RK11/05F/J

BASIC LOGIC TESTS
CZRKKF0

AH-9246F-MC

FICHE 1 OF 1

JUL 1978
digital
MADE IN USA

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IDENTIFICATION

PRODUCT CODE:	AC-9244F-MC
PRODUCT NAME:	CZRKKF0 RK11 BASIC LOGIC TEST 2
DATE CREATED:	JUNE 1978
MAINTAINER:	DIAGNOSTIC GROUP
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QUICK LOOK-UP OPERATING INSTRUCTIONS

FOR A QUICK REFERENCE, LOOK UP THE FOLLOWING SECTIONS:

1.0 ABSTRACT
2.0 REQUIREMENTS
4.1 LOADING AND OPERATOR ACTION
7.0 SWITCH OPTIONS

FOR A MORE COMPLETE EXPLANATION REFER TO THE TABLE OF CONTENTS BELOW AND THE FOLLOWING DOCUMENT.

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1.0 ABSTRACT

THE RK11 LOGIC TESTS CONSIST OF A SERIES OF TESTS AIMED AT CHECKING THE BASIC LOGIC OF THE RK11 CONTROLLER. THIS PROGRAM IS THE SECOND PART OF THE TWO-PART RK11 LOGIC TESTS. IT SHOULD BE NOTED THAT LOGIC TEST I AND LOGIC TEST II TOGETHER CONSTITUTE A COMPLETE PROGRAM AND BOTH OF THEM SHOULD BE RUN.

WHEN USED IN CONJUNCTION WITH A DRIVE IT IS CAPABLE OF DETECTING FAULTS IN THE DRIVE ALSO.

USED CORRECTLY THIS PROGRAM CAN BE AN EFFECTIVE ANALYTIC AND DIAGNOSTIC TOOL.

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 OR THE RK05 SIMULATOR
   (DRIVE TYPES MAY BE MIXED)

2.2 PRELIMINARY PROGRAMS

RK11 BASIC LOGIC TEST I (MD-11-DZRKJ)

2.3 EXECUTION TIME

ERROR FREE FIRST PASS ON PDP11/20 WITH CORE MEMORY TAKES APPROXIMATELY TWO MINUTES. CONSIDERABLY LESS FOR FASTER MACHINES OR MEMORIES.

3.0 STARTING ADDRESS

200 FOR ANY MODE OF OPERATION. NORMAL START UP WITH ALL SWITCHES DOWN.

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 .ABS 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 7.0) IF TESTING ON SIMULATOR PUT SW<10> UP.

PRESS START.

4.1.5 THE PROGRAM IDENTIFIES ITSELF (NAME,MAINDEC NO), THEN THE FOLLOWING QUESTION IS ASKED:

DRIVES TO BE TESTED?

THE USER SHOULD TYPE IN THE DRIVE NUMBERS THAT ARE IN 'RUN' AND TO BE TESTED. CARRIAGE RETURN SHOULD TERMINATE THE STRING. IF AN RK-05F IS TO BE TESTED, TYPE THE SUFFIX 'F' WITH THE FIRST DRIVE OF THE PAIR. FOR EXAMPLE, IF DRIVES 2 AND 3 ARE ON AN RK-05F, TYPE ONLY 2F.

EXMP: DRIVES TO BE TESTED? 0,1,2<CR>

THE DRIVES DO NOT HAVE TO BE IN LOGICAL ORDER.

EXMP: DRIVES TO BE TESTED? 2,4<CR>

IF ANY ONE DRIVE IS TO BE TESTED, TYPE IN THAT NUMBER. IT DOES NOT HAVE TO BE DRIVE 0.

THUS A NORMAL SEQUENCE WITH DRIVES 0,1 WOULD BE:

RK11 BASIC LOGIC TEST 2
MAINDEC-11-CZRKKF
DRIVES TO BE TESTED? 0,1<CR>

4.1.6 THERE IS A "RUBOUT" FEATURE WHICH ALLOWS RUBBING OUT ANY NUMBER OF CHARACTERS THAT WERE TYPED IN WRONG. THE RUBBED OUT CHARACTERS ARE ECHOED BACK WITHIN SLASHES.

" U" DELETES THE ENTIRE LINE

4.1.7 IF REPLY TO ANY OF THE ABOVE QUESTION IS IN A WRONG FORMAT (EX: 012<CR>;0,8<CR>; 0,A<CR>; M<CR> ETC), IT IS AUTOMATICALLY REJECTED, A "??" IS PRINTED OUT;

THE CORRECT ANSWER CAN NOW BE RETYPED AGAIN.

4.1.8 THE DRIVE NUMBER BEING TESTED OUT IS PRINTED:

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DRIVE N ;N=0,1...7
IF THE DRIVE IS AN RK-05F, AN F IS APPENDED
```

AT THE END OF A PASS THE FOLLOWING TYPE-OUT OCCURS

```
END PASS # X
```

WHERE X= PASS NUMBER (1,2,3---), CONTROL IS PASSED TO THE BEGINNING OF THE PROGRAM AND RE-EXECUTION BEGINS. NO QUESTIONS ARE TO BE ANSWERED AGAIN.

4.1.9 ERROR FREE PASSES OF THE PROGRAM APPEAR AS SHOWN BELOW.

```
RK11 BASIC LOGIC TEST 2
MAINDEC-11-CZRKKF
DRIVES TO BE TESTED?
0,1<CR>
DRIVE 0
DRIVE 1
END PASS # 1
 0
DRIVE 1
END PASS # 2
...
...
```

4.2 RKDP DUMP MODE

4.2.1 THE PROGRAM IS LOADED INTO THE MEMORY BY THE RKDP MONITOR

4.2.2 START AS NORMALLY USING SA 200

4.2.3 THE PROGRAM IDENTIFIES ITSELF (NAME,MAINDEC NO.). ON FINDING OUT THAT THE LOADING WAS BY RKDP (DUMP MODE), THE FOLLOWING MESSAGE APPEARS:

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

IF DRIVE 'N' IS TO BE TESTED, THE RKDP PACK ON THAT

DRIVE SHOULD BE REPLACED BY ANOTHER PACK, THE DRIVE SHOULD BE PUT ON 'WRT ENABL' (BECAUSE RKDP WRITE PROTECTS THE DRIVE).

IF DRIVE 'N' IS NOT TO BE CHECKED, THEN THE MESSAGE SHOULD BE IGNORED.

AFTER THIS, THE SEQUENCE OF QUESTIONING IS AS EXPLAINED IN SEC 4.1.5.

4.3 RKDP CHAIN MODE

THE PROGRAM IS CHAIN-LOADED FROM THE RKDP PACK ON DRIVE 'N'. AFTER THE PROGRAM IDENTIFIES ITSELF THE FOLLOWING PRINTOUT OCCURS.

'DRIVE 'N' NOT TESTED'

THERE IS NO OPERATOR INTERVENTION REQUIRED. THE PROGRAM FINDS OUT THE NUMBER OF DRIVES PRESENT.

4.4 ACT11 MODE

THE PROGRAM IS LOADED BY THE ACT11 MONITOR. ON STARTING, IDENTIFIES ITSELF, ASCERTAINS THE NUMBER OF DRIVES AND PROCEEDS WITH THE EXECUTION OF THE TESTS AS BEFORE.

5.0 DRIVE SELECTION

IF ANY PARTICULAR DRIVE IS TO BE SELECTED FOR TESTING, PUT THAT DRIVE ON 'RUN', 'WRITE ENABLE'; PUT REST OF THE DRIVES ON 'LOAD', 'WRITE LOCK' AND IN REPLY TO THE QUES- TIONVES TO BE TESTED?) TYPE IN THE DRIVE NUMBER FOLLOWED BY CR. SEE SEC 4.1.5.

6.0 DRIVE-LESS TEST

USE RK11 BASIC LOGIC TEST I, WHICH IS ACTUALLY THE FIRST PART OF THE TWO-PART RK11 BASIC LOGIC TESTS. SEE SEC 1.0, 2.2.

7.0 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	INHIBIT ITERATIONS
SW<10>=1	TESTING ON SIMULATOR
SW<09>=1	LOOP ON SPECIFIC ERROR
SW<08>=1	LOOP ON TEST AS PER SW<07:00>
SW<06>=1	DROP THE DRIVE AFTER MAXIMUM ALLOWABLE NUMBER OF ERRORS OCCUR

7.1 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.

7.2 SW<14>

THE PROGRAM LOOPS ON THE SUBTEST THAT IS BEING EXECUTED WHEN THE SWITCH IS PUT ON. THIS SWITCH IS USED NORMALLY ALONG SW 15. SEE SEC 8.0.

7.3 SW <13>

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

7.4 SW <12>

THIS SWITCH ALLOWS THE PORGRAM TO CYCLE FROM THE POINT OF ERROR TO THE PREVIOUS SCOPE STATEMENT. NOTE THAT IN DOING SO ANY INITIALIZATION BEING DONE AT THE BEGINING OF THE SUBTEST WILL BE DONE AGAIN AND AGAIN. SEE SEC 8.0 FOR DIFFERENT SCOPE LOOPS

AVAILABLE.

7.5 SW <11>

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

7.6 SW <10>

THIS SWITCH WHEN SET INDICATES THAT TESTING IS BEING DONE ON A SIMULATOR. THE SWITCH SHOULD BE PUT UP BEFORE START- ING THE PkOGRAM. NOTE THAT RK11C IS NOT COMPATIBLE WITH THE SIMULATOR.

7.7 SW <09>

THIS SWITCH PROVIDES THE TIGHTEST POSSIBLE SCOPE LOOP. NOTE THATKE 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

7.8 SW <08>

THIS SWITCH IS USED TO SELECT A PARTICULAR TEST (AS PER SW<00-07>) FOR EXECUTION AND SUBSEQUENT LOOPING. THUS IF TEST 15 IS TO BE SELECTED THE SWITCH SETTING WOULD BE 000415. IT SHOULD BE NOTED THAT BEFORE SELECTING TEST 15, ALL THE PREVIOUS TESTS (1-14) WILL BE EXECUTED.

7.9 SW<06>

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 5, AFTER 5 ERRRORS HAVE OCCURED DRIVE IS DROPPED AND A MESSAGE (DRIVE # XXX DROPPED) IS PRINTED.

8.0 SCOPE LOOPS

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                                                                J 1
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THERE ARE THREE KINDS OF SCOPE LOOPS AVAILABLE

1. SW14: LOOPING IS DONE FOR THE ENTIRE SUB-TEST

2. SW12: LOOPING IS DONE FROM THE POINT OF ERROR
BACK TO THE PREVIOUS 'SCOPE' STATEMENT.

3. SW09: PROVIDE THE TIGHTEST POSSIBLE SCOPE LOOP
SEE SEC. 7.7

EXAMPLE:

```
TST1:   SCOPE
        :



        INITIALIZATION
        :
   ERROR 1
        :
        ERROR 2
        :
        ERROR 3
        :
        ERROR 4
        :
        :
TST2:   SCOPE
```

THE SEQUENCE OF LOOPING FOR DIFFERENT CASES IS EXPLAINED BELOW. NOTE THAT 'TST1' AND 'TST2' ARE TAGS WHICH DEFINE THE BOUNDARY OF A TEST, (IN THIS CASE TEST 1). TEST 1 STARTS AT 'TST1' AND ENDS JUST BEFORE 'TST2'.

IN THE ILLUSTRATION BELOW --> INDICATES THE POINT FROM WHERE RETURN IS MADE AND LOOPING IS DONE.

1. ERROR 2 OCCURS, SW 14 SET.

TST1..ERROR 2..TST2-->TST1..ERROR 2..TST2-->TST1...

2. ERROR 2 OCCURS, SW 12 SET.

TST1...ERROR 2-->TST1...ERROR2-->TST1...

3. ERROR 2,3; SW 14 SET.

TST1..ERROR 2..ERROR 3..TST2-->TST1..ERROR 2..ERROR 3..TST2-->TST1...

4. ERROR 2,3; SW 12 SET.

TST1...ERROR 2-->TST1...ERROR 2-->TST1....

```
                NOTE THAT LOOPING IS DONE FROM THE VERY FIRST  ERROR
                ENCOUNTERED.   THE  MORE BASIC AND ERROR THE EARLIER
                IT OCCURS AND IS DETECTED AND SHOULD BE FIXED.

                IN THE ABOVE EXAMPLE NO  PART  OF  THE  SUB-TEST  IS
                BEING  REPEASING DIFFERENT PARAMETERS, HENCE IT
                SO HAPPENS  THAT  SW 9 AND 12 GIVE THE SAME KIND  OF
                LOOPS.   THE  EXAMPLE  BELOW  WILL  DEMONSTRATE  THE
                DIFFERENCE BETWEEN SW 9 AND 12.

                TST1:   SCOPE
                        :



                        INITIALIZATION
                        :
                        ERROR 1
                        :
                        MOV     #1$,$LPERR      ;'$LPERR'   CONTAINS
                                                ;THE ADDRESS TO LOOP
                                                ;BACK ON ERROR- SW 9
                1$:     :                       ----
                        :                       I
                        ER                  I   N REPETITIONS
                        :                       I
                TST2:   SCOPE                   ----

                1.   SW  12  SET,  ERROR  2   OCCURS   DURING   K.TH
                REPETITIONS


                TST1..1,2...K.ERROR 2-->TST1..1,2...K.ERROR 2-->TST1..

                2.  SW 9 SET, ERROR 2 OCCURS DURING K.TH REPETITION

                1$..K..ERROR 2-->1$..K..ERROR 2-->1$...


        9.0     PROGRAM STRUCTURE

                THERE ARE THREE DISTINCT PARTS OF THE PROGRAM.

                SET-UP PHASE
                DRIVE-DEPENDENT CONTROLLER TESTS

        9.1     SET-UP PHASE

                SETTING UP OF INITIAL POINTERS, VECTORS,  TABLES  IS
                DONE  IN THIS PART.  IN THIS SECTION THE DECISION IS
                MADE ABOUT THE PROGRAM MODE-PAPER TAPE,  RKDP  DUMP,
                CHAIN  OR  ACT11.   IF  IN  A  NON-INTERVENTION MODE
                (CHAIN, ACT11) NUMBER  OF  DRIVES  AND  THE  TYPE  OF
                CONTROLLER  IS FOUND OUT.  FLAGS ARE SET TO INDICATE
```

WHICH DRIVES ARE TO BE TESTED, ETC.

9.2 DRIVE DEPENDENT CONTROLLER TESTS

THIS SECTION FORMS A MAJOR PART OF THE PROGRAM WHEREIN MOST OF THE CONTROLLER IS CHECKED.

JUST BEFORE ENTERING THIS SECTION THE PROGRAM FINDS OUT WHICH DRIVE IS TO BE CHECKED. IF IN RKDP CHAIN MODE, DRIVE 'N' IF PRESENT, IS SKIPPED AND THE NEXT AVAILABLE DRIVE IS SELECTED.

THE DRIVE NUMBER BEING TESTED IS PRINTED OUT:

DRIVE N ;N=0,1,2...7

THE TESTING IS DONE IN A LOGICAL HIERCHY, SIMPLER THINGS FIRST, THEN MORE COMPLEX AND SO ON.

IN ONE OF THE TESTS THE ENTIRE DISK PACK IS FORMATTED, CHECKS ARE MADE FOR ERROR CONDITIONS. THE FIRST WORD OF EVERY SECTOR IS WRITTEN AS A PSUEDO-HEADER, REFLECTING THE ABSOLUTE ADDRESS OF THAT SECTOR (DRIVE #, CYLINDER #, SURFACE #, SECTOR #). EXAMPLE: THE PSUEDO-HEADER FOR SECTOR 5, SURFACE 0, CYLINDER 20, DRIVE 0 WOULD BE 001005.

IN THE NEXT TEST THE HEADERS FROM THE ENTIRE PACK ARE READ AND CHECKED FOR CORRECTNESS. IN A SUBSEQUENT TEST ALL THE PSUEDO-HEADERS ARE READ AND VERIFIED.

ALL THE FUNCTIONS ARE CHECKED OUT. 'SEEK' IS CHECKED IN THE THREE DIFFERENT VELOCITY MODES (HIGH, MEDIUM, LOW). VARIOUS ERRORS LIKE 'NXD', 'NXC', ETC. ARE SIMULATED AND CHECKED.

HARDWARE POGIC IS CHECKED USING ALL THE DRIVES THAT HAVE BEEN INDICATED.

AT THE END OF THIS SECTION, A CHECK IS MADE IF ALL INDICATED DRIVES HAVE BEEN TESTED. IF NOT, CONTROL IS TRANSFERRED TO THE BEGINNING OF THIS SECTION.

THUS ONE PASS OF THE PROGRAM INVOLVES DOING

1. SUBTEST #1 ONCE
2. DRIVE-DEPENDENT TESTS FOR ALL THE SELECTED DRIVES.

10.0 ERROR REPORTING

THE ERROR TABLE STARTING AT $ERRTB CONTAINS INFORMATION PERTAINING TO EVERY ERROR THAT CAN OCCUR. EACH ITEM IN THE TABLE CONSISTS OF FOUR

ENTRIES.

A. EM - THIS IS A POINTER TO THE ERROR MESSAGE TO BE TYPED OUT WHEN THE ERROR OCCURS.

B. DH - THIS IS A POINTER TO THE DATA HEADER TO BE TYPED OUT.

C. DT - THIS IS A POINTER TO THE DATA WHICH IS TO BE TYPED TYPED OUT UNDER THE HEADERS.

D. 0 - THIS IS A TERMINATOR SIGNIFYING THE END OF THE ITEM.

THE ERROR CALL IS AN EMT INSTRUCTION WITH ITS LOWER BYTE ENCODED TO INDICATE THE ERROR NUMBER. THUS OR 1" WOULD BE (EMT+1) IE 104001.

EVERY ERROR CORRESPONDS TO AN ITEM IN THE ERROR TABLE. THUS "ERROR 14" WOULD CORRESPOND TO ITEM 14. AS FAR AS POSSIBLE, THE ERROR MESSAGES HAVE BEEN KEPT SHORT, BUT CLARITY IS NOT SACRIFICED FOR BREVITY. INSPITE OF THIS, IF THE USER FINDS A NEED, HE CAN LOOK UP THE ENTIRE ERROR MESSAGE IN THE ERROR ITEMS TABLE FOUND IN THE BEGINNING OF THE LISTINGS. THUS FOR "ERROR 14", "ITEM 14" IN THE ITEM TABLE CAN BE LOOKED UP. WHEN THE ERROR INSTRUCTION IS EXECUTED A TRAP OCCURS TO THE ERROR HA LOCATED AT $ERROR WHICH PROCESSES THE ERROR CALL. SEE SEC 12.3

11.0 ERROR INTERPRETATION

WHENEVER AN ERROR MESSAGE IS PRINTED OUT, ALL REGISTERS AND OTHER DATA PERTAINING 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 ADVTO LOOK UP THE PC IN THE PROGRAM LISTING, WHERE HE WILL FIND MORE INFORMATION ABOUT THE ERROR. IN MANY INSTANCES, A SINGLE FAULT WILL GIVE RISE TO MORE THAN ONE ERROR REPORT. A LITTLE DELIBERATION AND CAREFUL EXAMINATION OF THE DATA GIVEN WILL BE CERTAINLY VERY HELPFUL IN PINPOINTING THE FAULT. A BRIEF EXPLANATION OF WHAT IS BEING CHECKED IN THE SUBTEST IS GIVEN AT THE BEGINNING OF EVERY SUBTEST. ALL THE NUMBERS GIVEN WITH ERROR MESSAGES ARE IN OCTAL.

12.0 HANDLERS AND COMMON ROUTINES

THE COMMOSED ROUTINES USED IN THE PROGRAM ARE CALLED IN TWO WAYS.

A. AS A SUBROUTINE THROUGH 'JSR' CALL

B. THROUGH A 'TRAP' HANDLER

12.1 TRAP HANDLER

MANY COMMONLY USED ROUTINES IN THE PROGRAM ARE CALLED USING THE TRAP INSTRUCTION AND THE 'TRAP' HANDLER. THE LOWER BYTE OF THE TRAP INSTRUCTION IS ENCODED DIFFERENTLY FOR DIFFERENCT ROUTINES. THE TRAP HANDLER IS LOCATED AT '$TRAP'. WHEN A CALL FOR A ROUTINE IS EXECUTED, A TRAP OCCURS TO THE HANDLER ARAP'. THE HANDLER PICKS UP THE LOWER BYTE OF THE "CALL INSTRUCTION" AND USES IT TO FORM THE STARTING ADDRESS OF THE ROUTINE TO GO TO FOR SERVICE.

12.2 SCOPE HANDLER

THE 'IOT' TRAP IS USED BY THE 'SCOPE' STATEMENT. WHEN 'SCOPE' IS EXECUTED, AN IOT TRAP OCCURS TO MEMORY LOCATION '$SCOPE'. THE SCOPE HANDLER STARTS AT $SCOPE. DEPENDING ON THE SWITCH SETTINGS THE HANDLER DECIDES TO LOOP ON TEXT, INHIBIT ITERATIONS ETC. THERE ARE CERTAIN POINTERS AND FLAGS WHICH ARE ADJUSTED. THUS, IT IS NOT ADVISABLE START THE PROGRAM AT ANY GIVEN LOCATION SINCE THE VARIOUS POINTERS AND FLAGS MAY NOT BE CORRECTLY ADJUSTED.

12.3 ERROR HANDLER

AN EMT TRAP INSTRUCTION IS USED BY THE ERROR CALL. THE LOWER BYTE IS ENCODED TO GIVE DIFFERENT ERROR CALLS. (EX: ERROR 1 = 104000+1; ERROR 16 = 104000+16). WHEN THE ERROR STATEMENT IS EXECUTED, A TRAP OCCURS TO MEMORY LOCATION '$ERROR'. THE ERROR HANDLER IS LOCATED AT '$ERROR'. THE HANDLER FORMS THE POINTER TO ERROR TABLE, WHICH IS USED IF AN ERROR MESSAGE IS TO BE TYPED OUEPENDING ON THE SWITCH SETTINGS, A DECISION ABOUT HALTING ON ERROR, INHIBITING TYPEOUT, LOOPING ON ERROR ETC. IS MADE. IF AN ERROR MESSAGE IS TO BE TYPED OUT AN EXIT IS MADE TO THE ERROR MESSAGE TYPEOUT ROUTINE LOCATED AT '$ERRTYP'.

12.4 CONTROL RESET ROUTINE

THE CALL FOR THIS ROUTINE IS "CNT.RESET" AND IS AN ENCODED 'TRAP' INSTRUCTION. WHEN "CNT.RESET" IS EXECUTED THE CONTROL RESET ROUTINE STARTING AT

"CN.RST" IS ENTERED. A CONTROL RESET IS ISSUED THE PROGRAM WAITS TILL THE CONTROL READY SETS, ON WHICH THE ROUTINE IS EXITED. IF CONTROL READY DOES NOT SET WITHIN A CERTAIN TIME AN ERROR IS REPORTED. THE PC TYPED OUT IS THE LOCATION WHERE THE "CNT.RESET" CALL IS LOCATED. THE WAITING TIME IS 2.8 MS FOR 11/20 AND 560 US FOR 11/45 WITH BIPOLAR MEMORY.

12.5 CONTROL READY ROUTINE

THIS ROUTINE IS CALLED BY "CNT.RDY" (AN ENCODED 'TRAP' INSTRUCTION) AND IS LOCATED AT "CN.RDY". THE ROUTINE WAITS FOR THE CONTROL READY TO SET AND WHEN IT DOES, EXITS IF CONTROL READY DOES NOT SET WITHIN A SPECIFIED TIME AN ERROR MESSAGE IS GIVEN

```
CNTRL RDY DIDN'T SET
PC = XXXXXX     RKCS = YYYYYY
```

THE PC IS THE LOCATION AT WHICH THE "CNT.RDY" CALL IS LOCATED. THE WAITING TIME IS 949 MS FOR 11/20 AND 189 MS FOR 11/45 WITH BIPOLAR MEMORY.

12.6 DRIVE RESET ROUTINE

THE DRIVE - RESET ROUTINE IS LOCATED AT "DRESET" AND IS CALLED BY A "JSR". IT ISSUES A DRIVE RESET AND WAITS FOR THE R/W/S RDY TO SET, ON WHICH THE ROUTINE IS EXITED. THE WAITING TIME IS 4959 MS FOR 11/20 AND 991 MS FOR 11/45 WITH BIPOLAR MEMORY.

12.7 TIME DELAY ROUTINE

THIS ROUTINE PROVIDES A VARIABLE TIME DELAY. THE CALL IS DELAY ,N WHERE N=1 TO 177777 (OCTAL) TIME DELAY PROVIDED= 7.5 TIMES(X) N MICRO SECS FOR 11/20, 1.5N US FOR 11/45 (N CONVERTED TO DECIMAL BEFORE COMPUTING DELAY) IF THE USER WANTS TO CHANGE THE DELAY AT ANY POINT IT CAN BE DONE BY SIMPLY CHANGING VARIABLE 'N'.

12.8 WAIT FOR INTERRUPT ROUTINE

THIS ROUTINE PROVIDES A VARIABLE TIME LIMIT DURING WHICH RK11 INTERRUPT MAY OCCUR. THE IS
WAT.INT .N N=1 TO 1777777 (OCTAL)
WAITING TIME=7.5 TIMES(X) N US FOR 11/20, 1.5N US

FOR 11/45 UPON ENTERING THE ROUTINE CPU PRIORITY IS DROPPED SO THAT RK11 CAN INTERRUPT.

C 2

12.9 OTHER ROUTINES

THERE ARE OTHER COMMONLY USED ROUTINES AS LISTED BELOW.

$TYPE:
TYPE ROUTINE FOR TYPING OUT ASCII STRINGS.
LOCATED AT "$TYPE"
CALLED BY "TYPE"

$TYPOC:
ROUTINE FOR TYPING OUT OCTAL NUMBERS.
LOCATED AT "$TYPOC"
CALLED BY "TYPOC"

$TYPDS:
ROUTINE FOR TYPING OUT DECIMAL NUMBERS.
LOCATED AT "$TYPDS"
CALLED BY "TYPDS"

$RDLIN:
ROUTINE FOR INPUTTING ASCII STRINGS FROM TTY.
LOCATED AT "$RDLIN"
CALLED BY "RDLIN"

$ERRTYP:
ROUTINE FOR TYPING OUT ERROR MESSAGES.
LOCATED AT $ERRTYP
CALLED BY "JSR $ERRTYP"

$PWRDN:
ROUTINE FOR HANDLING POWER FAILURE.
LOCATED AT $PWRDN
CALLED WHEN THERE IS A POWER FAILURE.

$PWRUP:
ROUTINE FOR HANDLING POWER UP AFTER A POWER FAIL.
LOCATE$PWRUP
CALLED WHEN POWER RETURNS AFTER HAVING GONE DOWN.

13.0 UNEXPECTED TIMEOUTS AND RK11 INTERRUPTS

WHEN AN UNEXPECTED TIMEOUT OCCURS, THE PC AT WHICH TIME OUT OCCURED 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 BEGINING. SW 9- LOOPING CAITY IS PROVIDED AS A TROUBLE SHOOTING AID.

14.0 QUICK VERIFYING MODE

THE FIRST PASS OF THE PROGRAM IS A QUICK VERIFYING MODE. ALL THE TESTS ARE DONE ONLY ONCE, ON SUBSEQUENT PASSES THE TESTS ARE ITERATED (NORMALLY 50 TIMES, 5 IN SOME CASES). THUS THE FIRST PASS TAKES A SHORTER TIME TO COMPLETE, WHEREAS SUBSEQUENT PASSES TAKE MORE TIME.

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                        .TITLE  MD-11-CZRKKF, RK11 BASIC LOGIC TEST 2
                        ;*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.
                        ;*
                        ;*PROGRAM REVISED BY TOM SAWYER, MARCH, 1976
                        ;*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' STATEMENT
                        ;*        11            INHIBIT ITERATIONS
                        ;*        10            TESTING ON SIMULATOR
                        ;*         9            LOOP ON ERROR
                        ;*         8            LOOP ON TEST IN SWR<7:0>
                        ;*         6            DROP THE DRIVE IF MORE THAN 5 ERRORS


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

                        ;YOU ARE ADVISED TO READ THE DOCUMENT BEFORE USING THIS PROGRAM.

                        ;ON GETTING AN ERROR REFER TO THE LISTINGS AT THE PC POINTED
```

```
                        ;OUT IN THE ERROR MESSAGE. ADJACENT ERROR MESSAGES IF FOLLOWED
                        ;CAREFULLY COULD LEAD TO AN EASY PINPOINTING OF THE FAULT

                        ;*****************************************************************
                        .SBTTL  BASIC DEFINITIONS

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

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

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
000003                  R3=     %3              ;;GENERAL REGISTER
000004                  R4=     %4              ;;GENERAL REGISTER
000005                  R5=     %5              ;;GENERAL REGISTER
000006                  R6=     %6              ;;GENERAL REGISTER
000007                  R7=     %7              ;;GENERAL REGISTER
000006                  SP=     %6              ;;STACK POINTER
000007                  PC=     %7              ;;PROGRAM COUNTER

                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0=    0               ;;PRIORITY LEVEL 0
000040                  PR1=    40              ;;PRIORITY LEVEL 1
000100                  PR2=    100             ;;PRIORITY LEVEL 2
000140                  PR3=    140             ;;PRIORITY LEVEL 3
000200                  PR4=    200             ;;PRIORITY LEVEL 4
000240                  PR5=    240             ;;PRIORITY LEVEL 5
000300                  PR6=    300             ;;PRIORITY LEVEL 6
000340                  PR7=    340             ;;PRIORITY LEVEL 7

                        ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
```

```
                        SW05=   40
                        SW04=   20
                        SW03=   10
                        SW02=   4
                        SW01=   2
                        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)
                        BIT15=  100000
                        BIT14=  40000
                        BIT13=  20000
                        BIT12=  10000
                        BIT11=  4000
                        BIT10=  2000
                        BIT09=  1000
                        BIT08=  400
                        BIT07=  200
                        BIT06=  100
                        BIT05=  40
                        BIT04=  20
                        BIT03=  10
                        BIT02=  4
                        BIT01=  2
                        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
```

```
1006            000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
1007            000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
1008                                    .SBTTL  TRAP CATCHER
1009
1010            000000                          .=0
1011                                    ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
1012                                    ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
1013                                    ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
1014            000174                          .=174
1015  000174    000000                DISPREG:  .WORD  0                ;;SOFTWARE DISPLAY REGISTER
1016  000176    000000                SWREG:    .WORD  0                ;;SOFTWARE SWITCH REGISTER
1017                                    .SBTTL  STARTING ADDRESS(ES)
1018  000200    000137  002636                JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
1019                                    .SBTTL  ACT11 HOOKS
1020
1021                                    ;;**********************************************************************
1022                                    ;HOOKS REQUIRED BY ACT11
1023            000204                          $SVPC=.                 ;SAVE PC
1024            000046                          .=46
1025  000046    020740                        $ENDAD                    ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
1026            000052                          .=52
1027  000052    000000                        .WORD   0                 ;;2)SET LOC.52 TO ZERO
1028            000204                          .=$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          $REG11: .WORD   0               ;;CONTAINS (($REGAD)+22)
001206  000000          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001210  000000          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001212     077          $QUES:  .ASCII  /?/             ;;QUESTION MARK
001213     015          $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001214  000012          $LF:    .ASCIZ  <12>            ;;LINE FEED
                        ;;**********************************************************************
001216  005015  051104  053111  MSG1:   .ASCIZ  <15><12>/DRIVE PRESNT/
```

```
 1085  001224  020105  051120  051505
 1086  001232  052116     000
 1087          001236                          .EVEN
 1088  001236  005015  047516  042516  MSG2:   .ASCIZ  <15><12>/NONE/
 1089  001244     000
 1090
 1091  001245     015  041412  052116  MSG3:   .ASCIZ  <15><12>/CNT RDY DIDN'T SET/
 1092  001252  051040  054504  042040
 1093  001260  042111  023516  020124
 1094  001266  042523  000124
 1095
 1096  001272  005015  051104  053111  MSG4:   .ASCIZ  <15><12>/DRIVE /
 1097  001300  020105     000
 1098
 1099  001303     015  040412  046114  MSG5:   .ASCII  <15><12>/ALL DRVS/
 1100  001310  042040  053122     123
 1101
 1102  001315     040  051104  050117  MSG6:   .ASCIZ  / DROPD/<15><12>
 1103  001322  006504  000012
 1104                                          .EVEN
 1105
 1106                                  ;RK11 REGISTERS
 1107                                  ;IF FOR ANY REASON THE REGISTER ADDRESSES ARE DIFFERENT FROM THESE
 1108                                  ;(GIVEN BELOW), THE CONTENTS OF THE APPROPRIATE POINTERS SHOULD BE
 1109                                  ;MODIFIED SO THAT THE CORRECT ADDRESS IS USED.
 1110                                  ;
 1111                                          .EVEN
 1112  001326  177400                  RKDS:   177400
 1113  001330  177402                  RKER:   177402
 1114  001332  177404                  RKCS:   177404
 1115  001334  177406                  RKWC:   177406
 1116  001336  177410                  RKBA:   177410
 1117  001340  177412                  RKDA:   177412
 1118  001342  177416                  RKDB:   177416
 1119
 1120
 1121                                  ;TAGS AND GENERAL DATA AREA
 1122                                  ;
 1123                                  ;
 1124
 1125  001344  000000                  SIMUL:  0               ;FLAG TO BE SET TO 1 WHEN ON SIMULATOR
 1126  001346  000000                  FTITLE: 0               ;FLAG FOR PRINTING PROGRAM TITLE
 1127  001350  000000                  DRIVAD: 0               ;CONTAINS ADDRESS OF THE DRIVE UNDER TEST
 1128  001352  000000                  DRVDON: 0               ;CONTAINS THE NUMBER OF DRIVES CHECKED.
 1129                                                          ;IT IS INCREMENTED EACH TIME THE TESTS FOR
 1130                                                          ;A DRIVE IS COMPLETED.
 1131  001354  000000                  DRVPTR: 0               ;CONTAINS THE POINTER TO THE DRIVE FLAG (DRIVE0
 1132                                                          ;-DRIVE7) OF THE DRIVE TO BE CHECKED NEXT.
 1133  001356  000000                  INDX1:  0               ;GENERAL INDEX FOR KEEPING COUNT
 1134  001360  000000                  INDX2:  0               ; GENERAL INDEX
 1135  001362  000000                  COUNT:  0               ;GENERAL COUNT REGISTER
 1136  001364  000000                  COUNT1: 0               ;COUNT REGISTER USED FOR 'DRESET' SUBROUTINE
 1137  001366  000000                  TIMER:  0               ;TIMER REGISTER
 1138  001370  000000                  EFLG1:  0               ;SET, TO INDICATE A PARTICULAR
 1139                                                          ;ERROR CONDITION
 1140
```

```
1141  001372  000100                SEEK0:  100             ;CONTAINS ADDRESS OF CYLINDER 2
1142  001374  001000                SEEK1:  1000            ;CONTAINS ADDRESS OF CYLINDER 20
1143  001376  014500                SEEK2:  14500           ;CONTAINS ADDRESS OF CYLINDER 312
1144  001400  000200                RKPRI:  200             ;CONTAINS THE CPU LEVEL AT WHICH
1145                                                        ;RK11 NORMALLY INTERRUPTS. THIS WORD
1146                                                        ;SHOULD BE CHANGED IF RK11 IS DESINGATED
1147                                                        ;A BR LEVEL OTHER THAN 5. E.G. IF IT IS CHANGED
1148                                                        ;TO 6, THIS WORD SHOULD BE CHANGED TO 240.
1149  001402  000220                RKVEC:  220             ;CONTAINS THE NORMAL VECTOR ADDRESS TO WHICH
1150                                                        ;RK11 INTERRUPTS. IF THIS IS NOT SO, CHANGE
1151                                                        ;THIS WORD TO CONTAIN MODIFIED VECTOR ADDRESS.
1152  001404  000000                FFLAG:  0
1153  001406  000000                ODDEVN: 0               ;USED TO DETERMINE WHICH OF RK-05F DRIVES ACTIVE
1154                                                        ;0 IF EVEN DRIVE
1155                                                        ;-1 IF ODD DRIVE
1156  001410  000000                DDPCH:  0               ;IF PROGRAM LOADED FROM RK05, CONTAINS
1157                                                        ;ADDRESS OF DRIVE WITH RKDP PACK
1158  001412  000000                DRIVS:  0               ;CONTAINS THE NUMBER OF DRIVES PRESENT
1159
1160
1161
1162
1163                                ;THE FLAGS BELOW (BIT 0) ARE SET TO 1 TO INDICATE THAT A PARTICULAR DRIVE
1164                                ;IS PRESENT AND IS TO BE TESTED. BIT 12, IF SET, INDICATES THAT THE DRIVE
1165                                ;WAS DROPPED AFTER MAXIMUM ALLOWABLE NUMBER OF ERRORS OCCURED ON THAT
1166                                ;DRIVE (SW 6 SET).
1167                                ;IF MORE THAN 5 ERRORS OCCUR IN THE HARDWARE POLLING TEST (LAST)
1168                                ;THEN ALL DRIVES ARE DROPPED. BUT BIT 12 IS NOT SET.
1169
1170  001414  000000                DRIV0:  0               ;FLAG SET TO 1 WHEN DRIVE 0 PRESENT
1171  001416  000000                DRIV1:  0               ;FOR DRIVE 1
1172  001420  000000                DRIV2:  0               ;FOR DRIVE 2
1173  001422  000000                DRIV3:  0               ;FOR DRIVE 3
1174  001424  000000                DRIV4:  0               ;FOR DRIVE 4
1175  001426  000000                DRIV5:  0               ;FOR DRIVE 5
1176  001430  000000                DRIV6:  0               ;FOR DRIVE 6
1177  001432  000000                DRIV7:  0               ;FOR DRIVE 7
1178
1179  001434  000000                T56FLG: 0
1180  001436  000000                PHYDRV: 0
1181  001440  000000                SIZYET: 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

001442                          $ERRTB:



                                ;THE ERROR ITEMS TABLE CONSISTS OF ALL THE POSSIBLE ERROR MESSAGES
                                ;USED IN THIS PROGRAM. AN ERROR CALL IN THE PROGRAM CORRESPONDS TO
                                ;THE ITEM NUMBER IN THE ERROR TABLE. THUS 'ERROR        1' IN THE
                                ;PROGRAM CORRESPONDS TO 'ITEM   1' IN THE ERROR TABLE.
                                ;'EM###' IS THE  POINTER TO THE ERROR MESSAGE WHICH WILL BE TYPED
                                ;OUT IN CASE THAT ERROR WERE TO OCCUR. THUS FOR 'ERROR  1' THE ERROR
                                ;MESSAGE TYPE OUT WILL BE 'TIME OUT ON RK11 REG'.
                                ;'DH###' IS THE POINTER TO THE HEADER BLOCK WHICH WILL BE TYPED OUT
                                ;IMMEDIATELY AFTER THE ERROR MESSAGE.
                                ;'DT###'  SERVES AS A POINTER TO THE MEMORY LOCATIONS WHERE
                                ;THE INFORMATION RELEVANT TO THE ERROR TYPE OUTS (LIKE PC, CONTENTS
                                ;OF RKCS ETC.) WILL BE PICKED UP FROM.
                                ;THE LAST ROW CONTAINING '0' SERVES AS A TERMINATOR.
                                ;EXAMPLE:
                                ;IF ON RUNNING THIS PROGRAM A TIMEOUT WERE TO OCCUR ON ADDRESSING RKDS
                                ;(177400), BECAUSE OF SOME FAULT, THE FOLOWING TYPEOUT WOULD
                                ;OCCUR ON THE TELETYPE.
                                ;
                                ;       TIME OUT ON RK11 REG
                                ;         PC       REG
                                ;       ######   177400
                                ;
                                ;NOTE THAT ###### WOULD BE THE ACTUAL PC WHERE 'ERROR   1' IS LOCATED.

                                ;THE ERROR HANDLER IS LOCATED AT '$ERROR'. THE ERROR CALL IS AN 'EMT'
                                ;INSTRUCTION WITH ITS LOWER BYTE ENCODED TO PROVIDE INDEXING TO THE
                                ;ITEMS IN THE ERROR TABLE.
                                ;THUS 'ERROR    1'   IS 104001
                                ;     'ERROR    103' IS 104126   ETC.



                                        ;ERROR ITEMS TABLE
```

```
                                ;ITEM   1
                                
001442  025402                        EM12    ;'SIN' IS SET
001444  032327                        DH44    ;PC     RKCS    RKER    RKDS    RKDA
001446  031742                        DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3
001450  000000                        0

                                ;ITEM   2

001452  027253                        EM70    ;CNTRL RDY DIDN'T SET ON READ/FMT FROM DISK ADDRESS
001454  032113                        DH14    ;PC     RKCS    RKER    RKWC
001456  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
001460  000000                        0

                                ;ITEM   3

001462  025427                        EM16    ;RKDA WRONG AFTER SSE
001464  032047                        DH4     ;PC     EXPCT   RECVD
001466  031732                        DT2     ;$ERRPC $REG0   $REG1
001470  000000                        0

                                ;ITEM   4

001472  025456                        EM21    ;RKDS ERROR
001474  032213                        DH34    ;PC     RKDS
001476  031724                        DT1     ;$ERRPC $REG0
001500  000000                        0

                                ;ITEM   5

001502  025470                        EM30    ;'DPL' BIT SET, CHECK DRIVE POWER
001504  032155                        DH30    ;PC     RKCS    RKER    RKDS
001506  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
001510  000000                        0

                                ;ITEM   6

001512  025500                        EM31    ;'DRU' BIT SET, CHECK DRIVE
001514  032155                        DH30    ;PC     RKCS    RKER    RKDS
001516  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
001520  000000                        0

                                ;ITEM   7

001522  025510                        EM32    ;'RK05' BIT NOT SET
001524  032213                        DH34    ;PC     RKDS
001526  031724                        DT1     ;$ERRPC $REG0
001530  000000                        0

                                ;ITEM   10

001532  025531                        EM33    ;'DRY' NOT SET
001534  032327                        DH44    ;PC     RKCS    RKER    RKDS    RKDA
001536  031742                        DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3
001540  000000                        0
```

```
                                ;ITEM   11

001542  025551                        EM34    ;'SOK' DID NOT SET
001544  032213                        DH34    ;PC     RKDS
001546  031724                        DT1     ;$ERRPC $REGO
001550  000000                        0

                                ;ITEM   12

001552  025570                        EM35    ;'SEC COUNTR' DIDN'T COUNT TO 0
001554  032231                        DH35    ;PC     SEC-CNTR
001556  031724                        DT1     ;$ERRPC $REGO
001560  000000                        0

                                ;ITEM   13

001562  025623                        EM36    ;'SEC COUNTR' DIDN'T INCREMENT
001564  032251                        DH36    ;PC     PRSNT-COUNT     NXT-COUNT
001566  031732                        DT2     ;$ERRPC $REGO           $REG1
001570  000000                        0

                                ;ITEM   14

001572  025653                        EM37    ;'SECTOR COUNTER' INCREMENTED WRONG
001574  032047                        DH4     ;PC     EXPCTD  RECVD
001576  031732                        DT2     ;$ERRPC $REGO   $REG1
001600  000000                        0

                                ;ITEM   15

001602  025707                        EM40    ;DIDN'T GET SC=SA FOR THIS SECTOR
001604  032301                        DH40    ;PC     SECTOR  RKDS
001606  031732                        DT2     ;$ERRPC $REGO   $REG1
001610  000000                        0

                                ;ITEM   16

001612  025747                        EM41    ;ERROR-'R/W/S RDY' SHOULD BE SET
001614  032213                        DH34    ;PC     RKDS
001616  031724                        DT1     ;$ERRPC $REGO
001620  000000                        0

                                ;ITEM   17

001622  025415                        EM13    ;RKBA ERROR
001624  032047                        DH4     ;PC     EXPCT   RECVD
001626  031732                        DT2     ;$ERRPC $REGO   $REG1
001630  000000                        0

                                ;ITEM   20

001632  026004                        EM43    ;UNEXPECTED RK11 INTERRUPT
001634  032150                        DH21    ;PC
001636  031756                        DT21    ;$ERRPC
001640  000000                        0
```

```
                                ;ITEM   21
                                
001642  026036                  EM44    ;'CNTRL RDY' DIDN'T SET AFTER SEEK OR DRIVE RESET
001644  032327                  DH44    ;PC     RKCS    RKER    RKDS    RKDA
001646  031742                  DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3.
001650  000000                  0
                                
                                ;ITEM   22
                                
001652  026112                  EM45    ;'ERR' OR 'HE' SET ON SEEK OR DRIVE RESET
001654  032327                  DH44    ;PC     RKCS    RKER    RKDS    RKDA
001656  031742                  DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3
001660  000000                  0
                                
                                ;ITEM   23
                                
001662  026160                  EM46    ;RKER BIT, ON SEEK OR DRIVE RESET
001664  032155                  DH30    ;PC     RKCS    RKER    RKDS
001666  031762                  DT26    ;$ERRPC $REG0   $REG1   $REG2
001670  000000                  0
                                
                                ;ITEM   24
                                
001672  026216                  EM47    ;RKCS CHANGED AFTER FUNCTION WAS DONE
001674  032047                  DH4     ;PC     EXPCT   RECVD
001676  031732                  DT2     ;$ERRPC $REG0   $REG1
001700  000000                  0
                                
                                ;ITEM   25
                                
001702  026260                  EM50    ;'R/W/S RDY' DID NOT CLEAR
001704  032155                  DH30    ;PC     RKCS    RKER    RKDS
001706  031762                  DT26    ;$ERRPC $REG0   $REG1   $REG2
001710  000000                  0
                                
                                ;ITEM   26
                                
001712  026307                  EM51    ;'R/W/S RDY' DIDN'T SET AFTER SEEK OR DRIVE RESET
001714  032327                  DH44    ;PC     RKCS    RKER    RKDS    RKDA
001716  031742                  DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3
001720  000000                  0
                                
                                ;ITEM   27
                                
001722  026362                  EM52    ;RKDA CHANGED AFTER SEEK
001724  032047                  DH4     ;PC     EXPCTD  REGVD
001726  031732                  DT2     ;$ERRPC $REG0   $REG1
001730  000000                  0
                                
                                ;ITEM   30
                                
001732  026407                  EM53    ;'CNTRL RDY' DIDN'T CLEAR AS GO WAS SET
001734  032155                  DH30    ;PC     RKCS    RKER    RKDS
001736  031762                  DT26    ;$ERRPC $REG0   $REG1   $REG2
001740  000000                  0
```

```
                                ;ITEM   31
                                
001742  026452                  EM54    ;'CNTRL RDY' DIDN'T SET ON DOING WRITE/FMT STARTING
                                        ;FROM <DSK-ADRES>
001744  032374                  DH54    ;PC     RKCS    RKER    RKDS    RKDA
                                        ;DRV#   CYL  <DSK-ADRES>         SUR     SECTR
001746  031774                  DT54    ;$ERRPC $REG0   $REG1   $REG2   $REG3
                                        ;$REG4  $REG5   $REG6   $REG>
001750  000000                  0

                                ;ITEM   32

001752  026544                  EM55    ;'HE' OR 'ERR'  ON WRITE/FMT STARTING FROM
                                        ;<DSK-ADRES>
001754  032374                  DH54    ;PC     RKCS    RKER    RKDS    RKDA
                                        ;DRV#   CYL  <DSK-ADRES>         SUR     SECTR
001756  031774                  DT54    ;$ERRPC $REG0   $REG1   $REG2   $REG3
                                        ;$REG4  $REG5   $REG6   $REG7
001760  000000                  0

                                ;ITEM   33

001762  026623                  EM56    ;RKDA INCREMENTED WRONG ON WRITE OR WRITE FORMAT
001764  032503                  DH56    ;PC     EXPCT:  DRV#    CYL     SUR     SECTR
                                        ;RECVD: DRV#    CYL     SUR     SECTR
001766  031774                  DT54    ;$ERRPC         $REG0   $REG1   $REG2   $REG3
                                        ;$REG4  $REG5   $REG6   $REG7
001770  000000                  0

                                ;ITEM   34

001772  026662                  EM57    ;RKWC DIDN'T OVERFLOW ON WRITE OR WRITE FORMAT
001774  032075                  DH5     ;PC     RECVD
001776  031724                  DT1     ;$ERRPC $REG0
002000  000000                  0

                                ;ITEM   35

002002  026720                  EM60    ;RKBA INCREMENTED WRONG ON WRITE OR WRITE FORMAT
002004  032047                  DH4     ;PC     EXPCT   RECVD
002006  031732                  DT2     ;$ERRPC $REG0   $REG1
002010  000000                  0

                                ;ITEM   36

002012  026757                  EM61    ;RKER SET, ON WRITE/READ/FORMAT
002014  032155                  DH30    ;PC     RKCS    RKER    RKDS
002016  031762                  DT26    ;$ERRPC $REG0   $REG1   $REG2
002020  000000                  0

                                ;ITEM   37

002022  027014                  EM62    ;RKDB ERROR
002024  032047                  DH4     ;PC     EXPCT   RECVD
002026  031732                  DT2     ;$ERRPC $REG0   $REG1
002030  000000                  0
```

```
1462
1463                                    ;ITEM   40
1464
1465  002032  027026                            EM63    ;RKDA INCREMENTED WRONG ON READ OR READ FORMAT
1466  002034  032503                            DH56    ;PC     EXPCT:  DRV#    CYL     SUR     SECTR
1467                                                    ;RECVD: DRV#    CYL     SUR     SECTR
1468  002036  031774                            DT54    ;$ERRPC         $REG0   $REG1   $REG2   $REG3
1469                                                    ;$REG4  $REG5   $REG6   $REG7
1470  002040  000000                            0
1471
1472                                    ;ITEM   41
1473
1474  002042  027072                            EM64    ;RKWC DID NOT OVERFLOW ON READ OR READ FORMAT
1475  002044  032610                            DH64    ;PC     RKWC    RKDA
1476  002046  031732                            DT2     ;$ERRPC $REG0   $REG1
1477  002050  000000                            0
1478
1479                                    ;ITEM   42
1480
1481  002052  027135                            EM65    ;RKBA INCREMENTED WRONG ON READ OR READ FORMAT
1482  002054  032047                            DH4     ;PC     EXPCT   RECVD
1483  002056  031732                            DT2     ;$ERRPC $REG0   $REG1
1484  002060  000000                            0
1485
1486                                    ;ITEM   43
1487
1488  002062  027201                            EM66    ;INCORRECT HEADER FROM 'SECTOR'
1489  002064  032634                            DH66    ;PC     SECTR   EXPCT   RECVD
1490  002066  031762                            DT26    ;$ERRPC $REG0   $REG1   $REG2.
1491  002070  000000                            0
1492
1493                                    ;ITEM   44
1494
1495  002072  027240                            EM67    ;DATA ERROR
1496  002074  032672                            DH67    ;PC     EXPCT   RECVD   DSK-ADRES
1497  002076  031762                            DT26    ;$ERRPC $REG0   $REG1   $REG2
1498  002100  000000                            0
1499
1500                                    ;ITEM   45
1501
1502  002102  027253                            EM70    ;'CNTRL RDY' DIDN'T SET ON DOING READ/FMT STARTING
1503                                                    ; FROM <DSK-ADRES>
1504  002104  032374                            DH54    ;PC     RKCS    RKER    RKDS    RKDA
1505                                                    ;DRV#   CYL     <DSK-ADRES>     SUR     SECTR
1506  002106  031774                            DT54    ;$ERRPC $REG0   $REG1   $REG2   $REG3
1507                                                    ;$REG4  $REG5   $REG6   $REG7
1508  002110  000000                            0
1509
1510                                    ;ITEM   46
1511
1512  002112  027344                            EM71    ;'HE' OR 'ERR' BIT SET ON READ/FMT STARTING
1513                                                    ; FROM <DSK-ADRES>
1514  002114  032374                            DH54    ;PC     RKCS    RKER    RKDS    RKDA
1515                                                    ;DRV#   CYL     <DSK-ADRES>     SUR     SECTR
1516  002116  031774                            DT54    ;$ERRPC $REG0   $REG1   $REG2   $REG3
1517                                                    ;$REG4  $REG5   $REG6   $REG7
```

```
1518  002120  000000                        0
1519
1520                                ;ITEM   47
1521
1522  002122  027422                        EM72    ;WRONG DRIVE ID IN RKDS AFTER SEEK
1523  002124  032047                        DH4     ;PC     EXPCT   RECVD
1524  002126  031732                        DT2     ;$ERRPC $REG0   $REG1
1525  002130  000000                        0
1526
1527                                ;ITEM   50
1528
1529  002132  027464                        EM73    ;HARDWARE POLL, DRIVE ID BITS(13-15) SHOULD BE CLEAR
1530  002134  032213                        DH34    ;PC     RKDS
1531  002136  031732                        DT2     ;$ERRPC $REG0
1532  002140  000000                        0
1533
1534                                ;ITEM   51
1535
1536  002142  027536                        EM74    ;HARDWARE POLL, INTERRUPTING DRIVE # NOT PRESENT
1537  002144  032732                        DH74    ;PC     DRIVE #
1538  002146  031724                        DT1     ;$ERRPC $REG0
1539  002150  000000                        0
1540
1541                                ;ITEM   52
1542
1543  002152  027606                        EM75    ;'DRIVE #' DID NOT INTERRUPT DURING HARDWARE POLL
1544  002154  032732                        DH74    ;PC     DRIVE #
1545  002156  031724                        DT1     ;$ERRPC $REG0
1546  002160  000000                        0
1547
1548                                ;ITEM   53
1549
1550  002162  027656                        EM76    ;SCP DID NOT SET AFTER WAS DONE
1551  002164  033106                        DH117   ;PC     RKCS
1552  002166  031724                        DT1     ;$ERRPC $REG0
1553  002170  000000                        0
1554
1555                                ;ITEM   54
1556
1557  002172  027721                        EM77    ;RKDA CHANGED AFTER 'DRIVE RESET'
1558  002174  032047                        DH4     ;PC     EXPCT   RECVD
1559  002176  031732                        DT2     ;$ERRPC $REG0   $REG1
1560  002200  000000                        0
1561
1562                                ;ITEM   55
1563
1564  002202  027756                        EM100   ;DATA ERROR AT WORD#
1565  002204  032753                        DH100   ;PC     WORD#   EXPCT   RECVD
1566  002206  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
1567  002210  000000                        0
1568
1569                                ;ITEM   56
1570
1571  002212  030001                        EM101   ;CNTRL RDY DID NOT SET AFTER READ CHECK
1572  002214  032327                        DH44    ;PC     RKCS    RKER    RKDS    RKDA
1573  002216  031742                        DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3
```

```
 1574  002220  000000                        0
 1575
 1576                                ;ITEM   57
 1577
 1578  002222  030043                        EM102   ;'ERR' OF 'HE' SET ON READ CHECK
 1579  002224  032155                        DH30    ;PC     RKCS    RKER    RKDS
 1580  002226  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
 1581  002230  000000                        0
 1582
 1583                                ;ITEM   60
 1584
 1585  002232  030067                        EM103   ;'CSE' ON READ CHECK
 1586  002234  033010                        DH103   ;PC     RKER
 1587  002236  031724                        DT1     ;$ERRPC $REG0
 1588  002240  000000                        0
 1589
 1590                                ;ITEM   61
 1591
 1592  002242  030105                        EM104   ;RKWC DID NOT OVERFLOW ON READ CHECK OR WRITE CHECK
 1593  002244  033024                        DH104   ;PC     RECVD   RKCS
 1594  002246  031732                        DT2     ;$ERRPC $REG0   $REG1
 1595  002250  000000                        0
 1596
 1597                                ;ITEM   62
 1598
 1599  002252  030156                        EM105   ;RKDA INCREMENTED WRONG ON READ CHECK
 1600  002254  032047                        DH4     ;PC     EXPCT   RECVD
 1601  002256  031732                        DT2     ;$ERRPC $REG0   $REG1
 1602  002260  000000                        0
 1603
 1604                                ;ITEM   63
 1605
 1606  002262  030214                        EM106   ;RKBA CHANGED AFTER READ CHECK
 1607  002264  032047                        DH4     ;PC     EXPCT   RECVD
 1608  002266  031732                        DT2     ;$ERRPC $REG0   $REG1
 1609  002270  000000                        0
 1610
 1611                                ;ITEM   64
 1612
 1613  002272  030245                        EM107   ;MEMORY WORD CHANGED AFTER READ CHECK
 1614  002274  033050                        DH107   ;PC     LOC     EXPCT   RECVD
 1615  002276  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
 1616  002300  000000                        0
 1617
 1618                                ;ITEM   65
 1619
 1620  002302  030306                        EM110   ;CNTRL RDY DID NOT SET AFTER WRITE CHECK
 1621  002304  032327                        DH44    ;PC     RKCS    RKER    RKDS    RKDA
 1622  002306  031742                        DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3
 1623  002310  000000                        0
 1624
 1625                                ;ITEM   66
 1626
 1627  002312  030351                        EM111   ;HE OR ERR BIT SET AFTER DOING WRITE CHECK
 1628  002314  032155                        DH30    ;PC     RKCS    RKER    RKDS
 1629  002316  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
```

```
1630  002320  000000                    0
1631
1632                                ;ITEM   67
1633
1634  002322  030376                    EM112   ;WRITE CHECK ERROR
1635  002324  032155                    DH30    ;PC     RKCS    RKER    RKDS
1636  002326  031762                    DT26    ;$ERRPC $REG0   $REG1   $REG2
1637  002330  000000                    0
1638
1639                                ;ITEM   70
1640
1641  002332  030417                    EM113   ;RKDA INCREMENTED WRONG ON WRITE CHECK
1642  002334  032047                    DH4     ;PC     EXPCT   RECVD
1643  002336  031732                    DT2     ;$ERRPC $REG0   $REG1
1644  002340  000000                    0
1645
1646                                ;ITEM   71
1647
1648  002342  030456                    EM114   ;RKBA INCREMENTED WRONG ON WRITE CHECK
1649  002344  032047                    DH4     ;PC     EXPCT   RECVD
1650  002346  031732                    DT2     ;$ERRPC $REG0   $REG1
1651  002350  000000                    0
1652
1653                                ;ITEM   72
1654
1655  002352  030515                    EM115   ;RKBA INCREMENTED WITH IBA SET
1656  002354  032047                    DH4     ;PC     EXPCT   RECVD
1657  002356  031732                    DT2     ;$ERRPC $REG0   $REG1
1658  002360  000000                    0
1659
1660                                ;ITEM   73
1661
1662  002362  030551                    EM116   ;WRONG MEMORY LOCATION CHANGED WITH IBA SET
1663  002364  032753                    DH100   ;PC     WORD#   EXPCT   RECVD
1664  002366  031762                    DT26    ;$ERRPC $REG0   $REG1   $REG2
1665  002370  000000                    0
1666
1667                                ;ITEM   74
1668
1669  002372  030624                    EM117   ;RK11 DID NOT INTERRUPT WHEN IDE WAS SET
1670  002374  033106                    DH117   ;PC     RKCS
1671  002376  031724                    DT1     ;$ERRPC $REG0
1672  002400  000000                    0
1673
1674                                ;ITEM   75
1675
1676  002402  030671                    EM120   ;RK11 DID NOT INTERRUPT AFTER SEEK WAS INITIATED
1677  002404  033106                    DH117   ;PC     RKCS
1678  002406  031724                    DT1     ;$ERRPC $REG0
1679  002410  000000                    0
1680
1681                                ;ITEM   76
1682
1683  002412  030744                    EM121   ;SCP SET BEFORE SEEK COMPLETED
1684  002414  033106                    DH117   ;PC     RKCS
1685  002416  031724                    DT1     ;$ERRPC $REG0
```

```
 1686  002420  000000                        0
 1687
 1688                                ;ITEM   77
 1689
 1690  002422  031002                        EM122   ;RK11 DID NOT INTERRUPT AFTER SEEK COMPLETED
 1691  002424  032155                        DH30    ;PC     RKCS    RKER    RKDS
 1692  002426  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
 1693  002430  000000                        0
 1694
 1695                                ;ITEM   100
 1696
 1697  002432  031051                        EM123   ;CNTRL RESET DID NOT CLEAR 'SCP' BIT
 1698  002434  033106                        DH117   ;PC     RKCS
 1699  002436  031724                        DT1     ;$ERRPC $REG0
 1700  002440  000000                        0
 1701
 1702                                ;ITEM   101
 1703
 1704  002442  031110                        EM124   ;RK11 DID NOT INTERRUPT AFTER READ WAS DONE
 1705  002444  033106                        DH117   ;PC     RKCS
 1706  002446  031724                        DT1     ;$ERRPC $REG0
 1707  002450  000000                        0
 1708
 1709                                ;ITEM   102
 1710
 1711  002452  031152                        EM125   ;CNTRL RESET DID NOT CLEAR REGISTER
 1712  002454  032020                        DH2     ;PC     REGADD  RECVD
 1713  002456  031732                        DT2     ;$ERRPC $REG0   $REG1
 1714  002460  000000                        0
 1715
 1716                                ;ITEM   103
 1717
 1718  002462  031211                        EM126   ;RK11 DID NOT INTERRUPT AT CPU LEVEL
 1719  002464  033122                        DH126   ;PC     LEVEL   RKCS
 1720  002466  031732                        DT2     ;$ERRPC $REG0   $REG1
 1721  002470  000000                        0
 1722
 1723                                ;ITEM   104
 1724
 1725  002472  031252                        EM127   ;RK11 INTERRUPTED AT WRONG CPU LEVEL
 1726  002474  033122                        DH126   ;PC     LEVEL   RKCS
 1727  002476  031732                        DT2     ;$ERRPC $REG0   $REG1
 1728  002500  000000                        0
 1729
 1730                                ;ITEM   105
 1731
 1732  002502  031314                        EM130   ;'ERR BIT' DID NOT SET IN RKER
 1733  002504  033150                        DH130   ;PC     RKCS    RKER    ERR BIT
 1734  002506  031762                        DT26    ;$ERRPC $REG0   $REG1   $REG2
 1735  002510  000000                        0
 1736
 1737
 1738                                ;ITEM   106
 1739
 1740  002512  031351                        EM131   ;HE OR ERR DID NOT SET
 1741  002514  033207                        DH131   ;PC     RKCS    RKER
```

```
1742  002516  031732                    DT2     ;$ERRPC $REG0   $REG1
1743  002520  000000                    0
1744
1745                              ;ITEM   107
1746
1747  002522  031376                    EM132   ;RKER ERROR
1748  002524  032047                    DH4     ;PC     EXPCT   RECVD
1749  002526  031732                    DT2     ;$ERRPC $REG0   $REG1
1750  002530  000000                    0
1751
1752                              ;ITEM   110
1753
1754  002532  031410                    EM133   ;NXC BIT DID NOT SET
1755  002534  033235                    DH133   ;PC     RKCS    RKER    RKDA
1756  002536  031762                    DT26    ;PC     $REG0   $REG1   $REG2
1757  002540  000000                    0
1758
1759                              ;ITEM   111
1760
1761  002542  031433                    EM134   ;RK11 DIDN'T INTERRUPT ON SOFT ERROR
1762  002544  033207                    DH131   ;PC     RKCS    RKER
1763  002546  031732                    DT2     ;$ERRPC $REG0   $REG1
1764  002550  000000                    0
1765
1766                              ;ITEM   112
1767
1768  002552  031474                    EM135   ;MEX BITS INCREMENTED WRONG IN RKCS
1769  002554  032047                    DH4     ;PC     EXPCTD  RECVD
1770  002556  031732                    DT2     ;$ERRPC $REG0   $REG1
1771  002560  000000                    0
1772
1773                              ;ITEM   113
1774
1775  002562  030306                    EM110   ;CNTRL RDY DID NOT SET AFTER WRT CHK
1776  002564  032113                    DH14    ;PC     RKCS    RKER    RKWC
1777  002566  031762                    DT26    ;$ERRPC $REG0   $REG1   $REG2
1778  002570  000000                    0
1779
1780                              ;ITEM   114
1781
1782  002572  031531                    EM137   ;'WPS' NOT CLEAR
1783  002574  032327                    DH44    ;PC     RKCS    RKER    RKDS    RKDA
1784  002576  031742                    DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3
1785  002600  000000                    0
1786
1787                              ;ITEM   115
1788
1789  002602  031547                    EM140   ;DATA ERROR ON TRANSFER FROM DISK TO TTY
1790  002604  033273                    DH140   ;PC     EXPCT   RECVD   RKBA    RKCS
1791  002606  031742                    DT20    ;$ERRPC $REG0   $REG1   $REG2   $REG3
1792  002610  000000                    0
1793
1794
1795                              ;ITEM   116
1796
1797  002612  031616                    EM141   ;'DRIVE #' PRESENT, BUT NOT SPECIFIED
```

```
1798  002614  032732                          DH74    ;PC     DRIVE #
1799  002616  031724                          DT1     ;$ERRPC $REG0
1800  002620  000000                          0
1801
1802                                  ;ITEM   117
1803
1804  002622  025370                          EM11    ;RKWC ERROR
1805  002624  032047                          DH4     ;PC     EXPCT   RECVD
1806  002626  031732                          DT2     ;$ERRPC $REG0   $REG1
1807  002630  000000                          0
1808                                  ;ITEM   120
1809  002632  031662                          EM142
1810  002634  000000                          0
1811
1812
1813
```

```
1814  002636  000005                  START:  RESET                   ;CLEAR THE BUS
1815                                  ;;GIVE DRIVES TIME TO LOAD HEADS IN CASE OF AN APT START.
1816  002640  023737  000042  000046          CMP     @#42,@#46       ;ARE WE IN ACT11 AUTOMATIC MODE?
1817  002646  001016                        BNE     STARTA          ;NO, SKIP DELAY
1818  002650  005077  176464                CLR     @RKDA           ;SELECT UNIT 0
1819  002654  012700  000250                MOV     #250,R0         ;WAIT FOR..
1820  002660  032777  000200  176440  20$:   BIT     #200,@RKDS      ;DRIVE READY..
1821  002666  001006                        BNE     STARTA          ;IN CASE..
1822  002670  005001                        CLR     R1              ;OF APT..
1823  002672  005301                        DEC     R1              ;START, BUT..
1824  002674  001376                        BNE     .-2             ;DON'T WAIT..
1825  002676  005300                        DEC     R0              ;FOREVER.
1826  002700  001367                        BNE     20$
1827  002702  000000                        HALT                    ;RKDS BIT 7 (DRIVE READY) NEVER SET
1828  002704                          STARTA:
1829                                  .SBTTL  INITIALIZE THE COMMON TAGS
1830                                  ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
1831  002704  012706  001100                MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
1832  002710  005026                        CLR     (R6)+           ;;CLEAR MEMORY LOCATION
1833  002712  022706  001140                CMP     #SWR,R6 ;;DONE?
1834  002716  001374                        BNE     .-6             ;;LOOP BACK IF NO
1835  002720  012706  001100                MOV     #STACK,SP       ;;SETUP THE STACK POINTER
1836                                  ;;INITIALIZE A FEW VECTORS
1837  002724  012737  022140  000020        MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
1838  002732  012737  000340  000022        MOV     #340,@#IOTVEC+2 ;;LEVEL 7
1839  002740  012737  022412  000030        MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
1840  002746  012737  000340  000032        MOV     #340,@#EMTVEC+2 ;;LEVEL 7
1841  002754  012737  024676  000034        MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
1842  002762  012737  000340  000036        MOV     #340,@#TRAPVEC+2;LEVEL 7
1843  002770  012737  024776  000024        MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
1844  002776  012737  000340  000026        MOV     #340,@#PWRVEC+2 ;;LEVEL 7
1845  003004  005037  001206                CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
1846  003010  005037  001210                CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
1847  003014  112737  000001  001115        MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
1848  003022  012737  003022  001106        MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
1849  003030  012737  003030  001110        MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
1850                                  ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
1851                                  ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
1852  003036  013746  000004                MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
1853  003042  012737  003076  000004        MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
1854  003050  012737  177570  001140        MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
1855  003056  012737  177570  001142        MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
1856  003064  022777  177777  176046        CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
1857  003072  001012                        BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
1858                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
1859  003074  000403                        BR      65$             ;;BRANCH IF NO TIMEOUT
1860  003076  012716  003104          64$:   MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
1861  003102  000002                        RTI
1862  003104  012737  000176  001140  65$:   MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
1863  003112  012737  000174  001142        MOV     #DISPREG,DISPLAY
1864  003120  012637  000004          66$:   MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
1865
1866  003124  023737  000042  000046        CMP     @#42,@#46       ;ARE WE IN ACT11 AUTOMATIC MODE?
1867  003132  001416                        BEQ     69$             ;YES, SKIP TITLE
1868                                  .SBTTL  TYPE PROGRAM NAME
1869                                  ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
```

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 1870  003134  005227  177777            INC     #-1             ;;FIRST TIME?
 1871  003140  001043                    BNE     67$             ;;BRANCH IF NO
 1872  003142  104401  003200            TYPE    ,68$            ;;TYPE ASCIZ STRING
 1873                          .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
 1874  003146  005737  000042            TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
 1875  003152  001006                    BNE     69$             ;;BRANCH IF YES
 1876  003154  023727  001140  000176    CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
 1877  003162  001005                    BNE     70$             ;;BRANCH IF NO
 1878  003164  104406                    GTSWR                   ;;GET SOFT-SWR SETTINGS
 1879  003166  000403                    BR      70$
 1880  003170  112737  000001  001134  69$:     MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
 1881  003176                          70$:
 1882  003176  000424                    BR      67$             ;;GET OVER THE ASCIZ
 1883                          ;;68$:    .ASCIZ  <CRLF>/RK11 LOGIC TEST 2/<15><12>/MAINDEC-11-CZRKKF/<CRLF>
 1884  003250                          67$:
 1885  003250  012700  001410            MOV     #DDPCH,R0
 1886  003254  012701  177764            MOV     #-14,R1
 1887  003260  005020                  1$:     CLR     (R0)+
 1888  003262  005201                    INC     R1
 1889  003264  001375                    BNE     1$
 1890  003266  005227  177777            INC     #-1             ;FIRST START ?
 1891  003272  001020                    BNE     START1          ;BR IF NOT
 1892  003274  013746  000004            MOV     ERRVEC,-(SP)    ;SAVE ERROR VECTOR ADDRESS
 1893  003300  012737  003314  000004    MOV     #2$,ERRVEC      ;NEW VECTOR ADDRESS
 1894  003306  005737  177776            TST     PS              ;SEE IF PROGRAM CAN REFERENCE THE
 1895                                                          ;PROCESSOR STATUS WORD
 1896  003312  000406                    BR      3$              ;BR IF REFERENCE DIDN'T CAUSE TRAP
 1897  003314  012737  000140  001400  2$:     MOV     #140,RKPRI      ;SETUP INTERRUPTING PRIORITY TO VALUE
 1898                                                          ;WHICH WILL ALLOW INTERRUPT ON AN LSI-11
 1899  003322  012716  003330            MOV     #3$,(SP)        ;SETUP RETURN ADDRESS
 1900  003326  000002                    RTI                     ;RETURN
 1901  003330  012637  000004          3$:     MOV     (SP)+,ERRVEC    ;RESTORE THE ERROR VECTOR
 1902                                    ;
 1903                                  ;FIND OUT IF ACT11, 'XXDP' CHAIN OR DUMP MODE
 1904                                  ;
 1905  003334  012700  001410          START1: MOV     #DDPCH,R0
 1906  003340  012701  177766            MOV     #-12,R1         ;CLEAR OUT DRIVE TABLE AREA
 1907  003344  005020                  1$:     CLR     (R0)+
 1908  003346  005201                    INC     R1
 1909  003350  001375                    BNE     1$
 1910  003352  122737  000002  000041    CMPB    #2,41           ;LOADED FROM AN RK05 ?
 1911  003360  001166                    BNE     ST2             ;BR IF NOT
 1912  003362  013737  000040  001410    MOV     40,DDPCH        ;GET DEVICE INDICATOR AND DRIVE ADDRESS OF
 1913                                                          ;LOADING RK05
 1914  003370  122737  000010  001410    CMPB    #10,DDPCH       ;VALID DRIVE NUMBER IN BYTE 40 ?
 1915  003376  101002                    BHI     2$              ;BR IF YES
 1916  003400  105037  001410            CLRB    DDPCH           ;MUST BE DRIVE ZERO WHICH LOADED
 1917                                                          ;THIS PROGRAM
 1918  003404  005737  000042          2$:     TST     42              ;CHAIN MODE OR ACT11 AUTO ACCEPT ?
 1919  003410  001432                    BEQ     4$              ;BR IF NEITHER
 1920  003412  005737  001410            TST     DDPCH           ;RUNNING FROM AN RK05 ?
 1921  003416  001002                    BNE     3$              ;BR IF YES
 1922  003420  000137  004262            JMP     ST3             ;FIND OUT NUMBER OF DRIVES
 1923  003424                          3$:
 1924  003424  104401  003432            TYPE    ,65$            ;;TYPE ASCIZ STRING
 1925  003430  000413                    BR      64$             ;;GET OVER THE ASCIZ
```

```
1926                                    ;;65$:  .ASCIZ  <15><12>/NOT TESTING DRIVE /
1927  003460                            64$:
1928  003460  005046                            CLR     -(SP)           ;CLEAR WORD ON STACK
1929  003462  113716  001410                    MOVB    DDPCH,(SP)      ;GET DRIVE ADDRESS
1930  003466  104403                            TYPOS                   ;TYPE THE ADDRESS
1931  003470     001                            .BYTE   1               ;ONLY 1 CHARACTER
1932  003471     000                            .BYTE   0               ;SUPRESS LEADING ZEROS
1933  003472  000137  004262                    JMP     ST3             ;GET NUMBER OF DRIVES
1934  003476  005227  177777            4$:     INC     #-1             ;FIRST TIME THROUGH HERE ?
1935  003502  001115                            BNE     ST2             ;BR IF NOT
1936  003504  104401  003512                    TYPE    ,67$            ;;TYPE ASCIZ STRING
1937  003510  000411                            BR      66$             ;;GET OVER THE ASCIZ
1938                                    ;;67$:  .ASCIZ  <15><12>/TO TEST DRIVE /
1939  003534                            66$:
1940  003534  005046                            CLR     -(SP)           ;CLEAR WORD ON THE STACK
1941  003536  113716  001410                    MOVB    DDPCH,(SP)      ;GET DRIVE ADDRESS
1942  003542  104403                            TYPOS                   ;TYPE THE DRIVE ADDRESS
1943  003544     001                            .BYTE   1               ;ONLY 1 CHARACTER
1944  003545     000                            .BYTE   0               ;SUPRESS LEADING ZEROS
1945  003546  104401  003554                    TYPE    ,69$            ;;TYPE ASCIZ STRING
1946  003552  000431                            BR      68$             ;;GET OVER THE ASCIZ
1947                                    ;;69$:  .ASCIZ  / HALT PROGRAM, REMOVE RKDP PACK AND REPLACE IT/<15><12>
1948  003636                            68$:
1949  003636  104401  003644                    TYPE    ,71$            ;;TYPE ASCIZ STRING
1950  003642  000435                            BR      70$             ;;GET OVER THE ASCIZ
1951                                    ;;71$:  .ASCIZ  /WITH A WORK PACK, CLEAR LOCATION 40, AND RESTART PROGRAM/
1952  003736                            70$:
1953
1954                                    ;FIND OUT FROM USER WHICH DRIVES (LOGICAL ADDRESSES) ARE TO BE
1955                                    ;TESTED (DRIVES TO BE TESTED ?). IN REPLY THE USER SHOULD TYPE IN THE
1956                                    ;LOGICAL ADDRESSES SEPERATED BY COMMAS. THUS IF 2 DRIVES 0,1 ARE PRESENT:
1957                                    ;       'DRIVS TO B TSTD?'
1958                                    ;       '0,1<CR>'       A CAR. RET. SHOULD BE TYPED TO TERMINATE THE LIST.
1959  003736  012700  001412            ST2:    MOV     #DRIVS,R0
1960  003742  012701  177765                    MOV     #-13,R1
1961  003746  005020                    13$:    CLR     (R0)+
1962  003750  005201                            INC     R1
1963  003752  001375                            BNE     13$
1964  003754  104401  003762                    TYPE    ,65$            ;;TYPE ASCIZ STRING
1965  003760  000415                            BR      64$             ;;GET OVER THE ASCIZ
1966                                    ;;65$:  .ASCIZ  <15><12>/DRIVES TO BE TESTED ?/<15><12>
1967  004014                            64$:
1968  004014  104411                            RDLIN
1969  004016  012600                            MOV     (SP)+,R0        ;GET STARTING ADRES OF ASCII STRING
1970  004020  012701  177770                    MOV     #-10,R1         ;SET UP COUNT
1971  004024  112002                    1$:     MOVB    (R0)+,R2        ;GET ASCII CHARACTER
1972  004026  042702  177400                    BIC     #177400,R2      ;MASK UNWANTED BITS
1973  004032  012703  001414                    MOV     #DRIV0,R3
1974  004036  012704  177770                    MOV     #-10,R4
1975  004042  012705  000060                    MOV     #60,R5
1976  004046  020502                    2$:     CMP     R5,R2           ;WAS THE TYPED IN CHARACTER
1977                                                                    ;A NUMBER BETWEEN 0-7?
1978  004050  001414                            BEQ     3$              ;YES, BRANCH
1979  004052  005205                            INC     R5              ;NO, INCREMENT
1980  004054  005723                            TST     (R3)+           ;INCREMENT POINTER TO DRV FLAG
1981  004056  005204                            INC     R4              ;CHARACTER THAT WAS INPUT
```

```
1982  004060  001372                        BNE     2$              ;SHOULD BE 0-7, IF ANY OTHER
1983                                                                  ;TYPE ?? & AGAIN ASK FOR
1984                                                                  ;DRIVS TO BE TSTD?
1985  004062  005702                        TST     R2              ;IS IT A TERMINATOR?
1986  004064  001461                        BEQ     6$              ;YES, EXIT. NO DRIVES INDICATED.
1987  004066                          4$:
1988  004066  104401  004074                TYPE    ,67$            ;;TYPE ASCIZ STRING
1989  004072  000402                        BR      66$             ;;GET OVER THE ASCIZ
1990                                  ;;67$:  .ASCIZ  /??/
1991  004100                          66$:
1992  004100  000716                        BR      ST2             ;GO, AGAIN ASK QUESTION
1993  004102  005713                  3$:   TST     @R3     ;SEE IF ALL READY SELECTED
1994  004104  001370                        BNE     4$      ;ERROR IF SELECTED  ALL READY
1995  004106  005213                        INC     @R3             ;SET UP FLAG FOR THE DRIVE
1996  004110  005237  001412                INC     DRIVS           ;INCREMENT TOTAL NO OF DRIVES PRESENT
1997  004114  111002                  11$:  MOVB    @R0,R2          ;GET NEXT CHAR
1998  004116  042702  177400                BIC     #177400,R2      ;CHARACTER ONLY
1999  004122  022702  000106                CMP     #'F,R2          ;IS IT F?
2000  004126  001026                        BNE     8$              ;NO, GO ON
2001  004130  052713  100000                BIS     #BIT15,@R3      ;SET BIT 15 TO SHOW RK05F
2002  004134  032705  000001                BIT     #BIT0,R5        ;EVEN DRIVE?
2003  004140  001407                        BEQ     9$              ;EVEN DRIVE SO BRANCH
2004  004142  005763  177776                TST     -2(R3)          ;CHECK EVEN DRIVE
2005  004146  001347                        BNE     4$              ;EVEN ALL READY SELECTED
2006  004150  012763  100001  177776        MOV     #BIT15!BIT0,-2(R3)      ;SELECT EVEN DRIVE
2007  004156  000406                        BR      10$             ;CONTINUE
2008  004160  005763  000002          9$:   TST     2(R3)           ;CHECK ODD DRIVE
2009  004164  001340                        BNE     4$              ;ERROR IF SELECTED BEFORE
2010  004166  012763  100001  000002        MOV     #BIT15!BIT0,2(R3)       ;SELECT ODD DRIVE
2011  004174  005237  001412          10$:  INC     DRIVS           ;COUNT DRIVES SELECTED
2012  004200  105720                        TSTB    (R0)+           ;POINT TO NEXT CHAR
2013  004202  000744                        BR      11$             ;CHECK FOR COMMA
2014  004204  022702  000054          8$:   CMP     #54,R2          ;IS IT A 'COMMA'?
2015  004210  001403                        BEQ     5$              ;YES, GO PROCESS NXT WORD
2016  004212  005702                        TST     R2              ;NO, IS IT A TERMINATOR?
2017  004214  001324                        BNE     4$              ;IF NOT, SOMETHING WRONG
2018                                                                  ;GO ASK QUESTION AGAIN
2019  004216  000404                        BR      6$              ;EXIT, IF A TERMINATOR
2020  004220  105720                  5$:   TSTB    (R0)+           ;INCREMENT PTR TO NXT BYTE
2021                                                                  ;IN INPUT BUFFER
2022  004222  005201                        INC     R1              ;THERE SHOULD BE NO MORE THAN
2023  004224  001277                        BNE     1$              ;8 DRIVES, HENCE IF MORE
2024  004226  000717                        BR      4$              ;THAN 8 DIFFERENT NOS. TYPED IN, ERROR!
2025                                                                  ;GO AGAIN ASK THE QUESTION
2026
2027  004230  005037  001440          6$:   CLR     SIZYET          ;NO SIZING NEEDED
2028  004234  032777  002000  174676        BIT     #SW10,@SWR      ;TESTING ON SIMULATOR?
2029  004242  001003                        BNE     7$              ;YES, BRANCH
2030  004244  005037  001344                CLR     SIMUL           ;NO, CLR FLAG
2031  004250  000502                        BR      ST4
2032
2033  004252  012737  000001  001344  7$:   MOV     #1,SIMUL        ;SET FLAG TO INDICATE SIMULATOR
2034  004260  000476                        BR      ST4
2035
2036
2037
```

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                                        ;CHECK NUMBER OF DRIVES
004262  012737  177777  001440  ST3:    MOV     #-1,SIZYET      ;CHECK FOR RK05F LATER
004270  012737  004442  000004          MOV     #5$,@#4         ;SET UP ADRES FOR TIME-OUT VECTOR
004276  005777  175024                  TST     @RKDS           ;REFERENCE RKDS
004302  005777  175032                  TST     @RKDA           ;REFERENCE RKDA
004306  012737  004534  000004          MOV     #BADTMO,@#4
004314  104401                          TYPE
004316  001216                          MSG1
004320  012700  177770                  MOV     #-10,R0         ;INITIALIZE COUNT FOR THE 8 DRIVES
004324  005037  001412                  CLR     DRIVS           ;INITIALIZE # OF DRIVES PRESENT TO 0
004330  005001                          CLR     R1              ;INITIALIZE ADDRESS TO DRIVE 0
004332  005004                          CLR     R4
004334  012702  001414                  MOV     #DRIV0,R2
004340  010177  174774          1$:     MOV     R1,@RKDA        ;ADDRESS THE DRIVE
004344  020177  174770                  CMP     R1,@RKDA        ;CHECK, WAS IT ADDRESSED?
004350  001405                          BEQ     3$              ;YES
004352  012703  004356                  MOV     #2$,R3
004356  004737  021026          2$:     JSR     PC,TYERM        ;WHILE CHECKING NUMBER OF DRIVE
                                                                ;UNDER NON-MANUAL MODE :-
                                                                ;RKDA HAD TO BE ADRESED BUT
                                                                ;IT WAS FOUND THAT THE DRIVE NO
                                                                ;THAT WAS WRITTEN COULD NOT BE READ BACK
                                                                ;CORRECTLY.
004362  000413                          BR      4$
004364  032777  000200  174734  3$:     BIT     #200,@RKDS      ;CHECK IF 'DRY' BIT IS SET, IF SET DRIVE IS
                                                                ;PRESENT
004372  001407                          BEQ     4$              ;
004374  104401                          TYPE
004376  001213                          $CRLF
004400  005237  001412                  INC     DRIVS           ;IF PRESENT, INCREMENT # OF DRIVES
004404  005212                          INC     (R2)            ;SET UP FLAG INDICATING THIS DRIVE PRESENT
004406  010446                          MOV     R4,-(SP)
004410  104402                          TYPOC
004412  005722          4$:     TST     (R2)+           ;SHIFT POINTER TO NXT DRIVE INDICATOR
004414  062701  020000                  ADD     #20000,R1       ;SET UP ADDRESS FOR THE NEXT DRIVE
004420  005204                          INC     R4              ;HAVE U CHECKED FOR ALL 8 DRIVES
004422  005200                          INC     R0
004424  001345                          BNE     1$
004426  005737  001412                  TST     DRIVS
004432  001011                          BNE     ST4
004434  104401                          TYPE
004436  001236                          MSG2
004440  000406                          BR      ST4             ;GO CHECK THE DRIVE INDEPENDENT
                                                                ;CONTROLLER LOGIC
004442  011603          5$:     MOV     (SP),R3         ;GET PC WHERE TIMEOUT OCCURED
004444  022626                  CMP     (SP)+,(SP)+     ;RESTORE STACK
004446  062703  177776                  ADD     #-2,R3
004452  004737  021026                  JSR     PC,TYERM        ;GO TYPE ERROR MESSAGE
                                                                ;WHILE CHECKING FOR THE NUMBER OF
                                                                ;DRIVES IN NON-MANUAL MODE:-
                                                                ;RKDS AND RKDA HAD TO BE REFERENCED, TIMEOUT
                                                                ;OCCURED ON REFERENCING.PC IN THE ERROR
                                                                ;MESSAGE INDICATES WHERE THE TIMEOUT OCCURED.
                                        ;
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2094
2095
2096  004456  005037  001434          ST4:    CLR     T56FLG
2097  004462  005737  001412                  TST     DRIVS
2098  004466  001004                          BNE     1$
2099  004470  004737  021742                  JSR     PC,WATIME
2100  004474  000137  020652                  JMP     $EOP
2101  004500  012737  001414  001354  1$:     MOV     #DRIV0,DRVPTR
2102  004506  005037  001352                  CLR     DRVDON          ;INITIALIZE THE NO. OF DRIVES
2103                                                                  ;THAT HAVE BEEN CHECKED
2104  004512  005037  001350                  CLR     DRIVAD          ;INITIALIZE DRIVE ADDRESS TO
2105                                                                  ;THE FIRST DRIVE
2106  004516  012737  004534  000004          MOV     #BADTMO,@#4     ;SET TIME OUT VECTOR FOR UNEXPECTED
2107                                                                  ;TIME OUTS
2108  004524  012777  004600  174650          MOV     #BADINT,@RKVEC  ;SET UP RK11 INTERRUPT VECTOR FOR
2109                                                                  ;UNEXPECTED INTERRUPTS FROM RK11
2110  004532  000465                          BR      TST1            ;GO TO TEST 1
2111
2112
2113
2114
2115                                          ;THIS ROUTINE HANDLES UNEXPECTED TIME OUTS
2116
2117  004534  011600          BADTMO: MOV     (SP),R0 ;SAVE PC WHERE TIME OUT OCCURED
2118  004536  005740                  TST     -(R0)
2119  004540  022626                  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
2120  004542  104401  004550          TYPE    ,65$            ;;TYPE ASCIZ STRING
2121  004546  000407                  BR      64$             ;;GET OVER THE ASCIZ
2122                          ;;65$:  .ASCIZ  <15><12>/TIMOUT,PC=/
2123  004566                  64$:
2124  004566  010046                  MOV     R0,-(SP)        ;SET UP FOR TYPING OUT PC
2125  004570  104402                  TYPOC                   ;GO TYPE OUT OCTAL PC
2126  004572  000000                  HALT
2127  004574  000137  002636          JMP     @#START
2128
2129
2130
2131                                          ;THIS ROUTINE HANDLES UNEXPECTED INTERRUPTS FROM RK11
2132                                          ;SW 9 AND 10 FOR LOOPING ON ERROR
2133                                          ;AND LOOPING ON TEST IN WHICH TIMEOUT
2134                                          ;OCCURRED, ARE PROVIDED.
2135
2136  004600  011600          BADINT: MOV     (SP),R0         ;SAVE PC WHERE INTERRUPT OCCURED
2137  004602  005740                  TST     -(R0)
2138  004604  032777  020000  174326          BIT     #20000,@SWR     ;INHIBIT ERROR TYPEOUT?
2139  004612  001014                          BNE     1$              ;YES, DON'T TYPE OUT
2140  004614  104401                          TYPE
2141  004616  001213                          $CRLF
2142  004620  104401                          TYPE
2143  004622  026004                          EM43                    ;TYPE 'UNEXPEXTED RK11 INTERRUPT'
2144                                                                  ;TYPE ' AT PC='
2145  004624  104401  004632                  TYPE    ,65$            ;;TYPE ASCIZ STRING
2146  004630  000403                          BR      64$             ;;GET OVER THE ASCIZ
2147                          ;;65$:  .ASCIZ  /,PC=/
2148  004640                  64$:
2149  004640  010046                  MOV     R0,-(SP)        ;SET UP FOR TYPING OUT PC
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2150  004642  104402                        TYPOC                   ;GO TYPE OCTAL PC WHERE BAD
2151                                                                  ;INTERUPT OCCURED
2152  004644  032777  001000  174266  1$:   BIT     #1000,@SWR        ;LOOP ON ERROR?
2153  004652  001403                        BEQ     2$                ;NO, BRANCH
2154  004654  022626                        CMP     (SP)+,(SP)+       ;YES, REPOSITION STACK
2155  004656  000177  174224                JMP     @$LPADR           ;GO TO THE STARTING ADDRESS OF
2156                                                                  ;THE TEST THAT GAVE UNEXPECTED INTERRUPT
2157  004662  032777  040000  174250  2$:   BIT     #40000,@SWR       ;LOOP ON TEST?
2158  004670  001401                        BEQ     3$                ;NO, BRANCH
2159  004672  000002                        RTI                       ;YES, LOOP. GO BACK WHER U INTERRUPTED FROM.
2160  004674  000000                3$:     HALT                      ;UNEXPECTED INTERRUPT OCCURED AS
2161                                                                  ;INDICATED IN THE TYPE OUT.U CAN LOOP
2162                                                                  ;ON ERROR, TEST,OR INHIBIT TYPEOUT BY
2163                                                                  ;SETTING APPROPRIATE SWITCHES.
2164  004676  000137  002636                JMP     @#START           ;GO BACK TO THE START OF THE
2165                                                                  ;PROGRAM. THUS PRESSING CONTINUE
2166                                                                  ;AFTER THE ABOVE HALT WILL
2167                                                                  ;RESTART THE PROGRAM
2168
2169
2170
2171                                ;RESTART AFTER POWER FAIL
2172                                ;THE PROGRAM WOULD RESTART HERE IF POWER CAME BACK AFTER A FALIURE.
2173
2174  004702  004737  021742        PFSTRT: JSR     PC,WATIME         ;KILL TIME
2175
2176
2177
2178                                ;;*****************************************************************
2179                                ;*TEST 1        CHECK THAT THE DRIVES THAT ARE NOT SPECIFIED ARE NOT FOUND TO BE PRESENT
2180                                        ;*THIS TEST CHECKS THAT THE DRIVES THAT ARE NOT SPECIFIED
2181                                        ;*(IN RESPONSE TO "DRIVS TO BE TSTD?") ARE NOT FOUND TO BE PRESENT.
2182                                        ;*EVERY DRIVE  FROM 0 TO 7 IS ADDRESSED. IF A PARTICULAR DRIVE
2183                                        ;*GIVES 'DRY' (IN RKDS), IT IS CHECKED THAT  THIS DRIVE
2184                                        ;*WAS SPECIFIED BY THE USER, IF IT WAS NOT AN ERROR IS
2185                                        ;*REPORTED, GIVING THE DRIVE NUMBER. IT IS LIKELY THAT THE USER
2186                                        ;*MAY HAVE FORGOTTEN TO PUT THE DRIVE (THAT IS NOT SPECIFIED) ON
2187                                        ;*'LOAD'. IF THIS IS THE CASE THEN PUT THIS DRIVE ON 'LOAD'.
2188                                        ;*IF THIS IS NOT THE CASE, THERE IS A GENUINE ERROR. (TWO DIFFERENT
2189                                        ;*DRIVE ADDRESSES MAY BE RESULTING IN THE SELECTION OF THE SAME
2190                                        ;*PHYSICAL DRIVE.)
2191                                ;;*****************************************************************
2192  004706  000004                TST1:   SCOPE
2193
2194  004710  012700  001414                MOV     #DRIV0,R0         ;INITIALIZE POINTER
2195  004714  005001                        CLR     R1                ;INITIALIZE DRIVE ADRES 0
2196  004716  005002                        CLR     R2                ;INITIALIZE DRIVE # 0
2197  004720  005737  001410        1$:     TST     DDPCH             ;LOADED FROM AN RK05 ?
2198  004724  001403                        BEQ     2$                ;B IF NOT
2199  004726  120237  001410                CMPB    R2,DDPCH          ;LOADED FROM THIS DRIVE ?
2200  004732  001435                        BEQ     4$                ;BR IF YES
2201  004734  010177  174400        2$:     MOV     R1,@RKDA          ;ADRES THE DRIVE
2202  004740  105777  174362                TSTB    @RKDS             ;DRIVE READY?
2203  004744  100005                        BPL     3$                ;NO, THIS DRIVE NOT PRESENT
2204                                                                  ;YES, THIS DRIVE SELECTED
2205  004746  005710                        TST     @R0               ;WAS THIS DRIVE SPECIFIED BY
```

```
                                                                ;THE USER?
004750  001026                          BNE     4$              ;YES, OK
                                                                ;NO, THIS DRIVE # WAS NOT SPECIFIED
                                                                ;BY THE USER, BUT STILL IS GIVING
                                                                ;'DRY' WHEN ADRESED. REPORT EROR.
004752  010237  001162                  MOV     R2,$REG0        ;GET DRIVE #
004756  104116                          ERROR   116             ;THIS DRIVE # WAS NOT SPECIFIED BY
                                                                ;THE USER, BUT WHEN ADRESED GAVE
                                                                ;'DRY'. CHECK THAT THIS DRIVE # IF
                                                                ;PHYSICALLY PRESENT IS ON 'LOAD'. IF
                                                                ;THIS IS NOT THE CASE, THEN ONE DRIVE
                                                                ;MAY BE GETTING SELECTED BY TWO DIFFERENT
                                                                ;LOGICAL ADDRESSES.
004760  005710                  3$:     TST     @R0             ;CHECK THAT THIS DRIVE WAS NOT INDICATED
004762  001421                          BEQ     4$              ;IF IT WAS, & IT IS NOT FOUND TO BE
                                                                ;PRESENT (DRY CLEAR), REPORT ERROR.
004764  004737  020774                  JSR     PC,GT4RG        ;GET RKCS, ER, DS, DA
004770  104010                          ERROR   10              ;DRIVE # (AS IN RKDA) WAS INDICATED BY
                                                                ;THE USER, BUT WAS NOT FOUND TO BE PRESENT.
                                                                ;CHECK THAT THE  ROTARY DRIVE SELECTION
                                                                ;SWITCH ON THE MODULE IS SET TO THE RIGHT
                                                                ;DRIVE #.
004772  005010                          CLR     @R0             ;THIS DRIVE IS NOT FOUND TO BE PRESENT
                                                                ;HENCE DROP IT FROM THE SELECTION TABLE.
004774  010003                          MOV     R0,R3           ;DRIVE ADDR
004776  162703  001414                  SUB     #DRIV0,R3       ;MINUS OFFSET FOR TABLE
005002  042703  000003                  BIC     #3,R3           ;EVEN DRIVE OF PAIR
005006  062703  001414                  ADD     #DRIV0,R3       ;POINT TO EVEN OF PAIR IF RK05 F
005012  042723  100000                  BIC     #100000,(R3)+   ;NOT SPECIFIED AS F MODEL
005016  042713  100000                  BIC     #100000,(R3)    ;SAME
005022  005337  001412                  DEC     DRIVS           ;DECREMENT DRIVE COUNT
005026  005202                  4$:     INC     R2              ;INCRMNT DRIVE #
005030  005720                          TST     (R0)+           ;INCRMNT POINTER
005032  062701  020000                  ADD     #20000,R1       ;INCRMNT ADRES TO NXT DRIVE
005036  001330                          BNE     1$              ;LUP BAK IF NOT DONE


                                                                ;THIS PART OF THE PROGRAM IS GOING TO BE REPEATED FOR
                                                                ;EACH DRIVE PRESENT
                                                                ;
                                                                ;'DRIVAD' CONTAINS IN BITS 15,14,13 THE ADDRESS OF THE
                                                                ;DRIVE BEING CURRENTLY CHECKED.
                                                                ;
005040                          NUDRV:


                                                ;;**************************************************************************
                                                ;*TEST 2         FIND OUT NEXT DRIVE TO BE CHECKED
                                                ;THIS CODE FINDS OUT THE NEXT DRIVE THAT IS PRESENT AND THEN  SETS UP
                                                ;THE ADDDRESS IN DRIVAD (BITS 13,14,15). THUS THROUGHOUT THE FOLLOWING TESTS
                                                ;THE DRIVE TESTED IS THE DRIVE WHOOSE ADDRESS IS IN 'DRIVAD'.
                                                ;;**************************************************************************
005040  000004                  TST2:   SCOPE
005042  012737  000001  001206          MOV     #1,$TIMES       ;;DO 1 ITERATION
005050  012737  000002  001102          MOV     #2,$TSTNM       ;RESET POINTER TO THIS TEST
```

```
                                                        ;NO. CHANGE THIS (2) IN CASE THE
                                                        ;TEST NO. CHANGES
005056  005037  001112          CLR     $ERTTL        ;CLEAR TOTAL ERROR COUNT
005062  005737  001412          TST     DRIVS         ;R THERE ANY DRIVES PRESENT?
005066  001002                  BNE     .+6           ;YES, BRANCH
005070  000137  020652    4$:   JMP     $EOP          ;NO, JMP TO THE END
005074  013701  001354          MOV     DRVPTR,R1     ;GET THAT POINTER TO THE NEXT
                                                        ;DRIVE FLAG
005100  032721  000001    2$:   BIT     #BIT0,(R1)+   ;IS THIS DRIVE PRESENT?
005104  001005                  BNE     1$            ;YES
005106  062737  020000  001350 6$:   ADD     #20000,DRIVAD ;FORM NXT DRIVE ADRES
005114  001371                  BNE     2$
005116  000764                  BR      4$
005120  005737  001410    1$:   TST     DDPCH         ;PROGRAM LOADED FROM AN RK05 ?
005124  001413                  BEQ     3$            ;NO, BRANCH
005126  013746  001350          MOV     DRIVAD,-(SP)  ;PUT TEST DRIVE ADDRESS ON THE STACK
005132  000316                  SWAB    (SP)          ;SETUP TO RIGHT JUSTIFY THE ADDRESS
005134  006216                  ASR     (SP)          ;RIGHT JUSTIFY THE ADDRESS
005136  006216                  ASR     (SP)          ;RIGHT JUSTIFY THE ADDRESS
005140  006216                  ASR     (SP)          ;RIGHT JUSTIFY THE ADDRESS
005142  006216                  ASR     (SP)          ;RIGHT JUSTIFY THE ADDRESS
005144  006216                  ASR     (SP)          ;RIGHT JUSTIFY THE ADDRESS
005146  122637  001410          CMPB    (SP)+,DDPCH   ;PROGRAM LOADED FROM THIS DRIVE ?
005152  001755                  BEQ     6$            ;BR IF YES, DON'T TEST THE DRIVE
005154  010137  001354    3$:   MOV     R1,DRVPTR     ;STORE POINTER TO THE NEXT
                                                        ;DRIVE FLAG
005160  104401  001272          TYPE    ,MSG4
005164  013746  001350          MOV     DRIVAD,-(R6)  ;GET THE DRIVE ADDRESS
005170  004737  021200          JSR     PC,SHFTRT     ;GO SHIFT IT TO THE RIGHT
005174  005037  001404          CLR     FFLAG
005200  011600                  MOV     (R6),R0       ;DRIVE NUMBER
005202  104403                  TYPOS                 ;GO TYPE THE OCTAL # FOR THE
                                                        ;DRIVE THAT IS BEING CHECKED
005204     001     000          .BYTE   1,0
005206  006300                  ASL     R0            ;INDEX TO TABLE
005210  005760  001414          TST     DRIV0(R0)     ;SEE IF F
005214  100006                  BPL     5$            ;NO
005216  104401  005224          TYPE    ,65$          ;;TYPE ASCIZ STRING
005222  000401                  BR      64$           ;;GET OVER THE ASCIZ
                          ;;65$:  .ASCIZ  /F/
005226                    64$:
005226  005237  001404          INC     FFLAG         ;SET F FLAG
005232  104401              5$: TYPE
005234  001213                  $CRLF                 ;TYPE CR, LF
                          ;;*****************************************************************
                          ;*TEST 3        CHECK THAT DRIVE IS SUPPLIED WITH POWER-DPL BIT
                          ;;*****************************************************************
005236  000004            TST3: SCOPE
005240  104413                  CNT.RESET             ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
```

```
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
005242  013700  001326          MOV     RKDS,R0
005246  013777  001350  174064  MOV     DRIVAD,@RKDA    ;ADDRESS THE DRIVE UNDER TEST
005254  005710                  TST     @R0             ;CHECK IF ANY BIT OF RKDS IS SET?
005256  001003                  BNE     1$              ;IF SET, BRANCH
005260  011037  001162          MOV     @R0,$REG0       ;GET RKDS
005264  104004                  ERROR   4               ;RKDS ERROR! RKDS IF ADDRESSED
                                                        ;CORRECTLY SHOULD BE NON-ZERO
005266  012777  000015  174036  1$:     MOV     #15,@RKCS       ;ISSUE A DRV RESET, IF DRVE
                                                        ;POWER IS LO, DPL WILL SET
005274  005001                  CLR     R1
005276  032710  010000          2$:     BIT     #10000,@R0      ;IS 'DPL' BIT SET?
005302  001003                  BNE     3$              ;DPL IS SET, BRANCH
005304  005201                  INC     R1              ;WAIT FOR SOME TIME TO
005306  001373                  BNE     2$              ;SEE IF DPL WOULD SET
005310  000403                  BR      4$-2            ;OK, DPL NOT SET
005312  004737  021002          3$:     JSR     PC,GT3RG        ;GO, GET RKCS, ER, DS
005316  104005                  ERROR   5               ;DPL BIT OF RKDS IS SET, CHECK DRIVE POWER

G05320  005001                  CLR     R1
005322  032710  000100          4$:     BIT     #100,@R0        ;DID R/W/S RDY BIT SET?
005326  001010                  BNE     TST4            ;;YES, EXIT
005330  104417  000011          DELAY   ,11             ;TIME DELAY
005334  005201                  INC     R1              ;WAIT FOR R/W/S RDY
005336  001371                  BNE     4$
005340  017737  173762  001162  MOV     @RKDS,$REG0     ;GET RKDS
005346  104016                  ERROR   16              ;R/W/S RDY DID NOT SET AFTER
                                                        ;DRIVE RESET. DRIVE RESET WAS DONE
                                                        ;TO CHECK 'DPL'BIT . THIS TEST
                                                        ;IS NOT FOR CHECKING DRIVE RESET.
                                                        ;U MIGHT WANT TO USE THE TEST PROVIDED
                                                        ;FOR CHECKING DRIVE RESET.

                        ;;**************************************************************
                        ;*TEST 4         CHECK THAT 'DRIVE UNSAFE' IS CLEAR, 'HDEN' IS SET, 'WPS' IS CLEAR
                        ;;**************************************************************
005350  000004          TST4:   SCOPE
005352  104413                  CNT.RESET               ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR & IF IT
                                                        ;OCCURS GO BACK TO TEST 10
005354  013777  001350  173756  MOV     DRIVAD,@RKDA    ;SET DRIVE ADDRESS
005362  017700  173740          MOV     @RKDS,R0                ;GET RKDS
005366  032700  002000          BIT     #2000,R0        ;IS 'DRU' BIT OF RKDS SET?
005372  001403                  BEQ     1$              ;NO
005374  004737  021002          JSR     PC,GT3RG        ;GO, GET RKCS, ER, DS
005400  104006                  ERROR   6               ;'DRU' BIT OF RKDS IS SET, CHECK
                                                        ;DRIV BY PUTTING RUN/LOAD SW TO LOAD
```

```
                                                        ;THEN BACK TO RUN
005402  032700  004000          1$:     BIT     #4000,R0        ;IS 'HDEN' BIT SET?
005406  001004                          BNE     2$              ;YES, BRANCH
005410  017737  173712  001162          MOV     @RKDS,$REG0     ;GET RKDS
005416  104007                          ERROR   7               ;ERROR, 'RKOS' BIT IS NOT SET

005420  032777  000040  173700  2$:     BIT     #40,@RKDS       ;IS 'WPS' CLEAR?
005426  001403                          BEQ     TST5            ;;YES, EXIT
005430  004737  020774                  JSR     PC,GT4RG        ;GET RKCS, ER, DS, DA
005434  104114                          ERROR   114             ;'WPS'-WRITE PROTECT STATUS- BIT OF
                                                        ;OF RKDS SHOULD BE CLEAR, IF THIS DRIVE
                                                        ;IS WRITE ENABLED. CHECK & SEE IF THIS
                                                        ;DRIVE IS WRITE ENABLED, IF IT IS NOT,
                                                        ;WRITE ENABLE IT.

                                        ;
                                ;;**************************************************************
                                ;*TEST 5         CHECK THAT 'DRIVE READY' IS SET IN RKDS
                                ;;**************************************************************
005436  000004                  TST5:   SCOPE
005440  104413                          CNT.RESET               ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR & IF IT
                                                        ;OCCURS GO BACK TO TEST 10
005442  013777  001350  173670          MOV     DRIVAD,@RKDA    ;ADDRS THE DRIVE
005450  105777  173652                  TSTB    @RKDS           ;IS 'DRY' SET?
005454  100403                          BMI     TST6            ;;YES, OK
005456  004737  020774                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
005462  104010                          ERROR   10              ;'DRY' NOT SET
                                        ;
                                ;;**************************************************************
                                ;*TEST 6         CHECK THAT 'SOK' BIT CAN SET
                                        ;* THIS TEST CHECKS THAT WITHIN A CERTAIN TIME
                                        ;* 'SOK' BIT CAN SET, IF IT DOES NOT AN ERROR IS REPORTED
                                ;;**************************************************************
005464  000004                  TST6:   SCOPE
005466  013777  001350  173644          MOV     DRIVAD,@RKDA    ;ADDRS THE DRIVE
005474  005001                          CLR     R1              ;INITIALIZE COUNT FOR TIMING WAIT LOOP
005476  032777  000400  173622  1$:     BIT     #400,@RKDS      ;IS SOK SET?
005504  001006                          BNE     TST7            ;;EXIT
005506  005201                          INC     R1              ;NO, WAIT
005510  001372                          BNE     1$              ;WAITED LONG?
005512  017737  173610  001162          MOV     @RKDS,$REG0     ;GET RKDS
005520  104011                          ERROR   11              ;WAITED LONG BUT 'SEC OK' BIT DID NOT
                                                        ;SET
                                        ;


                                ;;**************************************************************
                                ;*TEST 7         CHECK THAT 'SECTOR COUNTER' CAN COUNT FROM 0-13
```

```
                                        ;* THIS TEST CHECKS THAT THE SECTOR COUNTER CAN COUNT FROM
                                        ;* 0-13
                                        ;* 1) FIRST, FOR INITIALIZING PURPOSES THERE IS A TIMED LOOP
                                        ;* DURING WHICH SECTOR COUNTER SHOULD COUNT DOWN TO 0. IF THIS
                                        ;* IS NOT DONE AN ERROR IS REPORTED
                                        ;* 2) AFTER A COUNT OF 0 IS REACHED, THE PROGRAM WAITS
                                        ;* FOR A CERTAIN TIME, DURING WHICH THE SEC COUNTER
                                        ;* IS SAMPLED.  IF THE COUNTER DOES NOT CHANGE WITHIN THIS
                                        ;* TIME PERIOD AN ERROR IS REPORTED.
                                        ;* 3) UPON FINDING THAT THE COUNTER HAS CHANGED, IT IS CHECKED
                                        ;* IF IT INCREMENTED CORRECTLY.  IF IT DID NOT AN ERROR IS REPORTED
                                        ;* 4) IF IT INCREMENTED CORRECTLY, THE PROGRAM AGAIN WAITS IN A
                                        ;* LOOP TILL THE COUNTER CHANGES.  (STEPS 2,3,4 ARE REPEATED
                                        ;* TILL THE COUNTER COUNTS UP TO 13)
                                        ;;*****************************************************************
005522  000004                TST7:   SCOPE
005524  104413                        CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                ;THIS IS A VERY BASIC ERR & IF IT
                                                                ;OCCURS GO BACK TO TEST 10
005526  013777  001350  173604          MOV     DRIVAD,@RKDA
005534  013700  001326                  MOV     RKDS,R0         ;INITIALIZE
005540  005037  001356                  CLR     INDX1           ;'COUNT' - TO TIME 'ERROR 35'
005544  005005                          CLR     R5              ;INITIALIZE 'COUNT' - TO TIME
                                                                ;'ERROR 36' (WAIT LOOP)
005546  012704  177764                  MOV     #-14,R4         ;INITIALIZE 'COUNT' - FOR THE 12 SECTORS.
005552  012703  000001                  MOV     #1,R3           ;R3 CONTAINS THE 'NEXT' COUNT OF SEC-CNTR
                                                                ;R1 CONTAINS THE 'PREVIOUS' COUNT OF SEC-CNTR
                                                                ;R2 CONTAINS THE 'PRESENT' COUNT OF SEC-CNTR
005556  005037  001360          1$:     CLR     INDX2           ;INITIALIZE 'COUNT' - TO TIME
                                                                ;(WAIT LOOP) 'ERROR 34'
005562  005237  001356                  INC     INDX1           ;KEEP TIMING FOR 'ERROR 35'
005566  001440                          BEQ     6$              ;BRANCH & REPORT ERROR IF WAITED LONG?
005570  005237  001360          2$:     INC     INDX2           ;KEEP TIMING FOR 'ERROR 34'
005574  001441                          BEQ     7$              ;BRANCH & REPORT ERROR IF WAITED LONG?

005576  011001                          MOV     @R0,R1          ;GET RKDS
005600  032701  000400                  BIT     #400,R1         ;IS 'SOK' SET?
005604  001771                          BEQ     2$              ;NO, WAIT FOR IT TO SET
005606  021001                          CMP     @R0,R1          ;MAKE SURE THAT 2 CONSECUTIVE
005610  001362                          BNE     1$              ;READINGS OF SEC-CNTR ARE SAME
005612  042701  177760                  BIC     #177760,R1      ;YES, MASK OUT NON-SEC CNTR BITS
005616  001357                          BNE     1$              ;IS IT SECTOR 0, IF NOT LOOP BACK &
                                                                ;WAIT FOR SECTOR 0
005620  005204          3$:     INC     R4                      ;KEEP TRACK OF SECTORS CHECKED
005622  001447                          BEQ     TST10           ;;EXIT,IF ALL SECTORS CHKD
005624  005205          4$:     INC     R5                      ;KEEP TIMING FOR 'ERROR 36'
005626  001431                          BEQ     8$              ;BR & REPORT ERROR IF WAITED LONG
005630  011002                          MOV     @R0,R2          ;GET RKDS
005632  032702  000400                  BIT     #400,R2         ;IS SOK SET?
```

```
 2486  005636  001772                        BEQ     4$              ;NO, WAIT FOR SOK
 2487  005640  021002                        CMP     @R0,R2          ;MAKE SURE THAT 2 CONSECUTIVE
 2488  005642  001370                        BNE     4$              ;READINGS OF SEC-CNTR ARE SAME
 2489  005644  042702  177760                BIC     #177760,R2      ;MASK NON-SEC-CNTR BITS
 2490  005650  020201                        CMP     R2,R1           ;HAS SEC CNTR INCREMENTED?
 2491  005652  001764                        BEQ     4$              ;NO, WAIT FOR IT TO CHANGE
 2492  005654  020203                        CMP     R2,R3           ;YES, DID IT INCREMENT CORRECTLY?
 2493  005656  001023                        BNE     9$              ;NO - REPORT ERROR
 2494
 2495  005660  005203                5$:     INC     R3              ;INCREMENT "NEXT COUNT"
 2496  005662  005201                        INC     R1              ;INCREMENT "PREVIOUS COUNT"
 2497  005664  005005                        CLR     R5              ;INITIALIZE AGAIN FOR TIMING 'ERROR 36'
 2498  005666  000754                        BR      3$              ;GO & CHECK THE NEXT SECTOR COUNT
 2499
 2500  005670  010137  001162        6$:     MOV     R1,$REG0        ;GET 'SEC CNTR'
 2501  005674  104012                        ERROR   12              ;WAITED LONG, BUT SECTOR COUNTER
 2502                                                                ;DID NOT COUNT TO 0
 2503  005676  000421                        BR      TST10           ;;EXIT
 2504
 2505  005700  017737  173422  001162  7$:     MOV     @RKDS,$REG0     ;GET RKDS
 2506  005706  104011                        ERROR   11              ;WAITED LONG, BUT 'SOK' BIT DID
 2507                                                                ;NOT SET
 2508  005710  000414                        BR      TST10           ;;EXIT
 2509
 2510  005712  010237  001162        8$:     MOV     R2,$REG0        ;GET SEC CNTR (PRESENT COUNT)
 2511  005716  010337  001164                MOV     R3,$REG1        ;GET "NEXT COUNT"
 2512  005722  104013                        ERROR   13              ;WAITED LONG, BUT THE SECTOR
 2513                                                                ;COUNTER DID NOT INCREMENT FROM
 2514                                                                ;THE PRESENT COUNT TO THE NEXT COUNT
 2515  005724  000406                        BR      TST10           ;;EXIT
 2516
 2517  005726  010337  001162        9$:     MOV     R3,$REG0        ;GET 'NEXT COUNT' (SEC CNTR SHOULD BE THIS)
 2518  005732  010237  001164                MOV     R2,$REG1        ;GET PRESENT COUNT (WHAT SEC CNTR WAS)
 2519  005736  104014                        ERROR   14              ;SEC CNTR INCREMENTED WRONG, DID
 2520                                                                ;NOT INCREMENT FROM PRESENT COUNT
 2521                                                                ;TO NEXT COUNT
 2522  005740  000747                        BR      5$
 2523                                        ;
 2524
 2525                                ;;**************************************************************
 2526                                ;*TEST 10        CHECK THAT SC=SA CAN BE GENERATED
 2527                                        ;* THIS TEST CHECKS THAT SC=SA CAN BE GENERATED FOR
 2528                                        ;* EVERY SECTOR
 2529                                ;;**************************************************************
 2530  005742  000004                TST10:  SCOPE
 2531  005744  104413                        CNT.RESET               ;GO, DO CONTROL RESET
 2532                                                                ;THIS IS A CALL FOR THE 'CNTRL-
 2533                                                                ;RESET' ROUTINE. A CONTROL RESET IS
 2534                                                                ;ISSUED AND AFTER A CERTAIN TIME
 2535                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
 2536                                                                ;AN ERROR IS REPORTED. NOTE THAT
 2537                                                                ;THE PC IN ERROR MESSAGE IS THE
 2538                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
 2539                                                                ;THIS IS A VERY BASIC ERR & IF IT
 2540                                                                ;OCCURS GO BACK TO TEST 10
 2541  005746  013704  001350                MOV     DRIVAD,R4
```

```
2542  005752  013700  001326              MOV     RKDS,R0
2543  005756  012703  177764              MOV     #-14,R3         ;INITIALIZE COUNT FOR # OF SECTORS
2544  005762  010477  173352      1$:     MOV     R4,@RKDA        ;ADDRESS THE DRIVE
2545  005766  005005                      CLR     R5              ;INITIALIZE COUNT - FOR TIMING ERROR
2546  005770  005205              2$:     INC     R5              ;KEEP TIMING FOR ERROR
2547  005772  001410                      BEQ     3$              ;REPORT ERROR IF WAITED LONG
2548  005774  011001                      MOV     @R0,R1          ;GET RKDS
2549  005776  032701  000020              BIT     #20,R1          ;IS SC=SA SET?
2550  006002  001772                      BEQ     2$              ;NO, WAIT FOR IT
2551  006004  005204              4$:     INC     R4              ;ADDRS THE NEXT SECTOR
2552  006006  005203                      INC     R3              ;ARE ALL SECTORS CHECKED FOR SC=SA
2553  006010  001364                      BNE     1$              ;NO, GO & CHECK NEXT
2554  006012  000406                      BR      TST11           ;;YES, EXIT
2555
2556  006014  110437  001162      3$:     MOVB    R4,$REG0        ;GET SECTOR ADDRESS
2557  006020  010137  001164              MOV     R1,$REG1        ;GET RKDS
2558  006024  104015                      ERROR   15              ;COULD NOT GET SC=SA FOR THIS
2559                                                              ;'SECTOR ADDRESS'
2560  006026  000766                      BR      4$              ;GO CHK FOR THE REST
2561                                       ;
2562                                  ;;**********************************************************************
2563                                  ;*TEST 11        CHECK THAT 'R/W/S RDY' IS SET & 'SIN' IS CLEAR
2564                                  ;;**********************************************************************
2565  006030  000004              TST11:  SCOPE
2566  006032  104413                      CNT.RESET               ;GO, DO CONTROL RESET
2567  006034  013777  001350  173276      MOV     DRIVAD,@RKDA    ;ADDRESS THE DRIVE
2568  006042  005001                      CLR     R1
2569  006044  017700  173256      1$:     MOV     @RKDS,R0        ;GET RKDS
2570  006050  032700  000100              BIT     #100,R0         ;IS R/W/S RDY SET?
2571  006054  001007                      BNE     2$              ;YES, BRANCH
2572  006056  005201               3$:    INC     R1              ;INCREASE LOOP TIME
2573  006060  001376                      BNE     3$              ;FOR DRIVE RESET OF HEADS
2574  006062  005201                      INC     R1              ;WAITED LONG ENOUGH?
2575  006064  001367                      BNE     1$              ;IF NOT LUP BAK & WAIT
2576  006066  010037  001162              MOV     R0,$REG0        ;GET RKDS
2577  006072  104016                      ERROR   16              ;R/W/S RDY SHOULD BE SET
2578  006074  032700  001000      2$:     BIT     #1000,R0        ;IS SIN CLEAR?
2579  006100  001403                      BEQ     TST12           ;;YES, EXIT
2580  006102  004737  020774              JSR     PC,GT4RG        ;GET RKCS,ER,DS,DA
2581  006106  104001                      ERROR   1               ;'SIN' SHOULD HAVE BEEN CLEAR
2582                                                              ;IT WAS NOT CLEAR
2583                                                              ;NEXT TEST IS GOING TO CHECK
2584                                                              ;DRIVE RESET, SIN SHOULD BE
2585                                                              ;CLEARED THEN. IT WILL BE CHECKED
2586                                                              ;THERE.
2587
2588                                  ;;**********************************************************************
2589                                  ;*TEST 12        CHECK 'DRIVE RESET'
2590                                          ;*THIS TEST CHECKS THE VERY BASIC DRIVE RESET LOGIC.
2591                                          ;*SINCE THE HEADS ARE AT CYLINDER 0 (GOING INTO THIS
2592                                          ;*TEST) DRIVE RESET RETRACTS THEM BACK BEYOND CYLINDER 0,
2593                                          ;*AFTER WHICH THEY ARE PUSHED FORWARD TO CYLINDER 0 AGAIN.
2594                                          ;*IN THE LATER PART OF THIS PROGRAM THERE IS A DRIVE RESET
2595                                          ;*TEST WHICH DOES THE RESET FROM LAST CYLINDER.
2596                                  ;;**********************************************************************
2597  006110  000004              TST12:  SCOPE
```

```
                                        CNT.RESET                       ;GO, DO CONTROL RESET
                                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                        ;THIS IS A VERY BASIC ERR & IF IT
                                                                        ;OCCURS GO BACK TO TEST 10
006114  013700  001332                  MOV     RKCS,R0
006120  005004                          CLR     R4                      ;INITIALIZ COUNT - TO TIME ERROR
006122  013777  001350  173210          MOV     DRIVAD,@RKDA            ;ADDRESS THE DRIVE
006130  012710  000015                  MOV     #15,@R0                 ;'DRIVE RESET', GO
006134  104412                          CHKCRDY                         ;GO CHECK IF CONTROL RDY IS SET
                                                                        ;IF SO, SKIP THE EROR MESSAGE.
006136  104021                          ERROR   21                      ;CNTRL RDY DID NOT SET AFTER
                                                                        ;SENDING CYL ADDR TO THE DRIV.
                                                                        ;'ADD ACK' SHOULD HAVE COME BACK
                                                                        ;FROM DRIVE, THEREUPON SETTING 'CN RDY'
006140  012705  177776          2$:     MOV     #-2,R5                  ;SET UP DELAY COUNTER
006144  032777  000100  173154  6$:     BIT     #100,@RKDS              ;CHECK FOR R/W/S READY
006152  001402                          BEQ     .+6
006154  000137  006176                  JMP     3$
006160  005204                          INC     R4
006162  001370                          BNE     6$
006164  005205                          INC     R5
006166  001366                          BNE     6$
006170  004737  020774                  JSR     PC,GT4RG                ;GO, GET RKCS, ER, DS, DA
006174  104026                          ERROR   26                      ;R/W/S RDY DID NOT SET AFTER
                                                                        ;DRIVE RESET
006176  032777  001000  173122  3$:     BIT     #1000,@RKDS             ;DID SIN SET?
006204  001403                          BEQ     5$                      ;NO, BRANCH
006206  004737  020774                  JSR     PC,GT4RG                ;GO, GET RKCS,ER,DS,DA
006212  104001                          ERROR   1                       ;SIN SET, AFTER A
                                                                        ;DRIVE RESET.
006214  032710  140000          5$:     BIT     #140000,@R0             ;WAS 'ERR' BIT OR 'HE' BIT SET?
006220  001403                          BEQ     4$                      ;NO
006222  004737  020774                  JSR     PC,GT4RG                ;GO, GET RKCS, ER, DS, DA
006226  104022                          ERROR   22                      ;'ERR' OR 'HE' BIT SET WHILE DOING
                                                                        ;DRIVE RESET
006230  022710  000214          4$:     CMP     #214,@R0                ;DOES RKCS STILL CONTAIN THE
                                                                        ;'DRIV RES' BITS
006234  001406                          BEQ     TST13                   ;;YES, EXIT
006236  012737  000214  001162          MOV     #214,$REG0              ;GET EXPCTD RKCS
006244  011037  001164                  MOV     @R0,$REG1               ;GET RKCS, RECVD
006250  104024                          ERROR   24                      ;NO - RKCS SHOULD CONTAIN THE 'DRIV RES'
                                                                        ;FUNCTION, ERROR IF DIFFERENT.

                                ;;**********************************************************************
                                ;*TEST 13        CHECK 'SEEK' TO CYLINDER 0
                                        ;* THIS TEST CHECKS THE SEEK LOGIC DOING SEEK TO CYLINDER 0.
                                        ;* NOTE THAT SINCE THE HEADS ARE ALREADY ON CYLINDER 0, NO
                                        ;* HEAD MOVEMENT IS INVOLVEDN AND THE STRESS IS ON THE BASIC SEEK
                                        ;* LOGIC.
```

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                                ;;*****************************************************************
006252  000004                  TST13:  SCOPE
006254  104413                          CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                ;THIS IS A VERY BASIC ERR & IF IT
                                                                ;OCCURS GO BACK TO TEST 10
006256  104421                          TST.SIN                 ;GO CHECK IF SIN SET. IF SET
                                                                ;A DO DRIVE RESET TO CLEAR IT
006260  013700  001332                  MOV     RKCS,R0
006264  013777  001350  173046          MOV     DRIVAD,@RKDA    ;ADDRESS THE DRIVE
006272  012710  000011                  MOV     #11,@R0         ;'SEEK' GO
006276  104412                          CHKCRDY                 ;GO CHECK IF CONTROL RDY IS SET
                                                                ;IF SO, SKIP THE EROR MESSAGE.
006300  104021                          ERROR   21              ;'CNTRL RDY' DID NOT SET AFTER SENDING
                                                                ;CYL ADDR TO THE DRIVE, 'ADD ACK'
                                                                ;SHOULD HAVE COME BACK FROM THE
                                                                ;DRIVE, THEREUPON SETTING 'CNTRL RDY'
006302  005005                  2$:     CLR     R5
006304  032777  000100  173014          BIT     #100,@RKDS      ;DID R/W/S RDY BIT SET?
006312  001005                          BNE     3$              ;YES, BRANCH
006314  005205                          INC     R5              ;WAITED LONG ENOUGH?
006316  001372                          BNE     2$+2            ;IF NOT, LUP BAK & WAIT
006320  004737  020774                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
006324  104026                          ERROR   26              ;R/W/S RDY DID NOT SET AFTER SEEK
006326  032777  001000  172772  3$:     BIT     #1000,@RKDS     ;DID SIN SET?
006334  001403                          BEQ     6$              ;NO, BRANCH
006336  004737  020774                  JSR     PC,GT4RG        ;GO, GET RKCS,ER,DS,DA
006342  104001                          ERROR   1               ;SIN SET ON DOING SEEK
                                                                ;TO CYL 0 NOTE THIS IS THE
                                                                ;FIRST TIME THE HEADS HAVE
                                                                ;BEEN MOVED
006344  032710  140000          6$:     BIT     #140000,@R0     ;WAS 'ERR' OR 'HE' BIT SET?
006350  001403                          BEQ     4$
006352  004737  020774                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
006356  104022                          ERROR   22              ;'ERR' OR 'HE' BIT SET WHILE DOING 'SEEK'
006360  005777  172744          4$:     TST     @RKER           ;WAS ANY BIT IN RKER SET?
006364  001403                          BEQ     5$              ;NO
006366  004737  021002                  JSR     PC,GT3RG        ;GO, GET RKCS, ER, DS
006372  104023                          ERROR   23              ;RKER SHOWS AN ERROR BIT, CHECK
006374  022710  000210          5$:     CMP     #210,@R0        ;DOES RKCS STILL CONTAIN 'SEEK' FUNCTION
006400  001406                          BEQ     TST14           ;;YES, EXIT
006402  012737  000210  001162          MOV     #210,$REG0      ;GET EXPCTD RKCS
006410  011037  001164                  MOV     @R0,$REG1       ;GET RKCS RECVD
006414  104024                          ERROR   24              ;NO, RKCS SHOULD BE STILL CONTAINING
                                                                ;'SEEK' FUNCTION ERROR - IF IT CHANGED
```

```
                        ;
                        ;;*****************************************************************
                        ;*TEST 14       CHECK R/W/S RDY IS CLEAR WHEN HEADS ARE IN MOTION
                        ;*THIS TEST CHECKS THAT R/W/S DOES GET CLEARED
                        ;*WHEN THE HEADS ARE IN MOTION. SINCE 'MOVE L' ON
                        ;*M7700 (RK05) GENERATES THIS SIGNAL, ABSENCE OF
                        ;*R/W/S RDY-CLEAR COULD MEAN A FAULT ON M7702
                        ;*WHERE 'MOVE L' IS GENERATED.
                        ;*NOTE THIS IS THE FIRST TIME HEADS ARE MADE TO MOVE BY SEEKING
                        ;*TO CYLINDER 2.
                        ;;*****************************************************************
006416  000004         TST14:  SCOPE
006420  104413                 CNT.RESET              ;GO, DO CONTROL RESET
                                                       ;THIS IS A CALL FOR THE 'CNTRL-
                                                       ;RESET' ROUTINE. A CONTROL RESET IS
                                                       ;ISSUED AND AFTER A CERTAIN TIME
                                                       ;IF THE 'CNTRL RDY' DOES NOT SET
                                                       ;AN ERROR IS REPORTED. NOTE THAT
                                                       ;THE PC IN ERROR MESSAGE IS THE
                                                       ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                       ;THIS IS A VERY BASIC ERR & IF IT
                                                       ;OCCURS GO BACK TO TEST 10
006422  104421                 TST.SIN                ;GO CHECK IF SIN IS SET
                                                       ;IF SET DO DRV-RESET TO CLR IT
006424  004737  021504         JSR     PC,DRESET      ;MAKE SURE HEADS R ON CYL 0
006430  104026                 ERROR   26             ;R/W/S RDY DIDN'T SET
                                                       ;AFTER THE ABOVE DRV RESET
006432  005005                 CLR     R5
006434  013777  001350  172676 MOV     DRIVAD,@RKDA
006442  052777  000100  172670 BIS     #100,@RKDA     ;SEEK CYLINDER 2
006450  013701  001326         MOV     RKDS,R1
006454  012777  000011  172650 MOV     #11,@RKCS      ;SEEK, GO
006462  032711  000100       1$:BIT    #100,@R1       ;DID R/W/S RDY CLR?
006466  001405                 BEQ     2$             ;YES, BRANCH
006470  005205                 INC     R5
006472  100373                 BPL     1$
006474  004737  021002         JSR     PC,GT3RG
006500  104025                 ERROR   25             ;R/W/S RDY WAS NOT CLEAR WHEN HEADS
                                                       ;WERE SEEKING TO CYLINDER 2
006502  004737  021436       2$:JSR    PC,TSTRWS      ;GO, WAIT FOR R/W/S RDY TO SET
006506  104016                 ERROR   16             ;R/W/S RDY DID NOT SET AFTER SEEK
                                                       ;WAS TRIED TO CYLINDER 2 (ABOVE).
                                                       ;NOTE THIS WAS THE FIRST TIME A SEEK
                                                       ;WAS TRIED TO A CYLINDER OTHER THAN
                                                       ;0.
                        ;;*****************************************************************
                        ;*TEST 15       CHECK 'WRITE' FORMAT FUNCTION-CYLINDER 0, SECTOR 0
                        ;*THIS TEST CHECKS THE LOGIC INVOLVED IN THE WRITE FMT
                        ;*FUNCTION. ON ISSUING A WRT FMT, THE FOLLOWING IS CHECKED
                        ;*1)  CNTRL RDY WAS CLEARED AS GO WAS SET.
                        ;*2)  CNTRL RDY SETS WITHIN A CERTAIN TIME ON COMPLETION OF FUNCTION
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                                        ;*3)  IF 'HE' OR 'ERR' BIT SET?
                                        ;*4)  IF RKDA INCREMENTED CORRECTLY FROM 0 TO 1?
                                        ;*5)  IF RKWC OVERFLOWED CORRECTLY TO 0?
                                        ;*6)  IF RKBA INCREMENTED CORRECTLY BY 2?
                                        ;*7)  IF ANY BIT IN RKER SET?
                                        ;*8)  IF THE 'WRT FMT' FUNCTION BITS ARE STILL IN THE RKCS?
                                        ;*NOTE THAT ONE WORD '125252' WAS WRITTEN ON SECTOR
                                        ;*0 & IT WILL BE CHECKED IN THE NEXT TESTS.
                                    ;;**********************************************************************
006510  000004                    TST15:  SCOPE
006512  104413                            CNT.RESET                   ;GO, DO CONTROL RESET
                                                                    ;THIS IS A CALL FOR THE 'CNTRL-
                                                                    ;RESET' ROUTINE. A CONTROL RESET IS
                                                                    ;ISSUED AND AFTER A CERTAIN TIME
                                                                    ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                    ;AN ERROR IS REPORTED. NOTE THAT
                                                                    ;THE PC IN ERROR MESSAGE IS THE
                                                                    ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                    ;THIS IS A VERY BASIC ERR & IF IT
                                                                    ;OCCURS GO BACK TO TEST 10
006514  104421                            TST.SIN                     ;GO CHECK IF SIN IS SET
                                                                    ;IF SET, DO DRIVE RESET TO CLR IT
006516  012703  033342                    MOV     #OUTBUF,R3
                                                                    ;THIS CODE SETS UP A 256 WORD BUFFER
                                                                    ;WHICH WILL BE USED TO WRITE 1 SECTOR
                                                                    ;ON THE DISK
                                                                    ;1ST WORD       000001
                                                                    ;2ND WORD       177777  2'S COMPLEMENT
                                                                    ;3RD WORD       000002  OF ABOVE
                                                                    ;4TH WORD       177776
                                                                    ;  ...
                                                                    ;253RD WORD     000177
                                                                    ;254TH WORD     177601
                                                                    ;255TH WORD     000000
                                                                    ;256TH WORD     125252
006522  012700  000001                            MOV     #1,R0       ;SET COUNT
006526  010023                    9$:     MOV     R0,(R3)+    ;SET UP DATA WORDS
006530  010013                            MOV     R0,(R3)
006532  005423                            NEG     (R3)+
006534  005200                            INC     R0
006536  022700  000200                    CMP     #200,R0     ;DONE?
006542  001371                            BNE     9$
006544  005023                            CLR     (R3)+       ;SET 255TH WORD TO 0
006546  012713  125252                    MOV     #125252,@R3 ;SET 256TH WORD
006552  012703  033342                    MOV     #OUTBUF,R3  ;RESET POINTER TO OUTBUF
006556  013701  001332                    MOV     RKCS,R1
006562  013702  001336                    MOV     RKBA,R2
006566  010312                            MOV     R3,@R2      ;FROM HERE-SET UP CURRENT ADDRESS
006570  012777  177400  172536            MOV     #-400,@RKWC ;SET UP WORD COUNT 400 WORDS
006576  013777  001350  172534            MOV     DRIVAD,@RKDA ;SET UP DISK ADDRS, SECTOR 0, CYLINDER 0
006604  012711  002003                    MOV     #2003,@R1   ;WRITE FORMAT, GO
006610  105711                    1$:     TSTB    @R1         ;WAS 'CNTRL RDY' CLEARED AS GO WAS SET?
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2822  006612  100003                    BPL     2$              ;YES, BRANCH
2823  006614  004737  021002            JSR     PC,GT3RG        ;GO, GET RKCS, ER, DS
2824  006620  104030                    ERROR   30              ;'CNTRL RDY' DIDN'T CLEAR AS GO
2825                                                            ;WAS SET TO 'WRITE FORMAT'
2826  006622  005000            2$:     CLR     R0
2827  006624  105711                    TSTB    @R1             ;WAS 'CNTRL RDY' SET ON COMPLETION OF WRITE?
2828  006626  100411                    BMI     3$              ;YES, BRANCH
2829  006630  005200                    INC     R0              ;NO, HAVE U WAITED LONG ENOUGH?
2830  006632  001374                    BNE     2$+2            ;IF NOT, LOOP BACK & WAIT
2831                                                            ;IF YES, REPORT ERROR
2832  006634  004737  020774            JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS,DA
2833  006640  013737  001350  001202    MOV     DRIVAD,$REG10
2834  006646  104416                    BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
2835                                                            ;$REG10 INTO DR #,CYL,SUR,SEC BITS
2836  006650  104031                    ERROR   31              ;'CNTRL RDY' DIDN'T SET ON COMPLETION
2837                                                            ;OF WRITE FORMAT
2838                                                            ;WRT FMT WAS DONE STARTING AT <DSK-ADRES>
2839                                                            ;INDICATED IN EROR MSGE.
2840  006652  004737  021234    3$:     JSR     PC,CHKHE        ;GO CHECK IF 'HE' OR 'ERR' BIT SET,
2841                                                            ;IF YES, SAVE RKCS, ER, DS, DA.
2842                                                            ;RETURN HERE IF ERROR.
2843  006656  104032                    ERROR   32              ;'HE' OR 'ERR' BIT SET WHILE DOING
2844                                                            ;A WRITE FORMAT
2845                                                            ;WRT FMT WAS DONE STARTING AT <DSK-ADRES>
2846                                                            ;INDICATED IN EROR MSGE.
2847  006660  004737  021262    4$:     JSR     PC,CHKDA        ;GO CHECK IF RKDA INCREMENTED CORRECTLY
2848                                                            ;IF NOT, RETURN HERE.
2849  006664  104033                    ERROR   33              ;RKDA SHOULD HAVE INCREMENTED BY
2850                                                            ;1 SECTOR, IT DID NOT
2851  006666  004737  021316    5$:     JSR     PC,CHKWC        ;CHECK IF WORD COUNT OVERFLOWED, IF
2852                                                            ;NOT RETURN HERE.
2853  006672  104034                    ERROR   34              ;RKWC DID NOT OVERFLOW TO 0, AFTER
2854                                                            ;XFER ON WRITE FORMAT
2855  006674  022712  034342    6$:     CMP     #OUTBUF+1000,@R2        ;DID RKBA INCREMENT CORRECTLY?
2856  006700  001406                    BEQ     7$              ;YES, BRANCH
2857  006702  012737  034342  001162    MOV     #OUTBUF+1000,$REG0 ;GET EXPCTD RKBA
2858  006710  011237  001164            MOV     @R2,$REG1       ;GET ACTUAL RKBA
2859  006714  104035                    ERROR   35              ;RKBA DIDN'T INCREMENT BY 1000 AFTER
2860                                                            ;WRITE FORMAT OF 400 WORDS
2861  006716  004737  021342    7$:     JSR     PC,CHKER        ;CHECK IOF ANY BIT IN RKER SET,
2862                                                            ;IF YES RETURN HERE.
2863  006722  104036                    ERROR   36              ;RKER BIT SET ON DOING 1 WORD
2864                                                            ;WRITE FORMAT
2865  006724  022711  002202    8$:     CMP     #2202,@R1       ;DOES RKCS STILL HAVE 'WRT FMT' BITS?
2866  006730  001406                    BEQ     TST16           ;;YES, EXIT
2867  006732  012737  002202  001162    MOV     #2202,$REG0     ;GET EXPCTD RKCS
2868  006740  011137  001164            MOV     @R1,$REG1       ;GET ACTUAL RKCS
2869  006744  104024                    ERROR   24              ;RKCS DIDN'T CONTAIN 'WRT FMT' BITS
2870                                                            ;AFTER THE FUNCTION WAS COMPLETED
2871                                    ;
2872                                ;;**************************************************************
2873                                ;*TEST 16       CHECK 'READ FORMAT' FUNCTION-CYLINDER 0, SECTOR 0
2874                                        ;*THIS TEST CHECKS THE LOGIC INVOLVED IN THE WRITE FMT
2875                                        ;*FUNCTION. ON ISSUING A WRT FMT, THE FOLLOWING IS CHECKED
2876                                        ;*1)  CNTRL RDY WAS CLEARED AS GO WAS SET.
2877                                        ;*2)  CNTRL RDY SETS WITHIN A CERTAIN TIME ON COMPLETION OF FUNCTION
```

```
                                        ;*3)  IF 'HE' OR 'ERR' BIT SET?
                                        ;*4)  IF RKDA INCREMENTED CORRECTLY FROM 0 TO 1?
                                        ;*5)  IF RKWC OVERFLOWED CORRECTLY TO 0?
                                        ;*6)  IF RKBA INCREMENTED CORRECTLY BY 2?
                                        ;*7)  IF ANY BIT IN RKER SET?
                                        ;*8)  IF THE CORRECT HEADER WAS RECEIVED?
                                        ;*9)  FOR RK11C, AFTER RD FMT RKDB CONTAINS THE CHECKSUM
                                        ;*FOR THAT SECTOR. (125252 IN THIS CASE, BECAUSE THE
                                        ;*FIRST WORD IN SEC 0 WAS WRITTEN AS 125252 IN
                                        ;*THE PREVIOUS TEST)
                                        ;*10)  FOR RK11D, AFTER RD FMT RKDB SHOULD CONTAIN
                                        ;*A ZERO
                                        ;*11)  IF THE RD FMT FUNCTION BITS ARE STILL IN
                                        ;*THE RKCS?
                                    ;;**********************************************************************
006746  000004                    TST16:  SCOPE
006750  005000                            CLR     R0
006752  104413                            CNT.RESET                   ;GO, DO CONTROL RESET
                                                                    ;THIS IS A CALL FOR THE 'CNTRL-
                                                                    ;RESET' ROUTINE. A CONTROL RESET IS
                                                                    ;ISSUED AND AFTER A CERTAIN TIME
                                                                    ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                    ;AN ERROR IS REPORTED. NOTE THAT
                                                                    ;THE PC IN ERROR MESSAGE IS THE
                                                                    ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                    ;THIS IS A VERY BASIC ERR & IF IT
                                                                    ;OCCURS GO BACK TO TEST 10
006754  104421                            TST.SIN                     ;GO CHECK IF SIN IS SET
                                                                    ;IF SET, DO DRIVE RESET TO CLR IT
006756  013701  001332                    MOV     RKCS,R1
006762  013702  001336                    MOV     RKBA,R2
006766  012703  033342                    MOV     #OUTBUF,R3
006772  010312                            MOV     R3,@R2              ;SETUP ADRS WHERE HEADER WORD IS TO BE
                                                                    ;X-FERRED
006774  012777  177777  172332            MOV     #-1,@RKWC           ;SET UP WORD COUNT
007002  013777  001350  172330            MOV     DRIVAD,@RKDA        ;SET UP DISK ADRS, SECTOR 0, CYLINDER 0
007010  012711  002005                    MOV     #2005,@R1           ;READ FORMAT, GO
007014  105711                    1$:     TSTB    @R1                 ;WAS 'CNTRL RDY' CLEARED AS GO WAS SET?
007016  100003                            BPL     2$                  ;YES, BRANCH
007020  004737  021002                    JSR     PC,GT3RG            ;GO, GET RKCS, RKER
007024  104030                            ERROR   30                  ;CNTRL RDY DIDN'T CLEAR AS GO WAS
                                                                    ;SET TO 'READ FORMAT'
007026  005000                    2$:     CLR     R0
007030  105711                            TSTB    @R1                 ;WAS 'CNTRL RDY' SET ON COMPLETION OF
                                                                    ;TRANSFER
007032  100411                            BMI     3$                  ;YES, BRANCH
007034  005200                            INC     R0                  ;NO, HAVE U WAITED LONG ENOUGH?
007036  001374                            BNE     2$+2                ;IF NOT, LOOP BACK & WAIT
                                                                    ;IF YES, REPORT ERROR
007040  004737  020774                    JSR     PC,GT4RG            ;GO, GET RKCS, ER, DS,DA
007044  013737  001350  001202            MOV     DRIVAD,$REG10
007052  104416                            BRKDA4                      ;GO TO 'BDA4' & BREAK  CONTENTS OF
                                                                    ;$REG10 INTO DR #,CYL,SUR,SEC BITS
007054  104045                            ERROR   45                  ;'CNTRL RDY' DIDN'T SET ON COMPLETION
                                                                    ;OF READ FORMAT
```

```
2934
2935                                                    ;READ FMT WAS DONE STARTING AT <DSK-ADRES>
2936  007056  004737  021234          3$:     JSR     PC,CHKHE        ;INDICATED IN EROR MESGE
2937                                                    ;CHECK IF 'ERR' OR 'HE' BIT SET, IF
2938  007062  104046                  ERROR   46      ;YES RETURN HERE.
2939                                                    ;'HE' OR 'ERR' BIT SET WHILE
2940                                                    ;DOING A 'READ FORMAT'
2941                                                    ;READ FMT WAS DONE STARTING AT <DSK-ADRES>
2942  007064  004737  021262          4$:     JSR     PC,CHKDA        ;INDICATED IN EROR MESGE
2943                                                    ;CHECK IF RKDA INCREMENTED CORRECTLY
2944  007070  104040                  ERROR   40      ;IF NOT, RETURN HERE.
2945                                                    ;RKDA SHOULD HAVE INCREMENTED
2946                                                    ;BY 1 SECTOR, IT DID NOT
2947  007072  004737  021316          5$:     JSR     PC,CHKWC        ;CHECK IF RKWC OVERFLOWED TO 0, IF
2948                                                    ;NOT RETURN HERE.
2949  007076  104041                  ERROR   41      ;RKWC DID NOT OVERFLOW TO 0
2950                                                    ;AFTER XFER ON READ FORMAT
2951  007100  022712  033344          6$:     CMP     #OUTBUF+2,@R2   ;DID RKBA INCREMENT TO NXT WORD ADDRS?
2952  007104  001406                  BEQ     7$      ;YES, BRANCH
2953  007106  012737  033344  001162  MOV     #OUTBUF+2,$REG0 ;GET EXPCTD RKBA
2954  007114  011237  001164          MOV     @R2,$REG1       ;GET ACTUAL RKBA
2955  007120  104042                  ERROR   42      ;RKBA DIDN'T INCREMENT BY 2 AFTER
2956                                                    ;'READ FORMAT' OF 1 WORD
2957  007122  004737  021342          7$:     JSR     PC,CHKER        ;CHECK IF ANY BIT IN RKER SET, IF
2958                                                    ;YES RETURN HERE.
2959  007126  104036                  ERROR   36      ;RKER BIT SET ON DOING
2960                                                    ;1 WORD READ FORMAT
2961  007130  005713                  8$:     TST     @R3             ;DOES OUTBUF CONTAIN THE HEADER
2962                                                    ;WORD-0
2963  007132  001407                  BEQ     9$      ;YES, BRANCH
2964  007134  005037  001162          CLR     $REG0           ;GET SECTOR NO.
2965  007140  005037  001164          CLR     $REG1           ;EXPCTD HEADER
2966  007144  011337  001166          MOV     @R3,$REG2       ;GET HEADER RECVD
2967  007150  104043                  ERROR   43      ;CORRECT HEADER WORD-0-WAS
2968                                                    ;NOT RECEIVED ON READ FORMAT
2969  007152  022711  002204          9$:     CMP     #2204,@R1       ;DOES RKCS HAVE THE 'RDFMT' BITS?
2970  007156  001406                  BEQ     TST17           ;;YES, BRANCH
2971  007160  012737  002204  001162  MOV     #2204,$REG0     ;GET EXPCTD RKCS
2972  007166  011137  001164          MOV     @R1,$REG1       ;GET ACTUAL RKCS
2973  007172  104024                  ERROR   24      ;RKCS DIDN'T CONTAIN 'RD FMT'
2974                                                    ;BITS AFTER FUNCTION WAS
2975                                                    ;COMPLETED
2976
2977
2978
2979                            ;;*****************************************************************
2980                            ;*TEST 17        CHECK 'READ' FUNCTION-CYLINDER 0,SECTOR 0
2981                                    ;*THIS IS THE FIRST TIME A PURE READ IS PREFORMED IN THIS
2982                                    ;*TEST SEQUENCE.  THE FOLLOWING IS CHECKED
2983                                    ;*1) CNTRL RDY CLEARS AS GO IS SET
2984                                    ;*2) CNTRL RDY SETS WITHIN A CERTAIN TIME ON COMPLETION
2985                                    ;*OF FUNCTION
2986                                    ;*3) IF 'HE' OR 'ERR' BIT SET?
2987                                    ;*4) IF RKDA INCREMENTED CORRECTLY?
2988                                    ;*5) IF RKWC OVERFLOWED TO 0?
2989                                    ;*6) IF RKBA INCREMENTED CORRECTLY?
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                                        ;*7) IF ANY RKER BIT SET?
                                        ;*8) IF THE CORRECT PSUEDO-HEADER (FIRST WORD) WAS
                                        ;*READ FROM SECTOR 0
                                        ;*9) IF THE 'READ' FUNCTION BITS ARE STILL IN RKCS
                                    ;;*****************************************************************
007174  000004                  TST17:  SCOPE
007176  104413                          CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                ;THIS IS A VERY BASIC ERR & IF IT
                                                                ;OCCURS GO BACK TO TEST 10
007200  104421                          TST.SIN                 ;GO CHECK IF SIN IS SET
                                                                ;IF SET, DO DRIVE RESET TO CLR IT
007202  013701  001332                  MOV     RKCS,R1
007206  005000                          CLR     R0
007210  013702  001336                  MOV     RKBA,R2
007214  012703  033342                  MOV     #OUTBUF,R3
007220  010312                          MOV     R3,@R2          ;SET UP ADDRS WHERE DATA WORD IS
                                                                ;TO BE X-FERRED
007222  012777  177400  172104          MOV     #-400,@RKWC     ;SET UP WORD COUNT
007230  013777  001350  172102          MOV     DRIVAD,@RKDA    ;SET UP DISK ADRS, SECTOR 0, CYLINDER 0
007236  012711  000005                  MOV     #5,@R1          ;READ, GO
007242  105711                  1$:     TSTB    @R1             ;WAS 'CNTRL RDY' CLEARED AS GO WAS SET?
007244  100003                          BPL     2$              ;YES, BRANCH
007246  004737  021002                  JSR     PC,GT3RG        ;GO, GET RKCS, ER
007252  104030                          ERROR   30              ;CNTRL RDY DID NOT CLEAR AS GO
                                                                ;WAS SET TO 'READ'
007254  005000                  2$:     CLR     R0
007256  105711                          TSTB    @R1             ;WAS CNTRL RDY SET ON COMPLETION
                                                                ;OF TRANSFER?
007260  100411                          BMI     3$              ;YES, BRANCH
007262  005200                          INC     R0              ;NO, HAVE U WAITED LONG ENOUGH?
007264  001374                          BNE     2$+2            ;IF NOT, LOOP BACK & WAIT
                                                                ;IF YES, REPORT ERROR
007266  004737  020774                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS,DA
007272  013737  001350  001202          MOV     DRIVAD,$REG10
007300  104416                          BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
007302  104045                          ERROR   45              ;CNTRL RDY DID NOT SET ON
                                                                ;COMPLETION OF READ
                                                                ;READ WAS DONE STARTING AT <DSK-ADRES>
                                                                ;INDICATED IN EROR MESGE
007304  004737  021234          3$:     JSR     PC,CHKHE        ;CHECK IF 'ERR' OR 'HE' BIT IS SET
                                                                ;IF YES, RETURN HERE.
007310  104046                          ERROR   46              ;'HE' OR 'ERR' BIT SET WHILE
                                                                ;DOING A READ.
                                                                ;READ WAS DONE STARTING AT <DSK-ADRES>
                                                                ;INDICATED IN EROR MESGE
007312  004737  021262          4$:     JSR     PC,CHKDA        ;CHECK IF RKDA INCREMENTED CORRECTLY,
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                                                        ;IF NOT RETURN HERE.
007316  104040                  ERROR   40             ;RKDA DID NOT INCREMENT
                                                        ;BY 1 (SECTOR)
007320  004737  021316  5$:      JSR     PC,CHKWC       ;CHECK IF RKWC OVERFLOWED TO 0,
                                                        ;IF NOT RETURN HERE.
007324  104041                  ERROR   41             ;RKWC DID NOT OVERFLOW TO 0,
                                                        ;AFTER X-FER ON READ
007326  022712  034342  6$:      CMP     #OUTBUF+1000,@R2       ;DID RKBA INCREMENT CORRECTLY?
007332  001406                  BEQ     7$             ;YES, BRANCH
007334  012737  034342  001162  MOV     #OUTBUF+1000,$REG0     ;GET EXPCTD RKBA
007342  011237  001164          MOV     @R2,$REG1      ;GET ACTUAL RKBA
007346  104042                  ERROR   42             ;RKBA DID NOT INCREMENT BY 2
                                                        ;AFTER 'READ' OF 1 WORD
007350  004737  021342  7$:      JSR     PC,CHKER       ;CHECK IF ANY BIT IN RKER SET,
                                                        ;IF YES RETURN HERE.
007354  104036                  ERROR   36             ;RKER BIT SET ON DOING 1
                                                        ;WORD 'READ'
007356  022713  000001  8$:      CMP     #1,@R3         ;DOES OUTBUF CONTAIN THE RIGHT
                                                        ;DATA WORD
007362  001411                  BEQ     9$             ;YES BRANCH
007364  012737  000001  001162  MOV     #1,$REG0       ;GET EXPCTD DATA WORD
007372  011337  001164          MOV     (R3),$REG1     ;GET RECVD DATA WORD
007376  013737  001350  001166  MOV     DRIVAD,$REG2   ;GET DISK ADRS FROM WHICH READ WAS DONE
007404  104044                  ERROR   44             ;DID NOT READ THE CORRECT
                                                        ;DATA WORD--FROM DISK ADRES,

                                                        ;SEC 0, CYL 0, SUR 0

                                                        ;AFTER 1 SECTOR READ RKDB CONTAINS
                                                        ;FOR RK11C
                                                        ;THE CHECKSUM FOR THAT SECTOR
                                                        ;FOR RK11D
                                                        ;THE LAST WORD TRANSFERRED TO MEMORY
                                                        ;
                                                        ;IT SO HAPPENS THAT WITH THE SECTOR
                                                        ;THAT WAS READ, RKDB CONTAINS THE
                                                        ;SAME INFORMATION FOR BOTH RK11C
                                                        ;AND RK11D
007406  022777  125252  171726  9$:      CMP     #125252,@RKDB  ;DOES RKDB CONTAIN THE EXPCTD WORD?
007414  001407                  BEQ     10$            ;YES, BRANCH
007416  012737  125252  001162  MOV     #125252,$REG0  ;GET EXPCTD RKDB
007424  017737  171712  001164  MOV     @RKDB,$REG1    ;GET RECVD RKDB
007432  104037                  ERROR   37             ;RKDB DOESD NOT CONTAIN THE
                                                        ;EXPCTD WORD AFTER A READ OF SEC 0
                                                        ;CYL 0
007434  022711  000204  10$:     CMP     #204,@R1       ;DOES RKCS HAVE THE 'READ' BITS?
007440  001406                  BEQ     11$            ;YES , BRANCH
007442  012737  000204  001162  MOV     #204,$REG0     ;GET EXPCTD RKCS
007450  011137  001164          MOV     @R1,$REG1      ;GET RECVD RKCS
007454  104024                  ERROR   24             ;RKCS DID NOT CONTAIN 'READ'
                                                        ;FUNCTION BITS AFTER OPERATION
                                                        ;WAS COMPLETED
007456  104413  11$:     CNT.RESET                      ;GO DO CONTROL RESET
007460  005777  171656          TST     @RKDB          ;DID CONTROL RESET CLEAR RKDB?
007464  001407                  BEQ     TST20          ;;YES, EXIT
007466  013737  001342  001164  MOV     RKDB,$REG1     ;GET ADRES OF RKDB
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3102  007474  017737  171642  001164          MOV     @RKDB,$REG1     ;GET CONTENTS OF RKDB
3103  007502  104102                          ERROR   102             ;CONTROL RESET DIDN'T CLR RKDB
3104
3105                                  ;;*****************************************************************
3106                                  ;*TEST 20       CHECK 'WRITE FORMAT' -CYLINDER 0, SECTOR 0-13
3107                                          ;*THIS TEST GOES ONE STEP FURTHER & PERFORMS A WRT
3108                                          ;*FMT ON CYLINDER 0 & CHECKS THE FOLLOWING
3109                                          ;*1)  IF CNTRL RDY SET WITHIN A CERTAIN TIME ON COMPLETION
3110                                          ;*OF THE FUNCTION
3111                                          ;*2)  IF 'HE' OR 'ERR' BIT SET?
3112                                          ;*3)  IF THE RKDA INCREMENTS CORRECTLY?
3113                                          ;*4)  IF THE RKDB IS CLEAR?
3114                                          ;*WRT FMT IS DONE ONE SECTOR AT A TIME
3115                                          ;*THE FIRST WORD OF EVERY SECTOR IS WRITTEN AS A
3116                                          ;*PSUEDO-HEADER CONSISTING OF DRIVE #, CYLINDER #, SURFACE
3117                                          ;*& SECTOR #. THIS WILL BE READ & CHECKED IN THE FOLLOWING TEST.
3118                                  ;;*****************************************************************
3119  007504  000004                  TST20:  SCOPE
3120  007506  013703  001332                  MOV     RKCS,R3
3121  007512  012702  177764                  MOV     #-14,R2         ;SET UP COUNT FOR 12 SECTORS
3122  007516  013704  001340                  MOV     RKDA,R4
3123  007522  013701  001350                  MOV     DRIVAD,R1       ;GET DRIVE ADDRESS
3124  007526  010105                          MOV     R1,R5           ;STORE IT
3125  007530  005205                          INC     R5
3126  007532  012737  007540  001110          MOV     #1$,$LPERR      ;SET RETURN ADRES FOR LUPING
3127                                                                  ;ON     ERROR (SW 9)
3128  007540  104413                  1$:     CNT.RESET               ;GO, DO CONTROL RESET
3129                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
3130                                                                  ;RESET' ROUTINE. A CONTROL RESET IS
3131                                                                  ;ISSUED AND AFTER A CERTAIN TIME
3132                                                                  ;IF THE 'CNTRL RDY' DOES NOT SET
3133                                                                  ;AN ERROR IS REPORTED. NOTE THAT
3134                                                                  ;THE PC IN ERROR MESSAGE IS THE
3135                                                                  ;PC WHERE 'CNT.RESET' IS LOCATED.
3136                                                                  ;THIS IS A VERY BASIC ERR & IF IT
3137                                                                  ;OCCURS GO BACK TO TEST 10
3138  007542  104421                          TST.SIN                 ;GO CHECK IF SIN IS SET
3139                                                                  ;IF SET, DO DRIVE RESET TO CLR IT
3140  007544  005000                          CLR     R0
3141  007546  010137  033342                  MOV     R1,OUTBUF       ;THIS WORD TO BE X-FERRED. FIRST
3142                                                                  ;WORD OF EACH SECTOR WILL BE THE
3143                                                                  ;ACTUAL DRIVE-ADDRS CONSISTING OF
3144                                                                  ;DRIVE NO, CYL ADDRS, SURFACE
3145                                                                  ;SECTOR NO.
3146  007552  012777  033342  171556          MOV     #OUTBUF,@RKBA   ;ADRS FROM WHICH DATA WORD IS TO
3147                                                                  ;X-FERRED
3148  007560  012777  177777  171546          MOV     #-1,@RKWC       ;SET UP WORD COUNT
3149  007566  010114                          MOV     R1,@R4   ;ADDRS THE DRIVE, CYL 0, & CORRECT SECTOR
3150  007570  012713  002003                  MOV     #2003,@R3       ;WRITE FORMAT, GO
3151
3152  007574  105777  171532          2$:     TSTB    @RKCS           ;DID 'CNTRL RDY' SET?
3153  007600  100410                          BMI     3$              ;YES, BRANCH
3154  007602  005200                          INC     R0              ;NO, HAVE U WAITED LONG?
3155  007604  001373                          BNE     2$              ;IF NOT, LOOP BACK & WAIT
3156                                                                  ;IF YES, REPORT ERROR
3157  007606  004737  020774                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS,DA
```

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3158  007612  010137  001202              MOV     R1,$REG10       ;GET DISK ADRS (UNIT,CYL,SUR,SEC) TO WHICH
3159                                                              ;WRITE FORMAT WAS DONE
3160  007616  104416                      BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
3161                                                              ;$REG10 INTO DR #,CYL,SUR,SEC BITS
3162  007620  104031                      ERROR   31              ;'CNTRL RDY' DID NOT SET ON COMPLETION
3163                                                              ;OF 'WRITE FORMAT'
3164                                                              ;WRT FMT WAS DONE STARTING AT <DSK-ADRES>
3165                                                              ;INDICATED IN EROR MSGE.
3166  007622  004737  021226          3$:     JSR     PC,CHKHE1       ;CHECK IF 'ERR' OR 'HE' BIT IS SET,
3167                                                              ;IF YES RETURN HERE.
3168  007626  104032                      ERROR   32              ;'HE' OR 'ERR' BIT SET WHILE DOING
3169                                                              ;WRITE FORMAT ON CYLINDER 0,
3170                                                              ;SECTOR IN ERROR IS AS SHOWN IN
3171                                                              ;DISK-ADRES BITS 0-3
3172                                                              ;WRT FMT WAS DONE STARTING AT <DSK-ADRES>
3173                                                              ;INDICATED IN EROR MSGE.
3174
3175  007630  004737  021270          4$:     JSR     PC,CHKDA1       ;CHECK IF RKDA INCREMENTED CORRECTLY?
3176
3177  007634  104033                      ERROR   33              ;RKDA DID NOT INCREMENT CORRECT
3178                                                              ;AFTER 1 WORD 'WRITE FORMAT' ON
3179                                                              ;CYLINDER 0, SECTOR IN ERROR IS 1
3180                                                              ;LESS THAN THAT SHOWN IN EXPCTD RKDA
3181  007636  005777  171500          5$:     TST     @RKDB           ;CHECK THAT RKDB DOES CONTAIN A 0
3182                                                              ;AFTER WRT BECAUSE LAST WORD WRITTEN
3183                                                              ;WAS SERIALLY SHIFTED OUT TO THE DISK
3184  007642  001406                      BEQ     6$              ;YES, BRANCH
3185  007644  005037  001162              CLR     $REG0           ;THIS IS WHAT RKDB SHOULD CONTAIN
3186  007650  017737  171466  001164      MOV     @RKDB,$REG1     ;GET RKDB
3187  007656  104037                      ERROR   37              ;RKDB SHOULD BE 0 AFTER WRT SINCE THE
3188                                                              ;LAST WORD WRITTEN WAS SERIALLY SHIFTED
3189                                                              ;OUT OF RKDB
3190  007660  005201                  6$:     INC     R1              ;INCREMENT DRIVE ADDRS TO NXT SECTOR
3191  007662  005205                      INC     R5              ;
3192  007664  122705  000014              CMPB    #14,R5          ;R U GOING TO CHECK THE LAST SECTOR?
3193  007670  001002                      BNE     .+6             ;IF NOT,BRANCH
3194  007672  062705  000004              ADD     #4,R5           ;IF YES,INCREMENT R5 CORRECTLY TO 'EXPCTD RKDA'
3195                                                              ;AFTER HAVING CHECKED THE LAST SECTOR
3196  007676  005202                      INC     R2              ;HAVE U FORMATTED ALL 12 SECTORS?
3197  007700  001317                      BNE     1$              ;IF NOT, BRANCH BACK & LOOP
3198                                                              ;IF YES, EXIT
3199
3200                                  ;;*****************************************************************
3201                                  ;*TEST 21        CHECK 'READ FORMAT'-CYLINDER 0, SECTOR 0-13
3202                                          ;*THIS TEST PERFORMS A RD FMT ON THE 12 SECTORS OF CYLINDER 0
3203                                          ;*THE FOLLOWING IS CHECKED
3204                                          ;*1)  IF CNTRL RDY SET WITHIN A CERTAIN TIME ON COMPLETION
3205                                          ;*OF THE FUNCTION
3206                                          ;*2)  IF 'HE' OR 'ERR' BIT SET?
3207                                          ;*3)  IF THE RKDA INCREMENTS CORRECTLY?
3208                                          ;*4)  RKBA INCREMENTED CORRECTLY BY 30 (OCTAL)
3209                                          ;*5)  RKWC OVERFLOWED TO 0 FROM -14 (OCTAL)
3210                                          ;:6)  CORRECT HEADER WAS RECEIVED FROM ALL 12 SECTORS.
3211                                          ;*7)  RKCS STILL CONTAINS THE 'RD FMT' FUNCTION BITS.
3212                                          ;*IF THERE IS A READ ERROR IN THIS TEST OR ANY
3213                                          ;*OTHER TESTS THE USER SHOULD MAKE SURE THAT
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                                        ;*IT IS AN IRRECOVERABLE ERROR AND NOT A TRANSIENT
                                        ;*ONE. THIS CAN BE DONE BY LOOPING ON THE TEST
                                        ;*IN QUESTION. USUALLY A TRANSIENT ERROR
                                        ;*DISAPPEARS ON RETRIES, WHEREAS A LOGIC ERROR DOES NOT.
                                    ;;**********************************************************************
007702  000004                    TST21:  SCOPE
007704  005005                            CLR     R5
007706  104413                            CNT.RESET                       ;GO, DO CONTROL RESET
                                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                        ;THIS IS A VERY BASIC ERR & IF IT
                                                                        ;OCCURS GO BACK TO TEST 10
007710  104421                            TST.SIN                         ;GO CHECK IF SIN IS SET
                                                                        ;IS SET, DO DRIVE RESET TO CLR IT
007712  013701  001332                    MOV     RKCS,R1
007716  012700  177764                    MOV     #-14,R0                 ;SET UP COUNT FOR 12 SECTORS
007722  013702  001340                    MOV     RKDA,R2
007726  013712  001350                    MOV     DRIVAD,@R2              ;ADDRESS THE DRIVE
007732  012704  033342                    MOV     #OUTBUF,R4
007736  010477  171374                    MOV     R4,@RKBA                ;ADRS TO WHICH X-FER DATA FROM DSK
007742  012777  177764  171364            MOV     #-14,@RKWC              ;SET UP WORD COUNT FOR 12 HEADERS TO BREAD
007750  012777  002005  171354            MOV     #2005,@RKCS             ;READ FORMAT, GO

007756  105777  171350            1$:     TSTB    @RKCS                   ;DID CNTRL RDY SET ON COMPLETION?
007762  100411                            BMI     2$                      ;YES, BRANCH
007764  005205                            INC     R5                      ;NO, WAIT FOR IT TO SET
007766  001373                            BNE     1$                      ;IF WAITED LONG ENOUGH REPORT
                                                                        ;ERROR, OTHERWISE LOOP BACK & WAIT
007770  004737  020774                    JSR     PC,GT4RG                ;GO, GET RKCS, ER, DS,DA
007774  013737  001350  001202            MOV     DRIVAD,$REG10
010002  104416                            BRKDA4                          ;GO TO 'BDA4' & BREAK CONTENTS OF
                                                                        ;$REG10 INTO DR#,CYL,SUR,SEC BITS
010004  104045                            ERROR   45                      ;CNTRL RDY DID NOT SET ON COMPLETION
                                                                        ;OF READ FORMAT-OF CYLINDER 0,
                                                                        ;SECTORS 0-13
                                                                        ;READ FMT WAS DONE STARTING AT <DSK-ADRES>
                                                                        ;INDICATED IN EROR MESGE
010006  004737  021234            2$:     JSR     PC,CHKHE                ;CHECK IF 'ERR' OR 'HE' BIT IS SET,
                                                                        ;IF YES RETURN HERE.
010012  104046                            ERROR   46                      ;'ERR' OR 'HE' BIT SET ON DOING
                                                                        ;READ FMT-OF CYLINDER 0, SEC 0-13
                                                                        ;READ FMT WAS DONE STARTING AT <DSK-ADRES>
                                                                        ;INDICATED IN EROR MESGE
010014  013705  001350            3$:     MOV     DRIVAD,R5
010020  062705  000020                    ADD     #20,R5                  ;RKDA SHOULD HAVE INCREMENTD TO (R2)

010024  004737  021270                    JSR     PC,CHKDA1               ;CHECK IF RKDA INCREMENTED CORRECTLY,
                                                                        ;IF NOT, RETURN HERE.
010030  104040                            ERROR   40                      ;RKDA DID NOT INCREMENT BY 12
                                                                        ;AFTER A 'RD FMT' OF 12 HEADERS OF
                                                                        ;CYLINDER 0, SECTORS 0-13
```

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3270                                                    ;RKBA SHOULD INCREMENT BY 24 BYTES
3271                                                    ;AT THE END OF X-FER
3272  010032  022777  033372  171276  4$:     CMP     #OUTBUF+30,@RKBA ;DID RKBA INCREMENT CORRECTLY?
3273  010040  001407                          BEQ     5$              ;YES, BRANCH
3274  010042  012737  033372  001162          MOV     #OUTBUF+30,$REG0        ;GET EXPCTD RKBA
3275  010050  017737  171262  001164          MOV     @RKBA,$REG1     ;GET ACTUAL RKBA
3276  010056  104042                          ERROR   42              ;RKBA DID NOT INCREMENT CORRECTLY
3277                                                    ;AFTER READ FORMAT OF 12 HEADERS
3278  010060  004737  021316          5$:     JSR     PC,CHKWC        ;GO CHECK IF RKWC OVERFLOWED TO 0
3279                                                    ;IF NOT RETURN HERE.
3280  010064  104041                          ERROR   41              ;RKWC DID NOT OVERFLOW TO 0
3281                                                    ;AFTER 'RD FMT' OF 12 HEADERS
3282                                                    ;OF CYLINDER 0
3283  010066  005724                  6$:     TST     (R4)+           ;WAS THE CORRECT HEADER RECIEVED?
3284  010070  001413                          BEQ     7$              ;YES, BRANCH
3285  010072  010037  001162                  MOV     R0,$REG0        ;GET SECTOR FOR WHICH THE HEADER
3286  010076  062737  000014  001162          ADD     #14,$REG0       ;COULD NOT BE READ CORRECT
3287  010104  005037  001164                  CLR     $REG1           ;EXPCTD HEADER-0, FOR CYL 0
3288  010110  014437  001166                  MOV     -(R4),$REG2     ;GET WRONG HEADER RECVD
3289  010114  104043                          ERROR   43              ;HEADER WAS NOT READ RIGHT FOR
3290                                                    ;SECTOR (AS IN ER MSGE), & CYL 0
3291  010116  005724                          TST     (R4)+           ;WAS THE CORRECT HEADER RECVD?
3292  010120  005200                  7$:     INC     R0              ;YES, HAVE U CHECKED FOR ALL 12 SECTORS?
3293  010122  001361                          BNE     6$              ;IF NOT, LOOP BACK & CHK HDR FRM NXT SECTR
3294
3295  010124  004737  021342                  JSR     PC,CHKER        ;CHECK IF ANY BIT IN RKER IS SET,
3296                                                    ;IF YES, RETURN HERE.
3297  010130  104036                          ERROR   36              ;RKER BIT SET ON DOING RD FMT
3298                                                    ;OF CYL 0, SECTORS 0-13
3299  010132  022711  002204          8$:     CMP     #2204,@R1       ;DOES RKCS STILL CONTAIN FUNCTION BITS?
3300  010136  001406                          BEQ     TST22           ;;YES, EXIT
3301  010140  012737  002204  001162          MOV     #2204,$REG0     ;GET EXPCTD RKCS
3302  010146  011137  001164                  MOV     @R1,$REG1       ;GET ACTUAL RKCS
3303  010152  104024                          ERROR   24              ;RKCS DID NOT CONTAIN 'RD FMT'
3304                                                    ;FUNCTION BITS ON COMPETION OF
3305                                                    ;THE FUNCTION
3306
3307
3308
3309                                    ;;**************************************************************************
3310                                    ;*TEST 22        CHECK 'READ',CYLINDER 0, SECTORS 0 TO 13
3311                                            ;*THIS TEST PERFORMS A READ OF ALL THE SECTORS OF CYLINDER 0
3312                                            ;*& CHECKS THE FOLLOWING
3313                                            ;*1) CNTRL RDY SETS WITHIN A CERTAIN TIME ON COMPLETION
3314                                            ;*OF THE FUNCTION
3315                                            ;*2) IF 'HE' OR 'ERR' BIT SET?
3316                                            ;*3) IF THE CORRECT PSUEDO-HEADER (FIRST WORD OF EVERY)
3317                                            ;*SECTOR, WRITTEN IN A PREVIOUS TEST) WAS RECEIVED.
3318                                            ;*4) IF RKDS CONTAINS THE CORRECT WORD.
3319                                            ;*4) IF RKDA INCREMENTED CORRECTLY.
3320                                            ;*5) IF REST OF THE (377) WORDS IN EACH SECTOR ARE '0' , NOTE
3321                                            ;*PREVIOUSLY ONE WORD WAS WRITTEN PER SECTOR.
3322                                            ;*6) IF RKCS STILL CONTAINS THE 'READ' FUNCTION BITS
3323                                            ;*7) IF CONTROL RESET CLEARS RKDB.
3324                                            ;*  IF TESTING IS BEING DONE ON A SIMULATOR ONLY LAST SECTOR(13)
3325                                            ;*IS READ BECAUSE THE SIMULATOR CAN STORE ONLY 1 SECTOR (256 WORDS).
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3326                                        ;*HENCE ONLY THE DATA WRITTEN LAST CAN BE READ BACK.
3327                                        ;;*****************************************************************
3328  010154  000004                TST22:  SCOPE
3329  010156  012737  010230  001110        MOV     #1$,$LPERR      ;SET RETURN ADRES FOR LUPING
3330                                                                ;ON      ERROR (SW 9)
3331  010164  013703  001332                MOV     RKCS,R3
3332  010170  013701  001350                MOV     DRIVAD,R1
3333  010174  010105                        MOV     R1,R5
3334  010176  012704  033342                MOV     #OUTBUF,R4
3335  010202  005737  001344                TST     SIMUL           ;TESTING ON SIMULATOR?
3336  010206  001405                        BEQ     9$              ;NO, BRANCH
3337                                                                ;IF TESTING ON SIMULATOR READ
3338                                                                ;SECTOR  13  ONLY
3339  010210  052701  000013                BIS     #13,R1          ;SET BITS FOR SEC 13
3340  010214  052705  000020                BIS     #20,R5          ;RKDA SHOULD INCRMNT TO THIS AFTER READ
3341  010220  000403                        BR      1$
3342  010222  012702  177764        9$:     MOV     #-14,R2         ;SET COUNT FOR 12 SECTORS
3343  010226  005205                        INC     R5              ;RKDA SHOULD INCREMENT TO
3344                                                                ;THIS AFTER 1 SECTOR  READ
3345  010230  104413                1$:     CNT.RESET               ;GO, DO CONTROL RESET
3346                                                                ;THIS IS A CALL FOR THE 'CNTRL-
3347                                                                ;RESET' ROUTINE. A CONTROL RESET IS
3348                                                                ;ISSUED AND AFTER A CERTAIN TIME
3349                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
3350                                                                ;AN ERROR IS REPORTED. NOTE THAT
3351                                                                ;THE PC IN ERROR MESSAGE IS THE
3352                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
3353                                                                ;THIS IS A VERY BASIC ERR & IF IT
3354                                                                ;OCCURS GO BACK TO TEST 10
3355  010232  104421                        TST.SIN                 ;GO CHECK IF SIN IS SET
3356                                                                ;IF SET, DO DRIVE RESET TO CLR IT
3357  010234  010177  171100                MOV     R1,@RKDA        ;ADDRESS THE DRIVE
3358  010240  010477  171072                MOV     R4,@RKBA        ;ADRS TO WHICH X-FER DATA FROM DISK
3359  010244  012777  177400  171062        MOV     #-400,@RKWC     ;SETUP WORD COUNT
3360  010252  012713  000005                MOV     #5,@R3          ;READ,GO
3361
3362  010256  005000                        CLR     R0
3363  010260  105713                2$:     TSTB    @R3             ;DID CNTRL RDY SET ON COMPETION?
3364  010262  100410                        BMI     3$              ;YES, BRANCH
3365  010264  005200                        INC     R0              ;NO, WAIT FOR IT TO SET
3366  010266  001374                        BNE     2$              ;IF WAITED LONG ENOUGH, REPORT
3367                                                                ;ERROR, OTHERWISE LOOP BAK & WAIT
3368  010270  004737  020774                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS,DA
3369  010274  010137  001202                MOV     R1,$REG10       ;GET SECTOR ADDRES WHERE ERROR OCCURED
3370  010300  104416                        BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
3371                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
3372  010302  104045                        ERROR   45              ;CNTRL RDY DID NOT SET ON COMPLETION
3373                                                                ;OF READ OF CYLINDER 0, SECTOR
3374                                                                ;AS SHOWN IN <DSK-ADRES>
3375                                                                ;READ WAS DONE STARTING AT <DSK-ADRES>
3376                                                                ;INDICATED IN EROR MESGE
3377  010304  004737  021226        3$:     JSR     PC,CHKHE1       ;CHECK IF 'ERR' OR 'HE' BIT IS SET,
3378                                                                ;IF YES RETURN HERE.
3379  010310  104046                        ERROR   46              ;HE OR ERR BIT SET
3380                                                                ;ON 'READ' OF CYLINDER 0, SECTOR
3381                                                                ;AS SHOWN IN <DSK-ADRES>
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3382                                                    ;READ WAS DONE STARTING AT <DSK-ADRES>
3383                                                    ;INDICATED IN EROR MESGE
3384  010312  020114                 4$:     CMP     R1,(R4)         ;WAS THE DATA WORD RECVD, CORRECT?
3385                                                    ;THE FIRST DATA WORD OF EACH SECTOR
3386                                                    ;IS AN ADRS WORD COMRISING OF DRIVE NO,
3387                                                    ;CYLINDER ADRS, SUR, SECTOR ADRS
3388  010314  001407                         BEQ     5$
3389  010316  010137  001162               MOV     R1,$REG0        ;GET EXPCTD DATA WORD FROM DISK
3390  010322  011437  001164               MOV     (R4),$REG1      ;GET THE DATA WORD RECVD
3391  010326  010137  001166               MOV     R1,$REG2        ;GET DISK ADRES
3392  010332  104044                       ERROR   44              ;DID NOT RECIEVE CORRECT DATA WORD ON
3393                                                    ;READ, OF CYLINDER 0, SECTOR AS SHOWN IN 'DSK
3394                                                    ;ADRES' OF EXPCTD DATA WORD
3395  010334  004737  021270       5$:     JSR     PC,CHKDA1       ;CHECK IF RKDA INCREMENTED CORRECTLY,
3396                                                    ;IF NOT RETURN HERE.
3397  010340  104040                       ERROR   40              ;RKDA DID NOT INCREMENT CORRECTLY
3398                                                    ;AFTER READ OF 1 WORD, FROM CYL 0
3399                                                    ;SEC IN ERROR IS 1 LESS THAN THAT
3400                                                    ;SHOWN IN EXPCTD RKDA
3401                                                    ;
3402                                                    ;AS A RESULT OF 'WRT FMT' IN A PREVIOUS TEST
3403                                                    ;FIRST WORD OF EVERY SECTOR IS NON-
3404                                                    ;ZERO (PSUEDO-HDR), REST 377 WORDS
3405                                                    ;ARE ALL 0'S.
3406                                                    ;CHECK IF THE REST OF THE 377
3407                                                    ;WORDS ARE ALL 0'S
3408  010342  012737  177775  001370               MOV     #-3,EFLG1       ;ALLOW ONLY 3 ERRORS
3409  010350  012700  033344                       MOV     #OUTBUF+2,R0    ;INITIALIZE PTR TO 2ND WRD IN BUFR
3410  010354  012737  177401  001362               MOV     #-377,COUNT     ;CHECK 377 WORDS IN THE BUFFER
3411  010362  005710                 11$:    TST     @R0             ;IS THIS WRD 0?
3412  010364  001005                         BNE     12$             ;NO, ERROR
3413  010366  005720                         TST     (R0)+           ;INCRMNT PTR TO NXT WRD
3414  010370  005237  001362               INC     COUNT           ;CHKD ALL 377 WRDS?
3415  010374  001372                         BNE     11$
3416  010376  000412                         BR      7$              ;YES, BRANCH
3417  010400  005037  001162       12$:    CLR     $REG0           ;GET EXPCTD WORD
3418  010404  012037  001164               MOV     (R0)+,$REG1     ;GET WORD RECVD
3419  010410  010137  001166               MOV     R1,$REG2        ;GET DISK ADRES, ERROR IN THIS
3420                                                    ;SECTOR
3421  010414  104044                       ERROR   44              ;DATA ERROR, THE LAST 377 WORDS
3422                                                    ;READ FROM EACH SECTOR SHOULD BE 0
3423                                                    ;IN A PREVIOUS TEST, FIRST WORD OF
3424                                                    ;EVERY SEC (CYL 0) WAS WRITTEN AS A
3425                                                    ;PSUEDO-HDR, REST OF THE WORDS IN THE
3426                                                    ;SECTR ARE AUTOMATICALLY WRITTEN AS
3427                                                    ;0'S. THIS ERROR MAY MEAN THAT IT
3428                                                    ;DIDN'T HAPPEN SO
3429  010416  005237  001370               INC     EFLG1           ;ALLOW ONLY 3 DATA ERORS OF THIS KIND
3430  010422  001357                         BNE     11$
3431
3432
3433  010424  005737  001344       7$:     TST     SIMUL           ;TESTING ON SIMULATOR?
3434  010430  001011                         BNE     10$             ;YES BRANCH
3435                                                    ;IF NOT TESTING ON SIMULATOR GO AHEAD
3436                                                    ; & READ ALL 12 SECTORS ON CYL 0
3437  010432  005201                         INC     R1              ;INCREMENT DRIV-ADRES TO NXT SECTOR
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3438  010434  005205                          INC     R5              ;INCREMENT 'EXPCTD DRIV-ADRES'
3439  010436  122705  000014                  CMPB    #14,R5          ;R U GOING TO READ THE LAST SECTOR?
3440  010442  001002                          BNE     .+6             ;IF NOT, BRANCH
3441  010444  062705  000004                  ADD     #4,R5           ;IF YES, INCREMENT 'EXPCTD RKDA'
3442                                                                  ;CORRECTLY
3443  010450  005202                          INC     R2              ;HAVE U READ ALL 12 SECTORS?
3444  010452  001266                          BNE     1$              ;IF NOT LOOP BACK & READ THE
3445                                                                  ;NXT SECTOR
3446  010454  022713  000204          10$:    CMP     #204,@R3        ;DOES RKCS, STILL HAVE THE 'READ' FUNCTION
3447  010460  001406                          BEQ     8$              ;YES, BRANCH
3448  010462  012737  000204  001162          MOV     #204,$REG0      ;GET EXPCTD RKCS
3449  010470  011337  001164                  MOV     @R3,$REG1       ;GET RKCS RECVD
3450  010474  104024                          ERROR   24              ;RKCS SHOULD STILL CONTAIN THE 'READ'
3451                                                                  ;FUNCTION BITS
3452  010476  104413                  8$:     CNT.RESET               ;GO ,DO CONTROL RESET
3453                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
3454                                                                  ;RESET' ROUTINE. A CONTROL RESET IS
3455                                                                  ;ISSUED AND AFTER A CERTAIN TIME
3456                                                                  ;IF THE 'CNTRL RDY' DOES NOT SET
3457                                                                  ;AN ERROR IS REPORTED. NOTE THAT
3458                                                                  ;THE PC IN ERROR MESSAGE IS THE
3459                                                                  ;PC WHERE 'CNT.RESET' IS LOCATED.
3460                                                                  ;THIS IS A VERY BASIC ERR & IF IT
3461                                                                  ;OCCURS GO BACK TO TEST 10
3462  010500  005777  170636                  TST     @RKDB           ;DID CNTRL RESET CLEAR RKDB?
3463  010504  001407                          BEQ     TST23           ;;YES, EXIT
3464  010506  013737  001342  001162          MOV     RKDB,$REG0      ;GET ADRES OF RKDB
3465  010514  017737  170622  001164          MOV     @RKDB,$REG1     ;GET CONTENTS OF RKDB
3466  010522  104102                          ERROR   102             ;CONTROL RESET DID NOT
3467                                                                  ;CLEAR RKDB
3468
3469
3470                          ;;*****************************************************************
3471                          ;*TEST 23       CHECK 'WRITE FORMAT' OF THE DISK
3472                                  ;*THIS TEST WRITE FORMATS THE ENTIRE DISK.  THE FIRST
3473                                  ;*WORD OF EVERY SECTOR IS WRITTEN TO BE A PSUEDO-HEADER
3474                                  ;*CONSISTING OF THE DRIVE #, CYLINDER #, SURFACE & SECTOR #.
3475                                  ;*1 SECTOR IS WRITTEN AT A TIME. THE WRITING IS DONE
3476                                  ;*IN THIS ORDER: CYL 0-SUR 0; CYL 0-SUR 1;  CYL 1-SUR 0
3477                                  ;*CYL 1-SUR 1; CYL 2-SUR 0; CYL 2-SUR 1----- CYL 312-SUR 1.
3478                                  ;*IMPORTANCE OF THIS TEST SHOULD BE REALIZED, THIS IS
3479                                  ;*THE FIRST TIME EACH & EVERY SECTOR ON THE DISK IS
3480                                  ;*ACCESSED & WRITTEN ON.  THIS IS THE FIRST TIME RKDA
3481                                  ;*IS BEING MADE TO INCREMENT OVER THE ENTIRE DISK (FROM
3482                                  ;*000000 TO 014520) IF A 'SIN' OCCURS AT ANY POINT
3483                                  ;*A DRIVE RESET IS DONE BEFORE DOING WRT FMT FOR THE NEXT
3484                                  ;*SECTOR.  ANY OTHER ERROR IS CLEARED THROUGH A CONTROL RESET.
3485                                  ;*THE FOLLOWING CHECKING IS DONE AFTER WRITING EACH
3486                                  ;*CYLINDER.
3487                                  ;*1. CNTRL RDY SETS WITHIN A CERTAIN TIME ON COMPLETION
3488                                  ;*OF THE FUNCTION.
3489                                  ;*2. IF 'SIN' OCCURRED?
3490                                  ;*3. IF 'HE' OR 'ERR' BIT SET?
3491                                  ;*4. IF RKDA INCREMENTED CORRECTLY, INCLUDING BOUNDARY
3492                                  ;*CONDITIONS (SECTOR COUNTER BITS OVERFLOWING INTO SURFACE,
3493                                  ;*SURFACE BIT OVERFLOWING INTO CYLINDER BITS) AT THE END
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                                        ;*OF THIS POINTERS ARE INCREMENTED ADJUSTED, ETC.
                                        ;*& 'WRT FMT' ON THE NEXT SECTOR IS DONE.
                                        ;;*****************************************************************
010524  000004                TST23:  SCOPE
010526  012737  000001  001206        MOV     #1,$TIMES       ;;DO 1 ITERATION
010534  012737  010564  001110        MOV     #1$,$LPERR      ;SET RETURN ADRES FOR LUPING
                                                                ;ON  ERROR (SW 9)
010542  005003                        CLR     R3              ;(R3)=0, SURFACE 0 BEING WRITTEN
                                                                ;(R3)-1, SURFACE 1 BEING WRITTEN
010544  012704  177465                MOV     #-313,R4        ;SET UP COUNT FOR 203 CYLINDERS
010550  012702  177764                MOV     #-14,R2         ;SET UP COUNT FOR 12 SECTORS
010554  013701  001350                MOV     DRIVAD,R1       ;GET DRIVE ADRES
010560  010105                        MOV     R1,R5           ;STORE IT
010562  005205                        INC     R5
010564  104413                1$:     CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                ;THIS IS A VERY BASIC ERR & IF IT
                                                                ;OCCURS GO BACK TO TEST 10
010566  104421                        TST.SIN                 ;GO CHECK IF SIN IS SET
                                                                ;IF SET, DO DRIVE RESET TO CLR IT
010570  005037  001362        7$:     CLR     COUNT
010574  010137  033342                MOV     R1,OUTBUF       ;THIS WORD TO BE WRITTEN.  THE FIRST
                                                                ;WORD OF EACH SECTOR WILL BE THE ACTUAL
                                                                ;DISK-ADRES, CONSISTING OF THE DRIVE NO,
                                                                ;CYL ADRES, SURFACE BIT SECTOR ADRES
010600  012777  033342  170530        MOV     #OUTBUF,@RKBA   ;ADRES FROM WHICH WORD IS TO B X-FERRED
010606  012777  177777  170520        MOV     #-1,@RKWC       ;SET UP WORD COUNT
010614  010177  170520                MOV     R1,@RKDA        ;ADRES THE DRIVE, WITH CORRECT CYL
                                                                ;& SECTOR ADRES
010620  012777  002003  170504        MOV     #2003,@RKCS     ;WRITE FORMAT, GO      ,
010626  105777  170500        2$:     TSTB    @RKCS           ;DID CNTRL RDY SET
010632  100411                        BMI     3$              ;YES, BRANCH
010634  005237  001362                INC     COUNT           ;NO, HAVE U WAITED LONG ENOUGH?
010640  001372                        BNE     2$              ;IF NOT, LOOP BACK & WAIT
                                                                ;IF YES, REPORT ERROR
010642  004737  020774                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS,DA
010646  010137  001202                MOV     R1,$REG10       ;GET DISK ADRES, WHERE ERROR OCCURED
010652  104416                        BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
010654  104031                        ERROR   31              ;CNTRL RDY DID NOT SET ON COMPLETION
                                                                ;OF 'WRITE FORMAT', ON SECTOR AS
                                                                ;SHOWN IN <DSK-ADRES>
                                                                ;WRT FMT WAS DONE STARTING AT <DSK-ADRES>
                                                                ;INDICATED IN EROR MSGE.
010656  032777  001000  170442  3$:     BIT     #1000,@RKDS     ;DID SIN BIT SET?
010664  001405                        BEQ     4$              ;NO, BRANCH
010666  004737  021002                JSR     PC,GT3RG        ;GO, GET RKCS, ER, DS
010672  010137  001170                MOV     R1,$REG3        ;GET, DISK-ADRES WHERE ERROR OCCURED
010676  104001                        ERROR   1               ;SIN SET WHILE DOING WRT FMT
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                                                        ;TO DISK-ADRES (AS IN $REG3)
                                                        ;CHECK IF 'ERR' OR 'HE' BIT IS SET
                                                        ;IF YES, RETURN HERE.
010704  104032          ERROR   32                     ;HE OR ERR SET WHILE DOING WRITE
                                                        ;FORMAT ON SECTOR AS INDICATED IN
                                                        ;<DSK-ADRES>
                                                        ;WRT FMT WAS DONE STARTING AT <DSK-ADRES>
                                                        ;INDICATED IN EROR MSGE.
010706  004737  021270  5$:     JSR     PC,CHKDA1      ;CHECK IF RKDA INCREMENTED CORRECTLY,
                                                        ;IF NOT, RETURN HERE.
010712  104033          ERROR   33                     ;RKDA DID NOT INCREMENT CORRECTLY
                                                        ;AFTER 'WRITE FORMAT' WAS DONE
                                                        ;TO THE SECTOR PREVIOUS TO THAT
                                                        ;INDICATED IN 'EXPCTD' RKDA
010714  005201          6$:     INC     R1             ;INCREMENT TO THE NXT SECTOR
010716  005205                  INC     R5             ;INCREMENT R5, TO WHAT RKDA WILL INCREMENT
010720  022702  177776          CMP     #-2,R2         ;R U GOING TO FORMAT THE LAST SECTOR
                                                        ;IN THE CYLINDER ?
010724  001002                  BNE     .+6            ;IF NOT, BRANCH
010726  062705  000004          ADD     #4,R5          ;INCREMENT R5 CORRECTLY TO 'EXPCTD RKDA'
010732  005202                  INC     R2             ;HAVE U FORMATTED ALL 12 SECTORS
                                                        ;ON THIS CYLINDER
010734  001313                  BNE     1$             ;IF NOT, LOOP BACK & FORMAT THE
                                                        ;NEXT SECTOR
                                                        ;YES
010736  012702  177764          MOV     #-14,R2        ;RESET THE COUNT FOR 12 SECTORS
010742  042701  000037          BIC     #37,R1         ;CLEAR THE SEC ADRES BITS
010746  005703                  TST     R3             ;SURFACE 1?
010750  001006                  BNE     8$             ;YES, BRANCH
010752  005203                  INC     R3             ;NO, SET FLAG
010754  062701  000020          ADD     #20,R1         ;INCREMENT TO THE NXT SURFACE
010760  010105                  MOV     R1,R5          ;THIS IS WHAT RKDA SHOULD
010762  005205                  INC     R5             ;INCREMENT TO.
010764  000677                  BR      1$             ;GO, DO NXT SURFACE
010766  062701  000040  8$:     ADD     #40,R1         ;INCREMENT TO NXT CYL
010772  010105                  MOV     R1,R5          ;POSITION FOR
010774  005205                  INC     R5             ;EXPCTD RKDA
010776  005003                  CLR     R3
011000  005204                  INC     R4             ;HAVE U FORMATTED ALL 203 CYLINDERS
011002  001270                  BNE     1$             ;IF NOT, LOOP BACK & FORMAT THE
                                                        ;NEXT CYLINDER


;;*******************************************************************
;*TEST 24        CHECK 'READ FORMAT' FOR THE ENTIRE DISK
        ;*THIS TEST READ FORMATS THE ENTRE DISK, WHICH WAS WRT
        ;*FORMATTED IN THE PREVIOUS TEST.  THE FOLLOWING CHECKING
        ;*IS DONE
        ;*1. CNTRL RDY SETS WITHIN A CERTAIN TIME ON COMPLETION
        ;*OF FUNCTION
        ;*2. IF 'SIN' OCCURRED?
        ;*3. IF 'HE' OR 'ERR' OCCURRED?
        ;*4. RKDA INCREMENTED CORRECTLY.
        ;*5. IF THE CORRECT HEADER WAS READ.
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                                        ;*6. IF RKWC OVERFLOWED CORRECTLY.
                                        ;*12 SECTORS (1 CYLINDER) ARE READ AT A TIME. IF 'SIN'
                                        ;*OCCURS A DRIVE RESET IS DONE BEFORE READING THE NEXT
                                        ;*SECTOR.  READING IS DONE IN THIS ORDER CYL 0-SUR 0;
                                        ;*CYL 0-SUR 1; CYL 1-SUR 0; CYL 1-SUR 1; CYL 2-SUR 0;
                                        ;*CYL 2-SUR 1;-----CYL 312-SUR 1. IF TESTING ON SIMULATOR, ONLY
                                        ;*THE LAST CYLINDER (312), LAST SECTOR (13), SURFACE 1 IS READ.
                                        ;;*****************************************************************
011004  000004                  TST24:  SCOPE
011006  012737  000001  001206          MOV     #1,$TIMES       ;;DO 1 ITERATION
011014  012737  011100  001110          MOV     #1$,$LPERR      ;SET RETURN ADRES FOR LUPING
                                                                ;ON      ERROR (SW 9)
011022  005037  001356                  CLR     INDX1           ;INDX1=0, SURFACE 0 BEING READ
                                                                ;INDX1=1, SURFACE 1 BEING READ
011026  013701  001350                  MOV     DRIVAD,R1       ;GET DRIVE ADRES
011032  010102                          MOV     R1,R2
011034  005737  001344                  TST     SIMUL           ;TESTING ON SIMULATOR?
011040  001410                          BEQ     12$             ;NO, BRANCH
011042  052701  014533                  BIS     #14533,R1       ;SET BITS FOR CYL 312, SEC 13, SUR 1
                                                                ;ON SIMULATOR, CHECK ONLY CYL 312,
                                                                ;SECTOR 13, SURFACE 1
011046  052702  014540                  BIS     #14540,R2       ;RKDA SHOULD INCRMNT TO THIS AFTR
                                                                ;RD FMT OF 1 SECTOR
011052  012737  177777  001370          MOV     #-1,EFLG1       ;SET COUNT FOR READING HDR
                                                                ;FROM 1 SECTOR ONLY
011060  000407                          BR      1$
011062  012705  177465          12$:    MOV     #-313,R5        ;SET UP COUNT FOR 203 CYLINDERS
011066  012737  177764  001370          MOV     #-14,EFLG1      ;SET COUNT FOR 12 HDRS TO BE
                                                                ;READ FROM EACH CYLINDER
011074  062702  000020                  ADD     #20,R2          ;THIS IS WHAT RKDA SHOULD INCREMENT
                                                                ;BY, AFTER 'RD FMT' OF EACH CYLINDER
011100  104413                  1$:     CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                ;THIS IS A VERY BASIC ERR & IF IT
                                                                ;OCCURS GO BACK TO TEST 10
011102  104421                          TST.SIN                 ;CHECK IF SIN IS SET
                                                                ;IF SET DO DRV-RESET TO CLR IT
011104  012703  033342                  MOV     #OUTBUF,R3      ;STORE ADRES OF BUFFER
011110  005037  001360          11$:    CLR     INDX2
011114  010377  170216                  MOV     R3,@RKBA        ;ADRES TO WHICH DATA IS TO BE X-FERRED
                                                                ;FROM THE DISK
011120  013777  001370  170206          MOV     EFLG1,@RKWC     ;SET UP WORD COUNT FOR 12 HEADERS
                                                                ;TO BE READ OFF EACH CYLINDER
                                                                ;(ONLY 1 FOR SIMULATOR)
011126  010177  170206                  MOV     R1,@RKDA        ;ADRES THE DRIVE WITH CORRECT
                                                                ;CYLINDER & SECTOR ADRES
011132  012777  002005  170172          MOV     #2005,@RKCS     ;READ FORMAT, GO
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3662  011140  105777  170166          2$:   TSTB    @RKCS           ;DID CNTR1 RDY SET?
3663  011144  100411                        BMI     3$              ;YES, BRANCH
3664  011146  005237  001360                INC     INDX2           ;NO, HAVE U WAITED LONG ENOUGH?
3665  011152  001372                        BNE     2$              ;IF NOT, LOOP BACK & WAIT FOR IT
3666                                                                ;IF YES, REPORT ERROR
3667  011154  004737  020774                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS,DA
3668  011160  010137  001202                MOV     R1,$REG10       ;GET DRIV-ADRES STARTING WHICH
3669                                                                ;'READ FORMAT' WAS DONE
3670  011164  104416                        BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
3671                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
3672  011166  104045                        ERROR   45              ;CNTRL RDY DID NOT SET AFTER
3673                                                                ;READ FORMAT. 'RKDA' IN EROR MSGE
3674                                                                ;GIVES THE CONTENTS OF RKDA AT THE
3675                                                                ;TIME OF ERROR.
3676                                                                ;READ FMT WAS DONE STARTING AT <DSK-ADRES>
3677                                                                ;INDICATED IN EROR MSGE.
3678
3679  011170  032777  001000  170130  3$:   BIT     #1000,@RKDS     ;DID 'SIN' SET?
3680  011176  001405                        BEQ     4$              ;NO, BRANCH
3681  011200  004737  021002                JSR     PC,GT3RG        ;GO, GET RKCS, ER, DS
3682  011204  010137  001170                MOV     R1,$REG3        ;GET DISK-ADRES WHERE 'SIN'
3683                                                                ;OCCURED
3684  011210  104001                        ERROR   1               ;SIN ERROR ON DOING RD FMT
3685                                                                ;TO CYL INDICATED IN $REG3
3686
3687  011212  004737  021226          4$:   JSR     PC,CHKHE1       ;CHECK IF 'ERR' OR 'HE' BIT IS SET,
3688                                                                ;IF YES, RETURN HERE.
3689  011216  104046                        ERROR   46              ;HE OR ERR WHILE DOING A READ
3690                                                                ;FORMAT. 'RKDA' IN EROR MSGE GIVES
3691                                                                ;THE CONTENTS OF RKDA AT THE TIME OF ERROR
3692                                                                ;READ FMT WAS DONE STARTING AT <DSK-ADRES>
3693                                                                ;INDICATED IN EROR MESGE
3694  011220  020277  170114          5$:   CMP     R2,@RKDA        ;DID RKDA INCREMENT CORRECTLY BY 12 SEC
3695  011224  001410                        BEQ     6$
3696  011226  010237  001202                MOV     R2,$REG10       ;GET EXPCTD RKDA
3697  011232  104415                        BRKDA0                  ;GO TO 'BDA0' & BREAK  CONTENTS OF
3698                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
3699  011234  017737  170100  001202        MOV     @RKDA,$REG10    ;GET RECVD RDKA
3700  011242  104416                        BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
3701                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
3702  011244  104040                        ERROR   40              ;RKDA DID NOT INCREMENT BY 12 SECTORS
3703                                                                ;AFTER RD FMT WAS DONE. ADRES
3704                                                                ;OF CYLINDER IN ERROR CAN BE OBTAINED
3705                                                                ;FROM 'EXPCTD' RDDA
3706  011246  013700  001370          6$:   MOV     EFLG1,R0        ;SET UP COUNT FOR 12 HEADERS TO B CHKD
3707                                                                ;(ONLY 1, IF SIMULATOR)
3708  011252  010104                        MOV     R1,R4           ;GET DRIV-ADRES FROM WHERE RDFMT WAS DONE
3709  011254  042704  160037                BIC     #160037,R4      ;GET THE CYLINDER ADRES ONLY. (HEADER)
3710  011260  020413                  7$:   CMP     R4,(R3)         ;IS THE RECVD HEADER SAME AS EXPCTD?
3711  011262  001412                        BEQ     8$
3712  011264  010437  001164                MOV     R4,$REG1        ;GET EXPCTD HEADER WORD
3713  011270  011337  001166                MOV     (R3),$REG2      ;GET HEADER WORD RECVD
3714  011274  010037  001162                MOV     R0,$REG0
3715  011300  062737  000014  001162        ADD     #14,$REG0       ;GET THE SECTOR (OCTAL NO) WHICH DID
3716                                                                ;NOT GIVE THE CORRECT HEADER
3717  011306  104043                        ERROR   43              ;DID NOT RECIEVE THE CORRECT HEADER
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3718
3719                                                    ;WORD FROM 'SECTOR' AS INDICATED
3720  011310  005723              8$:     TST     (R3)+ ;(NOTE SECTOR # IS OCTAL)
3721                                                    ;INCREMENT POINTER TO THE NXT WORD
3722  011312  005200                      INC     R0    ;IN MEMORY WHERE THE RECVD HDR IS STORED
3723  011314  001361                      BNE     7$    ;HAVE U CHECKED ALL 12 HEADERS?
3724                                                    ;IF NOT, LOOP BACK & CHK THE NXT.
3725                                                    ;YES, ALL HEADERS FOR THIS CYLINDER
3726  011316  004737  021316              JSR     PC,CHKWC ;CHECKED.
3727                                                    ;CHECK IF RKWC OVERFLOWED TO 0, IF
3728  011322  104041                      ERROR   41    ;NOT RETURN HERE.
3729                                                    ;RKWC DID NOT OVERFLOW AFTER DOING
3730                                                    ;RDFMT OF 12 SECTORS ON THE CYLINDER
3731                                                    ;NOTE THAT 'RKDA' IS THE INCREMENTED
3732  011324  005737  001344    9$:     TST     SIMUL ;RKDA AFTER THE RDFMT
3733  011330  001031                      BNE     TST25 ;TSTING ON SIMULATOR?
3734                                                    ;;IF YES, EXIT
3735  011332  005737  001356              TST     INDX1 ;NO
3736  011336  001011                      BNE     10$   ;DOING SURFACE 1
3737  011340  005237  001356              INC     INDX1 ;YES, BRANCH
3738  011344  062701  000020              ADD     #20,R1 ;NO
3739  011350  010102                      MOV     R1,R2 ;INCREMENT DRIV ADRES TO THE NXT SURFACE
3740  011352  062702  000020              ADD     #20,R2
3741                                                    ;THIS IS WHAT RKDA SHOULD INCREMENT
3742  011356  000137  011100              JMP     1$    ;TO, AFTER READ FMT OF THE CYLINDER
3743  011362  005037  001356    10$:    CLR     INDX1 ;GO RD FMT THE NXT SURFACE
3744  011366  042701  000037              BIC     #37,R1 ;
3745  011372  062701  000040              ADD     #40,R1 ;CLR SEC, SURFACE BITS
3746  011376  010102                      MOV     R1,R2 ;INCREMENT TO NXT CYL
3747  011400  062702  000020              ADD     #20,R2 ;THIS IS WHAT RKDA SHOULD BE
3748  011404  005205                      INC     R5    ;AFTER RD FMT OF CYLINDER
3749  011406  001402                      BEQ     TST25 ;HAVE U DONE ALL CYLINDERS?
3750  011410  000137  011100              JMP     1$    ;;EXIT
3751                                                    ;IF NOT, LOOP BACK & READ FMT FROM
3752                                                    ;THE NXT CYLINDER
3753
3754                          ;;**************************************************************
3755                          ;*TEST 25       CHECK 'READ' OF THE ENTIRE DISK
3756                                  ;*READ OF THE ENTIRE DISK (ONE WORD PER SECTOR) IS DONE
3757                                  ;*IN THIS TEST.  IN A PREVIOUS TEST THE FIRST WORD OF
3758                                  ;*EVERY SECTOR WAS WRITTEN LIKE A PSUEDO-HEADER (DRIVE #,
3759                                  ;*CYLINDER #, SURFACE & SECTOR #).  THESE PSUEDO HEADERS
3760                                  ;*WILL BE READ & CHECKED IN THIS TEST, PROVING THAT ANY
3761                                  ;*SECTOR CAN BE ACCESSED AND READ.
3762                                  ;*THE FOLLOWING CHECKING IS DONE
3763                                  ;*1. CNTRL RDY SETS WITHIN A CERTAIN TIME ON COMPLETION
3764                                  ;*OF FUNCTION.
3765                                  ;*2. IF 'SIN' OCCURRED?
3766                                  ;*3. IF 'HE' OR 'ERR' OCCURRED?
3767                                  ;*4. THE CORRECT FIRST WORD FROM EVERY SECTOR
3768                                  ;*WAS RECEIVED.  THIS WORD REFLECTS THE ABSOLUTE
3769                                  ;*DISK ADDRESS (DRV #, CYL #, SUR, SEC#) OF THAT SECTOR.
3770                                  ;*5. IF RKDB CONTAINED THE CORRECT WORD.
3771                                  ;*IF 'SIN' OCCURS DRIVE RESET IS DONE BEFORE READING
3772                                  ;*THE NEXT SECTOR.  READ IS DONE IN THIS ORDER SEC 0-11
3773                                  ;*CYL 0 SUR 0 -> SEC 0-11 CYL 0 SUR 1 -> SEC 0-11 CYL 1,....
```

```
                                        ;*IF TESTING ON SIMULATOR ONLY LAST CYLINDER (312), LAST
                                        ;*SECTOR (13), SURFACE 1 IS READ.
                                ;;*****************************************************************
011414  000004                TST25:  SCOPE
011416  012737  000001  001206        MOV     #1,$TIMES       ;;DO 1 ITERATION
011424  012737  011470  001110        MOV     #1$,$LPERR      ;SET RETURN ADRES FOR
                                                                ;LOOPING ON ERROR (SW9)
011432  012703  033342                MOV     #OUTBUF,R3
011436  005004                        CLR     R4              ;FLAG, CLEAR WHEN READING SURFACE 0
                                                                ;SET WHEN READING SURFACE 1
011440  013701  001350                MOV     DRIVAD,R1       ;GET DRIVE ADDRESS
011444  005737  001344                TST     SIMUL           ;TSTING ON SIMULATOR?
011450  001403                        BEQ     10$             ;IF NOT BRANCH
011452  052701  014533                BIS     #14533,R1       ;SET ADRES BITS FOR LAST CYL (312)
011456  000404                        BR      1$              ;LAST SECTOR (13), SURFACE 1
011460  012700  177764        10$:    MOV     #-14,R0         ;SET COUNT FOR 12 SECTORS
011464  012705  177465                MOV     #-313,R5        ;SET UP COUNT FOR 203 CYLINDERS

011470  104413                1$:     CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                ;THIS IS A VERY BASIC ERR & IF IT
                                                                ;OCCURS GO BACK TO TEST 10
011472  104421                        TST.SIN                 ;GO CHECK SIN, IF SET DO
                                                                ;DRIVE RESET TO CLR IT
011474  005037  001356        8$:     CLR     INDX1
011500  010377  167632                MOV     R3,@RKBA        ;ADRES TO WHICH DATA IS TO B X-FERRED
                                                                ;FROM THE DISK
011504  012777  177777  167622        MOV     #-1,@RKWC       ;SET UP WORD COUNT
011512  010177  167622                MOV     R1,@RKDA        ;ADRES THE DRIVE WITH CORRECT
                                                                ;CYLINDER & SECTOR ADRES
011516  012777  000005  167606        MOV     #5,@RKCS        ;READ, GO

011524  105777  167602        2$:     TSTB    @RKCS           ;DID CNTRL RDY SET?
011530  100411                        BMI     3$              ;YES, BRANCH
011532  005237  001356                INC     INDX1           ;NO, HAVE U WAITED LONG ENOUGH
011536  001372                        BNE     2$              ;IF NOT, LOOP BACK & WAIT FOR IT
                                                                ;IF YES, REPORT ERROR
011540  004737  020774                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS,DA
011544  010137  001202                MOV     R1,$REG10       ;GET DISK-ADRES WHERE ERROR OCCURED
011550  104416                        BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
011552  104045                        ERROR   45              ;CNTRL RDY DID NOT SET AFTER DOING
                                                                ;A 1 WORD READ FROM ADRES AS
                                                                ;INDICATED IN <DISK-ADRES>
                                                                ;'RKDA' IN EROR MSGE GIVES THE
                                                                ;CONTENTS OF RKDA AT THE TIME OF ERROR

011554  032777  001000  167544  3$:     BIT     #1000,@RKDS     ;DID 'SIN' SET?
011562  001405                        BEQ     4$              ;NO, BRANCH
011564  004737  021002                JSR     PC,GT3RG        ;GO, GET RKCS, ER, DS
```

```
3830  011570  010137  001170            MOV     R1,$REG3        ;GET DISK-ADRES WHERE SIN OCCURED3
3831  011574  104001                    ERROR   1               ;'SIN' ERROR ON DOING READ FROM
3832                                                            ;DISK-ADRES INDICATED IN $REG3
3833  011576  004737  021226    4$:     JSR     PC,CHKHE1       ;CHECK IF 'ERR' OR 'HE' BIT IS SET,
3834                                                            ;IF YES, RETURN HERE.
3835  011602  104046                    ERROR   46              ;'HE' OR 'ERR' ON DOING A READ OF
3836                                                            ;1 WORD FROM ADRES AS INDICATED
3837                                                            ;IN <DISK-ADRES>
3838                                                            ;'RKDA' IN EROR MSGE GIVES THE
3839                                                            ;CONTENTS OF RKDA AT THE TIME OF EROR
3840  011604  020113            5$:     CMP     R1,(R3)         ;WAS THE CORRECT DATA WORD RECVD?
3841  011606  001407                    BEQ     6$
3842  011610  010137  001162            MOV     R1,$REG0        ;GET EXPCTD DATA WORD
3843  011614  011337  001164            MOV     (R3),$REG1      ;GET DATA WORD RECVD
3844  011620  010137  001166            MOV     R1,$REG2        ;GET DISK-ADRES
3845  011624  104044                    ERROR   44              ;DID NOT RECIEVE THE CORRECT
3846                                                            ;DATA WORD FROM DISK ON DOING
3847                                                            ;1 WORD READ FROM 'DISK-ADRES'
3848                                                            ;AS INDICATED BY 'EXPCTD' DATA WORD
3849                                                            ;NOTE THAT IN A PREVIOUS TEST THE
3850                                                            ;FIRST WORD OF EACH SECTOR IS UNIQUELY
3851                                                            ;WRITTEN WITH A WORD GIVING THE
3852                                                            ;ABSOLUTE ADDRESS OF THAT SECTOR IN
3853                                                            ;TERMS OF, DRIV #, CYL ADRES, SUR, SEC ADRS.
3854  011626  020177  167510    6$:     CMP     R1,@RKDB        ;DOES RKDB CONTAIN CORRECT WORD
3855  011632  001406                    BEQ     7$              ;YES, BRANCH
3856  011634  010137  001162            MOV     R1,$REG0        ;NO, GET EXPCTD RKDB
3857  011640  017737  167476  001164    MOV     @RKDB,$REG1     ;GET RKDB RECVD
3858  011646  104037                    ERROR   37              ;RKDB ERROR ON READ.
3859                                                            ;FOR RK11C, AFTER A READ RKDB
3860                                                            ;CONTAINS CHECKSUM FOR THE SECTOR
3861                                                            ;READ.
3862                                                            ;WHEREAS FOR RK11D, AFTER READ
3863                                                            ;RKDB CONTAINS THE LAST WORD
3864                                                            ;READ FROM THAT SECTOR &
3865                                                            ;X-FERRED TO MEMORY
3866  011650  005737  001344    7$:     TST     SIMUL           ;TESTING ON SIMULATOR?
3867  011654  001022                    BNE     TST26           ;;IF YES, EXIT
3868  011656  005201                    INC     R1              ;INCREMENT  TO ADRES NEXT SECTOR
3869  011660  005200                    INC     R0              ;HAVE U CHKD ALL 12 SECTORS?
3870  011662  001302                    BNE     1$              ;IF NOT, LUP BAK & CHK THE NXT
3871                                                            ;IF YES...
3872  011664  012700  177764            MOV     #-14,R0         ;RESET THE COUNT FOR 12 SECTORS
3873  011670  042701  000037            BIC     #37,R1          ;CLEAR SECTOR, SURFACE BITS
3874  011674  005704                    TST     R4              ;DOING SURFACE 1?
3875  011676  001004                    BNE     9$              ;YES, BRANCH
3876  011700  005204                    INC     R4              ;NO
3877  011702  062701  000020            ADD     #20,R1          ;INCREMENT THE ADRES TO NXT SURFACE
3878  011706  000670                    BR      1$              ;GO READ SURFACE 1
3879  011710  005004            9$:     CLR     R4
3880  011712  062701  000040            ADD     #40,R1          ;INCREMENT TO NXT CYL
3881  011716  005205                    INC     R5              ;HAVE U CHKD ALL 203 CYLINDERS
3882  011720  001263                    BNE     1$              ;IF NOT, LOOP BACK & CHK THE NXT CYLINDER
3883                                                            ;YES
3884
3885
```

```
                                ;;*****************************************************************
                                ;*TEST 26       CHECK 'SEEK' FUNCTION, WITH DIFFERRENT VELOCITY MODES
                                        ;* THIS TEST CHECKS SEEK IN DIFFERENT VELOCITY MODES (DIFF <3,
                                        ;* 3 < DIFF < 31, DIFF > 31).  FOR THESE 3 BASIC VELOCITIES SEEK IS DONE BOTH
                                        ;* IN FWD AND REV DIRECTION TO CHECK THE ADDER & DIFFERENCE LOGIC.  IF
                                        ;* WHILE DOING A SEEK 'SIN' OCCURS, A DRIVE RESET IS DONE TO INITIALIZE
                                        ;* THE POSITIONING LOGIC
                                ;;*****************************************************************
011722  000004                  TST26:  SCOPE
011724  012737  000005  001206          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
011732  012703  001372                  MOV     #SEEK0,R3       ;INITIALIZE POINTER TO THE FIRST
                                                                ;SEEK ADDRESS
011736  005037  001356                  CLR     INDX1           ;INDX1, WHEN 0 INDICATES SEEK IN FWD DIRECTION
                                                                ;       WHEN 1 INDICATES SEEK IN REV DIRECTION
011742  013700  001332                  MOV     RKCS,R0
011746  013701  001326                  MOV     RKDS,R1
011752  013702  001330                  MOV     RKER,R2
011756  012737  011764  001110          MOV     #1$,$LPERR      ;SET RETURN ADRES FOR LUPING ON
                                                                ;EROR (SW 9)
011764  000240                  1$:     NOP
011766  104413                  2$:     CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                ;THIS IS A VERY BASIC ERR & IF IT
                                                                ;OCCURS GO BACK TO TEST 10
011770  104421                          TST.SIN                 ;GO, CHECK IF SIN IS SET, IF SET
                                                                ;DO DRV-RESET TO CLEAR IT


011772  013704  001350                  MOV     DRIVAD,R4       ;GET DRIV-ADRES
011776  051304                          BIS     (R3),R4         ;SET CYLINDER BITS
012000  010477  167334                  MOV     R4,@RKDA        ;ADDRS THE DRIVE
012004  012710  000011                  MOV     #11,@R0         ;SET 'SEEK', 'GO'

012010  104412                          CHKCRDY                 ;GO CHECK IF CONTROL RDY IS SET
                                                                ;IF SO, SKIP THE EROR MESSAGE.
012012  104021                          ERROR   21              ;'CNTRL RDY' DID NOT SET AFTER
                                                                ;SENDING CYL ADD TO THE DRIV, 'ADD ACK'
                                                                ;FROM DRIVE SHLD HAVE COME BACK
                                                                ;THEREUPON SETTING 'CNTRL RDY'
012014  005005                  4$:     CLR     R5
012016  032711  000100          5$:     BIT     #100,@R1        ;DID R/W/S RDY SET?
012022  001005                          BNE     6$              ;YES, BRANCH
012024  005205                          INC     R5              ;NO, WAIT
012026  001373                          BNE     5$              ;WAITED LONG?
012030  004737  020774                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
012034  104026                          ERROR   26              ;R/W/S RDY DID NOT SET ON
                                                                ;COMPLETION OF SEEK
012036  032711  001000          6$:     BIT     #1000,@R1       ;DID SIN SET?
012042  001403                          BEQ     7$              ;NO, BRANCH
012044  004737  020774                  JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
```

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3942  012050  104001                    ERROR   1               ;SIN SET ON DOING SEEK
3943  012052  032710  140000    7$:     BIT     #140000,@R0     ;DID 'HE' OR 'ERR' SET?
3944  012056  001403                    BEQ     8$              ;YES
3945  012060  004737  020774            JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
3946  012064  104022                    ERROR   22              ;'ERR OF 'HE' BIT SET WHEN
3947                                                            ;SEEKING TO CYL AS INDICATED
3948                                                            ;IN RKDA
3949
3950  012066  022710  000210    8$:     CMP     #210,@R0        ;DOES RKCS STILL CONTAIN THE 'SEEK' FNCTION
3951  012072  001406                    BEQ     9$              ;YES - EXIT
3952  012074  011037  001164            MOV     @R0,$REG1       ;NO, GET RKCS RECVD
3953  012100  012737  000210  001162    MOV     #210,$REG0      ;GET EXPCTD RKCS
3954  012106  104024                    ERROR   24              ;RKCS SHOULD CONTAIN THE 'SEEK' BITS
3955                                                            ;IF NOT, ERROR
3956
3957  012110  020477  167224    [illegible]:  CMP     R4,@RKDA        ;DID RKDA CHANGE?
3958  012114  001406                    BEQ     10$             ;NO
3959  012116  010437  001162            MOV     R4,$REG0        ;YES, GET EXPCTD?
3960  012122  017737  167212  001164    MOV     @RKDA,$REG1     ;GET RKDA
3961  012130  104027                    ERROR   27              ;RKDA CHANGED AFTER DOING SEEK
3962
3963  012132  010477  167202    10$:    MOV     R4,@RKDA        ;ADRES THE DRIVE,SEC 0
3964  012136  012777  033342  167172    MOV     #OUTBUF,@RKBA   ;READ ONE HEADER INTO THIS
3965  012144  012777  177777  167162    MOV     #-1,@RKWC       ;BUS ADRES
3966  012152  012710  002005            MOV     #2005,@R0       ;GO,READ FORMAT
3967  012156  104414                    CNT.RDY                 ;WAIT FOR CNTRL RDY
3968  012160  021337  033342            CMP     (R3),OUTBUF     ;WAS THE CORRECT READE4R READ (FROM
3969  012164  001410                    BEQ     11$             ;CYLINDER TO WHICH SEEK WAS DONE BEFORE)
3970  012166  005037  001162            CLR     $REG0           ;STORE SEC # FROME  WHERE HDR WAS RD (0)
3971  012172  011337  001164            MOV     (R3),$REG1      ;GET EXPCTD HEADER
3972  012176  013737  033342  001166    MOV     OUTBUF,$REG2    ;GET HDR RECVD
3973  012204  104043                    ERROR   43              ;WRONG HDR WAS RECVD FROM CYLINDER (ADRES
3974                                                            ;IN ER MSGE). NOTE THAT A PURE SEEK WAS
3975                                                            ;DONE TO THIS CYL BEFORE  READING HDR
3976                                                            ;USING READ FORMAT
3977  012206  005737  001356    11$:    TST     INDX1           ;SEEK IN REVRSE DIRECTION?
3978  012212  001007                    BNE     12$             ;YES, BRANCH
3979  012214  005723                    TST     (R3)+           ;NO, INCREMENT PTR TO NXT SEEK ADRES
3980  012216  022703  001400            CMP     #SEEK2+2,R3     ;DONE WITH ALL SKS IN FWD DIR?
3981  012222  001260                    BNE     1$              ;NO, GO & DO NXT ONE
3982  012224  005237  001356            INC     INDX1           ;SET FLAG INDICATING SK IN REVRSE
3983  012230  005743                    TST     -(R3)
3984  012232  005743    12$:    TST     -(R3)           ;POSITION PTR TO NXT SK IN REV
3985  012234  022703  001370            CMP     #SEEK0-2,R3     ;DONE WITH ALL?
3986  012240  001251                    BNE     1$              ;IF NOT, DO NXT ONE
3987
3988
3989
3990                          ;;*****************************************************************
3991                          ;*TEST 27       CHECK DRIVE RESET FROM LAST CYLINDER
3992                                  ;*THE HEADS ARE POSITIONED ON THE LAST CYLINDER (DOING
3993                                  ;*AN IMPLIED SEEK-READ).  THEN A DRIVE RESET IS ISSUED.
3994                                  ;*IT'S CHECKED IF THE HEADS WERE BROUGHT BACK TO 0 BY
3995                                  ;*DOING A 1 WORD READ & CHECKING THAT THE CORRECT WORD
3996                                  ;*WAS RECEIVED. IF TESTING ON SIMULATOR THIS TEST IS SKIPPED.
3997                          ;;*****************************************************************
```

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 3998  012242  000004                    TST27:  SCOPE
 3999  012244  012737  000005  001206            MOV     #5,$TIMES       ;;DO 5 ITERATIONS
 4000  012252  005737  001344                    TST     SIMUL           ;R U ON A SIMULATOR?
 4001  012256  001124                            BNE     TST30           ;;YES, EXIT
 4002  012260  013701  001332                    MOV     RKCS,R1
 4003  012264  104413                            CNT.RESET               ;GO, DO CONTROL RESET
 4004                                                                    ;THIS IS A CALL FOR THE 'CNTRL-
 4005                                                                    ;RESET' ROUTINE. A CONTROL RESET IS
 4006                                                                    ;ISSUED AND AFTER A CERTAIN TIME
 4007                                                                    ;IF THE 'CNTRL RDY' DOES NOT SET
 4008                                                                    ;AN ERROR IS REPORTED. NOTE THAT
 4009                                                                    ;THE PC IN ERROR MESSAGE IS THE
 4010                                                                    ;PC WHERE 'CNT.RESET' IS LOCATED.
 4011                                                                    ;THIS IS A VERY BASIC ERR & IF IT
 4012                                                                    ;OCCURS GO BACK TO TEST 10
 4013  012266  005000                            CLR     R0
 4014  012270  012703  033342                    MOV     #OUTBUF,R3      ;ADRES WHERE DATA WILL BE READ INTO
 4015  012274  013704  001350                    MOV     DRIVAD,R4
 4016  012300  010405                            MOV     R4,R5
 4017  012302  052705  014500                    BIS     #14500,R5       ;SET CYL ADRES=312 (OCTAL)
 4018  012306  010577  167026                    MOV     R5,@RKDA        ;ADRES THE DRIVE, LAST CYLINDER
 4019  012312  012777  177777  167014            MOV     #-1,@RKWC       ;READ 1 WORD
 4020  012320  010377  167012                    MOV     R3,@RKBA        ;INTO THIS MEMORY ADRES
 4021
 4022  012324  012711  000005                    MOV     #5,@R1          ;READ, GO
 4023
 4024  012330  005000                            CLR     R0
 4025  012332  104414                    1$:     CNT.RDY                 ;THIS IS A CALL FOR CN.RDY ROUTINE
 4026                                                                    ;WHICH WAITS FOR CNTRL RDY TO SET.
 4027                                                                    ;A RETURN IS MADE AFTER CNTRL RDY
 4028                                                                    ;SETS. IF WITHIN A CERTAIN TIME
 4029                                                                    ;CNTRL RDY DOESN'T SET AN ERROR
 4030                                                                    ;MESSAGE IS GIVEN. WAITING TIME
 4031                                                                    ;883 MS FOR 11/20, 175 MS FOR 11/45
 4032  012334  020513                    2$:     CMP     R5,@R3          ;WAS THE CORRECT WORD READ?
 4033  012336  001407                            BEQ     3$              ;YES, SEEK TO 312 WAS DONE CORRECTLY5,@
 4034  012340  010537  001162                    MOV     R5,$REG0        ;GET EXPCTD WORD
 4035  012344  011337  001164                    MOV     @R3,$REG1       ;GET WORD RECVD
 4036  012350  010537  001166                    MOV     R5,$REG2        ;GET DSK-ADRES FROM WHERE WORD WAS READ
 4037  012354  104044                            ERROR   44              ;DID NOT READ BACK CORRECT WORD FROM
 4038                                                                    ;LAST CYL, SEC 0. IF TEST 45 & 46
 4039                                                                    ;WERE SUCCESSFULLY DONE THIS
 4040                                                                    ;ERROR MEANS THAT IMPLIED SEEK
 4041                                                                    ;TO CYL 312 COULD NOT B DONE
 4042  012356  012711  000015            3$:     MOV     #15,@R1         ;DRIVE RESET, GO
 4043  012362  104414                            CNT.RDY                 ;THIS IS A CALL FOR CN.RDY ROUTINE
 4044                                                                    ;WHICH WAITS FOR CNTRL RDY TO SET.
 4045                                                                    ;A RETURN IS MADE AFTER CNTRL RDY
 4046                                                                    ;SETS. IF WITHIN A CERTAIN TIME
 4047                                                                    ;CNTRL RDY DOESN'T SET AN ERROR
 4048                                                                    ;MESSAGE IS GIVEN. WAITING TIME
 4049                                                                    ;883 MS FOR 11/20, 175 MS FOR 11/45
 4050  012364  005000                            CLR     R0
 4051  012366  032777  000100  166732    4$:     BIT     #100,@RKDS      ;DID R/W/S RDY SET?
 4052  012374  001011                            BNE     5$              ;YES, BRANCH
 4053  012376  012702  177763                    MOV     #-15,R2         ;IF U R ON A SLOWER MACHINE
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4054  012402  005202                        INC     R2              ;& DO NOT NEED SUCH A LARGE MACHINE
4055  012404  001376                        BNE     .-2             ;TIME LOOP, CHANGE THESE 3
4056                                                                  ;INSTRUCTIONS TO 'NOP' THE
4057                                                                  ;LOOP TIME WILL BE REDUCED
4058                                                                  ;TO 1100 MS
4059                                                                  ;
4060                                                                  ;THE TOTAL TIME FOR THE ABOVE
4061                                                                  ;LOOPS (W/O PUTTING 'NOP'S) IS
4062                                                                  ;5304 MS FOR 11/20 AND
4063                                                                  ;1061 MS FOR 11/45 WITH MOS
4064                                                                  ;OR BIPOLAR MEMORY
4065  012406  005200                        INC     R0              ;WAITED LONG?
4066  012410  001366                        BNE     4$              ;IF NOT, LUP BAK & WAIT
4067                                                                  ;IF YES, ERROR
4068  012412  004737  020774                JSR     PC,GT4RG        ;GET RKCS,ER,DS,DA
4069  012416  104026                        ERROR   26              ;R/W/S RDY DID NOT SET AFTER
4070                                                                  ;DOING DRIVE RESET
4071  012420  032711  140000        5$:     BIT     #140000,@R1     ;DID HE OR ERR BIT SET?
4072  012424  001403                        BEQ     6$              ;IF NOT, BRANCH
4073
4074  012426  004737  020774                JSR     PC,GT4RG        ;GET RKCS,ER,DS,DA FOR ERROR MESSAGE
4075  012432  104022                        ERROR   22              ;HE OR ERR BIT SET ON DOING DRIVE
4076                                                                  ;RESET FROM LAST CYLINDER
4077  012434  005205                6$:     INC     R5              ;POSITION R5 TO EXPCTD RKDA
4078  012436  020577  166676                CMP     R5,@RKDA        ;DID THE CYL ADRES BITS IN RKDA GET CHANGED?
4079  012442  001406                        BEQ     7$              ;NO, BRANCH
4080  012444  010537  001162                MOV     R5,$REG0        ;GET EXPCTD RKDA
4081  012450  017737  166664  001164        MOV     @RKDA,$REG1     ;GET RKDA RECVD
4082  012456  104054                        ERROR   54              ;CYLINDER ADRES BITS IN RKDA
4083                                                                  ;GOT CHANGED AFTER
4084                                                                  ;DRIVE RESET, FROM LAST CYLINDER
4085  012460  012777  177777  166646  7$:     MOV     #-1,@RKWC       ;READ 1 WORD
4086  012466  010377  166644                MOV     R3,@RKBA        ;INTO THIS ADRES
4087  012472  010477  166642                MOV     R4,@RKDA        ;FROM THIS DSK ADRES-CYL 0, SEC 0
4088
4089  012476  012711  000005                MOV     #5,@R1          ;READ, GO
4090
4091  012502  005000                        CLR     R0
4092  012504  104414                8$:     CNT.RDY                 ;THIS IS A CALL FOR CN.RDY ROUTINE
4093                                                                  ;WHICH WAITS FOR CNTRL RDY TO SET.
4094                                                                  ;A RETURN IS MADE AFTER CNTRL RDY
4095                                                                  ;SETS. IF WITHIN A CERTAIN TIME
4096                                                                  ;CNTRL RDY DOESN'T SET AN ERROR
4097                                                                  ;MESSAGE IS GIVEN. WAITING TIME
4098                                                                  ;883 MS FOR 11/20, 175 MS FOR 11/45
4099  012506  020413                9$:     CMP     R4,@R3          ;WAS THE CORRECT WORD READ?
4100  012510  001407                        BEQ     TST30           ;;YES, EXIT
4101  012512  010437  001162                MOV     R4,$REG0        ;GET EXPCTD WORD
4102  012516  011337  001164                MOV     @R3,$REG1       ;GET WORD RECVD
4103  012522  010437  001166                MOV     R4,$REG2        ;GET DISK ADRES WHERE ERROR OCCURED
4104  012526  104044                        ERROR   44              ;DID NOT READ CORRECT WORD FROM
4105                                                                  ;CYL 0, SEC 0. IF TEST 45 & 46
4106                                                                  ;WERE SUCCESSFULLY DONE THIS
4107                                                                  ;ERROR COULD MEAN THAT DRIVE-RESET
4108                                                                  ;DID NOT BRING HEADS BACK TO 0.
4109
```

```
                        ;;*****************************************************************
                        ;*TEST 30        'WRITE' - 256 WORD BLOCK ON SECTOR 0, CYLINDER 0
                                ;THE TEST BELOW SHOULD BE CONSIDERED AS A SET UP PHASE FOR
                                ;THE FOLLOWING TEST.  IT WRITES A BLOCK OF 256 WORDS IN
                                ;SECTOR 0, CYLINDER 0 WITH A SPECIFIC PATTERN AND THIS WRITTEN
                                ;BLOCK WILL BE MADE USE OF IN THE NEXT TEST TO CHECK
                                ;OUT 'WRITE-CHECK' AND 'READ CHECK' FUNCTIONS.
                        ;;*****************************************************************
012530  000004         TST30:  SCOPE
012532  104413                 CNT.RESET                      ;GO, DO CONTROL RESET
                                                            ;THIS IS A CALL FOR THE 'CNTRL-
                                                            ;RESET' ROUTINE. A CONTROL RESET IS
                                                            ;ISSUED AND AFTER A CERTAIN TIME
                                                            ;IF THE 'CNTRL RDY' DOES NOT SET
                                                            ;AN ERROR IS REPORTED. NOTE THAT
                                                            ;THE PC IN ERROR MESSAGE IS THE
                                                            ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                            ;THIS IS A VERY BASIC ERR& IF IT
                                                            ;OCCURS GO BACK TO TEST 10
012534  104421                 TST.SIN                        ;CHECK IF SIN IS SET, IF SET
                                                            ;DO DRIVE RESET TO CLEAR IT
012536  013704  001332         MOV     RKCS,R4
                                                            ;THE FOLLOWING CODE IS FOR SETTING
                                                    ;UP THE I/O BUFFER IN MEMORY (STARTING AT
                                                    ;OUTBUF), WITH A PARTICULAR 256 WORD PATTERN.
                                                    ;STARTING FROM THE FIRST WORD IN THE BUFFER
                                                    ;THE LO BYTE WILL BE A COUNT PATTERN
                                                    ;FROM 0 TO 255 (DECIMAL), WHEREAS THE
                                                    ;HI-BYTE WILL BE THE COMPLEMENT OF LO BYTE,
                                                    ;A DECREASING COUNT PATTERN FROM 255 TO 0.
                                                    ;I.E.THE BUFFER WILL LOOK LIKE:
                                                    ;OUTBUF         (1 111 111 1 00 000 000)
                                                    ;OUTBUF+2       (1 111 111 0 00 000 001)
                                                    ;
                                                    ;LAST WORD      (0 000 000 0 11 111 111)
012542  012700  033342                 MOV     #OUTBUF,R0
012546  012701  177401                 MOV     #177401,R1      ;PATTERN GENERATING NUMBER
012552  012702  177400                 MOV     #-400,R2        ;SET UP COUNT FOR 256 WORDS
012556  012703  177400                 MOV     #177400,R3      ;SET UP THE FIRST PATTERN TO B WRITTEN
012562  010320                 MOV     R3,(R0)+        ;SET UP FIRST WORD IN I/O BUFFER
012564  005202                 INC     R2              ;INCREMENT COUNT
012566  060103         1$:     ADD     R1,R3           ;SET UP NEXT WORD PATTERN
012570  010320                 MOV     R3,(R0)+        ;WRITE IT IN NXT I/O BUFFER WORD
012572  005202                 INC     R2              ;HAVE U WRITTEN ALL 256 WORDS
012574  001374                 BNE     1$              ;IF NOT GO & WRITE NEXT PATTERN
012576  012777  177400  166530       MOV     #-400,@RKWC     ;WRITE 256 WORDS
012604  012777  033342  166524       MOV     #OUTBUF,@RKBA   ;STARTING FROM THIS BUS ADRES
012612  013777  001350  166520       MOV     DRIVAD,@RKDA    ;TO THIS DISK ADRES, CYL 0, SEC 0
012620  012714  000003                 MOV     #3,@R4          ;WRITE, GO
012624  105714         2$:     TSTB    @R4             ;WAS CNTRL RDY CLEARED AS GO WAS SET?
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 4166  012626  100003                    BPL     3$-2            ;YES, BRANCH
 4167  012630  004737  021002            JSR     PC,GT3RG        ;GET RKCS, ER, DS
 4168  012634  104030                    ERROR   30              ;CNTRL RDY DID NOT CLEAR AS GO WAS SET
 4169                                                            ;TO 'WRITE'
 4170
 4171  012636  005002                    CLR     R2
 4172  012640  105777  166466    3$:     TSTB    @RKCS           ;DID CNTRL RDY SET?
 4173  012644  100411                    BMI     4$              ;YES, BRANCH
 4174  012646  005202                    INC     R2              ;WAITED LONG ENOUGH?
 4175  012650  001373                    BNE     3$              ;IF NOT, LUP BAK & WAIT
 4176                                                            ;IF YES, ERROR
 4177  012652  004737  020774            JSR     PC,GT4RG        ;GO, GET RKCD, ER, DS, DA
 4178  012656  013737  001350  001202    MOV     DRIVAD,$REG10   ;GET THE STARING ADRES
 4179  012664  104416                    BRKDA4                  ;BREAK CONTENTS OF $REG10 INTO
 4180                                                            ;DRV #, CYL, SUR, SEC #
 4181  012666  104031                    ERROR   31              ;CNTRL RDY DID NOT SET ON COMPLETION
 4182                                                            ;OF WRITE OF 256 WORDS ON CYL 0, SEC 0
 4183                                                            ;'RKDA' IN EROR MSGE GIVES THE
 4184                                                            ;CONTENTS OF RKDA AT THE TIME OF EROR
 4185                                                            ;WRITE WAS DONE STARTING AT <DSK-ADRES>
 4186                                                            ;INDICATED IN EROR MSGE
 4187  012670  004737  021234    4$:     JSR     PC,CHKHE        ;CHECK IF 'ERR' OR 'HE' BIT IS SET,
 4188                                                            ;IF YES, RETURN HERE
 4189  012674  104032                    ERROR   32              ;HE OR ERR BIT SET ON DOING WRITE OF
 4190                                                            ;256 WORDS ON CYL 0, SEC 0
 4191                                                            ;WRITE WAS DONE STARTING AT <DSK-ADRES>
 4192                                                            ;INDICATED IN EROR MSGE
 4193                                                            ;'RKDA' IN EROR MSGE GIVES THE
 4194                                                            ;CONTENTS OF RKDA AT THE TIME OF EROR
 4195  012676  020077  166434    5$:     CMP     R0,@RKBA        ;DID RKBA INCREMENT CORRECTLY?
 4196  012702  001406                    BEQ     6$              ;YES, BRANCH
 4197  012704  010037  001162            MOV     R0,$REG0        ;GET EXPCTD RKBA
 4198  012710  017737  166422  001164    MOV     @RKBA,$REG1     ;GET RKBA RECVD
 4199  012716  104035                    ERROR   35              ;RKBA DID NOT INCREMENT CORRECTLY
 4200                                                            ;(BY 1000 OCTAL BYTES) AFTER WRITE
 4201                                                            ;OF 400 (OCTAL) WORDS ON SEC 0, CYL 0
 4202  012720  004737  021316    6$:     JSR     PC,CHKWC        ;CHECK IF RKWC OVERFLOWED TO 0,
 4203                                                            ;IF NOT RETURN HERE.
 4204  012724  104034                    ERROR   34              ;RKWC DID NOT OVERFLOW, AFTER A
 4205                                                            ;WRITE OF 256 WORDS ON CYL 0, SEC 0
 4206  012726  004737  021262    7$:     JSR     PC,CHKDA        ;CHECK IF RKDA INCREMENTED CORRECTLY,
 4207                                                            ;IF NOT RETURN HERE
 4208  012732  104033                    ERROR   33              ;RKDA DID NOT INCREMENT BY 1 AFTER
 4209                                                            ;A WRITE OF 256 WORDS IN CYL 0, SEC 0
 4210  012734  004737  021342    8$:     JSR     PC,CHKER        ;CHECK IF ANY BIT RKER IS SET
 4211                                                            ;IF YES RETURN HERE.
 4212  012740  104036                    ERROR   36              ;RKER BIT SET ON DOING WRITE ON
 4213                                                            ;CYLINDER 0, SECTOR 0
 4214  012742  022714  000202    9$:     CMP     #202,@R4        ;DOES RKCS STILL CONTAIN THE WRITE BITS?
 4215  012746  001406                    BEQ     TST31           ;;YES, EXIT
 4216  012750  012737  000202  001162    MOV     #202,$REG0      ;GET EXPECTED RKCS
 4217  012756  011437  001164            MOV     @R4,$REG1       ;GET RKCS RECVD
 4218  012762  104024                    ERROR   24              ;RKCS DID NOT CONTAIN THE 'WRITE'
 4219                                                            ;BITS AFTER THE FUNCTION WAS DONE.
 4220
 4221
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                        ;;*****************************************************************
                        ;*TEST 31       CHECK THAT WRITE WAS DONE CORRECTLY
                        ;*THIS TEST CHECKS IF THE 'WRITE' OF 256 WORDS DONE IN PREVIOUS
                        ;*TEST IS GOOD.  THE SEQUENCE OF OPERATIONS IS AS FOLLOWING:
                        ;*1) DO A READ OF 256 WORDS FROM SECTOR 0, CYLINDER 0
                        ;*   INTO A BUFFER STARTING AT 'OUTBUF'.
                        ;*2) COMPARE & CHECK THE DATA THAT IS READ (STARTING AT 'OUTBUF')
                        ;*   WITH THE DATA THAT WAS GENERATED PREVIOUSLY
                        ;*3) REPORT AN ERROR IF THE DATA READ BACK FROM DISK DOES
                        ;*   NOT COMPARE WITH DATA THAT WAS SUPPOSE TO HAVE BEEN WRITTEN
                        ;;*****************************************************************
012764  000004        TST31:  SCOPE
012766  104413                CNT.RESET               ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
012770  104421                TST.SIN                 ;CHECK IF SIN IS SET, IF SET
                                                        ;DO DRIVE RESET TO CLEAR IT
012772  012700  177400        MOV     #-400,R0        ;SET COUNT FOR 400 WORDS
012776  012701  033342        MOV     #OUTBUF,R1      ;TO BE CLEARED IN THE BUFFER
013002  005021          8$:   CLR     (R1)+           ;CLR THE 400 WORD BUFFER
013004  005200                INC     R0              ;STARTING AT 'OUTBUF'
013006  001375                BNE     8$
013010  005000                CLR     R0
013012  012777  177400  166314    MOV     #-400,@RKWC     ;READ 256 WORDS
013020  012777  033342  166310    MOV     #OUTBUF,@RKBA   ;INTO THIS ADRES
013026  012777  001350  166304    MOV     DRIVAD,@RKDA    ;STARTING FROM THIS DISK ADRES

013034  012777  000005  166270    MOV     #5,@RKCS        ;READ, GO

013042  105777  166264      1$:   TSTB    @RKCS           ;DID CNTRL RDY SET?
013046  100411                BMI     2$              ;YES, BRANCH
013050  005200                INC     R0              ;WAITED LONG ENOUGH?
013052  001373                BNE     1$              ;IF NOT, LUP BAK & WAIT
                                                        ;ERROR, IF YES
013054  004737  020774        JSR     PC,GT4RG        ;GO, GET RKCD, ER, DS, DA
013060  013737  001350  001202    MOV     DRIVAD,$REG10   ;GET THE STARTING ADRES
013066  104416                BRKDA4                  ;GO TO 'BDA4' & BREAK CONTENTS OF
                                                        ;$REG10 INTO DRV #, CYL, SUR, SEC BITS
013070  104045                ERROR   45              ;CNTRL RDY DID NOT SET AFTER READ
                                                        ;OF 400 WORDS FROM CYL 0, SEC 0
                                                        ;'RKDA' IN EROR MSGE GIVES THE
                                                        ;CONTENTS OF RKDA AT THE TIME OF EROR
                                                        ;READ WAS DONE STARTING AT <DSK-ADRES>
                                                        ;INDICATED IN EROR MESGE
013072  032777  001000  166226  2$:    BIT     #1000,@RKDS     ;IS SIN SET?
013100  001033                BNE     TST32           ;;IF YES, EXIT
013102  012701  177400      5$:   MOV     #-400,R1
013106  012702  177777            MOV     #177777,R2
013112  012703  033342            MOV     #OUTBUF,R3
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 4278  013116  012705  177773              MOV     #-5,R5
 4279  013122  062702  177401      6$:     ADD     #177401,R2
 4280  013126  020213                      CMP     R2,(R3) ;WAS THE READ WORD SAME AS THE WORD
 4281                                                      ;THAT WAS SUPPOSE TO BE WRITTEN
 4282  013130  001414                      BEQ     7$      ;YES, BRANCH
 4283                                                      ;NO, ERROR
 4284  013132  010137  001162              MOV     R1,$REG0        ;GET THE # OF WORD
 4285  013136  062737  000401  001162      ADD     #401,$REG0      ;THAT IS IN ERROR (EXAMPLE=1,2--376,377,400)
 4286  013144  010237  001164              MOV     R2,$REG1        ;GET EXPCTD WORD (THAT WAS SUPPOSED TO
 4287                                                      ;BE WRITTEN)
 4288  013150  011337  001166              MOV     (R3),$REG2      ;GET WORD RECVD (THAT WAS READ BAK)
 4289  013154  104055                      ERROR   55              ;DID NOT READ BACK WORD THAT WAS SUPPOSED
 4290                                                      ;TO HAVE BEEN WRITTEN PREVIOUSLY. POSITION
 4291                                                      ;OF WORD IN ERROR IS AS INDICATED BY
 4292                                                      ;WORD # ($REG0), SEC 0, CYL 0
 4293  013156  005205                      INC     R5
 4294  013160  001403                      BEQ     TST32           ;;EXIT
 4295  013162  005723              7$:     TST     (R3)+           ;INCREMENT POINTER TO NXT WORD (THAT
 4296                                                      ;WAS READ BACK)
 4297  013164  005201                      INC     R1              ;HAVE U CHKD ALL 256 WORDS?
 4298  013166  001355                      BNE     6$              ;IF NOT, LUP BAK & CHK THE NXT WORD
 4299                                                      ;IF YES, EXIT
 4300
 4301                              ;;**********************************************************************
 4302                              ;*TEST 32       CHECK 'READ CHECK' FUNCTION - CYLINDER 0, SECTOR 0
 4303                                      ;*THIS TEST CHECKS OUT THE BASIC :READ CHECK' LOGIC, USING THE DATA BLOCK
 4304                                      ;*'CYLINDER, SECTOR 0) WRITTEN IN A PREVIOUS TEST.  HENCE THE TEST WHICH
 4305                                      ;*WRITES THE DATA BLOCK SHOULD BE DONE PRIOR TO THIS TEST.
 4306                              ;;**********************************************************************
 4307  013170  000004              TST32:  SCOPE
 4308  013172  104413                      CNT.RESET               ;GO, DO CONTROL RESET
 4309                                                      ;THIS IS A CALL FOR THE 'CNTRL-
 4310                                                      ;RESET' ROUTINE. A CONTROL RESET IS
 4311                                                      ;ISSUED AND AFTER A CERTAIN TIME
 4312                                                      ;IF THE 'CNTRL RDY' DOES NOT SET
 4313                                                      ;AN ERROR IS REPORTED. NOTE THAT
 4314                                                      ;THE PC IN ERROR MESSAGE IS THE
 4315                                                      ;PC WHERE 'CNT.RESET' IS LOCATED.
 4316                                                      ;THIS IS A VERY BASIC ERR& IF IT
 4317                                                      ;OCCURS GO BACK TO TEST 10
 4318  013174  104421                      TST.SIN                 ;CHECK IF SIN IS SET, IF SET
 4319                                                      ;DO DRIVE RESET TO CLEAR IT
 4320  013176  013701  001332              MOV     RKCS,R1
 4321  013202  013702  001334              MOV     RKWC,R2
 4322  013206  013703  001340              MOV     RKDA,R3
 4323  013212  013704  001336              MOV     RKBA,R4
 4324  013216  012737  052525  033342      MOV     #52525,OUTBUF
 4325  013224  012712  177400              MOV     #-400,@R2       ;READ CHECK 256 WORDS
 4326  013230  013713  001350              MOV     DRIVAD,@R3      ;STARTING FROM CYL 0, SECTOR 0
 4327  013234  012714  033342              MOV     #OUTBUF,@R4
 4328  013240  012711  000013              MOV     #13,@R1         ;READ CHECK, GO
 4329
 4330  013244  105711              1$:     TSTB    @R1             ;DID CNTRL RDY GET CLEARED AS GO WAS SET?
 4331  013246  100003                      BPL     2$              ;YES, BRANCH
 4332  013250  004737  021002              JSR     PC,GT3RG        ;GET RKCS, ER, DS
 4333  013254  104030                      ERROR   30              ;CNTRL RDY DID NOT CLEAR AS GO
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4334  013256  104412                    2$:     CHKCRDY                 ;GO CHECK IF CONTROL RDY IS SET
4335                                                                      ;IF SO, SKIP THE EROR MESSAGE.
4336                                                                      ;WAS SET TO 'READ CHECK'
4337  013260  104056                            ERROR   56              ;CNTRL RDY DID NOT SET ON DOING
4338                                                                      ;'READ CHECK' FROM CYL 0, SEC 0
4339  013262  032711  140000          3$:     BIT     #140000,@R1     ;DID 'ERR' OR 'HE' BIT SET?
4340  013266  001403                          BEQ     4$              ;NO, BRANCH
4341  013270  004737  021002                  JSR     PC,GT3RG        ;GO, GET RKCS,ER,DS FOR ERROR MESSAGE
4342  013274  104057                          ERROR   57              ;'ERR' OR 'HE' BIT SET ON DOING
4343                                                                      ;'READ CHECK' ON CYLINDER 0, SEC 0
4344  013276  032777  000002  166024  4$:     BIT     #2,@RKER        ;DID 'CSE' BIT SET IN RKER?
4345  013304  001404                          BEQ     5$              ;NO, BRANCH
4346  013306  017737  166016  001162          MOV     @RKER,$REG0     ;GET RKER
4347  013314  104060                          ERROR   60              ;SOFT ERROR - CSE - ON DOING 'READ
4348                                                                      ;CHECK' ON CYLINDER 0, SECTOR 0
4349                                                                      ;U SHOULD HAVE GOT ERRROR 102 ALSO
4350  013316  005712                    5$:     TST     @R2             ;DID WORD COUNT OVERFLOW TO 0?
4351  013320  001405                          BEQ     6$              ;YES, BRANCH
4352  013322  011237  001162                  MOV     @R2,$REG0       ;GET RKWC
4353  013326  011137  001164                  MOV     @R1,$REG1       ;GET RKCS
4354  013332  104061                          ERROR   61              ;WORD COUNT DID NOT OVERFLOW
4355                                                                      ;ON DOING 'READ CHK' ON CYL 0, SEC 0
4356  013334  013702  001350          6$:     MOV     DRIVAD,R2       ;RKDA SHOULD INCREMENT
4357  013340  005202                          INC     R2              ;TO THIS AFTER 'RD CHK' IS DONE
4358  013342  020213                          CMP     R2,@R3          ;DID RKDA INCREMENT CORRECTLY?
4359  013344  001405                          BEQ     7$
4360  013346  010237  001162                  MOV     R2,$REG0        ;GET EXPCTD RKDA
4361  013352  011337  001164                  MOV     @R3,$REG1       ;GET RKDA RECVD
4362  013356  104062                          ERROR   62              ;RKDA DID NOT INCREMENT CORRECTLY
4363                                                                      ;(BY 1) ON DOING 'READ CHK' ON
4364                                                                      ;CYL 0, SEC 0
4365  013360  022714  033342          7$:     CMP     #OUTBUF,@R4     ;DID RKBA GET CHANGED?
4366  013364  001406                          BEQ     8$              ;NO, BRANCH (RKBA WON'T CHANGE, NO NPR'S)
4367  013366  012737  033342  001162          MOV     #OUTBUF,$REG0   ;GET EXPCTD RKBA
4368  013374  011437  001164                  MOV     @R4,$REG1       ;GET RKBA RECVD
4369  013400  104063                          ERROR   63              ;RKBA CHANGED AFTER DOING 'READ CHK'
4370                                                                      ;ON CYLINDER 0, SECTOR 0. SHOULD
4371                                                                      ;NOT CHANGE, FOR, NO NPR'S.
4372  013402  022737  052525  033342  8$:     CMP     #52525,OUTBUF   ;'OUTBUF' SHOULD STILL CONTAIN THE
4373                                                                      ;SAME WORD AS IT DID BEFORE 'RD CHK'
4374                                                                      ;NOTE THAT AT THE BEGINING OF THIS TEST
4375                                                                      ;52525 WAS WRITTEN INTO 'OUTBUF'
4376  013410  001412                          BEQ     TST33           ;;YES, EXIT
4377                                                                      ;REPORT ERROR IF 'OUTBUF' CHANGED
4378  013412  012737  033342  001162          MOV     #OUTBUF,$REG0   ;GET ADRES OF OUTBUF
4379  013420  012737  052525  001164          MOV     #52525,$REG1    ;GET EXPCTD WORD IN 'OUTBUF'
4380  013426  013737  033342  001166          MOV     OUTBUF,$REG2    ;GET WORD FOUND IN 'OUTBUF'
4381  013434  104064                          ERROR   64              ;AS MENTIONED ABOVE, IF 'WRITE' OF
4382                                                                      ;256 WORD DATA BLOCK WAS DONE
4383                                                                      ;CORRECTLY BEFORE, THEN THIS ERROR
4384                                                                      ;COULD MEAN THAT AN NPR WAS DONE
4385                                                                      ;ON 'READ CHECK'.
4386
4387                                    ;;*****************************************************************
4388                                    ;*TEST 33       CHECK THE 'WRITE CHECK' FUNCTION - ON CYLINDER 0, SECTOR 0
4389                                            ;*THIS TEST CHECKS OUT THE BASIC 'WRITE CHECK' LOGIC, USING THE 256
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                                        ;*WORD DATA BLOCK (SECTOR 0, CYLINDER 0) WRITTEN IN A PREVIOUS
                                        ;*TEST. THE BUFFER IN MEMORY, USED FOR COMPARISON OF DATA, IS THE
                                        ;*ONE STARTING AT 'OUTBUF'. HENCE THE TEST WHICH WRITES THE
                                        ;*256 WORD BLOCK ON THE DISK (AS WELL AS CREATING THE 256
                                        ;*256 WORD MEMORY BUFFER) SHOULD BE DONE BEFORE THIS TEST.
                                    ;;**********************************************************************
013436  000004                    TST33:  SCOPE
013440  104413                            CNT.RESET                   ;GO, DO CONTROL RESET
                                                                    ;THIS IS A CALL FOR THE 'CNTRL-
                                                                    ;RESET' ROUTINE. A CONTROL RESET IS
                                                                    ;ISSUED AND AFTER A CERTAIN TIME
                                                                    ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                    ;AN ERROR IS REPORTED. NOTE THAT
                                                                    ;THE PC IN ERROR MESSAGE IS THE
                                                                    ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                    ;THIS IS A VERY BASIC ERR& IF IT
                                                                    ;OCCURS GO BACK TO TEST 10
013442  104421                            TST.SIN                     ;CHECK IF SIN IS SET, IF SET
                                                                    ;DO DRIVE RESET TO CLEAR IT
013444  013701  001332                    MOV     RKCS,R1
013450  012700  177400                    MOV     #-400,R0
013454  012702  033342                    MOV     #OUTBUF,R2
013460  012703  177777                    MOV     #177777,R3
013464  062703  177401            1$:     ADD     #177401,R3
013470  010322                            MOV     R3,(R2)+
013472  005200                            INC     R0
013474  001373                            BNE     1$
013476  012777  177400  165630            MOV     #-400,@RKWC         ;WRITE CHECK 256 WORDS
013504  012777  033342  165624            MOV     #OUTBUF,@RKBA       ;STARTING AT THIS BUS ADRES
013512  013777  001350  165620            MOV     DRIVAD,@RKDA        ;WITH THIS DISK DATA BLOCK (CYL 0, SEC 0)
013520  012711  000007                    MOV     #7,@R1              ;WRITE CHECK, GO

013524  005000                            CLR     R0                  ;GIVE SOME TIME
013526  105711                    2$:     TSTB    @R1                 ;DID CNTRL RDY CLEAR AS GO WAS SET?
013530  100003                            BPL     3$                  ;YES BRANCH
013532  004737  021002                    JSR     PC,GT3RG            ;GET RKCS, ER, DS
013536  104030                            ERROR   30                  ;CNTRL RDY DID NOT CLEAR AS GO WAS
                                                                    ;SET TO DO WRITE CHECK
013540  104412                    3$:     CHKCRDY                     ;GO CHECK IF CONTROL RDY IS SET
                                                                    ;IF SO, SKIP THE EROR MESSAGE.
013542  104065                            ERROR   65                  ;CNTRL RDY DID NOT SET AFTER
                                                                    ;COMPLETING WRITE CHECK ON
                                                                    ;CYLINDER 0, SECTOR 0
013544  032711  140000            4$:     BIT     #140000,@R1         ;DID HE OR ERR BIT SET
013550  001403                            BEQ     5$                  ;NO, BRANCH
013552  004737  021002                    JSR     PC,GT3RG            ;GO GET RKCS ER DS FOR ERROR MESSAGE
013556  104066                            ERROR   66                  ;HE OR ERR BIT SET ON DOING WRITE
                                                                    ;CHK ON CYLINDER 0, SEC 0
013560  032777  000001  165542    5$:     BIT     #1,@RKER            ;DID WCE SET IN RKER?
013566  001403                            BEQ     6$                  ;NO, BRANCH
013570  004737  021002                    JSR     PC,GT3RG            ;YES GET RKCS, ER, DS
013574  104067                            ERROR   67                  ;WCE ON WRITE CHECK OF CYL 0, SEC 0
                                                                    ;NOTE THAT IF A PREVIOUS TEST
                                                                    ;& THEN COMPARED WITH MEMORY BUFFER
                                                                    ;TO SEE IF IT WAS WRITTEN CORRECT WAS
                                                                    ;DONE RIGHT BEFORE, THIS ERROR SHOULD NOT
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```
                                                        ;HAPPEN UNLESS THERE IS A FAULT IN THE
                                                        ;COMPARING LOGIC OF 'WRT CHK'
013576  005777  165532          6$:     TST     @RKWC           ;DID RKWC OVERFLOW?
013602  001406                          BEQ     7$              ;YES, BRANCH
013604  017737  165524  001162          MOV     @RKWC,$REG0     ;NO, GET RKWC
013612  011137  001164                  MOV     @R1,$REG1       ;GET RKCS
013616  104061                          ERROR   61              ;RKWC DID NOT OVERFLOW AFTER
                                                        ;WRITE CHECK ON CYL 0, SEC 0
013620  013704  001350          7$:     MOV     DRIVAD, R4      ;RKDA SHOULD INCREMENT
013624  005204                          INC     R4              ;TO THIS AFTER WRT CHK
013626  020477  165506                  CMP     R4,@RKDA        ;DID RKDA INCREMENT CORRECTLY?
013632  001406                          BEQ     8$              ;YES, BRANCH
013634  010437  001162                  MOV     R4,$REG0        ;NO, GET EXPCTD RKDA
013640  017737  165474  001164          MOV     @RKDA,$REG1     ;GET RKDA RECVD
013646  104070                          ERROR   70              ;RKDA DID NOT INCREMENT CORRECTLY
                                                        ;(BY 1 SECTOR) AFTER WAT CHK ON SEC 0, CYL 0
013650  022777  034342  165460  8$:     CMP     #OUTBUF+1000,@RKBA ;DID RKBA INCREMENT CORRECTLY?
013656  001407                          BEQ     9$              ;YES, EXIT
013660  012737  034342  001162          MOV     #OUTBUF+1000,$REG0 ;GET EPCTD RKBA
013666  017737  165444  001164          MOV     @RKBA,$REG1     ;GET RKBA RECVD
013674  104071                          ERROR   71              ;RKBA DID NOT INCREMENT CORRECTLY
                                                        ;(BY 1000 BYTES) AFTER A WRT CHK
                                                        ;OF 256 WORDS ON CYL 0, SEC 0
013676  022711  000206          9$:     CMP     #206,@R1        ;DOES RKCS STILL CONTAIN THE WRT CHK BITS?
013702  001406                          BEQ     TST34           ;;YES, BRANCH
013704  012737  000206  001162          MOV     #206,$REG0      ;NO, GET EXPCTD RKCS
013712  011137  001164                  MOV     @R1,$REG1       ;GET RKCS RECVD
013716  104024                          ERROR   24              ;RKCS BITS CHANGED AFTER WRT CHK
                                                        ;WAS DONE
                                ;;**********************************************************************
                                ;*TEST 34        CHECK THAT IBA INHIBITS INCREMENTING OF RKBA
                                        ;*THIS TEST CHECKS THAT THE BUS ADDRESS DOES NOT INCREMENT WHEN
                                        ;*THE IBA BIT IS SET. SEQUENCE OF OPERATIONS:
                                        ;*1) CLEAR OUT 256 WORD BUFFER IN MEMORY (OUTBUF)
                                        ;*2) READ FROM SECTOR 0, CYLINDER 0 THE 256 WORD BLOCK THAT WAS
                                        ;*WRITTEN IN A PREVIOUS TEST (NOTE: THAT TEST SHOULD HAVE BEEN
                                        ;*DONE BEFORE THIS). IBA BIT IS SET DURING READ BACK.
                                        ;*3) CHECK THAT RKBA DID NOT INCREMENT
                                        ;*4) CHECK THAT THE ENTIRE BLOCK WAS READ INTO THE SAME MEMORY
                                        ;*WORD (OUTBUF) & THE REST OF THE WORDS IN THAT BUFFER ARE 0
                                        ;*AS PREVIOUSLY CLEARED OUT.
                                ;;**********************************************************************
013720  000004                  TST34:  SCOPE
013722  104413                          CNT.RESET               ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
013724  104421                          TST.SIN                 ;CHECK IF SIN IS SET, IF SET
                                                        ;DO DRIVE RESET TO CLEAR IT
013726  013701  001332                  MOV     RKCS,R1
```

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 4502  013732  012700  177400                MOV     #-400,R0        ;SET UP COUNT FOR 256 WORDS
 4503  013736  012702  033342                MOV     #OUTBUF,R2
 4504  013742  010203                        MOV     R2,R3
 4505
 4506  013744  005023                1$:     CLR     (R3)+           ;CLEAR OUT THE 256
 4507  013746  005200                        INC     R0              ;WORD MEMORY BUFFER STARTING
 4508  013750  001375                        BNE     1$              ;AT 'OUTBUF'
 4509  013752  012777  177400  165354        MOV     #-400,@RKWC     ;READ BACK 256 WORDS
 4510  013760  010277  165352                MOV     R2,@RKBA        ;INTO THIS BUS ADRES (IBA WILL B SET)
 4511  013764  013777  001350  165346        MOV     DRIVAD,@RKDA    ;FROM THIS DSK ADRES (SEC 0, CYL 0)
 4512                                                                ;NOTE: SEC 0 HAS BEEN WRITTEN IN A
 4513                                                                ;PREVIOUS TEST WITH A UNIQUE PATTERN
 4514  013772  012711  004005                MOV     #4005,@R1       ;READ, GO, IBA SET
 4515
 4516  013776  005037  001362                CLR     COUNT
 4517  014002  105711                2$:     TSTB    @R1             ;DID CNTRL RDY SET?
 4518  014004  100412                        BMI     3$              ;YES, BRANCH
 4519  014006  005237  001362                INC     COUNT           ;WAITED LONG ENOUGH?
 4520  014012  001373                        BNE     2$              ;IF NOT, LUP BAK & WAIT
 4521  014014  004737  020774                JSR     PC,GT4RG        ;GO, GET RKCS, ER, DS, DA
 4522  014020  013737  001350  001202        MOV     DRIVAD,$REG10   ;GET THE STARTING ADRES
 4523  014026  104416                        BRKDA4                  ;BREAK CONTENTS OF $REG10
 4524                                                                ;INTO DR #, CYL, SUR, SEC
 4525  014030  104045                        ERROR   45              ;CNTRL RDY DID NOT SET AFTER DOING
 4526                                                                ;READ
 4527  014032  004737  021234        3$:     JSR     PC,CHKHE        ;CHECK IF 'ERR' OR 'HE' BIT IS SET,
 4528                                                                ;IF YES, RETURN HERE.
 4529  014036  104046                        ERROR   46              ;ERR BIT SET ON DOING READ FROM SEC 0,
 4530                                                                ;CYL 0 (INDICATED  IN <DSK-ADRES>)
 4531                                                                ;'RKDA' IN EROR MSGE GIVES THE
 4532                                                                ;CONTENTS OF RKDA AT THE TIME OF EROR
 4533
 4534  014040  020277  165272        4$:     CMP     R2,@RKBA        ;DID RKBA INCREMENT?
 4535  014044  001406                        BEQ     5$              ;OK IF NOT, BRANCH
 4536  014046  010237  001162                MOV     R2,$REG0        ;GET EXPCTD RKBA
 4537  014052  017737  165260  001164        MOV     @RKBA,$REG1     ;GET RKBA RECVD
 4538  014060  104072                        ERROR   72              ;RKBA INCREMNTED WHEN IBA BIT WAS
 4539                                                                ;SET, SHOULD NOT HAVE
 4540  014062  032777  001000  165236  5$:     BIT     #1000,@RKDS     ;IS SIN SET?
 4541  014070  001042                        BNE     TST35           ;;IF YES, EXIT
 4542  014072  012700  177400                MOV     #-400,R0
 4543  014076  022712  000377                CMP     #377,@R2        ;CHECK THAT THE FIRST WORD IN
 4544                                                                ;'OUTBUF' IS 377 (LAST WORD OF SEC 0,
 4545                                                                ;CYL 0). NOTE THAT READ WAS DONE
 4546  014102  001411                        BEQ     6$              ;INTO THIS SAME WRD WITH IBA SET
 4547  014104  012737  000377  001162        MOV     #377,$REG0       ;GET EXPCTD WORD (LAST WORD OF THE BUFFER
 4548  014112  011237  001164                MOV     (R2),$REG1      ;GET WORD RECVD (LAST WRD FROM SEC 0)
 4549  014116  013737  001350  001166        MOV     DRIVAD,$REG2    ;DISK ADRES WHERE ERROR OCCURED
 4550                                                                ;(SEC 0, CYL 0 LAST WORD)
 4551                                                                ;DATA ERROR
 4552  014124  104044                        ERROR   44              ;THE FIRST WORD IN MEM BUFFER (OUTBUF)
 4553                                                                ;SHOULD BE NON-ZERO & SHOULD CONTAIN
 4554                                                                ;THE LAST WORD READ BACK FROM SEC 0
 4555                                                                ;CYL 0,THIS DID NOT HAPPEN IF THE ERROR OCCURS
 4556  014126  005722                6$:     TST     (R2)+           ;INCREMENT POINTER TO THE NXT WORD
 4557  014130  012705  177773                MOV     #-5,R5          ;ALLOW ONLY 5 MESAGES FOR ERR 116
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4558  014134  005200                  7$:     INC     R0              ;CHKD ALL 256 WORDS IN THE BUFFER?
4559  014136  001417                          BEQ     TST35           ;;YES, EXIT
4560  014140  005722                          TST     (R2)+           ;IS THIS WORD 0?
4561  014142  001774                          BEQ     7$              ;YES, LUP BAK & CHK THE NXT WORD?
4562  014144  005037  001164                  CLR     $REG1           ;ERROR. GET EXPCTED WORD - 0
4563  014150  014237  001166                  MOV     -(R2),$REG2     ;GET WORD THAT WAS FOUND IN THE BUFFER
4564  014154  010004                          MOV     R0,R4
4565  014156  062704  000401                  ADD     #401,R4
4566  014162  010437  001162                  MOV     R4,$REG0        ;THIS 'WORD #' IN MEMORY BUFFER
4567                                                                  ;SHOULD HAVE BEEN ZERO
4568  014166  104073                          ERROR   73              ;THE 256 WORD BUFER (STARTING AT
4569                                                                  ;OUTBUF) WAS CLEARED BEFORE READING
4570                                                                  ;BAK SEC 0 INTO IT. SINCE THE IBA
4571                                                                  ;BIT WAS SET DURING THE READ, ONLY
4572                                                                  ;THE FIRST WORD OF (OUTBUF) SHOULD
4573                                                                  ;HAVE CHANGED, THE REST OF THE WORDS
4574                                                                  ;SHOULD BE STILL 0. IF THIS ERROR
4575                                                                  ;OCCURS, 'WORD #' (OF THE BUFFER) AS
4576                                                                  ;INDICATED IN THE EROR MESAGE) GOT
4577                                                                  ;CHANGED WHEN READ WAS DONE FROM
4578                                                                  ;THE DISK, INDICATING THAT WITH IBA
4579                                                                  ;SET X-FER WAS NOT DONE INTO THE
4580                                                                  ;SAME MEMORY LOCATION. 'WORD #'
4581                                                                  ;IS OCTAL & SPECIFIES THE POSITION
4582                                                                  ;IN THE BUFFER (FIRST WORD IS 'WORD #' 1)
4583  014170  005205                          INC     R5
4584  014172  001401                          BEQ     TST35           ;;EXIT
4585  014174  000757                          BR      7$
4586                                  ;
4587                                  ;;*****************************************************************
4588                                  ;*TEST 35       CHECK THAT RK11 INTERRUPTS WHEN IDE IS SET
4589                                          ;*THIS TEST CHECKS IF RK11 INTERRUPTS TO ITS DESIGNATED VECTOR
4590                                          ;*ADDRESS WHEN IDE BIT IS SET, WITH CONTROL READY SET & GO CLEAR.
4591                                          ;* IT IS NORMALLY 220, UNLESS IT HAS BEEN CHANGED. IF IT HAS BEEN
4592                                          ;*CHANGED RK11 WILL INTERRUPT TO 'RKVEC'. NOTE 'RKVEC' HAS
4593                                          ;*TO BE SET UP BY THE USER.
4594                                  ;;*****************************************************************
4595  014176  000004                  TST35:  SCOPE
4596  014200  104413                          CNT.RESET               ;GO, DO CONTROL RESET
4597                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
4598                                                                  ;RESET' ROUTINE. A CONTROL RESET IS
4599                                                                  ;ISSUED AND AFTER A CERTAIN TIME
4600                                                                  ;IF THE 'CNTRL RDY' DOES NOT SET
4601                                                                  ;AN ERROR IS REPORTED. NOTE THAT
4602                                                                  ;THE PC IN ERROR MESSAGE IS THE
4603                                                                  ;PC WHERE 'CNT.RESET' IS LOCATED.
4604                                                                  ;THIS IS A VERY BASIC ERR& IF IT
4605                                                                  ;OCCURS GO BACK TO TEST 10
4606  014202  104421                          TST.SIN                 ;CHECK IF SIN IS SET, IF SET
4607                                                                  ;DO DRIVE RESET TO CLEAR IT
4608  014204  012746  000340                  MOV     #340,-(SP)
4609  014210  012746  014216                  MOV     #64$,-(SP)
4610  014214  000002                          RTI
4611  014216                          64$:
4612  014216  013701  001332                  MOV     RKCS,R1
4613  014222  013700  001402                  MOV     RKVEC,R0        ;GET POINTER TO RK VECTOR ADRES
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4614  014226  012720  014262                  MOV     #1$,(R0)+       ;SET UP INTERRUPT VECTOR FOR RK11
4615  014232  012710  000340                  MOV     #340,(R0)       ;SET PSW ON INTERRUPT
4616  014236  105711                          TSTB    @R1             ;WAIT FOR CNTRL RDY TO SET
4617  014240  100376                          BPL     .-2             ;
4618  014242  012711  000100                  MOV     #100,@R1        ;SET IDE BIT IN RKCS
4619  014246  104420  000005                  WAT.INT ,5              ;WAIT FOR INTERRUPT, ATLEAST
4620                                                                  ;37 US FOR 11/20, 7 US FOR 11/45
4621  014252  011137  001162                  MOV     @R1,$REG0       ;GET RKCS
4622  014256  104074                          ERROR   74              ;RK11 DID NOT INTERRUPT WHEN IDE
4623                                                                  ;WAS SET, WITH CNTRLE RDY SET & GO
4624                                                                  ;CLEAR
4625  014260  000400                          BR      1$
4626  014262  022626                  1$:     CMP     (SP)+,(SP)+     ;RK11 INTERRUPTED CORRECTLY TO
4627                                                                  ;THIS. RESTORE STACK POINTER
4628                                                                  ;(FROM RK11 INTERRUPT)
4629  014264  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
4630                                                                  ;(FROM  WAT.INT)
4631  014266  012777  014302  165106          MOV     #2$,@RKVEC      ;IF THERE IS FAULTY POLLING OR INTERUPT
4632                                                                  ; LOGIC SECOND INTERRUPT MIGHT OCCUR
4633  014274  104420  000005                  WAT.INT ,5              ;WAIT FOR INTERRUPT,IF ANY
4634                                                                  ;DUE TO FAULTY LOGIC
4635
4636  014300  000403                          BR      3$
4637
4638  014302  022626                  2$:     CMP     (SP)+,(SP)+     ;RESTORE STACK PTR (FROM RK11 INTRUPT)
4639  014304  022626                          CMP     (SP)+,(SP)+     ;RESTORE STACK PTR (FROM WAT.INT)
4640  014306  104020                          ERROR   20              ;AN UNEXPECTED RK11 INTERRUPT
4641                                                                  ;OCCURED. THERE SHOULD HAVE BEEN
4642                                                                  ;ONLY 1 INTERRUPT (TO 1$ ABOVE)
4643  014310  012777  004600  165064  3$:     MOV     #BADINT,@RKVEC  ;RESTORE VECTOR ADRES FOR
4644                                                                  ;UNEXPECTED RK11 INTERRUPT,
4645  014316  012746  000340                  MOV     #340,-(SP)
4646  014322  012746  014330                  MOV     #65$,-(SP)
4647  014326  000002                          RTI
4648  014330                          65$:
4649
4650
4651                                  ;;*****************************************************************
4652                                  ;*TEST 36       CHECK THAT WITH IDE SET RK11 INTERRUPTS AFTER INTIATION & COMPLETION OF
4653                                          ;*THIS TEST CHECKS THAT AN INTERRUPT FROM RK11 OCCURS AFTER
4654                                          ;*A SEEK IS INITIATED WITH 'IDE' BIT SET, AND THEN A SECOND
4655                                          ;*INTERRUPT OCCURS AFTER THE SEEK IS DONE. IT ALSO CHECKS THAT
4656                                          ;*AFTER THE FIRST INTERRUPT 'SCP' BIT IS NOT SET, WHEREAS AFTER
4657                                          ;*THE SECOND INTERRUPT 'SCP' IS SET.
4658                                          ;*THIS TEST ALSO CHECKS A PART OF THE POLLING LOGIC.
4659                                  ;;*****************************************************************
4660  014330  000004                  TST36:  SCOPE
4661  014332  012737  000005  001206          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
4662  014340  104413                          CNT.RESET               ;GO, DO CONTROL RESET
4663                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
4664                                                                  ;RESET' ROUTINE. A CONTROL RESET IS
4665                                                                  ;ISSUED AND AFTER A CERTAIN TIME
4666                                                                  ;IF THE 'CNTRL RDY' DOES NOT SET
4667                                                                  ;AN ERROR IS REPORTED. NOTE THAT
4668                                                                  ;THE PC IN ERROR MESSAGE IS THE
4669                                                                  ;PC WHERE 'CNT.RESET' IS LOCATED.
```

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                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
014342  013700  001332          MOV     RKCS,R0
014346  013777  001350  164764  MOV     DRIVAD,@RKDA    ;ADRES THE DRIVE
014354  004737  021504          JSR     PC,DRESET       ;GO, DO DRIVE RESET
014360  104026                  ERROR   26              ;R/W/S RDY DIDN'T SET AFTER DOING
                                                        ;ABOVE DRIVE RESET
014362  013701  001402  2$:     MOV     RKVEC,R1
014366  012721  014432          MOV     #3$,(R1)+       ;SET UP VECTOR ADRES FOR RK11 INTERUPT
014372  012711  000340          MOV     #340,(R1)       ;SET UP PSW ON INTERRUPT
014376  052777  000040  164734  BIS     #40,@RKDA       ;ADRES  CYLINDER #1
014404  012710  000111          MOV     #111,@R0        ;SEEK, GO WITH IDE SET
014410  104420  000300          WAT.INT ,300            ;WAIT FOR THE DRIVE TO
                                                        ;INTERRUPT AFTER ADRES WAS RECVD
                                                        ;WAITING TIME= 1.4 MS FOR 11/20
                                                        ;280 US FOR 11/45
                                                        ;ERROR, IF INTERUPT DID NOT OCCUR
                                                        ;BY NOW
014414  012777  004600  164760  MOV     #BADINT,@RKVEC  ;RESTORE UNEXPECTED RK11 INTERRUPT
014422  011037  001162          MOV     @R0,$REG0       ;GET RKCS
014426  104075                  ERROR   75              ;INTERRUPT DID NOT OCCUR AFTER
                                                        ;SEEK WAS INITIATED WITH IDE SET
014430  000402                  BR      3$+4
014432  022626          3$:     CMP     (SP)+,(SP)+     ;OK, IF RK11 INTERRUPTED TO THIS
                                                        ;RESTORE STACK POINTER (FROM RK11 INTERRUPT)
014434  022626                  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER (FROM
                                                        ;WAT.INT)
014436  012777  014502  164736  MOV     #5$,@RKVEC      ;SET UP NEW VECTOR ADRES FOR RK11
014444  032710  020000          BIT     #20000,@R0      ;IS SCP CLEAR
014450  001403                  BEQ     4$              ;YES, BRANCH
014452  011037  001162          MOV     @R0,$REG0       ;GET RKCS
014456  104076                  ERROR   76              ;SCP SET BEFORE SEEK TO LAST
                                                        ;CYLINDER WAS DONE
014460  104420  056700  4$:     WAT.INT ,56700          ;WAIT FOR DRIVE TO INTERRUPT
                                                        ;AFTER SEEK WAS COMPLETED
                                                        ;WAITING TIME=180 MS FOR 11/20
                                                        ;36 MS FOR 11/45
014464  012777  004600  164710  MOV     #BADINT,@RKVEC  ;IT'S AN ERROR IF BY THIS TIME
                                                        ;INTERRUPT HAS NOT OCCURERED
014472  004737  021002          JSR     PC,GT3RG                ;GO GET RKCS, ER, DS
014476  104077                  ERROR   77              ;RK11 DID NOT INTERRUPT AFTER SEEK (TO
                                                        ;LAST CYLINDER) WAS DONE WITH IDE SET
014500  000401                  BR      5$+2
014502  022626          5$:     CMP     (SP)+,(SP)+     ;OK, IF RK11 INTERUPTED TO THIS AFTER
                                                        ;SEEK WAS COMPLETED. RESTORE
                                                        ;STACK POINTER (FROM RK11 INTERRUPT)
014504  022626                  CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER (FROM
                                                        ;WAT.INT)
014506  012777  004600  164666  MOV     #BADINT,@RKVEC  ;RESTORE RK11 INTERRUPT VECTOR ADRES
                                                        ;FOR UNEXPECTED INTERUTS
014514  032710  020000          BIT     #20000,@R0      ;DID SCP BIT SET?
014520  001003                  BNE     6$              ;YES, BRANCH
014522  011037  001162          MOV     @R0,$REG0       ;GET RKCS
014526  104053                  ERROR   53              ;SCP DID NOT SET AFTER RK11 INTERRUPTED
                                                        ;INDICATING SEEK WAS DONE
014530  017701  164572  6$:     MOV     @RKDS,R1        ;GET RKDS
```

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 4726  014534  042701  017777              BIC     #17777,R1       ;MASK NON-ID BITS IN RKDS
 4727  014540  020137  001350              CMP     R1,DRIVAD       ;CORRECT ID BITS IN RKDS?
 4728  014544  001414                      BEQ     7$              ;YES, BRANCH
 4729
 4730  014546  013746  001350              MOV     DRIVAD,-(SP)    ;PUSH DRV ADRES ON THE STACK
 4731  014552  004737  021200              JSR     PC,SHFTRT       ;GO, SHIFT RIGHT DRV #
 4732  014556  012637  001162              MOV     (SP)+,$REG0     ;GET EXPCTD DRV #
 4733  014562  010146                      MOV     R1,-(SP)        ;PUSH ID BITS ON THE STACK
 4734  014564  004737  021200              JSR     PC,SHFTRT       ;GO SHIFT THEM RIGHT
 4735  014570  012637  001164              MOV     (SP)+,$REG1     ;POP THE RECVD ID BITS
 4736  014574  104047                      ERROR   47              ;WRONG ID BITS WERE RECVD IN
 4737                                                              ;RKDS AFTER SEEK WAS DONE (INTRUPT
 4738                                                              ;MODE). 'EXPCT' INDICATES THE DRIVE
 4739                                                              ;# THAT SHOULD HAVE BEEN IN THE
 4740                                                              ;ID BITS, 'RECVD' INDICATES THE
 4741                                                              ;DRIVE # THAT WAS RECVD IN THE ID BITS
 4742
 4743  014576                          7$:
 4744  014576  012746  000340              MOV     #340,-(SP)
 4745  014602  012746  014610              MOV     #64$,-(SP)
 4746  014606  000002                      RTI
 4747  014610                          64$:
 4748  014610  104413                      CNT.RESET               ;GO DO CONTROL RESET
 4749  014612  013777  001350  164520      MOV     DRIVAD,@RKDA    ;ADRES THE DRIVE
 4750  014620  032777  160000  164500      BIT     #160000,@RKDS   ;DID CNTRL RESET CLEAR DRIVE ID BITS?
 4751  014626  001404                      BEQ     8$              ;YES, BRANCH
 4752  014630  017737  164472  001162      MOV     @RKDS,$REG0     ;GET RKDS
 4753  014636  104050                      ERROR   50              ;CONTROL RESET DIDN'T CLEAR THE
 4754
 4755                                                              ;DRIVE ID BITS (13-15) IN RKDS
 4756
 4757  014640  022710  000200          8$: CMP     #200,@R0        ;WAS SCP BIT CLEARED BY CNTRL RESET?
 4758  014644  001403                      BEQ     TST37           ;;YES, EXIT
 4759  014646  011037  001162              MOV     @R0,$REG0       ;GET RKCS
 4760  014652  104100                      ERROR   100             ;CNTRL RESET DID NOT CLEAR SCP BIT
 4761
 4762                                  ;;**********************************************************************
 4763                                  ;*TEST 37       CHECK THAT WITH IDE SET RK11 INTERRUPTS WHEN READ IS DONE
 4764                                          ;*THIS TEST CHECKS THAT WHEN A DATA TRANSFER FUNCTION IS DONE
 4765                                          ;*WITH IDE BIT SET, RK11 INTERRUPTS WHEN THE FUNCTION IS COMPLETED
 4766                                          ;*FUNCTION USED IN THIS TEST IS READ.
 4767                                  ;;**********************************************************************
 4768  014654  000004                  TST37:  SCOPE
 4769  014656  104413                          CNT.RESET               ;GO, DO CONTROL RESET
 4770                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
 4771                                                                  ;RESET' ROUTINE. A CONTROL RESET IS
 4772                                                                  ;ISSUED AND AFTER A CERTAIN TIME
 4773                                                                  ;IF THE 'CNTRL RDY' DOES NOT SET
 4774                                                                  ;AN ERROR IS REPORTED. NOTE THAT
 4775                                                                  ;THE PC IN ERROR MESSAGE IS THE
 4776                                                                  ;PC WHERE 'CNT.RESET' IS LOCATED.
 4777                                                                  ;THIS IS A VERY BASIC ERR& IF IT
 4778                                                                  ;OCCURS GO BACK TO TEST 10
 4779  014660  104421                          TST.SIN                 ;CHECK IF SIN IS SET, IF SET
 4780                                                                  ;DO DRIVE RESET TO CLEAR IT
 4781
```

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 4782  014662  013700  001332                 MOV     RKCS,R0
 4783  014666  013702  001340                 MOV     RKDA,R2
 4784  014672  013704  001336                 MOV     RKBA,R4
 4785  014676  013701  001350                 MOV     DRIVAD,R1
 4786  014702  052701  000013                 BIS     #13,R1          ;SET BITS FOR SEC 13
 4787  014706  012777  177600  164420         MOV     #-200,@RKWC     ;READ 200 (OCTAL WORDS)
 4788  014714  010112                         MOV     R1,@R2          ;FROM THIS DISK ADRES (CYL 0, SEC 13)
 4789  014716  012714  033342                 MOV     #OUTBUF,@R4     ;INTO THIS BUS ADRES
 4790  014722  013705  001402                 MOV     RKVEC,R5
 4791  014726  012725  014764                 MOV     #1$,(R5)+       ;SET UP VECTOR ADRES FOR RK11 TO INTRUPT
 4792  014732  012715  000340                 MOV     #340,(R5)       ;SET PSW ON INTERUPT
 4793  014736  012710  000105                 MOV     #105,@R0        ;READ, GO, IDE SET
 4794  014742  104420  127710                 WAT.INT ,127710         ;WAIT FOR RK11 TO INTERRUPT ON
 4795                                                                  ;COMPLETION OF READ
 4796                                                                  ;WAITING TIME= 337 MS FOR 11/20
 4797                                                                  ;67 MS FOR 11/45
 4798  014746  012777  004600  164426         MOV     #BADINT,@RKVEC  ;RESTORE UNEXPCTED INTERRUPT VECTOR ADRES
 4799  014754  011037  001162                 MOV     @R0,$REG0       ;GET RKCS
 4800  014760  104101                         ERROR   101             ;RK11 DID NOT INTERRUPT AFTER READ
 4801                                                                  ;WAS DONE, IDE BIT SET.
 4802  014762  000404                         BR      1$+10
 4803  014764  022626                 1$:     CMP     (SP)+,(SP)+     ;OK, IF RK11 INTERRUPTED TO THIS
 4804                                                                  ;RESTORE STACK POINTER (FROM RK11 INTERRUPT)
 4805  014766  022626                         CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER (FROM WAT.INT)
 4806  014770  012777  004600  164404         MOV     #BADINT,@RKVEC  ;RESTORE UNEXPECTED RK11 INTERRUPT
 4807                                                                  ;VECTOR ADRES
 4808  014776  004737  021342                 JSR     PC,CHKER        ;CHECK IF ANY BIT IN RKER IS SET,
 4809                                                                  ;IF YES, RETURN HERE.
 4810  015002  104036                         ERROR   36              ;RKER SET ON DOING READ FROM SEC 0,
 4811                                                                  ; CYL 13 IN INTERRUPT MODE
 4812  015004  062701  000005         4$:     ADD     #5,R1           ;RKDA SHOULD HAVE INCREMENTED TO THIS
 4813  015010  020112                         CMP     R1,@R2          ;DID RKDA INCREMENT CORRECTLY?
 4814  015012  001405                         BEQ     2$              ;YES BRANCH
 4815  015014  010137  001162                 MOV     R1,$REG0        ;GET EXPCTD RTDA
 4816  015020  011237  001164                 MOV     @R2,$REG1       ;GET RKDA RECVD
 4817  015024  104040                         ERROR   40              ;RKDA INCREMENTED WRONG ON DOING
 4818                                                                  ;A READ ON CYL 0, SEC 13
 4819  015026  004737  021316         2$:     JSR     PC,CHKWC        ;CHECK THAT RKWC OVERFLOWED TO 0,
 4820                                                                  ;IF NOT RETURN HERE.
 4821  015032  104041                         ERROR   41              ;RKWC DIDN'T OURFLO AFTER
 4822                                                                  ;A READ OF 200 WORDS
 4823
 4824  015034                         3$:
 4825  015034  012746  000340                 MOV     #340,-(SP)
 4826  015040  012746  015046                 MOV     #64$,-(SP)
 4827  015044  000002                         RTI
 4828  015046                         64$:
 4829  015046  022714  033742                 CMP     #OUTBUF+400,@R4 ;DID RKBA INCREMENT CORRECTLY?
 4830  015052  001406                         BEQ     TST40           ;;YES, EXIT
 4831  015054  012737  033742  001162         MOV     #OUTBUF+400,$REG0 ;GET EXPCT RKBA
 4832  015062  011437  001164                 MOV     @R4,$REG1       ;GET RKBA RECVD
 4833  015066  104042                         ERROR   42              ;RKBA DID NOT INCREMENT CORRECTLY
 4834                                                                  ;AFTER A READ OF 200 WORDS
 4835
 4836                                 ;;*****************************************************************
 4837                                 ;*TEST 40        CHECK THAT RK11 INTERRUPTS AT BR5 ONLY
```

```
                        ;*THIS TEST CHECKS THAT RK11 CAN ITERRUPT AT BR5 ONLY.  IF IT
                        ;*INTERRUPTS AT A LEVEL HIGHER THAN BR5 AN ERROR IS INDICATED.
                        ;*IF IT DOES NOT INTERRUPT AT BR5 ORLOWER THEN ALSO AN
                        ;*ERROR IS INDICATED.  IF FOR SOME REASON THE INTERRUPT
                        ;*LEVEL IS CHANGED FROM BR5, THEN CONTENTS OF RKPRI WILL
                        ;*HAVE TO BE CHANGED ACCORDINGLY AND STILL TEXT WILL
                        ;*CHECK FOR THIS BR LEVEL.
                        ;;*****************************************************************
015070  000004         TST40:  SCOPE
015072  104413                 CNT.RESET                  ;GO, DO CONTROL RESET
                                                           ;THIS IS A CALL FOR THE 'CNTRL-
                                                           ;RESET' ROUTINE. A CONTROL RESET IS
                                                           ;ISSUED AND AFTER A CERTAIN TIME
                                                           ;IF THE 'CNTRL RDY' DOES NOT SET
                                                           ;AN ERROR IS REPORTED. NOTE THAT
                                                           ;THE PC IN ERROR MESSAGE IS THE
                                                           ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                           ;THIS IS A VERY BASIC ERR& IF IT
                                                           ;OCCURS GO BACK TO TEST 10
015074  104421                 TST.SIN                    ;CHECK IF SIN IS SET, IF SET
                                                           ;DO DRIVE RESET TO CLEAR IT
015076  012737  015132  001110         MOV     #1$,$LPERR ;SET RETURN ADRES FOR LUPING
                                                           ;ON ERROR (SW 9)
015104  013700  001332         MOV     RKCS,R0
015110  013777  001350  164222 MOV     DRIVAD,@RKDA
015116  012701  000007         MOV     #7,R1              ;PRIORITY LEVEL 7
015122  012702  000340         MOV     #340,R2            ;BR LEVEL 7 FOR PSW
015126  013703  001400         MOV     RKPRI,R3           ;NOTE, IF RK11 INTERRUPT LEVEL IS
                                                           ;CHANGED FROM 5 TO ANY OTHER LEVEL
                                                           ;THEN CHANGE CONTENTS OF 'RKPRI'
                                                           ; ACCORDINGLY
015132  013704  001402  1$:    MOV     RKVEC,R4
015136  012724  015244         MOV     #3$,(R4)+          ;SET UP ADRES FOR RK11 TO INTERUPT
015142  012714  000340         MOV     #340,(R4)          ;SET UP PSW ON INTERUPT
015146  010246                 MOV     R2,-(SP)                   ;SET PROCESSOR PRIORITY LEVEL AS
015150  012746  015156         MOV     #4$,-(SP)
015154  000002                 RTI
015156                  4$:                                ;INDICATED BY R2
015156  012710  000100         MOV     #100,@R0           ;SET THE IDE BIT
015162  012705  177760         MOV     #-20,R5            ;WAIT FOR THE RK11 INTERRUPT
015166  005205                 INC     R5                 ;WAITING TIME=78 US FOR 11/20
015170  001376                 BNE     .-2                ;13 US FOR 11/45
015172  020203                 CMP     R2,R3              ;WAS THE CPU PRIORITY LEVEL LESS THAN
015174  003005                 BGT     2$                 ;THE RK11 LEVEL?  IF YES, RK11
                                                           ;SHOULD HAVE INTERRUPTED. ERROR,
                                                           ;IF IT DID NOT
015176  010137  001162         MOV     R1,$REG0           ;GET CPU BR LEVEL
015202  011037  001164         MOV     @R0,$REG1          ;GET RKCS
015206  104103                 ERROR   103                ;THOUGH CPU LEVEL WAS LESS THAN
                                                           ;THE RK11 LEVEL (5), RK11 DID NOT
                                                           ;INTERRUPT
015210  005010          2$:    CLR     @R0                ;CLEAR RKCS
015212  062702  177740         ADD     #-40,R2            ;DECREASE THE PRIORITY LEVEL (FOR
                                                           ;CPU) BY 1
015216  005301                 DEC     R1                 ;CPU WILL B AT THIS LEVEL
015220  001344                 BNE     1$                 ;LUP BAK & CHK FOR THIS BR LEVEL.
```

```
                                                        ;DONE WITH CHKING FOR ALL LEVELS.
015222  012777  004600  164152          MOV     #BADINT,@RKVEC  ;RESTORE UNEXPECTED RK11 INTERRUPT
                                                        ;VECTOR
015230  012746  000340                  MOV     #340,-(SP)
015234  012746  015242                  MOV     #64$,-(SP)
015240  000002                          RTI
015242                          64$:
015242  000414                  BR      TST41           ;;EXIT,TO NXT TST

015244  022626                  3$:     CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
015246  012777  004600  164126          MOV     #BADINT,@RKVEC  ;RESTORE UNEXPECTED RK11 INTERRUPT
                                                        ;VECTOR
015254  020203                  $       CMP     R2,R3           ;IF THIS INTERRUPT OCCURED WHEN
015256  003754                          BLE     2$              ;CPU LEVEL WAS LESS THAN THE
                                                        ;RK11 PRIORITY LEVEL (5) THEN IT IS
                                                        ;OK.  IF NOT SO, ERROR
015260  010137  001162                  MOV     R1,$REG0        ;GET CPU BR LEVEL
015264  011037  001164                  MOV     @R0,$REG1       ;GET RKCS
015270  104104                          ERROR   104             ;RK11 INTERRUPTED WHEN THE CPU
                                                        ;LEVEL (AS POINTED BY R1) WAS
                                                        ;HIGHER OR SAME AS THE RK11
                                                        ;LEVEL (5)
015272  000746                          BR      2$              ;GO BACK & CHK THE NXT LEVEL

                                ;;**********************************************************************
                                ;*TEST 41        SIMULATE & CHECK 'OVR' ERROR
                                        ;*THIS TEST SIMULATES OVERRUN ERROR AND CHECKS IF THE OVR
                                        ;*BIT IN RKER GETS SET.  THEN IT IS CLEARED USING CNTRL RESET
                                        ;*& CHECKED THAT IT WAS CLEARED.  OVR CONDITION IS SIMULATED
                                        ;*BY TRYING TO READ 401(OCTAL) WORDS FROM LAST CYLINDER(312),
                                        ;*LAST SECTOR (13), SURFACE 1.
                                ;;**********************************************************************
015274  000004                  TST41:  SCOPE
015276  104413                          CNT.RESET               ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
015300  104421                          TST.SIN                 ;CHECK IF SIN IS SET, IF
                                                        ;SET, DO DRIVE RESET TO CLR IT
015302  013701  001350                  MOV     DRIVAD,R1       ;GET ADRES OF DRIVE
015306  052701  014533                  BIS     #14533,R1       ;SET BITS FOR LAST CYLINDER (312),
                                                        ;SUR 1, LAST SECTOR (13)
015312  012777  177377  164014          MOV     #-401,@RKWC     ;READ 401 WORDS
015320  012777  033342  164010          MOV     #OUTBUF,@RKBA   ;INTO THIS MEMORY BUFFER
015326  010177  164006                  MOV     R1,@RKDA        ;FROM THIS DSK ADRES, LAST CYL,
                                                        ;LAST SEC, SURFACE 1
015332  012777  000005  163772          MOV     #5,@RKCS                ;READ, GO

015340  005002                          CLR     R2
015342  105777  163764          1$:     TSTB    @RKCS           ;DID CNTRL RDY SET?
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 4950  015346  100410                          BMI     2$              ;YES, BRANCH
 4951  015350  005202                          INC     R2              ;NO, WAIT FOR IT
 4952  015352  001373                          BNE     1$              ;IF WAITED LONG, REPORT ERROR MESSAGE BECAUSE
 4953                                                                  ;OVR SHOULD HAVE SET HE CAUSING
 4954                                                                  ;CNTRL RDY TO SET BY NOW
 4955  015354  017737  163754  001166          MOV     @RKWC,$REG2
 4956  015362  004737  021010                  JSR     PC,GT2RG        ;GO, GET RKCS, ER
 4957  015366  104002                          ERROR   2               ;CNTRL RDY DID NOT SET AFTER DOING
 4958                                                                  ;AN OVR READ.  HE SHOULD HAVE OCCURED
 4959                                                                  ;SETTING CNTRL RDY (HE BECAUSE OF
 4960                                                                  ;OVR CONDITIONS)
 4961  015370  032777  040000  163732  2$:     BIT     #40000,@RKER    ;DID OVR BIT SET IN RKER?
 4962  015376  001006                          BNE     3$
 4963  015400  004737  021010                  JSR     PC,GT2RG        ;GET RKCS, ER
 4964  015404  012737  040000  001166          MOV     #40000,$REG2    ;THIS BIT (OVR) DID NOT SET.
 4965  015412  104105                          ERROR   105             ;OVR ERROR BIT DID NOT SET IN RKER
 4966                                                                  ;ON SIMULATING OVR CONDITIONS
 4967  015414  022777  140204  163710  3$:     CMP     #140204,@RKCS   ;DID HE & ERR SET WHEN OVR SET IN RKER?
 4968  015422  001403                          BEQ     4$              ;YES, BRANCH
 4969  015424  004737  021010                  JSR     PC,GT2RG        ;GET RKCS, ER
 4970  015430  104106                          ERROR   106             ;HE OR ERR BIT DID NOT SET IN RKCS WHEN
 4971                                                                  ;AN OVR ERROR WAS SIMULATED
 4972                                                                  ;CLEAR OVER, ERR, HE BITS
 4973  015432  104413                  4$:     CNT.RESET               ;GO, DO CONTROL RESET
 4974                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
 4975                                                                  ;RESET' ROUTINE. A CONTROL RESET IS
 4976                                                                  ;ISSUED AND AFTER A CERTAIN TIME
 4977                                                                  ;IF THE 'CNTRL RDY' DOES NOT SET
 4978                                                                  ;AN ERROR IS REPORTED. NOTE THAT
 4979                                                                  ;THE PC IN ERROR MESSAGE IS THE
 4980                                                                  ;PC WHERE 'CNT.RESET' IS LOCATED.
 4981                                                                  ;THIS IS A VERY BASIC ERR& IF IT
 4982                                                                  ;OCCURS GO BACK TO TEST 10
 4983  015434  004737  021356                  JSR     PC,CHKECLR      ;CHECK IF 'OVR' BIT WAS CLEARED BY
 4984                                                                  ;CON.RESET, IF NOT RETURN HERE.
 4985  015440  104102                          ERROR   102             ;CNTRL RESET DID NOT CLEAR OVR
 4986                                                                  ;BIT IN RKER
 4987  015442  004737  021402          5$:     JSR     PC,CHKCCLR      ;CHECK IF 'ERR' & 'HE' BIT GOT CLEARED BY
 4988                                                                  ;CON.RESET, IF NOT RETURN HERE.
 4989  015446  104102                          ERROR   102             ;CNTRL RESET DID NOT CLEAR
 4990                                                                  ;HE OR ERR BIT IN RKCS.
 4991  015450  004737  021504          6$:     JSR     PC,DRESET       ;GO DO DRIVE RESET
 4992  015454  104026                          ERROR   26              ;R/W/S RDY DIDN'T SET
 4993                                                                  ;AFTER THE ABOVE DRIVE RESET
 4994
 4995                                  ;;*****************************************************************
 4996                                  ;*TEST 42        SIMULATE & CHECK PGE ERROR
 4997                                          ;*THIS TEST SIMULATES 'PROGRAMMING ERROR' & CHECKS IF IT IS
 4998                                          ;*DETECTED BY PGE BIT IN RKER.  THEN A CNTRL RESET IS DONE &
 4999                                          ;*IT IS CHECKED IF PGE BIT WAS CLEARED.  IT IS ALSO CHECKED IF
 5000                                          ;*THE SETTING & CLEARING OF PGE BIT SETS & CLEARS HE, ERR
 5001                                          ;*BITS IN RKCS.
 5002                                  ;;*****************************************************************
 5003  015456  000004                  TST42:  SCOPE
 5004  015460  104413                          CNT.RESET               ;GO, DO CONTROL RESET
 5005                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
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                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
015462  104421                    TST.SIN             ;GO CHECK IF SIN IS SET, IF
                                                        ;SET DO DRIVE RESET TO CLR IT
015464  013701  001330            MOV     RKER,R1
015470  013777  001350  163642    MOV     DRIVAD,@RKDA    ;ADRES THE DRIVE, CYLINDER 0
015476  012777  002011  163626    MOV     #2011,@RKCS     ;SEEK, GO WITH FMT SET
                                                        ;THIS IS A PGE SIMULATION
015504  104414                    CNT.RDY             ;THIS IS A CALL FOR 'CN.RDY'
                                                        ;ROUTINE WHICH WAITS FOR CNT
                                                        ;RDY TO SET. IF CNTRL RDY DOES
                                                        ;NOT SET WITHIN 883 MS/ 11-20
                                                        ;(176 MS FOR 11-45 WITH BIPOLAR)
                                                        ;AN ERROR IS REPORTED
015506  032711  004000            BIT     #4000,@R1       ;DID PGE BIT IN RKER SET?
015512  001006                    BNE     1$              ;YES, BRANCH
015514  012737  004000  001166    MOV     #4000,$REG2     ;THIS BIT IN RKER (PGE) DID NOT SET
015522  004737  021010            JSR     PC,GT2RG        ;GO GET RKCS, ER FOR MESAGE
015526  104105                    ERROR   105             ;PGE BIT DID NOT SET IN RKER
                                                        ;ON SIMULATION OF PGE CONDITION
                                                        ;$REG2 CONTAINS THE RKER BIT (PGE)
                                                        ;THAT SHOULD HAVE SET.
015530  022777  142210  163574  1$:     CMP     #142210,@RKCS   ;DID HE & ERR BITS SET?
015536  001403                    BEQ     2$              ;YES, BRANCH
015540  004737  021010            JSR     PC,GT2RG        ;GO, GET RKCS, ER
015544  104106                    ERROR   106             ;HE OR ERR BIT DID NOT SET WHEN
                                                        ;PGE SET IN RKER.
                                                        ;CLEAR PGE, HE, ERR BITS
015546  104413                    2$:     CNT.RESET       ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
015550  004737  021356            JSR     PC,CHKECLR      ;CHECK IF 'PGE' BIT GOT CLEARED BY
                                                        ;CONTROL RESET, IF NOT RETURN HERE.
015554  104102                    ERROR   102             ;CNTRL RESET DID NOT CLEAR
                                                        ;PGE BIT IN RKER
015556  004737  021402            3$:     JSR     PC,CHKCCLR      ;CHECK IF 'ERR' BITGOT CLEARED BY
                                                        ;CON.RESET, IF NOT RETURN HERE.
015562  104102                    ERROR   102             ;RKCS BITS HE OR ERR DID NOT
                                                        ;GET CLEARED BY CNTRL RESET

                                ;;**********************************************************************
                                ;*TEST 43        SIMULATE & CHECK NXM ERROR
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                                        ;*THIS TEST SIMULATES A NON-EXISTENT MEMORY ERROR (NXM) AND
                                        ;*CHECKS IF IT IS DETECTED BY NXM BIT OR RKER.LOCATION 760000
                                        ;*IS REFERENCED & IT HAPPENS TO BE A NON EXISTENT LOCATION
                                        ;*(FOR DIAGNOSTIC PURPOSES LIKE THIS). IT IS ALSO CHECKED
                                        ;*IF HE & ERR BITS ALSO SET AND ALL 3 BITS CAN BE CLEARED
                                        ;* BY CONTROL RESET.
                                    ;;*********************************************************************
015564  000004                    TST43:  SCOPE
015566  104413                            CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                ;THIS IS A VERY BASIC ERR& IF IT
                                                                ;OCCURS GO BACK TO TEST 10
015570  104421                            TST.SIN                 ;GO CHECK IF SIN IS SET
                                                                ;IF SET DO DRIVE RESET TO CLR IT
015572  005002                            CLR     R2
015574  013700  001332                    MOV     RKCS,R0
015600  012777  177777  163526            MOV     #-1,@RKWC       ;WRITE CHECK 1 WORD
015606  012777  160000  163522            MOV     #160000,@RKBA   ;AT THIS BUS ADRES
015614  013777  001350  163516            MOV     DRIVAD,@RKDA    ;WITH THIS DISK ADRES (CYL 0, SEC 0)
015622  012710  000067                    MOV     #67,@R0         ;WRT CHK, GO, MEX BITS SET
015626  105777  163500            1$:     TSTB    @RKCS           ;DID CNTRL RDY SET AS A RESULT OF HE?
015632  100410                            BMI     2$              ;YES, BRANCH
015634  005202                            INC     R2              ;WAITED LONG ENOUGH?
015636  001373                            BNE     1$              ;IF NOT LUP BAK & WAIT
015640  004737  021010                    JSR     PC,GT2RG        ;GET RKCS, ER
015644  017737  163464  001166            MOV     @RKWC,$REG2     ;GET RKWC
015652  104113                            ERROR   113             ;CNTRL RDY DID NOT SET ON DOING
                                                                ;A WRT CHK WITH A NXM LOCATION.
                                                                ;THIS HE SHOULD HAVE SET THE
                                                                ;CNTRL RDY BIT IN RKCS
015654  032777  002000  163446    2$:     BIT     #2000,@RKER     ;DID NXM BIT IN RKER SET?
015662  001006                            BNE     3$              ;YES, BRANCH
015664  004737  021010                    JSR     PC,GT2RG        ;GO GET RKCS, RKER
015670  012737  002000  001166            MOV     #2000,$REG2     ;THIS BIT (NXM) DID NOT SET IN RKER
015676  104105                            ERROR   105             ;NXM BIT DID NOT SET IN RKER ON
                                                                ;SIMULATING NXM CONDITION.
015700  022710  140266            3$:     CMP     #140266,@R0     ;DID HE & ERR BIT SET?
015704  001403                            BEQ     4$              ;YES, BRANCH
015706  004737  021010                    JSR     PC,GT2RG                ;GO, GET RKCS, RKER
015712  104106                            ERROR   106             ;HE OR ERR BIT DID NOT SET WHEN
                                                                ;NXM ERROR WAS SIMULATED
                                                                ;CLEAR NXM, HE, ERR BITS
015714  104413                    4$:     CNT.RESET               ;GO, DO CONTROL RESET
                                                                ;THIS IS A CALL FOR THE 'CNTRL-
                                                                ;RESET' ROUTINE. A CONTROL RESET IS
                                                                ;ISSUED AND AFTER A CERTAIN TIME
                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                ;AN ERROR IS REPORTED. NOTE THAT
                                                                ;THE PC IN ERROR MESSAGE IS THE
                                                                ;PC WHERE 'CNT.RESET' IS LOCATED.
```

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                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
015716  004737  021356                JSR     PC,CHKECLR      ;CHECK IF 'NXM' BIT GOT C;LEARED BY
                                                        ;CON.RESET, IF NOT RETURN HERE.
015722  104102                        ERROR   102             ;CNTRL RESET DID NOT CLEAR
                                                        ;NXM BIT IN RKER
015724  004737  021402        5$:     JSR     PC,CHKCCLR      ;CHECK IF 'HE' & 'ERR' BITS GOT CLEARED
                                                        ;BY CON.RESET, IF NOT RETURN HERE.
015730  104102                        ERROR   102             ;CNTRL RESET DID NOT CLEAR
                                                        ;HE OR ERR BIT IN RKCS.
015732  004737  021436        6$:     JSR     PC,TSTRWS       ;GO CHECK IF R/W/S RDY IS SET &
                                                        ;WAIT FOR IT.  SKIP ERROR IF IT IS SET
015736  104016                        ERROR   16              ;R/W/S RDY IS NOT SET

                        ;;**********************************************************************
                        ;*TEST 44        SIMULATE & CHECK NXD ERROR
                                ;*THIS TEST SIMULATES NON-EXISTENT DISK ERROR & CHECKS IF
                                ;*IT IS DETECTED BY NXD BIT OF RKER.  IF ALL EIGHT ARE PRESENT
                                ;*THEN THIS TEST IS ABORTED FOR SIMULATION CANNOT BE DONE.
                        ;;**********************************************************************
015740  000004        TST44:  SCOPE
015742  104413                CNT.RESET                       ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
015744  104421                TST.SIN                         ;CHECK IF SIN IS SET, IF SET
                                                        ;DO DRV RESET TO CLR IT
015746  013700  001332                MOV     RKCS,R0
015752  012702  160000                MOV     #160000,R2      ;ADRES DRIVE 7 TO FIND
                                                        ;IF IT IS PRESENT
015756  010277  163356        1$:     MOV     R2,@RKDA        ;ADRES DRIVE # POINTED TO BY R2
015762  104417  000001                DELAY   ,1              ;TIME DELAY, 7.5 US ON 11/20,
                                                        ;1.5 US ON 11/45
015766  105777  163334                TSTB    @RKDS           ;IS IT PRESENT?
015772  100004                        BPL     2$              ;NO, BRANCH
015774  062702  160000                ADD     #-20000,R2      ;ADRES THE NXT DRIVE IN THE
                                                        ;REVERSE ORDER. I.E. 7,6,...
016000  001366                        BNE     1$              ;LUP BAK & TRY TO FIND A DRIVE
                                                        ;THAT'S NOT PRESENT
016002  000435                        BR      TST45           ;;EXIT TO THE NXT TST

016004  012710  000015        2$:     MOV     #15,@R0         ;DRIVE RESET, ON A NX DRIVE
016010  104417  000106                DELAY   ,106            ;TIME DELAY, 525 US ON 11/20
                                                        ;105 US ON 11/45
016014  105777  163310                TSTB    @RKER           ;DID NXD BIT IN RKER SET?
016020  001006                        BNE     3$              ;YES, BRANCH
016022  004737  021010                JSR     PC,GT2RG        ;GET RKCS, RKER
016026  012737  000200  001166        MOV     #200,$REG2      ;THIS BIT (NXD) IN RKER DID NOT SET
016034  104105                        ERROR   105             ;NXD BIT DID NOT SET ON TRYING
                                                        ;TO PERFORM A FUNCTION ON A
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                                                        ;NON-EXISTENT DRIVE
                                                        ;CHECK THAT THE JUMPER CARD CONTAINING
                                                        ;JUMPERS FOR DRIVES PRESENT IS PROPERLY
                                                        ;CONNECTED
                                                        ;NOTE THAT ON RK11C IF A DRIVE
                                                        ;IS OFFLINE BUT PHYSICALLY PRESENT
                                                        ;(IE. DRY IS CLR FOR THAT DRIVE)
                                                        ;& A FUNCTION IS INITIATED ON THAT
                                                        ;DRIVE NXD WON'T SET, BUT U WILL
                                                        ;GET ONLY A DRE,HE & ERR.
016036  022710  140214          3$:     CMP     #140214,@R0     ;DID HE & ERR SET WHEN NXD SET?
016042  001403                          BEQ     4$              ;YES BRANCH
016044  004737  021010                  JSR     PC,GT2RG        ;HE OR ERR BIT DID NOT SET
016050  104106                          ERROR   106             ;WHEN NXD WAS SIMULATED
                                                        ;CLEAR NXD, HE, ERR BITS
016052  104413                  4$:     CNT.RESET               ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
016054  004737  021356                  JSR     PC,CHKECLR      ;CHECK IF 'NXD' BIT WAS CLEARED BY
                                                        ;CON.RESET. IF NOT, RETURN HERE.
016060  104102                          ERROR   102             ;CNTRL RESET DID NOT CLEAR
                                                        ;NXD BIT IN RKER
016062  004737  021402          5$:     JSR     PC,CHKCCLR      ;CHECK IF 'HE' & 'ERR' BITS WERE CLEARED
                                                        ;BY CON.RESET. IF NOT RETURN HERE.
016066  104102                          ERROR   102             ;CNTRL RESET DID NOT CLEAR
                                                        ;HE OR ERR BIT IN RKCS
016070  004737  021436                  JSR     PC,TSTRWS       ;GO CHECK & WAIT FOR R/W/S RDY
                                                        ;TO SET.  IF SET SKIP ERROR
016074  104016                          ERROR   16              ;R/W/S SHOULD BE SET, IT'S
                                                        ;NOT

                                ;;**************************************************************
                                ;*TEST 45        SIMULATE & CHECK NXC ERROR
                                        ;*THIS TEST SIMULATES THE NON-EXISTENT CYLINDER ERROR & CHECKS
                                        ;*IF IT IS DETECTED BY THE NXC BIT OF RKER, HE & ERR BITS
                                        ;*OF RKCS.  IT IS CHECKED IF THEY CAN BE CLEARED BY CONTROL
                                        ;*RESET
                                ;;**************************************************************
016076  000004                  TST45:  SCOPE
016100  013700  001332                  MOV     RKCS,R0
016104  012737  177773  001362  2$:     MOV     #-5,COUNT       ;ALLOW 'ERROR 133' ONLY 5 TIMES
016112  013702  001350                  MOV     DRIVAD,R2       ;GET ADRES OF DRIVE
016116  052702  014540                  BIS     #14540,R2       ;SET BITS FOR CYL 313
016122  012737  016130  001110          MOV     #3$,$LPERR      ;SET RETURN ADRES FOR
                                                        ;LUPING ON EROR (SW9)
016130  104413                  3$:     CNT.RESET               ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
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5230                                                    ;IF THE 'CNTRL RDY' DOES NOT SET
5231                                                    ;AN ERROR IS REPORTED. NOTE THAT
5232                                                    ;THE PC IN ERROR MESSAGE IS THE
5233                                                    ;PC WHERE 'CNT.RESET' IS LOCATED.
5234                                                    ;THIS IS A VERY BASIC ERR& IF IT
5235                                                    ;OCCURS GO BACK TO TEST 10
5236  016132  004737  021436              JSR     PC,TSTRWS       ;GO CHECK & WAIT FOR R/W/S RDY
5237                                                    ;TO SET. IF SET SKIP ERROR BELOW
5238  016136  104016                      ERROR   16              ;R/W/S RDY IS NOT SET
5239  016140  104421                      TST.SIN                 ;CHECK IF SIN IS SET, IF SET
5240                                                    ;DO DRIVE RESET TO CLR IT
5241  016142  010277  163172              MOV     R2,@RKDA        ;ADRES DRIVE, NXC CYLINDER
5242  016146  012710  000011              MOV     #11,@R0         ;SEEK, GO TO NXC CYL
5243  016152  104412                      CHKCRDY                 ;GO CHECK IF CONTROL RDY IS SET
5244                                                    ;IF SO, SKIP THE EROR MESSAGE.
5245  016154  104021                      ERROR   21              ;SEEK WAS TRIED TO A NON EXISTENT
5246                                                    ;CYLINDER, NXC SHOULD HAVE OCCURED
5247                                                    ;SETTING CNTRL RDY. BUT CNTRL RDY
5248                                                    ;DID NOT SET.
5249  016156  032777  000100  163144  9$:     BIT     #100,@RKER      ;DID NXC SET?
5250  016164  001020                      BNE     4$              ;YES, BRANCH
5251  016166  004737  021010              JSR     PC,GT2RG        ;GO GET RKCS, ER
5252  016172  017737  163142  001166      MOV     @RKDA,$REG2     ;GET RKDA
5253  016200  104110                      ERROR   110             ;NXC DID NOT SET WHEN SEEK
5254                                                    ;WAS TRIED TO CYLINDER AS INDICATED
5255                                                    ;IN RKDA
5256  016202  004737  021436              JSR     PC,TSTRWS       ;CHECK & WAIT FOR R/W/S RDY,
5257                                                    ;IF SET SKIP ERROR
5258  016206  104016                      ERROR   16              ;R/W/S SHOULD BE SET
5259  016210  104413                      CNT.RESET               ;GO DO CONTROL RESET
5260  016212  004737  021504              JSR     PC,DRESET       ;GO DO DRIVE RESET
5261  016216  104026                      ERROR   26              ;NXC DID NOT SET AND DRIVE MAY
5262                                                    ;HAVE TRIED TO DO A SEEK, AFTER
5263                                                    ;WHICH R/W/S RDY DID NOT SET
5264  016220  005237  001362              INC     COUNT           ;ALLOW ONLY 5 MESSAGES FOR
5265  016224  001405                      BEQ     5$              ;ERROR 133
5266  016226  062702  000040      4$:     ADD     #40,R2          ;ADRES THE NXT CYL(IN NON-EXISTENT ZONE)
5267  016232  032702  017740              BIT     #17740,R2       ;CHKD FOR ALL NXC'S?
5268  016236  001334                      BNE     3$              ;IF NOT, LUP BAK & CHK THE NXT NXC
5269
5270  016240  032710  140000      5$:     BIT     #140000,@R0     ;DID HE & ERR BIT SET WHEN NXC BIT SET?
5271  016244  001003                      BNE     6$              ;YES, BRANCH
5272  016246  004737  021010              JSR     PC,GT2RG        ;GET RKCS, ER
5273  016252  104106                      ERROR   106             ;HE OR ERR BIT DID NOT SET IN RKCS
5274                                                    ;WHEN NXC ERROR WAS SIMULATED
5275                                                    ;CLEAR HE, ERR, NXC BITS
5276  016254  104413      6$:             CNT.RESET               ;GO, DO CONTROL RESET
5277                                                    ;THIS IS A CALL FOR THE 'CNTRL-
5278                                                    ;RESET' ROUTINE. A CONTROL RESET IS
5279                                                    ;ISSUED AND AFTER A CERTAIN TIME
5280                                                    ;IF THE 'CNTRL RDY' DOES NOT SET
5281                                                    ;AN ERROR IS REPORTED. NOTE THAT
5282                                                    ;THE PC IN ERROR MESSAGE IS THE
5283                                                    ;PC WHERE 'CNT.RESET' IS LOCATED.
5284                                                    ;THIS IS A VERY BASIC ERR& IF IT
5285                                                    ;OCCURS GO BACK TO TEST 10
```

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 5286  016256  004737  021356                JSR     PC,CHKECLR      ;CHECK IF 'NXC' BIT WAS CLEARED BY
 5287                                                                  ;CON.RESET. IF NOT, RETURN HERE.
 5288  016262  104102                        ERROR   102             ;CNTRL RESET DID NOT CLEAR
 5289                                                                  ;NXC BIT IN RKER.
 5290  016264  032710  140000          7$:   BIT     #140000,@R0     ;DID HE & ERR BITS GET CLEARED?
 5291  016270  001405                        BEQ     TST46           ;;YES, EXIT
 5292  016272  010037  001162                MOV     R0,$REG0        ;GET ADRES OF RKCS
 5293  016276  011037  001164                MOV     @R0,$REG1       ;GET RKCS CONTENTS
 5294  016302  104102                        ERROR   102             ;CNTRL RESET DID NOT CLEAR
 5295                                                                  ;HE OR ERR BIT IN RKCS
 5296
 5297                                  ;;*****************************************************************
 5298                                  ;*TEST 46       SIMULATE & CHECK NXS ERROR
 5299                                          ;*THIS TEST SIMULATES NON-EXISTENT SECTOR ERROR & CHECKS THAT
 5300                                          ;*IT IS DETECTED BY NXS BIT OF RKER.  IT IS CHECKED THAT
 5301                                          ;*WHEN NXS SETS HE & ERR OF RKER ALSO SETS, AND ALL THREE
 5302                                          ;*CAN BE CLEARED BY CONTROL RESET.
 5303                                  ;;*****************************************************************
 5304  016304  000004                TST46:  SCOPE
 5305  016306  104413                        CNT.RESET               ;GO, DO CONTROL RESET
 5306                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
 5307                                                                  ;RESET' ROUTINE. A CONTROL RESET IS
 5308                                                                  ;ISSUED AND AFTER A CERTAIN TIME
 5309                                                                  ;IF THE 'CNTRL RDY' DOES NOT SET
 5310                                                                  ;AN ERROR IS REPORTED. NOTE THAT
 5311                                                                  ;THE PC IN ERROR MESSAGE IS THE
 5312                                                                  ;PC WHERE 'CNT.RESET' IS LOCATED.
 5313                                                                  ;THIS IS A VERY BASIC ERR& IF IT
 5314                                                                  ;OCCURS GO BACK TO TEST 10
 5315  016310  013700  001332                MOV     RKCS,R0
 5316  016314  013777  001350  163016        MOV     DRIVAD,@RKDA    ;GET ADRES OF DRIVE
 5317  016322  052777  000014  163010        BIS     #14,@RKDA       ;SET BITS FOR SECTOR 12 (DECIMAL)
 5318  016330  012777  177777  162776        MOV     #-1,@RKWC       ;READ 1 WORD
 5319  016336  012777  033342  162772        MOV     #OUTBUF,@RKBA   ;INTO THIS BUS ADRES
 5320  016344  012710  000005                MOV     #5,@R0          ;READ, GO (FROM NX SECTOR)
 5321  016350  104414                        CNT.RDY                 ;THIS IS A CALL FOR 'CN.RDY'
 5322                                                                  ;ROUTINE WHICH WAITS FOR CNT
 5323                                                                  ;RDY TO SET. IF CNTRL RDY DOES
 5324                                                                  ;NOT SET WITHIN 883 MS/ 11-20
 5325                                                                  ;(176 MS FOR 11-45 WITH BIPOLAR)
 5326                                                                  ;AN ERROR IS REPORTED
 5327                                                                  ;NXS ERROR SHOULD OCCUR NOW
 5328  016352  017702  162752                MOV     @RKER,R2
 5329  016356  032702  000040                BIT     #40,R2          ;DID NXS BIT SET IN RKER?
 5330  016362  001006                        BNE     1$              ;YES, BRANCH
 5331  016364  004737  021010                JSR     PC,GT2RG        ;GO GET RKCS, RKER
 5332  016370  012737  000040  001166        MOV     #40,$REG2       ;THIS BIT (NXS) IN RKER DID NOT SET
 5333  016376  104105                        ERROR   105             ;NXS BIT DID NOT SET ON SIMULATING
 5334                                                                  ;NXS ERROR
 5335  016400  042702  000040          1$:   BIC     #40,R2          ;MASK NXS BIT
 5336  016404  001407                        BEQ     2$              ;CHECK IF ANY OTHER
 5337                                                                  ;RKER BIT SET
 5338  016406  012737  000040  001162        MOV     #40,$REG0       ;GET EXPCTD RKER
 5339  016414  017737  162710  001164        MOV     @RKER,$REG1     ;GET RKER RECVD
 5340  016422  104107                        ERROR   107             ;ONLY 'NXS' SHOULD BE SET
 5341                                                                  ;IN RKER, ANOTHER RKER BIT
```

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5342                                                    ;WAS SET. (NOTE 'NXS' WAS
5343                                                    ;SIMULATED)
5344  016424  022710  140204          2$:     CMP     #140204,@R0     ;DID HE & ERR BITS SET?
5345  016430  001403                  BEQ     3$              ;YES, BRANCH
5346  016432  004737  021010          JSR     PC,GT2RG        ;GO GET RKCS, RKER
5347  016436  104106                  ERROR   106             ;HE OR ERR BIT DID NOT SET WHEN
5348                                                    ;NXS ERROR OCCURED
5349                                                    ;CLEAR NXS, HE, ERR BITS
5350  016440  104413          3$:     CNT.RESET               ;GO, DO CONTROL RESET
5351                                                    ;THIS IS A CALL FOR THE 'CNTRL-
5352                                                    ;RESET' ROUTINE. A CONTROL RESET IS
5353                                                    ;ISSUED AND AFTER A CERTAIN TIME
5354                                                    ;IF THE 'CNTRL RDY' DOES NOT SET
5355                                                    ;AN ERROR IS REPORTED. NOTE THAT
5356                                                    ;THE PC IN ERROR MESSAGE IS THE
5357                                                    ;PC WHERE 'CNT.RESET' IS LOCATED.
5358                                                    ;THIS IS A VERY BASIC ERR& IF IT
5359                                                    ;OCCURS GO BACK TO TEST 10
5360  016442  004737  021356          JSR     PC,CHKECLR      ;CHECK IF 'NXS' BIT WAS CLEARED BY
5361                                                    ;CON.RESET. IF NOT, RETUEN HERE.
5362  016446  104102                  ERROR   102             ;CNTRL RESET DID NOT CLEAR
5363                                                    ;NXS BIT IN RKER
5364  016450  004737  021402          4$:     JSR     PC,CHKCCLR      ;CHECL IF 'HE' & 'ERR' BITS WERE CLEARED
5365                                                    ;BY CON.RESET. IF NOT, RETURN HERE.
5366  016454  104102                  ERROR   102             ;RKCS BITS ERR OR HE WERE NOT
5367                                                    ;CLEARED BY CNTRL RESET
5368
5369                          ;;*****************************************************************
5370                          ;*TEST 47       SIMULATE & CHECK WCE
5371                                  ;*THIS TEST SIMULATES A WRITE CHECK ERROR AND CHECKS THAT IT
5372                                  ;*IS DETECTED BY WCE BIT OF RKER.  FOR COMPARISON IT USES
5373                                  ;*THE 256 WORDS DATA BLOCK WRITTEN ON SECTOR 0, CYLINDER 0
5374                                  ;*IN A PREVIOUS TEST.  THIS BLOCK IS COMPARED WITH THE 256 WORDS
5375                                  ;*MEMORY BUFFER STARTING AT 'OUTBUF'.  WCE IS SIMULATED BY
5376                                  ;*DROPPING A BIT FROM ONE OF THE WORDS IN THE MEMORY BUFFER.
5377                          ;;*****************************************************************
5378  016456  000004          TST47:  SCOPE
5379  016460  013700  001332          MOV     RKCS,R0
5380  016464  104413                  CNT.RESET               ;GO, DO CONTROL RESET
5381                                                    ;THIS IS A CALL FOR THE 'CNTRL-
5382                                                    ;RESET' ROUTINE. A CONTROL RESET IS
5383                                                    ;ISSUED AND AFTER A CERTAIN TIME
5384                                                    ;IF THE 'CNTRL RDY' DOES NOT SET
5385                                                    ;AN ERROR IS REPORTED. NOTE THAT
5386                                                    ;THE PC IN ERROR MESSAGE IS THE
5387                                                    ;PC WHERE 'CNT.RESET' IS LOCATED.
5388                                                    ;THIS IS A VERY BASIC ERR& IF IT
5389                                                    ;OCCURS GO BACK TO TEST 10
5390  016466  104421                  TST.SIN                 ;CHECK IF SIN IS SET, IF
5391                                                    ;SET DO DRV-RESET TO CLR IT
5392  016470  012701  033342          MOV     #OUTBUF,R1      ;THIS CODE SETS UP A MEMORY
5393  016474  012702  177400          MOV     #-400,R2        ;BUFFER OF 256 WORDS STARTING
5394  016500  012703  177777          MOV     #177777,R3      ;AT OUTBUF
5395                                                    ;FIRST WORD  177400
5396                                                    ;SECOND      177001
5397  016504  062703  177401          1$:     ADD     #177401,R3
```

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5398  016510  010321                        MOV     R3,(R1)+        ;LAST WORD   000377
5399  016512  005202                        INC     R2              ;HAVE U GENERATED ALL 256 WORDS?
5400  016514  001373                        BNE     1$              ;IF NOT, LUP BAK & GENERATE NXT
5401                                        ;
5402  016516  012737  170007  033360        MOV     #170007,OUTBUF+16 ;WCE WILL B SIMULATED BY DROPPING A
5403                                                                ;BIT IN THE EIGHTH WORD WHICH IS
5404                                                                ;SUPPOSED TO B 174007
5405  016524  012777  177400  162602        MOV     #-400,@RKWC     ;WRT CHK 400 WORDS
5406  016532  012777  033342  162576        MOV     #OUTBUF,@RKBA   ;STARTING AT THIS BUS ADRES
5407  016540  013777  001350  162572        MOV     DRIVAD,@RKDA    ;WITH THIS DISK ADRES, SEC 0, CYL 0
5408  016546  012710  000007                MOV     #7,@R0          ;WRT CHK, GO
5409
5410  016552  104412                        CHKCRDY                 ;GO CHECK IF CONTROL RDY IS SET
5411                                                                ;IF SO, SKIP THE EROR MESSAGE.
5412  016554  104065                        ERROR   65              ;CNTRL RDY DID NOT SET
5413                                                                ;AFTER WRT CHK
5414  016556  032777  000001  162544  3$:   BIT     #1,@RKER        ;DID WCE BIT SET?
5415  016564  001006                        BNE     4$
5416  016566  004737  021010                JSR     PC,GT2RG        ;GO, GET RKCS, RKER
5417  016572  012737  000001  001166        MOV     #1,$REG2        ;THIS BIT (WCE) DID NOT SET
5418  016600  104105                        ERROR   105             ;WCE DID NOT SET ON SIMULATING
5419                                                                ;WCE CONDITIONS
5420  016602  022710  100206          4$:   CMP     #100206,@R0     ;IS RKCS CORRECT?
5421  016606  001403                        BEQ     5$              ;YES, BRANCH
5422  016610  004737  021010                JSR     PC,GT2RG        ;GO, GET RKCS, RKER
5423  016614  104106                        ERROR   106             ;HE OR ERR BIT DID NOT SET WHEN
5424                                                                ;WCE WAS SIMULATED
5425  016616  104413                  5$:   CNT.RESET               ;CNTRL RESET
5426  016620  004737  021356                JSR     PC,CHKECLR      ;WAS 'WCE' BIT CLEARED?
5427                                                                ;IF NOT, RETURN HERE.
5428  016624  104102                        ERROR   102             ;CNTRL RESET DID NOT CLEAR
5429                                                                ;WCE BIT IN RKER
5430  016626  004737  021402          6$:   JSR     PC,CHKCCLR      ;CHECK IF 'ERR' BIT WAS CLEARED. IF
5431                                                                ;NOT RETURN HERE.
5432  016632  104102                        ERROR   102             ;CNTRL RESET DID NOT CLEAR
5433                                                                ;RKCS
5434
5435                                  ;;*****************************************************************
5436                                  ;*TEST 50       CHECK THAT SSE STOPS ALL CONTROL ACTION ON SOFT ERROR
5437                                          ;*THIS TEST CHECKS THAT WHEN 'STOP ON SOFT ERROR' BIT IS SET IN
5438                                          ;*RKCS AND A SOFT ERROR IS ENCOUNTERED ALL CONTROL ACTION WILL
5439                                          ;*STOP AT THE END OF THE CURRENT SECTOR IF IDE BIT IS CLEAR.
5440                                          ;*SOFT ERROR IS SIMULATED BY A WCE AS IN THE PREVIOUS
5441                                          ;*TEST. THE PREVIOUS TEST & THE TEST WHICH WRITES DATA
5442                                          ;*BLOCK ON CYLINDER 0, SECTOR 0, SHOULD BE DONE PRIOR
5443                                          ;*TO THIS TEST. A TWO SECTOR 'WRT CHK' WILL BE DONE.
5444                                          ;*CONTROL ACTION SHOULD STOP AFTER THE FIRST SECTOR DURING
5445                                          ;*WHICH A SOFT ERROR IS SIMULATED.
5446                                  ;;*****************************************************************
5447  016634  000004                  TST50:  SCOPE
5448  016636  104413                        CNT.RESET               ;GO, DO CONTROL RESET
5449                                                                ;THIS IS A CALL FOR THE 'CNTRL-
5450                                                                ;RESET' ROUTINE. A CONTROL RESET IS
5451                                                                ;ISSUED AND AFTER A CERTAIN TIME
5452                                                                ;IF THE 'CNTRL RDY' DOES NOT SET
5453                                                                ;AN ERROR IS REPORTED. NOTE THAT
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                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
016640  104421                  TST.SIN                 ;CHECK IF SIN IS SET, IF
                                                        ;SET DO DRIVE RESET TO CLR IT
016642  013700  001332          MOV     RKCS,R0
016646  012737  170007  033360  MOV     #170007,OUTBUF+16 ;WCE IS SIMULATED BY DROPPING A BIT
                                                        ;IN THE EIGTH WORD (WHICH IS ACTUALLY
                                                        ;174007). NOTE THAT 256 WORD MEMORY
                                                        ;BUFFER IS CREATED IN THE PREVIOUS TEST.
016654  013701  001350          MOV     DRIVAD,R1
016660  012777  177000  162446  MOV     #-1000,@RKWC    ;WRT CHK 1000 (OCTAL) WORDS, 2 SECTORS
016666  012777  033342  162442  MOV     #OUTBUF,@RKBA   ;FROM THIS BUS ADRES
016674  010177  162440          MOV     R1,@RKDA        ;WITH THIS DISK ADRES, SEC 0, CYL 0
016700  012710  000407          MOV     #407,@R0        ;WRT CHK, GO, SSE
016704  104412                  CHKCRDY                 ;GO CHECK IF CONTROL RDY IS SET
                                                        ;IF SO, SKIP THE EROR MESSAGE.
016706  104065                  ERROR   65              ;CNTRL RDY DID NOT SET AFTER WRT
                                                        ;CHK. A SOFT ERROR (WCE) IN
                                                        ;SECTOR 0 SHOULD HAVE STOPPED
                                                        ;ALL CONTROL ACTION.
016710  022777  000001  162412  2$:     CMP     #1,@RKER        ;CHECK ONLY 'WCE' BIT SHOULD
                                                        ;BE SET?
016716  001407                  BEQ     3$              ;YES, BRANCH
016720  012737  000001  001162  MOV     #1,$REG0        ;GET EXPCTD RKER
016726  017737  162376  001164  MOV     @RKER,$REG1     ;GET RKER RECVD
016734  104107                  ERROR   107             ;ONLY BIT 'WCE' OF RKER
                                                        ;SHOULD BE SET (WCE WAS
                                                        ;SIMULATED ABOVE).  ERROR
                                                        ;IF IT'S NOT
016736  005201          3$:     INC     R1              ;CHECK THAT RKDA INCREMENTED BY
016740  020177  162374          CMP     R1,@RKDA        ;1 SECTOR ONLY IMPLYING THAT
                                                        ;CNTRL ACTION DID STOP AFTER
                                                        ;SOFT ERROR IN SECTOR 0
016744  001406                  BEQ     TST51           ;;YES, EXIT
016746  010137  001162          MOV     R1,$REG0        ;GET EXPCTD RKDA
016752  017737  162362  001164  MOV     @RKDA,$REG1     ;GET RKDA RECVD
016760  104070                  ERROR   70              ;RKDA SHOULD HAVE INCRMNTD
                                                        ;BY 1 SECTOR ONLY, IT DIDN'T.
                                ;                       ;WCE WAS SIMULATED IN THE
                                                        ;FIRST SECTOR & A WRT CHK
                                                        ;OF 2 SECTORS WAS ISSUED.
                                                        ;CONTROLLER SHOULD STOP AFTER
                                                        ;DETECTING WCE IN THE FIRST
                                                        ;SECTOR.  HENCE RKDA SHOULD
                                                        ;INCREMENT BY 1 SECTOR ONLY


                        ;;**************************************************************************
                        ;*TEST 51        CHECK THAT RK11 INTERRUPTS ON SOFT ERROR WHEN SSE & IDE ARE SET
                                ;*THIS TEST CHECKS WHEN SSE BIT IS SET WITH IDE SET AND A SOFT
                                ;*ERROR OCCURS, THEN ALL CONTROL ACTION WILL STOP AND A BUS
                                ;*REQUEST (INTERRUPT) WILL OCCUR AT THE END OF THE CURRENT
                                ;*SECTOR.  SOFT ERROR IS SIMULATED BY WCE AS IN PREVIOUS
                                ;*TEST.  PREREQUISITES FOR THIS TEST ARE THE SAME AS THOSE
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                                        ;*FOR THE PREVIOUS TEST.
                                        ;;*****************************************************************
016762  000004                 TST51:  SCOPE
016764  104413                         CNT.RESET                       ;GO, DO CONTROL RESET
                                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                                        ;OCCURS GO BACK TO TEST 10
016766  104421                         TST.SIN                         ;CHECK IF SIN IS SET, IF
                                                                        ;SET DO DRIVE RESET TO CLR IT
016770  012737  170007  033360         MOV     #170007,OUTBUF+16 ;WCE IS SIMULATED BY DROPPING A BIT
                                                                        ;IN THE EIGHTH WORD (WHICH IS 174007)
                                                                        ;NOTE THAT THE 256 WORD MEMORY
                                                                        ;BUFFER (STARTING AT OUTBUF) IS
                                                                        ;CREATED IN A PREVIOUS TEST.
016776  013701  001350                 MOV     DRIVAD,R1
017002  012777  177000  162324         MOV     #-1000,@RKWC    ;WRT CHK 1000 (OCTAL) WORDS, 2 SECTORS
017010  012777  033342  162320         MOV     #OUTBUF,@RKBA   ;FROM THIS BUS ADRES
017016  010177  162316                 MOV     R1,@RKDA        ;WITH THIS DISK ADRES, SEC 0, CYL 0
017022  013700  001402                 MOV     RKVEC,R0
017026  012720  017060                 MOV     #1$,(R0)+       ;SET UP INTERRUPT VECTOR FOR RK11
017032  012710  000340                 MOV     #340,@R0        ;SET PSW ON INTERRUPT
017036  012777  000507  162266         MOV     #507,@RKCS      ;WRT CHK, GO. SSE, IDE SET
017044  104420  177777                 WAT.INT,177777          ;WAIT FOR INTERRUPT FROM RK11
                                                                ;TIME=485 MS FOR 11/20,
                                                                ;97 MS FOR 11/45
017050  004737  021010                 JSR     PC,GT2RG                ;11/05
017054  104111                         ERROR   111             ;RK11 DID NOT INTERRUPT AFTER A SOFT
                                                                ;ERROR (SIMULATED) IN  SECTOR 0
017056  000417                         BR      2$

017060  022626                 1$:     CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER (FROM RK11 INTRUPT)
017062  022626                         CMP     (SP)+,(SP)+     ;POP STACK (FROM WAT.INT)
017064  012777  004600  162310         MOV     #BADINT,@RKVEC  ;RESTORE RK11 INTERRUPT VECTOR
                                                                ;ADRES FOR UNEXPECTED INTERRUPTS
017072  005201                         INC     R1
017074  020177  162240                 CMP     R1,@RKDA        ;CHECK THAT RKDA INCREMENTED
                                                                ;BY ONLY 1 SECTOR BEFORE INTERRUPT
                                                                ;OCCURRED
017100  001406                         BEQ     2$
017102  010137  001162                 MOV     R1,$REG0        ;GET EXPCTD RKDA
017106  017737  162226  001164         MOV     @RKDA,$REG1     ;GET RKDA RECVD
017114  104003                         ERROR   3               ;RKDA SHOULD HAVE INCREMENTED BY
                                                                ;1 SECTOR ONLY, IF ALL CNTRL ACTION
                                                                ;HAD STOPPED AFTER SOFT ERROR
                                                                ;(SIMULATED) IN SECTOR 0. IT DID NOT.
017116                           2$:
017116  012746  000340                 MOV     #340,-(SP)
017122  012746  017130                 MOV     #64$,-(SP)
017126  000002                         RTI
017130                           64$:
                                 .
```

```
                                CLR     @RKCS           ;CLEAR THE IDE BIT

                        ;;*****************************************************************
                        ;*TEST 52        CHECK THE MEX BITS IN RKCS
                                ;*THIS TEST CHECKS OUT THE EXTENDED MEMORY BITS OF THE RKCS.
                                ;*THE RKBA IS SET TO 177776 AND A ONE WORD WRITE CHECK IS TRIED.
                                ;*THIS COULD GIVE RISE TO NXM ERROR, BUT EVEN THEN THE RKBA
                                ;*SHOULD OVERFLOW INTO THE MEX BITS. SIMILIARLY IT IS CHECKED
                                ;*THAT THE OVERFLOWING BIT CAN MAKE THE MEX BITS COUNT
                                ;*01,10,11,00.
                        ;;*****************************************************************
017134  000004         TST52:  SCOPE
017136  013700 001332          MOV     RKCS,R0
017142  012701 177774          MOV     #-4,R1          ;SET UP THE COUNT
017146  005002                CLR     R2              ;INITIALIZE MEX BITS TO B SET IN RKCS
017150  012737 017156 001110  MOV     #1$,$LPERR      ;SET RETURN ADRES FOR
                                                        ;LUPING ON EROR (SW9)
017156  104417 000142  1$:     DELAY   ,142            ;TIME DELAY
017162  004737 021436          JSR     PC,TSTRWS       ;WAIT FOR R/W/S RDY
017166  104016                ERROR   16              ;R/W/S RDY IS NOT SET
017170  104413                CNT.RESET               ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
017172  010210                MOV     R2,@R0          ;SET MEX BITS (AS IN R2) IN RKCS
017174  012777 177777 162132  MOV     #-1,@RKWC       ;WRT CHK 1 WORD
017202  013777 001350 162130  MOV     DRIVAD,@RKDA    ;THIS DISK ADRES, SEC 0, CYL 0
017210  012777 177776 162120  MOV     #177776,@RKBA   ;THIS BUS ADRES. NOTE THIS BA
                                                        ;IN CONJUCTION WITH MEX BITS OF RKCS
017216  052710 000007          BIS     #7,@R0          ;WRT CHK, GO
                                                        ;THERE MAY BE A NXM OR WCE BUT
                                                        ;WHATEVER THE CASE RKBA SHOULD
                                                        ;OVERFLOW MAKING THE MEX BITS COUNT
017222  104412                CHKCRDY                 ;GO CHECK IF CONTROL RDY IS SET
                                                        ;IF SO, SKIP THE EROR MESSAGE.
017224  104065                ERROR   65              ;CNTRL RDY DID NOT SET AFTER WRT CHK
017226  010205          3$:   MOV     R2,R5
017230  062705 000020          ADD     #20,R5          ;MEX BITS SHOULD INCREMENT BY 1 TO THIS
017234  042705 000100          BIC     #100,R5         ;MASK OUT IDE BIT POSITION, IF SET
017240  011004                MOV     @R0,R4          ;GET RKCS
017242  042704 177717          BIC     #177717,R4      ;MASK OUT ALL BITS EXCEPT MEX
017246  020504                CMP     R5,R4           ;DID MEX BITS INCREMENT CORRECTLY?
017250  001405                BEQ     4$              ;YES, BRANCH
017252  010537 001162          MOV     R5,$REG0        ;GET EXPCTD MEX BITS
017256  010437 001164          MOV     R4,$REG1        ;GET MEX BITS RECVD
017262  104112                ERROR   112             ;MEX BITS DID NOT INCREMENT AS
                                                        ;'EXPCTD' WHEN RKBA OVERFLOWED.
                                                        ;NOTE THAT BIT POSITION 4 & 5
                                                        ;REFLECT MEX BITS 0 & 1 IN THE
```

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                                                        ;ERROR MESSAGE.
017264  017703  162040          4$:   MOV   @RKER,R3    ;GET RKER
017270  010305                MOV   R3,R5
017272  042703  003001          BIC   #3001,R3    ;MASK WCE,DLT,NXM BIT, IF SET
017276  001410                BEQ   5$          ;BRANCH IF REST OF RKER CLR
017300  042705  177776          BIC   #177776,R5  ;MASK NON-WCE BITS
017304  010537  001162          MOV   R5,$REG0    ;THIS IS THE EXPCTD RKER
017310  017737  162014  001164  MOV   @RKER,$REG1 ;GET RKER RECVD
017316  104107                ERROR 107         ;ERROR IN RKER.  IT SHOULD
                                                        ;BE AS EXPECTED IN
                                                        ;ERROR MESSAGE
017320  062702  000020          5$:   ADD   #20,R2        ;INCREMENT TO NXT MEX BIT
017324  005201                INC   R1          ;HAVE U CHKD THE MEX BITS 4 TIMES?
017326  001313                BNE   1$          ;IF NOT, LUP BACK

                        ;;*********************************************************************
                        ;*TEST 53       TRANSFER FROM DISK TO TTY
                                ;* THIS TEST CHECKS THE HIGH ORDER BITS OF THE ADDRESS
                                ;* LINES.  FIRST A ONE WORD (100) IS WRITTEN ON SECTOR,
                                ;* 2, CYL 0.  THEN IT IS READ BACK, BUT THE NPR IS DONE
                                ;* NOT TO THE MEMORY, BUT THE TELETYPE BUFFER (TKS 177560)
                                ;* AND IT CHECKED THAT THE WORD WAS RECIEVED CORRECTLY.
                                ;*IF IT IS NOT, AN ERROR IS REPORTED. THIS TEST IS
                                ;*SKIPPED ON AN 11/05.
                        ;;*********************************************************************
017330  000004          TST53:  SCOPE
017332  012737  000001  001206  MOV   #1,$TIMES       ;;DO 1 ITERATION
                                                        ;THIS CODE FINDS OUT IF THE CPU
                                                        ;IS AN 11/05 OR ELSE.
                                                        ;ON AN 11/05, R0 (177700) CAN BE
                                                        ;ADDRESSED AS A MEMORY LOCATION, BUT
                                                        ;ON ANY OTHER CPU IF 177700 IS REFERENCED
                                                        ;A TIME OUT WILL OCCUR.
017340  012737  017362  000004      MOV   #5$,@#4     ;SET UP TIME OUT VECTOR
017346  005737  177700          TST   @#177700    ;REFERENCE R0
017352  012737  004534  000004  MOV   #BADTMO,@#4 ;R0 WAS REFERENCED W/O TIMEOUT
                                                        ;HENCE 11/05
017360  000520                BR    TST54       ;;SKIP THIS TEST
017362  022626          5$:   CMP   (SP)+,(SP)+   ;RESTORE STACK POINTER
017364  012737  004534  000004  MOV   #BADTMO,@#4 ;RESTORE TIMEOUT VECTOR
017372  012746  000340          MOV   #340,-(SP)
017376  012746  017404          MOV   #64$,-(SP)
017402  000002                RTI
017404                  64$:
017404  013700  001332          MOV   RKCS,R0
017410  104413                CNT.RESET         ;GO, DO CONTROL RESET
                                                        ;THIS IS A CALL FOR THE 'CNTRL-
                                                        ;RESET' ROUTINE. A CONTROL RESET IS
                                                        ;ISSUED AND AFTER A CERTAIN TIME
                                                        ;IF THE 'CNTRL RDY' DOES NOT SET
                                                        ;AN ERROR IS REPORTED. NOTE THAT
                                                        ;THE PC IN ERROR MESSAGE IS THE
                                                        ;PC WHERE 'CNT.RESET' IS LOCATED.
                                                        ;THIS IS A VERY BASIC ERR& IF IT
                                                        ;OCCURS GO BACK TO TEST 10
017412  012701  033342          MOV   #OUTBUF,R1
```

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 5678  017416  013704  001336                    MOV     RKBA,R4
 5679  017422  012711  000100                    MOV     #100,@R1        ;WRITE THIS WORD
 5680  017426  012777  177777  161700            MOV     #-1,@RKWC       ;WRITE 1 WORD
 5681  017434  013702  001350                    MOV     DRIVAD,R2
 5682  017440  052702  000002                    BIS     #2,R2           ;ON CYL 0, SEC 2
 5683  017444  010277  161670                    MOV     R2,@RKDA
 5684  017450  010114                            MOV     R1,@R4          ;FROM THIS MEMORY LOC
 5685  017452  012710  000003                    MOV     #3,@R0          ;WRITE, GO
 5686  017456  005003                            CLR     R3
 5687  017460  105710                  1$:       TSTB    @R0
 5688  017462  100410                            BMI     2$
 5689  017464  005203                            INC     R3
 5690  017466  001374                            BNE     1$
 5691  017470  004737  020774                    JSR     PC,GT4RG        ;GET RKCS, ER, DS
 5692  017474  010237  001202                    MOV     R2,$REG10       ;GET THE STARTING ADRES
 5693  017500  104416                            BRKDA4                  ;BREAK IT INTO DRV #, CYL, SUR, SEC #
 5694  017502  104031                            ERROR   31              ;CNTRL RDY DID NOT SET AFTER
 5695                                                                    ;WRITE OF 1 WORD ON CYL 0, SEC 2
 5696  017504  012777  177777  161622  2$:       MOV     #-1,@RKWC       ;READ 1 WORD
 5697  017512  010277  161622                    MOV     R2,@RKDA        ;FROM SEC 2, CYL 0
 5698  017516  013714  001144                    MOV     $TKS,@R4        ;INTO TTY STAUS REGISTER
 5699  017522  005077  161416                    CLR     @$TKS           ;CLEAR TTY KEY BRD STATUS REG
 5700
 5701  017526  012710  000065                    MOV     #65,@R0         ;READ, MEX BITS SET
 5702  017532  005003                            CLR     R3
 5703  017534  105710                  3$:       TSTB    @R0
 5704  017536  100410                            BMI     4$
 5705  017540  005203                            INC     R3
 5706  017542  001374                            BNE     3$
 5707  017544  004737  020774                    JSR     PC,GT4RG
 5708  017550  010237  001202                    MOV     R2,$REG10       ;GET THE STARTING ADRES
 5709  017554  104416                            BRKDA4                  ;BREAK IT INTO DR#, CYL, SUR, SEC#
 5710  017556  104045                            ERROR   45              ;CNTRL RDY DIDN'T SET AFTER
 5711                                                                    ;READ OF 1 WORD FROM CYL 0, SEC 2.
 5712                                                                    ;IN EROR MSGE, <DSK-ADRES> GIVES
 5713                                                                    ;ADRES WHERE READ BEGAN. 'RKDA'
 5714                                                                    ;GIVES CONTENTS OF RKDA AT TIME OF EROR
 5715  017560  032737  000100  001144  4$:       BIT.    #100,$TKS       ;WAS THE CORRECT WORD READ INTO
 5716                                                                    ;THE TTY  STATUS REGISTER?
 5717  017566  001015                            BNE     TST54           ;;YES, EXIT
 5718  017570  017705  161350                    MOV     @$TKS,R5                ;GET THE WORD RECVD FROM DISK
 5719  017574  010537  001164                    MOV     R5,$REG1
 5720  017600  052705  000100                    BIS     #100,R5         ;THIS WORD WAS EXPCTD
 5721  017604  010537  001162                    MOV     R5,$REG0        ;STORE EXPCTD WORD
 5722  017610  011437  001166                    MOV     @R4,$REG2       ;GET RKBA
 5723  017614  011037  001170                    MOV     @R0,$REG3       ;GET RKCS
 5724  017620  104115                            ERROR   115             ;DATA ERROR. A ONE WORD (100)
 5725                                                                    ;NPR WAS TRIED FROM DISK TO
 5726                                                                    ;TTY KEYBOARD STATUS REGISTER
 5727                                                                    ;(17756) . BIT 6 SHOULD HAVE BEEN
 5728                                                                    ; SET AS RESULT OF THIS
 5729                                                                    ;BUT IT WAS NOT
 5730
 5731
 5732                          ;;*****************************************************************
 5733                          ;*TEST 54        CHECK THAT RKBA CAN COUNT CORRECTLY
```

```
                                        ;*THIS TEST CHECKS THAT RKBA CAN COUNT CORRECTLY. IT IS SET
                                        ;*TO THE DESIRED INITIAL VALUE.  THEN A ONE WORD WRITE CHECK
                                        ;*IS TRIED, WITH MEX (MEMORY EXTENSION) BITS SET. IF THERE IS
                                        ;*NO MEMORY PRESENT (FOR CERTAIN BUS ADDRESSES),  THERE
                                        ;*WILL BE AN NXM ERROR STOPPING CONTROLLER ACTION. BUT RKBA
                                        ;*SHOULD HAVE INCREMENTED BY 1 FROM ITS INITIAL VALUE. IF IT
                                        ;*HAS NOT, AN ERROR IS REPORTED.
                                        ;;*****************************************************************
017622  000004                  TST54:  SCOPE
017624  012737  000005  001206          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
017632  104421                          TST.SIN                 ;CHECK IF SIN SET, IF SET DRV RESET
017634  005001                          CLR     R1              ;INITIALIZE (VALUE OF RKBA)
017636  012702  000002                  MOV     #2,R2           ;INITIALIZE (INCMNTD VALUE OF RKBA)

017642  012737  017654  001110          MOV     #1$,$LPERR      ;SET RETURN ADRES FOR LUPING
                                                                ;ON EROR

017650  013705  001336          1$:     MOV     RKBA,R5
017654  004737  021436                  JSR     PC,TSTRWS       ;WAIT FOR R/W/S RDY
017660  104016                          ERROR   16              ;R/W/S RDY IS NOT SET
017662  104413                          CNT.RESET               ;DO CONTROL RESET
017664  012777  177777  161442          MOV     #-1,@RKWC       ;WRITE CHK 1 WORD
017672  010115                          MOV     R1,@R5  ;THIS BUS ADRES
017674  013777  001350  161436          MOV     DRIVAD,@RKDA    ;SET DISK ADRES
017702  012777  000067  161422          MOV     #67,@RKCS       ;WRITE CHECK, GO, MEX BITS SET
017710  104412                          CHKCRDY                 ;GO CHECK IF CONTROL RDY IS SET
                                                                ;IF SO, SKIP THE EROR MESSAGE.
017712  104065                          ERROR   65              ;CNTRL RDY DID NOT SET AFTER
                                                                ;WRT CHK WAS TRIED TO NXM LOC
                                                                ;U MIGHT WANT TO USE TESTS
                                                                ;CHECKING MEX BITS & NXM.
017714  005237  001356                  INC     INDX1           ;ALLOW ONLY 5 ERRORS OF ABOVE KIND
017720  001417                          BEQ     5$

017722  020215          3$:     CMP     R2,@R5          ;DID RKBA INCREMENT BY 1 FROM
                                                        ;ITS INITIAL VALUE?
017724  001410                  BEQ     4$              ;YES, BRANCH
017726  010137  001162          MOV     R1,$REG0        ;GET EXPCTD RKBA
017732  011537  001164          MOV     @R5,$REG1       ;GET RKBA RECVD
017736  104017                  ERROR   17              ;RKBA DID NOT INCREMENT BY
                                                        ;1 FROM ITS INITIAL VALUE.
                                                        ;ONE WORD WRT CHK WAS TRIED
                                                        ;TO A NXM LOCATION. THERE
                                                        ;WILL BE AN NXM ERROR,
                                                        ;BUT STILL RKBA SHOULD
                                                        ;INCREMENT BY 1 FROM ITS
                                                        ;INITIAL VALUE.
017740  005237  001360          INC     INDX2           ;ALLOW ONLY 5 ERRORS OF
017744  001405                  BEQ     5$              ;THE ABOVE KIND
017746  060201          4$:     ADD     R2,R1           ;SET NXT VALUE OF RKBA
017750  010102                  MOV     R1,R2
017752  062702  000002          ADD     #2,R2           ;SET EXPCTD VALUE OF RKBA
017756  001336                  BNE     1$              ;ALL DONE?

017760                  5$:                             ;DUMMY EXIT POINT
```

```
                                        ;;*****************************************************************
                                        ;*TEST 55        CHECK FOR RK-05F
                                                ;*THIS TEST CHECKS RK-05F TYPE DRIVES
                                                ;*TO INSURE THAT IF SEEKS ARE ISSUED ON ONE
                                                ;*DRIVE, THE OTHER DRIVE BECOMES BUSY
                                        ;;*****************************************************************
017760  000004                        TST55:  SCOPE
017762  012737  000001  001206                MOV     #1,$TIMES       ;;DO 1 ITERATION
017770  005737  001404                        TST     FFLAG           ;SEE IF RK-05F
017774  001403                        1$:     BEQ     1$              ;NOT F
017776  004537  025160                        JSR     R5,FCHECK       ;SEE IF OTHER GOES BUSY
020002  104120                        1$:     ERROR   120

020004                                  1$:

                                        ;;*****************************************************************
                                        ;*TEST 56        END OF PROGRAM
                                                ;*THIS IS NOT A TEST, BUT A LINKAGE PROVIDED TO PERFORM
                                                ;*THE ABOVE SUB-TESTS FOR ALL DRIVES THAT ARE PRESENT.
                                                ;*NOTE THAT THE NEXT TEST- HARDWARE POLLING LOGIC-
                                                ;*IS DONE USING ALL THE DRIVES THAT ARE INDICATED PRESENT.
                                                ;*DO NOT LOOP ON THIS 'TEST'.
                                        ;;*****************************************************************
020004  000004                        TST56:  SCOPE
020006  012737  000001  001206                MOV     #1,$TIMES       ;;DO 1 ITERATION
020014  005237  001352                        INC     DRVDON          ;INCREMENT THE COUNT FOR THE NUMBER
                                                                        ;OF DRIVES THAT ARE CHECKED
020020  004737  021504                        JSR     PC,DRESET       ;RESET THE DRIVE
020024  104026                        1$:     ERROR   26              ;R/W/S DIDN'T SET AFTER DRIVE RESET
020026  023737  001412  001352        BTEOP:  CMP     DRIVS,DRVDON    ;HAVE U TESTED ALL THE DRIVES
                                                                        ;THAT ARE PRESENT?
020034  001405                        1$:     BEQ     1$              ;IF YES, EXIT
020036  062737  020000  001350                ADD     #20000,DRIVAD   ;ADRES THE NXT POSSIBLE DRIVE
020044  000137  005040                        JMP     NUDRV           ;GO BACK AND TEST THE NEXT
                                                                        ;DRIVE PRESENT
020050  005037  001112                1$:     CLR     $ERTTL

                                        ;;*****************************************************************
                                        ;*TEST 57        CHECK HARDWARE POLLING LOGIC
                                                ;*THIS TEST CHECKS THE HARDWARE POLL LOGIC, USING ALL THE DRIVES
                                                ;*PRESENT ON THE RK11.  ATLEAST TWO DRIVES SHOULD BE PRESENT
                                                ;*TO DO A MEANINGFUL HARDWARE POLL.  SEQUENCE OF OPERATIONS IS
                                                ;*AS FOLLOWING:
                                                ;*1) NUMBER OF DRIVES ON THE RK11 IS ASCERTAINED.
                                                ;*2) HAVING LOCKED OUT ALL INTERRUPTS (CPU PR 7), SEEK IS INITIATED
                                                ;*FOR ONE DRIVE AT A TIME, ONLY WHEN 'CNTRL RDY' IS SET.
                                                ;*3) CPU PRIORITY IS DROPPED TO 4 SO THAT RK11 CAN INTERRUPT, THE INCOMING
                                                ;*INTERRUPT IS PROCESSED TO CHECK IF IT WAS DUE TO 'SEEK DONE' BY
                                                ;*ONE OF THE DRIVES.
                                                ;*4) IF BY THE END OF THE SET TIME A DRIVE HAS NOT INTERRUPTED
                                                ;*AN ERROR MESSAGE IS GIVEN INDICATING WHICH DRIVE DID NOT
                                                ;*INTERRUPT AFTER SEEK WAS DONE.
                                        ;;*****************************************************************
020054  000004                        TST57:  SCOPE
```

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5846  020056  012737  000005  001206          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
5847  020064  005237  001440                  INC     SIZYET          ;FOUNR RK05F YET?
5848  020070  001002                          BNE     25$             ;YES
5849  020072  004737  025304                  JSR     PC,SIZEF        ;FIND WHICH ARE RK-05F
5850  020076  005037  001436          25$:    CLR     PHYDRV          ;NUMBER OF ACTUAL DRIVES
5851  020102  012700  001414                  MOV     #DRIV0,R0       ;TABLE
5852  020106  005710                  23$:    TST     (R0)            ;DRIVE HERE+?
5853  020110  001405                          BEQ     22$             ;NO
5854  020112  005237  001436                  INC     PHYDRV          ;COUNT DRIVE
5855  020116  005710                          TST     (R0)            ;RK05F?
5856  020120  100001                          BPL     22$             ;NO
5857  020122  005720                          TST     (R0)+           ;DONT COUNT F TWICE
5858  020124  005720                  22$:    TST     (R0)+   ;NEXT DRIVE
5859  020126  020027  001433                  CMP     R0,#DRIV7+1     ;ALL YET
5860  020132  002765                          BLT     23$             ;NO
5861  020134  005037  001406                  CLR     ODDEVN          ;EVEN DRIVES FIRST IF F
5862  020140  005737  001412          T56:    TST     DRIVS           ;ANY DRIVES PRESENT?
5863  020144  001002                          BNE     20$             ;YES
5864  020146  000137  020652                  JMP     $EOP            ;NO
5865  020152  005237  001434          20$:    INC     T56FLG
5866  020156  013700  001332                  MOV     RKCS,R0
5867  020162  005037  001356                  CLR     INDX1           ;FLAG TO INDICATE:
5868                                                                  ;(INDX1)=0 POLLING DONE AFTER ALL
5869                                                                              ;DRIVES SEEK TO CYL 0
5870                                                                  ;(INDX1)=1 POLLING DONE AFTER ALL
5871                                                                              ;DRIVES SEEK TO CYL 4
5872  020166  005037  001360          15$:    CLR     INDX2           ;FLAG INDICATING TYPE OF INTERRUPT
5873                                                                  ;SET TO NON-ZERO TO INDICATE
5874                                                                  ;THAT THE INTERRUPT IS DUE TO
5875                                                                  ;SEEK DONE
5876  020172  104413                          CNT.RESET               ;GO, DO CONTROL RESET
5877                                                                  ;THIS IS A CALL FOR THE 'CNTRL-
5878                                                                  ;RESET' ROUTINE. A CONTROL RESET IS
5879                                                                  ;ISSUED AND AFTER A CERTAIN TIME
5880                                                                  ;IF THE 'CNTRL RDY' DOES NOT SET
5881                                                                  ;AN ERROR IS REPORTED. NOTE THAT
5882                                                                  ;THE PC IN ERROR MESSAGE IS THE
5883                                                                  ;PC WHERE 'CNT.RESET' IS LOCATED.
5884                                                                  ;THIS IS A VERY BASIC ERR& IF IT
5885                                                                  ;OCCURS GO BACK TO TEST 10
5886  020174  005737  001356                  TST     INDX1           ;PERFORMING SEEKS TO CYL 4
5887  020200  001002                          BNE     .+6             ;YES, BRANCH
5888  020202  005002                          CLR     R2              ;NO
5889  020204  000402                          BR      .+6
5890  020206  012702  000200                  MOV     #200,R2         ;SET ADRES FOR FOURTH CYLINDER
5891  020212  012701  001414                  MOV     #DRIV0,R1       ;INITIALIZE POINTER
5892  020216  012703  177770                  MOV     #-10,R3         ;SET COUNT FOR 8 DRIVES
5893  020222  012705  033342                  MOV     #OUTBUF,R5      ;INITIALIZE POINTER TO INDICATOR AREA
5894  020226  005025                          CLR     (R5)+           ;CLEAR OUT THE 8-WORD INDICATOR
5895  020230  005203                          INC     R3              ;AREA WHICH IS USED FOR DOING
5896  020232  001375                          BNE     .-4             ;SOFTWARE POLLING LATER ON
5897  020234  012703  177770                  MOV     #-10,R3         ;SET COUNT FOR 8 POSSIBLE DRIVES
5898  020240  012705  033342                  MOV     #OUTBUF,R5      ;INITIALIZE POINTER TO INDICATOR AREA
5899  020244                          1$:
5900  020244  012746  000340                  MOV     #340,-(SP)
5901  020250  012746  020256                  MOV     #64$,-(SP)
```

```
 5902  020254  000002                    RTI
 5903  020256                    64$:
 5904  020256  032711  000001            BIT     #BIT0,(R1)      ;IS THIS DRIVE PRESENT?
 5905  020262  001433                    BEQ     4$              ;IF NOT, BRANCH
 5906  020264  005711                    TST     (R1)            ;RK06F?
 5907  020266  100012                    BPL     17$             ;NO, CONTINUE
 5908  020270  032702  020000            BIT     #BIT13,R2       ;DRIVE EVEN?
 5909  020274  001404                    BEQ     16$             ;YES
 5910  020276  005737  001406            TST     ODDEVN          ;DO WE WANT ODD?
 5911  020302  001423                    BEQ     4$              ;NO, SO DO NOT TEST
 5912  020304  000403                    BR      17$             ;ADD THIS DRIVE TO LIST
 5913  020306  005737  001406    16$:    TST     ODDEVN          ;DO WE WANT EVEN?
 5914  020312  001017                    BNE     4$              ;NO, SO SKIP
 5915  020314  010215            17$:    MOV     R2,(R5)         ;SET UP THIS WORD IN THE
 5916                                                            ;INDICATOR AREA SHOWING THAT THIS
 5917                                                            ;DRIVE (AS IN BITS 13-15 OF R2)
 5918                                                            ;IS PRESENT
 5919  020316  042725  017777            BIC     #17777,(R5)+    ;MASK OUT UNWANTED BITS (CYL,SUR,SEC BITS)
 5920  020322  005004                    CLR     R4
 5921  020324  105710            2$:     TSTB    @R0             ;IS CNTRL RDY SET?
 5922  020326  100405                    BMI     3$              ;YES, BRANCH
 5923  020330  005204                    INC     R4              ;NO, WAIT FOR IT
 5924  020332  001374                    BNE     2$              ;IF WAITED LONG REPORT ERROR
 5925  020334  004737  020774            JSR     PC,GT4RG                ;GO, GET RKCS,ER,DS,DA
 5926  020340  104021                    ERROR   21              ;CNTRL RDY DID NOT SET AFTER ACCEPTING
 5927                                                            ;ADRES FROM PREVIOUS SEEK
 5928  020342  010277  160772    3$:     MOV     R2,@RKDA        ;ADRES THIS DRIVE, CYL 0 OR CYL 4
 5929                                                            ;(WHICHEVER THE CASE MAY BE)
 5930  020346  012710  000111            MOV     #111,@R0        ;SEEK,GO,IDE SET
 5931  020352  005721            4$:     TST     (R1)+           ;NEXT DRIVE DATA
 5932  020354  062702  020000            ADD     #20000,R2       ;INCREMENT DRIVE ADRES (BITS 15,14,13)
 5933  020360  005203                    INC     R3              ;TO NEXT ONE
 5934  020362  001330                    BNE     1$              ;BRANCH BACK IF ALL DRIVES ARE
 5935                                                            ;NOT CHECKED TO SEE IF THE NEXT
 5936                                                            ;DRIVE IS PRESENT (& IF SO ISSUE A
 5937                                                            ;SEEK TO IT)
 5938                                                            ;BY NOW SEEKS HAVE BEEN ISSUED
 5939                                                            ;TO ALL DRIVES PRESENT & POLLING
 5940                                                            ;HAS BEGUN
 5941  020364  005004                    CLR     R4
 5942  020366  013702  001402    5$:     MOV     RKVEC,R2
 5943  020372  012722  020424            MOV     #6$,(R2)+       ;SET ADRES FOR RK11 TO INTERUPT
 5944  020376  012712  000340            MOV     #340,(R2)       ;SET PSW ON INTERUPT
 5945  020402  013746  001400            MOV     RKPRI,-(SP)     ;DROP CPU PRIORITY TO 4 SO THAT
 5946  020406  012746  020414            MOV     #18$,-(SP)              ;RK11 CAN INTERUPT
 5947  020412  000002                    RTI
 5948  020414  000240            18$:    NOP                     ;THIS IS A TIME LOOP DURING
 5949  020416  005204                    INC     R4              ;WHICH ALL DRIVES PRESENT SHOULD
 5950  020420  001375                    BNE     18$             ;INTERRUPT
 5951  020422  000452                    BR      11$             ;BRANCH AND CHECK IF ALL AVAILABLE
 5952                                                            ;DRIVES INTERRUPTED CORRECTLY
 5953  020424  022626            6$:     CMP     (SP)+,(SP)+     ;RESTORE STACK POINTER
 5954  020426  005737  001360            TST     INDX2           ;WAS THIS FIRST INTERRUPT
 5955                                                            ;DUE TO 'ADRES ACK' AFTER INITIATION
 5956                                                            ;OF SEEK?
 5957  020432  001021                    BNE     9$              ;IF YES, CHECK THE FOLLOWING
```

```
5958
5959  020434  032710  020000          BIT     #20000,@R0      ;CHECK THAT SCP IS NOT SET
5960  020440  001403                  BEQ     7$              ;BRANCH IF SCP CLEAR
5961  020442  011037  001162          MOV     @R0,$REG0       ;GET RKCS
5962  020446  104076                  ERROR   76              ;AFTER THE FIRST INTERRUPT WHICH
5963                                                          ;IS DUE TO INITIATION OF SEEK, SCP
5964                                                          ;SHOULD NOT HAVE SET. IT DID
5965  020450  017701  160652  7$:     MOV     @RKDS,R1
5966  020454  032701  160000          BIT     #160000,R1      ;RKDS BITS 15-13 SHLOULD BE CLR
5967  020460  001403                  BEQ     8$
5968  020462  010137  001162          MOV     R1,$REG0        ;GET RKDS
5969  020466  104050                  ERROR   50              ;SEEK, WITH IDE SET WAS ISSUED TO
5970                                                          ;ALL AVAILABLE DRIVES. THE FIRST
5971                                                          ;INTERUPT IS DUE TO SEEK INITIATED
5972                                                          ;BY FRST DRV. DRV ID BITS 13-15
5973                                                          ;SHOULD BE CLR AFTR THIS FRST INRUPT.
5974                                                          ;THEY WERE NOT IF THIS ERROR OCCURS.
5975  020470  005237  001360  8$:     INC     INDX2           ;SET UP FLAG INDICATING
5976                                                          ;THAT THE FIRST INTERRUPT DUE
5977                                                          ;TO INITIATION OF SEEK WAS
5978                                                          ;PROCESSED
5979  020474  000734                  BR      5$              ;GO BACK TO THE WAIT LOOP & WAIT
5980                                                          ;FOR NEXT INTERRUPT FROM RK11
5981  020476  013703  001436  9$:     MOV     PHYDRV,R3       ;SET COUNT OF # OF DRIVES PRESENT
5982  020502  012705  033342          MOV     #OUTBUF,R5      ;INITIALIZE POINTER
5983  020506  017701  160614          MOV     @RKDS,R1        ;GET RKDS
5984  020512  042701  017777          BIC     #17777,R1       ;MASK BITS 0-12
5985                                                          ;THE FOLLOWING CODE IS A SOFTWARE
5986                                                          ;POLL WHICH FINDS OUT WHICH DRIVE
5987                                                          ;CAUSED THE PRESENT INTERRUPT
5988                                                          ;AND SETS UP A FLAG BIT FOR
5989                                                          ;THE DRIVE #, INDICATING THAT
5990                                                          ;THIS DRIVE # INTERRUPTED
5991  020516  020125                  CMP     R1,(R5)+
5992  020520  001411                  BEQ     10$             ;BRANCH IF INTERRUPTING DRIVE WAS FOUND
5993  020522  005303                  DEC     R3              ;HAVE U CHKD ALL DRIVS PRESENT?
5994  020524  001374                  BNE     .-6             ;IF NOT LUP BAK & CHK
5995                                                          ;REPORT ERROR IF THE INTERRUPTING
5996                                                          ;DRIVE # (AS IN RKDS 13-15) WAS NOT
5997                                                          ;ANY ONE OF THOSE THAT ARE PRESENT
5998  020526  010146                  MOV     R1,-(R6)        ;GET WORD TO B SHFTD RT
5999  020530  004737  021200          JSR     PC,SHFTRT       ;GO SHIFT IT
6000  020534  012637  001162          MOV     (R6)+,$REG0     ;THIS DRIVE # WAS RECVD IN RKDS AS
6001                                                          ;THE INTERRUPTING DRIVE, BUT THIS
6002                                                          ;DRIVE IS NOT PHYSICALY PRESENT
6003  020540  104051                  ERROR   51              ;RKDS INDICATES AN INTERRUPTING
6004                                                          ;DRIVE # (DURING H'WARE POLL) BUT
6005                                                          ;THAT DRIVE IS ACTUALLY NOT PRESENT
6006  020542  000401                  BR      10$+2
6007  020544  005245          10$:    INC     -(R5)           ;SET UP FLAG INDICATING THAT
6008                                                          ;THE INTERRUPT FOR THIS DRIVE
6009                                                          ;(AFTER IT HAD COMPLETED ITS SEEK)
6010                                                          ;WAS PROCESSED
6011  020546  000707                  BR      5$              ;GO BAK & WAIT FOR FURTHER INTRUPTS
6012  020550  013703  001436  11$:    MOV     PHYDRV,R3       ;GET # OF DRIVES
6013  020554  012705  033342          MOV     #OUTBUF,R5      ;INITIALIZE POINTER
```

```
 6014
 6015  020560  105715                  14$:    TSTB    (R5)            ;DID THIS DRIVE INTERRUPT?
 6016  020562  001006                          BNE     13$             ;YES, BRANCH
 6017  020564  011546                          MOV     (R5),-(R6)      ;GET THIS DRIVE #
 6018  020566  004737  021200                  JSR     PC,SHFTRT       ;SHIFT IT TO THE RIGHT
 6019  020572  012637  001162                  MOV     (R6)+,$REG0     ;THIS DRIVE # DID NOT INTERRUPT
 6020                                                                  ;DURING H'WARE POLL
 6021  020576  104052                          ERROR   52              ;DRIVE # (AS IN $REG0) DID NOT
 6022                                                                  ;INTERRUPT DURING HARDWARE POLL
 6023  020600  062705  000002          13$:    ADD     #2,R5           ;INCREMENT POINTER TO THE NEXT FLAG
 6024  020604  005303                          DEC     R3              ;CHKD FOR ALL DRIVES?
 6025  020606  001364                          BNE     14$             ;IF NOT LUP BACK
 6026
 6027  020610  005737  001356                  TST     INDX1           ;DONE POLLING FOR SEEKS TO CYL 312?
 6028  020614  001004                          BNE     TSTEND          ;IF YES, EXIT
 6029  020616  005237  001356                  INC     INDX1           ;IF NOT, INCREMENT FLAG
 6030  020622  000137  020166                  JMP     15$             ;GO DO IT
 6031
 6032                                                                  ;INDICATOR TABLE
 6033                                                                  ;THE 8-WORD INDICATOR TABLE USED IN
 6034                                                                  ;THE FORMER PART OF THIS SUB-TEST
 6035                                                                  ;IS LOCATED STARTING AT 'OUTBUF'.
 6036                                                                  ;WORDS ARE SET UP TO INDICATE
 6037                                                                  ;PRESENCE OF A DRIVE EG: IF
 6038                                                                  ;DRIVES 0,1,2 ARE PRESENT, IT WILL
 6039                                                                  ;LOOK LIKE
 6040                                                                  ;OUTBUF:        000000 BITS 13,14,15
 6041                                                                  ;               020000 CONTAIN THE
 6042                                                                  ;               040000 DRIVE NO.
 6043                                                                  ;               000000 REST 0'S
 6044                                                                  ;WHEN A DRIVE INTERRUPTS AFTER SEEK
 6045                                                                  ;IS DONE BIT 0 OF THE CORRESPONDING
 6046                                                                  ;INDICATOR WORD IS SET. THUS FOR THE
 6047                                                                  ;ABOVE EXAMPLE IF ALL DRIVES INTERRUPTED
 6048                                                                  ;CORRECTLY THEN IT WILL LOOK LIKE:
 6049                                                                  ;       12$:    000001 BIT 0 SET
 6050                                                                  ;               020001 TO INDICATE
 6051                                                                  ;               040001 DR INTERRUPTED
 6052                                                                  ;               000000 REST 0'S
 6053
 6054
 6055  020626  005237  001406          TSTEND: INC     ODDEVN          ;NOW ODD IF RK05F
 6056  020632  022737  000002  001406          CMP     #2,ODDEVN       ;SEE IF DONE
 6057  020640  001402                          BEQ     21$             ;ALL DONE
 6058  020642  000137  020140                  JMP     T56             ;TEST AGAIN
 6059  020646  005037  001434          21$:    CLR     T56FLG
 6060
 6061
 6062                                  .SBTTL  END OF PASS ROUTINE
 6063
 6064                                  ;;******************************************************************
 6065                                  ;*INCREMENT THE PASS NUMBER ($PASS)
 6066                                  ;*INDICATE END-OF-PROGRAM AFTER 1 PASSES THRU THE PROGRAM
 6067                                  ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
 6068                                  ;*IF THERES A MONITOR GO TO IT
 6069                                  ;*IF THERE ISN'T JUMP TO ST4
```

```
                                        $EOP:
                                                SCOPE
                                                CLR     $TSTNM          ;;ZERO THE TEST NUMBER
                                                CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
                                                INC     $PASS           ;;INCREMENT THE PASS NUMBER
                                                BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
                                                DEC     (PC)+           ;;LOOP?
                                        $EOPCT: .WORD   1
                                                BGT     $DOAGN          ;;YES
                                                MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
                                        $ENDCT: .WORD   1
                                                $EOPCT
                                                TYPE    ,$ENDMG         ;;TYPE "END PASS #"
                                                MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
                                                TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                                TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
                                        $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
                                                BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
                                                RESET                   ;;CLEAR THE WORLD
                                        $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
                                                NOP                     ;;SAVE ROOM
                                                NOP                     ;;FOR
                                                NOP                     ;;ACT11
                                        $DOAGN:
                                                JMP     @(PC)+          ;;RETURN
                                        $RTNAD: .WORD   ST4
                                        $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
                                        $ENDMG: .ASCIZ  <15><12>/END PASS #/
```

```
                                                .SBTTL  GT2RG:  ROUTINE FOR GETTING RKCS,RKER

                                        ;SUBROUTINE FOR TRANSFERRING THE CONTENTS OF RKCS, RKER
                                        ;TO $REG0, $REG1 RESPECTIVELY BEFORE TYPING OUT AN ERROR MESSAGE.
                                        ;CALL:  JSR     PC,GT2RG

                                                .SBTTL  GT3RG:  ROUTINE FOR GETTING RKCS, RKER, RKDS

                                        ;GT3RG
                                        ;SUBROUTINE FOR TRANSFERRING THE CONTENTS OF RKCS, RKER, RKDS
                                        ;TO  $REG0, $REG1, $REG2 RESPECTIVELY BEFORE TYPING OUT AN
                                        ;ERROR MESSAGE.
                                        ;CALL:  JSR     PC,GT3RG

                                                .SBTTL  GT4RG:  ROUTINE FOR GETTING RKCS, RKER, RKDS, RKDA

                                        ;GT4RG
                                        ;SUBROUTINE FOR TRANSFERRING CONTENTS OF RKCS, RKER, RKDS
```

```
                                        ;RKDA TO $REG0, $REG1, $REG2, $REG3 RESPECTIVELY BEFORE
                                        ;TYPING OUT AN ERROR MESSAGE.
                                        ;CALL:  JSR     PC,GT4RG

020774  017737  160340  001170  GT4RG:  MOV     @RKDA,$REG3             ;GET RKDA
021002  017737  160320  001166  GT3RG:  MOV     @RKDS,$REG2             ;GET RKDS
021010  017737  160314  001164  GT2RG:  MOV     @RKER,$REG1             ;GET RKER
021016  017737  160310  001162          MOV     @RKCS,$REG0
021024  000207                        RTS     PC


                                                .SBTTL  TYERM:  SPECIAL ERROR MESSAGE ROUTINE

                                        ;TYERM
                                        ;THIS ROUTINE TYPES OUT 'EROR AT PC=X'
                                        ;X IS THE PC WHERE THE  EXPLANATION AS TO WHAT HAPPENED IS GIVEN. THIS ROUTINE
                                        ;IS USED ONLY FOR NON-MANUAL MODE OF THE PROGRAM.
                                        ;CALL:          JSR     TYERM

021026                                  TYERM:
021026  104401  021034                          TYPE    ,65$            ;;TYPE ASCIZ STRING
021032  000406                                  BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <15><12>/EROR,PC=/
021050                                  64$:
021050  010346                                  MOV     R3,-(SP)
021052  104402                                  TYPOC
021054  000207                                  RTS     PC


                                                .SBTTL  BDA0, BDA4:     BREAK DISK ADDRESS INTO SEC, SUR, CYL, DRIVE

                                        ;BDA0, BDA4

                                        ;THIS ROUTINE BREAKS A DISK ADDRESS (BITS 0-15) INTO  DRIVE #,
                                        ;CYLINDER #, SURFACE, SECTOR #. THE ROUTINE IS CALLED BY USING EITHER
                                        ;BRKDA0 OR BRKDA4, BOTH BEING 'TRAP' INSTRUCTIOS WITH THEIR LOWER BYTES
                                        ;ENCODED TO PROVIDE INDEXING TO 'BDA0' OR 'BDA4'. BEFORE CALLING
                                        ;THE ROUTINE THE DISK ADDRESS WHICH IS TO BE BROKEN AS ABOVE
                                        ;IS DEPOSITED IN $REG10.
                                        ;'BRKDA0' PUTS THE              BRKDA4 PUTS THE
                                        ;DRIVE # INTO $REG0             DRIVE # INTO $REG4
                                        ;CYLINDER # INTO $REG1          CYLINDER # INTO $REG5
                                        ;SURFACE # INTO $REG2           SURFACE # INTO $REG6
                                        ;SECTOR # INTO $REG3            SECTOR # INTO $REG7
                                        ;CALL:  BRKDA0                  BRKDA4

                                        BDA0:   MOV     R0,-(SP)        ;PUSH R0 ONTO THE STACK
021056  010046
021060  012700  001172                          MOV     #$REG3+2,R0     ;SET UP POINTER
```

```
                021064  000403                          BR      BDAR

                021066  010046                  BDA4:   MOV     R0,-(SP)        ;PUSH R0 ONTO THE STACK
                021070  012700  001202                  MOV     #$REG7+2,R0     ;SET UP POINTER

                021074  032777  020000  160036  BDAR:   BIT     #20000,@SWR     ;INHIBIT TYPEOUT?
                021102  001034                          BNE     2$              ;YES, BRANCH TO EXIT POINT

                021104  010146                          MOV     R1,-(SP)        ;PUSH R1 ON STACK
                021106  010246                          MOV     R2,-(SP)        ;PUSH R2 ON STACK
                021110  013701  001202                  MOV     $REG10,R1       ;GET THE ADDRESS WHICH
                                                                                ;HAS TO BE BROKEN
                021114  042701  177760                  BIC     #177760,R1      ;EXTRACT SECTOR BITS 0-3
                021120  010140                          MOV     R1,-(R0)        ;MOVE SECTOR BITS TO $REG3 OR $REG7
                021122  013701  001202                  MOV     $REG10,R1       ;GET THE DSK-ADRES TO BE BROKEN
                021126  006201                          ASR     R1              ;SHIFT RIGHT 4 TIMES
                021130  006201                          ASR     R1
                021132  006201                          ASR     R1
                021134  006201                          ASR     R1
                021136  010102                          MOV     R1,R2           ;STORE THIS
                021140  042702  177776                  BIC     #177776,R2      ;EXTRACCT THE SURFACE BIT
                021144  010240                          MOV     R2,-(R0)        ;MOVE SURFACE BIT TO $REG3 OR $RE@6
                021146  006201                          ASR     R1
                021150  010102                          MOV     R1,R2           ;STORE IT
                021152  042702  177400                  BIC     #177400,R2      ;EXTRACT THE CYLINDER BITS
                021156  010240                          MOV     R2,-(R0)        ;MOVE CYLINDER BITS TO $REG1 OR $REG5
                021160  000301                          SWAB    R1              ;SWAB HI-LO BYTES
                021162  042701  177770                  BIC     #177770,R1      ;EXTRACT THE DRIVE #
                021166  010140                          MOV     R1,-(R0)        ;MOVE DRIVE # TO $REG0 OR $REG4

                021170  012602                          MOV     (SP)+,R2        ;RESTORE R2
                021172  012601                          MOV     (SP)+,R1        ;RESTORE R1
                021174  012600                  2$:     MOV     (SP)+,R0        ;RESTORE R0 FROM THE STACK
                021176  000002                          RTI                     ;RETURN FROM INTERRUPT, EXIT THIS
                                                                                ;ROUTINE


                                                .SBTTL  SHFTRT: SHIFT RIGHT ROUTINE

                                        ;SHFTRT
                                        ;THIS ROUTINE SHIFTS A WORD TO THE RIGHT 13 TIMES. THE WORD TO BE SHIFTED
                                        ;IS PUT ON THE STACK BEFORE ENTERING THIS ROUTINE AND IT IS POPPED UP
                                        ;FROM THE STACK AFTER THE SHIFT HAS BEEN DONE.
                                        ;CALL:  JSR     PC,SHFTRT

                021200  012737  177763  021224  SHFTRT: MOV     #-15,2$         ;SET UP A COUNT OF 13
                021206  000241                          CLC                     ;CLEAR THA C BIT
                021210  006066  000002          1$:     ROR     2(R6)           ;ROTATE RIGHT THE WORD TO B SHFTD
                021214  005237  021224                  INC     2$              ;SHIFTED 13 TIMES?
                021220  001373                          BNE     1$              ;IF NOT LUP BAK & SHIFT
                021222  000207                          RTS     PC              ;EXIT FROM THIS SUBROUTINE
                021224  000000                  2$:     0
```

```
                                        .SBTTL  CHKHE:  CHECK FOR 'ERR'OR
                                        .SBTTL  CHKHE1: CHECK FOR 'ERR'OR

                                ;;CHKHE
                                ;THIS ROUTINE CHECKS IF 'HE' OR 'ERR' BITS IN RKCS ARE SET. IF ANY OF THE
                                ;TWO BITS ARE SET, THE CONTENTS OF RKCS, ER, DS, AND DA ARE SAVED AND A
                                ;RETURN IS MADE TO THE ERROR MESSAGE FOLLOWING THE 'JSR' CALL.
                                ;AT THE TIME OF ENTRY 'DRIVAD' CONTAINS THE DISK ADDRESS WHICH IS TO
                                ;BE BROKEN DOWN INTO DRIVE #, CYLINDER, SURFACE AND SECTOR #. THIS INFORMATION
                                ;IS SAVED TO BE USED LATER FOR ERROR REPORTING. IF THE BITS ARE NOT SET,
                                ;RETURN IS MADE TO SKIP THE ERROR MESSAGE.

                                ;CHKHE1
                                ;THIS ROUTINE CHECKS IF 'HE' OR 'ERR' BITS IN RKCS ARE SET. IF ANY OF THE
                                ;TWO BITS ARE SET, THE CONTENTS OF RKCS, ER, DS, AND DA ARE SAVED AND A
                                ;RETURN IS MADE TO THE ERROR MESSAGE FOLLOWING THE 'JSR' CALL.
                                ;AT THE TIME OF ENTRY R1 CONTAINS THE DISK ADDRESS WHICH IS TO BE BROKEN
                                ;DOWN INTO DRIVE #, CYLINDER, SURFACE AND SECTOR #. THIS INFORMATION IS
                                ;SAVED TO BE USED LATER FOR ERROR REPORTING. IF THE BITS ARE NOT SET,
                                ;RETURN IS MADE TO SKIP THE ERROR MESSAGE.

021226  010137  001202        CHKHE1: MOV     R1,$REG10       ;SAVE THE DISK ADRES
021232  000403                        BR      CHE1

021234  013737  001350  001202  CHKHE:  MOV     DRIVAD,$REG10   ;SAVE THE DISK ADRES
021242  032777  140000  160062  CHE1:   BIT     #140000,@RKCS   ;IS 'HE' OR 'ERR' BIT SET?
021250  001467                        BEQ     CRETRN          ;NO
021252  004737  020774                JSR     PC,GT4RG        ;GET RKCS,ER,DS, DA
021256  104416                        BRKDA4                  ;GO TO 'BDA4' & BREAK CONTENTS O
                                                                ;$REG10 INTO DR#, CYL, SUR, SEC BITS
021260  000207                        RTS     PC              ;RETURN TO THE ERROR MESSAGE


                                        .SBTTL  CHKDA:  CHECK IF RKDA INCREMENTED CORRECTLY

                                ;CHKDA
                                ;THIS ROUTINE CHECKS IF RKDA INCREMENTED CORRECTLY. IF RKDA INCREMENTED
                                ;CORRECTLY RETURN IS MADE TO SKIP THE ERROR MESSAGE.
                                ;IF RKDA DID NOT INCREMENT CORRECTLY, THE EXPECTED AND RECIEVED VALUES
                                ;OF RKDA ARE SAVED AND A RETURN IS MADE TO THE ERROR MESSAGE FOLLOWING THE
                                ;'JSR' CALL.
021262  013705  001350        CHKDA:  MOV     DRIVAD,R5       ;RKDA SHOULD INCREMENT TO THIS
021266  005205                        INC     R5              ;AFTER DATA TRANSFER IS DONE
021270  020577  160044        CHKDA1: CMP     R5,@RKDA        ;DID RKDA INCREMENT CORRECTLY?
021274  001455                        BEQ     CRETRN          ;IF YES, BRANCH
                                                                ;IF NOT, REPORT ERROR
021276  010537  001202                MOV     R5,$REG10       ;GET EXPCTD RKDA
021302  104415                        BRKDA0                  ;GO TO 'BDA0' & BREAK  CONTENTS OF
                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
021304  017737  160030  001202        MOV     @RKDA,$REG10    ;GET ACTUAL RKDA
021312  104416                        BRKDA4                  ;GO TO 'BDA4' & BREAK  CONTENTS OF
                                                                ;$REG10 INTO DR #,CYL,SUR,SEC BITS
021314  000207                        RTS     PC              ;RETURN TO THE ERROR MESSAGE
```

```
                                        .SBTTL  CHKWC:  CHECK IF RKWC OVERFLOWED

                                ;CHKWC
                                ;THIS ROUTINE CHECKS IF RKWC OVERFLOWED TO 0. IF IT DID A RETURN IS MADE
                                ;TO SKIP THE ERROR MESSAGE. IF NOT,THE CONTENTS OF RKWC AND RKDA ARE SAVED
                                ;AND A RETURN IS MADE TO THE ERROR MESSAGE FOLLOWING THE 'JSR' CALL.
021316  005777  160012          CHKWC:  TST     @RKWC           ;DID WORD COUNT OVERFLOW TO 0?
021322  001442                          BEQ     CRETRN          ;IF YES, BRANCH
                                                                ;IF NOT, ERROR
021324  017737  160004  001162          MOV     @RKWC,$REG0     ;GET RKWC
021332  017737  160002  001164          MOV     @RKDA,$REG1     ;GET RKDA
021340  000207                          RTS     PC              ;RETURN TO THE ERROR MESSAGE

                                        .SBTTL  CHKER:  CHECK RKER CONTENTS
                                ;CHKER
                                ;THIS ROUTINE CHECKS IF ANY BIT IN RKER SET. IF NOT RETURN IS MADE TO SKIP
                                ;THE ERROR MESSAGE. IF ANY BIT IS SET THE CONTENTS OF RKCS, RKER, RKDS ARE
                                ;SAVED AND A RETURN IS MADE TO THE ERROR MESSAGE.

021342  005777  157762          CHKER:  TST     @RKER           ;DID ANY BIT IN RKER SET?
021346  001430                          BEQ     CRETRN          ;NO, BRANCH
                                                                ;YES, ERROR
021350  004737  021002                  JSR     PC,GT3RG        ;GO, GET RKCS, ER, DS

021354  000207                          RTS     PC              ;RETURN TO THE ERROR MESSAGE


                                ;CHKECLR
                                ;THIS ROUTINE CHECKS THAT RKER IS CLEAR. IF NOT, THE CONTENTS OF RKER
                                ;ARE SAVED AND A RETURN IS MADE TO THE ERROR MESSAGE FOLLOWING THE "JSR"
                                ;CALL. IF RKER IS CLEAR THE ERROR MESSAGE IS SKIPPED ON RETURN.

021356  005777  157746          CHKECLR: TST    @RKER           ;ANY BIT IN RKER SET?
021362  001422                          BEQ     CRETRN          ;NO
021364  013737  001330  001162          MOV     RKER,$REG0      ;GET ADRES OF RKER
021372  017737  157732  001164          MOV     @RKER,$REG1     ;GET CONTENTS OF RKER
021400  000207                          RTS     PC              ;RETURN TO THE ERROR MESSAGE


                                ;CHKCCLR
                                ;THIS ROUTINE CHECKS THAT RKCS IS CLEAR. IF NOT, THE CONTENTS OF RKCS ARE
                                ;SAVED AND A RETURN IS MADE TO THE ERROR MESSAGE. IF RKCS IS CLEAR THE
                                ;ERROR MESSAGE IS SKIPPED ON RETURN.
021402  022777  000200  157722  CHKCCLR: CMP    #200,@RKCS      ;IS RKCS CLEAR?
021410  001407                          BEQ     CRETRN          ;YES
021412  013737  001332  001162          MOV     RKCS,$REG0      ;SAVE ADRES OF RKCS
021420  017737  157706  001164          MOV     @RKCS,$REG1     ;SAVE THE CONTENT OF RKCS
021426  000207                          RTS     PC              ;RETURN TO THE ERROR MESSAGE

021430  062716  000002          CRETRN: ADD     #2,(SP)         ;SKIP ERROR MESSAGE ON
021434  000207                          RTS     PC              ;RETURN
```

```
                                        .SBTTL  TSTRWS: WAIT FOR R/W/S RDY ROUTINE

                                ;TSTRWS
                                ;THIS ROUTINE WAITS FOR R/W/S RDY TO SET. WHEN IT SETS, THE RETURN PC
                                ;IS INCREMENTED SO THAT ON RETURN (TO THE MAIN PROGRAM) THE ERROR
                                ;MESSAGE FOLLOWING THE 'JSR' CALL IS SKIPPED. IF R/W/S RDY DOES NOT SET
                                ;THEN A RETURN IS MADE TO THE ERROR MESSAGE (FOLLOWING THE 'JSR' CALL).
                                ;WAITING TIME IS APPROX. 1040 MS FOR 11/20, APPROX. 208 MS FOR 11/45
                                ;CALL:  JSR     TSTRWS

021436  013777  001350  157674  TSTRWS: MOV     DRIVAD,@RKDA    ;ADRES THE DRIVE
021444  005037  001366          1$:     CLR     TIMER           ;INITIALIZE COUNT
021450  032777  000100  157650          BIT     #100,@RKDS      ;DID R/W/S RDY SET?
021456  001007                          BNE     2$              ;YES, BRANCH
021460  005237  001366                  INC     TIMER           ;WAIT FOR R/W/S RDY
021464  001371                          BNE     1$              ;ERROR IF IT'S NOT SET BY NOW
021466  017737  157634  001162          MOV     @RKDS,$REG0     ;GET RKDS
021474  000207                          RTS     PC              ;EXIT (TO ERROR FOOLOWING 'JSR TSTRWS')

021476  062716  000002          2$:     ADD     #2,(SP)         ;ADJUST RETURN ADRES TO SKIP OVER
                                                                ;ERROR (FOLLOWING 'JSR TSTRWS')
021502  000207                          RTS     PC              ;EXIT



                                        .SBTTL  DRESET: DRIVE RESET ROUTINE

                                ;DRESET
                                ;THIS ROUTINE DOES A DRIVE RESET ON THE DRIVE WHOOSE ADDRESS IS IN
                                ;RKDA. MULTIPLE RETURN ADDRESSES FOR THIS ROUTINE ARE PROVIDED.
                                ;IF THERE IS NO ERROR (R/W/S RDY SETS WITHIN CERTAIN TIME) , THEN BEFORE
                                ;EXITNG FROM THIS ROUTINE THE RETURN ADDRESS IS INCREMENTED BY 2, TO SKIP
                                ;THE ERROR MESSAGE ON RETURN. IF THERE IS AN ERROR, THE 3 REGISTERS (CS,ER,DS)
                                ;ARE STORED AND THEN A NORMAL EXIT IS MADE FROM THIS ROUTINE TO THE
                                ;ERROR MESSAGE FOLLOWING THE CALL FOR THIS ROUTINE.
                                ;CALL:  JSR     PC,DRESET


021504  005037  001364          DRESET: CLR     COUNT1          ;INITIALIZE THE COUNT
021510  013777  001350  157622          MOV     DRIVAD,@RKDA    ;ADRES THE DRIVE
021516  012777  000015  157606          MOV     #15,@RKCS       ;DRIVE RESET, GO
021524  104414                          CNT.RDY                 ;THIS IS A CALL FOR 'CN.RDY'
                                                                ;ROUTINE WHICH WAITS FOR CNT
                                                                ;RDY TO SET. IF CNTRL RDY DOES
                                                                ;NOT SET WITHIN 883 MS/ 11-20
                                                                ;(176 MS FOR 11-45 WITH BIPOLAR)
                                                                ;AN ERROR IS REPORTED
021526  032777  000100  157572  1$:     BIT     #100,@RKDS              ;DID R/W/S RDY SET?
021534  001013                          BNE     2$
021536  012746  177770                  MOV     #-10,-(SP)      ;PUSH COUNT ON SP
021542  005216                          INC     (SP)            ;COUNT IT DOWN
021544  001376                          BNE     .-2
021546  005726                          TST     (SP)+           ;POP UP $P
021550  005237  001364                  INC     COUNT1                  ;IF NOT WAIT
```

```
 6406  021554  001364                        BNE     1$                      ;WAITED LONG?
 6407  021556  004737  020774                JSR     PC,GT4RG
 6408  021562  000402                        BR      2$+4
 6409  021564  062716  000002        2$:     ADD     #2,@R6
 6410  021570  000207                        RTS     PC
 6411
 6412
 6413
 6414
 6415                                  .SBTTL  TSTSIN: CHECK 'SIN' ROUTINE
 6416
 6417                                ;TSTSIN
 6418                                ;THIS ROUTINE CHECKS IF 'SIN' IS SET, IF IT IS SET A
 6419                                ;DRIVE RESET IS DONE TO CLEAR 'SIN' AND INITIALIZE POSITIONER.
 6420                                ;CALL:          TST.SIN
 6421                                ;IF ON DOING DRIVE RESET R/W/S RDY DOES NOT SET  A MESSAGE
 6422                                ;       ERROR PC=XXXXXX  IS GIVEN.
 6423                                ;XXXXXX=PC IN THE MAIN PROGRAM WHERE 'TST.SIN' CALL IS LOCATED.
 6424
 6425  021572  013777  001350  157540 TSTSIN: MOV     DRIVAD,@RKDA    ;ADRES THE DRIVE
 6426  021600  032777  001000  157520        BIT     #1000,@RKDS     ;IS SIN SET?
 6427  021606  001403                        BEQ     1$
 6428  021610  004737  021504                JSR     PC,DRESET       ;GO DO DRIVE RESET, SIN  SET
 6429  021614  000401                        BR      2$              ;REPORT ERROR
 6430  021616  000002                1$:     RTI
 6431  021620  032777  020000  157312 2$:     BIT     #SW13,@SWR      ;INHIBIT TYPEOUT?
 6432  021626  001373                        BNE     1$              ;IF YES, SKIP TYPEOUT
 6433  021630  104401  021636                TYPE    ,65$            ;;TYPE ASCIZ STRING
 6434  021634  000406                        BR      64$             ;;GET OVER THE ASCIZ
 6435                                ;;65$:  .ASCIZ  /ERROR PC= /
 6436  021652                        64$:
 6437  021652  011646                        MOV     (SP),-(SP)
 6438  021654  062716  177776                ADD     #-2,(SP)        ;GET THE PC WHERE 'TST.SIN' IS LOCATED
 6439  021660  104402                        TYPOC                   ;GO TYPE OUT PC
 6440  021662  000755                        BR      1$
 6441
 6442
 6443
 6444                                  .SBTTL  DELAY:  TIME DELAY ROUTINE
 6445
 6446                                ;DELAY
 6447                                ;THIS ROUTINE PROVIDES  A VARIABLE TIME DELAY. THE CALL FOR THIS
 6448                                ;ROUTINE IS AN ENCODED 'TRAP' INSTRUCTION.
 6449                                ;CALL:          DELAY   ,N      N IS ANY OCTAL NO. FROM 1 TO 177777
 6450                                ;THE DELAY PROVIDED IS 7.5N US (CONVERT N TO DECIMAL) FOR 11/20
 6451                                ;1.5N US FOR 11/45
 6452                                ;IF THE USER WANTS TO CHANGE THE DELAY TIME (EXMP: SHORTER DELAY TO
 6453                                ;GET A TIGHTER SCOPE LOOP) THE VARIABLE 'N' FOLLOWING 'DELAY' SHOULD
 6454                                ;BE CHANGED TO SUIT THE INDIVIDUAL NEED.
 6455
 6456  021664  017637  000000  001366 DELA.Y: MOV     @(SP),TIMER     ;GET 'AMOUNT' (N) FOR WHICH
 6457  021672  062716  000002                ADD     #2,(SP)         ;DELAY IS TO BE PROVIDED
 6458                                                                  ;ADJUST STACK POINTER TO SKIP OVER 'N'
 6459  021676  005337  001366        1$:     DEC     TIMER           ;COUNT DOWN TO 0
 6460  021702  001375                        BNE     1$
 6461
```

```
                                        RTI                     ;RETURN TO MAIN PROGRAM


                                        .SBTTL  WAT.INT:        WAIT FOR INTERRUPT ROUTINE

                                ;WAT.INT
                                ;THIS ROUTINE PROVIDES A VARIABLE TIME WAIT LOOP DURING WHICH AN INTERRUPT
                                ;FROM RK11 CAN OCCUR. THE CALL IS AN ENCODED 'TRAP' INSTRUCTION.

                                ;CALL:          WAT.INT ,N      N IS ANY OCTAL NO. FROM 1 TO 177777

                                ;WAIT LOOP TIME= APPROX. 7.5N US (CONVERT N TO DECIMAL) FOR 11/20
                                ;APPROX. 1.5N US FOR 11/45
                                ;UPON ENTERING THE ROUTINE THE CPU PRIORITY IS DROPPED SO THAT
                                ;RK11 CAN INTERRUPT. NOTE THAT WHEN RK11 INTERRUPTS THIS ROUTINE
                                ;IS EXITED WITHOUT POPPING THE STACK, THIS POPPING IS DONE AFTER GETTING
                                ;TO RK11 INTERRUPT HANDLER.
                                ;IF FOR ANY REASON THE WAIT LOOP TIME HAS TO BE CHANGED IT CAN BE DONE
                                ;BY SIMPLY CHANGING THE VARIABLE 'N' FOLLOWING THE 'WAT.INT'.

021706  017637  000000  001366  WATINT: MOV     @(SP),TIMER     ;GET 'AMOUNT' (N) FOR WHICH
021714  062716  000002                  ADD     #2,(SP)         ;WAITING IS TO BE DONE
                                                                ;ADJUST STACK POINTER FOR CORRECT RETURN
021720  013746  001400                  MOV     RKPRI,-(SP)     ;DROP CPU PRIORITY SO THAT RK11 CAN
021724  012746  021732                  MOV     #1$,-(SP)       ; INTERRUPT
021730  000002                          RTI
021732  005337  001366          1$:     DEC     TIMER           ;WAIT FOR RK11 TO INTERRUPT
021736  001375                          BNE     1$
                                                                ;IF INTERRUPT HAS NOT OCCURED BY NOW
                                                                ;RETURN AND REPORT ERROR
021740  000002                          RTI                     ;EXIT


                                ;WATIME

021742  005000                  WATIME: CLR     R0
021744  005001                          CLR     R1
021746  005200                  1$:     INC     R0
021750  001376                          BNE     1$
021752  105201                          INCB    R1
021754  001374                          BNE     1$
021756  000207                          RTS     PC


                                        .SBTTL  CHKCRDY:        CHECK CONTROL READY

                                ;;CH.CRDY
                                ;THIS ROUTINE WAITS FOR THE CONTROL READY TO SET. IF THE CONTROL READY BIT
                                ;DOES NOT SET WITHIN A CERTAIN TIME, THEN THE CONTENTS OF RKCS, RKER, RKDS
                                ;AND RKDA ARE SAVED AND AN EXIT MADE TO THE ERROR MESSAGE FOLLOWING THE
                                ;'JSR' CALL FOR THIS ROUTINE.
                                ;IF CONTROL READY SETS THEN THE RETURN ADDRESS IS ADJUSTED TO SKIP THE
                                ;ERROR MESSAGE ON RETURN.
```

```
                                ;CALL:  CHKCRDY
                                ;       ERROR           ;RETURN HERE IF ERROR
                                ;       ---             ;RETURN HERE IF NO ERROR

021760  005037  001366          CH.CRDY: CLR TIMER
021764  105777  157342          1$:     TSTB    @RKCS           ;CNTRL RDY SET?
021770  100406                          BMI     2$              ;YES
021772  005237  001366                  INC     TIMER
021776  001372                          BNE     1$              ;NO, WAIT
022000  004737  020774                  JSR     PC,GT4RG        ;SAVE RKCS, ER, DS, DA
022004  000002                          RTI

022006  062716  000002          2$:     ADD     #2,(SP)         ;ADJUST RETURN ADDRESS TO
022012  000002                          RTI                     ;SKIP ERROR MESSAGE ON RETURN


                                        .SBTTL  CON.RESET:      CONTROL REST ROUTINE

                                ;CON.RESET
                                ;THIS 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=YYYYYY
                                ;IS GIVEN. NOTE THAT XXXXXX IS THE PC WHERE 'CNT.RESET' OR 'CNT.RDY'
                                ;IS CALLED.

                                ;CALL:  CNT.RESET



                                        .SBTTL  CNT.RDY:        WAIT FOR CONTROL READY ROUTINE

                                ;CN.RDY
                                ;THIS ROUTINE WAITS FOR THE CONTROL READY BIT TO SET AND WHEN IT
                                ;SETS EXITS OUT. IF WITHIN A CERTAIN TIME CNTRL RDY DOES
                                ;NOT SET AN ERROR IS REPORTED. WAITING TIME IS 883 MS FOR 11/20
                                ;175 MS FOR 11/45 WITH BIPOLAR MEMORY.
                                ;CALL:  CNT.RDY
000001  012777  000001  157310  CN.RST: MOV     #1,@RKCS        ;ISSUE A CONTROL RESET
177500  001170                  MOV     #-300,$REG3     ;SET UP COUNT
000402                          BR      CN.RDY+4                ;SKIP OVER CN.RDY
005037  001170          CN.RDY: CLR     $REG3
105777  157270          1$:     TSTB    @RKCS           ;DID CNTRL-RDY SET?
100435                          BMI     3$              ;YES, EXIT
005237  001170                  INC     $REG3           ;WAITED LONG?
001372                          BNE     1$              ;IF NOT, GO BAK & WAIT
032777  020000  157060  2$:     BIT     #SW13,@SWR      ;INHIBIT TYPEOUT?
001026                          BNE     3$              ;IF YES, SKIP TYPEOUT
104401                          TYPE
001245                          MSG3
104401  022074                  TYPE    ,65$            ;;TYPE ASCIZ STRING
000403                          BR      64$             ;;GET OVER THE ASCIZ
                        ;;65$:  .ASCIZ  <15><12>/PC=/
```

```
                                64$:
022102                                  MOV     (SP),-(SP)
022102  011646                            SUB     #2,(SP)
022104  162716  000002                    TYPOC                   ;GO TYPE PC IN THE MAIN PROGRAM,
022110  104402                            ; WHERE ERROR OCCURRED
                                        TYPE    ,67$            ;;TYPE ASCIZ STRING
022112  104401  022120                    BR      66$             ;;GET OVER THE ASCIZ
022116  000404                    ;;67$:  .ASCIZ  / RKCS=/
                                66$:
022130                                  MOV     @RKCS,-(SP)     ;GET RKCS
022130  017746  157176                    TYPOC                   ;GO TYPE IT
022134  104402
                                3$:     RTI                     ;RETURN FROM THIS
022136  000002                            ;ROUTINE TO THE MAIN
                                        ;PROGRAM


                                ;THIS PART OF THE PROGRAM CONTAINS THE COMMON ROUTINES CALLED
                                ;FROM THE SYSMAC.SML PACKAGE
                                ;

                                .SBTTL  SCOPE HANDLER ROUTINE

                                ;;**********************************************************************
                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;*SW14=1         LOOP ON TEST
                                ;*SW11=1         INHIBIT ITERATIONS
                                ;*SW09=1         LOOP ON ERROR
                                ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                                ;*CALL
                                ;*      SCOPE           ;;SCOPE=IOT

                                $SCOPE:
                                        CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
022140  104407
022142  032777  040000  156770  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
022150  001111                          BNE     $OVER           ;;YES IF SW14=1
                                ;#####START OF CODE FOR THE XOR TESTER#####
022152  000416                $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
022154  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
022160  012737  022200  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
022166  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
022172  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
022176  000463                          BR      $SVLAD          ;;GO TO THE NEXT TEST
022200  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
022202  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
022206  000423                          BR      7$              ;;LOOP ON THE PRESENT TEST
022210                          6$:;#####END OF CODE FOR THE XOR TESTER#####
022210  032777  000400  156722          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
022216  001404                          BEQ     2$              ;;BR IF NO
022220  127737  156714  001102          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
022226  001462                          BEQ     $OVER           ;;BR IF YES
022230  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
```

```
 6630  022234  001421                          BEQ     3$                ;;BR IF NO
 6631  022236  123737  001115  001103          CMPB    $ERMAX,$ERFLG     ;;MAX. ERRORS FOR THIS TEST OCCURRED?
 6632  022244  101015                          BHI     3$                ;;BR IF NO
 6633  022246  032777  001000  156664          BIT     #BIT09,@SWR       ;;LOOP ON ERROR?
 6634  022254  001404                          BEQ     4$                ;;BR IF NO
 6635  022256  013737  001110  001106  7$:     MOV     $LPERR,$LPADR     ;;SET LOOP ADDRESS TO LAST SCOPE
 6636  022264  000443                          BR      $OVER
 6637  022266  105037  001103          4$:     CLRB    $ERFLG            ;;ZERO THE ERROR FLAG
 6638  022272  005037  001206                  CLR     $TIMES            ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
 6639  022276  000415                          BR      1$                ;;ESCAPE TO THE NEXT TEST
 6640  022300  032777  004000  156632  3$:     BIT     #BIT11,@SWR       ;;INHIBIT ITERATIONS?
 6641  022306  001011                          BNE     1$                ;;BR IF YES
 6642  022310  005737  001100                  TST     $PASS             ;;IF FIRST PASS OF PROGRAM
 6643  022314  001406                          BEQ     1$                ;;      INHIBIT ITERATIONS
 6644  022316  005237  001104                  INC     $ICNT             ;;INCREMENT ITERATION COUNT
 6645  022322  023737  001206  001104          CMP     $TIMES,$ICNT      ;;CHECK THE NUMBER OF ITERATIONS MADE
 6646  022330  002021                          BGE     $OVER             ;;BR IF MORE ITERATION REQUIRED
 6647  022332  012737  000001  001104  1$:     MOV     #1,$ICNT          ;;REINITIALIZE THE ITERATION COUNTER
 6648  022340  013737  022410  001206          MOV     $MXCNT,$TIMES     ;;SET NUMBER OF ITERATIONS TO DO
 6649  022346  105237  001102          $SVLAD: INCB    $TSTNM            ;;COUNT TEST NUMBERS
 6650  022352  011637  001106                  MOV     (SP),$LPADR       ;;SAVE SCOPE LOOP ADDRESS
 6651  022356  011637  001110                  MOV     (SP),$LPERR       ;;SAVE ERROR LOOP ADDRESS
 6652  022362  005037  001210                  CLR     $ESCAPE           ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
 6653  022366  112737  000001  001115          MOVB    #1,$ERMAX         ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
 6654  022374  013777  001102  156540  $OVER:  MOV     $TSTNM,@DISPLAY   ;;DISPLAY TEST NUMBER
 6655  022402  013716  001106                  MOV     $LPADR,(SP)       ;;FUDGE RETURN ADDRESS
 6656  022406  000002                          RTI                       ;;FIXES PS
 6657  022410  000050                  $MXCNT: 50                        ;;MAX. NUMBER OF ITERATIONS
 6658
 6659
 6660                                  ;;**********************************************************************
 6661
 6662                                  .SBTTL  ERROR HANDLER ROUTINE
 6663
 6664                                  ;*SW15=1        HALT ON ERROR
 6665                                  ;*SW13=1        INHIBIT ERROR TYPEOUTS
 6666                                  ;*SW10=1        TESTING ON SIMULATOR
 6667                                  ;*SW09=1        LOOP ON ERROR
 6668                                  ;*SW12=1        CYCLE ON ERROR TO PREVIOUS 'SCOPE'
 6669                                  ;*SW06=1        DROP DRIVE AFTER MAXIMUM (ALLOWABLE) ERRORS ON THE DRIVE
 6670                                  ;*GO TO $ERRTYP ON ERROR
 6671
 6672  022412  104407                  $ERROR: CKSWR                             ;CHECK FOR SOFTWARE SWITCH REGISTER REQUEST
 6673  022414  105237  001103          7$:     INCB    $ERFLG                    ;SET THE ERROR FLAG
 6674  022420  001775                          BEQ     7$                        ;DON'T LET THE FLAG GO TO ZERO
 6675  022422  013777  001102  156512          MOV     $TSTNM,@DISPLAY ;DISPLAY TEST NUMBER AND ERROR FLAG
 6676  022430  005237  001112          1$:     INC     $ERTTL                    ;COUNT THE NUMBER OF ERRORS
 6677
 6678  022434  032777  000100  156476          BIT     #BIT6,@SWR                ;DESELECT DRIVE SW SET?
 6679  022442  001404                          BEQ     6$                        ;NO
 6680  022444  023727  001112  000005          CMP     $ERTTL,#5                 ;MORE THAN 5 ERRORS ON THIS DRIVE?
 6681  022452  101053                          BHI     8$                        ;YES, DESELCT THE DRIVE
 6682
 6683  022454  011637  001116          6$:     MOV     (SP),$ERRPC               ;GET ADDRESS OF ERROR INSTRUCTION
 6684  022460  162737  000002  001116          SUB     #2,$ERRPC
 6685  022466  117737  156424  001114          MOVB    @$ERRPC,$ITEMB            ;STRIP AND SAVE THE ERROR ITEM CODE
```

```
 6686  022474  032777  020000  156436          BIT     #SW13,@SWR              ;SKIP TYPEOUT IF SET
 6687  022502  001004                          BNE     2$                      ;SKIP TYPEOUTS
 6688  022504  004737  022734                  JSR     PC,@#$ERRTYP            ;GO TO USER ERROR ROUTINE
 6689  022510  104401  001213                  TYPE    ,$CRLF
 6690  022514  023737  000042  000046  2$:     CMP     @#42,@#46               ;ARE WE IN ACT11 AUTO MODE?
 6691  022522  001403                          BEQ     .+10                    ;YES, HALT ON ERROR
 6692  022524  005777  156410                  TST     @SWR                    ;HALT ON ERROR?
 6693  022530  100002                          BPL     3$                      ;SKIP IF CONTINUE
 6694  022532  000000                          HALT                            ;HALT ON ERROR!
 6695  022534  104407                          CKSWR                           ;CHECK FOR SOFTWARE SWITCH REGIATER REQUEST
 6696  022536  032777  010000  156374  3$:     BIT     #SW12,@SWR              ;SW 12 SET?
 6697  022544  001402                          BEQ     .+6                     ;NO, BRANCH
 6698  022546  013716  001106                  MOV     $LPADR,(SP)             ;ADJUST RETURN ADRES FOR SW12
 6699  022552  032777  001000  156360          BIT     #SW09,@SWR              ;LOOP ON ERROR SWITCH SET?
 6700  022560  001402                          BEQ     4$                      ;BR IF NO
 6701  022562  013716  001110                  MOV     $LPERR,(SP)             ;FUDGE RETURN FOR LOOPING
 6702  022566  005737  001210          4$:     TST     $ESCAPE                 ;CHECK FOR AN ESCAPE ADDRESS
 6703  022572  001402                          BEQ     5$                      ;BR IF NONE
 6704  022574  013716  001210                  MOV     $ESCAPE,(SP)            ;FUDGE RETURN ADDRESS FOR ESCAPE
 6705  022600  000002                  5$:     RTI                             ;RETURN
 6706
 6707  022602  005737  001434          8$:     TST     T56FLG                  ;IF EROR WAS IN LAST TEST (POLL)
 6708                                                                          ;DROP ALL THE DRIVES
 6709  022606  001407                          BEQ     10$
 6710  022610  104401  001303                  TYPE    ,MSG5
 6711  022614  005037  001412                  CLR     DRIVS
 6712  022620  022626                          CMP     (SP)+,(SP)+
 6713  022622  000137  020652                  JMP     $EOP
 6714  022626  013746  001354          10$:    MOV     DRVPTR,-(SP)            ;DROP THE DRIVE FROM THE
 6715  022632  162716  000002                  SUB     #2,(SP)                 ;SELECTION LIST
 6716  022636  013746  001350                  MOV     DRIVAD,-(SP)            ;DRIVE ADDR TO STACK
 6717  022642  004737  021200                  JSR     PC,SHFTRT               ;RIGHT JUSTIFY
 6718  022646  042716  000001                  BIC     #1,(R6)                 ;MAKE EVEN
 6719  022652  062716  001414                  ADD     #DRIV0,(SP)             ;POINTS TO TABLE FOR EVEN DRIVE
 6720  022656  042776  100000  000000          BIC     #BIT15,@(R6)            ;TEST REMAINING DRIVE AS RK05E
 6721  022664  062716  000002                  ADD     #2,(R6)                 ;POINT TO ODD
 6722  022670  042736  100000                  BIC     #BIT15,@(SP)+           ;TEST AS RK-05E
 6723  022674  012736  010000                  MOV     #BIT12,@(SP)+           ;INDICATE THIS DRIVE DROPPED
 6724  022700  104401  001272                  TYPE    ,MSG4
 6725  022704  013746  001350                  MOV     DRIVAD,-(R6)            ;PUSH DRIVE # ON STACK
 6726  022710  004737  021200                  JSR     PC,SHFTRT               ;SHIFT IT BEFORE TYPING
 6727  022714  104402                          TYPOC                           ;TYPE OUT DRIVE #
 6728  022716  104401  001315                  TYPE    ,MSG6
 6729  022722  005337  001412                  DEC     DRIVS                   ;DECREMENT # OF DRIVES PRESNT
 6730  022726  022626                  9$:     CMP     (SP)+,(SP)+             ;RESTORE STACK
 6731  022730  000137  020026                  JMP     BTEOP                   ;GO BACK TO THE END OF PROGRM
 6732                                                                          ;LINKAGE.
 6733
 6734                                  .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
 6735
 6736                                  ;;**********************************************************************
 6737                                  ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
 6738                                  ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
 6739                                  ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
 6740
 6741  022734                          $ERRTYP:
```

```
 6742  022734  104401  001213          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 6743  022740  010046                  MOV     R0,-(SP)        ;;SAVE R0
 6744  022742  005000                  CLR     R0              ;;PICKUP THE ITEM INDEX
 6745  022744  153700  001114          BISB    @#$ITEMB,R0
 6746  022750  001004                  BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
 6747                                                          ;;TYPE THE PC OF THE ERROR
 6748  022752  013746  001116          MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
 6749                                                          ;;ERROR ADDRESS
 6750  022756  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 6751  022760  000426                  BR      6$              ;;GET OUT
 6752  022762  005300          1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
 6753  022764  006300                  ASL     R0              ;;      WORK FOR THE ERROR TABLE
 6754  022766  006300                  ASL     R0
 6755  022770  006300                  ASL     R0
 6756  022772  062700  001442          ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
 6757  022776  012037  023006          MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
 6758  023002  001404                  BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
 6759  023004  104401                  TYPE                    ;;TYPE THE "ERROR MESSAGE"
 6760  023006  000000          2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
 6761  023010  104401  001213          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 6762  023014  012037  023024  3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
 6763  023020  001404                  BEQ     5$              ;;SKIP TYPEOUT IF 0
 6764  023022  104401                  TYPE                    ;;TYPE THE "DATA HEADER"
 6765  023024  000000          4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
 6766  023026  104401  001213          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 6767  023032  011000          5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
 6768  023034  001004                  BNE     7$              ;;GO TYPE THE DATA
 6769  023036  012600          6$:     MOV     (SP)+,R0        ;;RESTORE R0
 6770  023040  104401  001213          TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
 6771  023044  000207                  RTS     PC              ;;RETURN
 6772  023046                  7$:
 6773  023046  013046                  MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
 6774  023050  104402                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 6775  023052  005710                  TST     (R0)            ;;IS THERE ANOTHER NUMBER?
 6776  023054  001770                  BEQ     6$              ;;BR IF NO
 6777  023056  104401  023064          TYPE    ,8$             ;;TYPE TWO(2) SPACES
 6778  023062  000771                  BR      7$              ;;LOOP
 6779  023064  020040     000  8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
 6780          023070                  .EVEN
 6781
 6782                          .SBTTL  TYPE ROUTINE
 6783
 6784                          ;;**********************************************************************
 6785                          ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
 6786                          ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
 6787                          ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
 6788                          ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
 6789                          ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
 6790                          ;*
 6791                          ;*CALL:
 6792                          ;*1) USING A TRAP INSTRUCTION
 6793                          ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
 6794                          ;*OR
 6795                          ;*      TYPE
 6796                          ;*      MESADR
 6797                          ;*
```

```
 6798
 6799  023070  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
 6800  023074  100002                          BPL     1$              ;;BR IF YES
 6801  023076  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
 6802  023100  000407                          BR      3$              ;;LEAVE
 6803  023102  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
 6804  023104  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
 6805  023110  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
 6806  023112  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
 6807  023114  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
 6808  023116  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
 6809  023120  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
 6810  023124  000002                          RTI                     ;;RETURN
 6811  023126  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
 6812  023132  001430                          BEQ     8$
 6813  023134  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
 6814  023140  001006                          BNE     5$
 6815  023142  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
 6816  023144  104401                          TYPE                    ;;TYPE A CR AND LF
 6817  023146  001213                          $CRLF
 6818  023150  105037  023304                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
 6819  023154  000755                          BR      2$              ;;GET NEXT CHARACTER
 6820  023156  004737  023240          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
 6821  023162  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
 6822  023166  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
 6823  023170  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
 6824                                                                  ;;AND THE NULL CHAR.
 6825  023174  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
 6826  023200  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
 6827  023202  004737  023240                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
 6828  023206  105337  023304                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
 6829  023212  000770                          BR      7$              ;;LOOP
 6830
 6831                                  ;HORIZONTAL TAB PROCESSOR
 6832
 6833  023214  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
 6834  023220  004737  023240          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
 6835  023224  132737  000007  023304          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 6836  023232  001372                          BNE     9$              ;;TAB STOP
 6837  023234  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
 6838  023236  000724                          BR      2$              ;;GET NEXT CHARACTER
 6839  023240  105777  155704          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
 6840  023244  100375                          BPL     $TYPEC
 6841  023246  116677  000002  155676          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 6842  023254  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
 6843  023262  001003                          BNE     1$              ;;BRANCH IF NO
 6844  023264  105037  023304                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
 6845  023270  000406                          BR      $TYPEX          ;;EXIT
 6846  023272  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 6847  023300  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
 6848  023302  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
 6849  023304  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
 6850  023306  000207          $TYPEX: RTS     PC
 6851
 6852
 6853                                  .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
```

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

023310                  $TYPDS:
023310  010046                 MOV     R0,-(SP)        ;;PUSH R0 ON STACK
023312  010146                 MOV     R1,-(SP)        ;;PUSH R1 ON STACK
023314  010246                 MOV     R2,-(SP)        ;;PUSH R2 ON STACK
023316  010346                 MOV     R3,-(SP)        ;;PUSH R3 ON STACK
023320  010546                 MOV     R5,-(SP)        ;;PUSH R5 ON STACK
023322  012746  020200         MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
023326  016605  000020         MOV     20(SP),R5       ;;GET THE INPUT NUMBER
023332  100004                 BPL     1$              ;;BR IF INPUT IS POS.
023334  005405                 NEG     R5              ;;MAKE THE BINARY NUMBER POS.
023336  112766  000055  000001 MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
023344  005000         1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
023346  012703  023524         MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
023352  112723  000040         MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
023356  005002         2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
023360  016001  023514         MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
023364  160105         3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
023366  002402                 BLT     4$              ;;BR IF DONE
023370  005202                 INC     R2              ;;INCREASE THE BCD DIGIT BY 1
023372  000774                 BR      3$
023374  060105         4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
023376  005702                 TST     R2              ;;CHECK IF BCD DIGIT=0
023400  001002                 BNE     5$              ;;FALL THROUGH IF 0
023402  105716                 TSTB    (SP)            ;;STILL DOING LEADING 0'S?
023404  100407                 BMI     7$              ;;BR IF YES
023406  106316         5$:     ASLB    (SP)            ;;MSD?
023410  103003                 BCC     6$              ;;BR IF NO
023412  116663  000001  177777 MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
023420  052702  000060         BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
023424  052702  000040         BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
023430  110223                 MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
023432  005720                 TST     (R0)+           ;;JUST INCREMENTING
023434  020027  000010         CMP     R0,#10          ;;CHECK THE TABLE INDEX
023440  002746                 BLT     2$              ;;GO DO THE NEXT DIGIT
023442  003002                 BGT     8$              ;;GO TO EXIT
023444  010502                 MOV     R5,R2           ;;GET THE LSD
023446  000764                 BR      6$              ;;GO CHANGE TO ASCII
023450  105726         8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
023452  100003                 BPL     9$              ;;BR IF NO
023454  116663  177777  177776 MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
023462  105013         9$:     CLRB    (R3)            ;;SET THE TERMINATOR
023464  012605                 MOV     (SP)+,R5        ;;POP STACK INTO R5
023466  012603                 MOV     (SP)+,R3        ;;POP STACK INTO R3
023470  012602                 MOV     (SP)+,R2        ;;POP STACK INTO R2
023472  012601                 MOV     (SP)+,R1        ;;POP STACK INTO R1
```

```
                        MOV     (SP)+,R0        ;;POP STACK INTO R0
                        TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
                        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
                        MOV     (SP)+,(SP)
                        RTI                     ;;RETURN TO USER
$DTBL:                  10000.
                        1000.
                        100.
                        10.
$DBLK:                  .BLKW   4

                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

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

$TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
        MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
        MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
        ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
        BR      $TYPON
$TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
        MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
$TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
        MOV     R3,-(SP)        ;;SAVE R3
        MOV     R4,-(SP)        ;;SAVE R4
        MOV     R5,-(SP)        ;;SAVE R5
        MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
        NEG     R4
        ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
        MOVB    R4,$OMODE       ;;SAVE IT FOR USE
        MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
        MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
        CLR     R3              ;;CLEAR THE OUTPUT WORD
1$:     ROL     R5              ;;ROTATE MSB INTO "C"
        BR      3$              ;;GO DO MSB
```

```
 6966  023644  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
 6967  023646  006105                          ROL     R5
 6968  023650  006105                          ROL     R5
 6969  023652  010503                          MOV     R5,R3
 6970  023654  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
 6971  023656  105337  023760                  DECB    $OMODE          ;;TYPE THIS DIGIT?
 6972  023662  100016                          BPL     7$              ;;BR IF NO
 6973  023664  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
 6974  023670  001002                          BNE     4$              ;;TEST FOR 0
 6975  023672  005704                          TST     R4              ;;SUPPRESS THIS 0?
 6976  023674  001403                          BEQ     5$              ;;BR IF YES
 6977  023676  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 6978  023700  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 6979  023704  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 6980  023710  110337  023754                  MOVB    R3,8$           ;;SAVE FOR TYPING
 6981  023714  104401  023754                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
 6982  023720  105337  023756          7$:     DECB    $OCNT           ;;COUNT BY 1
 6983  023724  003347                          BGT     2$              ;;BR IF MORE TO DO
 6984  023726  002402                          BLT     6$              ;;BR IF DONE
 6985  023730  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 6986  023732  000744                          BR      2$              ;;GO DO THE LAST DIGIT
 6987  023734  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
 6988  023736  012604                          MOV     (SP)+,R4        ;;RESTORE R4
 6989  023740  012603                          MOV     (SP)+,R3        ;;RESTORE R3
 6990  023742  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 6991  023750  012616                          MOV     (SP)+,(SP)
 6992  023752  000002                          RTI                     ;;RETURN
 6993  023754     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 6994  023755     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 6995  023756     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 6996  023757     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 6997  023760  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
 6998
 6999                                  .SBTTL  TTY INPUT ROUTINE
 7000
 7001                                  ;;**************************************************************************
 7002                                  .ENABL  LSB
 7003
 7004                                  ;;**************************************************************************
 7005                                  ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
 7006                                  ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
 7007                                  ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
 7008                                  ;*WHEN OPERATING IN TTY FLAG MODE.
 7009  023762  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
 7010  023770  001074                          BNE     15$             ;;BRANCH IF NO
 7011  023772  105777  155146                  TSTB    @$TKS           ;;CHAR THERE?
 7012  023776  100071                          BPL     15$             ;;IF NO, DON'T WAIT AROUND
 7013  024000  117746  155142                  MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
 7014  024004  042716  177600                  BIC     # C177,(SP)     ;;STRIP-OFF THE ASCII
 7015  024010  022726  000007                  CMP     #7,(SP)+        ;;IS IT A CONTROL G?
 7016  024014  001062                          BNE     15$             ;;NO, RETURN TO USER
 7017  024016  123727  001134  000001          CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
 7018  024024  001456                          BEQ     15$             ;;BRANCH IF YES
 7019
 7020  024026  104401  024647                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G ( G)
 7021  024032  104401  024654          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
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 7022  024036  013746  000176            MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
 7023  024042  104402                    TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
 7024  024044  104401  024665            TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
 7025  024050  005046                19$:  CLR     -(SP)           ;;CLEAR COUNTER
 7026  024052  005046                      CLR     -(SP)           ;;THE NEW SWR
 7027  024054  105777  155064        7$:   TSTB    @$TKS           ;;CHAR THERE?
 7028  024060  100375                      BPL     7$              ;;IF NOT TRY AGAIN
 7029
 7030  024062  117746  155060            MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
 7031  024066  042716  177600            BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 7032
 7033
 7034
 7035  024072  021627  000025        9$:   CMP     (SP),#25        ;;IS IT A CONTROL-U?
 7036  024076  001005                      BNE     10$             ;;BRANCH IF NOT
 7037  024100  104401  024642            TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U ( U)
 7038  024104  062706  000006        20$:  ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
 7039  024110  000757                      BR      19$             ;;LET'S TRY IT AGAIN
 7040
 7041
 7042  024112  021627  000015        10$:  CMP     (SP),#15        ;;IS IT A <CR>?
 7043  024116  001022                      BNE     16$             ;;BRANCH IF NO
 7044  024120  005766  000004            TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
 7045  024124  001403                      BEQ     11$             ;;BRANCH IF YES
 7046  024126  016677  000002  155004      MOV     2(SP),@SWR      ;;SAVE NEW SWR
 7047  024134  062706  000006        11$:  ADD     #6,SP           ;;CLEAR UP STACK
 7048  024140  104401  001213        14$: *TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 7049  024144  123727  001135  000001      CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 7050  024152  001003                      BNE     15$             ;;BRANCH IF NOT
 7051  024154  012777  000100  154762      MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 7052  024162  000002                15$:  RTI                     ;;RETURN
 7053  024164  004737  023240        16$:  JSR     PC,$TYPEC       ;;ECHO CHAR
 7054  024170  021627  000060            CMP     (SP),#60        ;;CHAR < 0?
 7055  024174  002420                      BLT     18$             ;;BRANCH IF YES
 7056  024176  021627  000067            CMP     (SP),#67        ;;CHAR > 7?
 7057  024202  003015                      BGT     18$             ;;BRANCH IF YES
 7058  024204  042726  000060            BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 7059  024210  005766  000002            TST     2(SP)           ;;IS THIS THE FIRST CHAR
 7060  024214  001403                      BEQ     17$             ;;BRANCH IF YES
 7061  024216  006316                      ASL     (SP)            ;;NO, SHIFT PRESENT
 7062  024220  006316                      ASL     (SP)            ;;    CHAR OVER TO MAKE
 7063  024222  006316                      ASL     (SP)            ;;    ROOM FOR NEW ONE.
 7064  024224  005266  000002        17$:  INC     2(SP)           ;;KEEP COUNT OF CHAR
 7065  024230  056616  177776            BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 7066  024234  000707                      BR      7$              ;;GET THE NEXT ONE
 7067  024236  104401  001212        18$:  TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 7068  024242  000720                      BR      20$             ;;SIMULATE CONTROL-U
 7069                                .DSABL  LSB
 7070
 7071
 7072                                ;;**************************************************************************
 7073                                ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
 7074                                ;*CALL:
 7075                                ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
 7076                                ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
 7077                                ;*                              ;;WITH PARITY BIT STRIPPED OFF
```

```
                                    ;
7078
7079
7080 024244 011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
7081 024246 016666 000004 000002            MOV     4(SP),2(SP)     ;;SAVE THE PS
7082 024254 105777 154664           1$:     TSTB    @$TKS           ;;WAIT FOR
7083 024260 100375                          BPL     1$              ;;A CHARACTER
7084 024262 117766 154660 000004            MOVB    @$TKB,4(SP)     ;;READ THE TTY
7085 024270 042766 177600 000004            BIC     #<177>,4(SP)    ;;GET RID OF JUNK IF ANY
7086 024276 026627 000004 000023            CMP     4(SP),#23       ;;IS IT A CONTROL-S?
7087 024304 001013                          BNE     3$              ;;BRANCH IF NO
7088 024306 105777 154632           2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
7089 024312 100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
7090 024314 117746 154626                   MOVB    @$TKB,-(SP)     ;;GET CHARACTER
7091 024320 042716 177600                   BIC     #C177,(SP)      ;;MAKE IT 7-BIT ASCII
7092 024324 026627 000021                   CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
7093 024330 001366                          BNE     2$              ;;IF NOT DISCARD IT
7094 024332 000750                          BR      1$              ;;YES, RESUME
7095 024334 026627 000004 000140    3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
7096 024342 002407                          BLT     4$              ;;BRANCH IF YES
7097 024344 026627 000004 000175            CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
7098 024352 003003                          BGT     4$              ;;BRANCH IF YES
7099 024354 042766 000040 000004            BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
7100 024362 000002                  4$:     RTI                     ;;GO BACK TO USER
7101                                ;*********************************************************************
7102                                ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
7103                                ;*
7104                                ;*       RDLIN                   ;;INPUT A STRING FROM THE TTY
7105                                ;*       RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
7106                                ;*
7107                                ;*TERMINATOR WILL BE A BYTE OF ALL 0'S
7108 024364 010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
7109 024366 005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
7110 024370 012703 024620           1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
7111 024374 022703 024642           2$:     CMP     #$TTYIN+22,R3   ;;BUFFER FULL?
7112 024400 101456                          BLOS    4$              ;;BR IF YES
7113 024402 104410                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
7114 024404 112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
7115 024406 122713 000177           10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
7116 024412 001022                          BNE     5$              ;;BR IF NO
7117 024414 005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
7118 024416 001007                          BNE     6$              ;;BR IF NO
7119 024420 112737 000134 024616            MOVB    #',@$         ;;TYPE A BACK SLASH
7120 024426 104401 024616                   TYPE    ,@$
7121 024432 012716 177777                   MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
7122 024436 005303                  6$:     DEC     R3              ;;BACKUP BY ONE
7123 024440 020327 024620                   CMP     R3,#$TTYIN      ;;STACK EMPTY?
7124 024444 103434                          BLO     4$              ;;BR IF YES
7125 024446 111337 024616                   MOVB    (R3),@$       ;;SETUP TO TYPEOUT THE DELETED CHAR.
7126 024452 104401 024616                   TYPE    ,@$
7127 024456 000746                          BR      2$              ;;GO READ ANOTHER CHAR.
7128 024460 005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
7129 024462 001406                          BEQ     7$              ;;BR IF NO
7130 024464 112737 000134 024616            MOVB    #',@$         ;;TYPE A BACK SLASH
7131 024472 104401 024616                   TYPE    ,@$
7132 024476 005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
7133 024500 122713 000025           7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
```

```
 7134  024504  001003                        BNE     8$              ;;BR IF NO
 7135  024506  104401  024642                TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
 7136  024512  000726                        BR      1$              ;;GO START OVER
 7137  024514  122713  000022        8$:     CMPB    #22,(R3)        ;;IS CHARACTER A " R"?
 7138  024520  001011                        BNE     3$              ;;BRANCH IF NO
 7139  024522  105013                        CLRB    (R3)            ;;CLEAR THE CHARACTER
 7140  024524  104401  001213                TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
 7141  024530  104401  024620                TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
 7142  024534  000717                        BR      2$              ;;GO PICKUP ANOTHER CHACTER
 7143  024536  104401  001212        4$:     TYPE    ,$QUES          ;;TYPE A '?'
 7144  024542  000712                        BR      1$              ;;CLEAR THE BUFFER AND LOOP
 7145  024544  111337  024616        3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
 7146  024550  104401  024616                TYPE    ,9$
 7147  024554  122723  000015                CMPB    #15,(R3)+       ;;CHECK FOR RETURN
 7148  024560  001305                        BNE     2$              ;;LOOP IF NOT RETURN
 7149  024562  105063  177777                CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
 7150  024566  104401  001214                TYPE    ,$LF            ;;TYPE A LINE FEED
 7151  024572  005726                        TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
 7152  024574  012603                        MOV     (SP)+,R3        ;;RESTORE R3
 7153  024576  011646                        MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
 7154  024600  016666  000004  000002        MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
 7155  024606  012766  024620  000004        MOV     #$TTYIN,4(SP)
 7156  024614  000002                        RTI                     ;;RETURN
 7157  024616     000              9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
 7158  024617     000                      .BYTE   0               ;;TERMINATOR
 7159  024620  000022              $TTYIN: .BLKB   22              ;;RESERVE 22 BYTES FOR TTY INPUT
 7160  024642  052536  005015     000  $CNTLU: .ASCIZ  / U/<15><12>    ;;CONTROL "U"
 7161  024647     136  006507  000012  $CNTLG: .ASCIZ  / G/<15><12>    ;;CONTROL "G"
 7162  024654  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
 7163  024662  020075     000
 7164  024665     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
 7165  024672  036440  000040
 7166                                                  ;CONTROL U, RUBOUT CAPABILITY
 7167                          .SBTTL  TRAP DECODER
 7168
 7169                          ;;**************************************************************
 7170                          ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
 7171                          ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
 7172                          ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
 7173                          ;*GO TO THAT ROUTINE.
 7174
 7175  024676  010046              $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
 7176  024700  016600  000002              MOV     2(SP),R0        ;;GET TRAP ADDRESS
 7177  024704  005740                       TST     -(R0)           ;;BACKUP BY 2
 7178  024706  111000                       MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
 7179  024710  006300                       ASL     R0              ;;POSITION FOR INDEXING
 7180  024712  016000  024732               MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
 7181  024716  000200                       RTS     R0              ;;GO TO ROUTINE
 7182
 7183
 7184                          ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
 7185
 7186  024720  011646              $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
 7187  024722  016666  000004  000002       MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
 7188  024730  000002                       RTI                     ;;RESTORE THE PSW
 7189
```

```
                        .SBTTL  TRAP TABLE

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

                        ;       ROUTINE
                        ;       -------
024732  024720  $TRPAD: .WORD   $TRAP2
024734  023070          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
024736  023560          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
024740  023534          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
024742  023574          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
024744  023310          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

024746  024032          $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

024750  023762          $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
024752  024244          $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
024754  024364          $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE

024756  021760          CH.CRDY ;;CALL=CHKCRDY  TRAP+12(104412) CHECK CONTROL READY

024760  022014          CN.RST  ;;CALL=CNT.RESET        TRAP+13(104413) CONTROL RESET ROUTINE

024762  022032          CN.RDY  ;;CALL=CNT.RDY  TRAP+14(104414) WAIT FOR CNTRL RDY TO SET

024764  021056          BDA0    ;;CALL=BRKDA0   TRAP+15(104415) BREAK RKDA INTO DR #,CYL,SUR,SEC BITS

024766  021066          BDA4    ;;CALL=BRKDA4   TRAP+16(104416) BREAK RKDA INTO DR #,CYL,SUR,SEC BITS

024770  021664          DELA.Y  ;;CALL=DELAY    TRAP+17(104417) TIME DELAY ROUTINE

024772  021706          WATINT  ;;CALL=WAT.INT  TRAP+20(104420) WAIT FOR RK11 INTERRUPT ROUTINE

024774  021572          TSTSIN  ;;CALL=TST.SIN  TRAP+21(104421) TEST SIN ROUTINE


                        .SBTTL  POWER DOWN AND UP ROUTINES

                        ;;**************************************************************
                        ;POWER DOWN ROUTINE
024776  012737  025142  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
025004  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
025012  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
025014  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
025016  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
025020  010346                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
025022  010446                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
025024  010546                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
025026  017746  154106          MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
025032  010637  025146          MOV     SP,$SAVR6       ;;SAVE SP
025036  012737  025050  000024  MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
025044  000000                  HALT
025046  000776                  BR      .-2             ;;HANG UP

                        ;;**************************************************************
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```
 7246                                   ;POWER UP ROUTINE
 7247  025050  012737  025142  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
 7248  025056  013706  025146                  MOV     $SAVR6,SP        ;;GET SP
 7249  025062  005037  025146                  CLR     $SAVR6           ;;WAIT LOOP FOR THE TTY
 7250  025066  005237  025146          1$:     INC     $SAVR6           ;;WAIT FOR THE INC
 7251  025072  001375                          BNE     1$               ;;OF  WORD
 7252  025074  012677  154040                  MOV     (SP)+,@SWR       ;;POP STACK INTO @SWR
 7253  025100  012605                          MOV     (SP)+,R5         ;;POP STACK INTO R5
 7254  025102  012604                          MOV     (SP)+,R4         ;;POP STACK INTO R4
 7255  025104  012603                          MOV     (SP)+,R3         ;;POP STACK INTO R3
 7256  025106  012602                          MOV     (SP)+,R2         ;;POP STACK INTO R2
 7257  025110  012601                          MOV     (SP)+,R1         ;;POP STACK INTO R1
 7258  025112  012600                          MOV     (SP)+,R0         ;;POP STACK INTO R0
 7259  025114  012737  024776  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
 7260  025122  012737  000340  000026          MOV     #340,@#PWRVEC+2  ;;PRIO:7
 7261  025130  104401                          TYPE                     ;REPORT THE POWER FAILURE
 7262  025132  025150                  $PWRMG: .WORD   $POWER           ;;POWER FAIL MESSAGE POINTER
 7263  025134  012716                          MOV     (PC)+,(SP)       ;;RESTART AT PFSTRT
 7264  025136  004702                  $PWRAD: .WORD   PFSTRT            ;;RESTART ADDRESS
 7265  025140  000002                          RTI
 7266  025142  000000                  $ILLUP: HALT                     ;;THE POWER UP SEQUENCE WAS STARTED
 7267  025144  000776                          BR      .-2              ;; BEFORE THE POWER DOWN WAS COMPLETE
 7268  025146  000000                  $SAVR6: 0                        ;;PUT THE SP HERE
 7269  025150  005015  047520  042527  $POWER: .ASCIZ   <15><12>"POWER"
 7270  025156  000122
 7271                                          .EVEN
 7272
 7273  025160  004737  021504          FCHECK: JSR     PC,DRESET                ;RESETB DRIVE
 7274  025164  104026                          ERROR   26
 7275  025166  104413                          CNT.RESET
 7276  025170  013737  001350  025302          MOV     DRIVAD,DRHOLD            ;SAVE DRIVE ADRR
 7277  025176  032737  020000  001350          BIT     #20000,DRIVAD            ;SEE IF ODD
 7278  025204  001404                          BEQ     1$
 7279  025206  042737  020000  001350          BIC     #20000,DRIVAD            ;MAKE EVEN
 7280  025214  000403                          BR      2$
 7281  025216  052737  020000  001350  1$:     BIS     #20000,DRIVAD            ;MAKE ODD
 7282  025224  013777  001350  154106  2$:     MOV     DRIVAD,@RKDA    ;DRIVE ADDR
 7283  025232  012777  000011  154072          MOV     #11,@RKCS                ;DRIVE SEEK
 7284  025240  104414                          CNT.RDY
 7285  025242  013777  025302  154070          MOV     DRHOLD,@RKDA             ;OTHER DRIVE
 7286  025250  104414                          CNT.RDY
 7287  025252  032777  000100  154046          BIT     #100,@RKDS               ;HEAEDS IN MOTIONN?
 7288  025260  001001                          BNE     3$                       ;NO SO RK-05J
 7289  025262  005725                          TST     (R5)+                    ;YES RK-05F
 7290  025264  013737  025302  001350  3$:     MOV     DRHOLD,DRIVAD            ;RESTORE ADDR
 7291  025272  004737  021504                  JSR     PC,DRESET                ;WAIT FOR RESET
 7292  025276  104026                          ERROR   26
 7293  025300  000205                          RTS     R5
 7294  025302  000000                  DRHOLD: 0
 7295  025304  005037  001350          SIZEF:  CLR     DRIVAD           ;START AT DR0
 7296  025310  012700  001414                  MOV     #DRIV0,R0                ;TABLE OF AVAIL DRIVES
 7297  025314  005710                  4$:     TST     (R0)                     ;THIS DRIVE HERE?
 7298  025316  001413                          BEQ     2$                       ;NO
 7299  025320  005760  000002                  TST     2(R0)                    ;COMPLEMENT HERE?
 7300  025324  001410                          BEQ     2$                       ;NO
 7301  025326  004537  025160                  JSR     R5,FCHECK                ;SEE IF F MODEL
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 7302  025332  000405                          BR      2$                      ;J MODEL
 7303  025334  052710  100000                  BIS     #100000,(R0)            ;SET SIGN FOR F
 7304  025340  052760  100000  000002          BIS     #100000,2(R0)           ;BOTH DRIVES
 7305  025346  005720                  2$:     TST     (R0)+
 7306  025350  005720                          TST     (R0)+                   ;NEXT PAIR OF DRIVES
 7307  025352  062737  040000  001350          ADD     #40000,DRIVAD           ;NEXT ACTUL ADDR
 7308  025360  022700  001433                  CMP     #DRIV7+1,R0             ;CHECKED ALL?
 7309  025364  003353                          BGT     4$                      ;NOT YET
 7310  025366  000207                          RTS     PC
 7311
 7312                                          ;ERROR MESSAGES
 7313
 7314                                          .SBTTL  ERROR MESSAGES
 7315
 7316  025370  045522  041527  042440  EM11:   .ASCIZ  /RKWC EROR/
 7317  025376  047522  000122
 7318
 7319
 7320  025402  044523  020116  051511  EM12:   .ASCIZ  /SIN IS SET/
 7321  025410  051440  052105     000
 7322
 7323  025415     122  041113  020101  EM13:   .ASCIZ  /RKBA EROR/
 7324  025422  051105  051117     000
 7325
 7326  025427     122  042113  020101  EM16:   .ASCIZ  /RKDA WRONG AFTER 'SSE'/
 7327  025434  051127  047117  020107
 7328  025442  043101  042524  020122
 7329  025450  051447  042523  000047
 7330
 7331  025456  045522  051504  042440  EM21:   .ASCIZ  /RKDS EROR/
 7332  025464  047522  000122
 7333
 7334  025470  050104  020114  042523  EM30:   .ASCIZ  /DPL SET/
 7335  025476  000124
 7336
 7337  025500  051104  020125  042523  EM31:   .ASCIZ  /DRU SET/
 7338  025506  000124
 7339
 7340  025510  045522  032460  041040  EM32:   .ASCIZ  /RK05 BIT NOT SET/
 7341  025516  052111  047040  052117
 7342  025524  051440  052105     000
 7343
 7344  025531     104  054522  041040  EM33:   .ASCIZ  /DRY BIT NOT SET/
 7345  025536  052111  047040  052117
 7346  025544  051440  052105     000
 7347
 7348  025551     123  045517  042040  EM34:   .ASCIZ  /SOK DIDN'T SET/
 7349  025556  042111  023516  020124
 7350  025564  042523  000124
 7351
 7352  025570  042523  026503  047103  EM35:   .ASCIZ  /SEC-CNTR DIDN'T COUNT TO 0/
 7353  025576  051124  042040  042111
 7354  025604  023516  020124  047503
 7355  025612  047125  020124  047524
 7356  025620  030040     000
 7357
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 7358  025623     123  041505  041455  EM36:   .ASCIZ  /SEC-CNTR DIDN'T INCRMNT/
 7359  025630  052116  020122  044504
 7360  025636  047104  052047  044440
 7361  025644  041516  046522  052116
 7362  025652     000
 7363
 7364  025653     123  041505  041455  EM37:   .ASCIZ  /SEC-COUNTR INCRMENTED WRONG/
 7365  025660  052517  052116  020122
 7366  025666  047111  051103  042515
 7367  025674  052116  042105  053440
 7368  025702  047522  043516     000
 7369
 7370  025707     104  042111  023516  EM40:   .ASCIZ  /DIDN'T GET SC=SA FOR THIS SECTR/
 7371  025714  020124  042507  020124
 7372  025722  041523  051475  020101
 7373  025730  047506  020122  044124
 7374  025736  051511  051440  041505
 7375  025744  051124     000
 7376
 7377  025747     105  047522  026522  EM41:   .ASCIZ  "EROR-R/W/S RDY SHOULD BE SET"
 7378  025754  027522  027527  020123
 7379  025762  042122  020131  044123
 7380  025770  052517  042114  041040
 7381  025776  020105  042523  000124
 7382
 7383  026004  047125  054105  042520  EM43:   .ASCIZ  /UNEXPECTED RK11 INTERRUPT/
 7384  026012  052103  042105  051040
 7385  026020  030513  020061  047111
 7386  026026  042524  051122  050125
 7387  026034  000124
 7388
 7389  026036  047103  051124  020114  EM44:   .ASCIZ  /CNTRL RDY DIDN'T SET AFTER SEEK OR DR RESET/
 7390  026044  042122  020131  044504
 7391  026052  047104  052047  051440
 7392  026060  052105  040440  052106
 7393  026066  051105  051440  042505
 7394  026074  020113  051117  042040
 7395  026102  020122  042522  042523
 7396  026110  000124
 7397
 7398  026112  051105  020122  051117  EM45:   .ASCIZ  /ERR OR HE BIT SET ON SEEK OR DR RESET/
 7399  026120  044040  020105  044502
 7400  026126  020124  042523  020124
 7401  026134  047117  051440  042505
 7402  026142  020113  051117  042040
 7403  026150  020122  042522  042523
 7404  026156  000124
 7405
 7406  026160  045522  051105  041040  EM46:   .ASCIZ  /RKER BIT, ON SEEK OR DR RESET/
 7407  026166  052111  020054  047117
 7408  026174  051440  042505  020113
 7409  026202  051117  042040  020122
 7410  026210  042522  042523  000124
 7411
 7412  026216  045522  051503  041440  EM47:   .ASCIZ  /RKCS CHNGD AFTR FUNCTION WAS DONE/
 7413  026224  047110  042107  040440
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 7414  026232  052106  020122  052506
 7415  026240  041516  044524  047117
 7416  026246  053440  051501  042040
 7417  026254  047117  000105
 7418
 7419  026260  027522  027527  020123  EM50:   .ASCIZ  "R/W/S RDY DIDN'T CLEAR"
 7420  026266  042122  020131  044504
 7421  026274  047104  052047  041440
 7422  026302  042514  051101     000
 7423
 7424  026307     122  053457  051457  EM51:   .ASCIZ  "R/W/S RDY DIDN'T SET AFTR SEEK OR DR RESET"
 7425  026314  051040  054504  042040
 7426  026322  042111  023516  020124
 7427  026330  042523  020124  043101
 7428  026336  051124  051440  042505
 7429  026344  020113  051117  042040
 7430  026352  020122  042522  042523
 7431  026360  000124
 7432
 7433  026362  045522  040504  041440  EM52:   .ASCIZ  /RKDA CHNGD AFTR SEEK/
 7434  026370  047110  042107  040440
 7435  026376  052106  020122  042523
 7436  026404  045505     000
 7437
 7438  026407     103  052116  046122  EM53:   .ASCIZ  /CNTRL RDY DIDN'T CLR AS GO WAS SET/
 7439  026414  051040  054504  042040
 7440  026422  042111  023516  020124
 7441  026430  046103  020122  051501
 7442  026436  043440  020117  040527
 7443  026444  020123  042523  000124
 7444
 7445  026452  047103  051124  020114  EM54:   .ASCIZ  "CNTRL RDY DIDN'T SET ON WRT/FMT STARTING FROM <DSK-ADRES>"
 7446  026460  042122  020131  044504
 7447  026466  047104  052047  051440
 7448  026474  052105  047440  020116
 7449  026502  051127  027524  046506
 7450  026510  020124  052123  051101
 7451  026516  044524  043516  043040
 7452  026524  047522  020115  042074
 7453  026532  045523  040455  051104
 7454  026540  051505  000076
 7455
 7456  026544  042510  047440  020122  EM55:   .ASCIZ  "HE OR ERR ON WRT/FMT STARTING FROM <DSK-ADRES>"
 7457  026552  051105  020122  047117
 7458  026560  053440  052122  043057
 7459  026566  052115  051440  040524
 7460  026574  052122  047111  020107
 7461  026602  051106  046517  036040
 7462  026610  051504  026513  042101
 7463  026616  042522  037123     000
 7464
 7465  026623     122  042113  020101  EM56:   .ASCIZ  /RKDA INCRMNTD WRONG ON WRT-FMT/
 7466  026630  047111  051103  047115
 7467  026636  042124  053440  047522
 7468  026644  043516  047440  020116
 7469  026652  051127  026524  046506
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 7470  026660  000124
 7471
 7472  026662  045522  041527  042040  EM57:   .ASCIZ  /RKWC DIDN'T OVRFLO ON WRT FMT/
 7473  026670  042111  023516  020124
 7474  026676  053117  043122  047514
 7475  026704  047440  020116  051127
 7476  026712  020124  046506  000124
 7477
 7478  026720  045522  040502  044440  EM60:   .ASCIZ  /RKBA INCRMNTD WRONG ON WRT FMT/
 7479  026726  041516  046522  052116
 7480  026734  020104  051127  047117
 7481  026742  020107  047117  053440
 7482  026750  052122  043040  052115
 7483  026756     000
 7484
 7485  026757     122  042513  020122  EM61:   .ASCIZ  /RKER SET,ON WRT OR RD OR FMT/
 7486  026764  042523  026124  047117
 7487  026772  053440  052122  047440
 7488  027000  020122  042122  047440
 7489  027006  020122  046506  000124
 7490
 7491  027014  045522  041104  042440  EM62:   .ASCIZ  /RKDB EROR/
 7492  027022  047522  000122
 7493
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 7494  027026  045522  040504  044440  EM63:   .ASCIZ  /RKDA INCRMNTD WRONG ON RD OR RD FMT/
 7495  027034  041516  046522  052116
 7496  027042  020104  051127  047117
 7497  027050  020107  047117  051040
 7498  027056  020104  051117  051040
 7499  027064  020104  046506  000124
 7500
 7501  027072  045522  041527  042040  EM64:   .ASCIZ  /RKWC DIDN'T OVRFLO ON RD OR RD FMT/
 7502  027100  042111  023516  020124
 7503  027106  053117  043122  047514
 7504  027114  047440  020116  042122
 7505  027122  047440  020122  042122
 7506  027130  043040  052115     000
 7507
 7508  027135     122  041113  020101  EM65:   .ASCIZ  /RKBA INCRMNTD WRONG ON RD OR RD FMT/
 7509  027142  047111  051103  047115
 7510  027150  042124  053440  047522
 7511  027156  043516  047440  020116
 7512  027164  042122  047440  020122
 7513  027172  042122  043040  052115
 7514  027200     000
 7515
 7516  027201     111  041516  051117  EM66:   .ASCIZ  /INCORRECT HEADER FROM 'SECTOR'/
 7517  027206  042522  052103  044040
 7518  027214  040505  042504  020122
 7519  027222  051106  046517  023440
 7520  027230  042523  052103  051117
 7521  027236  000047
 7522
 7523  027240  040504  040524  042440  EM67:   .ASCIZ  /DATA ERROR/
 7524  027246  051122  051117     000
 7525
 7526  027253     103  052116  046122  EM70:   .ASCIZ  "CNTRL RDY DIDN'T SET ON RD/FMT STARTING FROM <DSK-ADRES>"
 7527  027260  051040  054504  042040
 7528  027266  042111  023516  020124
 7529  027274  042523  020124  047117
 7530  027302  051040  027504  046506
 7531  027310  020124  052123  051101
 7532  027316  044524  043516  043040
 7533  027324  047522  020115  042074
 7534  027332  045523  040455  051104
 7535  027340  051505  000076
 7536
 7537  027344  042510  047440  020122  EM71:   .ASCIZ  "HE OR ERR ON RD/FMT STARTING FROM <DSK-ADRES>"
 7538  027352  051105  020122  047117
 7539  027360  051040  027504  046506
 7540  027366  020124  052123  051101
 7541  027374  044524  043516  043040
 7542  027402  047522  020115  042074
 7543  027410  045523  040455  051104
 7544  027416  051505  000076
 7545
 7546  027422  051127  047117  020107  EM72:   .ASCIZ  /WRONG DRIVE ID IN RKDS AFTER SEEK/
 7547  027430  051104  053111  020105
 7548  027436  042111  044440  020116
 7549  027444  045522  051504  040440
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 7550  027452  052106  051105  051440
 7551  027460  042505  000113
 7552
 7553  027464  051110  053504  042522  EM73:   .ASCIZ  /HRDWRE POLL-DRV ID BITS(13-15) SHLDBE CLR/
 7554  027472  050040  046117  026514
 7555  027500  051104  020126  042111
 7556  027506  041040  052111  024123
 7557  027514  031461  030455  024465
 7558  027522  051440  046110  041104
 7559  027530  020105  046103  000122
 7560
 7561  027536  051110  053504  042522  EM74:   .ASCIZ  /HRDWRE POLL-INTRUPTING DRIV # NOT PRSNT/
 7562  027544  050040  046117  026514
 7563  027552  047111  051124  050125
 7564  027560  044524  043516  042040
 7565  027566  044522  020126  020043
 7566  027574  047516  020124  051120
 7567  027602  047123  000124
 7568
 7569  027606  051104  053111  021440  EM75:   .ASCIZ  /DRIV # DIDN'T INTRUPT AFTER HRDWRE POLL/
 7570  027614  042040  042111  023516
 7571  027622  020124  047111  051124
 7572  027630  050125  020124  043101
 7573  027636  042524  020122  051110
 7574  027644  053504  042522  050040
 7575  027652  046117  000114
 7576
 7577  027656  041523  020120  044504  EM76:   .ASCIZ  /SCP DIDN'T SET AFTER SEEK WAS DONE/
 7578  027664  047104  052047  051440
 7579  027672  052105  040440  052106
 7580  027700  051105  051440  042505
 7581  027706  020113  040527  020123
 7582  027714  047504  042516     000
 7583
 7584  027721     122  042113  020101  EM77:   .ASCIZ  /RKDA CHANGD AFTER DRIV RESET/
 7585  027726  044103  047101  042107
 7586  027734  040440  052106  051105
 7587  027742  042040  044522  020126
 7588  027750  042522  042523  000124
 7589
 7590  027756  040504  040524  042440  EM100:  .ASCIZ  /DATA EROR AT WORD#/
 7591  027764  047522  020122  052101
 7592  027772  053440  051117  021504
 7593  030000     000
 7594
 7595  030001     103  052116  046122  EM101:  .ASCIZ  /CNTRL RDY DIDN'T SET AFTER RD CHK/
 7596  030006  051040  054504  042040
 7597  030014  042111  023516  020124
 7598  030022  042523  020124  043101
 7599  030030  042524  020122  042122
 7600  030036  041440  045510     000
 7601
 7602  030043     105  051122  047440  EM102:  .ASCIZ  /ERR OR HE ON RD CHK/
 7603  030050  020122  042510  047440
 7604  030056  020116  042122  041440
 7605  030064  045510     000
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 7606
 7607  030067    103  042523  047440  EM103:  .ASCIZ  /CSE ON RD CHK/
 7608  030074 020116  042122  041440
 7609  030102 045510     000
 7610
 7611  030105    122  053513  020103  EM104:  .ASCIZ  /RKWC DIDN'T OVERFLO ON RD CHK OR WRT CHK/
 7612  030112 044504  047104  052047
 7613  030120 047440  042526  043122
 7614  030126 047514  047440  020116
 7615  030134 042122  041440  045510
 7616  030142 047440  020122  051127
 7617  030150 020124  044103  000113
 7618
 7619  030156 045522  040504  044440  EM105:  .ASCIZ  /RKDA INCRMNTD WRONG ON RD CHK/
 7620  030164 041516  046522  052116
 7621  030172 020104  051127  047117
 7622  030200 020107  047117  051040
 7623  030206 020104  044103  000113
 7624
 7625  030214 045522  040502  041440  EM106:  .ASCIZ  /RKBA CHANGD AFTER RD CHK/
 7626  030222 040510  043516  020104
 7627  030230 043101  042524  020122
 7628  030236 042122  041440  045510
 7629  030244    000
 7630
 7631  030245    115  046505  051117  EM107:  .ASCIZ  /MEMORY WORD CHANGED AFTER RD CHK/
 7632  030252 020131  047527  042122
 7633  030260 041440  040510  043516
 7634  030266 042105  040440  052106
 7635  030274 051105  051040  020104
 7636  030302 044103  000113
 7637
 7638  030306 047103  051124  020114  EM110:  .ASCIZ  /CNTRL RDY DIDN'T SET AFTER WRT CHK/
 7639  030314 042122  020131  044504
 7640  030322 047104  052047  051440
 7641  030330 052105  040440  052106
 7642  030336 051105  053440  052122
 7643  030344 041440  045510     000
 7644
 7645  030351    110  020105  051117  EM111:  .ASCIZ  /HE OR ERR ON WRT CHK/
 7646  030356 042440  051122  047440
 7647  030364 020116  051127  020124
 7648  030372 044103  000113
 7649
 7650  030376 051127  052111  020105  EM112:  .ASCIZ  /WRITE CHECK EROR/
 7651  030404 044103  041505  020113
 7652  030412 051105  051117     000
 7653
 7654  030417    122  042113  020101  EM113:  .ASCIZ  /RKDA INCRMNTD WRONG ON WRT CHK/
 7655  030424 047111  051103  047115
 7656  030432 042124  053440  047522
 7657  030440 043516  047440  020116
 7658  030446 051127  020124  044103
 7659  030454 000113
 7660
 7661  030456 045522  040502  044440  EM114:  .ASCIZ  /RKBA INCRMNTD WRONG ON WRT CHK/
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 7662  030464  041516  046522  052116
 7663  030472  020104  051127  047117
 7664  030500  020107  047117  053440
 7665  030506  052122  041440  045510
 7666  030514     000
 7667
 7668  030515     122  041113  020101  EM115:  .ASCIZ  /RKBA INCRMNTD, WITH IBA SET/
 7669  030522  047111  051103  047115
 7670  030530  042124  020054  044527
 7671  030536  044124  044440  040502
 7672  030544  051440  052105     000
 7673
 7674  030551     127  047522  043516  EM116:  .ASCIZ  /WRONG MEMORY LOCATION CHANGED WITH IBA SET/
 7675  030556  046440  046505  051117
 7676  030564  020131  047514  040503
 7677  030572  044524  047117  041440
 7678  030600  040510  043516  042105
 7679  030606  053440  052111  020110
 7680  030614  041111  020101  042523
 7681  030622  000124
 7682
 7683  030624  045522  030461  042040  EM117:  .ASCIZ  /RK11 DIDN'T INTRUPT WHEN IDE WAS SET/
 7684  030632  042111  023516  020124
 7685  030640  047111  051124  050125
 7686  030646  020124  044127  047105
 7687  030654  044440  042504  053440
 7688  030662  051501  051440  052105
 7689  030670     000
 7690
 7691  030671     122  030513  020061  EM120:  .ASCIZ  /RK11 DIDN'T INTRUPT AFTER SK WAS INITIATED/
 7692  030676  044504  047104  052047
 7693  030704  044440  052116  052522
 7694  030712  052120  040440  052106
 7695  030720  051105  051440  020113
 7696  030726  040527  020123  047111
 7697  030734  052111  040511  042524
 7698  030742  000104
 7699
 7700  030744  041523  020120  042523  EM121:  .ASCIZ  /SCP SET BEFORE SEEK COMPLETED/
 7701  030752  020124  042502  047506
 7702  030760  042522  051440  042505
 7703  030766  020113  047503  050115
 7704  030774  042514  042524  000104
 7705
 7706  031002  045522  030461  042040  EM122:  .ASCIZ  /RK11 DIDN'T INTRUPT AFTER SK COMPLETED/
 7707  031010  042111  023516  020124
 7708  031016  047111  051124  050125
 7709  031024  020124  043101  042524
 7710  031032  020122  045523  041440
 7711  031040  046517  046120  052105
 7712  031046  042105     000
 7713
 7714  031051     103  052116  046122  EM123:  .ASCIZ  /CNTRL RESET DIDN'T CLEAR 'SCP'/
 7715  031056  051040  051505  052105
 7716  031064  042040  042111  023516
 7717  031072  020124  046103  040505
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 7718  031100  020122  051447  050103
 7719  031106  000047
 7720
 7721  031110  045522  030461  042040  EM124:  .ASCIZ  /RK11 DIDN'T INTRUPT AFTER RD DONE/
 7722  031116  042111  023516  020124
 7723  031124  047111  051124  050125
 7724  031132  020124  043101  042524
 7725  031140  020122  042122  042040
 7726  031146  047117  000105
 7727
 7728  031152  047103  051124  020114  EM125:  .ASCIZ  /CNTRL RESET DIDN'T CLR REGISTR/
 7729  031160  042522  042523  020124
 7730  031166  044504  047104  052047
 7731  031174  041440  051114  051040
 7732  031202  043505  051511  051124
 7733  031210     000
 7734
 7735  031211     122  030513  020061  EM126:  .ASCIZ  /RK11 DIDN'T INTRUPT AT CPU LEVEL/
 7736  031216  044504  047104  052047
 7737  031224  044440  052116  052522
 7738  031232  052120  040440  020124
 7739  031240  050103  020125  042514
 7740  031246  042526  000114
 7741
 7742  031252  045522  030461  044440  EM127:  .ASCIZ  /RK11 INTRUPTED AT WRONG CPU LEVEL/
 7743  031260  052116  052522  052120
 7744  031266  042105  040440  020124
 7745  031274  051127  047117  020107
 7746  031302  050103  020125  042514
 7747  031310  042526  000114
 7748
 7749  031314  042447  051122  041040  EM130:  .ASCIZ  /'ERR BIT' DIDN'T SET IN RKER/
 7750  031322  052111  020047  044504
 7751  031330  047104  052047  051440
 7752  031336  052105  044440  020116
 7753  031344  045522  051105     000
 7754
 7755  031351     110  020105  051117  EM131:  .ASCIZ  /HE OR ERR DIDN'T SET/
 7756  031356  042440  051122  042040
 7757  031364  042111  023516  020124
 7758  031372  042523  000124
 7759
 7760  031376  045522  051105  042440  EM132:  .ASCIZ  /RKER EROR/
 7761  031404  047522  000122
 7762
 7763  031410  054116  020103  044502  EM133:  .ASCIZ  /NXC BIT DIDN'T SET/
 7764  031416  020124  044504  047104
 7765  031424  052047  051440  052105
 7766  031432     000
 7767
 7768  031433     122  030513  020061  EM134:  .ASCIZ  /RK11 DIDN'T INTRUPT ON SOFT EROR/
 7769  031440  044504  047104  052047
 7770  031446  044440  052116  052522
 7771  031454  052120  047440  020116
 7772  031462  047523  052106  042440
 7773  031470  047522  000122
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 7774
 7775  031474  042515  020130  044502  EM135:  .ASCIZ  /MEX BITS INCRMNTD WRONG-RKCS/
 7776  031502  051524  044440  041516
 7777  031510  046522  052116  020104
 7778  031516  051127  047117  026507
 7779  031524  045522  051503     000
 7780
 7781  031531     127  051520  047040  EM137:  .ASCIZ  /WPS NOT CLEAR/
 7782  031536  052117  041440  042514
 7783  031544  051101     000
 7784
 7785  031547     104  052101  020101  EM140:  .ASCIZ  /DATA EROR ON TRANSFER FROM DISK TO TTY/
 7786  031554  051105  051117  047440
 7787  031562  020116  051124  047101
 7788  031570  043123  051105  043040
 7789  031576  047522  020115  044504
 7790  031604  045523  052040  020117
 7791  031612  052124  000131
 7792
 7793  031616  042047  044522  020126  EM141:  .ASCIZ  /'DRIV #' PRESENT, BUT NOT INDICATED/
 7794  031624  023443  050040  042522
 7795  031632  042523  052116  020054
 7796  031640  052502  020124  047516
 7797  031646  020124  047111  044504
 7798  031654  040503  042524  000104
 7799  031662  047040  020117  052502  EM142:  .ASCIZ  / NO BUSY ON OTHER HALF OF RK-05F/
 7800  031670  054523  047440  020116
 7801  031676  052117  042510  020122
 7802  031704  040510  043114  047440
 7803  031712  020106  045522  030055
 7804  031720  043065     000
 7805
 7806
 7807
 7808
 7809
 7810          031724                          .EVEN
 7811
 7812                                          .SBTTL  ERROR DATA POINTERS
 7813
 7814  031724  001116  001162  000000  DT1:    .WORD   $ERRPC,$REG0,0
 7815
 7816  031732  001116  001162  001164  DT2:    .WORD   $ERRPC,$REG0,$REG1,0
 7817  031740  000000
 7818
 7819  031742  001116  001162  001164  DT20:   .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG3,0
 7820  031750  001166  001170  000000
 7821
 7822  031756  001116  000000          DT21:   .WORD   $ERRPC,0
 7823
 7824  031762  001116  001162  001164  DT26:   .WORD   $ERRPC,$REG0,$REG1,$REG2,0
 7825  031770  001166  000000
 7826
 7827  031774  001116  001162  001164  DT54:   .WORD   $ERRPC,$REG0,$REG1,$REG2,$REG3,$REG4,$REG5,$REG6,$REG7,0
 7828  032002  001166  001170  001172
 7829  032010  001174  001176  001200
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 7830  032016  000000
 7831
 7832
 7833
 7834
 7835                                        .SBTTL  ERROR HEADERS
 7836
 7837  032020  020040  041520  020040  DH2:    .ASCIZ  /  PC   REGADD    RECVD/
 7838  032026  051040  043505  042101
 7839  032034  020104  020040  051040
 7840  032042  041505  042126     000
 7841
 7842  032047     040  050040  020103  DH4:    .ASCIZ  /  PC    EXPCT   RECVD/
 7843  032054  020040  042440  050130
 7844  032062  052103  020040  051040
 7845  032070  041505  042126     000
 7846
 7847  032075     040  050040  020103  DH5:    .ASCIZ  /  PC    RECVD/
 7848  032102  020040  051040  041505
 7849  032110  042126     000
 7850
 7851  032113     040  050040  020103  DH14:   .ASCIZ  /  PC    RKCS    RKER    RKWC/
 7852  032120  020040  051040  041513
 7853  032126  020123  020040  051040
 7854  032134  042513  020122  020040
 7855  032142  051040  053513  000103
 7856
 7857  032150  020040  041520     000  DH21:   .ASCIZ  /  PC/
 7858
 7859  032155     040  050040  020103  DH30:   .ASCIZ  /  PC     RKCS    RKER    RKDS/
 7860  032162  020040  020040  045522
 7861  032170  051503  020040  020040
 7862  032176  045522  051105  020040
 7863  032204  020040  045522  051504
 7864  032212     000
 7865
 7866  032213     040  050040  020103  DH34:   .ASCIZ  /  PC     RKDS/
 7867  032220  020040  020040  045522
 7868  032226  051504     000
 7869
 7870  032231     040  050040  020103  DH35:   .ASCIZ  /  PC   SEC-CNTR/
 7871  032236  020040  042523  026503
 7872  032244  047103  051124     000
 7873
 7874  032251     040  050040  020103  DH36:   .ASCIZ  /  PC     PRSNT  NXT-CNT/
 7875  032256  020040  020040  051120
 7876  032264  047123  020124  047040
 7877  032272  052130  041455  052116
 7878  032300     000
 7879
 7880  032301     040  050040  020103  DH40:   .ASCIZ  /  PC    SECTOR   RKDS/
 7881  032306  020040  051440  041505
 7882  032314  047524  020122  020040
 7883  032322  045522  051504     000
 7884
 7885  032327     040  050040  020103  DH44:   .ASCIZ  /  PC    RKCS    RKER    RKDS    RKDA/
```

```
 7886  032334  020040  051040  041513
 7887  032342  020123  020040  051040
 7888  032350  042513  020122  020040
 7889  032356  051040  042113  020123
 7890  032364  020040  051040  042113
 7891  032372  000101
 7892
 7893  032374  020040  041520  020040  DH54:   .ASCIZ  /  PC    RKCS    RKER    RKDS    RKDA   DRV#....CYL.<DSK-ADRS>.SUR..SEC/
 7894  032402  020040  045522  051503
 7895  032410  020040  020040  045522
 7896  032416  051105  020040  020040
 7897  032424  045522  051504  020040
 7898  032432  020040  045522  040504
 7899  032440  020040  042040  053122
 7900  032446  027043  027056  041456
 7901  032454  046131  036056  051504
 7902  032462  026513  042101  051522
 7903  032470  027076  052523  027122
 7904  032476  051456  041505     000
 7905
 7906  032503     040  041520  020040  DH56:   .ASCIZ  / PC  EXPC: DR#   CYL     SUR     SEC  RECV: DR#   CYL     SUR     SEC/
 7907  032510  054105  041520  020072
 7908  032516  051104  020043  020040
 7909  032524  054503  020114  020040
 7910  032532  020040  052523  020122
 7911  032540  020040  051440  041505
 7912  032546  020040  042522  053103
 7913  032554  020072  051104  020043
 7914  032562  020040  054503  020114
 7915  032570  020040  020040  052523
 7916  032576  020122  020040  020040
 7917  032604  042523  000103
 7918
 7919  032610  020040  041520  020040  DH64:   .ASCIZ  /  PC    RKWC   RKDA/
 7920  032616  020040  045522  041527
 7921  032624  020040  051040  042113
 7922  032632  000101
 7923
 7924  032634  020040  041520  020040  DH66:   .ASCIZ  /  PC    SECTR   EXPCT   RECVD/
 7925  032642  020040  042523  052103
 7926  032650  020122  020040  054105
 7927  032656  041520  020124  020040
 7928  032664  042522  053103  000104
 7929
 7930  032672  020040  041520  020040  DH67:   .ASCIZ  /  PC    EXPCT   RECVD  DSK-ADRS/
 7931  032700  020040  054105  041520
 7932  032706  020124  020040  042522
 7933  032714  053103  020104  042040
 7934  032722  045523  040455  051104
 7935  032730  000123
 7936
 7937  032732  020040  041520  020040  DH74:   .ASCIZ  /  PC      DRIV #/
 7938  032740  020040  020040  051104
 7939  032746  053111  021440     000
 7940
 7941  032753     040  050040  020103  DH100:  .ASCIZ  /  PC  WORD #   EXPCT   RECVD/
```

```
 7942  032760  053440  051117  020104
 7943  032766  020043  020040  054105
 7944  032774  041520  020124  020040
 7945  033002  042522  053103  000104
 7946
 7947  033010  020040  041520  020040  DH103:  .ASCIZ  /  PC   RKER/
 7948  033016  051040  042513  000122
 7949
 7950  033024  020040  041520  020040  DH104:  .ASCIZ  /  PC   RECVD   RKCS/
 7951  033032  051040  041505  042126
 7952  033040  020040  051040  041513
 7953  033046  000123
 7954
 7955  033050  020040  041520  020040  DH107:  .ASCIZ  /  PC     LOC    EXPCT   RECVD/
 7956  033056  020040  046040  041517
 7957  033064  020040  020040  054105
 7958  033072  041520  020124  020040
 7959  033100  042522  053103  000104
 7960
 7961  033106  020040  041520  020040  DH117:  .ASCIZ  /  PC   RKCS/
 7962  033114  051040  041513  000123
 7963
 7964  033122  020040  041520  020040  DH126:  .ASCIZ  /  PC    LEVEL    RKCS/
 7965  033130  020040  042514  042526
 7966  033136  020114  020040  051040
 7967  033144  041513  000123
 7968
 7969  033150  020040  041520  020040  DH130:  .ASCIZ  /  PC     RKCS    RKER  ERR BIT/
 7970  033156  020040  051040  041513
 7971  033164  020123  020040  051040
 7972  033172  042513  020122  042440
 7973  033200  051122  041040  052111
 7974  033206     000
 7975
 7976  033207     040  050040  020103  DH131:  .ASCIZ  /  PC     RKCS    RKER/
 7977  033214  020040  020040  045522
 7978  033222  051503  020040  020040
 7979  033230  045522  051105     000
 7980
 7981  033235     040  050040  020103  DH133:  .ASCIZ  /  PC     RKCS    RKER    RKDA/
 7982  033242  020040  020040  045522
 7983  033250  051503  020040  020040
 7984  033256  045522  051105  020040
 7985  033264  020040  045522  040504
 7986  033272     000
 7987
 7988  033273     040  050040  020103  DH140:  .ASCIZ  /  PC    EXPCT   RECVD    RKBA    RKCS/
 7989  033300  020040  042440  050130
 7990  033306  052103  020040  051040
 7991  033314  041505  042126  020040
 7992  033322  020040  045522  040502
 7993  033330  020040  020040  045522
 7994  033336  051503     000
 7995
 7996
 7997          033342                          .EVEN
```

```
 7998                                   ;DATA BUFFER
 7999
 8000  033342  000400                   OUTBUF: .BLKW   256.    ;THIS 256 WORD BUFFER IS FOR
 8001                                                           ;DATA TRANSFERS FROM AND
 8002                                                           ;TO THE DISK.
 8003
 8004          000001                           .END
```

```
BADINT  004600          2108   2136#  4643   4688   4707   4718   4798   4806   4895   4904   5548
BADTMO  004534          2043   2106   2117#  5657   5661
BDAR    021074          6182   6187#
BDA0    021056          6180#  7216
BDA4    021066          6184#  7218
BIT0  = 000001           993#  2002   2006   2010   2270   5904
BIT00 = 000001           983#   993
BIT01 = 000002           982#   992
BIT02 = 000004           981#   991
BIT03 = 000010           980#   990
BIT04 = 000020           979#   989
BIT05 = 000040           978#   988
BIT06 = 000100           977#   987
BIT07 = 000200           976#   986
BIT08 = 000400           975#   985   6625
BIT09 = 001000           974#   984   6633
BIT1  = 000002           992#
BIT10 = 002000           973#
BIT11 = 004000           972#  6640
BIT12 = 010000           971#  6723
BIT13 = 020000           970#  5908
BIT14 = 040000           969#  6611
BIT15 = 100000           968#  2001   2006   2010   6720   6722
BIT2  = 000004           991#
BIT3  = 000010           990#
BIT4  = 000020           989#
BIT5  = 000040           988#
BIT6  = 000100           987#  6678
BIT7  = 000200           986#
BIT8  = 000400           985#
BIT9  = 001000           984#
BPTVEC= 000014          1000#
BRKDA0= 104415          3697   6288   7216#
BRKDA4= 104416          2834   2930   3032   3160   3249   3370   3538   3670   3700   3819   4179   4265   4523
                        5693   5709   6268   6291   7218#
BTEOP   020026          5820#  6731
CHE1    021242          6262   6265#
CHKCCL  021402          4987   5055   5124   5203   5364   5430   6340#
CHKCRD= 104412          2612   2672   3925   4334   4428   5243   5410   5470   5606   5759   7210#
CHKDA   021262          2847   2942   3045   4206   6282#
CHKDA1  021270          3175   3265   3395   3559   6284#
CHKECL  021356          4983   5051   5120   5199   5286   5360   5426   6329#
CHKER   021342          2861   2957   3059   3295   4210   4808   6316#
CHKHE   021234          2840   2936   3039   3256   4187   4527   6264#
CHKHE1  021226          3166   3377   3552   3687   3833   6261#
CHKWC   021316          2851   2947   3049   3278   3726   4202   4819   6302#
CH.CRD  021760          6522#  7210
CKSWR = 104407          6610   6672   6695   7206#
CNT.RD= 104414          3967   4025   4043   4092   5021   5321   6393   7214#  7284   7286
CNT.RE= 104413          2310   2357   2394   2446   2531   2566   2598   2656   2722   2776   2895   2996   3098
                        3128   3221   3345   3452   3508   3637   3792   3906   4003   4120   4234   4308   4397
                        4489   4596   4662   4748   4769   4847   4927   4973   5004   5041   5070   5110   5139
                        5189   5226   5259   5276   5305   5350   5380   5425   5448   5513   5587   5667   5754
                        5876   7212#  7275
CN.RDY  022032          6561   6562#  7214
CN.RST  022014          6559#  7212
```

```
COUNT   001362          1135#  3410*  3414*  3520*  3533*  4516*  4519*  5221*  5264*
COUNT1  001364          1136#  6390*  6405*
CR    = 000015           908#  6842   6852
CRETRN  021430          6266   6285   6303   6317   6330   6341   6346#
CRLF  = 000200           909#  1884   6813   6852
DDISP = 177570           915#  1057   1855
DDPCH   001410          1156#  1885   1905   1912*  1914   1916*  1920   1929   1941   2197   2199   2275   2284
DELAY = 104417          2342   5155   5166   5584   7220#
DELA.Y  021664          6456#  7220
DH100   032753          1565   1663   7941#
DH103   033010          1586   7947#
DH104   033024          1593   7950#
DH107   033050          1614   7955#
DH117   033106          1551   1670   1677   1684   1698   1705   7961#
DH126   033122          1719   1726   7964#
DH130   033150          1733   7969#
DH131   033207          1741   1762   7976#
DH133   033235          1755   7981#
DH14    032113          1248   1776   7851#
DH140   033273          1790   7988#
DH2     032020          1712   7837#
DH21    032150          1346   7857#
DH30    032155          1269   1276   1367   1381   1402   1452   1579   1628   1635   1691   7859#
DH34    032213          1262   1283   1297   1332   1530   7866#
DH35    032231          1304   7870#
DH36    032251          1311   7874#
DH4     032047          1255   1318   1339   1374   1395   1445   1459   1482   1523   1558   1600   1607   1642
                        1649   1656   1748   1769   1805   7842#
DH40    032301          1325   7880#
DH44    032327          1241   1290   1353   1360   1388   1572   1621   1783   7885#
DH5     032075          1438   7847#
DH54    032374          1410   1420   1504   1514   7893#
DH56    032503          1429   1466   7906#
DH64    032610          1475   7919#
DH66    032634          1489   7924#
DH67    032672          1496   7930#
DH74    032732          1537   1544   1798   7937#
DISPLA  001142          1057#  1855*  1863*  6654*  6675*
DISPRE  000174          1015#  1863
DRESET  021504          2734   4674   4991   5260   5818   6390#  6428   7273   7291
DRHOLD  025302          7276*  7285   7290   7294#
DRIVAD  001350          1127#  2104*  2272*  2277   2289   2321   2367   2404   2416   2456   2541   2567   2610
                        2669   2738   2818   2833   2913   2929   3015   3031   3068   3123   3236   3248   3262
                        3332   3505   3620   3784   3920   4015   4161   4178   4254   4264   4326   4356   4419
                        4454   4511   4522   4549   4673   4727   4730   4749   4785   4862   4939   5017   5086
                        5222   5316   5407   5465   5530   5599   5681   5757   5823*  6264   6282   6360   6391
                        6425   6716   6725   7276   7277   7279*  7281*  7282   7290*  7295*  7307*
DRIVS   001412          1158#  1959   1996*  2011*  2047*  2068*  2077   2097   2237*  2265   5820   5862   6711*
                        6729*
DRIV0   001414          1170#  1973   2050   2101   2194   2232   2234   2297   5851   5891   6719   7296
DRIV1   001416          1171#
DRIV2   001420          1172#
DRIV3   001422          1173#
DRIV4   001424          1174#
DRIV5   001426          1175#
DRIV6   001430          1176#
```

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DRIV7   001432          1177#   5859    7308
DRVDON  001352          1128#   2102*   5816*   5820
DRVPTR  001354          1131#   2101*   2268    2286*   6714
DSWR  = 177570           914#   1056    1854
DT1     031724          1263    1284    1298    1305    1333    1439    1538    1545    1552    1587    1671    1678    1685
                        1699    1706    1799    7814#
DT2     031732          1256    1312    1319    1326    1340    1375    1396    1446    1460    1476    1483    1524    1531
                        1559    1594    1601    1608    1643    1650    1657    1713    1720    1727    1742    1749    1763
                        1770    1806    7816#
DT20    031742          1242    1291    1354    1361    1389    1573    1622    1784    1791    7819#
DT21    031756          1347    7822#
DT26    031762          1249    1270    1277    1368    1382    1403    1453    1490    1497    1566    1580    1615    1629
                        1636    1664    1692    1734    1756    1777    7824#
DT54    031774          1412    142.    1431    1468    1506    1516    7827#
EFLG1   001370          1138#   3408*   3429*   3629*   3633*   3655    3706
EMTVEC= 000030          1003#   1839*   1840*
EM100   027756          1564    7590#
EM101   030001          1571    7595#
EM102   030043          1578    7602#
EM103   030067          1585    7607#
EM104   030105          1592    7611#
EM105   030156          1599    7619#
EM106   030214          1606    7625#
EM107   030245          1613    7631#
EM11    025370          1804    7316#
EM110   030306          1620    1775    7638#
EM111   030351          1627    7645#
EM112   030376          1634    7650#
EM113   030417          1641    7654#
EM114   030456          1648    7661#
EM115   030515          1655    7668#
EM116   030551          1662    7674#
EM117   030624          1669    7683#
EM12    025402          1240    7320#
EM120   030671          1676    7691#
EM121   030744          1683    7700#
EM122   031002          1690    7706#
EM123   031051          1697    7714#
EM124   031110          1704    7721#
EM125   031152          1711    7728#
EM126   031211          1718    7735#
EM127   031252          1725    7742#
EM13    025415          1338    7323#
EM130   031314          1732    7749#
EM131   031351          1740    7755#
EM132   031376          1747    7760#
EM133   031410          1754    7763#
EM134   031433          1761    7768#
EM135   031474          1768    7775#
EM137   031531          1782    7781#
EM140   031547          1789    7785#
EM141   031616          1797    7793#
EM142   031662          1809    7799#
EM16    025427          1254    7326#
EM21    025456          1261    7331#
EM30    025470          1268    7334#
```

```
EM31    025500          1275    7337#
EM32    025510          1282    7340#
EM33    025531          1289    7344#
EM34    025551          1296    7348#
EM35    025570          1303    7352#
EM36    025623          1310    7358#
EM37    025653          1317    7364#
EM40    025707          1324    7370#
EM41    025747          1331    7377#
EM43    026004          1345    2143    7383#
EM44    026036          1352    7389#
EM45    026112          1359    7398#
EM46    026160          1366    7406#
EM47    026216          1373    7412#
EM50    026260          1380    7419#
EM51    026307          1387    7424#
EM52    026362          1394    7433#
EM53    026407          1401    7438#
EM54    026452          1408    7445#
EM55    026544          1418    7456#
EM56    026623          1428    7465#
EM57    026662          1437    7472#
EM60    026720          1444    7478#
EM61    026757          1451    7485#
EM62    027014          1458    7491#
EM63    027026          1465    7494#
EM64    027072          1474    7501#
EM65    027135          1481    7508#
EM66    027201          1488    7516#
EM67    027240          1495    7523#
EM70    027253          1247    1502    7526#
EM71    027344          1512    7537#
EM72    027422          1522    7546#
EM73    027464          1529    7553#
EM74    027536          1536    7561#
EM75    027606          1543    7569#
EM76    027656          1550    7577#
EM77    027721          1557    7584#
ERRVEC= 000004           996#   1852    1853*   1864*   1892    1893*   1901*   6616    6617*   6619*   6622*
FCHECK  025160          5801    7273#   7301
FFLAG   001404          1152#   2291*   2303*   5799
FTITLE  001346          1126#
GNS   = ****** U        1014    1883    1926    1938    1947    1951    1966    1990    2122    2147    2301    6151    6435
                        6573    6581    7198    7199    7200    7201    7202    7204    7206    7207    7208    7210    7212
                        7214    7216    7218    7220    7222    7224
GTSWR = 104406          1878    7204#
GT2RG   021010          4956    4963    4969    5030    5037    5092    5100    5106    5170    5186    5251    5272    5331
                        5346    5416    5422    5541    6132#
GT3RG   021002          2335    2371    2701    2746    2823    2918    3020    3547    3681    3829    4167    4332    4341
                        4425    4435    4440    4709    6131#   6319
GT4RG   020774          2222    2382    2407    2580    2626    2632    2637    2683    2687    2696    2832    2928    3030
                        3157    3247    3368    3536    3667    3817    3936    3941    3945    4068    4074    4177    4263
                        4521    5691    5707    5925    6130#   6267    6407    6527
HT    = 000011           906#   6811    6852
INDX1   001356          1133#   2458*   2467*   3618*   3735    3737*   3743*   3804*   3814*   3898*   3977    3982*   5765*
                        5867*   5886    6027    6029*
```

```
INDX2   001360          1134#  2465*  2469*  3652*  3664*  5781*  5872*  5954   5975*
IOTVEC= 000020          1001#  1837*  1838*
LF    = 000012           907#  6846   6852
MSG1    001216          1084#  2045
MSG2    001236          1088#  2080
MSG3    001245          1091#  6570
MSG4    001272          1096#  2288   6724
MSG5    001303          1099#  6710
MSG6    001315          1102#  6728
NUDRV   005040          2250#  5824
ODDEVN  001406          1153#  5861*  5910   5913   6055*  6056
OUTBUF  033342          2788   2813   2855   2857   2909   2951   2953   3011   3053   3055   3141*  3146   3237
                        3272   3274   3334   3409   3521*  3525   3651   3781   3964   3968   3972   4014   4147
                        4160   4247   4253   4277   4324*  4327   4365   4367   4372   4378   4380   4411   4418
                        4462   4464   4503   4789   4829   4831   4943   5319   5392   5402*  5406   5461*  5467
                        5525*  5532   5677   5893   5898   5982   6013   8000#
PFSTRT  004702          2174#  7264
PHYDRV  001436          1180#  5850*  5854*  5981   6012
PIRQ  = 177772           913#
PIRQVE= 000240          1007#
PR0   = 000000           930#
PR1   = 000040           931#
PR2   = 000100           932#
PR3   = 000140           933#
PR4   = 000200           934#
PR5   = 000240           935#
PR6   = 000300           936#
PR7   = 000340           937#
PS    = 177776           910#   911    1894
PSW   = 177776           911#
PWRVEC= 000024          1002#  1843*  1844*  7231*  7232*  7241*  7247*  7259*  7260*
RDCHR = 104410          7113   7207#
RDLIN = 104411          1968   7208#
RESVEC= 000010           997#
RKBA    001336          1116#  2815   2908   3010   3146*  3238*  3272   3275   3358*  3525*  3653*  3805*  3964*
                        4020*  4086*  4160*  4195   4198   4253*  4323   4418*  4462   4465   4510*  4534   4537
                        4784   4943*  5085*  5319*  5406*  5467*  5532*  5600*  5678   5751
RKCS    001332          1114#  2327*  2608   2668   2741*  2814   2907   3008   3120   3152   3233   3240*  3242
                        3331   3529*  3531   3660*  3662   3810*  3812   3900   4002   4132   4172   4256*  4258
                        4320   4409   4501   4612   4672   4782   4861   4946*  4949   4967   5019*  5035   5083
                        5088   5151   5220   5315   5379   5460   5537*  5566*  5579   5666   5758*  5866   6133
                        6265   6340   6342   6343   6392*  6523   6559*  6563   6583   7283*
RKDA    001340          1117#  1818*  2042   2051*  2052   2201*  2321*  2367*  2404*  2416*  2456*  2544*  2567*
                        2610*  2669*  2738*  2739*  2818*  2913*  3015*  3122   3235   3357*  3527*  3658*  3694
                        3699   3808*  3922*  3957   3960   3963*  4018*  4078   4081   4087*  4161*  4254*  4322
                        4419*  4456   4459   4511*  4673*  4680*  4749*  4783   4862*  4944*  5017*  5086*  5154*
                        5241*  5252   5316*  5317*  5407*  5468*  5486   5491   5533*  5551   5556   5599*  5683*
                        5697*  5757*  5928*  6130   6284   6290   6306   6360*  6391*  6425*  7282*  7285*
RKDB    001342          1118#  3084   3087   3099   3101   3102   3181   3186   3462   3464   3465   3854   3857
RKDS    001326          1112#  1820   2041   2063   2202   2320   2345   2368   2377   2380   2405   2418   2422
                        2457   2505   2542   2569   2619   2630   2679   2685   2740   3545   3679   3827   3901
                        4051   4273   4540   4725   4750   4752   5157   5965   5983   6131   6362   6366   6399
                        6426   7287
RKER    001330          1113#  2699   3902   4344   4346   4438   4961   5016   5098   5168   5249   5328   5339
                        5414   5476   5480   5623   5629   6132   6316   6329   6331   6332
RKPRI   001400          1144#  1897*  4865   5945   6487
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RKVEC   001402          1149#  2108*  4613   4631*  4643*  4677   4688*  4697*  4707*  4718*  4790   4798*  4806*
                        4869   4895*  4904*  5534   5548*  5942
RKWC    001334          1115#  2817*  2912*  3014*  3148*  3239*  3359*  3526*  3655*  3807*  3965*  4019*  4085*
                        4159*  4252*  4321   4417*  4448   4450   4509*  4787*  4942*  4955   5084*  5093   5318*
                        5405*  5466*  5531*  5598*  5680*  5696*  5755*  6302   6305
SEEK0   001372          1141#  3896   3985
SEEK1   001374          1142#
SEEK2   001376          1143#  3980
SHFTRT  021200          2290   4731   4734   5999   6018   6228#  6717   6726
SIMUL   001344          1125#  2030*  2033*  3335   3433   3622   3732   3785   3866   4000
SIZEF   025304          5849   7295#
SIZYET  001440          1181#  2027*  2039*  5847*
STACK = 001100           901#  1835
START   002636          1018   1814#  2127   2164
STARTA  002704          1817   1821   1828#
START1  003334          1891   1905#
STKLMT= 177774           912#
ST2     003736          1911   1935   1959#  1992
ST3     004262          1922   1933   2039#
ST4     004456          2031   2034   2078   2081   2096#  6096
SWR     001140          1056#  1833   1854*  1856   1862*  1876   2028   2138   2152   2157   6187   6431   6567
                        6611   6625   6627   6633   6640   6678   6686   6692   6696   6699   7009   7046*  7239
                        7252*
SWREG   000176          1016#  1862   1876   7009   7022
SW0   = 000001           965#
SW00  = 000001           955#   965
SW01  = 000002           954#   964
SW02  = 000004           953#   963
SW03  = 000010           952#   962
SW04  = 000020           951#   961
SW05  = 000040           950#   960
SW06  = 000100           949#   959
SW07  = 000200           948#   958
SW08  = 000400           947#   957
SW09  = 001000           946#   956    6699
SW1   = 000002           964#
SW10  = 002000           945#   2028
SW11  = 004000           944#
SW12  = 010000           943#   6696
SW13  = 020000           942#   6431   6567   6686
SW14  = 040000           941#
SW15  = 100000           940#
SW2   = 000004           963#
SW3   = 000010           962#
SW4   = 000020           961#
SW5   = 000040           960#
SW6   = 000100           959#
SW7   = 000200           958#
SW8   = 000400           957#
SW9   = 001000           956#
TBITVE= 000014           998#
TIMER   001366          1137#  6361*  6364*  6456*  6459*  6484*  6490*  6522*  6525*
TKVEC = 000060          1005#
TPVEC = 000064          1006#
TRAPVE= 000034          1004#  1841*  1842*
TRTVEC= 000014           999#
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TSTEND  020626            6028    6055#
TSTRWS  021436            2750    5128    5207    5236    5256    5585    5752    6360#
TSTSIN  021572            6425#   7224
TST.SI= 104421            2666    2732    2786    2905    3006    3138    3231    3355    3518    3648    3802    3916    4130
                          4244    4318    4407    4499    4606    4779    4857    4937    5014    5080    5149    5239    5390
                          5458    5523    5744    7224#
TST1    004706            2110    2192#
TST10   005742            2481    2503    2508    2515    2530#
TST11   006030            2554    2565#
TST12   006110            2579    2597#
TST13   006252            2642    2655#
TST14   006416            2705    2721#
TST15   006510            2775#
TST16   006746            2866    2893#
TST17   007174            2970    2995#
TST2    005040            2259#
TST20   007504            3100    3119#
TST21   007702            3219#
TST22   010154            3300    3328#
TST23   010524            3463    3497#
TST24   011004            3614#
TST25   011414            3733    3749    3777#
TST26   011722            3867    3894#
TST27   012242            3998#
TST3    005236            2309#
TST30   012530            4001    4100    4119#
TST31   012764            4215    4233#
TST32   013170            4274    4294    4307#
TST33   013436            4376    4396#
TST34   013720            4470    4488#
TST35   014176            4541    4559    4584    4595#
TST36   014330            4660#
TST37   014654            4758    4768#
TST4    005350            2341    2356#
TST40   015070            4830    4846#
TST41   015274            4901    4926#
TST42   015456            5003#
TST43   015564            5069#
TST44   015740            5138#
TST45   016076            5163    5219#
TST46   016304            5291    5304#
TST47   016456            5378#
TST5    005436            2381    2393#
TST50   016634            5447#
TST51   016762            5489    5512#
TST52   017134            5578#
TST53   017330            5647#
TST54   017622            5659    5717    5742#
TST55   017760            5797#
TST56   020004            5814#
TST57   020054            5845#
TST6    005464            2406    2415#
TST7    005522            2419    2445#
TYERM   021026            2055    2086    6148#
TYPDS = 104405            6085    7202#
TYPE  = 104401            1872    1924    1936    1945    1949    1964    1988    2044    2066    2079    2120    2140    2142
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                    2145    2288    2299    2304    6083    6086    6149    6433    6569    6571    6579    6689    6710
                    6724    6728    6742    6759    6761    6764    6766    6770    6777    6816    6911    6981    7020
                    7021    7024    7037    7048    7067    7120    7126    7131    7135    7140    7141    7143    7146
                    7150    7198#   7261
TYPOC = 104402      2071    2125    2150    6154    6439    6577    6584    6727    6750    6774    7023    7199#
TYPON = 104404      7201#
TYPOS = 104403      1930    1942    2293    7200#
T56     020140      5862#   6058
T56FLG  001434      1179#   2096*   5865*   6059*   6707
WATIME  021742      2099    2174    6500#
WATINT  021706      6484#   7222
WAT.IN= 104420      4619    4633    4682    4703    4794    5538    7222#
$AUTOB  001134      1053#   1880*   7017    7166
$BDADR  001122      1048#
$BDDAT  001126      1050#
$CHARC  023304      6818*   6828*   6835    6844*   6849#
$CKSWR  023762      7009#   7206
$CMTAG  001100      1036#   1830    1831    1839    1845    1846
$CM1   = 000012     1068#   1069#   1070#   1071#   1072#   1073#   1074#   1075#   1076#   1077#   1078#
$CM2   = 000024     1068#   1069#   1070#   1071#   1072#   1073#   1074#   1075#   1076#   1077#   1078#
$CM3   = 000012     1066#   1068
$CNTLG  024647      7020    7161#
$CNTLU  024642      7037    7135    7160#
$CRLF   001213      1081#   2067    2141    2305    6689    6742    6761    6766    6770    6817    6852    7048    7140
                    7160
$DBLK   023524      6877    6911    6919#
$DOAGN  020750      6079    6088    6094#
$DTBL   023514      6880    6915#
$ENDAD  020740      1025    6090#
$ENDCT  020706      6081#
$ENDMG  020757      6083    6098#
$ENULL  020754      6086    6097#
$EOP    020652      2100    2267    5864    6071#   6713
$EOPCT  020700      6078#   6082
$ERFLG  001103      1039#   6600    6629    6631    6637*   6658    6673*
$ERMAX  001115      1045#   1847*   6631    6653*   6658
$ERROR  022412      1839    6672#
$ERRPC  001116      1046#   6683*   6684*   6685    6748    7814    7816    7819    7822    7824    7827
$ERRTB  001442      1196#   6756
$ERRTY  022734      6688    6741#
$ERTTL  001112      1043#   2264*   5826*   6676*   6680
$ESCAP  001210      1079#   1846*   6652*   6702    6704
$FILLC  001156      1064#   6821    6852
$FILLS  001155      1063#   6852
$GDADR  001120      1047#
$GDDAT  001124      1049#
$GET42  020730      6087#
$GTSWR  024032      7021#   7204
$HD    = 000000      871
$ICNT   001104      1040#   6644*   6645    6647*   6657
$ILLUP  025142      7231    7247    7266#
$INTAG  001135      1054#   7049    7166
$ITEMB  001114      1044#   6685*   6745
$LF     001214      1082#   6852    7150    7160
$LPADR  001106      1041#   1848*   2155    6635*   6650*   6655    6657    6698
$LPERR  001110      1042#   1849*   3126*   3329*   3499*   3616*   3779*   3903*   4859*   5224*   5582*   5748*   6635
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                    6651*  6657   6701
$MAIL = ****** U    1866   1876   6650   6805
$MNEW   024665      7024   7164#
$MSWR   024654      7021   7162#
$MXCNT  022410      6648   6657#
$NULL   001154      1062#  6823   6852
$NWTST= 000001      2178#  2180   2253#  2255   2306#  2353#  2390#  2410#  2412   2428#  2430   2525#  2527
                    2562#  2588#  2590   2648#  2650   2711#  2713   2760#  2762   2872#  2874   2979#  2981
                    3105#  3107   3200#  3202   3309#  3311   3470#  3472   3595#  3597   3754#  3756   3886#
                    3888   3990#  3992   4111#  4113   4222#  4224   4301#  4303   4387#  4389   4475#  4477
                    4587#  4589   4651#  4653   4762#  4764   4836#  4838   4918#  4920   4995#  4997   5060#
                    5062   5132#  5134   5212#  5214   5297#  5299   5369#  5371   5435#  5437   5503#  5505
                    5569#  5571   5637#  5639   5732#  5734   5791#  5793   5806#  5808   5829#  5831
$OCNT   023756      6953*  6982*  6995#
$OMODE  023760      6948*  6952*  6957   6960*  6971*  6997#
$OVER   022374      6612   6628   6636   6646   6654#
$PASS   001100      1037#  6075*  6076*  6084   6097   6642   6658
$POWER  025150      7262   7269#
$PWRAD  025136      7264#
$PWRDN  024776      1843   7231#  7259
$PWRMG  025132      7262#
$PWRUP  025050      7241   7247#
$QUES   001212      1080#  6852   7067   7143   7160
$RDCHR  024244      7080#  7207
$RDDEC= ****** U    7209
$RDLIN  024364      7108#  7208
$RDOCT= ****** U    7209
$RDSZ = 000022      7101#
$REGAD  001160      1066#
$REGO   001162      1068#  2211*  2324*  2345*  2377*  2422*  2500*  2505*  2510*  2517*  2556*  2576*  2643*
                    2706*  2857*  2867*  2953*  2964*  2971*  3055*  3066*  3086*  3093*  3185*  3274*  3285*
                    3286*  3301*  3389*  3417*  3448*  3464*  3714*  3715*  3842*  3856*  3953*  3959*  3970*
                    4034*  4080*  4101*  4197*  4216*  4284*  4285*  4346*  4352*  4360*  4367*  4378*  4450*
                    4458*  4464*  4471*  4536*  4547*  4566*  4621*  4689*  4700*  4722*  4732*  4752*  4759*
                    4799*  4815*  4831*  4884*  4910*  5292*  5338*  5479*  5490*  5555*  5616*  5628*  5721*
                    5771*  5961*  5968*  6000*  6019*  6133*  6305*  6331*  6342*  6366*  7814   7816   7819
                    7824   7827
$REG1   001164      1069#  2511*  2518*  2557*  2644*  2707*  2858*  2868*  2954*  2965*  2972*  3056*  3067*
                    3087*  3094*  3101*  3102*  3186*  3275*  3287*  3302*  3390*  3418*  3449*  3465*  3712*
                    3843*  3857*  3952*  3960*  3971*  4035*  4081*  4102*  4198*  4217*  4286*  4353*  4361*
                    4368*  4379*  4451*  4459*  4465*  4472*  4537*  4548*  4562*  4735*  4816*  4832*  4885*
                    4911*  5293*  5339*  5480*  5491*  5556*  5617*  5629*  5719*  5772*  6132*  6306*  6332*
                    6343*  7816   7819   7824   7827
$REG10  001202      1076#  2833*  2929*  3031*  3158*  3248*  3369*  3537*  3668*  3696*  3699*  3818*  4178*
                    4264*  4522*  5692*  5708*  6192   6196   6261*  6264*  6287*  6290*
$REG11  001204      1077#
$REG2   001166      1070#  2966*  3068*  3288*  3391*  3419*  3713*  3844*  3972*  4036*  4103*  4288*  4380*
                    4549*  4563*  4955*  4964*  5029*  5093*  5101*  5171*  5252*  5332*  5417*  5722*  6131*
                    7819   7824   7827
$REG3   001170      1071#  3548*  3682*  3830*  5723*  6130*  6181   6560*  6562*  6565*  7819   7827
$REG4   001172      1072#  7827
$REG5   001174      1073#  7827
$REG6   001176      1074#  7827
$REG7   001200      1075#  6185   7827
$RTNAD  020752      6096#
$R2A  = ****** U    7209
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$SAVRE= ****** U        7209
$SAVR6  025146          7240* 7248  7249* 7250* 7268#
$SCOPE  022140          1837  6609#
$SETUP= 000117          1814# 1836  1837  1839  1841  1843  1845  1846  1848  1872  1873  6073  6610
                        7004  7166
$STUP = 177777          1814#
$SVLAD  022346          6620  6649#
$SVPC = 000204          1023# 1028
$SWR  = 165400           852#  871   877   878   879   880   881   882   883   884  1078  1079  1080
                        1845  1846  1848  1849  2193  2260  2310  2357  2394  2416  2446  2531  2566
                        2598  2656  2722  2776  2894  2996  3120  3220  3329  3498  3615  3778  3895
                        3999  4120  4234  4308  4397  4489  4596  4661  4769  4847  4927  5004  5070
                        5139  5220  5305  5379  5448  5513  5579  5648  5743  5798  5815  5846  6068
                        6074  6089  6095  6097  6601  6602  6603  6604  6605  6611  6623  6625  6626
                        6629  6630  6631  6638  6639  6640  6651  6654  6657  7265
$SWRMK= 000000           884   885  6605  6606  6627
$TIMES  001206         1078# 1845* 2260* 3498* 3615* 3778* 3895* 3999* 4661* 5648* 5743* 5798* 5815*
                       5846* 6074* 6638* 6645  6648* 6657
$TKB    001146         1059# 7002  7013  7030  7084  7090
$TKS    001144         1058# 5698  5699* 5715  5718  7002  7011  7027  7051* 7082  7088
$TN   = 000060          852#  871  2178  2193# 2253  2260# 2306  2310# 2341  2353  2357# 2381  2390
                       2394# 2406  2410  2416# 2419  2428  2446# 2481  2503  2508  2515  2525  2531#
                       2554  2562  2566# 2579  2588  2598# 2642  2648  2656# 2705  2711  2722# 2760
                       2776# 2866  2872  2894# 2970  2979  2996# 3100  3105  3120# 3200  3220# 3300
                       3309  3329# 3463  3470  3498# 3595  3615# 3733  3749  3754  3778# 3867  3886
                       3895# 3990  3999# 4001  4100  4111  4120# 4215  4222  4234# 4274  4294  4301
                       4308# 4376  4387  4397# 4470  4475  4489# 4541  4559  4584  4587  4596# 4651
                       4661# 4758  4762  4769# 4830  4836  4847# 4901  4918  4927# 4995  5004# 5060
                       5070# 5132  5139# 5163  5212  5220# 5291  5297  5305# 5369  5379# 5435  5448#
                       5489  5503  5513# 5569  5579# 5637  5648# 5659  5717  5732  5743# 5791  5798#
                       5806  5815# 5829  5846#
$TPB    001152         1061# 6841* 6852
$TPFLG  001157         1065# 6799  6852
$TPS    001150         1060# 6839  6852
$TRAP   024676         1841  7175#
$TRAP2  024720         7186# 7197
$TRP  = 000022         7190# 7199# 7200# 7201# 7202# 7203# 7204  7205# 7206  7207# 7208# 7209# 7210
                       7211# 7212  7213# 7214  7215# 7216  7217# 7218  7219# 7220  7221# 7222  7223#
                       7224  7225#
$TRPAD  024732         7180  7197#
$TSTNM  001102         1038# 2261* 6073* 6600  6627  6649* 6654  6658  6675
$TTYIN  024620         7110  7111  7123  7141  7155  7159#
$TYPBN= ****** U       7203
$TYPDS  023310         6865# 7202
$TYPE   023070         6799# 7190  7198
$TYPEC  023240         6820  6827  6834  6839# 6840  7053
$TYPEX  023306         6845  6847  6850#
$TYPOC  023560         6951# 7199
$TYPON  023574         6950  6953# 7201
$TYPOS  023534         6946# 7200
$XTSTR  022152         6614#
$$GET4= 000000         6089#
$OFILL  023757         6947* 6951* 6961  6996#
$40CAT= ****** U       6611
.     = 034342         1010# 1014# 1023  1024# 1026# 1028# 1035# 1083  1087# 1824  1834  1848  1849
                       1884# 1927# 1939# 1948# 1952# 1991# 2123# 2148# 2266  2620  3193  3440  3569
```

4055	461'	4879	5887	5889	5896	5994	6097	6101	6152#	6403	6436#	6582#
6657	66>8	6691	6697	6780#	6852	6919#	7002	7159#	7160	7166	7243	7267
7810#	7'97#	8000#										

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COMMEN      1#   1008#
ENDCOM      1#   1008#
ERROR     902#   2212   2223   2325   2336   2346   2372   2378   2383   2408   2423   2501   2506   2512   2519
         2558   2577   2581   2614   2627   2633   2638   2645   2674   2684   2688   2697   2702   2708   2735
         2747   2751   2824   2836   2843   2849   2853   2859   2863   2869   2919   2932   2938   2944   2949
         2955   2959   2967   2973   3021   3034   3041   3047   3051   3057   3061   3069   3088   3095   3103
         3162   3168   3177   3187   3251   3258   3267   3276   3280   3289   3297   3303   3372   3379   3392
         3397   3421   3450   3466   3540   3549   3554   3561   3672   3684   3689   3702   3717   3728   3821
         3831   3835   3845   3858   3927   3937   3942   3946   3954   3961   3973   4037   4069   4075   4082
         4104   4168   4181   4189   4199   4204   4208   4212   4218   4267   4289   4333   4337   4342   4347
         4354   4362   4369   4381   4426   4430   4436   4441   4452   4460   4466   4473   4525   4529   4538
         4552   4568   4622   4640   4675   4690   4701   4710   4723   4736   4753   4760   4800   4810   4817
         4821   4833   4886   4912   4957   4965   4970   4985   4989   4992   5031   5038   5053   5057   5094
         5102   5107   5122   5126   5130   5172   5187   5201   5205   5209   5238   5245   5253   5258   5261
         5273   5288   5294   5333   5340   5347   5362   5366   5412   5418   5423   5428   5432   5472   5481
         5492   5542   5557   5586   5608   5618   5630   5694   5710   5724   5753   5761   5773   5802   5819
         5926   5962   5969   6003   6021   7274   7292
ESCAPE      1#   1008#
GETPRI      1#   1008#
GETSWR      1#    852#  1008#  1873#
MESAGE   2177#   2180   2253#  2255   2410#  2412   2427#  2430   2524#  2527   2588#  2590   2648#  2650   2711#
         2713   2760#  2762   2872#  2874   2978#  2981   3105#  3107   3200#  3202   3308#  3311   3470#  3472
         3594#  3597   3753#  3756   3885#  3888   3989#  3992   4110#  4113   4221#  4224   4300#  4303   4387#
         4389   4475#  4477   4587#  4589   4651#  4653   4762#  4764   4836#  4838   4918#  4920   4995#  4997
         5060#  5062   5132#  5134   5212#  5214   5297#  5299   5369#  5371   5435#  5437   5502#  5505   5568#
         5571   5637#  5639   5731#  5734   5791#  5793   5806#  5808   5828#  5831
MORETA   1029#  1084
MULT        1#   1008#
NEWTST      1#   1008#  2178   2253   2306   2353   2390   2410   2428   2525   2562   2588   2648   2711   2760
         2872   2979   3105   3200   3309   3470   3595   3754   3886   3990   4111   4222   4301   4387   4475
         4587   4651   4762   4836   4918   4995   5060   5132   5212   5297   5369   5435   5503   5569   5637
         5732   5791   5806   5829
POP         1#   1008#  6906   7252   7253
PRIOR7   1198#   4608   4645   4743   4824   4897   5561   5662   5899
PUSH        1#   1008#  6865   7233   7239
REPORT      1#   1008#
SCOPE     903#   2192   2259   2309   2356   2393   2415   2445   2530   2565   2597   2655   2721   2775   2893
         2995   3119   3219   3328   3497   3614   3777   3894   3998   4119   4233   4307   4396   4488   4595
         4660   4768   4846   4926   5003   5069   5138   5219   5304   5378   5447   5512   5578   5647   5742
         5797   5814   5845   6072
SETPRI      1#   1008#
SETTRA   7190#   7199   7200   7201   7202   7204   7206   7207   7208   7210   7212   7214   7216   7218   7220
         7222   7224
SETUP       1#   1008#  1828
SKIP        1#   1008#  2341   2381   2406   2419   2481   2503   2508   2515   2554   2579   2642   2705   2866
         2970   3100   3300   3463   3733   3749   3867   4001   4100   4215   4274   4294   4376   4470   4541
         4559   4584   4758   4830   4901   5163   5291   5489   5659   5717
SLASH       1#   1008#
SPACE    1008#
STARS       1#   1008#  1021   1031   1083   2178   2191   2253   2258   2306   2308   2353   2355   2390   2392
         2410   2414   2428   2444   2525   2529   2562   2564   2588   2596   2648   2654   2711   2720   2760
         2774   2872   2892   2979   2994   3105   3118   3200   3218   3309   3327   3470   3496   3595   3613
         3754   3776   3886   3893   3990   3997   4111   4118   4222   4232   4301   4306   4387   4395   4475
         4487   4587   4594   4651   4659   4762   4767   4836   4845   4918   4925   4995   5002   5060   5068
         5132   5137   5212   5218   5297   5303   5369   5377   5435   5446   5503   5511   5569   5577   5637
         5646   5732   5741   5791   5796   5806   5813   5829   5844   6064   6597   6736   6784   6855   6923
```

```
        7001    7004    7072    7101    7169    7229    7245
SWRSU     1#    1008#   1850#
TRMTRP  7190#
TYPBIN    1#    1008#
TYPDEC    1#    1008#   6084
TYPNAM    1#     852#   1008#   1868
TYPNUM    1#    1008#
TYPOCS    1#    1008#
TYPOCT    1#    1008#   6748    6772    7022
TYPTXT    1#    1008#   1923    1936    1945    1949    1964    1987    2120    2145    2299    6148    6433    6571    6579
$$CMRE  1029#   1068    1069    1070    1071    1072    1073    1074    1075    1076    1077
$$CMTM  1029#
$$ESCA    1#    1008#
$$NEWT    1#    1008#   2178    2253    2306    2353    2390    2410    2428    2525    2562    2588    2648    2711    2760
          2872    2979    3105    3200    3309    3470    3595    3754    3886    3990    4111    4222    4301    4387    4475
          4587    4651    4762    4836    4918    4995    5060    5132    5212    5297    5369    5435    5503    5569    5637
          5732    5791    5806    5829
$$SET   7190#   7199    7200    7201    7202    7204    7206    7207    7208    7210    7212    7214    7216    7218    7220
          7222    7224
$$SKIP    1#    1008#   2341    2381    2406    2419    2481    2503    2508    2515    2554    2579    2642    2705    2866
          2970    3100    3300    3463    3733    3749    3867    4001    4100    4215    4274    4294    4376    4470    4541
          4559    4584    4758    4830    4901    5163    5291    5489    5659    5717
.EQUAT    1#     852#    898
.HEADE    1#     852#    861
.KT11     1#
.SETUP    1#     852#   1814
.SWRHI    1#     852#    873
.SWRLO  852#     885#
.$ACT1    1#     852#   1019
.$APTB    1#
.$APTH    1#
.$APTY    1#
.$ASTA    1#
.$CATC    1#     852#   1008
.$CMTA    1#     852#   1029
.$DB2D    1#
.$DB2O    1#
.$DIV     1#
.$EOP     1#     852#   6062
.$ERRO    1#
.$ERRT    1#     852#   6734
.$MULT    1#
.$POWE    1#     852#   7227
.$RAND    1#
.$RDDE    1#     852#
.$RDOC    1#
.$READ    1#     852#   6999
.$R2AZ    1#
.$SAVE    1#
.$SB2D    1#
.$SB2O    1#
.$SCOP    1#     852#   6595
.$SIZE    1#
.$SUPR    1#
.$TRAP    1#     852#   7167
.$TYPB    1#
```

```
.$TYPD      1#    852#   6853
.$TYPE      1#    852#   6782
.$TYPO      1#    852#   6921
.$40CA      1#
.1170       1#


. ABS.  034342     000


ERRORS DETECTED:  0

CZRKKF,CZRKKF.LST/CRF/SOL=CZRKKF.SML,CZRKKF.P11
RUN-TIME: 22 31 1 SECONDS
RUN-TIME RATIO: 392/55=7.0
CORE USED:  34K  (67 PAGES)
```