RP04/5/6

FUNCTIONAL CONTROL 1

CZRJIB0

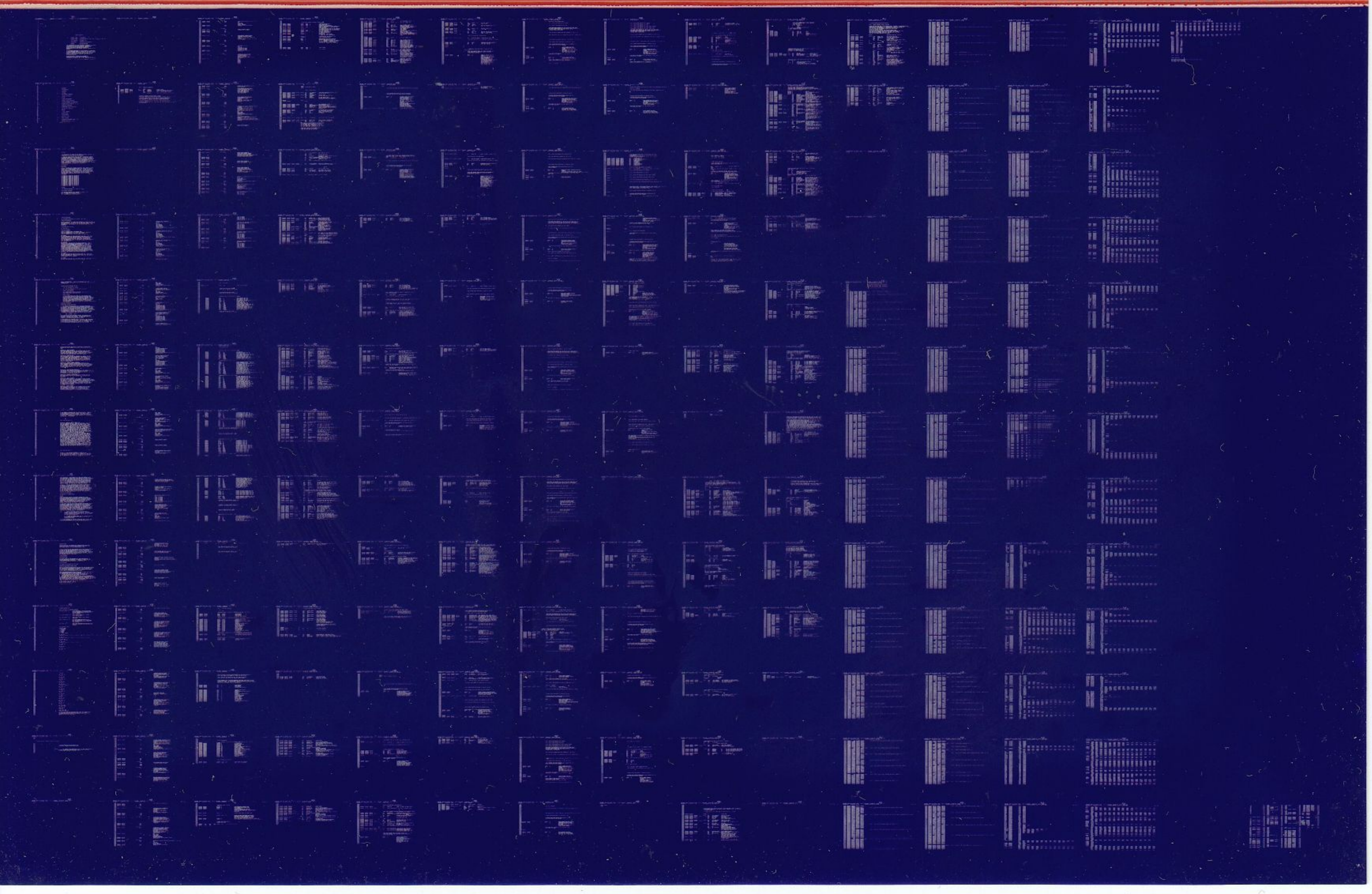
AH-9220B-MC

FICHE 1 OF 1

JAN 1978

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE: AC-9218B-MC
PRODUCT NAME: CZRJIB0 RP04/5/6 FUNCTIONAL CONTROLLER TEST PART I
DATE CREATED: DECEMBER 1977
MAINTAINER: DIAGNOSTIC ENGINEERING
AUTHOR: PETE BLACKSTONE

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                                1.0     ABSTRACT


                                        THIS DIAGNOSTIC IS USED TO TEST RP04/5/6 DEVICE CONTROL LOGIC
                                        CONNECTED TO AN RH11 OR RH70 CONTROLLER.

                                        IT USES THE DISK SURFACE AND THE DRIVE MECHANICS TO PROVE
                                        THE PROPER WORKING OF THE SUBSYSTEM.  IT DOES NOT NEED A
                                        FORMATTED DISK PACK.  A DISK PACK WITH NO VITAL INFORMATION
                                        WRITTEN ON IT IS ESSENTIAL.  AFTER A SUCCESSFUL RUN (WITH
                                        NO ERRORS) OF THIS DIAGNOSTIC IT CAN BE ASSERTED THAT THE
                                        DCL IN THE RP04/5/6 SUBSYSTEM WORKS SUCCESSFULLY WHILE STANDING
                                        ALONE.  SYSTEMS INTERACTION AND DRIVE TIMING IS LEFT TO
                                        OTHER DIAGNOSTICS.  THIS IS WITH THE ASSUMPTION THAT PROGRAMS
                                        DZRJGA AND DZRJHA HAVE BEEN RUN SUCCESSFULLY.

                                2.0     REQUIREMENTS

                                2.1     EQUIPMENT

                                        PDP-11 COMPUTER WITH CONSOLE TELETYPE, AND A RP04/5/6 DISK
                                        SYSTEM.  THE RP04/5/6 DISK SYSTEM WILL CONSIST OF AN RH11
                                        CONTROLLER, A DISK CONTROL LOGIC (DCL), A DEC 733 DISK
                                        DRIVE, AND ITS APPROPRIATE DISK PACK.  THE DISK PACK NEED
                                        NOT BE FORMATTED.  USED SECTION OF THE DISK SURFACE SHALL
                                        BE GOOD (HOLE FREE).  THE SURFACE FOR THE FOLLOWING SECTORS
                                        MUST BE GOOD, THAT IS, FREE OF ANY HOLES OR SURFACE
                                        IRREGULARITY BEFORE ANY DATA ERROR CAN BE ATTRIBUTED TO
                                        THE LOGIC.

                                        CYLINDER 00, TRACK 00, SECTOR 00
                                        CYLINDER 00, TRACK 00, SECTOR 01
                                        CYLINDER 00, TRACK 18, SECTOR 21
                                        CYLINDER 01, TRACK 00, SECTOR 00
                                        CYLINDER 02, TRACK 00, SECTOR 00
                                        CYLINDER 03, TRACK 00, SECTOR 00
                                        CYLINDER 04, TRACK 00, SECTOR 00
                                        CYLINDER 05, TRACK 00, SECTOR 00
                                        CYLINDER 05, TRACK 07, SECTOR 04
                                        CYLINDER 06, TRACK 00, SECTOR 00
                                        CYLINDER 07, TRACK 00, SECTOR 00
                                        CYLINDER 08, TRACK 00, SECTOR 00
                                        CYLINDER 09, TRACK 18, SECTOR 21
                                        CYLINDER 410,TRACK 18, SECTOR 21

                                2.2     STORAGE

                                        THIS PROGRAM REQUIRES 16K WORDS OF MEMORY

                                2.3     PRELIMINARY PROGRAMS

                                        THIS PROGRAM ASSUMES THAT MAINDEC-11-DZRJG-(LATEST
                                        REV) HAS BEEN RUN WITHOUT ERRORS.
                                        AND IT ASSUMES THAT MAINDEC-11-DZRJH-(LATEST
                                        REV) HAS BEEN RUN WITHOUT ERRORS.
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                        3.0     LOADING PROCEDURE

                                USE STANDARD PROCEDURE FOR LOADING .ABS TAPES

                        4.0     STARTING PROCEDURE

                                SWITCH 12 MUST BE SET WHEN THIS PROGRAM IS TO BE RUN USING AN
                                RH70 CONTROLLER.  IT CAN BE SET AT THE FRONT PANEL, OR IN THE
                                SOFTWARE SWITCH REGISTER IF THE OPERATOR SO DESIRES.  SEE
                                PARAGRAPH 5.1 FOR A DESCRIPTION OF SOFTWARE SWITCH REGISTER
                                OPERATION.

                        4.1     CONTROL SWITCH SETTINGS

                                SEE SECTION 5.1

                        4.2     STARTING ADDRESS

                                START AT ADDRESS 200---FOR NORMAL RUN
                                START AT ADDRESS 204---TO SELECT NON-DEFAULT ADDRESSES
                                START AT ADDRESS 210---FOR UNIT SELECTION
                                START AT ADDRESS 220---FOR NO MANUAL INTERVENTION

                                200 START
                                ALL SWITCHES MUST BE DOWN FOR WORST CASE RUN.  WITH THIS
                                STARTING ADDRESS ALL THE RP04/5/6S ON THE SYSTEM WILL BE
                                TESTED ONE AT A TIME BEFORE "END PASS" IS PRINTED OUT.
                                TESTING WILL START WITH THE LOWEST UNIT NUMBER DRIVE
                                THAT IS POWERED UP (THAT IS THE LOWEST UNIT NUMBER RHAS REGISTER
                                THAT RESPONDS)THEN GO ON TO THE NEXT HIGHER UNIT NUMBER
                                THAT IS POWERED UP.

                                204 RESTART
                                SAME AS START 200 WITH THE FOLLOWING EXCEPTION:  THE
                                PROGRAM WILL INTERROGATE THE OPERATOR FOR A NON-STANDARD
                                C.S.R AND VECTOR ADDRESS BEFORE STARTING.  ONCE THE
                                QUESTIONS HAVE BEEN CORRECTLY ANSWERED, AND IT IS ALSO
                                NECESSARY TO SELECT A PARTICULAR UNIT FOR TEST (TYPICAL
                                PROGRAM EXECUTION FROM ADDRESS 210), OR IT IS NECESSARY
                                TO RUN THE PROGRAM WITHOUT MANUAL INTERVENTION (TYPICAL
                                PROGRAM EXECUTION FROM ADDRESS 220), THE PROCESSOR MAY
                                BE HALTED AND RESTARTED FROM THE DESIRED RESTART ADDRESS.
                                IF ALL UNITS ARE TO BE CHECKED, THE PROCESSOR NEED NOT BE
                                TOUCHED.  THE PROGRAM WILL AUTOMATICALLY RESTART AT ADDRESS
                                200 AFTER RECEIVING THE NEW DEVICE PARAMETERS.

                                210 START
                                ALL SWITCHES MUST BE DOWN FOR WORST CASE RUN.  WITH THIS
                                STARTING ADDRESS THE CONSOLE TELETYPE WILL ASK FOR THE UNIT
                                NUMBER TO BE TESTED.  THEN ONLY THAT UNIT WILL BE TESTED
                                FOR EACH PASS OF THE PROGRAM.

                                220 START
                                ALL SWITCHES MUST BE DOWN FOR WORST CASE RUN. WITH THIS STARTING
                                ADDRESS THE PROGRAM WILL NOT RUN THOSE TESTS THAT NEED
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MANUAL INTERVENTION. THIS IS RECOMMENDED ONLY FOR DEBUGGING WHERE THE ERROR IS NOT IN A TEST THAT REQUIRES MANUAL INTERVENTION

4.3 PROGRAM AND/OR OPERATOR ACTION

1. LOAD THE PROGRAM INTO MEMORY.
2. SET STARTING ADDRESS ON THE SWITCH REGISTER
3. PRESS "LOAD ADDRESS".
4. SET "OPERATIONAL SWITCH SETTINGS" (SEE SECTION 5.1) WORST CASE IS ALL SWITCHES DOWN.
5. PRESS "START".
6. FOR THE FIRST PASS EACH TEST WILL BE EXECUTED ONCE ON THE DRIVES PRESENT OR DRIVE SELECTED BEFORE "END PASS" IS PRINTED. THE FIRST PASS WILL REQUIRE OPERATOR INTERVENTION IF THE PROGRAM IS NOT RUN UNDER AN "ACT-11" MONITOR. THE SECOND AND SUBSEQUENT PASSES WILL EXECUTE EACH TEST FOUR TIMES ON EACH DRIVES PRESENT OR DRIVE SELECTED BEFORE "END PASS" IS PRINTED. THE SECOND AND SUBSEQUENT PASSED DO NOT NEED ANY OPERATOR INTERVENTION.

5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

IF THE PROGRAM IS BEIDNG RUN ON A SWITCHLES PROCESSOR (I. E. AN 11/34) IT WILL DETERMINE THAT A HARWARE SWITCH REGISTER IS NOT PRESENT, AND WILL USE "SOFTWARE" SWITCH REGISTER. THE SETTINGS OF THE SWITCHES ARE CONTROLLED THROUGH A KEYBOARD ROUTINE WHICH IS CALED BY TYPING A 'COBNTROL G'. THE PROGRAM WILL RECOGNIZE A 'CONTROL G' AT ANY TIME EXCEPT WHEN IT IS AR A HIGHER PRIORITY PROCESSING AN RP04/5/6 INTERRUPT. THE "SOFTWARE" SWITCH VALUE S ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE TO PROMPTING FROM THE SWITCH ENTRY ROUTINE:

'SWR = NNNNNN NEW ='

EACH TIME SWITCH SETTINGS 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 REGISTER, THE "SOFTWARE" SWITCH REGISTER MAY ALSO BE USED. IF THE PROGRAM FINDS ALL 16 SWITCHES IN THE 'UP' POSITION WHEN IT IS STARTED, ALL SWITCH REGISTER REFERENCES WILL BE TO THE "SOFTWARE" REGISTER AND THE PROCEDURES DESCRIBED ABOVE MUST BE FOLLOWED.

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                SWITCH DEFINITIONS ARE GIVEN IN SECTION 9 "OPERATIONAL
                SWITCH SETTINGS" HOWEVER THE DETAIL DESCRIPTION ARE GIVEN
                HERE.

                SWITCH 15 - HALT ON ERROR
                WHEN THIS SWITCH IS SET, IF THE PROGRAM FINDS AN ERROR
                THEN THE APPROPIATE INFORMATION WILL BE PRINTED OUT
                AND THEN THE PROGRAM WILL HALT.  AFTER THIS HALT, PRESSING
                "CONTINUE" WILL CONTINUE WITH THE PROGRAM TILL THE NEXT
                ERROR IS FOUND WHEN THE SAME THING WILL HAPPEN.

                SWITCH 14 - LOOP ON TEST
                WHEN THIS SWITCH IS SET THE PROGRAM WILL BEGIN TO LOOP
                ON THE CURRENT TEST BEING EXECUTED.  FOR EXAMPLE IF THIS
                SWITCH IS SET WHEN THE PROGRAM IS IN TEST 10 THEN THE
                PROGRAM WILL KEEP EXECUTING ALL OF TEST 10 REPEATEDLY.
                ONE WAY TO BE SURE THAT THE PROGRAM IS IN THE EXPECTED
                TEST IS TO SET THIS SWITCH DURING AN ERROR PRINTOUT OR
                DURING A PROGRAM HALT.

                SWITCH 13 - INHIBIT ERROR TYPEOUTS
                WHEN THIS SWITCH IS SET FURTHER ERROR PRINTOUTS WILL
                CEASE, HOWEVER OPERATOR INSTRUCTIONS SUCH AS "STOP DRIVE X"
                WILL CONTINUE.  AT THE END OF PASS "TOTAL NUMBER OF ERRORS
                ON THIS PASS ON DRIVE X" WILL BE TRUE, THAT IS, ALTHOUGH
                PRINTOUTS WERE INHIBITED IF THAT PASS FOUND 6 ERRORS,
                IT WILL SAY SO.


                SWITCH 12 - RH70 CONTROLLER SELECT
                THIS SWITCH MUST BE SET AT THE START OF THE PROGRAM WHEN THE
                DISK DRIVES TO BE TESTED ARE CONNECTED TO AN RH70
                CONTROLLER.  IT MUST NOT BE SET WHEN DISK DRIVES TO BE TESTED
                ARE CONNECTED TO AN RH11 CONTROLLER.

                SWITCH 11 - INHIBIT ITERATIONS
                WHEN THIS SWITCH IS SET THE PROGRAM ON SECOND PASS WILL
                NOT REPEAT EACH TEST FOUR TIMES BUT WILL DO EACH TEST
                ONCE ONLY.

                SWITCH 10 - BELL ON ERROR
                WHEN THIS SWITCH IS SET, IF THE PROGRAM FINDS AN ERROR
                THE "BELL" OR "ALARM" WILL BE SOUNDED.  THIS SWITCH IS USEFUL
                WHEN SWITCH 11 IS SET YET INFORMATION IS NEEDED WHEN ANY ERROR
                IS DETECTED. TAKE THE EXAMPLE OF A PROGRAM LOOPING ON A TEST WITH
                SWITCH 11 SET TO HELP SCOPING.  THEN IF THIS SWITCH IS
                SET AND THE BELL OR ALARM SOUNDS IT MEANS THAT THE ERROR
                IS PRESENT BUT IF THE BELL OR ALARM STOPS IT MEANS THAT
                THE ERROR IS NOT PRESENT.

                SWITCH 9 - LOOP ON ERROR
                WHEN THIS SWITCH IS SET, IF THE PROGRAM FINDS AN ERROR
                THEN GENERALLY THE PROGRAM WILL LOOP BACK TO THE LAST
                EXECUTED "SCOPE" STATEMENT.  IF ON THE SECOND TIME
                THROUGH AN ERROR IS FOUND IT WILL AGAIN LOOP BACK TO
                THAT "SCOPE" STATEMENT.  THIS LOOPING WILL CONTINUE AS LONG
```

AS THE ERROR IS PRESENT AND THIS SWITCH IS SET. HOWEVER
IF THE ERROR IS NOT PRESENT AT ANY TIME THEN IT WILL
CONTINUE NORMALLY WITH THE PROGRAM. EACH TIME THE ERROR
IS ENCOUNTERED PRINTOUT WILL TAKE PLACE UNLESS SWITCH 11
IS ALSO SET. DURING BEGUG, USING A SCOPE, IT IS RECOMMENDED
THAT SWITCH 11 IS ALSO SET.

NOTE: SEE SECTION 8.3

SWITCH 8 - LOOP ON TEST IN SWR <7:0>
THIS IS A SPECIAL SWITCH. WHEN SET SWITCHES 0 THRU 7
HAVE ONE MEANING AND WHEN RESET SWITCHES 0 THRU 7 HAVE
ANOTHER MEANING. THIS MEANS THAT ANY SETTING OF SWITCH
0 THRU 7 MUST BE DONE WITH SWITCH 8 IN THE APPROPIATE
POSITION. WHEN THIS SWITCH IS SET THEN SWITCHES 0 THRU
7 GIVE THE TEST NUMBER TO BE LOOPED ON. FOR EXAMPLE
WITH SWITCH 8 SET AND SWITCH 3 SET THE PROGRAM WILL LOOP
ON TEST 10. HOWEVER THIS SETTING MUST BE DONE AT THE
BEGINNING OF THE PROGRAM THEN ALL THE TESTS FROM 1 TO 10
WILL BE EXECUTED AND THEN TEST 10 WILL BE REPEATED OVER
AND OVER AGAIN. WHEN THIS SWITCH IS NOT SET THEN SWITCHES
0 THRU 7 HAVE THE MEAING ITS NAME INDICATES.
FOR EXAMPLE SWITCH 7 IS "STOP FURTHER COMPARES: THAT IS
IF SWITCH 8 IS NOT SET AND SWITCH 7 IS SET THEN WHEN A
DATA ERROR IS DETECTED NO FURTHER COMPARES WILL BE DONE.
FOR EXAMPLE IN A 256 WORD BUFFER IF ALL THE WORDS ARE IN
ERROR THEN AFTER SEEING THE PRINTOUT FOR THE FIRST FEW
WORDS SETTING SWITCH 7 ONLY WILL STOP FURTHER PRINTOUTS
OF THIS ERROR AND GO ON WITH THE TEST RATHER THAN PRINT
ALL THE 256 WORDS. HOWEVER IF THIS WAS DONE WITH SWITCH 11
THEN THE NEXT ERROR THAT THE PROGRAM DETECTS IN A SUB-
SEQUENT TEST WILL ALSO BE LOST. BUT WITH SWITCH 7 ONLY
THIS GROUP OF DATA ERRORS ARE NOT PRINTED OUT. ANOTHER
EXAMPLE OF SWITCH 8 BEING LOW IS WITH SWITCH 6, WHICH
IS "ECC TEST-COMPARE END RESULT ONLY". THAT IS IF SWITCH
8 IS NOT SET AND SWITCH 6 IS SET THEN ON ECC TESTS (TEST
120 THRU TEST 134) INSTEAD OF COMPARING CONTENTS OF THE
POSITION REGISTER AND PATTERN REGISTER AFTER EVERY CLOCK,
COMPARES WILL ONLY BE DONE AT THE END OF ALL THE CLOCKS.

NOTE: SEE SECTION 8.3

SWITCH 7 - STOP FURTHER COMPARES IF SW08 IS LOW.
IF SWITCH 8 IS SET AND THIS SWITCH IS ALSO SET THEN THIS
SWITCH GIVES THE TEST NUMBER TO BE LOOPED ON AS INDICATED
IN THE DESCRIPTION OF SWITCH 8. IF SWITCH 8 IS NOT SET
AND THIS SWITCH IS SET THEN THE PROGRAM WILL DO AS THE

NAME INDICATES. FOR EXAMPLE IN A 256 WORD BUFFER IF ALL
THE WORDS ARE IN ERROR THEN AFTER SEEING THE ERROR PRINTOUTS
FOR THE FIRST FEW WORDS THEN SETTING SWITCH 7 WITH SWITCH 8
NOT SET WILL STOP THE PRINTOUT OF ALL 256 WORDS BUT WILL
NOT STOP THE PRINTOUT OF ANOTHER ERROR IN ANY SUBSEQUENT
TEST. IT IS EXPECTED THAT SWITCH 7 AFTER BEING SET FOR
A WHILE TO STOP PRINTING ALL THE 256 WORDS WILL BE RESET
AGAIN TO ENABLE THE PRINTING OF OTHER DATA ERRORS.

SWITCH 6 - TYPE ALL REGISTERS WITH ERROR IF SW08 IS LOW
IF SWITCH 8 IS SET AND THIS SWITCH IS ALSO SET THEN
THIS SWITCH GIVES THE TEST NUMBER TO BE LOOPED ON AS
INDICATED IN THE DESCRIPTION OF SWITCH 8. IF SWITCH 8 IS
NOT SET AND THIS SWITCH IS SET THEN THE PROGRAM WILL DO
AS THE NAME INDICATES. THAT IS ON FINDING AN ERROR INSTEAD
OF ONLY GIVING THE ERROR MESSAGE AND RELEVANT REGISTERS
AS WILL BE DONE IF SWITCH 11 IS NOT SET BUT WILL ALSO
GIVE ALL THE REGISTER CONTENTS (EXCEPT "DATA BUFFER" RHDB).

5.2 SUB-ROUTINE ABSTRACTS

SEE SECTION 9 "SUBROUTINES".

6.0 ERRORS

ERROR PRINTOUTS CONTAIN THE ERROR ADDRESS AND OTHER
PERTINENT INFORMATION CONCERNING THE PARTICULAR FAILURE.
THIS INFORMATION MAY BE THE CONTENTS OF RELEVANT RP04/5/6
REGISTERS OR GOOD/RECEIVED DATA. IF THE ERROR OCCURRED IN A
SUBROUTINE, THE ADDRESS OF THE SUBROUTINE CALL IS ALSO
GIVEN. REFER TO THE PROGRAM LISTING AT THE STATED
ADDRESS TO DETERMINE THE CAUSE OF THE ERROR.

6.1

IN THE EVENT THAT THE DISK DRIVE BECOMES UNAVAILABLE TO THE
CONTROLLER, POWERS DOWN, OR CERTAIN CRITICAL STATUS BITS
CANNOT BE CLEARED PRIOR TO THE START OF A TEST SEQUENCE -
THIS INFORMATION WILL BE COMMUNICATED TO THE OPERATIOR. IN
ADDITION, THE TTY BELL WILL RING AND THE PROGRAM WILL HALT.
IT IS SUGGESTED THAT IF THIS HAPPENS, THE OPERATOR LOAD
ADDRESS 200 (210) AND RESTART THE PROGRAM AS A FIRST ATTEMPT
TO SOLVE THE PROBLEM. IF THE FILURE CONTINUES TO OCCUR,
THERE ARE TWO OPTIONS OPEN TO THE OPERATOR:

1. LOOK IN THE TEST LISTING FOR THE 'HALT'
INSTRUCTION AND REPLACE IT PLUS THE TWO WORDS
("TYPE ,CPHALT") ABOVE WITH 'NOP'S. WITH TTY ERROR
PRINTOUTS INHIBITED, A SCOPE LOOP CAN BE INITIATED
FOR THE TEST IN QUESTION.

2. GO BACK AND RERUN DZRPS, AS IT IS QUITE POSSIBLE
THAT A HARD FAILURE HAS OCCURRED IN ONE OF THE
HARDWARE REGISTERS.

IT IS ALSO POSSIBLE TO CONTINUE FROM THE 'HALT' POINT, BUT
THIS IS NOT RECOMMENDED AS ALL FOLLOWISNG TESTS WILL EXHIBIT
THE SAME SYMPTOMS AND GIVE MISLEADING ERROR PRINTOUTS.

7.0 RESTRICTIONS

BEFORE STARTING THE PROGRAM THE OPERATOR MUST HAVE THE DRIVE PORT SWITCH LOCKED EITHER ON PORT A OR PORT B BUT MUST NEVER LEAVE IT IN THE PROGRAMMABLE STATE.

SWITCH 12 MUST BE SET WHEN RUNNING ON AN RH70 CONTROLLER AND IT MUST NOT BE SET WHEN RUNNING ON AN RH11 CONTROLLER. BECAUSE OF THE REQUIREMENT FOR IT TO BE SET WHEN USING AN RH70, THE PROGRAM CANNOT BE RUN IN CHAIN MODE WHEN USING THE SOFTWARE SWITCH REGISTER FEATURE WHILE ON AN RH70. THIS IS BECAUSE THE ROUTINE WHICH GETS "SOFTWARE" SWITCH SETTINGS IS NOT OPERABLE WHEN IN CHAIN MODE.

8. MISCELLANEOUS

8.1 EXECUTION TIME

THE FIRST PASS OF THE PROGRAM WILL TAKE APPROXIMATELY 1 MINUTES PROVIDED AN OPERATOR IS PRESENT TO CARRY OUT THE TYPED INSTRUCTIONS IMMEDIATELY. SUBSEQUENT PASSES WILL TAKE 30 SECONDS WHETHER AN OPERATOR IS THERE OR NOT.

8.2 STACK POINTER

THE STACK IS INITIALLY SET TO 1000

8.3 OPERATOR SELECTABLE SCOPE LOOPS

HERE IS A DETAILED EXPLAINATION OF HOW THE LOOP ON ERROR WORKS. FOR INSTRUCTIONS REGARDING THE USAGE OF THIS TECHNIQUE, HIT ↑C ANY TIME WHILE THE PROGRAM IS RUNNING. ON HITTING AN ERROR IF THE LOOP ON ERROR SWITCH IS SET, THE PROGRAM GOES BACK - USUALLY BACK TO THE BEGINNING OF THE TEST.

WHEN THIS OPERATOR SELECTABLE SCOPE LOOP IS USED THEN THE POINT THE PROGRAM GOES BACK TO CAN BE CHANGED.
THE RESTRICTIONS TO THE POINT WHERE THE PROGRAM CAN GO ARE: -
1. IT MUST BE WITHIN THE TEST UNDER CONSIDERATION
2. LOOP ON ERROR SWITCH MUST BE SET
3. THE ERROR MUST OCCUR WITHIN THE TEST UNDER CONSIDERATION
IF THE ERROR DOES NOT OCCUR WITHIN THE TEST UNDER CONSIDERATION THE PROGRAM WILL REVERT TO NORMAL OPERATION. HOWEVER, IF LOOP ON TEST SWITCH IS SET AND THIS OPERATOR SELECTABLE SCOPE LOOP IS USED THEN THE PROGRAM WILL LOOP BACK TO THE SELECTED POINT WHEN IT COMES TO THE END OF THE TEST UNDER CONSIDERATION.

AFTER LOOPING FOR SOME TIME IF THE LOOP SWITCH IS PUT DOWN THEN NORMAL OPERATION WILL CONTINUE.

8.4 PROGRAM REVISION HISTORY

9.0 PROGRAM DESCRIPTION

9.1 LOGIC DIVISION IN HARDWARE MODULES

REGISTER BOARD (RG) - ERROR REGISTER 1 STATUS REGISTERS MUX FOR REGISTERS GO HANDLING REGISTER DECODE COMMAND DECODE EXECUTION OF MECH. COMMANDS

SYNC. DATA BOARD (SN) - DATA CONTROL PARALLEL TO SERIAL SYNC. BYTE DETECT.

SEEK AND SEARCH (SS) - SEEK LOGIC SEARCH LOGIC HEADER HANDLING.

ERROR CORRECTION (EC) - ECC LOGIC ERROR REGISTER 2 & 3 MUX FOR ERROR REG. 2 & 3 LOOK AHEAD REG. SECTOR COUNTER DATA FORMATION RING COUNTER.

DUAL PORT (DP) - DUAL PORT ARBITRATION ATTENTION LOGIC SERIAL NO REGISTER MASS BUS REGISTER STORAGE

9.2 DISK SURFACE USAGE

SYMBOLS USED
C = CYLINDER
T = TRACK
S = SECTOR
W = WRITE
R = READ
TT = TEST NUMBER

C0, T0, S0
TT22-W,R, TT23-R, TT24-W,R, TT25-W,R, TT26-W,R, TT35-W,R, TT37-W, TT50-W, TT51-W

C0, T0, S1
TT27-W,R, TT37-W,R, TT40-R, TT41-W,R, TT42-W,R, TT43-W,R

C0, T18, S21
TT30-W, TT31-W,R

C1, T0, S0
TT30-W,R, TT31-W,R, TT53-W,R, TT54-W,R

C1, T18, S21
TT31-W

C2, T0, S0
TT31-W,R

C2, T18, S21
TT31-W

C3, T0, S0

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                                        TT31-W,R

                                        C3, T18, S21
                                        TT31-W

                                        C4, T0, S0
                                        TT31-W,R

                                        C4, T18, S21
                                        TT31-W

                                        C5, T0, S0
                                        TT31-W,R

                                        C5, T7, S4
                                        TT33-W,R, TT34-W,R

                                        C5, T18, S21
                                        TT31-W

                                        C6, T0, S0
                                        TT31-W,R

                                        C6, T18, S21
                                        TT31-W

                                        C7, T0, S0
                                        TT31-W,R

                                        C7, T18, S18
                                        TT31-W

                                        C8, T0, S0
                                        TT31-W,R

                                        C8, T18, S21
                                        TT31-W

                                        C9, T0, S0
                                        TT31-W

                                        C9, T18, S21
                                        TT31-W, TT32-R

                                        C10, T0, S0
                                        TT31-W,R

                                        C410, T18, S21
                                        TT36-W,R, TT50-W,R

                9.3     THE FOLLOWING SECTION DESCRIBES EACH TEST AND SUBROUTINES
                        IN DETAIL AND CAN BE USED AS AN INDEX TO THE LISTING.
                        THE LEFT MOST COLUMN IS THE LINE NUMBER WITHIN THE LISTING
                        WHERE THAT ITEM WILL BE FOUND.
                        @
```

```
603
604

      ;*DRIVE MUST BE LOCKED ON PORT A OR PORT B

610
611
612                                   ;*INTERNAL PROGRAM MACROS BEGIN HERE
613                                   ;************************************
614
615
616                                ;**
617                                ;**NOTE:        ALL MACRO CALLS BEGINNING WITH ".$" ARE SUPPLIED FROM AN
618                                ;*       EXTERNAL SYSMAC.SML PACKAGE WHICH MUST BE MADE AVAILABLE
619                                ;*       TO THE SOURCE PROGRAM AT ASSEMBLY TIME.
620                                ;*
621
622
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623
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624
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                                .SBTTL  STARTING ADDRESSES

                        000200          .=200
000200  000137  005012  RA:     JMP     @#BEGIN         ;NORMAL START
000204  000137  043606  ADDMOD: JMP     @#BASECH        ;START FOR ADDRESS-MODIFICATION
000210  000137  004776          JMP     @#BEGIN2        ;JUMP TO SELECT DRIVE START
                        000220          .=220
000220  000137  004762          JMP     @#BEGIN1        ;JUMP TO NO OPERATOR TESTS START


                ;*STARTING ADDRESS 200 FOR NORMAL STARTS
                ;*THIS WILL TEST ALL DRIVES ON THE SYSTEM A SINGLE DRIVE AT A TIME

                ;*STARTING ADDRESS 204 FOR NON-DEFAULT ADDRESS PARAMETERS
                ;*AUTO RESTART AT ADDRESS 200 AFTER LOADING PARAMETERS

                ;*STARTING ADDRESS 210 WILL TEST ONLY ONE SPECIFIED DRIVE

                ;*STARTING ADDRESS 220 WILL JUMP OVER THE TESTS REQUIRING AN OPERATOR
                ;*AT THE DRIVE
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   649          001110                          .=1110
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                                ;*ITEM1
001226  051114                          EM1             ;RP04 DID NOT INTERRUPT
                                                        ;WAITED ON BIT DID NOT OCCUR
001230  067154                          DH1             ;PC
                                                        ;WAT PC
                                                        ;BIT WAITED
                                                        ;REG ADDRESS
                                                        ;REG CONTENTS
                                                        ;RHCS1 CONTENTS
001232  071502                          DT1             ;$ERRPC,WAITPC,WAITBT,WAITRE,$BDDAT,CS1
001234  072010                          DF1             ;0,0,0,0,0,0

                                ;*ITEM2
001236  051143                          EM2             ;INTERRUPT ENABLE BIT DOWN BUT
                                                        ;WAITED ON BIT DID NOT OCCUR
001240  067154                          DH1             ;PC
                                                        ;WAT PC
                                                        ;BIT WAITED
                                                        ;REG ADDRESS
                                                        ;REG CONTENTS
                                                        ;RHCS1 CONTENTS
001242  071502                          DT1             ;$ERRPC,WAITPC,WAITBT,WAITRE,$BDDAT,CS1
001244  072010                          DF1             ;0,0,0,0,0,0

                                ;*ITEM3
001246  051232                          EM3             ;RP04 DID NOT INTERRUPT WHEN
                                                        ;WAITED ON BIT DID SET
001250  067154                          DH1             ;PC
                                                        ;WAT PC
                                                        ;BIT WAITED
                                                        ;REG ADDRESS
                                                        ;RHCS1 CONTENTS
001252  071502                          DT1             ;$ERRPC,WAITPC,WAITBT,WAITRE,$BDDAT,CS1
001254  072010                          DF1             ;0,0,0,0,0,0

                                ;*ITEM4
001256  051313                          EM4             ;WAITED ON BIT DID SET BUT
                                                        ;TIME IS IN ERROR
                                                        ;TIME IS GIVEN IN 10 MICRO SEC.
                                                        ;(DECIMAL)
001260  067333                          DH4             ;PC
                                                        ;WAT PC
                                                        ;BIT WAITED
                                                        ;REG ADDRESS
                                                        ;TIME IN 10 MSEC
001262  071522                          DT4             ;$ERRPC,WAITPC,WAITBT,WAITRE,$BDDAT,WAITIM
001264  072017                          DF4             ;0,0,0,0,0,1

                                ;*ITEM5
001266  051424                          EM5             ;RHAS DOES NOT CLEAR BY
                                                        ;MOVING IN ALL ONES
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001270  067474                  DH5             ;PC
                                                ;REG. ADDR.
                                                ;GOOD DATA
                                                ;RECEIVED DATA
001272  071542                  DT5             ;$ERRPC,REGADR,$GDDAT,$BDDAT
001274  072026                  DF5             ;0,0,0,0

                        ;*ITEM6
001276  051476                  EM6             ;LOADING RHER1 FOR ALL
                                                ;UNITS DID NOT SET ANY BITS
                                                ;IN RHAS-NO UNITS PRESENT
001300  067613                  DH6             ;PC
                                                ;REG ADDR
                                                ;RECEIVED DATA
001302  071556                  DT6             ;$ERRPC,REGADR,$BDDAT
001304  072033                  DF6             ;0,0,0

                        ;*ITEM7
001306  051564                  EM7             ;SPECIFIED REGISTER NONEXISTANT
                                                ;SO ABORT PROGRAM
001310  067712                  DH7             ;PC
                                                ;ADDR. OF REG.
001312  071570                  DT7             ;$ERRPC,TEMP1
001314  072037                  DF7             ;0,0

                        ;*ITEM10
001316  051634                  EM10            ;STOPED DRIVE HAS MOL BIT
                                                ;IN RHDS1 = 1
001320  067752                  DH10            ;PC
                                                ;TEST NO
                                                ;FAILING REG ADDR
                                                ;CONTENTS OF RHCS1
                                                ;CONTENTS OF RHCS2
                                                ;CONTENTS OF RHDS1
                                                ;CONTENTS OF RHER1
001322  071600                  DT10            ;$ERRPC,$TSTNM,$BDADR,CS1,CS2,DS1,ER1
001324  072042                  DF10            ;0,0,0,0,0,0,0

                        ;*ITEM11
001326  051703                  EM11            ;WITH SPINDLE POWERED DOWN
                                                ;RHCS2 SHOULD HAVE ONLY
                                                ;UNIT NUMBER AND IR HIGH
001330  067752                  DH10            ;PC
                                                ;TEST NO
                                                ;FAILING REG. ADR
                                                ;CONTENTS OF RHCS1
                                                ;CONTENTS OF RHCS2
                                                ;CONTENTS OF RHDS1
                                                ;CONTENTS OF RHER1
001332  071600                  DT10            ;$ERRPC,$TSTNM,$BDADR,CS1,CS2,DS1,ER1
001334  072042                  DF10            ;0,0,0,0,0,0,0

                        ;*ITEM12
001336  052010                  EM12            ;AFTER A POWER UP WITH
                                                ;NO PACK ACKNOWLEDGE COMMAND
                                                ;RHDS1 SHOULD HAVE MOL=1, VV=0
```

```
001340  067752                  DH10            ;PC
                                                ;TEST NO
                                                ;FAILING REGISTER ADDR.
                                                ;CONTENTS OF RHCS1
                                                ;CONTENTS OF RHCS2
                                                ;CONTETNS OF RHDS1
                                                ;CONTENTS OF RHER1
001342  071600                  DT10            ;$ERRPC,$TSTNM,$BDADR,CS1,CS2,DS1,ER1
001344  072042                  DF10            ;0,0,0,0,0,0,0

                        ;*ITEM13
001346  052116                  EM13            ;AFTER A POWER UP WITHOUT
                                                ;ANY INIT RHCS1 SHOULD
                                                ;HAVE GO=0, DVA=1, RDY=1
                                                ;*E=0, DISREGARD
                                                ;ALL OTHER BITS
001350  067752                  DH10            ;PC
                                                ;TEST NO
                                                ;FAILING REGISTER ADDR.
                                                ;CONTENTS OF RHCS1
                                                ;CONTENTS OF RHCS2
                                                ;CONTENTS OF RHDS1
                                                ;CONTENTS OF RHER1
001352  071600                  DT10            ;$ERRPC,$TSTNM,$BDADR,CS1,CS2,DS1,ER1
001354  072042                  DF10            ;0,0,0,0,0,0,0

                        ;*ITEM14
001356  052240                  EM14            ;AFTER POWER UP RHCC
                                                ;SHOULD BE=0
001360  067474                  DH5             ;PC
                                                ;REG. ADDR.
                                                ;GOOD DATA
                                                ;RECEIVED DATA
001362  071542                  DT5             ;$ERRPC,REGADR,$GDDAT,$BDDAT
001364  072026                  DF5             ;0,0,0,0

                        ;*ITEM15
001366  052313                  EM15            ;PACK ACKNOWLEDGE CAUSED
                                                ;AN ERROR
                                                ;GOOD DATA IS BEFORE COMMAND
                                                ;RECEIVED DATA IS AFTER COMMAND
001370  067474                  DH5             ;PC
                                                ;REG. ADDR.
                                                ;GOOD DATA
                                                ;RECEIVED DATA
001372  071542                  DT5             ;$ERRPC,REGADR,$GDDAT,$BDDAT
001374  072026                  DF5             ;0,0,0,0

                        ;*ITEM16
001376  052454                  EM16            ;GIVING A NO-OP COMMAND CAUSED
                                                ;AN ERROR
                                                ;GOOD DATA GIVES REGISTER
                                                ;CONTENTS BEFORE COMMAND
                                                ;RECEIVED DATA GIVES REGISTER
                                                ;CONTENTS AFTER COMMAND
001400  067474                  DH5             ;PC
```

```
                                                                ;REG. ADDR.
                                                                ;GOOD DATA
                                                                ;RECEIVED DATA
001402  071542                          DT5                   ;$ERRPC,REGADR,$GDDAT,$BDDAT
001404  072026                          DF5                   ;0,0,0,0

                                ;*ITEM17
001406  052602                          EM17                  ;DRIVE CLEAR COMMAND
                                                              ;CAUSED AN ERROR
                                                              ;GOOD DATA GIVES WHAT SHOULD
                                                              ;BE THERE
                                                              ;RECEIVED DATA GIVES WHAT WAS
                                                              ;THERE AFTER COMMAND
001410  067474                          DH5                   ;PC
                                                              ;REG. ADDR.
                                                              ;GOOD DATA
                                                              ;RECEIVED DATA
001412  071542                          DT5                   ;$ERRPC,REGADR,$GDDAT,$BDDAT
001414  072026                          DF5                   ;0,0,0,0

                                ;*ITEM20
001416  052737                          EM20                  ;READ-IN COMMAND GAVE AN ERROR
                                                              ;GOOD DATA HAS WHAT SHOULD BE THERE
                                                              ;RECEIVED DATA HAS WHAT WAS
                                                              ;AFTER COMMAND
001420  067474                          DH5                   ;PC
                                                              ;REG. ADDR.
                                                              ;GOOD DATA
                                                              ;RECEIVED DATA
001422  071542                          DT5                   ;$ERRPC,REGADR,$GDDAT,$BDDAT
001424  072026                          DF5                   ;0,0,0,0

                                ;*ITEM 21
001426  053103                          EM21                  ;RHCS1 CONTENTS DURING
                                                              ;COMMAND WAS IN ERROR
001430  067474                          DH5
001432  071542                          DT5
001434  072026                          DF5

                                ;*ITEM 22
001436  053156                          EM22                  ;RHDS1 CONTENTS DURING
                                                              ;COMM ANS WAS IN ERROR
001440  067474                          DH5
001442  071542                          DT5
001444  072026                          DF5

                                ;*ITEM 23
001446  053231                          EM23                  ;UNLOAD COMMAND GAVE AN ERROR
                                                              ;GOOD DATA GIVES WHAT SHOULD
                                                              ;BE THERE
                                                              ;RECEIVED DATA GIVES WHAT WAS
                                                              ;THERE AFTER COMMAND
001450  067474                          DH5
001452  071542                          DT5
001454  072026                          DF5
```

```
                                ;*ITEM 24
001456  053374                          EM24            ;OFFSET COMMAND CAUSED AN ERROR
                                                        ;GOOD DATA IS WHAT SHOULD BE THERE
                                                        ;RECEIVED DATA GIVES WHAT WAS THERE
                                                        ;AFTER AN OFFSET COMMAND

001460  067474                          DH5
001462  071542                          DT5
001464  072026                          DF5

                                ;*ITEM 25
001466  053537                          EM25            ;RETURN TO CENTER LINE COMMAND
                                                        ;CAUSED AN ERROR
                                                        ;GOOD DATA GIVES WHAT SHOULD BE
                                                        ;THERE
                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                        ;THERE AFTER COMMAND

001470  067474                          DH5
001472  071542                          DT5
001474  072026                          DF5

                                ;*ITEM 26
001476  053721                          EM26            ;500 OFFSETS CAUSED AN ERROR
001500  070131                          DH26            ;PC
                                                        ;CONT. OF RHCS1
                                                        ;CONT. OF RHCS2
                                                        ;CONT. OF RHDS1
                                                        ;CONT. OF RHER1
                                                        ;CONT. OF RHER2
                                                        ;CONT. OF RHER3
001502  071620                          DT26            ;$ERRPC,CS1,CS2,DS1,ER1,ER2,ER3
001504  072051                          DF26            ;0,0,0,0,0,0,0

                                ;*ITEM 27
001506  054011                          EM27            ;WRITE HEADER AND DATA
                                                        ;CAUSED IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT
                                                        ;SHOULD BE THERE
                                                        ;RECEIVED DATA GIVES WHAT
                                                        ;WAS THERE AFTER COMMAND

001510  067474                          DH5
001512  071542                          DT5
001514  072026                          DF5

                                ;*ITEM 30
001516  054227                          EM30            ;WRITE HEADER AND DATA
                                                        ;CHANGED WRITE FROM BUFFER
001520  070330                          DH30            ;PC
                                                        ;WORD NO
                                                        ;GOOD DATA
                                                        ;BAD DATA
001522  071642                          DT30            ;$ERRPC,ERWORD,$GDDAT,$BDDAT
001524  072061                          DF30            ;0,0,0,0

                                ;*ITEM 31
001526  054307                          EM31            ;READ HEADER AND DATA CAUSED
```

```
                                                        ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA HAS WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT
                                                        ;WAS THERE AFTER COMMAND
001530  067474                      DH5
001532  071542                      DT5
001534  072026                      DF5

                            ;*ITEM 32
001536  054524                      EM32                ;WRITE HEADER AND DATA FOLLOWED
                                                        ;BY A READ HEADER AND DATA
                                                        ;CAUSED A READ/WRITE ERROR
001540  070330                      DH30
001542  071642                      DT30
001544  072061                      DF30

                            ;*ITEM 33
001546  054633                      EM33                ;READ DATA CAUSED IMPROPER REGISTER
                                                        ;CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD BE THERE
                                                        ;RECEIVED DATA GIVES WHAT WAS THERE AFTER
                                                        ;COMMAND
001550  067474                      DH5
001552  071542                      DT5
001554  072026                      DF5

                            ;*ITEM 34
001556  055035                      EM34                ;READ DATA INCORRECT
001560  070330                      DH30
001562  071642                      DT30
001564  072061                      DF30

                            ;*ITEM 35
001566  055061                      EM35                ;WRITE DATA COMMAND CAUSED
                                                        ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD BE THERE
                                                        ;RECEIVED DATA GIVES REGISTER
                                                        ;CONTENTS AFTER WRITE DATA
001570  067474                      DH5
001572  071542                      DT5
001574  072026                      DF5

                            ;*ITEM 36
001576  055277                      EM36                ;WRITE DATA COMMAND CHANGED
                                                        ;WRITE FROM BUFFER
001600  070330                      DH30
001602  071642                      DT30
001604  072061                      DF30

                            ;*ITEM 37
001606  055354                      EM37                ;SEEK COMMAND CAUSED AN
                                                        ;ERROR
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT
```

```
                                                        ;WAS THERE AFTER SEEK COMMAND
001610  067474                      DH5                 ;
001612  071542                      DT5                 ;
001614  072026                      DF5                 ;

                    ;*ITEM 40
001616  055571                      EM40                ;WRITE CHECK CAUSED AN
                                                        ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                        ;THERE AFTER COMMAND
001620  067474                      DH5
001622  071542                      DT5
001624  072026                      DF5

                    ;*ITEM 41
001626  056000                      EM41                ;LOCKING OUT WRITES BY WRITE
                                                        ;LOCK BUTTON CAUSED IMPROPER
                                                        ;REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT
                                                        ;WAS THERE AFTER WRITES
                                                        ;WERE LOCKED OUT BY
                                                        ;BUTTON
001630  067474                      DH5
001632  071542                      DT5
001634  072026                      DF5

                    ;*ITEM 42
001636  056261                      EM42                ;ATTEMPTING TO WRITE WITH WRITE
                                                        ;LOCKED OUT CAUSED IMPROPER
                                                        ;REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                        ;THERE AFTER ATTEMPT
001640  067474                      DH5
001642  071542                      DT5
001644  072026                      DF5

                    ;*ITEM 43
001646  056537                      EM43                ;WRITING WITH WRITE LOCKED
                                                        ;OUT CHANGED DISK DATA
                                                        ;GOOD DATA GIVES WHAT WAS
                                                        ;ON DISK BEFORE WRITE WITH
                                                        ;WRITE LOCK WAS ATTEMPTED
                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                        ;READ BACK AFTER WRITE WITH
                                                        ;WRITE LOCK WAS ATTEMPTED
001650  070330                      DH30
001652  071642                      DT30
001654  072061                      DF30

                    ;*ITEM 44
```

```
1042  001656  057101                          EM44                    ;ENABLING WRITES BY WRITE LOCK
1043                                                                  ;BUTTON CAUSED AN ERROR
1044                                                                  ;GOOD DATA GIVES WHAT SHOULD
1045                                                                  ;BE THERE
1046                                                                  ;RECEIVED DATA GIVES WHAT WAS
1047                                                                  ;THERE AFTER WRITE LOCK
1048                                                                  ;BUTTON ENABLED WRITES
1049  001660  067474                              DH5                 ;
1050  001662  071542                              DT5                 ;
1051  001664  072026                              DF5                 ;
1052
1053                                  ;*ITEM 45
1054  001666  057373                          EM45                    ;TRANSFERRING ON LAST BLOCK IE. CYLINDER
1055                                                                  ;410, SECTOR 21, TRACK 18
1056                                                                  ;CAUSED IMPROPER REGISTER
1057                                                                  ;CHANGE
1058                                                                  ;GOOD DATA GIVES WHAT SHOULD
1059                                                                  ;BE THERE
1060                                                                  ;RECEIVED DATA GIVES WHAT WAS
1061                                                                  ;THERE AFTER TRANSFER
1062  001670  067474                              DH5
1063  001672  071542                              DT5
1064  001674  072026                              DF5
1065
1066                                  ;*ITEM 46
1067  001676  057667                          EM46                    ;DATA READ FROM LAST
1068                                                                  ;BLOCK IE. CYLINDER 410
1069                                                                  ;SECTOR 21, TRACK 18 IS IN
1070                                                                  ;ERROR
1071  001700  070330                              DH30
1072  001702  071642                              DT30
1073  001704  072061                              DF30
1074
1075                                  ;*ITEM 47
1076  001706  060002                          EM47                    ;TRANSFERRING FROM NONEXISTANT
1077                                                                  ;SECTOR CAUSED IMPROPER
1078                                                                  ;REGISTER CHANGE
1079                                                                  ;GOOD DATA GIVES WHAT SHOULD
1080                                                                  ;BE THERE
1081                                                                  ;RECEIVED DATA GIVES WHAT WAS
1082                                                                  ;THERE AFTER ATTEMPTED
1083                                                                  ;TRANSFER
1084  001710  067474                              DH5
1085  001712  071542                              DT5
1086  001714  072026                              DF5
1087
1088                                  ;*ITEM 50
1089  001716  060264                          EM50                    ;TRANSFERRING FROM NONEXISTANT
1090                                                                  ;SECTOR CAUSED DATA ERROR
1091                                                                  ;GOOD DATA GIVES WHAT
1092                                                                  ;SHOULD BE IN BUFFER
1093                                                                  ;RECEIVED DATA GIVES WHAT WAS
1094                                                                  ;IN BUFFER AFTER TRANSFER
1095  001720  070330                              DH30
1096  001722  071642                              DT30
1097  001724  072061                              DF30
```

```
                                ;*ITEM 51
001726  060503                        EM51            ;GIVING ILLEGAL FUNCTION CAUSED
                                                        ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD BE
                                                        ;THERE
                                                        ;RECEIVED DATA GIVES REGISTER
                                                        ;CONTENTS AFTER ILLEGAL FUNCTION
001730  070444                        DH51            ;PC
                                                        ;REG. ADDR.
                                                        ;GOOD DATA
                                                        ;RECEIVED DATA
                                                        ;ILLEGAL FUNCTION
001732  071656                        DT51            ;$ERRPC,REGADR,$GDDAT,$BDDAT,ILLEGL
001734  072066                        DF51            ;0,0,0,0,0

                                ;*ITEM 52
001736  060750                        EM52            ;WRITE DATA ON NONEXISTANT
                                                        ;SECTOR CAUSED IMPROPER
                                                        ;REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT
                                                        ;WAS THERE AFTER ATTEMPTED
                                                        ;WRITE DATA
001740  067474                        DH5
001742  071542                        DT5
001744  072026                        DF5

                                ;*ITEM 53
001746  061225                        EM53            ;READ HEADER AND DATA AFTER
                                                        ;A SEARCH CAUSED AN ERROR
001750  070330                        DH30
001752  071642                        DT30
001754  072061                        DF30

                                ;*ITEM 54
001756  061313                        EM54            ;ATTEMPTED OPERATION WITH
                                                        ;INVALID ADDRESS CAUSED
                                                        ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                        ;THERE AFTER OPERATION
001760  067474                        DH5
001762  071542                        DT5
001764  072026                        DF5

                                ;*ITEM 55
001766  061560                        EM55            ;WRITING/READING WITH EXPECTED
                                                        ;ADDRESS OVERFLOW ERROR CAUSED
                                                        ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT
```

```
                                                        ;WAS THERE AFTER OPERATION
001770  067474                      DH5
001772  071542                      DT5
001774  072026                      DF5

                            ;*ITEM 56
001776  062046                      EM56                ;DATA READ WITH AN EXPECTED
                                                        ;ADDRESS OVERFLOW ERROR IS
                                                        ;INCORRECT
                                                        ;WORD NO 1 TO 260 SHOULD
                                                        ;BE READ
                                                        ;WORD NOS 261 TO 266 SHOULD
                                                        ;NOT CHANGE DUE TO READ
002000  070330                      DH30
002002  071642                      DT30
002004  072061                      DF30

                            ;*ITEM 57
002006  062256                      EM57                ;ATTEMPTING DATA COMMAND
                                                        ;WITH WRONG FORMAT BIT CAUSED
                                                        ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD BE
                                                        ;THERE
                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                        ;THERE AFTER ATTEMPTED DATA
                                                        ;TRANSFER
002010  067474                      DH5
002012  071542                      DT5
002014  072026                      DF5

                            ;*ITEM 60
002016  062550                      EM60                ;ATTEMPTING TO MODIFY REGISTER
                                                        ;DURING AN OPERATION CAUSED
                                                        ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                        ;THERE AFTER OPERATION
                                                        ;WAS COMPLETE
002020  070603                      DH60                ;PC
                                                        ;REG. ADDR.
                                                        ;GOOD DATA
                                                        ;RECEIVED DATA
                                                        ;MODFING REGISTER
002022  071674                      DT60                ;$ERRPC,REGADR,$GDDAT,$BDDAT,$BDADR
002024  072074                      DF60                ;0,0,0,0,0

                            ;*ITEM 61
002026  063161                      EM61                ;DEVICE NOT AVAILBLE BEFORE COMMAND WAS TO BE GIVEN
002030  070740                      DH61                ;PC
                                                        ;TEST NO.
                                                        ;PC OF JSR
                                                        ;RHCS1 CONTENTS
002032  071712                      DT61                ;$ERRPC,$TSTNM,PCJSR,$BDADR
002034  072102                      DF61                ;0,0,0,0
```

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1210
1211  002036  063242                    ;*ITEM 62
1212  002040  071033                            EM62            ;RHDS1 HAS STATUS BITS STUCK AT ONE
1213                                             DH62            ;PC
1214                                                             ;TEST NO.
1215                                                             ;PC OF JSR
1216  002042  071724                            DT62            ;RHDS1 CONTENTS
1217  002044  072106                            DF62            ;$ERRPC,$TSTNM,PCJSR,$BDADR
1218                                                             ;0,0,0,0
1219
1220                                    ;*ITEM 63
1221  002046  063323                            EM63            ;RHDS1 CONTENTS DURING
1222                                                             ;COMMAND WAS IN ERROR
1223  002050  067474                            DH5
1224  002052  071542                            DT5
1225  002054  072026                            DF5
1226
1227
1228                                    ;*ITEM 64
1229  002056  063377                            EM64            ;RECALIBRATE COMMAND CAUSED
1230                                                             ;IMPROPER REGISTER CHANGE.
1231                                                             ;GOOD DATA GIVES WHAT SHOULD BE
1232                                                             ;THERE.
1233                                                             ;RECEIVED DATA GIVES WHAT WAS THERE
1234                                                             ;AFTER COMMAND
1235  002060  067474                            DH5
1236  002062  071542                            DT5
1237  002064  072026                            DF5
1238
1239
1240                                    ;*ITEM65
1241
1242  002066  063616                            EM65            ;INTERRUPT FAILING
1243  002070  071126                            DH65            ;PC
1244                                                             ;TEST NO
1245                                                             ;CONTENTS OF RHCS1
1246                                                             ;CONTENTS OF RHAS
1247                                                             ;CONTENTS OF RHDS1
1248  002072  071736                            DT65            ;$ERRPC,TSTNM,CS1,AS,DS1
1249  002074  072112                            DF65            ;0,0,0,0,0
1250
1251
1252                                    ;*ITEM66
1253  002076  063640                            EM66            ;HEADER AND DATA COMMAND
1254                                                             ;FOR HEAD SELECTION TEST
1255                                                             ;CAUSED AN ERROR
1256                                                             ;RHDST GIVES WHAT TRACK
1257                                                             ;WAS BEING WRITTEN ON CYLINDER 0
1258                                                             ;SECTOR 0
1259  002100  071251                            DH66            ;PC
1260                                                             ;RHDST
1261                                                             ;RHER1
1262                                                             ;RHER2
1263                                                             ;RHER3
1264                                                             ;RHCS1
1265                                                             ;RHCS2
```

```
1266  002102  071752                    DT66          ;$ERRPC,DST,ER1,ER2,ER3,CS1,CS2
1267  002104  072117                    DF66          ;0,0,0,0,0,0,0
1268                          ;*ITEM67
1269  002106  064032                    EM67          ;READ HEADER AND DATA ERROR
1270                                                   ;IN HEAD SELECTION TEST
1271                                                   ;FIRST FOUR WORDS GIVE HEADER
1272                                                   ;NEXT WORDS ARE DATA
1273                                                   ;GOOD DATA WORDS GIVE
1274                                                   ;THE TRACK NUMBER IN
1275                                                   ;BITS 4,5,6,7,8
1276  002110  070330                    DH30
1277  002112  071642                    DT30
1278  002114  072061                    DF30
1279                          ;*ITEM70
1280  002116  064322                    EM70          ;READ HEADER AND DATA ERROR
1281                                                   ;IN DIFFERENCE LINE TEST
1282                                                   ;WORD NOS. 1-4 GIVE
1283                                                   ;HEADER
1284                                                   ;WORD NOS. 5-260 GIVE DATA
1285                                                   ;WHICH IS THE CYLINDER
1286                                                   ;ADDRESS
1287  002120  070330                    DH30
1288  002122  071642                    DT30
1289  002124  072061                    DF30
1290
1291                          ;*ITEM 71
1292  002126  064530                    EM71          ;FORCING OPI CAUSED IMPROPER REGISTER
1293                                                   ;  CHANGE
1294                                                   ;GOOD DATA GIVES WHAT SHOULD
1295                                                   ;BE THERE
1296                                                   ;RECEIVED DATA GIVES WHAT WAS
1297                                                   ;THERE AFTER 3 INDEX PULSES
1298  002130  067474                    DH5           ;PC
1299                                                   ;REG. ADDR.
1300                                                   ;GOOD DATA
1301                                                   ;RECEIVED DATA
1302  002132  071542                    DT5           ;$ERRPC,REGADR,$GDDAT,$BDDAT
1303  002134  072026                    DF5           ;0,0,0,0
1304                          ;*ITEM 74
1305  002136  065273                    EM74          ;WHILE USING UNIBUS B
1306                                                   ;READ DATA CAUSED IMPROPER REGISTER
1307                                                   ;CHANGE
1308                                                   ;GOOD DATA GIVES WHAT SHOULD BE THERE
1309                                                   ;RECEIVED DATA GIVES WHAT WAS THERE AFTER
1310                                                   ;COMMAND
1311  002140  067474                    DH5
1312  002142  071542                    DT5
1313  002144  072026                    DF5
1314
1315                          ;*ITEM 73
1316  002146  065221                    EM73          ;WHILE USING UNIBUS B
1317                                                   ;READ DATA INCORRECT
1318  002150  070330                    DH30
1319  002152  071642                    DT30
1320  002154  072061                    DF30
1321
```

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1322
1323  002156  065273                    ;*ITEM 74
                                                EM74            ;WHILE USING UNIBUS B
1324                                                            ;WRITE DATA COMMAND CAUSED
1325                                                            ;IMPROPER REGISTER CHANGE
1326                                                            ;GOOD DATA GIVES WHAT SHOULD BE THERE
1327                                                            ;RECEIVED DATA GIVES REGISTER
1328                                                            ;CONTENTS AFTER WRITE DATA
1329  002160  067474                            DH5
1330  002162  071542                            DT5
1331  002164  072026                            DF5
1332
1333                                    ;*ITEM 75
1334  002166  065537                            EM75            ;WHILE USING UNIBUS B
1335                                                            ;WRITE DATA COMMAND CHANGED
1336                                                            ;WRITE FROM BUFFER
1337  002170  070330                            DH30
1338  002172  071642                            DT30
1339  002174  072061                            DF30
1340
1341                                    ;*ITEM 76
1342  002176  065642                            EM76            ;WHILE USING UNIBUS B
1343                                                            ;WRITE CHECK CAUSED AN
1344                                                            ;IMPROPER REGISTER CHANGE
1345                                                            ;GOOD DATA GIVES WHAT SHOULD
1346                                                            ;BE THERE
1347                                                            ;RECEIVED DATA GIVES WHAT WAS
1348                                                            ;THERE AFTER COMMAND
1349  002200  067474                            DH5
1350  002202  071542                            DT5
1351  002204  072026                            DF5
1352
1353                                    ;*ITEM 77
1354  002206  066077                            EM77            ;CURRENT CYLINDER DOES NOT REFLECT DESIRED 'RHCC'
1355  002210  071347                            DH77            ;PC
1356                                                            ;PC OF JSR
1357                                                            ;REGISTER ADDRESS
1358                                                            ;GOOD DATA
1359                                                            ;BAD DATA
1360  002212  071772                            DT77            ;$ERRPC,PCJSR,REGADR,$GDDAT,$BDDAT
1361  002214  072127                            DF77            ;0,0,0,0,0
1362
1363                                    ;*ITEM 100
1364  002216  066322                            EM100           ;ERROR AFTER ADDRESS PLUG CHANGE
1365  002220  067474                            DH5             ;PC
1366                                                            ;REGISTER ADDRESS
1367                                                            ;GOOD DATA
1368                                                            ;RECEIVED DATA
1369  002222  071542                            DT5             ;$ERRPC,REGADR,$GDDAT,$BDDAT
1370  002224  072026                            DF5             ;0,0,0,0
1371
1372                                    ;*ITEM 101
1373  002226  066404                            EM101           ;UNIT DID NOT GO OFFLINE WHEN ADDR
1374                                                            ;PLUG WAS REMOVED
1375  002230  070131                            DH26            ;PC
1376                                                            ;CONT OF RHCS1
1377                                                            ;CONT OF RHCS2
```

```
1378
1379
1380
1381  002232  071620                    DT26        ;$ERRPC,CS1,CS2,DS1,ER2,ER3
1382  002234  072051                    DF26        ;0,0,0,0,0,0,0
1383
1384                          ;*ITEM 102
1385  002236  066466                    EM102       ;UNIT DID NOT COME BACK ONLINE WHEN
1386                                                 ;ADDR PLUG WAS REPLACED
1387  002240  070131                    DH26        ;PC
1388                                                 ;CONT OF RHCS1
1389                                                 ;CONT OF RHCS2
1390                                                 ;CONT OF RHDS1
1391                                                 ;CONT OF RHER2
1392                                                 ;CONT OF RHER3
1393  002242  071620                    DT26        ;$ERRPC,CS1,CS2,DS1,ER2,ER3
1394  002244  072051                    DF26        ;0,0,0,0,0,0,0
1395
1396                          ;*ITEM  103
1397  002246  066545                    EM103       ;REGISTER CONTENTS INCORRECT BEFORE A
1398                                                 ;DIAGNOSTIC SEEK
1399  002250  070131                    DH26        ;PC
1400                                                 ;CONT OF RHCS1
1401                                                 ;CONT OF RHCS2
1402                                                 ;CONT OF RHDS1
1403                                                 ;CONT OF RHER2
1404                                                 ;CONT OF RHER3
1405  002252  071620                    DT26        ;$ERRPC,CS1,CS2,DS1,ER2,ER3
1406  002254  072051                    DF26        ;0,0,0,0,0,0,0
1407
1408                          ;*ITEM  104
1409  002256  066631                    EM104       ;REGISTER CONTENTS INCORRECT AFTER A
1410                                                 ;DIAGNOSTIC SEEK
1411  002260  070131                    DH26        ;PC
1412                                                 ;CONT OF RHCS1
1413                                                 ;CONT OF RHCS2
1414                                                 ;CONT OF RHDS1
1415                                                 ;CONT OF RHER2
1416                                                 ;CONT OF RHER3
1417  002262  071620                    DT26        ;$ERRPC,CS1,CS2,DS1,ER2,ER3
1418  002264  072051                    DF26        ;0,0,0,0,0,0,0
1419
```

```
1420
1421                                    ;*RH11 REGISTERS
1422
1423
1424  002266  000254                    RPVEC:  254                     ;RP04 VECTOR ADDRESS
1425
1426
1427
1428                                    ;*WORD COUNT REGISTER (RHWC)
1429                                    ;*EACH BIT IS CALLED BY BIT NUMBER
1430
1431
1432
1433                                    ;*BUS ADDRESS REGISTER (RHBA)
1434                                    ;*EACH BIT IS CALLED BY BIT NUMBER
1435
1436
1437
1438                                    ;*CONTROL AND STATUS REGISTER 2 (RHCS2)
1439
1440            000001                  US1=    1               ;UNIT SELECT (BIT #0)
1441            000002                  US2=    2               ;UNIT SELECT (BIT #1)
1442            000004                  US4=    4               ;UNIT SELECT (BIT #2)
1443            000010                  BAI=    10              ;BUS ADDRESS INCREMENT INHIBIT (BIT #3)
1444            000020                  UNIB=   20              ;UNIBUS B DC LO (BIT #4)
1445            000040                  CLR=    40              ;CLEAR (BIT #5)
1446            000100                  IR=     100             ;INPUT READY (BIT #6)
1447            000200                  OR=     200             ;OUTPUT READY (BIT #7)
1448            000400                  MPE=    400             ;MASS BUS PARITY ERROR (BIT #8)
1449            001000                  MXF=    1000            ;MISSED TRANSFER ERROR (BIT #9)
1450            002000                  PGE=    2000            ;PROGRAM ERROR (BIT #10)
1451            004000                  NEM=    4000            ;NON EXISTANT MEMORY (BIT #11)
1452            010000                  NED=    10000           ;NON EXISTANT DRIVE (BIT #12)
1453            020000                  UPE=    20000           ;UNIBUS PARITY ERROR (BIT #13)
1454            040000                  WCE=    40000           ;WRITE CHECK ERROR (BIT #14)
1455            100000                  DLT=    100000          ;DATA LATE (BIT #15)
1456
1457                                    ;*DATA BUFFER REGISTER (RHDB)
1458                                    ;*EACH BIT IS CALLED BY BIT NUMBER
1459
1460
```

```
                        ;*RP04 REGISTERS


                        ;*CONTROL AND STATUS 1 REGISTER. (#00)

000001          GO=     1               ;GO (BIT #0)
000100          IE=     100             ;INTERRUPT ENABLE (BIT #6)
000200          RDY=    200             ;READY (BIT #7)
000400          A16=    400             ;HIGH ORDER UNIBUS BITS (BIT #8)
001000          A17=    1000            ;HIGH ORDER UNIBUS BITS (BIT #9)
002000          PSEL=   2000            ;PORT SELECT (BIT #10)
004000          DVA=    4000            ;DEVICE AVAILABLE (BIT #11)
020000          MCPE=   20000           ;MASSBUSS PARITY ERROR (BIT #13)
040000          TRE=    40000           ;TRANSFER ERROR (BIT #14)
100000          SC=     100000          ;SPECIAL CONDITION (BIT #15)

                        ;*STATUS REGISTER (RHDS1) (#01)

000001          DFF5=   1               ;DRIVE FORWARD 5"/SEC.  (BIT #0)
000002          DFF20=  2               ;DRIVE FORWARD 20"/SEC.  (BIT #1)
000004          DIGB=   4               ;DRIVE TO INNER GAVRD BAND (BIT #2)
000010          GRV=    10              ;GO REVERSE (BIT #3)
000020          DL64=   20              ;DIFFERENCE LESS THAN 64 (BIT #4)
000040          DE1=    40              ;DIFFERENCE EQUALS 1 (BIT #5)
000100          VV=     100             ;VOLUME VALID (BIT #6)
000200          DRY=    200             ;DRIVE READY (BIT #7)
000400          DPR=    400             ;DRIVE PRESENT (BIT #8)
001000          PROG=   1000            ;PROGRAMABLE (BIT #9)
002000          LBT=    2000            ;LAST SECTOR TRANSFERRED (BIT #10)
004000          WRL=    4000            ;WRITE LOCK (BIT #11)
010000          MOL=    10000           ;MEDIUM ON-LINE (BIT #12)
020000          PIP=    20000           ;POSITIONING OPERATION IN PROGRESS (BIT #13)
040000          ERR=    40000           ;COMPOSIT ERROR. (BIT #14)
100000          ATA=    100000          ;ATTENTION ACTIVE (BIT #15)

                        ;*ERROR REGISTER #01 (RHER1) (#02)
000001          ILF=    1               ;ILLEGAL FUNCTION (BIT #0)
000002          ILR=    2               ;ILLEGAL REGISTER (BIT #1)
000004          RMR=    4               ;REGISTER MODIFICATION REFUSED (BIT #2)
000010          PAR=    10              ;PARITY ERROR (BIT #3)
000020          FER=    20              ;FORMAT ERROR (BIT #4)
000040          WCF=    40              ;WRITE CLOCK FAIL (BIT #5)
000100          ECH=    100             ;ECC HARD ERROR (BIT #6)
000200          HCE=    200             ;HEADER COMPARE ERROR (BIT #7)
000400          HCRC=   400             ;HEADER CRC ERROR (BIT #8)
001000          AOE=    1000            ;ADDRESS OVERFLOW ERROR (BIT #9)
002000          IAE=    2000            ;INVALID ADDRESS ERROR (BIT #10)
004000          WLE=    4000            ;WRITE LOCK ERROR (BIT #11)
010000          DTE=    10000           ;DRIVE TIMING ERROR (BIT #12)
020000          OPI=    20000           ;OPERATION INCOMPLETE (BIT #13)
040000          UNS=    40000           ;DRIVE UNSAFE (BIT #14)
100000          DCK=    100000          ;DATA CHECK ERROR (BIT 15)

                        ;*MAINTAINABILITY REGISTER (RHMR)(#03)
```

```
1517            000001          DMD=    1               ;DIAGINOSTIC MODE (BIT #0)
1518            000002          MCLK=   2               ;MAINTAINABILITY CLOCK (BIT #1)
1519            000004          MINX=   4               ;MAINTAINABILITY INDEX (BIT #2)
1520            000010          MSTCK=  10              ;MAINTAINABILITY SECTOR CLOCK (BIT #3)
1521            000020          MRD=    20              ;MAINTAINABILITY READ (BIT #4)
1522            000040          MWR=    40              ;MAINTAINABILITY WRITE (BIT #5)
1523            001000          DTSY=   1000            ;MAINTAINABILITY SYNC DETECTED (BIT #9)
1524
1525                            ;*ATTENTION SUMMARY PSEUDO-REGISTER (RHAS) (#04)
1526
1527            000001          AT0=    1               ;DEVICE 0 (BIT #0)
1528            000002          AT1=    2               ;DEVICE 1 (BIT #1)
1529            000004          AT2=    4               ;DEVICE 2 (BIT #2)
1530            000010          AT3=    10              ;DEVICE 3 (BIT #3)
1531            000020          AT4=    20              ;DEVICE 4 (BIT #4)
1532            000040          AT5=    40              ;DEVICE 5 (BIT #5)
1533            000100          AT6=    100             ;DEVICE 6 (BIT #6)
1534            000200          AT7=    200             ;DEVICE 7 (BIT #7)
1535
1536                            ;*DESIRED SECTOR/TRACK ADDRESS REGISTER (RHDST) (#1)
1537                            ;*EACH BIT IS CALLED BY BIT NUMBER
1538
1539
1540
1541
1542
1543                            ;*DRIVE TYPE REGISTER (RHDT) (#06)
1544                            ;*EACH BIT IS CALLED BY BIT NUMBER
1545
1546
1547
1548
1549
1550                            ;*LOOK-AHEAD REGISTER (RHLA) (#07)
1551
1552            000001          EXT1=   1               ;EXTENSION 1 (BIT #0)
1553            000002          EXT2=   2               ;EXTENSION 2 (BIT #1)
1554            000004          EXT4=   4               ;EXTENSION 3 (BIT #2)
1555            000010          EXT10=  10              ;EXTENSION 4 (BIT #3)
1556            000020          EXT20=  20              ;EXTENSION 5 (BIT #4)
1557            000040          EXT40=  40              ;EXTENSION 6 (BIT #5)
1558            000100          SC1=    100             ;SECTOR COUNT FIELD 0 (BIT #6)
1559            000200          SC2=    200             ;SECTOR COUNT FIELD 1 (BIT #7)
1560            000400          SC4=    400             ;SECTOR COUNT FIELD 2 (BIT #8)
1561            001000          SC10=   1000            ;SECTOR COUNT FIELD 3 (BIT #9)
1562            002000          SC20=   2000            ;SECTOR COUNT FIELD 4 (BIT #10)
1563            004000          TRK1=   4000            ;TRACK FIELD 1 (BIT #11)
1564            010000          TRK2=   10000           ;TRACK FIELD 2 (BIT #12)
1565            020000          TRK4=   20000           ;TRACK FIELD 3 (BIT #13)
1566            040000          TRK10=  40000           ;TRACK FIELD 4 (BIT #14)
1567            100000          TRK20=  100000          ;TRACK FIELD 5 (BIT #15)
1568
1569                            ;*ERROR REGISTER #2 (RHER2) (#10)
1570
1571            000001          WCU=    1               ;WRITE CURRENT UNSAFE (BIT #0)
1572            000002          CSF=    2               ;CURRENT SINK FAILURE (BIT #1)
```

```
1573            000004                  WSU=    4                       ;WRITE SELECT UNSAFE (BIT #2)
1574            000010                  CSU=    10                      ;CURRENT SWITCH UNSAFE (BIT #3)
1575            000020                  MSE=    20                      ;MOTOR SEQUENCE ERROR (BIT #4)
1576            000040                  TDF=    40                      ;TRANSITIONS DETECTOR FAILURE (BIT #5)
1577            000100                  TUF=    100                     ;TRANSITIONS UNSAFE (BIT #6)
1578            000200                  FEN=    200                     ;FAILSAFE ENABLED (BIT #7)
1579            000400                  WRU=    400                     ;WRITE READY UNSAFE (BIT #8)
1580            001000                  MHS=    1000                    ;MULTIPLE HEAD SELECT (BIT #9)
1581            002000                  NHS=    2000                    ;NO HEAD SELECTION (BIT #10)
1582            004000                  IXE=    4000                    ;INDEX ERROR (BIT #11)
1583            010000                  VU30=   10000                   ;30VOLT UNSAFE (BIT #12)
1584            020000                  PLU=    20000                   ;PLO UNSAFE (BIT #13)
1585            100000                  ACU=    100000                  ;ACUNSAFE (BIT #15)
1586
1587                                    ;*OFFSET REGISTER (RHOF) (#11)
1588
1589            000001                  OF25=   1                       ;OFFSET 25 MICRO INCHES (BIT #0)
1590            000002                  OF50=   2                       ;OFFSET 50 MICRO INCHES (BIT #1)
1591            000004                  OF100=  4                       ;OFFSET 100 MICRO INCHES (BIT #2)
1592            000010                  OF200=  10                      ;OFFSET 200 MICRO INCHES (BIT #3)
1593            000020                  OF400=  20                      ;OFFSET 400 MICRO INCHES (BIT #4)
1594            000040                  OF800=  40                      ;OFFSET 800 MICRO INCHES (BIT #5)
1595
1596            000200                  OFREV=  200                     ;OFFSET NEGATIVE (REVERSE) (BIT #5)
1597            002000                  HCI=    2000                    ;HEADER COMPARE INHIBIT (BIT #10)
1598            004000                  ECI=    4000                    ;ERROR CORRECTION CODE INHIBIT (BIT #11)
1599            010000                  FMT22=  10000                   ;FORMAT BIT (BIT #12
1600
1601                                    ;*DESIRED CYLINDER ADDRESS (RHCA) (#12)
1602                                    ;*EACH BIT IS CALLED BY BIT NUMBER.
1603
1604
1605
1606
1607                                    ;*CURRENT CYLINDER ADDRESS (RHCC) (#13)
1608                                    ;*EACH BIT IS CALLED BY BIT NUMBER
1609
1610
1611
1612
1613                                    ;*SERIAL NUMBER REGISTER (RHSN) (#14)
1614                                    ;*EACH IS CALLED BY BIT NUMBER
1615
1616
1617
1618
1619                                    ;*ERROR REGISTER #03 (RHER3) (#15)
1620
1621            000001                  PSU=    1                       ;PACK SPEED UNSAFE (BIT #0)
1622            000002                  VUF=    2                       ;VELOCITY UNSAFE (BIT #1)
1623            000010                  UWR=    10                      ;ANY UNSAFE EXCEPT READ/WRITE (BIT #3)
1624            000020                  PRE=    20                      ;DISK PACK ROTATION ERROR (BIT #4)
1625            000040                  ACL=    40                      ;AC LOW (BIT #5)
1626            000100                  DCL=    100                     ;DC LOW (BIT #6)
1627            020000                  ACE=    20000                   ;ADDRESS CHANGE ERROR (BIT #13)
1628            040000                  SKI=    40000                   ;SEEK INCOMPLETE (BIT #14)
```

```
1629            100000                  OCYL=   100000                  ;OFF CYLINDER (BIT #15)
1630
1631
1632
1633                                    ;*ECC POSITION REGISTER (RHEC1) (#16)
1634                                    ;*EACH BIT IS CALLED BY BIT NUMBER
1635
1636
1637
1638
1639                                    ;*ECC PATTERN REGISTER (RHEC2) (#17)
1640                                    ;*EACH BIT IS CALLED BY BIT NUMBER
1641
1642
1643
1644
1645
1646
1647
1648
1649
```

```
                        .SBTTL  REGISTER ADDRESSES


                        ;*RP04/5/6 DISK I/O REGISTER LOCATED IN THE RH11 CONTROLLER

002270  176722          RHDB:   176722          ;DATA BUFFER
002272  176702          RHWC:   176702          ;WORD COUNT
002274  176704          RHBA:   176704          ;BUS ADDRESS
002276  176710          RHCS2:  176710          ;CONTROL AND STATUS 2

                        ;*RP04/5/6 DISK I/O REGISTERS LOCATED IN THE DEVICE CONTROL LOGIC (DCL)

002300  176700          RHCS1:  176700          ;CONTROL AND STATUS 1
002302  176714          RHER1:  176714          ;ERROR #1
002304  176706          RHDST:  176706          ;DESIRED SECTOR/TRACK ADDRESS
002306  176740          RHER2:  176740          ;ERROR #2
002310  176732          RHOF:   176732          ;OFFSET
002312  176734          RHCA:   176734          ;DESIRED CYLINDER ADDRESS
002314  176742          RHER3:  176742          ;ERROR #3
002316  176716          RHAS:   176716          ;ATTENTION SUMMARY
002320  176724          RHMR:   176724          ;MAINTAINABILITY
002322  176712          RHDS1:  176712          ;DRIVE STATUS
002324  176726          RHDT:   176726          ;DRIVE TYPE
002326  176730          RHSN:   176730          ;SERIAL NUMBER
002330  176744          RHEC1:  176744          ;ECC POSITION
002332  176746          RHEC2:  176746          ;ECC PATTERN
002334  176736          RHCC:   176736          ;CURRENT CYLINDER ADDRESS
002336  176720          RHLA:   176720          ;LOOK-AHEAD

                        ;*ADDITIONAL I/O REGISTERS LOCATED IN THE RH70 CONTROLLER LOGIC

002340  176750          RHBAE:  176750          ;BUS ADDRESS EXTENSION REGISTER
002342  176752          RHCS3:  176752          ;CONTROL AND STATUS REGISTER #3


                        ;*P-CLOCK (KW11-P) I/O REGISTERS

002344  172540          PCLCSR: 172540          ;CONTROL AND STATUS REGISTER
002346  172542          PCLBUF: 172542          ;COUNT SET BUFFER
002350  172544          PCLCTR: 172544          ;COUNTER

```

```
1693
1694
1695                                    ;*THE FOLLOWING LOCATIONS ARE RESERVED FOR REGISTER SNAPSHOTS
1696                                    ;*ANY TIME THERE IS AN ERROR ALL THESE WILL BE FILLED
1697
1698                                    ;*ONLY SOME MAY BE PRINTED BUT ALL WILL BE FILLED TRUE
1699                                    ;*FOR THE TIME JUST AFTER THE "ERROR" ERROR COMMAND
1700
1701
1702                                    ;*THIS ASSUMES THAT A REGISTER SNAPSHOT HAS BEEN TAKEN WHICH IS NOT
1703                                    ;*ALWAYS THE CASE - IF QUESTIONABLE CONTENTS APPEAR IN THE REGISTER
1704                                    ;*PRINTOUTS, CHECK THE INLINE TEST CODE TO SEE IF THE REGISTER SNAPSHOT
1705                                    ;*REFLECTS THE CURRENT STATE OF THE MACHINE
1706
1707
1708  002352  000000                    DB:     0                       ;DATA BUFFER
1709  002354  000000                    WC:     0                       ;WORD COUNT
1710  002356  000000                    BA:     0                       ;BUS ADDRESS
1711  002360  000000                    CS2:    0                       ;CONTROL AND STATUS 2
1712
1713
1714  002362  000000                    CS1:    0                       ;CONTROL AND STATUS 1
1715  002364  000000                    ER1:    0                       ;ERROR #1
1716  002366  000000                    DST:    0                       ;DESIRED SECTOR/TRACK ADDRESS
1717  002370  000000                    ER2:    0                       ;ERROR #2
1718  002372  000000                    OF:     0                       ;OFFSET
1719  002374  000000                    CA:     0                       ;DESIRED CYLINDER ADDRESS
1720  002376  000000                    ER3:    0                       ;ERROR #3
1721  002400  000000                    AS:     0                       ;ATTENTION SUMMARY
1722  002402  000000                    MR:     0                       ;MAINTAINABILITY
1723  002404  000000                    DS1:    0                       ;DRIVE STATUS
1724  002406  000000                    DT:     0                       ;DRIVE TYPE
1725  002410  000000                    SN:     0                       ;SERIAL NUMBER
1726  002412  000000                    EC1:    0                       ;ECC POSITION
1727  002414  000000                    EC2:    0                       ;ECC PATTERN
1728  002416  000000                    CC:     0                       ;CURRENT CYLINDER ADDRESS
1729  002420  000000                    LA:     0                       ;LOOK-AHEAD
1730
```

```
1731
1732
1733                                    ;*FUNCTION EQUATES
1734
1735                                        ;*TABLE OF FUNCTIONS FOR RHCS1 THEN "GO" BIT HAS TO BE SET
1736  002422                            FUTABL:
1737  002422  000000                    NOPERA: 0                       ;NO OPERATION
1738  002424  000002                    UNLOAD: 2                       ;UNLOAD (STAND BY)
1739  002426  000006                    RECALI: 6                       ;RECALIBRATE
1740  002430  000010                    DCLEAR: 10                      ;DRIVE CLEAR
1741  002432  000012                    RELEAS: 12                      ;RELEASE (DUAL-PORT OPERATION)
1742  002434  000030                    SERCH:  30                      ;SEARCH COMMAND
1743  002436  000050                    WRCHEK: 50                      ;WRITE CHECK DATA
1744  002440  000052                    WRCHOT: 52                      ;WRITE CHECK HEADER AND DATA
1745  002442  000060                    WRIDAT: 60                      ;WRITE DATA
1746  002444  000062                    WRIFOR: 62                      ;WRITE HEADER AND DATA (FORMAT)
1747  002446  000070                    READAT: 70                      ;READ DATA
1748  002450  000072                    REFOR:  72                      ;READ HEADER AND DATA
1749  002452  000004                    SEECOM: 4                       ;SEEK COMMAND
1750  002454  000014                    OFSETC: 14                      ;OFFSET COMMAND
1751  002456  000016                    RETCL:  16                      ;RETURNTO CENTERLINE
1752  002460  000022                    PKACK:  22                      ;PACK ACKNOWLEDGE
1753  002462  000020                    READIN: 20                      ;READ IN
1754  002464  000000                    ILLEGL: .WORD   0               ;COMPUTED ILLEGAL FUNCTION
1755
1756
1757
1758                                    ;*DATA BUFFERS FOR READ/WRITE
1759
1760
1761  002470  000422                    WRFROM: .BLKW   274.            ;WRITE FROM THIS BUFFER
1762  003534  000422                    REINTO: .BLKW   274.            ;READ INTO THIS BUFFER
1763
```

```
1764
1765
1766                                    ;*RESERVED CORE LOCATIONS
1767
1768  004600  000000                    REGADR: 0                       ;SAVE REGISTER ADDRESS HERE
1769  004602  000000                    ERWORD: 0                       ;SAVE ERROR WORD NUMBER HERE
1770  004604  000000                    TSTNM:  0                       ;TEST NUMBER
1771  004606  000000                    RP4VEC: 0                       ;CONTAINS ADDRESS OF LOCATION
1772                                                                    ;WHERE AN RP04 INTERRUPT IS TO VECTOR TO
1773                                                                    ;THIS MUST BE MOVED INTO 'RPVEC' TO BE
1774                                                                    ;EFFECTIVE.
1775
1776  004610  000000                    OFSTVL: 0                       ;OFFSET VALUE USED IN OFFSET TEST
1777
1778
1779  004612  000024                    SAVERE: .BLKW   20.             ;BLOCK TO SAVE REGISTERS FOR PRETEST
1780                                                                    ;HARDWARE REGISTER SNAPSHOTS - THESE
1781                                                                    ;ARE USUALLY THEN CHANGED TO REFLECT
1782                                                                    ;EXPECTED CONDITIONS AFTER THE TEST
1783  004662  000000                    FINALA: 0                       ;SAVE LOOK AHEAD REGISTER AT END OF OPERATION
1784  004664  000000                    FINACC: 0                       ;SAVE CURRENT CYLINDER REGISTER AT END OF OPERATION
1785
1786
1787                                    ;*TABLE FOR ATTENTION BITS
1788                                    ;*ATTENTION TABLE
1789
1790  004666     001     002     004    ATABLE: .BYTE   1,2,4,10,20,40,100,200
1791  004671     010     020     040
1792  004674     100     200
1793
```

```
1794
1795
1796                                    ;*FLAGS AND INTERNAL PROGRAM CONTROL WORDS
1797
1798  004676  000010                    UNITS:  .BLKW   8.              ;THIS IS FILLED WITH -1
1799  004716  000000                    UNIT:   .WORD   0               ;UNIT UNDER TEST
1800  004720  000000                    NOUNIT: .WORD   0               ;NUMBER OF UNITS PRESENT
1801                                                                    ;USED TO KEEP TRACK OF UNIT UNDER TEST
1802  004722  000000                    NUNIT:  .WORD   0               ;USED TO DETERMIN IF THERE ARE MORE
1803                                                                    ;THAN ONE UNIT
1804  004724  000000                    NOPUSH: 0                       ;ALL ONES INDICATE NONE OF THE OPERATOR
1805                                                                    ;INTERVENTION TESTS WILL BE PERFORMED
1806  004726  000000                    SELECT: .WORD   0               ;ALL ONES INDICATE UNIT TO BE SELECTED
1807  004730  000000                    UNITSL: .WORD   0               ;UNIT NO. SELECTED
1808  004732  000000                    UBUSB:  0                       ;IF ZERO UNIBUS PRESENT
1809                                                                    ;IF ONES NO UNIBUS B
1810  004734  000000                    ERFLGS: 0                       ;ERROR FLAG
1811  004736  000000                    FIRST:  0                       ;IF ZERO WILL TYPE HEADER
1812                                                                    ;IF ONES WILL NOT TYPE HEADER
1813
1814  004740  000000                    ATTENT: 0                       ;ATTENTION BIT FOR PRESENT UNIT
1815  004742  000000                    TOTALAT:0                       ;TOTAL ATTENTION BITS
1816
1817  004744  000000                    RP06:   0                       ;RP06 DEVICE TYPE FLAG LOCATION
1818  004746  000000                    RP05:   0                       ;MEMOREX RP04 DEVICE TYPE FLAG
1819  004750  000000                    RH70:   0                       ;IF = 1, PROGRAM IS RUNNING ON RWP04 SYSTEM
1820                                                                    ;IF = 0, PROGRAM IS RUNNING ON RJP04
1821  004752  000000                    INUNIT: 0                       ;INITIAL UNIT NO. - USED DURING
1822                                                                    ;CHECKING ALL ADDRESS PLUG ADDRESSES
1823
1824
1825
1826
1827
1828  004754  000000                    TMP0:   .WORD   0               ;TEMP STORAGE
1829  004756  000000                    TMP1:   .WORD   0
1830  004760  000000                    TMP4:   .WORD   0               ;TEMP STORAGE
```

```
                                        .SBTTL
                                        .SBTTL  **DIAGNOSTIC CODE**
                                        .SBTTL

                                                .SBTTL  SETUP TESTS

004762  012737  177777  004724  BEGIN1: MOV     #-1,@#NOPUSH    ;JUMP OVER OPERATOR REQUIRED TESTS
004770  005037  004726          BEGIN2: CLR     @#SELECT        ;DO NOT SELECT UNIT
004774  000412                  BR      START
004776  012737  177777  004726          MOV     #-1,@#SELECT    ;SELECT UNIT
005004  005037  004724                  CLR     @#NOPUSH        ;DO NOT JUMP OVER ANY TEST
005010  000404                  BR      START
005012  005037  004726          BEGIN:  CLR     @#SELECT        ;DO NOT SELECT UNIT
005016  005037  004724                  CLR     @#NOPUSH        ;DO NOT JUMP OVER ANY OPERATOR
                                                                ;INTERVENTION TESTS - NORMAL RUN

005022                          START:
005022  000005                  RESET

005244  012737  000000  177776          MOV     #0,PS           ;SET PROCESSOR STATUS TO 0
005252  012737  000200  000036          MOV     #200,@#TRAPVEC+2;TRAP PRIORITY = 4
005260  013700  002266                  MOV     @#RPVEC,R0      ;GET RP VECTOR ADDRESS
005264  012720  044662                  MOV     #RPVECT,(R0)+   ;THIS IS FOR UNTIMELY INTERRUPTS
005270  012710  000340                  MOV     #340,(R0)       ;DRIVE INTERRUPT SERVICE ROUTINE
                                                                ;PRIORITY = 7

005274  004737  045662                  JSR     PC,@#STKINT     ;INITIALIZE THE TTY KEYBOARD
005300  005737  004736                  TST     @#FIRST         ;IS THIS FIRST TIME ROUND ?
005304  001001                  BNE     1$              ;DON'T GIVE HEADER IF NOT
005306  000402                  BR      2$              ;HEADER 1ST TIME THROUGH
005310  000137  006110          1$:     JMP     @#SND1          ;NO HEADER

005314                          2$:


006110  012737  177777  004736  SND1:   MOV     #-1,@#FIRST     ;NEXT TIME DO NOT GIVE HEADER


006146  032777  010000  172764  RH70CK: BIT     #SW12,@SWR      ;LOOK TO SEE IF USING RH70
006154  001403                  BEQ     3$              ;IF SW12 = 0, SKIP NEXT
006156  012737  000001  004750          MOV     #1,@#RH70       ;IF SW12 = 1, CU IS AN RH70
006164                          3$:
                                ;*IS THERE A P-CLOCK (KW11-P) ON THE SYSTEM
                                ;*IF SO MAKE 'WAT' TRAPS GO TO 'WAIT.P'
                                ;*IF SO MAKE RP04 INTERRUPTS GO TO 'TIME 1'
                                ;*IF NOT MAKE 'WAT' TRAPS GO TO 'WAIT.T'
                                ;*IF NOT MAKE RP04 INTERRUPTS GO TO 'TIME 2'

                                ;*THE NEXT LINE IS TO BE ADDED LATER
                                ;*AND THE JUMP AND NOP REMOVED
                                ;*FOR NOW NO CLOCK WILL BE USED
```

```
1887
1888                                    ;       MOV     @#1$,@#ERRVEC   ;SET TIME-OUT VECTOR
1889                                    ;
1890                                    ;       JMP     @#1$            ;DO NOT USE CLOCK
1891                                    ;       NOP
1892                                    ;       TST     @#PCLCSR        ;REFERENCE P-CLOCK STATUS REGISTER
1893                                    ;                               ;ADDRESS = 172540
1894                                    ;       MOV     #WAIT.P,@#STRPAD+20 ;THERE IS A P-CLOCK
1895                                    ;       MOV     #TIME1,@#RP4VEC ;THERE IS A P CLOCK SO
1896                                    ;                               ;VECTOR TO TIME1
1897                                    ;       BR      2$
1898                                    ;1$:    MOV     #WAIT.T,@#STRPAD+20 ;THERE IS NO P-CLOCK
1899
1900
1901
1902  006164  012737  041664  004606          MOV     #TIME2,@#RP4VEC ;RP04/5/6 INTERRUPTS GO TO 'TIME 2'
1903  006172  012737  177777  047270  2$:     MOV     #-1,@#PRITEM    ;CLEAR PREVIOUS ITEM NUMBER
1904
1905
1906
1907
1908  006200  005737  004726                  TST     @#SELECT        ;WAS IT A 200 START
1909  006264  104412                          RDOCT
1910  006266  042716  177770                  BIC     #177770,(SP)    ;ONLY KEEP LAST 3 BITS
1911  006272  011637  004716                  MOV     (SP),@#UNIT     ;SAVE UNIT TO BE TESTED
1912  006276  012637  004730                  MOV     (SP)+,@#UNITSL  ;SAVE UNIT TO BE TESTED
1913
1914
1915
1916  006304  013737  004730  004716          MOV     @#UNITSL,@#UNIT ;SET UNIT NUMBER
1917
```

```
1918
1919  006330  012706  001000                  MOV     #STACK, SP      ;SET UP STACK POINTER
1920  006334  012737  047132  000030          MOV     #REGSA1,@#EMTVEC;ERROR VECTOR SO THAT
1921                                                                  ;NO REGISTERS ARE SAVED
1922  006342  012737  006370  000004          MOV     #2$,@#ERRVEC    ;SET UP FOR BUS TIMEOUT
1923
1924  006350  012700  000024                  MOV     #24,R0          ;THERE ARE 24 REG TO TEST
1925  006354  012701  002270                  MOV     #RHDB,R1        ;R1 NOW HAS ADDR OF ADDR OF FIRST REG.
1926  006360  013102                  1$:     MOV     @(R1)+,R2       ;READ HARDWARE REG.
1927  006362  005300                          DEC     R0              ;COUNT DOWN
1928  006364  001375                          BNE     1$              ;BRANCH IF 24 NOT DONE
1929  006366  000454                          BR      3$              ;BRANCH IF 24 DONE
1930  006370  012737  000006  000004  2$:     MOV     #ERRVEC+2,@#ERRVEC ;RESTORE TRAP CATCHER
1931  006376  022626                          CMP     (SP)+,(SP)+     ;CLEAN STACK
1932  006400  016137  177776  001200          MOV     -2(R1),$TMP1    ;STORE FAILING REG ADDR
1933  006406  104007                          ERROR   7               ;REGISTER NON EXISTANT
1934  006410  032777  020000  172522          BIT     #SW13,@SWR      ;INHIBIT ERROR PRINTOUT ?
1935  006416  001036                          BNE     4$              ;BRANCH IF YES
1936
1937
1938  006504  012746  000204                  MOV     #ADDMOD,-(SP)   ;GET READY TO TYPE STARTING ADDRESS
1939                                                                  ;OF "CHANGE OF BASE ADDRESS" ROUTINE
1940  006510  104402                          TYPOC
1941  006512  000000                          HALT                    ;STOP TO FORCE THE CORRECT RESTART
1942  006514  000137  041000          4$:     JMP     @#$EOP          ;GO TO END OF PROGRAM ------------->
1943
1944  006520  012737  006574  000004  3$:     MOV     #TRP,@#4        ;INITIALIZE VECTOR
1945  006526  005737  002340                  TST     @#RHBAE         ;ADDRESS RPBAE(RH11/RH70?)
1946  006532  005237  004750                  INC     @#RH70          ;FOUND AN RH70-SET MASK
1947  006572  000420                          BR      RTN             ;AND GET OUT
1948  006574  005726                  TRP:    TST     (SP)+
1949  006576  005726                          TST     (SP)+           ;RESTORE THE STACK
1950  006634  012737  047122  000030  RTN:    MOV     #$ERROR,@#EMTVEC;RESTORE ERROR VECTOR
1951                                                                  ;SO THAT REGISTERS ARE SAVED
1952  006642  012737  000006  000004          MOV     #ERRVEC+2,@#ERRVEC ;RESTORE TRAP CATCHER
1953
```

```
1954
1955
1956  006660  012706  001000                  MOV     #STACK,SP       ;SET STACK POINTER
1957
1958  006672  013701  002316                  MOV     @#RHAS,R1       ;R1 HAS ADDRESS OF RHAS
1959  006676  012711  177777                  MOV     #-1,@R1         ;THIS WRITES ALL ONES INTO RHAS
1960  006702  105711                          TSTB    @R1             ;TEST RHAS FOR ALL 0'S
1961  006706  011137  001126                  MOV     @R1,@#$BDDAT    ;BAD DATA
1962  006712  005037  001124                  CLR     @#$GDDAT        ;GOOD DATA
1963  006716  010137  004600                  MOV     R1,@#REGADR     ;FAILING REG. (RHAS)
1964
1965  006722  104005                          ERROR   5               ;RHAS DOES NOT CLEAR BY WRITING
1966                                                                  ;ALL ONES INTO IT
1967
```

```
1968
1969  006742  000005                          RESET                   ;START WITH AN INIT
1970  006744  004737  045662                  JSR     PC,@#$TKINT     ;INITIALIZE TTY KEYBOARD
1971
1972  006750  032777  020000  172162          BIT     #SW13,@SWR      ;INHIBIT ERROR TYPEOUT?
1973  006756  001026                          BNE     4$              ;BRANCH IF YES
1974  007034  013701  002316          4$:     MOV     @#RHAS,R1       ;R1 HAS ADDR. OF RHAS
1975  007040  013702  002276                  MOV     @#RHCS2,R2      ;R2 HAS ADDR. OF RHCS2
1976  007044  005012                          CLR     @R2             ;CLEAR RHCS2
1977  007046  012700  000010                  MOV     #8.,R0          ;COUNT
1978  007052  013704  002302                  MOV     @#RHER1,R4      ;R4 HAS ADDR. OF RHER1
1979  007056  012714  177777          1$:     MOV     #-1,@R4         ;MOVE ERRORS INTO RHER1
1980  007062  005212                          INC     @R2             ;INCREMENT UNIT NO.
1981  007064  005300                          DEC     R0              ;COUNT DOWN DRIVE COUNTER
1982  007066  001373                          BNE     1$              ;DO NEXT UNIT IF 8 NOT DONE
1983
1984  007070  111137  004742                  MOVB    @R1,@#TOTALAT   ;SAVE TOTAL ATTENTION
1985                                                                  ;USED IN DRIVE CLEAR TEST
1986  007074  105037  004743                  CLRB    @#TOTALAT+1     ;CLEAR UPPER BYTE
1987  007100  105711                          TSTB    @R1             ;TEST 'RHAS' FOR ANY DRIVES PRESENT
1988  007102  001402                          BEQ     2$              ;NONE RESPONDING - TYPE THE MESSAGE
1989  007104  000137  007456                  JMP     XE2             ;SOME THERE - GO FILL "UNITS" TABLE
1990
1991  007110  032777  020000  172022  2$:     BIT     #SW13,@SWR      ;INHIBIT ERROR TYPE OUT?
1992  007116  001402                          BEQ     3$              ;"NO DRIVES" MESSAGE IF NOT
1993  007120  000137  010014                  JMP     SELTST          ;CHECK FOR SELECTED UNIT START AND LOAD
1994                                                                  ;"UNITS" TABLE WITH SELECTED ONE IF SO
1995
1996  007124                          3$:
1997
1998  007452  000137  041000                  JMP     @#$EOP          ;GO OUT---------------------------->
1999
2000
2001
2002
2003
2004  007456                          XE2:
2005  007456  012700  000010          2$:     MOV     #8.,R0          ;COUNTER
2006  007462  012703  004676                  MOV     #UNITS,R3       ;POINTER
2007  007466  012723  177777          3$:     MOV     #-1,(R3)+       ;PRESET BLOCK TO ALL ONES
2008  007472  005300                          DEC     R0              ;COUNT
2009  007474  001374                          BNE     3$              ;BRANCH IF 8 NOT DONE
2010  007476  012703  004676                  MOV     #UNITS,R3       ;POINTER
2011  007502  005005                          CLR     R5              ;INITIALIZE UNIT NO. TO 0
2012  007504  005037  004720                  CLR     @#NOUNIT        ;NO. OF UNITS PRESENT
2013  007510  012700  000010                  MOV     #8.,R0          ;COUNTER
2014  007514  011137  001176                  MOV     @R1,@#$TMP0     ;TEMPORARY STORAGE
2015  007520  006037  001176          4$:     ROR     @#$TMP0         ;SET CARRY IF ONE IN  0 BIT
2016  007524  103120                          BCC     5$              ;CHECK NEXT UNIT IF ONE NOT IN BIT 0
2017
2018  007526  010577  172544                  MOV     R5,@RHCS2       ;INSERT UNIT NUMBER INTO RHCS2 UA BITS
2019  007532  022777  024020  172564          CMP     #24020,@RHDT    ;IS THIS A DUAL PORT RP04 ?
2020  007540  001503                          BEQ     6$              ;TYPE THE UNIT NO. IF YES
2021  007542  022777  020020  172554          CMP     #20020,@RHDT    ;IS THIS A SINGLE PORT RP04 ?
2022  007550  001477                          BEQ     6$              ;TYPE UNIT NO. IF YES
2023
```

```
2024  007552  022777  024021  172544          CMP     #24021,@RHDT    ;DUAL PORT RP05 ?
2025  007560  001473                          BEQ     6$              ;TYPE UNIT NO. IF SO
2026  007562  022777  020021  172534          CMP     #20021,@RHDT    ;SINGLE PORT RP05 ?
2027  007570  001467                          BEQ     6$              ;TYPE UNIT NO. IF SO
2028
2029  007572  022777  024022  172524          CMP     #24022,@RHDT    ;IS THIS A DUAL PORT RP06 ?
2030  007600  001463                          BEQ     6$              ;TYPE THE UNIT NO. IF SO
2031  007602  022777  020022  172514          CMP     #20022,@RHDT    ;IS THIS A SINGLE PORT RP06 ?
2032  007610  001457                          BEQ     6$              ;TYPE UNIT NO. IF SO
2033
2034
2035                                          ;*NO...IT'S NOT AN RP04/RP05/RP06 DEVICE SO TYPE
2036                                          ;*OUT THE DEVICE TYPE
2037
2038  007640  010546                          MOV     R5,-(SP)        ;GET READY TO TYPE UNIT NUMBER
2039  007642  104405                          TYPDS
2040  007666  017746  172432                  MOV     @RHDT,-(SP)     ;GET READY TO TYPE RHDT
2041  007672  104402                          TYPOC
2042  007746  000407                          BR      5$              ;NO RP04/RP05/RP06 FOUND SO TEST NEXT UNIT
2043
2044  007750  010523          6$:             MOV     R5,(R3)+        ;LOAD TABLE POSITION AND INCR IT
2045  007752  104401  001223                  TYPE    ,$CRLF
2046  007756  010546                          MOV     R5,-(SP)        ;PUT DRIVE NO. ON STACK
2047  007760  104405                          TYPDS                   ;TYPE DRIVE NO.
2048  007762  005237  004720                  INC     @#NOUNIT        ;INCR THE TOTAL NO. OF UNITS
2049
2050  007766  005205          5$:             INC     R5              ;'RHCS2' UNIT ADDRESS
2051  007770  005300                          DEC     R0              ;DRIVE COUNTER DOWN ONE
2052  007772  001252                          BNE     4$              ;TEST AND DO NEXT UNIT IF 8 NOT DONE
2053
2054  007774  013737  004676  004716          MOV     @#UNITS,@#UNIT  ;SET UNIT NO. TO FIRST ONE FOUND OR 0
2055  010002  013737  004720  004722          MOV     @#NOUNIT,@#NUNIT;SAVE NO. OF UNITS
2056  010010  005337  004722                  DEC     @#NUNIT         ;IF NUNIT = 0 THEN ONLY ONE UNIT
2057                                                                  ;IF NUNIT > 0 THEN MORE THAN ONE UNIT
2058
2059  010014  005737  004726          SELTST: TST     @#SELECT        ;STARTING ADDRESS 200
2060  010022  013737  004730  004716          MOV     @#UNITSL,@#UNIT ;CHANGE UNIT NUMBER TO SELECTED ONE
```

```
2061
2062
2063
2064  010064  005037  004740                CLR     @#ATTENT        ;CLEAR
2065
2066  010070  005737  004716                TST     @#UNIT          ;IS "UNIT 0" NEXT IN THE UNITS TABLE ?
2067  010074  001107                        BNE     9$              ;IF NOT TEST THIS UNIT
2068  010076  012700  000041                MOV     #41,R0          ;IF SO, CHECK THE LOAD MEDIA LOCATION
2069  010102  122710  000011                CMPB    #11,(R0)        ;WAS IT AN RP04/5/6 ?
2070  010106  001102                        BNE     9$              ;NO - GO AHEAD WITH TESTING UNIT #0
2071
2072  010110  005737  004726                TST     @#SELECT        ;WAS UNIT #0 SELECTED ?
2073                                                                ;(IE. WAS IT A 210 START ?)
2074  010114  001006                        BNE     12$             ;IF SO, CHANGE PACKS
2075
2076                                        ;*INCREMENT THE UNITS TABLE TO NEXT DRIVE (IF ANY)
2077                                        ;*& DECREMENT THE "NOUNITS" PRESENT (TO BE TESTED)
2078
2079  010116  012700  004676                MOV     #UNITS,R0       ;LOAD UNITS TABLE POINTER
2080  010122  005720                        TST     (R0)+           ;SELECT THE NEXT UNIT IN THE TABLE
2081                                                                ;(DOUBLE INCREMENT THE POINTER, R0)
2082  010124  022710  177777                CMP     #-1,(R0)        ;IS THERE ANOTHER TABLE ENTRY PRESENT ?
2083  010130  001065                        BNE     11$             ;IF SO, USE THE NEXT DRIVE & DEC "NOUNITS"
2084                                                                ;IF NOT, MUST USE DRIVE #0 & CHANGE PACK
2085  010132                        12$:
2086  010300  000000                        HALT
2087  010302  000404                        BR      9$              ;CONTINUE, USING SCRATCH PACK ON UNIT #0
2088
2089  010304  011037  004716        11$:    MOV     (R0),@#UNIT     ;SET UP TO BE THE UNIT UNDER TEST
2090  010310  005337  004720                DEC     @#NOUNITS       ;DECREMENT BECAUSE UNIT #0 WON'T BE TESTED
2091
2092  010314  013700  004716        9$:     MOV     @#UNIT,R0       ;R0 CONTAINS UNIT UNDER TEST
2093
2094
2095
2096  010320  005037  004744                CLR     @#RP06          ;CLEAR RP06 DEVICE TYPE FLAG
2097  010324  010077  171746                MOV     R0,@RHCS2       ;SET UP UNIT ADDRESSING
2098  010330  022777  024022  171766        CMP     #24022,@RHDT    ;IS IT A DUAL PORT RP06 ?
2099  010336  001405                        BEQ     2$              ;YES...SET THE FLAG
2100  010340  022777  020022  171756        CMP     #20022,@RHDT    ;IS IT A SINGLE PORT RP06 ?
2101  010346  001401                        BEQ     2$              ;YES...SET FLAG
2102  010350  000404                        BR      3$              ;DON'T SET FLAG - CHECK FOR RP04
2103  010352  012737  177777  004744  2$:   MOV     #-1,@#RP06      ;SET THE FLAG
2104  010360  000416                        BR      8$              ;DON'T CHECK FOR RP04, IT WAS RP06
2105
2106  010362  005037  004746          3$:   CLR     @#RP05          ;CLEAR MEMOREX RP04 DEVICE FLAG
2107  010366  022777  024021  171730        CMP     #24021,@RHDT    ;IS IT A DUAL PORT MEMOREX RP04 ?
2108  010374  001405                        BEQ     7$              ;YES..SET THE FLAG FOR ADDR PLUG TESTS
2109  010376  022777  020021  171720        CMP     #20021,@RHDT    ;IS IT A SINGLE PORT MEMOREX RP04 ?
2110  010404  001401                        BEQ     7$              ;YES..SET THE FLAG FOR ADDR PLUG TESTS
2111  010406  000403                        BR      8$              ;DON'T SET FLAG - NOT MEMOREX DRIVE
2112  010410  012737  177777  004746  7$:   MOV     #-1,@#RP05      ;SET THE FLAG
2113  010416                        8$:                             ;ASSUME THE NEXT UNIT IS AN RP04
2114
2115
2116
```

```
  2117  010416  116037  004666  004740          MOVB    ATABLE(R0),@#ATTENT ;SET APPROPRIATE ATTENTION BIT
  2118  010462  013746  004716                  MOV     @#UNIT,-(SP)        ;UNIT NO. TO STACK
  2119  010466  104405                          TYPDS                       ;TYPE  DRIVE NO.
  2120
```

```
                                                ;TYPE OUT THE DRIVE TYPE IN ASCII
                                                
                                                
010560  022777  024020  171536        CMP     #24020,@RHDT    ;DUAL PORT RP04 ?
010566  001425                        BEQ     4$              ;TYPE ASCII MSG OUT
010570  022777  020020  171526        CMP     #20020,@RHDT    ;SINGLE PORT RP04 ?
010576  001421                        BEQ     4$              ;TYPE THE MESSAGE
                                                
010600  022777  024021  171516        CMP     #24021,@RHDT    ;DUAL PORT RP05 ?
010606  001453                        BEQ     6$              ;TYPE THE MESSAGE
010610  022777  020021  171506        CMP     #20021,@RHDT    ;SINGLE PORT RP05 ?
010616  001447                        BEQ     6$              ;TYPE THE MESSAGE
                                                
010620  022777  024022  171476        CMP     #24022,@RHDT    ;DUAL PORT RP06 ?
010626  001424                        BEQ     5$              ;TYPE THE MESSAGE
010630  022777  020022  171466        CMP     #20022,@RHDT    ;SINGLE PORT RP06 ?
010636  001420                        BEQ     5$              ;TYPE THE MESSAGE
010640  000454                        BR      1$              ;DRIVE IS NOT AN RP04/RP05/RP06
                                                            ;DON'T TYPE ASCII MESSAGE OUT
                                                
                                                            ;-SHOULD NEVER HAPPEN AT THIS POINT
                                                            ;UNLESS DRIVE GOT SICK WHILE TESTING
                                                            ;WAS IN PROGRESS
                                                
010642                          4$:
010676  000435                        BR      1$              ;SKIP NEXT MESSAGE
010700                          5$:
010734  000416                        BR      1$              ;SKIP NEXT MESSAGE
010736                          6$:
                                                
                                                
                                                
                                                
010772  005777  171330          1$:   TST     @RHSN           ;READ SERIAL NO. AND DRIVE TYPE
010776  005777  171322                TST     @RHDT           ;THESE TWO ARE TO HELP SCOPE LOOPS
011002  017737  171320  002410        MOV     @RHSN,@#SN      ;SAVE TO CHECK IF DRIVE CLEAR CLEARS ANY BITS
011010  017737  171310  002406        MOV     @RHDT,@#DT      ;SAVE TO CHECK IF DRIVE CLEAR CLEARS ANY BITS
```

```
2158
2159
2160
2161
2162  011026  004737  041452          JSR     PC,@#CLDISK     ;GIVE INITIALIZE
2163  011032  032713  010000          BIT     #MOL,@R3        ;CHECK MOL IN RHDS1
2164  011254  032713  010000    1$:   BIT     #MOL,@R3        ;CHECK MOL IN RHDS1
2165  011260  001775                  BEQ     1$              ;BRANCH IF MOL IS HIGH
```

```
2166
2167
2168  011372  012706  001000                MOV     #STACK,SP       ;RESET STACK
2169
2170  011402  013700  002266                MOV     @#RPVEC,R0      ;GET RP VECTOR ADDRESS
2171  011406  012720  011454                MOV     #RPTRP1,(R0)+   ;THIS IS FOR TIMELY INTERRUPTS
2172  011412  012710  000340                MOV     #340,(R0)       ;RP04 INTERRUPT SERVICE ROUTINE
2173                                                                 ;PRIORITY = 7
2174  011416  012737  000200  177776        MOV     #200,PS         ;SET PROCESSOR PRIORITY @ 4 (DISK @ 5)
2175  011424  012711  000300                MOV     #RDY!IE,@R1     ;RDY, IE IN RHSC1 SHOULD CAUSE INTERRUPT
2176
2177  011430  013737  042150  001200        MOV     @#TIMCNT,@#STMP1;COUNTER
2178  011436  005337  001200          1$:   DEC     @#STMP1         ;WAIT FOR INTERRUPT
2179  011442  001375                BNE     1$              ;BRANCH IF NOT ZERO
2180                                                                 ;BEFORE THIS IS ZERO INTERRUPT SHOULD OCCUR
2181  011444  104065                ERROR   65              ;INTERRUPT DID NOT OCCUR
2182  011446  012712  000040                MOV     #40,@R2         ;CLEAR CONTROLLER VIA CS2 CLR BIT
2183
2184  011454  022626          RPTRP1: CMP     (SP)+,(SP)+     ;RESTORE STACK
2185  011456  022711  004200                CMP     #DVA!RDY,@R1    ;IE SHOULD BE LOW AS RUPT OCCURRED
2186  011464  104065                ERROR   65              ;INTERRUPT OCCURED BUT
2187                                                                 ;IE FAILED TO RESET
2188  011466  012712  000040                MOV     #40,@R2         ;CLEAR CONTROLLER VIA CS2 CLR BIT
```

```
2189
2190
2191
2192  011502  012706  001000                    MOV     #STACK,SP       ;RESET STACK
2193
2194  011512  013700  002266                    MOV     @#RPVEC,R0      ;GET RP VECTOR ADDRESS
2195  011516  012720  011562                    MOV     #RPTRP2,(R0)+   ;THIS IS FOR UNTIMELY INTERRUPTS
2196  011522  012710  000340                    MOV     #340,(R0)       ;RP04 INTERRUPT SERVICE ROUTINE
2197                                                                    ;PRIORITY = 7
2198  011526  012737  000240  177776            MOV     #240,PS         ;SET PROCESSOR PRIORITY @ 5
2199  011534  012711  000300                    MOV     #RDY!IE,@R1     ;RDY, IE IN RHSC1 WHOULD CAUSE INTERRUPT
2200
2201  011540  013737  042150  001200            MOV     @#TIMCNT,@#STMP1;COUNTER
2202  011546  005337  001200          1$:       DEC     @#STMP1         ;WAIT FOR INTERRUPT
2203  011552  001375                            BNE     1$              ;BRANCH IF NOT ZERO
2204                                                                    ;BEFORE THIS IS ZERO INTERRUPT WHOULD
2205                                                                    ;OCCUR
2206  011554  012712  000040                    MOV     #40,@R2         ;CLEAR THE CONTROLLER VIA CS2 CLR BIT
2207
2208  011562  022626                  RPTRP2:   CMP     (SP)+,(SP)+     ;RESTORE STACK
2209  011564  104065                            ERROR   65              ;INTERRUPT OCCURRED WITH PROCESSOR
2210                                                                    ;PROCESSOR STATUS SAME AS DISK
2211  011566  012712  000040                    MOV     #40,@R2         ;CLEAR THE CONTROLLER VIA CS2 CLR BIT
2212
2213
2214
2215
2216
```

```
2217  011612  012737  000000  177776          MOV     #0,PS           ;SET PROCESSER STATUS TO 0
2218
2219  011674  013746  004716                  MOV     @#UNIT,-(SP)    ;GET UNIT UNDER TEST
2220  011700  104405                          TYPDS
2221  011736  000000                          HALT
2222  011740  032713  010000                  BIT     #MOL,@R3        ;MOL IN RHDS1 SHOULD BE = 0
2223  011744  001403                          BEQ     3$              ;BRANCH IF MOL=0
2224  011746  010337  001122                  MOV     R3,@#$BDADR     ;FAILING REGISTER ADDRESS-RHDS1
2225  011752  104010                          ERROR   10              ;ON SPINPLE POWERED DOWN
2226                                                                  ;MOL SHOULD BE 0
2227  011754  013746  004716          3$:     MOV     @#UNIT,-(SP)    ;UNIT NUMBER
2228  011760  052716  000100                  BIS     #IR,(SP)        ;INCLUDE IR
2229  011764  022612                          CMP     (SP)+,@R2       ;ONLY UNIT NO. AND IR SHOULD BE
2230                                                                  ;HIGH IN RHCS2
2231  011766  001403                          BEQ     4$              ;BRANCH IF RHCS2 GOOD
2232  011770  010237  001122                  MOV     R2,@#$BDADR     ;FAILING REGISTER ADDRESS-RHCS2
2233  011774  104011                          ERROR   11              ;WITH SPINDLE POWERED DOWN
2234                                                                  ;ONLY UNIT NO. AND IR SHOULD BE
2235                                                                  ;HIGH
2236
2237  011776                          4$:
2238  012026  013746  004716                  MOV     @#UNIT,-(SP)    ;GET UNIT UNDER TEST
2239  012032  104405                          TYPDS
2240  012102  000000                          HALT
2241  012104  032713  010000                  BIT     #MOL,@R3        ;MOL IN RHDS1 SHOULD BE = 1
2242  012110  001411                          BEQ     5$              ;BRANCH IF MOL = 0
2243  012112  032713  000400                  BIT     #DPR,@R3        ;DPR IN RHDS1 SHOULD BE = 1
2244  012116  001406                          BEQ     5$              ;BRANCH IF DPR = 0
2245  012120  032713  000200                  BIT     #DRY,@R3        ;DRY IN RHDS1 SHOULD BE = 1
2246  012124  001403                          BEQ     5$              ;BRANCH IF DRY =0
2247  012126  032713  000100                  BIT     #VV,@R3         ;VV IN RHDS1 SHOULD BE = 0
2248  012132  001403                          BEQ     6$              ;BRANCH IF VV = 0 (GOOD)
2249  012134  010337  001122          5$:     MOV     R3,@#$BDADR     ;FAILING REGISTER ADDRESS - RHDS1
2250  012140  104012                          ERROR   12              ;WITH SPINDLE POWERED UP
2251                                                                  ;RHDS1 SHOULD HAVE VV = 0, MOL = 1
2252
2253  012142  011100                  6$:     MOV     @R1,R0          ;GET RHCS1 CONTENTS
2254  012144  042700  160076                  BIC     #SC!TRE!MCPE!76,R0 ;CLEAR SC,TRE,MCPE AND
2255                                                                  ;ALL FUNCTION BITS
2256  012150  022700  004200                  CMP     #DVA!RDY,R0     ;RHCS1 SHOULD HAVE
2257                                                                  ;GO = 0, DVA = 1, RDY = 1
2258  012154  001403                          BEQ     7$              ;BRANCH IF RHCS1 IS GOOD
2259  012156  010137  001122                  MOV     R1,@#$BDADR     ;FAILING REGISTER RHCS1
2260  012162  104013                          ERROR   13              ;AFTER A POWER UP WITHOUT ANY
2261                                                                  ;INIT RHCS1 SHOULD HAVE
2262                                                                  ;GO = 0, DVA = 1, RDY = 1, IE = 0
2263                                                                  ;DISREGARD ALL OTHER BITS
2264
2265  012164  005777  170144          7$:     TST     @RHCC           ;TEST RHCC, IT SHOULD = 0
2266  012170  001411                          BEQ     10$             ;BRANCH IF RHCC = 0
2267  012172  013737  002334  004600          MOV     @#RHCC,@#REGADR ;FAILING REGISTER RHCC
2268  012200  005037  001124                  CLR     @#$GDDAT        ;RHCC SHOULD BE = 0
2269  012204  017737  170124  001126          MOV     @RHCC,@#$BDDAT  ;BAD DATA
2270  012212  104014                          ERROR   14              ;AFTER POWER UP RHCC
2271                                                                  ;SHOULD BE 0
2272
```

```
2273  012214                          10$:
2274
2275                                          ;*NOW SAVE REGISTERS FOR COMPARISON AFTER PACK ACKNOWLEDGE
2276
2277
2278
2279
2280
2281
2282                                          ;*NOW COMPARE REGISTERS SO THAT NO REGISTERS
2283                                          ;*CHANGED EXCEPT VV IN RHDS1 AND IE IN RHCS1
2284
2285
2286  012340  104015                  11$:    ERROR   15              ;GIVING A PACK ACKNOWLEDGE
2287  012342  000207                          RTS     PC              ;CAUSED AN ERROR
2288                                                                  ;PACK ACKNOWLEDGE SHOULD
2289                                                                  ;SET VV IN RHDS1
2290                                                                  ;INTERRUPT SHOULD MAKE
2291                                                                  ;IE = 0
2292                                                                  ;NO OTHER REGISTERS SHOULD
2293                                                                  ;CHANGE
2294                                                                  ;GOOD DATA GIVES
2295                                                                  ;CONTENTS OF REGISTER BEFORE
2296                                                                  ;PACK ACKNOWLEDGE
2297                                                                  ;RECEIVED DATA GIVES
2298                                                                  ;CONTENTS OF REGISTER
2299                                                                  ;AFTER PACK ACKNOWLEDGE
2300
2301  012344  012737  177777  047270  12$:    MOV     #-1,@#PRITEM    ;CLEAR PREVIOUS ITEM NUMBER
2302
```

```
2303
2304
2305
2306
2307                                    ;*IN CASE THERE IS ANY DRIVE ERRORS DURING POWER UP
2308                                    ;*OR POWER DOWN OR ANY PARITY ERRORS A RESET IS GIVEN
2309  012354  000005                    RESET
2310  012356  004737  045662           JSR     PC,@#$TKINT     ;INITILIZE TK
2311
2312
2313
2314                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER PACK ACKNOWLEDGE
2315
2316
2317
2318
2319
2320                                    ;*NOW COMPARE REGISTERS BEFORE PACK ACKNOWLEDGE
2321                                    ;*WITH AFTER PACK ACKNOWLEDGE
2322
2323
2324
2325  012604  104015            1$:     ERROR   15              ;GIVING A PACK ACKNOWLEDGE
2326  012606  000207                    RTS     PC              ;CAUSED AN ERROR
2327                                                            ;PACK ACKNOWLEDGE SHOULD
2328                                                            ;SET VV IN RHDS1
2329                                                            ;INTERRUPT SHOULD MAKE
2330                                                            ;IE = 0
2331                                                            ;NO OTHER REGISTERS SHOULD
2332                                                            ;CHANGE
2333                                                            ;GOOD DATA GIVES CONTENTS
2334                                                            ;OF REGISTER BEFORE COMMAND
2335                                                            ;RECEIVED DATA GIVES CONTENTS
2336                                                            ;OF REGISTER AFTER COMMAND
2337  012610                    2$:
```

```
2338
2339  012610  005737  004744          TST     @#RP06          ;TEST FOR RP06 DRIVE
2340  012614  001005                  BNE     3$              ;IF = 1 DO "MAKECYL" 777
2341  012616  005737  004746          TST     @#RP05          ;TEST FOR RP05 DRIVE
2342  012622  001004                  BNE     4$              ;IF = 1 DO "MAKECYL" 377
2343                                                          ;OR THE ADDRESS PLUG TESTS
2344  012630                      3$:
2345  012634                      4$:
2346
2347
2348
2349
2350
2351
```

```
                                                TST     @#RP06          ;TEST FOR RP06 DRIVE
                                                BNE     4$              ;IF = 1, DO THIS TEST
                                                TST     @#RP05          ;TEST FOR MEMOREX RP04
                                                BNE     4$              ;IF = 1, DO THIS TEST
                                                                        ;IF NEITHER FLAG IS UP, ASSUME THE
                                                                        ;DRIVE IS AN ISS RP04 AND SKIP TEST
                                        4$:

                                                ;*SET DIAGNOSTIC MODE TO ENABLE A COMMAND ACTIVE WHILE
                                                ;*THE PLUG IS PULLED

                                                BIS     #DMD,@RHMR      ;SET UP DIAGNOSTIC MODE

                                                ;*TAKE AN INITIAL REGISTER SNAPSHOT



                                                ;*ISSUE A COMMAND AND THE 'GO' BIT (NOT POSITIONING COMMAND)
                                                ;*TO VERIFY COMMAND ABORT IF PLUG IS PULLED



                                                ;*ISSUE SOME CLOCKS TO GET THE COMMAND STARTED
                                                ;*(USE "SEARCH" WITH "DTETST" FLAG UP TO STOP CLOCKING ?)


                                                MOV     @#UNIT,-(SP)    ;GET THE UNIT NO. UNDER TEST
                                                TYPOS                   ;TYPE IT OUT
                                                HALT                    ;WAIT FOR OPERATOR PLUG CHANGE

                                                ;*CHECK THAT THE UNIT NO. UNDER TEST HAS GONE OFFLINE

                                                MOV     @RHDST,R0       ;ATTEMPT TO ADDRESS THE DRIVE
                                                JSR     PC,@#PUTREG     ;TAKE REGISTER SNAPSHOTS
                                                BIT     #NED,@#CS2      ;TEST FOR NON EXISTENT DRIVE
                                                BNE     7$              ;CONTINUE IF 'NED' BIT SET (UNIT
                                                                        ;IS OFFLINE AS IT SHOULD BE)
                                                ERROR   101             ;UNIT DID NOT GO OFFLINE WHEN ADDRESS
                                                                        ;PLUG WAS REMOVED
                                        7$:
```

```
                                        ;*NOW REPLACE THE ADDRESS PLUG
                                        ;
                                        ;
013266  013746  004716                  MOV     @#UNIT,-(SP)    ;GET THE UNIT UNDER TEST
013272  104405                          TYPOS                   ;TYPE IT OUT
013336  000000                          HALT                    ;WAIT FOR OPERATOR PLUG REPLACEMENT
                                        ;
                                        ;*CHECK THAT THE ORIGINAL UNIT HAS COME BACK ON LINE
                                        ;
013340  004737  043364                  JSR     PC,@#PUTREG     ;TAKE NEW REGISTER SNAPSHOTS
013344  032737  000400  002404          BIT     #DPR,@#DS1      ;TEST THAT 'DPR' = 1
013352  001411                          BEQ     9$              ;ERROR - DRIVE SHOULD BE PRESENT
013354  032737  004000  002362          BIT     #DVA,@#CS1      ;TEST THAT DEVICE IS NOW AVAILABLE
013362  001405                          BEQ     9$              ;ERROR - 'DVA' SHOULD = 1
013364  032737  000200  002404          BIT     #DRY,@#DS1      ;TEST THAT DRIVE READY IS = 1
013372  001401                          BEQ     9$              ;ERROR - 'DRY' SHOULD = 1
013374  000403                          BR      8$              ;A-OK: 'DPR' = 1, 'DVA' = 1, & 'DRY' =1
013376  104102                  9$:     ERROR   102             ;UNIT NOT AVAILABLE AFTER
                                                                ;ADDRESS PLUG WAS REPLACED
                                        ;
013404                          8$:     ;CHANGE THE INITIAL REGISTER SNAPSHOT TO EXPECTED VALUES
                                        ;*AFTER THE PLUG CHANGE
                                        ;
                                        ;
013510  053737  004740  004636          BIS     @#ATTENT,@#SAVERE+24 ;SET UNIT UNDER TEST ATTENTION
013516  005037  004654                  CLR     @#SAVERE+42     ;SET RHCC REGISTER IMAGE TO ALL 0'S
                                        ;
                                        ;*TAKE A NEW REGISTER SNAPSHOT AND
                                        ;*COMPARE THE REGISTER CONTENTS WITH EXPECTED VALUES
                                        ;
                                        ;
013540  104100                  5$:     ERROR   100             ;ADDRESS PLUG CHANGE CAUSED SOME
                                                                ;REGISTER ERROR
013542  000207                          RTS     PC              ;GO BACK AND CHECK THE NEXT REGISTER
                                                                ;UNTIL ALL 18. HAVE BEEN DONE
```

```
                                        ;*NOW CLEAR OUT THE CONTROLLER AND DRIVE
013544                          6$:
                                        ;*CHANGE THE REGISTER SNAPSHOT TO EXPECTED VALUES AFTER THE CLEAR
013660  043737  004740  004636            BIC     @#ATTENT,@#SAVERE+24 ;UNIT UNDER TEST ATTENTION BIT
                                        ;*TAKE ANOTHER REGISTER SNAPSHOT AND COMPARE RESULTS
                                        ;*WITH THE EXPECTED VALUES
013704  104100                  10$:    ERROR   100             ;ADDRESS PLUG CHANGE CAUSED SOME
013706  000207                          RTS     PC              ;INCORRECT REGISTER RESULT
013710                          11$:
                                        ;*(USE NED METHOD TO VERIFY
                                        ;*THAT ATTENTION BIT COMES UP IN THE PROPER LOCATION ??)
                                        ;*SET 'VV' IN RHDS1 AFTER RESET FROM THE RECALIBRATE
                                        ;*CAUSED BY PULLING THE PLUG
```

```
2464
2465
2466
2467
2468  013752  005737  004744                TST     @#RP06          ;TEST FOR RP06 DRIVE
2469  013756  001005                        BNE     4$              ;IF = 1, OK TO DO THIS TEST
2470  013760  005737  004746                TST     @#RP05          ;TEST FOR MEMOREX RP04
2471  013764  001002                        BNE     4$              ;IF = 1, OK TO DO THIS TEST
2472                                                                ;NOT AN RP06 OR MEMOREX RP04 SO
2473                                                                ;ASSUME AN ISS RP04 AND SKIP TEST
2474  013772                          4$:
2475
2476                                        ;#CHECK TO SEE IF THIS TEST HAS BEEN SELECTED WITH SW5
2477
2478  013772  032777  000040  165140        BIT     #SW5,@SWR       ;TEST THE SWITCH
2479  014000  001002                        BNE     5$              ;IF 0, TEST HAS NOT BEEN SELECTED
2480  014006                          5$:                           ;TEST SELECTED, CONTINUE IT
2481
2482
2483
2484
2485
2486
2487  014214  013737  004716  004752        MOV     @#UNIT,@#INUNIT ;MAKE THE INITIAL UNIT NO. = "UNIT"
2488
```

```
2489
2490
2491                                            ;*CHANGE ADDRESS PLUG ON THE UNIT UNDER TEST
2492
2493  014222                                6$:
2494  014270  013746  004716                    MOV     @#UNIT,-(SP)    ;GET THE UNIT UNDER TEST
2495  014274  104405                            TYPDS                   ;TYPE IT OUT
2496  014412  000000                            HALT
2497
2498                                            ;*HOUSEKEEPING
2499
2500  014414  005037  047270                    CLR     @#PRITEM        ;CLEAR THE PREVIOUS ERROR NUMBER
2501  014420  005237  004716                    INC     @#UNIT          ;ADD ONE TO THE UNIT NO.
2502  014424  042737  177770  004716            BIC     #^C7,@#UNIT     ;TRUNCATE TO LOW ORDER 3 BITS
2503
2504
2505                                            ;*ATTEMPT TO ADDRESS THE NEW UNIT NUMBER
2506
2507  014436  017700  165642                    MOV     @RHDST,R0       ;ATTEMPT TO ADDRESS THE NEW DRIVE NO.
2508  014442  004737  043364                    JSR     PC,@#PUTREG     ;TAKE REG. SNAPSHOT IN CASE OF ERROR
2509  014446  032737  010000  002360            BIT     #NED,@#CS2      ;TEST FOR NON EXISTENT DRIVE
2510  014454  001423                            BEQ     7$              ;CONTINUE IF 'NED' IS NOT SET - DRIVE
2511                                                                    ;SHOULD BE EXISTENT ON THE BUSS
2512  014456  104102                            ERROR   102             ;UNIT NOT AVAILABLE AFTER ADDRESS
2513                                                                    ;PLUG REPLACED
2514  014504  013746  004716                    MOV     @#UNIT,-(SP)    ;GET THE BAD UNIT NUMBER
2515  014510  104405                            TYPDS                   ;TYPE IT OUT
2516
```

```
                                        ;*CHECK IF ALL UNIT NUMBERS HAVE BEEN TRIED
                                        ;
014524  023737  004716  004752  7$:   CMP     @#UNIT,@#INUNIT ;HAVE WE INCREMENTED BACK TO THE
                                                              ;ORIGINAL UNIT NO. YET ?
014532  001233                        BNE     6$              ;NO..DO NEXT ADDRESS PLUG
                                                              ;YES..CONTINUE WITH TESTS
                                        ;
                                        ;*SET 'VV'IN RHDS1 AFTER RESET FROM THE RECALIBRATE
                                        ;*CAUSED BY PULLING THE ADDRESS PLUGS OUT
```

```
2531
2532
2533                                    .SBTTL
2534                                    .SBTTL  **DRIVE COMMAND TESTS**
2535                                    .SBTTL
2536
2537
2538
2539
2540
2541
2542
2543
2544                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER NO OPERATION
2545
2546
2547
2548
2549
2550                                    ;*NOW COMPARE REGISTERS BEFORE NO-OP COMMAND
2551                                    ;*WITH AFTER NO-OP COMMAND
2552
2553  015074  104016                  1$:     ERROR   16              ;GIVING A NO-OP COMMAND
2554  015076  000207                          RTS     PC              ;CAUSED AN ERROR
2555                                                                  ;NO REGISTERS SHOULD CHANGE
2556                                                                  ;GOOD DATA GIVES REGISTER
2557                                                                  ;CONTENTS BEFORE COMMAND
2558                                                                  ;RECEIVED DATA GIVES REGISTER
2559                                                                  ;CONTENTS AFTER COMMAND
2560
```

```
2561
2562                                        ;*NOW REPEAT TEST BY MOVING IN ALL POSSIBLE ONES
2563
2564  015100                          2$:
2565  015104  012700  002272                MOV     #RHWC,R0        ;ADDR. OF ADDR OF RHWC IN R0
2566
2567
2568                                        ;*NOW SAVE REGISTERS FOR COMPARISON AFTER A NO-OP
2569
2570
2571
2572
2573
2574                                        ;*CHANGE REGISTERS TO EXPECTED VALUES
2575
2576  015320  005737  004750                TST     @#RH70          ;RUNNING ON AN RH70 ?
2577  015324  001406                        BEQ     5$              ;IF NOT, SKIP NEXT
2578  015326  005737  004722                TST     @#NUNIT         ;TESTING MORE THAN ONE DRIVE ?
2579  015332  001003                        BNE     5$              ;SKIP NEXT IF SO
2580  015334  042737  100000  004620        BIC     #SC,@#SAVERE+6  ;CLEAR 'SC' IN RHCS1
2581
2582  015342                          5$:
2583
2584
2585                                        ;*NOW COMPARE REGISTERS BEFORE NO-OP WITH
2586                                        ;*AFTER NO-OP COMMAND
2587
2588
2589  015402  104016                  3$:   ERROR   16              ;GIVING A NO-OP COMMAND
2590  015404  000207                        RTS     PC              ;CAUSED AN ERROR
2591                                                                ;NO REGISTERS SHOULD CHANGE
2592                                                                ;GOOD DATA GIVES REGISTER
2593                                                                ;CONTENTS BEFORE COMMAND
2594                                                                ;RECEIVED DATA GIVES REGISTER
2595                                                                ;CONTENTS AFTER COMMAND
2596  015406                          4$:
2597
2598
```

```
2599
2600                                        ;*WRITE ALL WRITABLE REGISTER BITS
2601
2602  015440  012700  002272              MOV     #RHWC,R0        ;ADDR. OF ADDR. OF RHWC IN R0
2603
2604  015566  017737  164542  004654      MOV     @RHCC,@#SAVERE+42 ;SAVE RHCC IN SAVERE TABLE
2605
2606
2607
2608                                        ;*NOW LOAD 'SAVERE' REGISTER SNAPSHOT WITH EXPECTED VALUES
2609
2610  015650  005037  004616              CLR     @#SAVERE+4      ;CLEAR LOCATION FOR RHCS2
2611  015654  053737  004716  004616      BIS     @#UNIT,@#SAVERE+4;PUT UNIT # BACK IN THE SAVED RHCS2
2612
2613  015662  005737  004750              TST     @#RH70          ;RUNNING ON AN RH70 CONTROLLER ?
2614  015666  001021                      BNE     8$              ;IF SO SKIP NEXT RH11 CODE
2615
2616  015730  000416                      BR      9$              ;SKIP NEXT RH70 CODE
2617
2618  015732                          8$:
2619  015752  005737  004722              TST     @#NUNIT         ;TESTING MORE THAN ONE DRIVE ?
2620  015756  001003                      BNE     9$              ;SKIP NEXT IF SO
2621  015760  042737  100000  004620      BIC     #SC,@#SAVERE+6  ;CLEAR 'SC' IF NOT
2622  015766                          9$:
2623  016046  013746  004742              MOV     @#TOTALAT,-(SP) ;GET ALL BITS OF DRIVE & PRESENT
2624                                                              ;IN RHAS
2625  016052  043716  004740              BIC     @#ATTENT,(SP)   ;CLEAR WORKING DRIVE BIT
2626  016056  012637  004636              MOV     (SP)+,@#SAVERE+24 ;MOVE THIS INTO RHAS POSITION
2627
2628  016072                          3$:
2629
2630  016102  013737  002406  004644  4$: MOV     @#DT,@#SAVERE+32 ;MOVE DRIVE TYPE INTO RHDT
2631                                                              ;POSITION OF SAVRE TABLE
2632  016110  013737  002410  004646      MOV     @#SN,@#SAVERE+34 ;MOVE SERIAL NUMBER INTO RHSN
2633                                                              ;POSITION OF SAVERE TABLE
2634
2635
2636                                        ;*NOW THAT SAVERE TABLE HAS BEEN LOADED WITH
2637                                        ;*EXPECTED VALUES, THE REGISTERS WILL BE COMPARED
2638                                        ;*WITH SAVERE TABLE
2639
2640
2641  016170  104017                  5$: ERROR   17              ;DRIVE CLEAR COMMAND
2642  016172  000207                      RTS     PC              ;GAVE AN ERROR
2643                                                              ;GOOD DATA HAS WHAT SHOULD
2644                                                              ;BE IN REGISTER AFTER A
2645                                                              ;DRIVE CLEAR
2646                                                              ;RECEIVED DATA HAS WHAT
2647                                                              ;THE REGISTER ACTUALLY
2648                                                              ;CONTAINED
2649  016174                          6$:
2650
```

```
2651
2652
2653  016270  013746  004716            MOV     @#UNIT,-(SP)    ;GET UNIT UNDER TEST
2654  016274  104405                    TYPOS                   ;TYPE IT OUT
2655  016276  104401  001223            TYPE    ,$CRLF
2656  016302  032713  010000      3$:   BIT     #MOL,@R3        ;MOL WILL BE HIGH TILL STOP IS HIT
2657  016306  001375                    BNE     3$              ;WAIT TILL STOP IS HIT
2658
2659
2660  016332  013746  004716            MOV     @#UNIT,-(SP)    ;GET UNIT UNDER TEST
2661  016336  104405                    TYPOS                   ;TYPE IT
2662  016340  104401  001223            TYPE    ,$CRLF
2663
2664  016344  032713  010000      4$:   BIT     #MOL,@R3        ;MOL WILL BE LOW TILL FILE READY
2665  016350  001775                    BEQ     4$              ;WAIT TILL FILE READY
2666  016370  012700  002272            MOV     #RHWC,R0        ;ADDR. OF ADDR. OF RHWC IN R0
2667
2668
2669                                    ;*NOW INITIALIZE ALL THE REGISTERS
2670
2671
2672  016516  013777  004740  163572    MOV     @#ATTENT,@RHAS  ;CLEAR WORKING DRIVE 'ATA'
2673
2674                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ-IN COMMAND
2675
2676
2677
2678  016552  005737  004750            TST     @#RH70          ;RUNNING ON AN RH70 CONTROLLER ?
2679  016556  001411                    BEQ     7$              ;SKIP NEXT FOR RH70 IF NOT
2680  016600  000406                    BR      8$              ;SKIP NEXT FOR RH11
2681
2682  016602                      7$:
2683
2684  016616                      8$:
2685
2686                                    ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
2687
2688
2689                                    ;*NOW THAT SAVERE TABLE WITH SAVED REGISTERS HAVE
2690                                    ;*THE EXPECTED VALUE AFTER A READ-IN COMMAND
2691                                    ;*COMPARISONS ARE MADE
2692
2693
2694  016726  104020            5$:   ERROR   20              ;READ IN COMMAND GAVE AN
2695  016730  000207                    RTS     PC              ;ERROR
2696                                                          ;GOOD DATA HAS WHAT SHOULD
2697                                                          ;BE IN REGISTER AFTER A
2698                                                          ;READ-IN COMMAND
2699                                                          ;RECEIVED DATA HAS WHAT
2700                                                          ;THE REGISTER ACTUALLY CONTAINED
2701                                                          ;THE FOLLOWING SHOULD
2702                                                          ;BE THE REGISTER CONTENTS
2703                                                          ;RHCA=0, RHDST = 0
2704                                                          ;RHOF SHOULD HAVE FMT22 = 0,
2705                                                          ;HCI = 0, ECI = 0,
2706                                                          ;RHDS1 SHOULD HAVE VV = 1
```

```
 2707                                                          ;ALL OTHER BITS SHOULD
 2708                                                          ;BE UNCHANGED
 2709  016732  012737  177777  047270  6$:     MOV     #-1,@#PRITEM    ;CLEAR PREVIOUS ITEM NUMBER
```

```
2710
2711
2712  016772  012700  002272                MOV     #RHWC,R0        ;ADDR. OF ADDR. OF RHWC IN R0
2713
2714
2715                                          ;*INITIALIZE ALL THE REGISTERS
2716
2717
2718  017056  013777  004740  163232        MOV     @#ATTENT,@RHAS  ;CLEAR WORKING DRIVE 'ATA'
2719
2720                                          ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ-IN COMMAND
2721
2722
2723
2724  017112  005737  004750                TST     @#RH70          ;RUNNING ON AN RH70 CONTROLLER ?
2725  017116  001411                        BEQ     9$              ;SKIP NEXT IF NOT
2726  017140  000406                        BR      10$             ;SKIP NEXT RH11 CODE
2727
2728  017142                          9$:
2729
2730  017156                          10$:
2731
2732                                          ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
2733
2734
2735                                          ;*NOW THAT SAVERE TABLE WITH SAVED REGISTERS HAVE
2736                                          ;*THE EXPECTED VALUE AFTER A READ-IN COMMAND
2737                                          ;*COMPARISONS ARE MADE
2738
2739
2740  017266  104020                  5$:     ERROR   20              ;READ-IN COMMAND GAVE AN
2741  017270  000207                          RTS     PC              ;ERROR
2742                                                                  ;GOOD DATA HAS WHAT SHOULD
2743                                                                  ;BE IN REGISTER AFTER A
2744                                                                  ;READ-IN COMMAND
2745                                                                  ;RECEIVED DATA HAS WHAT
2746                                                                  ;THE REGISTER ACTUALLY CONTAINE
2747                                                                  ;THE FOLLOWING SHOULD
2748                                                                  ;BE THE REGISTER CONTENTS
2749                                                                  ;RHCA = 0, RHDST = 0
2750                                                                  ;RHOF SHOULD HAVE FMT22 = 0,
2751                                                                  ;HCI = 0, ECI = 0,
2752                                                                  ;RHDS1 SHOULD HAVE VV = 1
2753                                                                  ;ALL OTHER BITS SHOULD
2754                                                                  ;BE UNCHANGED
2755  017272                          6$:
```

```
2756   017272   005737   004744            TST     @#RP06          ;TEST FOR RP06 DRIVE
2757   017276   001401                     BEQ     7$              ;IF = 0, TREAT DRIVE AS AN RP04
2758   017300   000402                     BR      8$              ;TREAT AS RP06 - DO NEXT "MAKECL"
2759   017302   000137   017346      7$:   JMP     @#DOG           ;DO SECOND FOLLOWING "MAKECL"
2760   017306                       8$:
2761
2762
2763
2764   017342   000137   017402            JMP     @#FISH          ;DON'T DO NEXT "MAKECL"
2765
2766
2767   017346                       DOG:
2768
```

```
2769
2770
2771
2772  017402                          FISH:
2773  017434  012700  002272                MOV     #RHWC,R0        ;ADDR. OF ADDR. OF RHWC IN R0
2774
2775
2776                                          ;*NOW SAVE REGISTERS FOR COMPARISON AFTER RECALIBRATE
2777
2778
2779                                          ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
2780
2781
2782
2783                                          ;*NOW COMPARE REGISTERS AFTER A RECALIBRATE COMMAND
2784
2785
2786  020042  104064                  1$:     ERROR   64              ;RECALIBRATE COMMAND CAUSED
2787  020044  000207                          RTS     PC              ;AN ERROR
2788                                                                  ;GOOD DATA GIVES WHAT SHOULD
2789                                                                  ;BE THERE
2790                                                                  ;RECEIVED DATA GIVES WHAT WAS
2791                                                                  ;THERE AFTER COMMAND
2792
2793  020046                          2$:
```

```
2794
2795  020046  005737  004744          TST     @#RP06          ;TEST FOR RP06 DRIVE
2796  020052  001401                  BEQ     3$              ;IF = 0, TREAT DRIVE AS AN RP04
2797  020054  000402                  BR      4$              ;TREAT AS RP06 - DO NEXT "MAKECL"
2798  020056  000137  020122    3$:   JMP     @#CAT           ;DO SECOND FOLLOWING "MAKECL"
2799  020062            4$:
2800
2801
2802  020116  000137  020156          JMP     @#BIRD          ;DON'T DO NEXT "MAKECL"
2803
2804
2805  020122            CAT:
```

```
2806
2807
2808
2809  020156                          BIRD:
2810  020210  012700  002272                MOV     #RHWC,R0        ;ADDR. OF ADDR OF RHWC IN R0
2811
2812
2813                                          ;*NOW SAVE REGISTERS FOR COMPARISON AFTER RECALIBRATE
2814
2815                                          ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
2816
2817
2818                                          ;*NOW COMPARE REGISTERS AFTER A RECALIBRATE COMMAND
2819
2820
2821  020520  104064                  1$:     ERROR   64              ;RECALIBRATE COMMAND CAUSED
2822  020522  000207                          RTS     PC              ;AN ERROR
2823                                                                  ;GOOD DATA GIVES WHAT SHOULD BE
2824                                                                  ;THERE
2825                                                                  ;RECEIVED DATA GIVES WHAT WAS
2826  020524                          2$:                             ;THERE AFTER A RECALIBRATE
2827
```

```
2828
2829
2830                                        ;*THIS SETTING OF VV IS FOR LOOP ON ERROR ONLY
2831                                        ;*WHERE UNLOAD TAKES EFFECT AND CYCLE UP BRINGS VV DOWN
2832
2833  020606  017746  161510                MOV     @RHDS1,-(SP)    ;PUSH RHDS1 ONTO STACK
2834  020612  042716  167677                BIC     #167677,(SP)    ;CLEAR EVERYTHING EXCEPT VV AND MOL
2835  020616  022726  010100                CMP     #VV!MOL,(SP)+   ;ARE VV AND MOL SET ?
2836  020622  001504                        BEQ     6$              ;CONTINUE IF YES
2837  020766  000000                        HALT                    ;WAIT FOR CONTINUE
2838
2839
2840                                        ;*SET VV IN RHDS1 WITH PACK ACKNOWLEDGE
2841
2842
2843
2844  021034                        6$:
2845
2846  021046  012700  002272                MOV     #RHWC,R0        ;ADDR. OF ADDR OF RHWC IN R0
2847
2848                                        ;*LOAD ALL POSSIBLE REGISTERS WITH ONES
2849
2850
2851                                        ;*NOW SAVE REGISTERS FOR COMPARISON AFTER UNLOAD
2852
2853
2854
2855
2856  021242  104413                        WAT                     ;WAIT FOR BIT TO SET
2857  021244  002300                        RHCS1                   ;IN RHCS1 REGISTER
2858  021246  000200                        RDY                     ;'RDY' BIT
2859  021250  000001                        1.                      ;ALLOW 10 MICRO SECONDS
2860  021252  000001                        1.                      ;ANOTHER 10 - 'RDY' MUST SET BETWEEN
2861                                                                ;00 AND 20 MICRO SECONDS
```

```
2862
2863                                        ;*COMPARE CONTENTS OF RHCS1 AND RHDS1, WHICH WERE SAVED
2864                                        ;*DURING THE UNLOAD COMMAND, WITH THE EXPECTED RESULTS
2865
2866  021254  013746  002424              MOV     @#UNLOAD,-(SP)   ;PUSH COMMAND ON STACK
2867  021260  052716  004201              BIS     #DVA!GO!RDY,(SP) ;INCLUDE THESE BITS SET
2868  021264  005737  004722              TST     @#NUNIT          ;IS THERE MORE THAN ONE UNIT ?
2869  021270  001413                      BEQ     9$               ;SKIP NEXT IF ONLY ONE UNIT
2870  021272  010037  004760              MOV     R0,@#TMP4        ;PUT SAVED RHCS1 INTO TMP4
2871  021276  042737  177677  004760      BIC     #^CIE,@#TMP4     ;MASK ALL BUT THE 'IE' BIT IN RHCS1
2872  021304  042716  000100              BIC     #IE,(SP)         ;CLEAR 'IE' IN EXPECTED DATA
2873  021310  053716  004760              BIS     @#TMP4,(SP)      ;SET 'IE' STATE FROM ACTUAL RHCS1 DATA
2874  021314  052716  100000              BIS     #SC,(SP)         ;SET 'SC' IN RHCS1 SAVED DATA
2875
2876  021320  011637  001124      9$:     MOV     (SP),@#$GDDAT    ;SAVE EXPECTED DATA FOR PRINTOUT
2877  021324  022600                      CMP     (SP)+,R0         ;COMPARE EXPECTED DATA WITH SAVED
2878                                                               ;RHCS1 DATA AND RESET THE STACK
2879  021326  001405                      BEQ     10$              ;CHECK NEXT BITS IF THESE OK
2880  021330  010037  001126              MOV     R0,@#$BDDAT      ;RHCS1 IS BAD - PRINT IT OUT
2881  021334  010137  004600              MOV     R1,@#REGADR      ;REGISTER ADDRESS
2882  021340  104021                      ERROR   21               ;DURING ABOVE OPERATION ONLY THE
2883                                                               ;'DVA'  'GO'  'RDY' AND COMMAND BITS
2884                                                               ;SHOULD BE SET
2885
2886  021342  012746  020400      10$:    MOV     #PIP!DPR,-(SP)   ;PUT SOME EXPECTED RHDS1 BITS ON STACK
2887  021346  010537  004760              MOV     R5,@#TMP4        ;PUT SAVED RHDS1 INTO TMP4
2888  021352  042737  167677  004760      BIC     #^C<MOL!VV>,@#TMP4 ;MASK ALL BUT 'MOL' & 'VV' IN RHDS1
2889  021360  042716  010100              BIC     #MOL!VV,(SP)     ;CLEAR 'MOL' & 'VV' IN EXPECTED RHDS1
2890  021364  053716  004760              BIS     @#TMP4,(SP)      ;SET EXPECTED 'MOL' & 'VV' BIT STATES
2891                                                               ;FROM THE ACTUAL DATA (DON'T CARE)
2892  021370  011637  001124              MOV     (SP),@#$GDDAT    ;SAVE EXPECTED DATA FOR PRINTOUT
2893  021374  022605                      CMP     (SP)+,R5         ;COMPARE EXPECTED DATA WITH SAVED
2894                                                               ;RHDS1 DATA AND RESET THE STACK
2895  021376  001405                      BEQ     11$              ;CONTINUE IF EXPECTED=SAVED
2896  021400  010537  001126              MOV     R5,@#$BDDAT      ;RHDS1 IS BAD - PRINT IT OUT
2897  021404  010337  004600              MOV     R3,@#REGADR      ;REGISTER ADDRESS
2898  021410  104063                      ERROR   63               ;DURING THE ABOVE OPERATION, ONLY 'PIP
2899                                                               ;AND 'DPR' SHOULD BE SET
2900                                                               ;'MOL' & 'VV' ARE DON'T CARES
2901  021412                      11$:
2902
2903                                        ;THIS PROVIDES A 1 SECOND "STALL"
2904
```

```
2905
2906
2907                                        ;*NOW CHANGE REGISTERS SAVED BEFORE UNLOAD COMMAND
2908                                        ;*TO EXPECTED VALUES AFTER UNLOAD COMMAND
2909
2910                                        ;* - AGAIN 'MOL' $ 'VV' ARE DON'T CARES
2911
2912
2913  021472  012746  020400                MOV     #PIP!DPR,-(SP)  ;SET EXPECTED FINAL RHDS1 BITS
2914  021476  017737  160620  004760        MOV     @RHDS1,@#TMP4   ;GET PRESENT ACTUAL RHDS1 CONTENTS
2915  021504  042737  167677  004760        BIC     #^C<MOL!VV>,@#TMP4 ;MASK OUT ALL BUT 'MOL' & 'VV'
2916  021512  042716  010100                BIC     #MOL!VV,(SP)    ;CLEAR 'MOL' & 'VV' IN EXPECTED RHDS1
2917  021516  053716  004760                BIS     @#TMP4,(SP)     ;SET EXPECTED 'MOL' & 'VV' STATES
2918                                                                ;FROM THE ACTUAL (DON'T CARE COND.)
2919  021522  042716  100200                BIC     #ATA!DRY,(SP)   ;CLEAR THESE ADDITIONAL RHDS1 BITS
2920  021526  012637  004642                MOV     (SP)+,@#$AVERE+30 ;CHANGE THE SAVED RHDS1 REGISTER
2921                                                                ;AND ADJUST THE STACK
2922
2923
2924  021546  005737  004722                TST     @#NUNIT         ;IS THERE MORE THAN ONE UNIT ?
2925  021552  001006                        BNE     7$              ;SKIP NEXT IF MORE THAN ONE UNIT
2926  021570                          7$:
2927
2928                                        ;*NOW COMPARE REGISTERS AFTER THE UNLOAD COMMAND
2929                                        ;*WITH EXPECTED VALUES
2930
2931
2932  021614  104023                  3$:   ERROR   23              ;UNLOAD COMMAND GAVE
2933  021616  000207                        RTS     PC              ;AN ERROR
2934                                                                ;GOOD DATA GIVES WHAT SHOULD
2935                                                                ;BE THERE
2936                                                                ;RECEIVED DATA GIVES WHAT WAS
2937                                                                ;THERE AFTER UNLOAD COMMAND
2938
2939  021620                          4$:
2940  021642  013746  004716                MOV     @#UNIT,-(SP)    ;GET UNIT UNDER TEST
2941  021646  104405                        TYPDS
2942
2943  021766  005037  047270                CLR     @#PRITEM        ;CLEAR PREVIOUS ERROR NUMBER
2944  021772  000000                        HALT                    ;WAIT FOR CONTINUE
2945
2946
2947                                        ;*SET VV IN RHDS1 AFTER RESET FROM ACTUATING
2948                                        ;*THE STANDBY SWITCH AND CYCLING UP (MOL = 1)
2949
2950
```

```
                022100  112737  000001  004610          MOVB    #1,@#OFSTVL     ;SET OFFSET VALUE TO 1
                022106  112737  000034  004611          MOVB    #34,@#OFSTVL+1  ;SET HCI,ECI,FMT22
                022114                          1$:
                022132  012700  002272                  MOV     #RHWC,R0        ;ADDR. OF ADDR OF RHWC IN R0
                                                        ;*THE OFFSET REGISTER WILL BE INCREMENTED FROM 0 TO 377
                022172  013730  004610                  MOV     @#OFSTVL,@(R0)+ ;SET OFFSET REGISTER

                                                        ;*NOW SAVE REGISTERS FOR COMPARISON AFTER OFFSET

                                                        ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES

                                                        ;*NOW COMPARE REGISTERS AFTER AN OFSET COMMAND

                022530  104024                  2$:     ERROR   24              ;OFFSET COMMAND CAUSED AN ERROR
                022532  000207                          RTS     PC              ;GOOD DATA IS WHAT SHOULD BE THERE
                                                                                ;RECEIVED DATA GIVES WHAT WAS THERE
                                                                                ;AFTER AN OFFSET COMMAND
                022534  013777  004740  157554  3$:     MOV     @#ATTENT,@RHAS  ;CLEAR WORKING DRIVE ATTENTION

                                                        ;*NOW A RETURN TO CENTER LINE COMMAND WILL BE GIVEN

                                                        ;*NOW REGISTERS ARE SAVED FOR COMPARISON AFTER COMMAND

                                                        ;*NOW CHANGE SAVED REGISTER TO EXPECTED VALUE

                                                        ;*NOW COMPARE REGISTERS AFTER RETURN-TO-CENTER-LINE
                023034  104025                  4$:     ERROR   25              ;RETURN TO CENTER-LINE
                023036  000207                          RTS     PC              ;COMMAND CAUSED AN ERROR
                                                                                ;GOOD DATA HAS WHAT SHOULD
                                                                                ;BE THERE
                                                                                ;RECEIVED DATA HAS WHAT WAS
                                                                                ;THERE AFTER COMMAND
                023040                          5$:
                023044  105237  004610                  INCB    @#OFSTVL        ;GET NEXT OFFSET VALUE
                023050  132737  000100  004610          BITB    #100,@#OFSTVL   ;SEE IF UNUSED BIT 6  IS ON
```

```
 3007  023056  001403                    BEQ     7$              ;NO SO DO SOME MORE
 3008  023060  062737  000100  004610    ADD     #100,@#OFSTVL   ;YES SO BY-PASS IT
 3009  023066  105737  004610    7$:     TSTB    @#OFSTVL        ;IF ZERO ALL COMBINATIONS ARE
 3010                                                            ;COMPLETE
 3011  023072  001001                    BNE     6$              ;BRANCH IF 377 NOT DONE
 3012  023076  000137  022114    6$:     JMP     @#1$            ;JUMP BECAUSE 377 NOT DONE
 3013
```

```
3014  023104  012737  000764  004756          MOV     # 500.,@#TMP1   ;COUNTER
3015  023112                          1$:
3016  023176  032777  040000  157116          BIT     #ERR,@RHDS1     ;IS ERR SET?
3017  023204  001417                          BEQ     2$              ;NO
3018  023206  104026                          ERROR   26              ;REPEATED OFFSETS CAUSED AN ERROR
3019  023210  000004                          SCOPE
3020  023244  005337  004756          2$:     DEC     @#TMP1          ;COUNT DOWN
3021  023252  000717                          BR      1$              ;GO BACK AND DO IT AGIEN
3022
```

```
                        .SBTTL  READ/WRITE TESTS USING MEDIA

                                ;*FILL WRITE FROM BUFFER WITH HEADER

                                ;*FILL WRITE FROM BUFFER WITH DATA

                                ;*NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA
                                ;*AS WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
                                ;*CAN BE MADE TO MAKE SURE THAT WRITE DID NOT
                                ;*CHANGE WRITE FROM BUFFER

                                ;*NOW THE WRITE HEADER AND DATA COMMAND WILL BE FILLED

                                ;*NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DATA




                                ;*ONE REVOLUTION=16670 MICRO SEC, ONE SECTOR = 760 MICRO SEC

                                ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES

                                ;*NOW COMPARE REGISTERS BEFORE WRITE HEADER AND DATA
                                ;*WITH REGISTERS AFTER COMMAND

023614  104027          1$:   ERROR   27              ;WRITE HEADER AND DATA
023616  000207                RTS     PC              ;CAUSED IMPROPER REGISTER
                                                      ;CHANGE
                                                      ;GOOD DATA GIVES WHAT SHOULD
                                                      ;BE THERE
                                                      ;RECEIVED DATA GIVES WHAT
                                                      ;WAS THERE AFTER COMMAND

                                ;*NOW WRITE FROM BUFFER WILL BE CHECKED TO SEE THAT
                                ;*NOTHING GOT CHANGED

023620                  2$:

023636  104030          3$:   ERROR   30              ;WRITE HEADER AND DATA
023640  000207                RTS     PC              ;CHANGED WRITE FROM BUFFER

                                ;*NOW A READ HEADER AND DATA COMMAND WILL BE GIVEN
                                ;*READ INTO BUFFER IS FILLED WITH ONES

023642                  4$:

                                ;*NOW FILL COMMAND
```

```
3079
3080                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ HEADER AND DATA
3081
3082
3083
3084
3085
3086
3087                                    ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
3088
3089
3090                                    ;*COMPARE REGISTER BEFORE READ HEADER AND DATA
3091                                    ;*WITH REGISTERS AFTER COMMAND
3092
3093
3094  024114  104031          5$:       ERROR   31              ;READ HEADER AND DATA CAUSED
3095  024116  000207                    RTS     PC              ;IMPROPER REGISTER CHANGE
3096                                                            ;GOOD DATA GIVES WHAT SHOULD
3097                                                            ;BE THERE
3098                                                            ;RECEIVED DATA GIVES WHAT WAS
3099                                                            ;THERE AFTER COMMAND
3100
3101                                    ;*NOW READ INTO BUFFER WILL BE CHECKED TO SEE
3102                                    ;*THE READ WAS GOOD
3103
3104  024120                    6$:
3105
3106  024136  104032          7$:       ERROR   32              ;WRITE HEADER AND DATA
3107  024140  000207                    RTS     PC              ;FOLLOWED BY A READ HEADER
3108                                                            ;AND DATA GAVE A READ ERROR
3109                                                            ;ERROR MAY BE IN READ OR WRITE
3110  024142                    10$:
3111
```

```
3112
3113
3114                                    ;*FILL WRITE FROM BUFFER WITH EXPECTED DATA
3115
3116
3117                                    ;*NOW THE READ DATA COMMAND WILL BE FILLED
3118
3119
3120                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
3121
3122
3123
3124
3125
3126
3127                                    ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
3128
3129
3130                                    ;*NOW COMPARE REGISTERS BEFORE READ DATA WITH
3131                                    ;*AFTER COMMAND
3132
3133
3134  024430  104033          1$:       ERROR   33              ;READ DATA CAUSED IMPROPER REGISTER
3135  024432  000207                    RTS     PC              ;CHANGE
3136                                                            ;GOOD DATA GIVES WHAT SHOULD BE THERE
3137                                                            ;RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND
3138                                    ;*NOW READ INTO BUFFER WILL BE CHECKED TO SEE THAT READ
3139                                    ;*WAS GOOD
3140
3141  024434                    2$:
3142
3143  024452  104034          3$:       ERROR   34              ;READ DATA COMMAND
3144  024454  000207                    RTS     PC              ;READ INCORRECTLY
3145
3146  024456                    4$:
```

```
3147
3148
3149                                    ;*NOW FILL WRITE FROM BUFFER -200 OF 1'S AND 56 OF 125252
3150
3151
3152                                    ;*NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA AS
3153                                    ;*WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
3154                                    ;*CAN BE MADE TO DETERMINE THAT WRITE DID NOT CHANGE BUFFER
3155
3156
3157                                    ;*NOW WRITE DATA COMMAND WILL BE LOADED
3158
3159
3160                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE DATA
3161
3162
3163
3164
3165
3166                                    ;*ONE REVOLUTION = 16670 MICRO SEC, ONE SECTOR=760 MICRO SEC
3167
3168
3169                                    ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
3170
3171
3172                                    ;*NOW COMPARE REGISTERS BEFORE WRITE DATA WITH REGISTERS
3173                                    ;*AFTER COMMAND
3174
3175
3176  025002  104035          1$:       ERROR   35              ;WRITE DATA COMMAND CAUSED
3177  025004  000207                    RTS     PC              ;IMPROPER REGISTER CHANGE
3178                                                            ;GOOD DATA GIVES WHAT SHOULD
3179                                                            ;BE
3180                                                            ;RECEIVED DATA GIVES WHAT WAS
3181                                                            ;THERE AFTER COMMAND
3182
3183                                    ;*NOW WRITE FROM BUFFER WILL BE CHECKED FOR NO CHANGE
3184
3185  025006                  2$:
3186
3187  025024  104036          3$:       ERROR   36              ;WRITE DATA COMMAND CHANGED
3188  025026  000207                    RTS     PC              ;WRITE FROM BUFFER
3189
3190                                    ;*NOW A READ DATA COMMAND WILL BE GIVEN
3191
3192                                    ;*FILL READ INTO BUFFER WITH 200 ZEROS AND 56 OF 377
3193
3194  025030                  4$:
3195
3196                                    ;*FILL WRITE FROM BUFFER WITH 200 ONES AND 56 OF 377
3197
3198
3199                                    ;*NOW FILL COMMAND
3200
3201
3202                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
```

```
3203
3204
3205
3206
3207
3208
3209                                    ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
3210
3211
3212                                    ;*COMPARE REGISTERS BEFORE READ DATA COMMAND
3213                                    ;*WITH REGISTERS AFTER COMMAND
3214
3215
3216  025340  104033            5$:     ERROR   33              ;READ DATA CAUSED IMPROPER
3217  025342  000207                    RTS     PC              ;REGISTER CHANGE
3218                                                            ;GOOD DATA GIVES WHAT SHOULD BE THERE
3219                                                            ;RECEIVED DATA GIVES WHAT WAS THERE
3220                                                            ;AFTER COMMAND
3221
3222                                    ;*NOW READ INTO BUFFER IS CHECKED FOR GOOD READ
3223
3224  025344                    6$:
3225
3226  025362  104034            7$:     ERROR   34              ;INCORRECT DATA AFTER
3227  025364  000207                    RTS     PC              ;WRITE DATA FOLLOWED BY A
3228                                                            ;READ DATA
3229  025366                    10$:
3230
3231
3232
```

```
                                ;*NOW FILL WRITE FROM BUFFER - 256 OF 125252

                                ;*NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA AS
                                ;*WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
                                ;*CAN BE MADE TO DETERMINE THAT WRITE DID NOT CHANGE BUFFER

                                ;*NOW WRITE DATA COMMAND WILL BE LOADED

                                ;*NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE DATA



                                ;*ONE REVOLUTION=16670 MICROSEC, ONE SECTOR=760 MICROSEC

                                ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE

                                ;*NOW COMPARE REGISTERS BEFORE WRITE DATA WITH REGISTERS
                                ;*AFTER COMMAND

025666  104035          1$:   ERROR   35              ;WRITE DATA COMMAND CAUSED
025670  000207                RTS     PC              ;IMPROPER REGISTER CHANGE
                                                      ;GOOD DATA GIVES WHAT SHOULD
                                                      ;BE
                                                      ;RECEIVED DATA GIVES WHAT WAS
                                                      ;THERE AFTER COMMAND

                                ;*NOW WRITE FROM BUFFER WILL CHECKED FOR NO CHANGE

025672                    2$:

025710  104036          3$:   ERROR   36              ;WRITE DATA COMMAND CHANGED
025712  000207                RTS     PC              ;WRITE FROM BUFFER

                                ;*NOW A READ DATA COMMAND WILL BE GIVEN
                                ;*FILL READ INTO BUFFER WITH 256 ZEROS

025714                    4$:

                                ;*FILL WRITE FROM BUFFER WITH 256 OF 125252

                                ;*NOW FILL COMMAND

                                ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
```

```
3289
3290
3291
3292
3293                                    ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
3294
3295
3296                                    ;*COMPARE REGISTERS BEFORE READ DATA COMMAND
3297                                    ;*WITH REGISTERS AFTER COMMAND
3298
3299
3300  026200  104033          5$:       ERROR   33              ;READ DATA CAUSED IMPROPER
3301  026202  000207                    RTS     PC              ;REGISTER CHANGE
3302                                                            ;GOOD DATA GIVES WHAT SHOULD BE THE
3303                                                            ;RECEIVED DATA GIVES WHAT WAS THERE
3304                                                            ;AFTER COMMAND
3305
3306                                    ;*NOW READ INTO BUFFER IS CHECKED FOR GOOD READ
3307
3308  026204                    6$:
3309
3310  026222  104034          7$:       ERROR   34              ;INCORRECT DATA AFTER
3311  026224  000207                    RTS     PC              ;WRITE DATA FOLLOWED BY A
3312                                                            ;READ DATA
3313  026226                    10$:
3314
```

```
3315
3316                                    ;*NOW FILL WRITE FROM BUFFER-200 OF 52525 AND 56 OF 377
3317
3318
3319                                    ;*NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA AS
3320                                    ;*WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
3321                                    ;*CAN BE MADE TO DETERMINE THAT WRITE DID NOT CHANGE BUFFER
3322
3323
3324                                    ;*NOW WRITE DATA COMMAND WILL BE LOADED
3325
3326
3327                                    ;*NOW SAVE REGISTER FOR COMPARISON AFTER WRITE DATA
3328
3329
3330
3331
3332
3333                                    ;*ONE REVOLUTION=16670 MICROSEC, ONE SECTOR=760 MICROSEC
3334
3335
3336                                    ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
3337
3338
3339                                    ;*NOW COMPARE REGISTERS BEFORE WRITE DATA WITH REGISTERS
3340                                    ;*AFTER COMMAND
3341
3342
3343  026552  104035          1$:     ERROR   35              ;WRITE DATA COMMAND CAUSED
3344  026554  000207                  RTS     PC              ;IMPROPER REGISTER CHANGE
3345                                                          ;GOOD DATA GIVES WHAT SHOULD
3346                                                          ;BE
3347                                                          ;RECEIVED DATA GIVES WHAT WAS
3348                                                          ;THERE AFTER COMMAND
3349
3350                                    ;*NOW WRITE FROM BUFFER WILL BE CHECKED FOR NO CHANGE
3351
3352  026556                  2$:
3353
3354  026574  104036          3$:     ERROR   36              ;WRITE DATA COMMAND CHANGED
3355  026576  000207                  RTS     PC              ;WRITE FROM BUFFER
3356
3357                                    ;*NOW A READ DATA COMMAND WILL BE GIVEN
3358
3359                                    ;*FILL READ INTO BUFFER WITH 200 ZEROS AND 56 OF ALL ONES
3360
3361  026600                  4$:
3362
3363                                    ;*FILL WRITE FROM BUFFER WITH 200 OF 52525 AND 56 OF 0
3364
3365
3366                                    ;*NOW FILL COMMAND
3367
3368
3369                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
3370
```

```
3371
3372
3373
3374
3375
3376                                    ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
3377
3378
3379                                    ;*COMPARE REGISTERS BEFORE READ DATA COMMAND
3380                                    ;*WITH REGISTERS AFTER COMMAND
3381
3382
3383  027110  104033          5$:       ERROR   33              ;READ DATA CAUSED IMPROPER
3384  027112  000207                    RTS     PC              ;REGISTER CHANGE
3385                                                            ;GOOD DATA GIVES WHAT SHOULD BE THE
3386                                                            ;RECEIVED DATA GIVES WHAT WAS THERE
3387                                                            ;AFTER COMMAND
3388
3389                                    ;*NOW READ INTO BUFFER IS CHECKED FOR GOOD READ
3390
3391  027114                    6$:
3392
3393  027132  104034            7$:     ERROR   34              ;INCORRECT DATA AFTER
3394  027134  000207                    RTS     PC              ;WRITE DATA FOLLOWED BY A
3395                                                            ;READ DATA
3396  027136                    10$:
3397
3398
3399
3400
```

```
3401
3402  027176  005037  004732                  CLR     @#UBUSB         ;CLEAR UNIBUS INDICATOR
3403
3404                                          ;*NOW FILL WRITE FROM BUFFER-200 OF 52525 AND 56 OF 377
3405
3406
3407                                          ;*NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA AS
3408                                          ;*WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
3409                                          ;*CAN BE MADE TO DETERMINE THAT WRITE DID NOT CHANGE BUFFER
3410
3411
3412                                          ;*NOW WRITE DATA COMMAND WILL BE LOADED
3413
3414  027274  052777  002000  152776          BIS     #PSEL,@RHCS1    ;SET PORT B
3415                                                                  ;THAT IS UNIBUS B
3416
3417                                          ;*NOW SAVE REGISTER FOR COMPARISON AFTER WRITE DATA
3418
3419
3420
3421                                          ;*ONE REVOLUTION=16670 MICROSEC, ONE SECTOR=760 MICROSEC
3422
3423
3424
3425
3426                                  ;*CHECK IF NEM NON EXISTANT MEMORY IS SET
3427                                  ;*IF SET IT MEANS UNIBUS B IS NOT CONNECTED
3428                                  ;*SO THIS TEST IS NOT PERFORMED
3429
3430  027446  032777  004000  152622          BIT     #NEM,@RHCS2     ;TEST NEM
3431  027454  001441                          BEQ     11$             ;BRANCH IF UNIBUS B THERE
3432  027456  012737  177777  004732          MOV     #-1,@#UBUSB     ;UNIBUS B NOT THERE
3433  027544  104401  001223                  TYPE    ,$CRLF
3434  027550  104401  001223                  TYPE    ,$CRLF
3435  027554  000137  030306                  JMP     @#10$           ;JUMP TO NEXT TEST - NO UNIBUS B
3436  027560
3437  027636  104401  001223          11$:    TYPE    ,$CRLF
3438  027642  104401  001223                  TYPE    ,$CRLF
3439
3440                                          ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
3441
3442
3443                                          ;*NOW COMPARE REGISTERS BEFORE WRITE DATA WITH REGISTERS
3444                                          ;*AFTER COMMAND
3445
3446
3447  027714  104074          1$:     ERROR   74              ;WHILE USING UNIBUS B
3448                                                          ;WRITE DATA COMMAND CAUSED
3449  027716  000207                  RTS     PC              ;IMPROPER REGISTER CHANGE
3450                                                          ;GOOD DATA GIVES WHAT SHOULD
3451                                                          ;BE
3452                                                          ;RECEIVED DATA GIVES WHAT WAS
3453                                                          ;THERE AFTER COMMAND
3454
3455                                          ;*NOW WRITE FROM BUFFER WILL BE CHECKED FOR NO CHANGE
3456
```

```
3457  027720                          2$:
3458
3459  027736  104075                  3$:     ERROR   75              ;WHILE USING UNIBUS B
3460                                                                  ;WRITE DATA COMMAND CHANGED
3461  027740  000207                          RTS     PC              ;WRITE FROM BUFFER
3462
3463                                          ;*NOW A READ DATA COMMAND WILL BE GIVEN
3464                                          ;*FILL READ INTO BUFFER WITH 200 ZEROS AND 56 OF ALL ONES
3465
3466  027742                          4$:
3467
3468                                          ;*FILL WRITE FROM BUFFER WITH 200 OF 52525 AND 56 OF 0
3469
3470
3471                                          ;*NOW FILL COMMAND
3472
3473  030040  052777  002000  152232          BIS     #PSEL,@RHCS1    ;SET PORT B
3474                                                                  ;THAT IS UNIBUS B
3475
3476                                          ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
3477
3478
3479
3480
3481
3482                                          ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
3483
3484
3485                                          ;*COMPARE REGISTERS BEFORE READ DATA COMMAND
3486                                          ;*WITH REGISTERS AFTER COMMAND
3487
3488
3489  030260  104072                  5$:     ERROR   72              ;WHILE USING UNIBUS B
3490                                                                  ;READ DATA CAUSED IMPROPER
3491  030262  000207                          RTS     PC              ;REGISTER CHANGE
3492                                                                  ;GOOD DATA GIVES WHAT SHOULD BE THE
3493                                                                  ;RECEIVED DATA GIVES WHAT WAS THERE
3494                                                                  ;AFTER COMMAND
3495
3496                                          ;*NOW READ INTO BUFFER IS CHECKED FOR GOOD READ
3497
3498  030264                          6$:
3499
3500  030302  104073                  7$:     ERROR   73              ;WHILE USING UNIBUS B
3501                                                                  ;INCORRECT DATA AFTER
3502  030304  000207                          RTS     PC              ;WRITE DATA FOLLOWED BY A
3503                                                                  ;READ DATA
3504  030306                          10$:
3505
3506
3507
3508
3509
3510
```

```
                                        ;*FILL WRITE FROM BUFFER WITH HEADER

                                        ;*FILL WRITE FROM BUFFER WITH DATA

                                        ;*FILL WRITE FROM BUFFER WITH NEXT SECTOR HEADER

                                        ;*FILL WRITE FROM BUFFER WITH NEXT SECTOR DATA

                                        ;*NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA
                                        ;*AS WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
                                        ;*CAN BE MADE TO MAKE SURE THAT WRITE DID NOT
                                        ;*CHANGE WRITE FROM BUFFER.

                                        ;*NOW THE WRITE HEADER AND DATA COMMAND WILL BE FILLED

                                        ;*NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DAT1



                                        ;*ONE REVOLUTION = 16670 MICRO SEC, ONE SECTOR = 760 MICRO SEC

                                        ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES

                                        ;*NOW COMPARE REGISTERS BEFORE WRITE HEADER AND DATA
                                        ;*WITH REGISTERS AFTER COMMAND

030732  104027            1$:     ERROR   27              ;WRITE HEADER AND DATA
030734  000207                    RTS     PC              ;CAUSED IMPROPER REGISTER
                                                        ;CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE
                                                        ;RECEIVED DATA GIVES WHAT
                                                        ;WAS THERE AFTER COMMANT

                                        ;*NOW WRITE FROM BUFFER WILL BE CHECKED TO SEE THAT
                                        ;*NOTHING GOT CHANGED

030736                      2$:

030754  104030            3$:     ERROR   30              ;WRITE HEADER AND DATA
030756  000207                    RTS     PC              ;CHANGED WRITE FROM BUFFER

                                        ;*NOW A READ HEADER AND DATA COMMAND WILL BE GIVEN
                                        ;*FOR SECTOR 1, 256 WORDS
                                        ;*READ INTO BUFFER IS FILLED WITH ONES
030760                      4$:

                                        ;*WRITE FROM BUFFER IS FILLED WITH EXPECTED DATA
```

```
3567
3568
3569                                    ;*NOW FILL COMMAND
3570
3571
3572                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ HEADER AND DATA
3573
3574
3575
3576
3577
3578                                    ;*ONE REVOLUTION = 16670 MICRO SEC, ONE SECTOR 760 MICRO SECONDS
3579
3580
3581                                    ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
3582
3583
3584                                    ;*COMPARE REGISTERS BEFORE READ HEADER AND DATA
3585                                    ;*WITH REGISTERS AFTER COMMAND
3586
3587
3588
3589  031270  104031          5$:     ERROR   31              ;READ HEADER AND DATA CAUSED
3590  031272  000207                  RTS     PC              ;IMPROPER REGISTER CHANGE
3591                                                          ;GOOD DATA GIVES WHAT SHOULD
3592                                                          ;BE THERE
3593                                                          ;RECEIVED DATA GIVES WHAT WAS
3594                                                          ;THERE AFTER COMMAND
3595
3596                                    ;*NOW READ INTO BUFFER WILL BE CHECKED TO SEE
3597                                    ;*THAT READ WAS GOOD
3598
3599  031274                    6$:
3600
3601
3602  031312  104032          7$:     ERROR   32              ;WRITE HEADER AND DATA
3603  031314  000207                  RTS     PC              ;FOLLOWED BY A READ HEADER
3604                                                          ;AND DATA GAVE A READ ERROR
3605                                                          ;ERROR MAY BE IN READ OR WRITE
3606  031316                    10$:
```

```
3607
3608                                    ;*FILL WRITE FROM BUFFER WITH HEADER
3609
3610                                    ;*FILL WRITE FROM BUFFER WITH DATA
3611
3612                                    ;*FILL WRITE FROM BUFFER WITH NEXT TRACK HEADER
3613
3614                                    ;*FILL WRITE FROM BUFFER WITH NEXT TRACK DATA
3615
3616                                    ;*NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA
3617                                    ;*AS WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
3618                                    ;*CAN BE MADE TO MAKE SURE THAT WRITE DID NOT
3619                                    ;*CHANGE WRITE FROM BUFFER.
3620
3621                                    ;*NOW THE WRITE HEADER AND DATA COMMAND WILL BE FILLED
3622
3623                                    ;*NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DATA1
3624
3625
3626
3627
3628                                    ;*ONE REVOLUTION = 16670 MICRO1 SEC, ONE SECTOR = 760 MICRO1 SEC
3629
3630                                    ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
3631
3632                                    ;*NOW COMARE REGISTERS BEFORE WRITE HEADER AND DATA
3633                                    ;*WITH REGISTERS AFTER COMMAND
3634
3635
3636
3637
3638
3639
3640
3641
3642  031762  104027          1$:     ERROR   27              ;WRITE HEADER AND DATA
3643  031764  000207                  RTS     PC              ;CAUSED IMPROPER REGISTER
3644                                                          ;CHANGE
3645                                                          ;GOOD DATA GIVES WHAT SHOULD
3646                                                          ;BE THERE
3647                                                          ;RECEIVED DATA GIVES WHAT
3648                                                          ;WAS THERE AFTER COMMANT
3649
3650                                    ;*NOW WRITE FROM BUFFER WILL BE CHECKED TO SEE THAT
3651                                    ;*NOTHING GOT CHANGED
3652
3653  031766                    2$:
3654
3655  032004  104030          3$:     ERROR   30              ;WRITE HEADER AND DATA
3656  032006  000207                  RTS     PC              ;CHANGED WRITE FROM BUFFER
3657
3658                                    ;*NOW A READ HEADER AND DATA COMMAND WILL BE GIVEN
3659                                    ;*READ INTO BUFFER IS FILLED WITH ONES
3660
3661  032010                    4$:
3662
```

```
                                        ;#WRITE FROM BUFFER IS FILLED WITH 10001,0,0,0,2000,2000, AND 254 OF 0
                                        ;#NOW FILL COMMAND
                                        ;#NOW SAVE REGISTERS FOR COMPARISON AFTER READ HEADER AND DATA
                                        ;#CHANGE SAVED REGISTERS TO EXPECTED VALUES
                                        ;#COMPARE REGISTERS BEFORE READ HEADER AND DATA
                                        ;#WITH REGISTERS AFTER COMMAND

032320  104031          5$:   ERROR   31          ;READ HEADER AND DATA CAUSED
032322  000207                RTS     PC          ;IMPROPER REGISTER CHANGE
                                                  ;GOOD DATA GIVES WHAT SHOULD
                                                  ;BE THERE
                                                  ;RECEIVED DATA GIVES WHAT WAS
                                                  ;THERE AFTER COMMAND
                                        ;#NOW READ INTO BUFFER WILL BE CHECKED TO SEE
                                        ;#THAT READ WAS GOOD
032324                      6$:

032342  104032          7$:   ERROR   32          ;WRITE HEADER AND DATA
032344  000207                RTS     PC          ;FOLLOWED BY A READ HEADER
                                                  ;AND DATA GAVE A READ ERROR
                                                  ;ERROR MAY BE IN READ OR WRITE
032346                      10$:
```

```
3699
3700
3701                                        ;*THE FOLLOWING MOVES ARE TO INITIALIZE TEST FROM
3702                                        ;*CYLINDER 0
3703                                        ;*THESE LOCATIONS ARE CHANGED DURING TEST TO ENABLE
3704                                        ;*GOING TO NEXT CYLINDER
3705
3706  032366  012737  010000  032544        MOV     #10000,@#ST1+10
3707  032374  012737  001125  032564        MOV     #<<18.*40>!21.>,@#ST2+10
3708  032402  012737  010001  032576        MOV     #10001,@#ST3+10
3709  032410  012737  002000  032616        MOV     #2000,@#ST4+10
3710  032416  012737  000000  032624        MOV     #0,@#ST5+4
3711  032424  012737  000001  033034        MOV     #1,@#ST6+6
3712  032432  012737  000001  033044        MOV     #1,@#ST6+16
3713  032440  012737  010001  033126        MOV     #10001,@#ST9+10
3714  032446  012737  002000  033146        MOV     #2000,@#ST10+10
3715  032454  012737  000001  033166        MOV     #1,@#ST11+4
3716
3717                                        ;*THIS IS TO GET THE HEADS TO CYLINDER 0
3718
3719  032522  012737  000012  001200        MOV     #10.,@#STMP1    ;TEN COUNT TO GET TO CYLINDER 10
3720
3721                                        ;*FILL WRITE FROM BUFFER WITH HEADER
3722  032534                        ST1:
3723
3724                                        ;*FILL WRITE FROM BUFFER WITH DATA
3725  032554                        ST2:
3726
3727                                        ;*FILL WRITE FROM BUFFER WITH NEXT TRACK HEADER
3728  032566                        ST3:
3729
3730                                        ;*FILL WRITE FROM BUFFER WITH NEXT TRACK DATA
3731  032606                        ST4:
3732
3733                                        ;*THE WRITE HEADER AND DATA COMMAND WILL BE FILLED
3734  032620                        ST5:
3735
3736                                        ;*SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DATA
3737
3738
3739
3740
3741
3742                                        ;*ONE REVOLUTION = 16670 MICRO SECONDS, ONE SECTOR = 760 MICRO SEC.
3743                                        ;*MAX TIME ALLOWED = ONE REVOLUTION + SEEK + 2 SECTORS
3744                                        ;*MIN TIME ALLOWED = 2 SECTORS + SEEK
3745
3746
3747                                        ;*NOW CHANGES SAVED REGISTERS TO EXPECTED VALUES
3748
3749  033026                        ST6:
3750
3751                                        ;*COMPARE REGISTERS BEFORE WRITE HEADER AND DATA
3752                                        ;*WITH REGISTERS AFTER COMMAND
3753
3754  033074  104027                ST7:    ERROR   27              ;WRITE HEADER AND DATA CAUSED
```

```
3755  033076  000207                          RTS     PC              ;IMPROPER REGISTER CHANGE
3756                                                                  ;GOOD DATA GIVES WHAT SHOULD BE
3757                                                                  ;THERE
3758                                                                  ;RECEIVED DATA GIVES WHAT WAS BE
3759                                                                  ;THERE AFTER COMMAND
3760
3761                                          ;*SETUP TO READ HEADER AND DATA FOR NEXT TRACK
3762                                          ;*FILL READ INTO BUFFER WITH ALL ONES
3763
3764  033100                          ST8:
3765
3766                                          ;*FILL WRITE FROM BUFFER WITH EXPECTED DATA
3767
3768  033116                          ST9:
3769  033136                          ST10:
3770
3771                                          ;*FILL COMMAND INTO REGISTERS
3772  033162                          ST11:
3773
3774                                          ;*SAVE REGISTERS FOR COMPARISON AFTER READ HEADER
3775                                          ;*AND DATA
3776
3777
3778
3779
3780
3781
3782                                          ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
3783
3784
3785                                          ;*COMPARE REGISTERS BEFORE READ HEADER AND DATA WITH
3786                                          ;*REGISTERS AFTER COMMAND
3787
3788
3789  033416  104031                  ST12:   ERROR   31              ;READ HEADER AND DATA CAUSED
3790  033420  000207                          RTS     PC              ;IMPROPER REGISTER CHANGE
3791                                                                  ;GOOD DATA GIVES WHAT SHOULD
3792                                                                  ;BE THERE
3793                                                                  ;RECEIVED DATA GIVES WHAT
3794                                                                  ;WAS THERE AFTER COMMAND
3795
3796                                          ;*READ INTO BUFFER IS CHECKED FOR PROPER READ
3797  033422                          ST13:
3798
3799  033440  104032                  ST14:   ERROR   32              ;WRITE HEADER AND DATA
3800  033442  000207                          RTS     PC              ;WITH AN IMPLIED SEEK
3801                                                                  ;FOLLOWED BY A READ
3802                                                                  ;HEADER AND DATA ON THE
3803                                                                  ;NEXT TRACK GAVE A
3804                                                                  ;READ ERROR
3805                                                                  ;ERROR MAY BE READ OR WRITE
3806
3807                                          ;*THE HEADS HAVE ADVANCED ONE CYLINDER BY AN IMPLIED
3808                                          ;*SEEK
3809                                          ;*CHANGES WILL BE MADE TO ENABLE GOING TO THE NEXT
3810                                          ;*CYLINDER AND THEN THE ABOVE WILL BE REPEATED
```

```
3811                                            ;*TILL CYLINDER 10 IS REACHED
3812
3813  033444  005237  032544          ST15:     INC     @#ST1+10
3814  033450  062737  002000  032564            ADD     #<1.*2000>,@#ST2+10
3815  033456  005237  032576                    INC     @#ST3+10
3816  033462  062737  002000  032616            ADD     #<1.*2000>,@#ST4+10
3817  033470  005237  032624                    INC     @#ST5+4
3818  033474  005237  033034                    INC     @#ST6+6
3819  033500  005237  033044                    INC     @#ST6+16
3820  033504  005237  033126                    INC     @#ST9+10
3821  033510  062737  002000  033146            ADD     #<1.*2000>,@#ST10+10
3822  033516  005237  033166                    INC     @#ST11+4
3823  033522  005337  001200                    DEC     @#STMP1         ;COUNT FOR TEN TIMES
3824  033526  001001                            BNE     ST16            ;BRANCH IF 10 NOT DONE
3825  033530  000402                            BR      ST17            ;10 COMPLETED SO CONTINUE
3826  033532  000137  032534          ST16:     JMP     ST1             ;JUMP AS 10 NOT DONE
3827
3828                                            ;*THE HEADS ARE NOW AT CYLINDER 10
3829                                            ;*ALL REGISTERS WILL BE SAVED AND A SEEK WILL BE GIVEN
3830                                            ;*TO CYLINDER 0
3831                                            ;*FILL REGISTERS FOR A SEEK COMMAND
3832
3833  033536                          ST17:
3834
3835                                            ;*SAVE REGISTERS FOR COMPARISON AFTER SEEK COMMAND
3836
3837
3838
3839                                            ;*SEEK FOR ONE CYLINDER=7MILI SEC., FOR TEN=70 MILI SEC
3840
3841                                            ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
3842
3843
3844                                            ;*COMPARE REGISTERS AFTER A SEEK COMMAND
3845
3846  033766  104037          ST18:     ERROR   37              ;SEEK COMMAND CAUSED AN
3847  033770  000207                    RTS     PC              ;ERROR
3848                                                            ;GOOD DATA GIVES WHAT SHOULD
3849                                                            ;BE THERE
3850                                                            ;RECEIVED DATA GIVES WHAT WAS
3851                                                            ;THERE AFTER A SEEK COMMAND
3852
3853                                            ;*AT THIS POINT THE CURRENT CYLINDER IS GOOD AND THERE ARE
3854                                            ;*NO ERROR BITS
3855                                            ;*A READ HEADER AND DATA WILL BE DONE ON CYLINDER 0
3856                                            ;*SECTOR 21 TRACK 18, EXPECTED DATA IS 1125
3857                                            ;*FOR 10 WORDS
3858                                            ;*CLEAR READ INTO BUFFER WITH ALL ONES
3859
3860  033772                          ST19:
3861
3862                                            ;*FILL WRITE FROM BUFFER WITH EXPECTED DATA
3863
3864                                            ;*FILL READ HEADER AND DATA COMMAND FOR 10 WORDS
3865
3866
```

```
3867
3868
3869
3870                                        ;*CHECK READ WORDS
3871
3872  034156  104032            ST26:     ERROR   32          ;READ HEADER AND DATA
3873  034160  000207                      RTS     PC          ;FOLLOWING A SEEK TO CYLINDER 0
3874                                                          ;FROM CYLINDER 10 GAVE AN
3875                                                          ;ERROR
3876
3877  034162                    ST27:
3878
```

```
                                        ;*THIS GETS HEADS TO CYLINDER 0

                                        ;*FILL REGISTERS FOR A SEEK COMMAND
                                        ;*SAVE REGISTERS FOR COMPARISON AFTER SEEK COMMAND


                                        ;*SEEK FOR ONE CYLINDER=7 MILI SEC., FOR TEN=70 MILI SEC
                                        ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE

                                        ;*COMPARE REGISTERS AFTER A SEEK COMMAND
034466  104037              1$:       ERROR   37              ;SEEK COMMAND CAUSED
034470  000207                        RTS     PC              ;ERROR
                                                                ;GOOD DATA GIVES WHAT SHOULD
                                                                ;BE THERE
                                                                ;RECEIVED DATA GIVES WHAT WAS
                                                                ;THERE AFTER A SEEK COMMAND

                                        ;*AT THIS POINT THE CURRENT CYLINDER IS GOOD AND THERE ARE
                                        ;*NO ERROR BITS
                                        ;*A READ HEADER AND DATA WILL BE DONE ON CYLINDER 9
                                        ;*SECTOR 21 TRACK 18, EXPECTED DATA IS 23125
                                        ;*FOR 20 WORDS
                                        ;*CLEAR READ INTO BUFFER WITH ALL ONES

034472                          2$:

                                        ;*FILL  WRITE FROM BUFFER WITH EXPECTED DATA


                                        ;*FILL READ HEADER AND DATA COMMAND FOR 10 WORDS




                                        ;*CHECK READ WORDS

034662  104032              3$:       ERROR   32              ;READ HEADER AND DATA
034664  000207                        RTS     PC              ;FOLLOWING A SEEK TO CYLINDER 9
                                                                ;FROM CYLINDER 0 GAVE AN
                                                                ;ERROR
034666                          4$:
```

```
3935
3936
                        .SBTTL  WRITE CHECK DATA & WRITE PROTECT TESTS
```

```
3937
3938                                        ;*GET HEADS TO CYLINDER 5
3939
3940
3941
3942
3943                                        ;*FILL WRITE FROM BUFFER WITH HEADER
3944
3945                                        ;*10 WORDS OF OF THE FOLLOWING DATA
3946                                        ;* 12344,17777,0,52525,125252
3947
3948
3949                                        ;*FILL LEFT ROTATING ZEROS FROM WRFROM+<54.*2>
3950
3951  035076  012700  177776                MOV     #177776,R0      ;DATA
3952  035102  012705  000020                MOV     #16.,R5         ;COUNT
3953  035106  012701  002644                MOV     #WRFROM+<54.*2>,R1 ;WHERE DATA GOES
3954  035112  000261                        SEC
3955  035114  010021              1$:       MOV     R0,(R1)+        ;STORE DATA
3956  035116  006100                        ROL     R0              ;GET ZERO ONE BIT LEFT
3957  035120  005305                        DEC     R5              ;COUNT 16
3958  035122  001374                        BNE     1$              ;BRANCH IF 16 NOT DONE
3959
3960                                        ;*FILL LEFT ROTATING ONE INTO WRFROM+<65.*2>
3961
3962  035124  000241                        CLC
3963  035126  012700  000001                MOV     #1,R0
3964  035132  010021              2$:       MOV     R0,(R1)+
3965  035134  006300                        ASL     R0
3966  035136  103375                        BCC     2$
3967
3968                                        ;*FILL REST OF DATA
3969
3970
3971
3972                                        ;*READ INTO BUFFER WILL BE CLEARED
3973
3974                                        ;*THE WRITE HEADER AND DATA COMMAND WILL BE LOADED
3975
3976                                        ;*NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DATA
3977
3978
3979
3980
3981
3982
3983                                        ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
3984
3985                                        ;*NOW COMPARE REGISTERS BEFORE WRITE HEADER AND DATA
3986                                        ;*WITH REGISTERS AFTER COMMAND
3987
3988
3989
3990  035370  104027              3$:       ERROR   27              ;WRITE HEADER AND DATA
3991  035372  000207                        RTS     PC              ;CAUSED IMPROPER REGISTER
3992                                                                ;CHANGE
```

```
                                        ;GOOD DATA GIVES WHAT SHOULD
                                        ;BE THERE
                                        ;RECEIVED DATA GIVES WHAT
                                        ;WAS THERE AFTER COMMANT

                        ;*NOW FILL COMMAND FOR READ

035374                  4$:

                        ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ HEADER AND DATA



                        ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES

                        ;*COMPARE REGISTERS BEFORE READ HEADER AND DATA
                        ;*WITH REGISTERS AFTER COMMAND


035550  104031          5$:     ERROR   31              ;READ HEADER AND DATA CAUSED
035552  000207                  RTS     PC              ;IMPROPER REGISTER CHANGE
                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                        ;BE THERE RECEIVED DATA GIVES WHAT WAS
                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                        ;THERE AFTER COMMAND

                        ;*NOW READ INTO BUFFER WILL BE CHECKED TO SEE
                        ;*THAT READ WAS GOOD

035554                  6$:

035572  104032          7$:     ERROR   32              ;WRITE HEADER AND DATA
035574  000207                  RTS     PC              ;FOLLOWED BY A READ HEADER
                                                        ;AND DATA GAVE A READ ERROR
                                                        ;ERROR MAY BE IN READ OR WRITE

                        ;*A WRITE,READ HAS BEEN SUCCESSFULLY COMPLETED
                        ;*NOW A WRITE CHECK HEADER AND DATA WILL BE GIVEN
                        ;*FILL THE WRITE CHECK HEADER AND DATA

035576                  10$:

                        ;*SAVE REGISTERS FOR COMPARISON AFTER WRITE CHECK

035624                  ST25:
```

```
4049
4050                                        ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
4051
4052
4053                                        ;*COMPARE REGISTERS BEFORE WRITE CHECK HEADER AND DATA
4054                                        ;*WITH REGISTERS AFTER COMMAND
4055
4056
4057  036036  104040              8$:      ERROR   40              ;WRITE CHECK CAUSED
4058  036040  000207                       RTS     PC              ;AN IMPROPER REGISTER
4059                                                               ;CHANGE
4060                                                               ;GOOD DATA GIVES WHAT
4061                                                               ;SHOULD BE THERE
4062                                                               ;RECEIVED DATA GIVES WHAT
4063                                                               ;WAS THERE AFTER COMMAND
4064
4065
4066  036042                        9$:
```

```
4067
4068
4069                                    ;*GET HEADS TO CYLINDER 5
4070
4071
4072
4073
4074
4075
4076                                    ;*10 WORDS OF EACH 12344,17777,0,52525,125252
4077
4078
4079                                    ;*FILL LEFT ROTATING ZEROS FROM WRFROM+<50.*2>
4080
4081  036226  012700  177776            MOV     #177776,R0      ;DATA
4082  036232  012705  000020            MOV     #16.,R5         ;COUNT
4083  036236  012701  002634            MOV     #WRFROM+<50.*2>,R1 ;WHERE DATA GOES
4084  036242  000261                    SEC
4085  036244  010021              1$:   MOV     R0,(R1)+        ;STORE DATA
4086  036246  006100                    ROL     R0              ;GET ZERO ONE BIT LEFT
4087  036250  005305                    DEC     R5              ;COUNT 16
4088  036252  001374                    BNE     1$              ;BRANCH IF 16 NOT DONE
4089
4090                                    ;*FILL LEFT ROTATING ONE INTO WRFROM+<65.*2>
4091
4092  036254  000241                    CLC
4093  036256  012700  000001            MOV     #1,R0
4094  036262  010021              2$:   MOV     R0,(R1)+
4095  036264  006300                    ASL     R0
4096  036266  103375                    BCC     2$
4097
4098                                    ;*FILL REST OF DATA
4099
4100
4101                                    ;*FILL THE WRITE CHECK HEADER AND DATA
4102
4103                                    ;*SAVE REGISTERS FOR COMPARISON AFTER WRITE CHECK
4104
4105
4106
4107
4108
4109                                    ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
4110
4111
4112                                    ;*COMPARE REGISTERS BEFORE WRITE CHECK HEADER AND DATA
4113                                    ;*WITH REGISTER AFTER COMMAND
4114
4115  036552  104040              8$:   ERROR   40              ;WRITE CHECK CAUSED
4116  036554  000207                    RTS     PC              ;AN IMPROPER REGISTER
4117                                                            ;CHANGE
4118                                                            ;GOOD DATA GIVES WHAT
4119                                                            ;SHOULD BE THERE
4120                                                            ;RECEIVED DATA GIVES WHAT
4121                                                            ;WAS THERE AFTER COMMANDS
4122
```

```
4123  036556                    9$:
4124
4125
```

```
4126
4127
4128  036622  005737  004732                  TST     @#UBUSB         ;IS UNIBUS B THERE
4129  036626  001402                          BEQ     11$             ;UNIBUS B THERE SO CONTINUE
4130  036630  000137  037324                  JMP     @#9$            ;NO UNIBUS B, GO TO NEXT TEST
4131
4132                                          ;*GET HEADS TO CYLINDER 5
4133
4134  036634                          11$:
4135
4136
4137
4138
4139
4140                                          ;*10 WORDS OF EACH 12344,17777,0,52525,125252
4141
4142
4143                                          ;*FILL LEFT ROTATING ZEROS FROM WRFROM+<50.*2>
4144
4145  036766  012700  177776                  MOV     #177776,R0      ;DATA
4146  036772  012705  000020                  MOV     #16.,R5         ;COUNT
4147  036776  012701  002634                  MOV     #WRFROM+<50.*2>,R1 ;WHERE DATA GOES
4148  037002  000261                          SEC
4149  037004  010021                  1$:     MOV     R0,(R1)+        ;STORE DATA
4150  037006  006100                          ROL     R0              ;GET ZERO ONE BIT LEFT
4151  037010  005305                          DEC     R5              ;COUNT 16
4152  037012  001374                          BNE     1$              ;BRANCH IF 16 NOT DONE
4153
4154                                          ;*FILL LEFT ROTATING ONE INTO WRFROM+<65.*2>
4155
4156  037014  000241                          CLC
4157  037016  012700  000001                  MOV     #1,R0
4158  037022  010021                  2$:     MOV     R0,(R1)+
4159  037024  006300                          ASL     R0
4160  037026  103375                          BCC     2$
4161
4162                                          ;*FILL REST OF DATA
4163
4164                                          ;*FILL THE WRITE CHECK HEADER AND DATA
4165
4166
4167  037100  052777  002000  143172          BIS     #PSEL,@RHCS1    ;SET PORT B
4168                                                                  ;THAT IS UNIBUS B
4169
4170                                          ;*SAVE REGISTERS FOR COMPARISON AFTER WRITE CHECK
4171
4172
4173
4174                                          ;*SET PORT SELECT
4175
4176
4177                                          ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
4178
4179
4180                                          ;*COMPARE REGISTERS BEFORE WRITE CHECK HEADER AND DATA
4181                                          ;*WITH REGISTER AFTER COMMAND
```

```
4182
4183  037320  104076          8$:   ERROR   76          ;WHILE USING UNIBUS B
4184                                                    ;WRITE CHECK CAUSED
4185  037322  000207                RTS     PC          ;AN IMPROPER REGISTER
4186                                                    ;CHANGE
4187                                                    ;GOOD DATA GIVES WHAT
4188                                                    ;SHOULD BE THERE
4189                                                    ;RECEIVED DATA GIVES WHAT
4190                                                    ;WAS THERE AFTER COMMANDS
4191
4192  037324                    9$:
4193
4194
4195
4196
4197
```

```
4198
4199
4200
4201                                    ;*FILL SECTOR 0, TRACK 0, CYL 0 WITH ONES
4202                                    ;*FILL WRITE FROM BUFFER
4203
4204                                    ;*FILL WRITE DATA COMMAND
4205
4206
4207
4208
4209                                    ;*TIME IS NOT CRITICAL
4210
4211                                    ;*SAVE REGISTERS FOR COMPARISON AFTER WRITE PROTECT
4212                                    ;*BUTTON HAS BEEN HIT
4213
4214
4215  037534  013746  004716            MOV     @#UNIT,-(SP)            ;GET UNIT UNDER TEST
4216  037540  104405                    TYPDS
4217  037654  000000                    HALT
4218                                    ;*THE ONLY REGISTER THAT SHOULD  CHANGE IS RHDS1 - BIT #11
4219                                    ;*-WRL
4220
4221                                    ;*COMPARE ALL REGISTERS BEFORE WRITE WAS LOCKED
4222                                    ;*OUT WITH REGISTER VALUES AFTER WRITE WAS LOCKED OUT
4223
4224  037710  104041            3$:     ERROR   41              ;LOCKING OUT WRITE BY
4225  037712  000207                    RTS     PC              ;WRITE LOCK BUTTON CAUSED
4226                                                            ;IMPROPER REGISTER CHANGE
4227                                                            ;GOOD DATA GIVES WHAT SHOULD
4228                                                            ;BE THERE
4229                                                            ;RECEIVED DATA GIVES WHAT
4230                                                            ;WAS THERE AFTER WRITE
4231                                                            ;WAS LOCKED OUT BY BUTTON
4232
4233                                    ;*NOW A WRITE WILL BE ATTEMPTED WITH WRITE LOCKED
4234                                    ;*OUT BY BUTTON
4235                                    ;*FILL WRITE FROM BUFFER WITH 377
4236
4237  037714  013737  037714  001110  4$:     MOV     @#4$,@#$LPERR   ;SCOPE LOOP STARTS FROM HERE
4238
4239
4240                                    ;*TRY A ONE WORD WRITE
4241
4242                                    ;*SAVE REGISTERS
4243
4244
4245                                    ;*TIME IS NOT CRITICAL
4246
4247                                    ;*CHANGE SAVED REGISTERS TO EXPECTED VALUE
4248
4249  040030  017737  142236  004612    MOV     @RHWC,@#SAVERE  ;RHWC IS UNPREDICTABLE
4250  040036  017737  142232  004614    MOV     @RHBA,@#SAVERE+2;RHBA IS UNPREDICTABLE
4251  040044  017746  142226            MOV     @RHCS2,-(SP)    ;GET RHCS2
4252  040050  042716  177477            BIC     #^C<IR!OR>,(SP) ;KEEP IR AND OR
4253  040054  042737  000300  004616    BIC     #IR!OR,@#SAVERE+4;CLEAR SAVED IR OR
```

```
                        040062  052637  004616                  BIS     (SP)+,@#SAVERE+4;SET OR IR AS REQUIRED
                                                                ;*COMPARE REGISTERS BEFORE WRITE WAS ATTEMPTED
                                                                ;*WITH REGISTERS AFTER ATTEMPT
                        040176  104042                  5$:     ERROR   42              ;ATTEMPTING TO WRITE WITH
                        040200  000207                          RTS     PC              ;WRITE LOCKED OUT
                                                                                        ;CAUSED IMPROPER REGISTER
                                                                                        ;CHANGE
                                                                                        ;GOOD DATA GIVES WHAT SHOULD
                                                                                        ;BE THERE
                                                                                        ;RECEIVED DATA GIVES WHAT WAS
                                                                                        ;THERE AFTER ATTEMPT
                                                                ;*NOW A READ WILL BE DONE TO DETERMIN THAT
                                                                ;*READS CAN BE DONE WITH WRITE LOCKED OUT AND
                                                                ;*THAT NO DATA ON DISK GOT CHANGED, BUT FIRST CLEAR ERROR
                        040202                          6$:
                                                                ;*FILL READ INTO BUFFER WITH 0
                                                                ;*FILL WRITE FROM BUFFER WITH EXPECTED DATA FROM READ
                                                                ;*FILL COMMAND
                                                                ;*COMPARE READ DATA
                        040326  104043                  7$:     ERROR   43              ;WRITING WITH WRITE
                                                                                        ;LOCKED CHANGED DISK
                                                                                        ;GOOD DATA GIVES WHAT WAS
                                                                                        ;ON DISK BEFORE WRITE WITH
                                                                                        ;WRITE LOCK WAS ATTEPTED
                                                                                        ;
                                                                                        ;RECEIVED DATA GIVES WHAT
                                                                                        ;WAS READ BACK AFTER WRITE
                                                                                        ;WITH WRITE LOCKED WAS ATTEPTED
                                                                ;*SAVE REGISTERS FOR COMPARISON AFTER WRITE LOCK HAS BEEN
                                                                ;*UNLOCKED
                        040330                          8$:
                        040342                          ST20:
                        040366  013746  004716                  MOV     @#UNIT,-(SP)    ;GET UNIT UNDER TEST
                        040372  104405                          TYPDS
                        040502  000000                          HALT
                                                                ;*THE ONLY BIT THAT SHOULD CHANGE IS WRL-BIT #11 IN RHDS1
                                                                ;*COMPARE ALL REGISTERS BEFORE WRITE LOCK WAS UNLOCKED
                                                                ;*WITH REGISTERS AFTER WRITE WAS UNLOCKED
```

```
 4310
 4311
 4312  040536  104044              9$:     ERROR   44              ;UNLOCKING WRITES BY WRITE
 4313  040540  000207                      RTS     PC              ;LOCK BUTTON CAUSED AN ERROR
 4314                                                              ;GOOD DATA GIVES WHAT SHOULD
 4315                                                              ;BE THERE
 4316                                                              ;RECEIVED DATA GIVES WHAT WAS
 4317                                                              ;THERE AFTER WRITES WERE
 4318                                                              ;UNLOCKED
 4319                                                              ;ON THIS ERROR NO LOOPING IS RECOMMENDED
 4320                                                              ;JUST A HALT ON ERROR WILL DO THE SAME
 4321                                                              ;THING AS ONLY THE REGISTERS ARE READ
 4322  040542  012737  177777  047270  10$:     MOV     #-1,@#PRITEM    ;CLEAR PREVIOUS ITEM NUMBER
```

```
4323
4324
4325  040560  012737  000000  177776          MOV     #0,PS               ;REINSTATE PS TO 0
4326
4327  040644  013746  004716                  MOV     @#UNIT,-(SP)        ;GET READY TO TYPE UNIT NUMBER
4328  040650  104405                          TYPDS
4329  040664  013746  001112                  MOV     @#SERTTL,-(SP)      ;GET READY TO TYPE NUMBER OF ERRORS
4330  040670  104405                          TYPDS
4331  040672  005037  001112                  CLR     @#SERTTL            ;CLEAR TOTAL NUMBER OF ERRORS
4332  040676  005037  001102                  CLR     @#TSTNM             ;CLEAR TEST NUMBER
4333  040702  005737  004726                  TST     @#SELECT            ;STARTING FROM 200 ?
4334  040706  001413                          BEQ     3$                  ;CHECK NEXT DRIVE IF SO
4335                                                                      ;CONTINUE WITH THIS ONE IF NOT
4336
4337  040710  005237  001100                  INC     @#$PASS             ;INCREASE PASS COUNT
4338  040714  104401  041105                  TYPE    ,$ENDMG             ;TYPE "END PASS #"
4339  040720  013746  001100                  MOV     @#$PASS,-(SP)
4340  040724  104405                          TYPDS
4341  040726  104401  041102                  TYPE    ,$ENULL
4342  040732  000137  010030                  JMP     @#TST4              ;JUMP TEST 4 ---------------------->
4343
4344  040736  012737  177777  047270  3$:     MOV     #-1,@#PRITEM        ;CLEAR PREVIOUS ITEM NUMBER
4345  040744  005337  004720                  DEC     @#NOUNITS           ;NO. OF UNITS PRESENT
4346  040750  001413                          BEQ     $EOP                ;BRANCH IF ALL DRIVES COMPLETE
4347  040752  013700  004716                  MOV     @#UNIT,R0           ;UNIT UNDER TEST
4348  040756  012701  004676                  MOV     #UNITS,R1           ;TABLE POINTER
4349  040762  022100          1$:     CMP     (R1)+,R0            ;IS THIS UNIT JUST TESTED ?
4350  040764  001401                          BEQ     2$                  ;BRANCH IF YES
4351  040766  000775                          BR      1$                  ;BRANCH IF NO
4352  040770  011137  004716          2$:     MOV     (R1),@#UNIT         ;MAKE THIS NEXT UNIT
4353  040774  000137  010030                  JMP     @#TST4              ;TEST THE NEXT DRIVE ------------->
4354
```

```
4355                                    .SBTTL
4356                                    .SBTTL  **SUBROUTINES**
4357                                    .SBTTL
4358
4359
4360
```

```
4361
4362
4363                                    .SBTTL  JAM CURRENT CYLINDER ROUTINE
4364
4365                                ;*THIS ROUTINE WILL CHANGE THE CURRENT CYLINDER REGISTER - 'RHCC'
4366                                ;*BY GIVING A 'SEEK' COMMAND FOLLOWED BY AN INIT WHICH WILL LOAD
4367                                ;*'RHCC' WITH THE DESIRED CYLINDER VALUE.  THE ROUTINE THEN CHECKS
4368                                ;*THAT THE LOADED VALUE IS CORRECT.
4369                                ;*
4370                                ;*CALL IS:
4371                                ;*      JSR     R0,@#MAKECYL
4372                                ;*      XC                      ;DESIRED VALUE OF CURRENT CYLINDER
4373
4374  041122                        MAKECYL:
4375  041124  010037  041506                MOV     R0,@#PCJSR      ;PC OF JSR+4
4376  041130  162737  000004  041506        SUB     #4,@#PCJSR      ;SAVE PC OF JSR
4377  041136  012005                        MOV     (R0)+,R5        ;GETTING READY TO FILL DESIRED CYLINDER
4378  041140  010577  141146               MOV     R5,@RHCA        ;FILL DESIRED CYLINDER REGISTER
4379  041144  005077  141134               CLR     @RHDST          ;MAKE SURE DESIRED SECTOR TRACK IS NOT ILLEGAL
4380  041150  013777  002452  141122        MOV     @#SEECOM,@RHCS1 ;FILL SEEK COMMAND
4381  041156  012777  000001  141134        MOV     #DMD,@RHMR      ;SET DIAGNOSTIC MODE
4382
4383  041164  004737  043364               JSR     PC,@#PUTREG     ;TAKE A REGISTER SNAPSHOT
4384  041170  032737  040000  002404        BIT     #ERR,@#DS1      ;CHECK FOR COMPOSITE ERROR
4385  041176  001401                        BEQ     2$              ;NOT = 1, A-OK
4386  041200  104103                        ERROR   103             ;REGISTER CONTENTS INCORRECT BEFORE A
4387                                                                ;DIAGNOSTIC SEEK
4388
4389  041202  052777  000001  141070  2$:   BIS     #GO,@RHCS1      ;ISSUE 'GO' TO SEEK COMMAND
4390  041210  000240                        NOP                     ;ALLOW TIME FOR SEEK TO HANG UP
4391  041212  000240                        NOP                     ;ALLOW TIME FOR SEEK TO HANG UP
4392  041214  000240                        NOP                     ;ALLOW TIME FOR SEEK TO HANG UP
4393  041216  000240                        NOP                     ;ALLOW TIME FOR SEEK TO HANG UP
4394
4395  041220  004737  043364               JSR     PC,@#PUTREG     ;TAKE A 2ND REGISTER SNAPSHOT
4396  041224  032737  040000  002404        BIT     #ERR,@#DS1      ;CHECK FOR ERRORS
4397  041232  001401                        BEQ     3$              ;NOT = 1, A-OK
4398  041234  104104                        ERROR   104             ;REGISTER CONTENTS INCORRECT AFTER
4399                                                                ;A DIAGNOSTIC SEEK
4400
4401  041236  004737  041452        3$:   JSR     PC,@#CLDISK     ;GIVE INIT TO FORCE THE TRANSFER
4402  041242  017737  141066  001126        MOV     @RHCC,@#$BDDAT  ;TEST DATA
4403  041250  020537  001126               CMP     R5,@#$BDDAT     ;COMPARE CURRENT CYLINDER
4404  041254  001406                        BEQ     1$              ;BRANCH IF GOOD
4405  041256  010537  001124               MOV     R5,@#$GDDAT     ;GOOD VALUE OF RHCC
4406  041262  013737  002334  004600        MOV     @#RHCC,@#REGADR ;FAILING REGISTER ADDRESS
4407  041270  104077                        ERROR   77              ;CURRENT CYLINDER DOES NOT MATCH DESIRED CYLINDER
4408                                                                ;REGISTER AFTER A SEEK AND AN INIT
4409  041272                        1$:
4410  041274  000200                        RTS     R0
```

```
                                ;*THIS FILLS MEMORY WITH GIVEN DATA
                                ;*USED CHIEFLY FOR HEADER INFORMATION
                                ;*CALL IS
                                ;*      JSR     R0,@#FLHEAD     ;FILL HEADER
                                ;*      LOC                     ;LOCATION WHERE SAVED
                                ;*      XN                      ;NUMBER OF WORDS
                                ;*      XD1                     ;DATA REPEATED XN TIMES
                                ;*      XD2                     ;DATA REPEATED XN TIMES
                                ;*
                                ;*
                                ;*
041276
041302  012001                  FLHEAD: MOV     (R0)+,R1        ;R1 HAS ADDRESS OF WHERE TO SAVE
041304  012002                          MOV     (R0)+,R2        ;R2 HAS NUMBER OF WORDS

                                        ;*NOW FILL DATA

041306  012021                  1$:     MOV     (R0)+,(R1)+     ;SAVE DATA
041310  005302                          DEC     R2              ;DECREMENT COUNT
041312  001375                          BNE     1$              ;BRANCH IF INCOMPLETE
041320  000200                          RTS     R0



                                ;*THIS CLEARS ANY BLOCK OF MEMORY.
                                ;*FILLING IT WITH ANY DATA
                                ;*CALL IS
                                ;*      JSR     R0,@#CLAREA
                                ;*      F                       ;FROM
                                ;*      N                       ;NUMBER OF WORDS
                                ;*      D                       ;DATA  TO BE FILLED
                                ;*
                                ;*R1 WILL HAVE STARTING ADDRESS OF BLOCK TO BE FILLED
                                ;*R2 WILL HAVE NUMBER OF WORDS
                                ;*R3 WILL HAVE DATA

041322                          CLAREA:
041330  012001                          MOV     (R0)+,R1        ;FROM
041332  012002                          MOV     (R0)+,R2        ;NUMBER
041334  012003                          MOV     (R0)+,R3        ;DATA
041336  010321                  1$:     MOV     R3,(R1)+        ;MOVE DATA
041340  005302                          DEC     R2              ;COUNT
041342  001375                          BNE     1$              ;BRANCH IF NOT COMPLETE
041352  000200                          RTS     R0              ;RETURN TO MAIN PROGRAM



                                ;*THIS IS A SUBROUTINE TO FILL SAVED REGISTER LOCATION
                                ;*WITH GIVEN VALUE
                                ;*CALL IS
                                ;*      JSR     R0,@#FILLRE
```

```
                                        ;*      RHXX            ;REGISTER NAME
                                        ;*      D               ;DATA
                                        ;*
                                        FILLRE:
                                                MOV     (R0)+,R1        ;ADDRESS OF ADDRESS OF REGISTER
                                                MOV     (R0)+,R2        ;DATA
                                                SUB     #RHWC,R1        ;OFSET
                                                MOV     R2,SAVERE(R1)   ;DATA IS MOVED IN
                                                RTS     R0              ;RETURN TO MAIN PROGRAM
```

```
                                        ;*THIS SUBROUTINE SETS UP FOR SEARCH
                                        ;*CALL IS
                                        ;*      JSR     R0,@#SRCH
                                        ;*      C                       ;CYLINDER
                                        ;*.BYTE S                       ;SECTOR
                                        ;*.BYTE T                       ;TRACK
                                        ;
041402  012077  140704          SRCH:   MOV     (R0)+,@RHCA     ;SET DESIRED CYLINDER ADDRESS
041406  012077  140672                  MOV     (R0)+,@RHDST    ;SET DESIRED SECTOR/TRACK ADDRESS
041412  013777  002434  140660          MOV     @#SERCH,@RHCS1  ;GET READY FOR SEARCH
                                                                ;WITH 30 IN RHCS1
041420  000200                          RTS     R0


                                        ;*THIS SUBROUTINE SETS UP FOR SEEK COMMANDS
                                        ;*CALL IS
                                        ;*      JSR     R0,@#SEEKCY
                                        ;*      C                       ;CYLINDER
                                        ;*
041422  012077  140664          SEEKCY: MOV     (R0)+,@RHCA     ;SET DESIRED CYLINDER ADDRESS
041426  013777  002452  140644          MOV     @#SEECOM,@RHCS1 ;MOV 4 INTO RHCS1
041434  000200                          RTS     R0              ;RETURN TO MAIN PROGRAM
```

```
4508
4509                                    ;*THIS SUBROUTINE SETS UP FOR OFFSET COMMANDS
4510                                    ;*CALL IS
4511                                    ;*      JSR     R0,@#OFSET
4512                                    ;*      0                       ;MICRO INCHES OFSET
4513
4514  041436  052077  140646  OFSET:   BIS     (R0)+,@RHOF     ;SET OFSET REGISTER
4515  041442  013777  002454  140630   MOV     @#OFSETC,@RHCS1 ;MOV14 INTO RHCS1
4516  041450  000200                   RTS     R0              ;RETURN TO MAIN PROGRAM
4517
4518
4519  041452  013701  002300  CLDISK:  MOV     @#RHCS1,        R1      ;R1 WILL BE CONTROL AND STATUS1
4520  041456  013702  002276           MOV     @#RHCS2,        R2      ;R2 WILL BE CONTROL AND STATUS2
4521  041462  013703  002322           MOV     @#RHDS1,        R3      ;R3 WILL BE DISK STATUS REGISTER1
4522  041466  013704  002302           MOV     @#RHER1,        R4      ;R4 WILL BE ERROR REGISTER #1
4523
4524  041472  012712  000040           MOV     #CLR,@R2                ;CLEAR ALL REG.
4525  041476  013712  004716           MOV     @#UNIT,@R2      ;REINSTATE UNIT NO.
4526  041502  005011                   CLR     @R1                     ;CLEAR FUNCTION BITS
4527  041504  000207                   RTS     PC
```

```
                                ;*THIS CHECKS THAT DEVICE AVAILABLE (DVA) AND READY (RDY) IN RHCS1 = 1
                                ;*AND CHECKS MEDIUM ON LINE (MOL), DEVICE PRESENT (DPR), DEVICE READY
                                ;* (DRY) IN RHDS1 = 1

                                ;*IT ALSO CHECKS THAT THERE ARE NO BITS STUCK AT 1 IN RHDS1

041506  000000                  PCJSR:  0                       ;PC OF JSR

041510  011637  041506          CHECK:  MOV     (SP),@#PCJSR    ;SAVE PC OF JSR+4
041514  162737  000004  041506          SUB     #4,@#PCJSR      ;GET PC OF JSR
041522  011346                          MOV     @R3,-(SP)       ;GET RHDS1
041524  052716  000100                  BIS     #VV,(SP)        ;DONT CHECK VV BIT
041530  000406                          BR      CHECKC          ;GOTO COMMON CHECK ROUTINE

041532  011637  041506          CHECKT: MOV     (SP),@#PCJSR    ;SAVE PC OF JSR+4
041536  162737  000004  041506          SUB     #4,@#PCJSR      ;GET PC OF JSR
041544  011346                          MOV     @R3,-(SP)       ;GET RHDS1 & DO VV CHECK AT 3$

041546  011146                  CHECKC: MOV     @R1,-(SP)       ;GET CS1
041550  042716  173577                  BIC     #173577,(SP)    ;CLEAR UNWANTED BITS
041554  022726  004200                  CMP     #DVA!RDY,(SP)+  ;RHCS1 SHOULD HAVE DEVICE AVAILABLE
                                                                ;AND BE READY
041560  001403                          BEQ     3$              ;BRANCH IF IT DOES
041562  011137  001122                  MOV     @R1,@#$BDADR    ;BAD DATA REGISTER (RHCS1)
041566  104061                          ERROR   61              ;RHCS1 DID NOT HAVE DEVICE
                                                                ;AVAILABLE RIGHT AT THE START
                                                                ;ALL OTHER BITS SHOULD BE 0

041570  042716  102000          3$:     BIC     #ATA!LBT,(SP)   ;CLEAR UNWANTED BITS
041574  022726  010700                  CMP     #MOL!DPR!DRY!VV,(SP)+ ;RHDS1 SHOULD HAVE THESE SET
041600  001404                          BEQ     7$              ;BRANCH IF GOOD
041602  011337  001122                  MOV     @R3,@#$BDADR    ;BAD DATA IN  REGISTER (RHDS1)
041606  104062                          ERROR   62              ;RHDS1 HAS SOME BITS OTHER
                                                                ;THAN MOL, DRY, DPR,VV SET
                                                                ;ALL OTHER BITS SHOULD BE 0
041610  000207                          RTS     PC              ;RETURN TO TEST AND HALT/CONTINUE
                                                                ;DEPENDING ON WHETHER THIS IS A
                                                                ;"FATAL" ERROR

041612  062716  000006          7$:     ADD     #6,(SP)         ;ADJUST STACK TO JUMP OVER HALT IN TEST
041616  000207                          RTS     PC              ;RETURN TO THE TEST AND CONTINUE
```

```
                                ;*THIS IS A SUBROUTINE TO SAVE REGISTERS
                                ;*IN THE REGISTER TABLE TO ANY LOCATION
                                ;*THE CALL IS
                                ;*JSR   R0,@#SAVER
                        ;*      F       ;FROM
                        ;*      T       ;TO
                        ;*      N       ;NUMBER OF WORDS SAVED
                        ;*F MUST ALWAYS BE RHCS1
                        ;*T MUST ALWAYS BE SAVRE

041620                  SAVER:
041626  012001                  MOV     (R0)+,R1        ;FROM
041630  012002                  MOV     (R0)+,R2        ;TO
041632  012003                  MOV     (R0)+,R3        ;NUMBER
041634  013122          1$:     MOV     @(R1)+,(R2)+    ;SAVE REGISTER CONTENTS
041636  005303                  DEC     R3              ;COUNT
041640  001375                  BNE     1$              ;BRANCH IF NOT DONE
041650  000200                  RTS     R0


                                ;*WHEN AN EVENT IS TO BE TIMED THE RPO4 VECTORS TO "TIME 1"
                                ;*PRIORITY OF PROCESS OR IS 4
                                ;*PRIORITY OF TRAPS MUST BE 6
                                ;*PRIORITY OF RPO4 INTERRUPTS IS 7
                                ;*

041652  005077  140466  TIME1:   CLR     @PCLCSR                 ;STOP THE CLOCK
041656  017737  140466  041710          MOV     @PCLCTR,@#WAITTM ;GET TIME ON CLOCK
041664  017737  140444  004664  TIME2:   MOV     @RHCC,@#FINACC          ;GET CURRENT CYLINDER
041672  017737  140440  004662          MOV     @RHLA,@#FINALA          ;GET LOOK AHEAD
041700  000002                          RTI                     ;RETURN TO WAIT P OR WAIT.T


                                ;*THIS IS A WAIT LOOP WHEN AN EVENT IS TO BE TIMED
                                ;*THE CALL IS
                                ;*      WAT
                                ;*      A       ;ABSOLUTE REGISTER ADDRESS
                                ;*      B       ;BIT WAITED FOR
                                ;*      TA      ;TIME ALLOWED GIVEN IN 10 MICROSEC
                                ;*      TO      ;TOLERANCE PLUS/MINUS IN 10 MICROSEC
                                ;*
```

```
                                        ;*R1-WILL HAVE TIME ALLOWED IN 10 MICRO SECONDS
                                        ;*R2-WILL HAVE TOLERANCE PLUS/MINUS IN 10 MICRO SECONDS
                                        ;*MINIMUM TIME THAT CAN BE MEASURED IS ABOUT 12 MICRO SECONDS
                                        ;*FOR THE SLOWEST PROCESSOR

041702  000000                  WAITPC: 0                       ;WAT PC
041704  000000                  WAITRE: 0                       ;WAIT ON REGISTER ADDRESS
041706  000000                  WAITBT: 0                       ;WAIT ON BIT
041710  000000                  WAITTM: 0                       ;WAITED TIME
041712  005037  041710          WAIT.P: CLR     @#WAITTM        ;CLEAR WAITED TIME
041716  005077  140424                  CLR     @PCLBUF ;CLEAR COUNT SET BUFFER
041722  012777  000021  140414          MOV     #GO!BIT4,@PCLCSR ;COUNT UP, 100 KHZ, START CLOCK
041740  016600  000010                  MOV     10(SP),R0       ;R0 HAS ADDRESS OF NEXT LOCATION
041744  010037  041702                  MOV     R0,@#WAITPC     ;NOW WAITPC HAS WAT PC + 2
041750  162737  000002  041702          SUB     #2,@#WAITPC     ;WAT PC IS IN WAITPC
041756  013037  041704                  MOV     @(R0)+,@#WAITRE ;WAIT ON REGISTER ADDRESS
041762  012037  041706                  MOV     (R0)+,@#WAITBT  ;WAIT ON BIT
041766  012001                          MOV     (R0)+,R1        ;R1 HAS TIME IN 10 MSEC
041770  012002                          MOV     (R0)+,R2        ;R2 HAS TOLERANCE IN 10 MSEC
041772  010066  000010                  MOV     R0,10(SP)       ;RESTORE RETURN ON STACK

                                        ;*THIS SECTION WAITS FOR BIT, THROUGH TWO COUNT DOWNS
041776  013703  042150                  MOV     @#TIMCNT,R3     ;R3 IS A TEMPORARY COUNTER
042002  033777  041706  177674  1$:     BIT     @#WAITBT,@WAITRE ;IS REQUIRED BIT THERE
042010  001025                          BNE     4$              ;BRANCH IF YES
042012  005303                          DEC     R3              ;COUNT IF REQUIRED BIT NOT THERE
042014  001372                          BNE     1$
042016  013703  042150                  MOV     @#TIMCNT,R3     ;TEMPORARY COUNTER
042022  033777  041706  177654  2$:     BIT     @#WAITBT,@WAITRE ;IS REQUIRED BIT THERE
042030  001015                          BNE     4$              ;BRANCH IF YES
042032  005303                          DEC     R3              ;COUNT IF REQUIRED BIT NOT THERE
042034  001372                          BNE     2$
042036  017737  177642  001126          MOV     @WAITRE,@#SBDDAT ;REGISTER CONTENTS FOR TYPEOUT
042044  032777  000100  140226          BIT     #IE,@RHCS1      ;DID ANY INTERRUPT OCCUR
042052  001402                          BEQ     3$              ;BRANCH IF YES
042054  104001                          ERROR   1               ;RP04 DID NOT INTERRUPT
042056  000427                          BR      7$              ;OUT
042060  104002                  3$:     ERROR   2               ;RP04 INTERRUPTED BUT WAITED
                                        ;ON BIT DID NOT OCCUR
                                        ;EVEN AFTER TWO COUNT DOWNS
                                        ;FROM 177777 TO 0
042062  000425                          BR      7$              ;OUT

                                        ;*NOW TIME AND TOLERANCE WILL BE CHECKED
042064  017737  177614  001126  4$:     MOV     @WAITRE,@#SBDDAT ;REGISTER CONTENTS FOR TYPEOUT
042072  032777  000100  140200          BIT     #IE,@RHCS1      ;DID ANY INTERRUPT OCCUR
042100  001402                          BEQ     5$              ;BRANCH IF YES
042102  104003                          ERROR   3               ;INTERRUPT DID NOT OCCUR EVEN
                                        ;AFTER ONE BNE AND ONE MOV
                                        ;OF THE WAITED ON BIT SETTING
042104  000414                          BR      7$              ;OUT
042106  160201                  5$:     SUB     R2,R1           ;R1 NOW HAS LOWER LIMIT OF TIME
042110  023701  041710                  CMP     @#WAITTM,R1     ;FOR GOOD RESULTS, WAITTM
                                        ;MUST BE GREATER OR EQUAL
                                        ;TO R1
042114  103002                          BHIS    6$              ;BRANCH IF GOOD
```

```
 4687  042116  104004                          ERROR   4               ;BIT DID OCCUR BUT TIME
 4688                                                                  ;TAKEN IS BELOW LOWER LIMIT
 4689  042120  000406                          BR      7$              ;OUT
 4690
 4691  042122  060202                  6$:     ADD     R2,R2           ;DOUBLE TOLERANCE
 4692  042124  060201                          ADD     R2,R1           ;R1 NOW HAS UPPER LIMIT OF TIME
 4693  042126  020137  041710                  CMP     R1,@#WAITTM     ;FOR GOOD RESULTS, WAITTM
 4694                                                                  ;MUST BE LESS OR EQUAL TO R1
 4695  042132  103001                          BHIS    7$              ;BRANCH IF GOOD
 4696  042134  104004                          ERROR   4               ;BIT DID OCCUR BUT TIME TAKEN
 4697                                                                  ;IS ABOVE UPPER LIMIT
 4698  042136                          7$:
 4699  042146  000002                          RTI                     ;RETURN TO MAIN TEST
 4700
 4701
 4702
 4703
 4704
 4705
 4706                                  ;*THIS IS A WAIT LOOP WHEN NO P-CLOCK IS AVAILABLE
 4707                                  ;*NO TIMING IS DONE
 4708                                  ;*CALL IS
 4709                                  ;*      WAT
 4710                                  ;*      A       ;ABSOLUTE REGISTER ADDRESS
 4711                                  ;*      B       ;BIT WAITE) FOR
 4712                                  ;*      TA      ;TIME-NOT USED HERE
 4713                                  ;*      TO      ;TIME-NOT USED HERE
 4714                                  ;*R3-IS A TEMPORARY COUNTER
 4715  042150  177777                  TIMCNT: 177777                  ;COUNT FOR WAIT LOOP
 4716
 4717  042152                          WAIT.T:
 4718  042156  016600  000004                  MOV     4(SP),R0        ;R0 HAS ADDRESS OF NEXT LOCATION
 4719  042162  010037  041702                  MOV     R0,@#WAITPC     ;WAT PC +2 IS IN WAITPC
 4720  042166  162737  000002  041702          SUB     #2,@#WAITPC     ;WAT PC IS IN WAITPC
 4721  042174  013037  041704                  MOV     @(R0)+,@#WAITRE ;WAIT ON REGISTER ADDRESS
 4722  042200  012037  041706                  MOV     (R0)+,@#WAITBT  ;WAIT ON BIT
 4723  042204  022020                          CMP     (R0)+,(R0)+     ;DUMP NEXT TWO WORDS-TA, TO
 4724  042206  010066  000004                  MOV     R0,4(SP)        ;RESTORE RETURN ON STACK
 4725
 4726                                          ;*THIS HAS THE TWO COUNT DOWNS FROM 177777
 4727  042212  013703  042150          MOV     @#TIMCNT,R3     ;R3 HAS TEMPORARY COUNT
 4728  042216  033777  041706  177460  1$:     BIT     @#WAITBT,@WAITRE ;IS REQUIRED BIT THERE
 4729  042224  001025                  BNE     4$              ;BRANCH IF YES
 4730  042226  005303                  DEC     R3              ;COUNT IF REQUIRED BIT NOT THERE
 4731  042230  001372                  BNE     1$
 4732  042232  013703  042150          MOV     @#TIMCNT,R3     ;SECOND COUNT DOWN FROM 177777
 4733  042236  033777  041706  177440  2$:     BIT     @#WAITBT,@WAITRE ;IS REQUIRED BIT THERE
 4734  042244  001015                  BNE     4$              ;BRANCH IF YES
 4735  042246  005303                  DEC     R3              ;COUNT IF REQUIRED BIT NOOT THERE
 4736  042250  001372                  BNE     2$
 4737  042252  017737  177426  001126  MOV     @WAITRE,@#$BDDAT ;REGISTER CONTENTS FOR TYPEOUT
 4738  042260  032777  000100  140012  BIT     #IE,@RHCS1      ;DID ANY INTERRUPT OCCUR
 4739  042266  001402                  BEQ     3$              ;BRANCH IF YES
 4740  042270  104001                  ERROR   1               ;RP04 DID NOT INTERRUPT
 4741                                                          ;BIT DID NOT OCCUR
 4742  042272  000414                  BR      5$              ;OUT
```

```
4743  042274  104002                3$:     ERROR   2               ;RP04 INTERRUPTED BUT
4744                                                                  ;WAITED ON BIT DID NOT OCCUR
4745                                                                  ;EVEN AFTER TWO COUNT DOWNS
4746                                                                  ;FROM 177777 TO 0
4747  042276  000412                        BR      5$              ;OUT
4748
4749                                        ;*BIT DID SET SO CHECK IF INTERRUPT OCCURED
4750  042300  000240                4$:     NOP                     ;ALLOW TIME FOR INTERRUPT
4751  042302  032777  000100  137770      BIT     #IE,@RHCS1      ;DID ANY INTERRUPT OCCUR
4752  042310  001405                        BEQ     5$              ;BRANCH IF YES
4753  042312  017737  177366  001126      MOV     @WAITRE,@#$BDDAT ;REGISTER CONTENTS FOR TYPEOUT
4754  042320  104003                        ERROR   3               ;INTERRUPT DID NOT OCCUR
4755                                                                  ;EVEN AFTER ONE BNE OF
4756                                                                  ;THE WAITED ON BIT OCCURING
4757  042322  000400                        BR      5$              ;OUT
4758  042324                        5$:
4759  042330  000002                        RTI                     ;RETURN TO MAIN TEST
```

```
                                ;*THIS CHANGES REGISTER SAVED VALUE
                                ;*CALL IS
                                ;*      JSR     R0,@#CHREG
                                ;*      R                       ;REGISTER TO BE CHANGED
                                ;*      N                       ;NUMBER OF BITS TO BE CHANGED
                                ;*      NEW                     ;NEW VALUE OF BIT MUST BE 0 OR1
                                ;*      P                       ;POSITION OF BIT TO BE CHANGED
                                ;*NEW AND P WILL BE REPEATED N NUMBER OF TIMES
042332                          CHREG:
042336  012001                          MOV     (R0)+,R1        ;R1 HAS ADDRESS OF ADDRESS OF REGISTER
042340  012002                          MOV     (R0)+,R2        ;R2 HAS NUMBER OF CHANGES
042342  162701  002272                  SUB     #RHWC,R1        ;R1 HAS OFSET OF REQUIRED REGISTER
042346  005720                  1$:     TST     (R0)+           ;IS A BIC OR A BIS TO BE DONE
042350  001403                          BEQ     2$              ;BRANCH IF A BIC IS REQUIRED
042352  052061  004612                  BIS     (R0)+,SAVERE(R1) ;SET REQUIRED BIT
042356  000402                          BR      3$              ;BRANCH TO DECREMENT COUNT
042360  042061  004612          2$:     BIC     (R0)+,SAVERE(R1) ;CLEAR REQUIRED BIT
042364  005302                  3$:     DEC     R2              ;DECREMENT NUMBER OF CHANGES
042366  001367                          BNE     1$              ;BRANCH IF NOT COMPLETE
042374  000200                          RTS     R0              ;RETURN TO MAIN PROGRAM


                                ;*THIS FILLS A BLOCK WITH INCREMENTAL DATA
                                ;*CALL IS
                                ;*      JSR     R0,@#FILL
                                ;*      F                       ;FROM
                                ;*      N                       ;NUMBER OF WORDS
                                ;*      S                       ;STARTING VALUE OF DATA
                                ;*      I                       ;INCREMENT DATA BY

042376                          FILL:
042406  012001                          MOV     (R0)+,R1        ;R1 HAS ADDRESS WHERE DATA IS TO GO
042410  012002                          MOV     (R0)+,R2        ;R2 HAS NUMBER OF WORDS TO BE FILLED
042412  012003                          MOV     (R0)+,R3        ;STARTING VALUE OF DATA
042414  012004                          MOV     (R0)+,R4        ;R4 HAS INCREMENT
                                ;*NOW DATA WILL BE FILLED
042416  010321                  1$:     MOV     R3,(R1)+        ;FILL DATA
042420  060403                          ADD     R4,R3           ;GET NEXT VALUE OF DATA
042422  005302                          DEC     R2              ;DECREMENT COUNT
042424  001374                          BNE     1$              ;BRANCH IF ALL NOT DONE
042436  000200                          RTS     R0              ;RETURN TO MAIN PROGRAM
```

```
                                        ;*THIS IS A SUBROUTINE TO COMPARE REGISTERS
                                        ;*GOOD DATA IS ALREADY SAVED IN 'SAVERE'
                                        ;*TEST DATA IS IN THE REGISTERS
                                        ;*CALL IS
                                        ;*      JSR     R0,@#COMREG
                                        ;*      SAVERE                  ;GOOD DATA
                                        ;*      RHCS1                   ;ADDRESS OF ADDRESS TEST DATA
                                        ;*      N.                      ;RETURN FOR ERROR
                                        ;*      RG                      ;RETURN FOR GOOD COMPARISON
                                        ;*ON RETURN WITH ERROR '$GDDAT' HAS GOOD DATA, '$BDDAT' HAS BAD DATA
                                        ;*'REGADR' HAS REGISTER ADDRESS

042440                                  COMREG:
042452  012001                                  MOV     (R0)+,R1        ;R1 HAS ADDRESS OF GOOD DATA
042454  012002                                  MOV     (R0)+,R2        ;R2 HAS ADDRESS OF ADDRESS OF TEST DATA
042456  012003                                  MOV     (R0)+,R3        ;R3 HAS NUMBER OF WORDS
042460  012004                                  MOV     (R0)+,R4        ;R4 HAS RETURN FOR ERROR
042462  011000                                  MOV     (R0),R0         ;R0 HAS RETURN ON NO ERROR
                                                ;*NOW SAVE REGISTERS
042464  004737  043364                          JSR     PC,@#PUTREG     ;SAVE REGISTERS
042470  113737  004637  002401                  MOVB    @#$SAVERE+25,@#AS+1;MAKE UPPER BYTE OF RHAS SAME
042476  012705  177776                          MOV     #-2,R5          ;PRESET R5 TO -2
                                                ;*NOW COMPARES WILL MADE
042502  062705  000002                  1$:     ADD     #2,R5           ;INCREMENT TO INDEX
042506  022122                                  CMP     (R1)+,(R2)+     ;COMPARE REGISTER CONTENTS
042510  001420                                  BEQ     2$              ;BRANCH IF GOOD
042512  014137  001124                          MOV     -(R1),@#$GDDAT  ;SAVE GOOD DATA
042516  014237  001126                          MOV     -(R2),@#$BDDAT  ;SAVE BAD DATA
042522  016537  002272  004600                  MOV     RHWC(R5),@#REGADR       ;SAVE ADDRESS OF FAILING REGISTER
042530  004714                                  JSR     PC,@R4          ;RETURN TO MAIN PROGRAM
                                                                        ;TO PRINT ERROR
042532  022122                                  CMP     (R1)+,(R2)+     ;UNDO -(R1) AND -(R2) FOR ERRORS
042534  017746  136400                          MOV     @SWR,-(SP)      ;GET SWITCH SETTING
042540  042716  177177                          BIC     #^C600,(SP)     ;KEEP ONLY SWITCH 7 AND 8
042544  022726  000200                          CMP     #SW07,(SP)+     ;IS 7 SET AND 8 DOWN
042550  001402                                  BEQ     3$              ;BRANCH OUT IF YES
042552  005303                          2$:     DEC     R3              ;ARE ALL COMPARES DONE
042554  001352                                  BNE     1$              ;BRANCH IF NOT COMPLETE

042556                                  3$:
042570  000200                                  RTS     R0              ;RETURN TO MAIN PROGRAM
042572  000000                          4$:     .WORD   0               ;TEMP STORAGE
```

```
4853
4854
4855
4856                                    ;*HERE IS A DETAILED EXPLAINATION OF HOW THE LOOP ON ERROR WORKS.
4857                                    ;*ON HITTING AN ERROR IF THE LOOP ON ERROR SWITCH IS SET, THE
4858                                    ;*PROGRAM GOES BACK - USUALLY BACK TO THE BEGINNING OF THE TEST.
4859
4860                                    ;*WHEN THIS OPERATOR SELECTABLE SCOPE LOOP IS USED THEN THE POINT
4861                                    ;*THE PROGRAM GOES BACK TO CAN BE CHANGED.
4862                                    ;*THE RESTRICTIONS TO THE POINT WHERE THE PROGRAM CAN GO ARE: -
4863                                    ;*1.  IT MUST BE WITHIN THE TEST UNDER CONSIDERATION
4864                                    ;*2.  LOOP ON ERROR SWITCH MUST BE SET
4865                                    ;*3.  THE ERROR MUST OCCUR WITHIN THE TEST UNDER CONSIDERATION
4866                                    ;*IF THE ERROR DOES NOT OCCUR WITHIN THE TEST UNDER CONSIDERATION
4867                                    ;*THE PROGRAM WILL REVERT TO NORMAL OPERATION.  HOWEVER, IF LOOP ON
4868                                    ;*TEST SWITCH IS SET AND THIS OPERATOR SELECTABLE SCOPE LOOP IS USED
4869                                    ;*THEN THE PROGRAM WILL LOOP BACK TO THE SELECTED POINT WHEN IT
4870                                    ;*COMES TO THE END OF THE TEST UNDER CONSIDERATION.
4871                                    ;*
4872                                    ;*AFTER LOOPING FOR SOME TIME IF THE LOOP SWITCH IS PUT DOWN THEN
4873                                    ;*NORMAL OPERATION WILL CONTINUE.
4874
4875  042574  000000                   TESTAD: 0                          ;FIRST ADDRESS OF TEST
4876  042576                          OPERSEL:
4877  042576  005037  177776                   CLR     PS                 ;MAKE PROCESSOR STATUS ZERO
4878  042602  012737  177777  047270           MOV     #-1,@#PRITEM       ;CLEAR PREVIOUS ITEM NUMBER
4879  042660  013746  004604                   MOV     @#TSTNM,-(SP)      ;GET READY TO TYPE TEST
4880  042664  104402                           TYPOC                      ;NUMBER
4881  042724  013746  001110                   MOV     @#$LPERR,-(SP)     ;GET READY TO TYPE LOOP BACK PC
4882  042730  104402                           TYPOC
4883  042732  104401  001223                   TYPE    ,$CRLF
4884  043164  104412                           RDOCT
4885  043166  062716  000002                   ADD     #2,(SP)            ;GET LPADR
4886  043172  012637  001106                   MOV     (SP)+,@#$LPADR
4887  043350  104412                           RDOCT
4888  043352  012637  001110                   MOV     (SP)+,@#$LPERR     ;GET LPERR
4889  043356  013746  001106                   MOV     @#$LPADR,-(SP)
4890  043362  000002                           RTI
4891
4892
```

```
                                        ;*THIS SAVES THE CONTENTS OF ALL HARDWARE REGISTERS
                                        ;*IN MEMORY LOCATIONS TAGED FROM "WC" TO "EC2"

                                        ;*THIS IS DONE SO THAT COMPARES ARE DONE WITH SAVED LOCATIONS
                                        ;*AND NOT THE REGISTERS THEMSELVES.   THIS WILL MAKE
                                        ;*ERROR PRINTOUTS FOR GOOD AND BAD DATA ALWAYS DIFFRENT


043364                          PUTREG:
043372  012700  002272                  MOV     #RHWC,R0        ;STARTING ADDRESS OF REG
043376  012701  002354                  MOV     #WC,R1          ;STARTING ADDRESS OF WERE SAVED
043402  012702  000022                  MOV     #RHCC-RHWC+2/2,R2 ;NUMBER OF REG. INTO R2
043406  013021                  10$:     MOV     @(R0)+,(R1)+    ;SAVE HARDWARE REG.
043410  005302                          DEC     R2
043412  001375                          BNE     10$
043422  000207                          RTS     PC


                                ;*THIS IS A DATA  COMMAND SETUP SUBROUTINE
                                ;*THE CALL IS
                                ;*      JSR     R0,@#RUN
                                ;*      C                       ;CYLINDER
                                ;*.BYTE S                       ;SECTOR
                                ;*.BYTE T                       ;TRACK
                                ;*      -W                      ;WORD COUNT
                                ;*      B                       ;BUS ADDRESS
                                ;*      BAI                     ;BUS ADDRESS INHIBIT
                                ;*      FMT22!ECI!HCI           ;FMT22=1 =16 BIT WORDS
                                ;*                              ;ECI = ECC CORRECTION INHIBIT
                                ;*                              ;HCI = HEADER COMPARE INHIBIT
                                ;*      COM                     ;COMMAND ADDRESS
043424  012C77  136662          RUN:    MOV     (R0)+,@RHCA     ;CYLINDER
043430  012077  136650                  MOV     (R0)+,@RHDST    ;DESIRED SECTOR/TRACK
043434  012077  136632                  MOV     (R0)+,@RHWC     ;WORD COUNT
043440  012077  136630                  MOV     (R0)+,@RHBA     ;BUS ADDRESS
043444  013746  004716                  MOV     @#UNIT,-(SP)    ;GET UNIT NO
043450  052016                          BIS     (R0)+,(SP)      ;SET BUS ADDRESS INHIBIT
043452  012677  136620                  MOV     (SP)+,@RHCS2    ;UNIT NO AND BAI TO RHCS2
043456  012077  136626                  MOV     (R0)+,@RHOF     ;FORMAT, ECC INHIBIT, HEADER
                                                                ;COMPARE, IF THERE
043462  013077  136612                  MOV     @(R0)+,@RHCS1   ;COMMAND IN RHCS1
043466  000200                          RTS     R0              ;RETURN TO MAIN PROGRAM
```

```
                                ;*THIS IS A SUBROUTINE TO COMPARE TWO BLOCKS IN MEMORY
                                ;*
                                ;*R1 HAS GOOD DATA BUFFER ADDRESS
                                ;*R2 HAS TEST DATA BUFFER ADDRESS
                                ;*R5 HAS ADDRESS OF RETURN ON ERROR
                                ;*R3 HAS NUMBER OF WORDS TO BE COMPARED
                                ;*R4 HAS ONE MORE THAN NUMBER OF WORDS TO BE COMPARED
                                ;*
                                ;*CALL IS:
                                ;*      JSR     R0,@#COMPAR
                                ;*      G                       ;ADDRESS OF GOOD DATA
                                ;*      T                       ;ADDRESS OF TEST DATA
                                ;*      N                       ;NUMBER OF WORDS TO BE COMPARED
                                ;*      RE                      ;RETURN ON ERROR
                                ;*      RG                      ;RETURN ON NO ERROR
                                ;*
                                ;*
043470                          COMPAR:
043502  012001                          MOV     (R0)+,R1        ;ADDRESS OF GOOD DATA BUFFER
043504  012002                          MOV     (R0)+,R2        ;ADDRESS OF TEST DATA BUFFER
043506  012003                          MOV     (R0)+,R3        ;NO OF WORDS TO BE COMPARED
043510  012005                          MOV     (R0)+,R5        ;RETURN ON ERROR
043512  011000                          MOV     (R0),R0         ;RETURN ON NO ERROR
043514  010304                          MOV     R3,R4           ;NO OF WORDS TO BE COMPARED
043516  005204                          INC     R4
043520  010437  004602          1$:     MOV     R4,@#ERWORD     ;FOR ERROR WORD NO
043524  022122                          CMP     (R1)+,(R2)+     ;COMPARE GOOD WITH TEST DATA
043526  001417                          BEQ     2$              ;BRANCH IF GOOD
                                ;
043530  014137  001124                  MOV     -(R1),@#$GDDAT  ;GOOD DATA
043534  014237  001126                  MOV     -(R2),@#$BDDAT  ;BAD DATA
043540  160337  004602                  SUB     R3,@#ERWORD     ;ERROR WORD NO.
043544  004715                          JSR     PC,@R5          ;RETURN TO PRINT ERROR
043546  022122                          CMP     (R1)+,(R2)+     ;UNDO -(R1) AND -(R2) FOR ERRORS
043550  017746  135364                  MOV     @SWR,-(SP)      ;GET SWITCH SETTING
043554  042716  177177                  BIC     #^C600,(SP)     ;KEEP ONLY SWITCH 7 AND 8
043560  022726  000200                  CMP     #SW07,(SP)+     ;IS 7 SET AND 8 RESET
043564  001402                          BEQ     3$              ;BRANCH OUT IF YES
043566  005303                  2$:     DEC     R3              ;COUNT
043570  001353                          BNE     1$              ;BRANCH IF ALL NOT DEVICE
043572                          3$:
043604  000200                          RTS     R0              ;RETURN TO MAIN PROGRAM
```

```
4987
4988
4989                                    ;*      THIS ROUTINE WILL ALLOW THE CHANGE OF THE BASE
4990                                    ;*      ADDRESS FROM 176700 TO ANY TYPED VALUE
4991
4992  043606                            BASECH:
4993  043606  013746  002300                    MOV     @#RHCS1,-(SP)   ;GET READY TO TYPE OLD BASE
4994  043612  104402                            TYPOC
4995  043614  004737  045662                    JSR     PC,@#$TKINT     ;INITIALIZE THE TTY KEYBOARD
4996  043620  104412                            RDOCT
4997  043622  012700  002270                    MOV     #RHDB,R0        ;GET STARTING ADDRESS OF REGISTERS
4998  043626  012701  000026                    MOV     #22.,R1         ;NUMBER OF REGISTERS
4999  043632  012737  044572  000004            MOV     #ADTIMO,@#4     ;SET TRAP CATCHER TO CHECK THIS ADDRESS
5000  044000  021637  002300                    CMP     @SP,@#RHCS1     ;NEW ADDRESS?
5001  044004  001407                            BEQ     1$              ;NO, OLD ONE JUST RETYPED.
5002  044006  005776  000000                    TST     @0(SP)          ;OK, SO ACCESS THIS NEW ADDRESS
5003  044012  163716  002300                    SUB     @#RHCS1,@SP     ;GET THE ADDRESS OFFSET
5004  044016  061620                    2$:     ADD     @SP,(R0)+       ;AND PLUG IT IN.
5005  044020  005301                            DEC     R1              ;ONE LESS REGISTER TO GO
5006  044022  001375                            BNE     2$              ;BUT WE'RE NOT DONE YET.
5007  044024                            1$:
5008  044070  013746  002266                    MOV     @#RPVEC,-(SP)   ;GET READY TO TYPE OLD VECTOR ADDRESS
5009  044074  104402                            TYPOC
5010  044202  104412                            RDOCT
5011  044204  012637  002266                    MOV     (SP)+,@#RPVEC   ;SETUP VECTOR ADDRESS
5012  044252  013746  002300                    MOV     @#RHCS1,-(SP)
5013  044256  104402                            TYPOC
5014  044322  013746  002266                    MOV     @#RPVEC,-(SP)
5015  044326  104402                            TYPOC
5016  044546  012746  000200                    MOV     #RA,-(SP)
5017  044552  104402                            TYPOC
5018  044566  000137  005012                    JMP     @#BEGIN         ;RESTART, TO RUN ALL DRIVES
5019  044572                            ADTIMO:
5020  044654  022626                            CMP     (SP)+,(SP)+     ;RESTORE THE STACK
5021  044656  000137  043606                    JMP     @#BASECH        ;AND DO THE WHOLE THING AGAIN!
5022
5023
```

```
5024
5025  044662                          RPVECT:
5026  044712  104402                          TYPOC                   ;TYPE FROM PC
5027  044714  012777  044662  135344          MOV     #RPVECT,@RPVEC  ;RESTORE TRAP RP04 VECTOR
5028  044722  000000                          HALT                    ;CHANGE TO CONTINUE
5029
5030
5031
5032
```

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5033                                                    ;FROM THE TTY
```

SEQ 0129

5034

```
                                ;*;**********************************

                                .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE

                                ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
                                ;*ERROR IS TO BE REPORTED.  IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
                                ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
                                ;*IT IS A COPY OF THE $ERRTYP SUBROUTINE FROM SYSMAC.
                                ;*WITH ONLY MINOR CHANGES
                                ;*FIRST IF SWITCH 6 IS SET AND SWITCH 8 RESET THEN
                                ;*ALL REGISTER CONTENTS WILL BE TYPED BEFOR REPORTING THE ERROR
                                ;*SECOND IF THE CURRENT ERROR HAS THE SAME ITEM NUMBER
                                ;*AS THE PREVIOUS ERROR THEN ONLY THE DATA WILL BE TYPED
                                ;*AND NOT THE ERROR MESSAGE AND HEADER.

047270  000000          PRITEM: 0                       ;PREVIOUS ITEM NO. LOCATION

047272  017746  131642  $ERRTYP: MOV     @SWR,-(SP)      ;GET SWITCH SETTING
047276  042716  177277          BIC     #^C500,(SP)     ;KEEP ONLY SWITCH 8 AND 6
047302  022726  000100          CMP     #SW06,(SP)+     ;IS 6 SET AND 8 RESET
047306  001001                  BNE     1$              ;IF NOT BRANCH
047310  000402                  BR      2$              ;BRANCH IF SW 6 IS SET AND 8 RESET
047312  000137  050232  1$:     JMP     @#TYPERR        ;JUMP IF SW 8 IS SET
                                                        ;OR IF SW 8 IS RESET AND SW 6 IS RESET
047316                  2$:
050226  005037  047270          CLR     @#PRITEM        ;CLEAR PREVIOUS ERROR ITEM
050232                  TYPERR:
050232  104401  001223          TYPE    ,$CRLF          ;"CARRIAGE RETURN" & "LINE FEED"
050236  010046                  MOV     R0,-(SP)        ;SAVE R0
050240  005000                  CLR     R0              ;PICKUP THE ITEM INDEX
050242  153700  001114          BISB    @#$ITEMB,R0
050246  001004                  BNE     1$              ;IF ITEM NUMBER IS ZERO, JUST
                                                        ;TYPE THE PC OF THE ERROR
050250  013746  001116          MOV     $ERRPC,-(SP)    ;SAVE $ERRPC FOR TYPEOUT
                                                        ;ERROR ADDRESS
050254  104402                  TYPOC                   ;GO TYPE--OCTAL ASCII(ALL DIGITS)
050256  000454                  BR      10$             ;GET OUT
050260  005300          1$:     DEC     R0              ;ADJUST THE INDEX SO THAT IT WILL
050262  006300                  ASL     R0              ;       WORK FOR THE ERROR TABLE
050264  006300                  ASL     R0
050266  006300                  ASL     R0
050270  062700  001226          ADD     #$ERRTB,R0      ;FORM TABLE POINTER
050274  020037  047270          CMP     R0,@#PRITEM     ;WAS PREVIOUS ERROR SAME
050300  001002                  BNE     13$             ;BRANCH IF NOT
050302  022020                  CMP     (R0)+,(R0)+     ;POP R0 OVER EM AND DH
050304  000420                  BR      5$
050306  010037  047270  13$:    MOV     R0,@#PRITEM     ;SAVE NEW ERROR ITEM
050312  012037  050322          MOV     (R0)+,2$        ;PICKUP "ERROR MESSAGE" POINTER
050316  001404                  BEQ     3$              ;SKIP TYPEOUT IF NO POINTER
050320  104401                  TYPE                    ;TYPE THE "ERROR MESSAGE"
050322  000000          2$:     .WORD   0               ;"ERROR MESSAGE" POINTER GOES HERE
050324  104401  001223          TYPE    ,$CRLF          ;"CARRIAGE RETURN" & "LINE FEED"
050330  012037  050340  3$:     MOV     (R0)+,4$        ;PICKUP "DATA HEADER" POINTER
050334  001404                  BEQ     5$              ;SKIP TYPEOUT IF 0
050336  104401                  TYPE                    ;TYPE THE "DATA HEADER"
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5091  050340  000000            ..      4$:     .WORD   0               ;"DATA HEADER" POINTER GOES HERE
5092  050342  104401  001223            5$:     TYPE    $CRLF           ;"CARRIAGE RETURN" & "LINE FEED"
5093  050346  010146                    MOV     R1,-(SP)                ;SAVE R1
5094  050350  012001                    MOV     (R0)+,R1                ;PICKUP "DATA TABLE" POINTER
5095  050352  001415                    BEQ     9$                      ;BR IF NO DATA TO BE TYPED
5096  050354  012000                    MOV     (R0)+,R0                ;PICKUP "DATA FORMAT" POINTER
5097  050356  105720                6$: TSTB    (R0)+                   ;"OCTAL" OR "DECIMAL"
5098  050360  001003                    BNE     7$                      ;BR IF DECIMAL
5099  050362  013146                    MOV     @(R1)+,-(SP)            ;SAVE @(R1)+ FOR TYPEOUT
5100  050364  104402                    TYPOC                           ;GO TYPE--OCTAL ASCII(ALL DIGITS)
5101  050366  000402                    BR      8$
5102  050370                         7$:
5103  050370  013146                    MOV     @(R1)+,-(SP)            ;SAVE @(R1)+ FOR TYPEOUT
5104  050372  104405                    TYPDS                           ;GO TYPE--DECIMAL ASCII WITH SIGN
5105  050374  005711                8$: TST     (R1)                    ;IS THERE ANOTHER NUMBER?
5106  050376  001403                    BEQ     9$                      ;BR IF NO
5107  050400  104401  050414            TYPE    ,11$                    ;TYPE TWO(2) SPACES
5108  050404  000764                    BR      6$                      ;LOOP
5109
5110  050406  012601                9$: MOV     (SP)+,R1                ;RESTORE R1
5111  050410  012600                10$:MOV     (SP)+,R0                ;"CARRIAGE RETURN" & "LINE FEED"
5112  050412  000207                    RTS     PC                      ;RETURN
5113  050414  020040      000       11$:.ASCIZ  /  /                    ;TWO(2) SPACES
5114          050420                    .EVEN
5115
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5116
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5117
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                        ;************************************
                        ;*
                        ;*ERROR AND MESSAGE TABLE CONDIMENTS
                        ;*
                        ;************************************


051114  050122  032060  042040  EM1:    .ASCIZ  /RP04 DID NOT INTERRUPT/
051122  042111  047040  052117
051130  044440  052116  051105
051136  052522  052120  000000
051143  000111  052116  051105  EM2:    .ASCIZ  /INTERRUPT ENABLE BIT DOWN BUT EXPECTED BIT DID NOT SET/
051150  052522  052120  042440
051156  040516  046102  020105
051164  044502  020124  047504
051172  047127  041040  052125
051200  042440  050130  041505
051206  042524  020104  044502
051214  020124  044504  020104
051222  047516  020124  042523
051230  000124
051232  050122  032060  042040  EM3:    .ASCIZ  /RP04 DID NOT INTERRUPT WHEN EXPECTED BIT DID SET/
051240  042111  047040  052117
051246  044440  052116  051105
051254  052522  052120  053440
051262  042510  020116  054105
051270  042520  052103  042105
051276  041040  052111  042040
051304  042111  051440  052105
051312  000000
051313  000105  050130  041505  EM4:    .ASCIZ  /EXPECTED BIT DID SET BUT TIME IS IN ERROR (TIME IN 10 MICROSEC, DECIMAL
051320  042524  020104  044502
051326  020124  044504  020104
051334  042523  020124  052502
051342  020124  044524  042515
051350  044440  020123  047111
051356  042440  051122  051117
051364  024040  044524  042515
051372  044440  020116  030061
051400  046440  041511  047522
051406  042523  026103  042040
051414  041505  046511  046101
051422  000051
051424  044122  051501  042040  EM5:    .ASCIZ  /RHAS DOES NOT CLEAR BY MOVING IN ALL ONES/
051432  042517  020123  047516
051440  020124  046103  040505
051446  020122  054502  046440
051454  053117  047111  020107
051462  047111  040440  046114
051470  047440  042516  000123
051476  047514  042101  047111  EM6:    .ASCIZ  /LOADING RHER1 FOR ALL UNITS DID NOT SET ANY RHAS BITS/
051504  020107  044122  051105
051512  020061  047506  020122
051520  046101  020114  047125
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5174  051526  052111  020123  044504
5175  051534  020104  047516  020124
5176  051542  042523  020124  047101
5177  051550  020131  044122  051501
5178  051556  041040  052111  000123
5179  051564  047516  020116  054105  EM7:    .ASCIZ  /NON EXISTENT REGISTER, PROGRAM ABORTED./
5180  051572  051511  042524  052116
5181  051600  051040  043505  051511
5182  051606  042524  026122  050040
5183  051614  047522  051107  046501
5184  051622  040440  047502  052122
5185  051630  042105  000056
5186
5187  051634  052123  050117  042520  EM10:   .ASCIZ  /STOPPED DRIVE HAS MOL BIT IN RHDS1 SET/
5188  051642  020104  051104  053111
5189  051650  020105  040510  020123
5190  051656  047515  020114  044502
5191  051664  020124  047111  051040
5192  051672  042110  030523  051440
5193  051700  052105      000
5194  051703      127 052111  020110  EM11:   .ASCIZ  /WITH SPINDLE POWERED DOWN RHCS2 SHOULD ONLY HAVE UNIT NO. AND IR SET/
5195  051710  050123  047111  046104
5196  051716  020105  047520  042527
5197  051724  042522  020104  047504
5198  051732  047127  051040  041510
5199  051740  031123  051440  047510
5200  051746  046125  020104  047117
5201  051754  054514  044040  053101
5202  051762  020105  047125  052111
5203  051770  047040  027117  040440
5204  051776  042116  044440  020122
5205  052004  042523  000124
5206  052010  043101  042524  020122  EM12:   .ASCIZ  /AFTER SPINDLE POWERED UP, NO PACK ACKN. RHDS1 SHOULD HAVE MOL=1, VV=0/
5207  052016  050123  047111  046104
5208  052024  020105  047520  042527
5209  052032  042522  020104  050125
5210  052040  020054  047516  050040
5211  052046  041501  020113  041501
5212  052054  047113  020056  044122
5213  052062  051504  020061  044123
5214  052070  052517  042114  044040
5215  052076  053101  020105  047515
5216  052104  036514  026061  053040
5217  052112  036526  000060
5218  052116  044527  044124  051440  EM13:   .ASCIZ  /WITH SPINDLE POWERED UP, NO INTIALIZE, RHCS1 SHOULD HAVE GO=0, DVA=1, R
5219  052124  044520  042116  042514
5220  052132  050040  053517  051105
5221  052140  042105  052440  026120
5222  052146  047040  020117  047111
5223  052154  044524  046101  055111
5224  052162  026105  051040  041510
5225  052170  030523  051440  047510
5226  052176  046125  020104  040510
5227  052204  042526  043440  036517
5228  052212  026060  042040  040526
5229  052220  030475  020054  042122
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5230  052226  036531  026061  044440
5231  052234  036505  000060
5232  052240  043101  042524  020122  EM14:   .ASCIZ  /AFTER SPINDLE POWERED UP, RHCC SHOULD BE=0/
5233  052246  050123  047111  046104
5234  052254  020105  047520  042527
5235  052262  042522  020104  050125
5236  052270  020054  044122  041503
5237  052276  051440  047510  046125
5238  052304  020104  042502  030075
5239  052312     000
5240  052313     120  041501  020113  EM15:   .ASCII  /PACK ACKNOWLEDGE COMMAND CAUSED AN ERROR/<15><12>
5241  052320  041501  047113  053517
5242  052326  042514  043504  020105
5243  052334  047503  046515  047101
5244  052342  020104  040503  051525
5245  052350  042105  040440  020116
5246  052356  051105  047522  006522
5247  052364     012
5248  052365     107  047517  020104          .ASCIZ  /GOOD DATA IS BEFORE COMMAND, REC DATA IS AFTER COMMAND/
5249  052372  040504  040524  044440
5250  052400  020123  042502  047506
5251  052406  042522  041440  046517
5252  052414  040515  042116  020054
5253  052422  042522  020103  040504
5254  052430  040524  044440  020123
5255  052436  043101  042524  020122
5256  052444  047503  046515  047101
5257  052452  000104
5258  052454  047516  047455  020120  EM16:   .ASCII  /NO-OP COMMAND CAUSED AN ERROR/<15><12>
5259  052462  047503  046515  047101
5260  052470  020104  040503  051525
5261  052476  042105  040440  020116
5262  052504  051105  047522  006522
5263  052512     012
5264  052513     107  047517  020104          .ASCIZ  /GOOD DATA IS BEFORE COMMAND, REC DATA IS AFTER COMMAND/
5265  052520  040504  040524  044440
5266  052526  020123  042502  047506
5267  052534  042522  041440  046517
5268  052542  040515  042116  020054
5269  052550  042522  020103  040504
5270  052556  040524  044440  020123
5271  052564  043101  042524  020122
5272  052572  047503  046515  047101
5273  052600  000104
5274  052602  051104  053111  020105  EM17:   .ASCII  /DRIVE CLEAR COMMAND CAUSED AN ERROR/<15><12>
5275  052610  046103  040505  020122
5276  052616  047503  046515  047101
5277  052624  020104  040503  051525
5278  052632  042105  040440  020116
5279  052640  051105  047522  006522
5280  052646     012
5281  052647     107  047517  020104          .ASCIZ  /GOOD DATA GIVES SHOULD BE, REC DATA GIVES AFTER COMMAND/
5282  052654  040504  040524  043440
5283  052662  053111  051505  051440
5284  052670  047510  046125  020104
5285  052676  042502  020054  042522
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5286  052704  020103  040504  040524
5287  052712  043440  053111  051505
5288  052720  040440  052106  051105
5289  052726  041440  046517  040515
5290  052734  042116     000
5291
5292  052737     122  040505  026504  EM20:   .ASCII  /READ-IN COMMAND CAUSED AN ERROR/<15><12>
5293  052744  047111  041440  046517
5294  052752  040515  042116  041440
5295  052760  052501  042523  020104
5296  052766  047101  042440  051122
5297  052774  051117  005015
5298  053000  047507  042117  042040          .ASCIZ  /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONT. AFTER COMMAND/
5299  053006  052101  020101  044507
5300  053014  042526  020123  044123
5301  053022  052517  042114  041040
5302  053030  026105  051040  041505
5303  053036  042040  052101  020101
5304  053044  044507  042526  020123
5305  053052  042522  027107  041440
5306  053060  047117  027124  040440
5307  053066  052106  051105  041440
5308  053074  046517  040515  042116
5309  053102     000
5310  053103     122  041510  030523  EM21:   .ASCIZ  /RHCS1 CONTENTS DURING COMMAND WAS IN ERROR/
5311  053110  041440  047117  042524
5312  053116  052116  020123  052504
5313  053124  044522  043516  041440
5314  053132  046517  040515  042116
5315  053140  053440  051501  044440
5316  053146  020116  051105  047522
5317  053154  000122
5318  053156  044122  051504  020061  EM22:   .ASCIZ  /RHDS1 CONTENTS DURING COMMAND WAS IN ERROR/
5319  053164  047503  052116  047105
5320  053172  051524  042040  051125
5321  053200  047111  020107  047503
5322  053206  046515  047101  020104
5323  053214  040527  020123  047111
5324  053222  042440  051122  051117
5325  053230     000
5326  053231     125  046116  040517  EM23:   .ASCII  /UNLOAD COMMAND CAUSED AN ERROR/<15><12>
5327  053236  020104  047503  046515
5328  053244  047101  020104  040503
5329  053252  051525  042105  040440
5330  053260  020116  051105  047522
5331  053266  006522     012
5332  053271     107  047517  020104          .ASCIZ  /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONT. AFTER COMMAND/
5333  053276  040504  040524  043440
5334  053304  053111  051505  051440
5335  053312  047510  046125  020104
5336  053320  042502  020054  042522
5337  053326  020103  040504  040524
5338  053334  043440  053111  051505
5339  053342  051040  043505  020056
5340  053350  047503  052116  020056
5341  053356  043101  042524  020122
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5342  053364  047503  046515  047101
5343  053372  000104
5344  053374  043117  051506  052105  EM24:   .ASCII  /OFFSET COMMAND CAUSED AN ERROR/<15><12>
5345  053402  041440  046517  040515
5346  053410  042116  041440  052501
5347  053416  042523  020104  047101
5348  053424  042440  051122  051117
5349  053432  005015
5350  053434  047507  042117  042040          .ASCIZ  /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONT. AFTER COMMAND/
5351  053442  052101  020101  044507
5352  053450  042526  020123  044123
5353  053456  052517  042114  041040
5354  053464  026105  051040  041505
5355  053472  042040  052101  020101
5356  053500  044507  042526  020123
5357  053506  042522  027107  041440
5358  053514  047117  027124  040440
5359  053522  052106  051105  041440
5360  053530  046517  040515  042116
5361  053536     000
5362  053537     122  052105  051125  EM25:   .ASCII  /RETURN TO CENTER LINE COMMAND CAUSED AN ERROR/<15><12>
5363  053544  020116  047524  041440
5364  053552  047105  042524  020122
5365  053560  044514  042516  041440
5366  053566  046517  040515  042116
5367  053574  041440  052501  042523
5368  053602  020104  047101  042440
5369  053610  051122  051117  005015
5370  053616  047507  042117  042040          .ASCIZ  /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONT. AFTER COMMAND/
5371  053624  052101  020101  044507
5372  053632  042526  020123  044123
5373  053640  052517  042114  041040
5374  053646  026105  051040  041505
5375  053654  042040  052101  020101
5376  053662  044507  042526  020123
5377  053670  042522  027107  041440
5378  053676  047117  027124  040440
5379  053704  052106  051105  041440
5380  053712  046517  040515  042116
5381  053720     000
5382  053721     065  030060  047440  EM26:   .ASCIZ  /500 OFFSET COMMANDS ONE AFTER THE OTHER CAUSED AN ERROR/
5383  053726  043106  042523  020124
5384  053734  047503  046515  047101
5385  053742  051504  047440  042516
5386  053750  040440  052106  051105
5387  053756  052040  042510  047440
5388  053764  044124  051105  041440
5389  053772  052501  042523  020104
5390  054000  047101  042440  051122
5391  054006  051117     000
5392  054011     127  044522  042524  EM27:   .ASCII  /WRITE HEADER AND DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
5393  054016  044040  040505  042504
5394  054024  020122  047101  020104
5395  054032  040504  040524  041440
5396  054040  052501  042523  020104
5397  054046  046511  051120  050117
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5398   054054   051105   051040   043505
5399   054062   051511   042524   020122
5400   054070   044103   047101   042507
5401   054076   005015
5402   054100   047507   042117   042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5403   054106   052101   020101   044507
5404   054114   042526   020123   044127
5405   054122   052101   051440   047510
5406   054130   046125   020104   042502
5407   054136   052040   042510   042522
5408   054144   005015
5409   054146   042522   042503   053111          .ASCIZ  /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
5410   054154   042105   042040   052101
5411   054162   020101   044507   042526
5412   054170   020123   044127   052101
5413   054176   053440   051501   052040
5414   054204   042510   042522   040440
5415   054212   052106   051105   041440
5416   054220   046517   040515   042116
5417   054226      000
5418
5419   054227      127   044522   042524  EM30:   .ASCIZ  /WRITE HEADER AND DATA CHANGED WRITE FROM BUFFER/
5420   054234   044040   040505   042504
5421   054242   020122   047101   020104
5422   054250   040504   040524   041440
5423   054256   040510   043516   042105
5424   054264   053440   044522   042524
5425   054272   043040   047522   020115
5426   054300   052502   043106   051105
5427   054306      000
5428   054307      122   040505   020104  EM31:   .ASCII  /READ HEADER AND DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
5429   054314   042510   042101   051105
5430   054322   040440   042116   042040
5431   054330   052101   020101   040503
5432   054336   051525   042105   044440
5433   054344   050115   047522   042520
5434   054352   020122   042522   044507
5435   054360   052123   051105   041440
5436   054366   040510   043516   006505
5437   054374      012
5438   054375      107   047517   020104          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5439   054402   040504   040524   043440
5440   054410   053111   051505   053440
5441   054416   040510   020124   044123
5442   054424   052517   042114   041040
5443   054432   020105   044124   051105
5444   054440   006505      012
5445   054443      122   041505   044505          .ASCIZ  /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
5446   054450   042526   020104   040504
5447   054456   040524   043440   053111
5448   054464   051505   053440   040510
5449   054472   020124   040527   020123
5450   054500   044124   051105   020105
5451   054506   043101   042524   020122
5452   054514   047503   046515   047101
5453   054522   000104
```

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5454  054524  051127  052111  020105  EM32:   .ASCIZ  /WRITE HEADER DATA, FOLLOWED BY READ HEADER AND DATA, CAUSED DATA ERROR/
5455  054532  042510  042101  051105
5456  054540  042040  052101  026101
5457  054546  043040  046117  047514
5458  054554  042527  020104  054502
5459  054562  051040  040505  020104
5460  054570  042510  042101  051105
5461  054576  040440  042116  042040
5462  054604  052101  026101  041440
5463  054612  052501  042523  020104
5464  054620  040504  040524  042440
5465  054626  051122  051117     000
5466  054633     122  040505  020104  EM33:   .ASCII  /READ DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
5467  054640  040504  040524  041440
5468  054646  052501  042523  020104
5469  054654  046511  051120  050117
5470  054662  051105  051040  043505
5471  054670  051511  042524  020122
5472  054676  044103  047101  042507
5473  054704  005015
5474  054706  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5475  054714  052101  020101  044507
5476  054722  042526  020123  044127
5477  054730  052101  051440  047510
5478  054736  046125  020104  042502
5479  054744  052040  042510  042522
5480  054752  005015
5481  054754  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
5482  054762  042105  042040  052101
5483  054770  020101  044507  042526
5484  054776  020123  044127  052101
5485  055004  053440  051501  052040
5486  055012  042510  042522  040440
5487  055020  052106  051105  041440
5488  055026  046517  040515  042116
5489  055034     000
5490  055035     122  040505  020104  EM34:   .ASCIZ  /READ DATA INCORRECT/
5491  055042  040504  040524  044440
5492  055050  041516  051117  042522
5493  055056  052103     000
5494  055061     127  044522  042524  EM35:   .ASCII  /WRITE DATA COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>
5495  055066  042040  052101  020101
5496  055074  047503  046515  047101
5497  055102  020104  040503  051525
5498  055110  042105  044440  050115
5499  055116  047522  042520  020122
5500  055124  042522  044507  052123
5501  055132  051105  041440  040510
5502  055140  043516  006505     012
5503  055145     107  047517  020104          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5504  055152  040504  040524  043440
5505  055160  053111  051505  053440
5506  055166  040510  020124  044123
5507  055174  052517  042114  041040
5508  055202  020105  044124  051105
5509  055210  006505     012
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5510  055213  122     041505  044505          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
5511  055220  042526  020104  040504
5512  055226  040524  043440  053111
5513  055234  051505  051040  043505
5514  055242  051511  042524  020122
5515  055250  047503  052116  047105
5516  055256  051524  040440  052106
5517  055264  051105  041440  046517
5518  055272  040515  042116  000
5519  055277  127     044522  042524  EM36:   .ASCIZ  /WRITE DATA COMMAND CHANGED WRITE FROM BUFFER/
5520  055304  042040  052101  020101
5521  055312  047503  046515  047101
5522  055320  020104  044103  047101
5523  055326  042507  020104  051127
5524  055334  052111  020105  051106
5525  055342  046517  041040  043125
5526  055350  042506  000122
5527  055354  042523  045505  041440  EM37:   .ASCII  /SEEK COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>
5528  055362  046517  040515  042116
5529  055370  041440  052501  042523
5530  055376  020104  046511  051120
5531  055404  050117  051105  051040
5532  055412  043505  051511  042524
5533  055420  020122  044103  047101
5534  055426  042507  005015
5535  055432  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5536  055440  052101  020101  044507
5537  055446  042526  020123  044127
5538  055454  052101  051440  047510
5539  055462  046125  020104  042502
5540  055470  052040  042510  042522
5541  055476  005015
5542  055500  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER SEEK COMMAND/
5543  055506  042105  042040  052101
5544  055514  020101  044507  042526
5545  055522  020123  042522  044507
5546  055530  052123  051105  041440
5547  055536  047117  042524  052116
5548  055544  020123  043101  042524
5549  055552  020122  042523  045505
5550  055560  041440  046517  040515
5551  055566  042116  000
5552
5553  055571  127     044522  042524  EM40:   .ASCII  /WRITE CHECK CAUSED IMPROPER REGISTER CHANGE/<15><12>
5554  055576  041440  042510  045503
5555  055604  041440  052501  042523
5556  055612  020104  046511  051120
5557  055620  050117  051105  051040
5558  055626  043505  051511  042524
5559  055634  020122  044103  047101
5560  055642  042507  005015
5561  055646  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5562  055654  052101  020101  044507
5563  055662  042526  020123  044127
5564  055670  052101  051440  047510
5565  055676  046125  020104  042502
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5566  055704  052040  042510  042522
5567  055712  005015
5568  055714  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
5569  055722  042105  042040  052101
5570  055730  020101  044507  042526
5571  055736  020123  042522  044507
5572  055744  052123  051105  041440
5573  055752  047117  042524  052116
5574  055760  020123  043101  042524
5575  055766  020122  047503  046515
5576  055774  047101  000104
5577  056000  047514  045503  047111  EM41:   .ASCII  /LOCKING OUT WRITE BY WRITE LOCK BUTTON CAUSED IMPROPER REGISTER CHANGE/
5578  056006  020107  052517  020124
5579  056014  051127  052111  020105
5580  056022  054502  053440  044522
5581  056030  042524  046040  041517
5582  056036  020113  052502  052124
5583  056044  047117  041440  052501
5584  056052  042523  020104  046511
5585  056060  051120  050117  051105
5586  056066  051040  043505  051511
5587  056074  042524  020122  044103
5588  056102  047101  042507  005015
5589  056110  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5590  056116  052101  020101  044507
5591  056124  042526  020123  044127
5592  056132  052101  051440  047510
5593  056140  046125  020104  042502
5594  056146  052040  042510  042522
5595  056154  005015
5596  056156  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER WRITES WERE LOCKED OUT/
5597  056164  042105  042040  052101
5598  056172  020101  044507  042526
5599  056200  020123  042522  044507
5600  056206  052123  051105  041440
5601  056214  047117  042524  052116
5602  056222  020123  043101  042524
5603  056230  020122  051127  052111
5604  056236  051505  053440  051105
5605  056244  020105  047514  045503
5606  056252  042105  047440  052125
5607  056260     000
5608  056261     101  052124  046505  EM42:   .ASCII  /ATTEMPTING TO WRITE WITH WRITES LOCKED OUT CAUSED IMPROPER REGISTER CHA
5609  056266  052120  047111  020107
5610  056274  047524  053440  044522
5611  056302  042524  053440  052111
5612  056310  020110  051127  052111
5613  056316  051505  046040  041517
5614  056324  042513  020104  052517
5615  056332  020124  040503  051525
5616  056340  042105  044440  050115
5617  056346  047522  042520  020122
5618  056354  042522  044507  052123
5619  056362  051105  041440  040510
5620  056370  043516  006505     012
5621  056375     107  047517  020104          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
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5622   056402  040504  040524  043440
5623   056410  053111  051505  053440
5624   056416  040510  020124  044123
5625   056424  053517  042114  041040
5626   056432  020105  044124  051105
5627   056440  006505      012
5628   056443      122  041505  044505          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED WRITE/
5629   056450  042526  020104  040504
5630   056456  040524  043440  053111
5631   056464  051505  051040  043505
5632   056472  051511  042524  020122
5633   056500  047503  052116  047105
5634   056506  051524  040440  052106
5635   056514  051105  040440  052124
5636   056522  046505  052120  042105
5637   056530  053440  044522  042524
5638   056536      000
5639   056537      127  044522  044524  EM43:   .ASCII  /WRITING WITH WRITES LOCKED OUT CHANGED DISK DATA/<15><12>
5640   056544  043516  053440  052111
5641   056552  020110  051127  052111
5642   056560  051505  046040  041517
5643   056566  042513  020104  052517
5644   056574  020124  044103  047101
5645   056602  042507  020104  044504
5646   056610  045523  042040  052101
5647   056616  006501      012
5648   056621      107  047517  020104          .ASCII  /GOOD DATA GIVES WHAT WAS ON DISK BEFORE WRITE (WITH WRITE LOCKED OUT)/<
5649   056626  040504  040524  043440
5650   056634  053111  051505  053440
5651   056642  040510  020124  040527
5652   056650  020123  047117  042040
5653   056656  051511  020113  042502
5654   056664  047506  042522  053440
5655   056672  044522  042524  020040
5656   056700  044527  044124  053440
5657   056706  044522  042524  046040
5658   056714  041517  042513  020104
5659   056722  052517  024524  005015
5660   056730  040527  020123  052101          .ASCII  /WAS ATTEMPTED/<15><12>
5661   056736  042524  050116  042524
5662   056744  006504      012
5663   056747      122  041505  044505          .ASCII  /RECEIVED DATA GIVES WHAT WAS READ BACK AFTER WRITE/<15><12>
5664   056754  042526  020104  040504
5665   056762  040524  043440  053111
5666   056770  051505  053440  040510
5667   056776  020124  040527  020123
5668   057004  042522  042101  041040
5669   057012  041501  020113  043101
5670   057020  042524  020122  051127
5671   057026  052111  006505      012
5672   057033      050  044527  044124          .ASCIZ  /(WITH WRITE LOCKED OUT) WAS ATTEMPTED/
5673   057040  053440  044522  042524
5674   057046  046040  041517  042513
5675   057054  020104  052517  024524
5676   057062  053440  051501  040440
5677   057070  052124  046505  052120
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5678  057076  042105      000
5679  057101      105  040516  046102  EM44:   .ASCII  /ENABLING WRITES BY WRITE LOCK BUTTON CAUSED IMPROPER REGISTER CHANGE/<1
5680  057106  047111  020107  051127
5681  057114  052111  051505  041040
5682  057122  020131  051127  052111
5683  057130  020105  047514  045503
5684  057136  041040  052125  047524
5685  057144  020116  040503  051525
5686  057152  042105  044440  050115
5687  057160  047522  042520  020122
5688  057166  042522  044507  052123
5689  057174  051105  041440  040510
5690  057202  043516  006505      012
5691  057207      107  047517  020104          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5692  057214  040504  040524  043440
5693  057222  053111  051505  053440
5694  057230  040510  020124  044123
5695  057236  052517  042114  041040
5696  057244  020105  044124  051105
5697  057252  006505      012
5698  057256      122  041505  044505  .ASCII  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER WRITE LOCK BUTTON/<15><12>
5699  057262  042526  020104  040504
5700  057270  040524  043440  053111
5701  057276  051505  051040  043505
5702  057304  051511  042524  020122
5703  057312  047503  052116  047105
5704  057320  051524  040440  052106
5705  057326  051105  053440  044522
5706  057334  042524  046040  041517
5707  057342  020113  052502  052124
5708  057350  047117  005015
5709  057354  047105  041101  042514          .ASCIZ  /ENABLED WRITES/
5710  057362  020104  051127  052111
5711  057370  051505      000
5712  057373      124  040522  051516  EM45:   .ASCII  /TRANSFERRING ON LAST BLOCK - CYLINDER 410, SECTOR 21, TRACK 18/<15><12>
5713  057400  042506  051122  047111
5714  057406  020107  047117  046040
5715  057414  051501  020124  046102
5716  057422  041517  020113  020055
5717  057430  054503  044514  042116
5718  057436  051105  032040  030061
5719  057444  020054  042523  052103
5720  057452  051117  031040  022061
5721  057460  052040  040522  045503
5722  057466  030440  006470      012
5723  057473      103  052501  042523  .ASCII  /CAUSED IMPROPER REGISTER CHANGE/<15><12>
5724  057500  020104  046511  051120
5725  057506  050117  051105  051040
5726  057514  043505  051511  042524
5727  057522  020122  044103  047101
5728  057530  042507  005015
5729  057534  047507  042117  042040  .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5730  057542  052101  020101  044507
5731  057550  042526  020123  044127
5732  057556  052101  051440  047510
5733  057564  046125  020104  042502
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5734  057572  052040  042510  042522
5735  057600  005015
5736  057602  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER TRANSFER/
5737  057610  042105  042040  052101
5738  057616  020101  044507  042526
5739  057624  020123  042522  044507
5740  057632  052123  051105  041440
5741  057640  047117  042524  052116
5742  057646  020123  043101  042524
5743  057654  020122  051124  047101
5744  057662  043123  051105  000
5745  057667     104  052101  020101  EM46:   .ASCII  /DATA READ FROM LAST BLOCK - CYLINDER 410, SECTOR 21, TRACK 18/<15><12>
5746  057674  042522  042101  043040
5747  057702  047522  020115  040514
5748  057710  052123  041040  047514
5749  057716  045503  026440  041440
5750  057724  046131  047111  042504
5751  057732  020122  030464  026060
5752  057740  051440  041505  047524
5753  057746  020122  030462  020054
5754  057754  051124  041501  020113
5755  057762  034061  005015
5756  057766  051511  044440  020116          .ASCIZ  /IS IN ERROR/
5757  057774  051105  047522  000122
5758  060002  051124  047101  043123  EM47:   .ASCII  /TRANSFERRING DATA FROM NONEXISTANT SECTOR CAUSED IMPROPER /<15><12>
5759  060010  051105  044522  043516
5760  060016  042040  052101  020101
5761  060024  051106  046517  047040
5762  060032  047117  054105  051511
5763  060040  040524  052116  051440
5764  060046  041505  047524  020122
5765  060054  040503  051525  042105
5766  060062  044440  050115  047522
5767  060070  042520  020122  005015
5768  060076  042522  044507  052123          .ASCII  /REGISTER CHANGE, GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5769  060104  051105  041440  040510
5770  060112  043516  026105  043440
5771  060120  047517  020104  040504
5772  060126  040524  043440  053111
5773  060134  051505  053440  040510
5774  060142  020124  044123  052517
5775  060150  042114  041040  020105
5776  060156  044124  051105  006505
5777  060164     012
5778  060165     122  041505  044505          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED TRANSFER/
5779  060172  042526  020104  040504
5780  060200  040524  043440  053111
5781  060206  051505  051040  043505
5782  060214  051511  042524  020122
5783  060222  047503  052116  047105
5784  060230  051524  040440  052106
5785  060236  051105  040440  052124
5786  060244  046505  052120  042105
5787  060252  052040  040522  051516
5788  060260  042506  000122
5789
```

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5790  060264  051124  047101  043123  EM50:   .ASCII  /TRANSFERRING FROM NONEXISTANT SECTOR CAUSED DATA ERROR/<15><12>
5791  060272  051105  044522  043516
5792  060300  043040  047522  020115
5793  060306  047516  042516  044530
5794  060314  052123  047101  020124
5795  060322  042523  052103  051117
5796  060330  041440  052501  042523
5797  060336  020104  040504  040524
5798  060344  042440  051122  051117
5799  060352  005015
5800  060354  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5801  060362  052101  020101  044507
5802  060370  042526  020123  044127
5803  060376  052101  051440  047510
5804  060404  046125  020104  042502
5805  060412  052040  042510  042522
5806  060420  005015
5807  060422  040502  020104  040504          .ASCIZ  /BAD DATA GIVES WHAT WAS IN BUFFER AFTER TRANSFER/
5808  060430  040524  043440  053111
5809  060436  051505  053440  040510
5810  060444  020124  040527  020123
5811  060452  047111  041040  043125
5812  060460  042506  020122  043101
5813  060466  042524  020122  051124
5814  060474  047101  043123  051105
5815  060502     000
5816  060503     107  053111  047111  EM51:   .ASCII  /GIVING ILLEGAL FUNCTION CAUSED IMPROPER REGISTER CHANGE/<15><12>
5817  060510  020107  046111  042514
5818  060516  040507  020114  052506
5819  060524  041516  044524  047117
5820  060532  041440  052501  042523
5821  060540  020104  046511  051120
5822  060546  050117  051105  051040
5823  060554  043505  051511  042524
5824  060562  020122  044103  047101
5825  060570  042507  005015
5826  060574  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5827  060602  052101  020101  044507
5828  060610  042526  020123  044127
5829  060616  052101  051440  047510
5830  060624  046125  020104  042502
5831  060632  052040  042510  042522
5832  060640  005015
5833  060642  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ILLEGAL FUNCTION IS GIVEN/
5834  060650  042105  042040  052101
5835  060656  020101  044507  042526
5836  060664  020123  042522  044507
5837  060672  052123  051105  041440
5838  060700  047117  042524  052116
5839  060706  020123  043101  042524
5840  060714  020122  046111  042514
5841  060722  040507  020114  052506
5842  060730  041516  044524  047117
5843  060736  044440  020123  044507
5844  060744  042526  000116
5845  060750  051127  052111  020105  EM52:   .ASCII  /WRITE DATA COMMAND ON NONEXISTANT SECTOR CAUSED IMPROPER REG. CHANGE/<1
```

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5846  060756  040504  040524  041440
5847  060764  046517  040515  042116
5848  060772  047440  020116  047516
5849  061000  042516  044530  052123
5850  061006  047101  020124  042523
5851  061014  052103  051117  041440
5852  061022  052501  042523  020104
5853  061030  046511  051120  050117
5854  061036  051105  051040  043505
5855  061044  020056  044103  047101
5856  061052  042507  005015
5857  061056  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5858  061064  052101  020101  044507
5859  061072  042526  020123  044127
5860  061100  052101  051440  047510
5861  061106  046125  020104  042502
5862  061114  052040  042510  042522
5863  061122  005015
5864  061124  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED WRITE DATA/
5865  061132  042105  042040  052101
5866  061140  020101  044507  042526
5867  061146  020123  042522  044507
5868  061154  052123  051105  041440
5869  061162  047117  042524  052116
5870  061170  020123  043101  042524
5871  061176  020122  052101  042524
5872  061204  050115  042524  020104
5873  061212  051127  052111  020105
5874  061220  040504  040524      000
5875  061225     122  040505  020104  EM53:   .ASCIZ  /READ HEADER AND DATA AFTER A SEARCH CAUSED DATA ERROR/
5876  061232  042510  042101  051105
5877  061240  040440  042116  042040
5878  061246  052101  020101  043101
5879  061254  042524  020122  020101
5880  061262  042523  051101  044103
5881  061270  041440  052501  042523
5882  061276  020104  040504  040524
5883  061304  042440  051122  051117
5884  061312     000
5885  061313     101  052124  046505  EM54:   .ASCII  /ATTEMPTING COMMAND WITH INVALID ADDRESS CAUSED IMPROPER REGISTER CHANGE
5886  061320  052120  047111  020107
5887  061326  047503  046515  047101
5888  061334  020104  044527  044124
5889  061342  044440  053116  046101
5890  061350  042111  040440  042104
5891  061356  042522  051523  041440
5892  061364  052501  042523  020104
5893  061372  046511  051120  050117
5894  061400  051105  051040  043505
5895  061406  051511  042524  020122
5896  061414  044103  047101  042507
5897  061422  005015
5898  061424  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5899  061432  052101  020101  044507
5900  061440  042526  020123  044127
5901  061446  052101  051440  047510
```

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 5902  061454  046125  020104  042502
 5903  061462  052040  042510  042522
 5904  061470  005015
 5905  061472  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER OPERATION/
 5906  061500  042105  042040  052101
 5907  061506  020101  044507  042526
 5908  061514  020123  042522  044507
 5909  061522  052123  051105  041440
 5910  061530  047117  042524  052116
 5911  061536  020123  043101  042524
 5912  061544  020122  050117  051105
 5913  061552  052101  047511  000116
 5914  061560  051127  052111  047111  EM55:   .ASCII  /WRITING OR READING WITH EXPECTED ADDRESS OVERFLOW ERROR/<15><12>
 5915  061566  020107  051117  051040
 5916  061574  040505  044504  043516
 5917  061602  053440  052111  020110
 5918  061610  054105  042520  052103
 5919  061616  042105  040440  042104
 5920  061624  042522  051523  047440
 5921  061632  042526  043122  047514
 5922  061640  020127  051105  047522
 5923  061646  006522     012
 5924  061651     103  052501  042523          .ASCII  /CAUSED IMPROPER REGISTER CHANGE/<15><12>
 5925  061656  020104  046511  051120
 5926  061664  050117  051105  051040
 5927  061672  043505  051511  042524
 5928  061700  020122  044103  047101
 5929  061706  042507  005015
 5930  061712  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
 5931  061720  052101  020101  044507
 5932  061726  042526  020123  044127
 5933  061734  052101  051440  047510
 5934  061742  046125  020104  042502
 5935  061750  052040  042510  042522
 5936  061756  005015
 5937  061760  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER OPERATION/
 5938  061766  042105  042040  052101
 5939  061774  020101  044507  042526
 5940  062002  020123  042522  044507
 5941  062010  052123  051105  041440
 5942  062016  047117  042524  052116
 5943  062024  020123  043101  042524
 5944  062032  020122  050117  051105
 5945  062040  052101  047511  000116
 5946  062046  040504  040524  051040  EM56:   .ASCII  /DATA READ WITH AN EXPECTED ADDRESS OVERFLOW ERROR IS INCORRECT/<15><12>
 5947  062054  040505  020104  044527
 5948  062062  044124  040440  020116
 5949  062070  054105  042520  052103
 5950  062076  042105  040440  042104
 5951  062104  042522  051523  047440
 5952  062112  042526  043122  047514
 5953  062120  020127  051105  047522
 5954  062126  020122  051511  044440
 5955  062134  041516  051117  042522
 5956  062142  052103  005015
 5957  062146  047527  042122  047040          .ASCII  /WORD NO. 1 TO 260 SHOULD BE READ, WORD NO 261 TO 266 SHOULD/<15><12>
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 5958  062154  027117  030440  052040
 5959  062162  020117  033062  020060
 5960  062170  044123  052517  042114
 5961  062176  041040  020105  042522
 5962  062204  042101  020054  047527
 5963  062212  042122  047040  020117
 5964  062220  033062  020061  047524
 5965  062226  031040  033066  051440
 5966  062234  047510  046125  006504
 5967  062242     012
 5968  062243     102  020105  044103          .ASCIZ  /BE CHANGED/
 5969  062250  047101  042507  000104
 5970  062256  052101  042524  050115  EM57:   .ASCII  /ATTEMPTING DATA COMMAND WITH WRONG FORMAT BIT CAUSED/<15><12>
 5971  062264  044524  043516  042040
 5972  062272  052101  020101  047503
 5973  062300  046515  047101  020104
 5974  062306  044527  044124  053440
 5975  062314  047522  043516  043040
 5976  062322  051117  040515  020124
 5977  062330  044502  020124  040503
 5978  062336  051525  042105  005015
 5979  062344  046511  051120  050117          .ASCII  /IMPROPER REGISTER CHANGE/<15><12>
 5980  062352  051105  051040  043505
 5981  062360  051511  042524  020122
 5982  062366  044103  047101  042507
 5983  062374  005015
 5984  062376  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
 5985  062404  052101  020101  044507
 5986  062412  042526  020123  044127
 5987  062420  052101  051440  047510
 5988  062426  046125  020104  042502
 5989  062434  052040  042510  042522
 5990  062442  005015
 5991  062444  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED DATA TRANSFER/
 5992  062452  042105  042040  052101
 5993  062460  020101  044507  042526
 5994  062466  020123  042522  044507
 5995  062474  052123  051105  041440
 5996  062502  047117  042524  052116
 5997  062510  020123  043101  042524
 5998  062516  020122  052101  042524
 5999  062524  050115  042524  020104
 6000  062532  040504  040524  052040
 6001  062540  040522  051516  042506
 6002  062546  000122
 6003
 6004  062550  052101  042524  050115  EM60:   .ASCII  /ATTEMPTING TO MODIFY REGISTER DURING AN OPERATION CAUSED IMPROPER/<15><
 6005  062556  044524  043516  052040
 6006  062564  020117  047515  044504
 6007  062572  054506  051040  043505
 6008  062600  051511  042524  020122
 6009  062606  052504  044522  043516
 6010  062614  040440  020116  050117
 6011  062622  051105  052101  047511
 6012  062630  020116  040503  051525
 6013  062636  042105  044440  050115
```

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 6014  062644  047522  042520  006522
 6015  062652     012
 6016  062653     122  043505  051511          .ASCII  /REGISTER CHANGE. GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
 6017  062660  042524  020122  044103
 6018  062666  047101  042507  020056
 6019  062674  047507  042117  042040
 6020  062702  052101  020101  044507
 6021  062710  042526  020123  044127
 6022  062716  052101  051440  047510
 6023  062724  046125  020104  042502
 6024  062732  052040  042510  042522
 6025  062740  005015
 6026  062742  042522  042503  053111          .ASCII  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER OPERATION WAS ATTEMPTED/<15
 6027  062750  042105  042040  052101
 6028  062756  020101  044507  042526
 6029  062764  020123  042522  044507
 6030  062772  052123  051105  041440
 6031  063000  047117  042524  052116
 6032  063006  020123  043101  042524
 6033  063014  020122  050117  051105
 6034  063022  052101  047511  020116
 6035  063030  040527  020123  052101
 6036  063036  042524  050115  042524
 6037  063044  006504     012
 6038  063047     115  042117  043111          .ASCIZ  /MODIFYING REG GIVES ADDRESS OF REGISTER BEING MODIFIED WHICH CAUSED ERR
 6039  063054  044531  043516  051040
 6040  063062  043505  043440  053111
 6041  063070  051505  040440  042104
 6042  063076  042522  051523  047440
 6043  063104  020106  042522  044507
 6044  063112  052123  051105  041040
 6045  063120  044505  043516  046440
 6046  063126  042117  043111  042511
 6047  063134  020104  044127  041511
 6048  063142  020110  040503  051525
 6049  063150  042105  042440  051122
 6050  063156  051117     000
 6051  063161     122  041510  030523  EM61:   .ASCIZ  /RHCS1 HAS SOME INCORRECT STATUS BITS = 1, OR = 0/
 6052  063166  044040  051501  051440
 6053  063174  046517  020105  047111
 6054  063202  047503  051122  041505
 6055  063210  020124  052123  052101
 6056  063216  051525  041040  052111
 6057  063224  020123  020075  026061
 6058  063232  047440  020122  020075
 6059  063240  000060
 6060  063242  044122  051504  020061  EM62:   .ASCIZ  /RHDS1 HAS SOME INCORRECT STATUS BITS = 1, OR = 0/
 6061  063250  040510  020123  047523
 6062  063256  042515  044440  041516
 6063  063264  051117  042522  052103
 6064  063272  051440  040524  052524
 6065  063300  020123  044502  051524
 6066  063306  036440  030440  020054
 6067  063314  051117  036440  030040
 6068  063322     000
 6069  063323     122  042110  030523  EM63:   .ASCIZ  /RHDS1 CONTENTS DURING COMMAND WERE IN ERROR/
```

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6070  063330  041440  047117  042524
6071  063336  052116  020123  052504
6072  063344  044522  043516  041440
6073  063352  046517  040515  042116
6074  063360  053440  051105  020105
6075  063366  047111  042440  051122
6076  063374  051117     000
6077  063377     122  041505  046101  EM64:   .ASCII  /RECALIBRATE COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>
6078  063404  041111  040522  042524
6079  063412  041440  046517  040515
6080  063420  042116  041440  052501
6081  063426  042523  020104  046511
6082  063434  051120  050117  051105
6083  063442  051040  043505  051511
6084  063450  042524  020122  044103
6085  063456  047101  042507  005015
6086  063464  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
6087  063472  052101  020101  044507
6088  063500  042526  020123  044127
6089  063506  052101  051440  047510
6090  063514  046125  020104  042502
6091  063522  052040  042510  042522
6092  063530  005015
6093  063532  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
6094  063540  042105  042040  052101
6095  063546  020101  044507  042526
6096  063554  020123  042522  044507
6097  063562  052123  051105  041440
6098  063570  047117  042524  052116
6099  063576  020123  043101  042524
6100  063604  020122  047503  046515
6101  063612  047101  000104
6102  063616  047111  042524  051122  EM65:   .ASCIZ  /INTERRUPT FAILING/
6103  063624  050125  020124  040506
6104  063632  046111  047111  000107
6105  063640  042510  042101  051105  EM66:   .ASCII  /HEADER AND DATA COMMAND FOR HEAD SELECTION TEST CAUSED/<15><12>
6106  063646  040440  042116  042040
6107  063654  052101  020101  047503
6108  063662  046515  047101  020104
6109  063670  047506  020122  042510
6110  063676  042101  051440  046105
6111  063704  041505  044524  047117
6112  063712  052040  051505  020124
6113  063720  040503  051525  042105
6114  063726  005015
6115  063730  051105  047522  020122          .ASCII  /ERROR - RHDST GIVES TRACK BEING WRITTEN OR READ ON CYL 0, SCTR 0/<15><1
6116  063736  020055  044122  051504
6117  063744  020124  044507  042526
6118  063752  020123  051124  041501
6119  063760  020113  042502  047111
6120  063766  020107  051127  052111
6121  063774  042524  020116  051117
6122  064002  051040  040505  020104
6123  064010  047117  041440  046131
6124  064016  030040  020054  041523
6125  064024  051124  030040  005015
```

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6126  064032  042522  042101  044040  EM67:   .ASCII  /READ HEADER AND DATA ERROR IN HEAD SELECTION TEST./<12><15>
6127  064040  040505  042504  020122
6128  064046  047101  020104  040504
6129  064054  040524  042440  051122
6130  064062  051117  044440  020116
6131  064070  042510  042101  051440
6132  064076  046105  041505  044524
6133  064104  047117  052040  051505
6134  064112  027124  006412
6135  064116  044506  051522  020124          .ASCII  /FIRST FOUR WORD NUMBERS ARE THE HEADER./<12><15>
6136  064124  047506  051125  053440
6137  064132  051117  020104  052516
6138  064140  041115  051105  020123
6139  064146  051101  020105  044124
6140  064154  020105  042510  042101
6141  064162  051105  005056     015
6142  064167     127  051117  020104          .ASCII  /WORD NUMBERS 5 TO 260 ARE DATA WORDS,/<12><15>
6143  064174  052516  041115  051105
6144  064202  020123  020065  047524
6145  064210  031040  030066  040440
6146  064216  042522  042040  052101
6147  064224  020101  047527  042122
6148  064232  026123  006412
6149  064236  047101  020104  047111          .ASCIZ  /AND IN DATA WORDS BITS 4,5,6,7,8 GIVE TRACK NUMBER./
6150  064244  042040  052101  020101
6151  064252  047527  042122  020123
6152  064260  044502  051524  032040
6153  064266  032454  033054  033454
6154  064274  034054  043440  053111
6155  064302  020105  051124  041501
6156  064310  020113  052516  041115
6157  064316  051105  000056
6158
6159  064322  042522  042101  044040  EM70:   .ASCII  /READ HEADER AND DATA ERROR IN/<15><12>
6160  064330  040505  042504  020122
6161  064336  047101  020104  040504
6162  064344  040524  042440  051122
6163  064352  051117  044440  006516
6164  064360     012
6165  064361     104  043111  042506          .ASCII  /DIFFERENCE LINE TEST/<15><12>
6166  064366  042522  041516  020105
6167  064374  044514  042516  052040
6168  064402  051505  006524     012
6169  064407     127  051117  020104          .ASCII  /WORD NOS 1-4 GIVE HEADER/<15><12>
6170  064414  047516  020123  026461
6171  064422  020064  044507  042526
6172  064430  044040  040505  042504
6173  064436  006522     012
6174  064441     127  051117  020104          .ASCIZ  /WORD NOS 5-260 GIVE DATA WHICH IS THE CYLINDER ADDRESS/
6175  064446  047516  020123  026465
6176  064454  033062  020060  044507
6177  064462  042526  042040  052101
6178  064470  020101  044127  041511
6179  064476  020110  051511  052040
6180  064504  042510  041440  046131
6181  064512  047111  042504  020122
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6182  064520  042101  051104  051505
6183  064526  000123
6184  064530  047506  041522  047111  EM71:   .ASCII  /FORCING OPI BY 3 INDEX PULSES/<15><12>
6185  064536  020107  050117  020111
6186  064544  054502  031440  044440
6187  064552  042116  054105  050040
6188  064560  046125  042523  006523
6189  064566     012
6190  064567     103  052501  042523          .ASCII  /CAUSED IMPROPER REGISTER CHANGE/<15><12>
6191  064574  020104  046511  051120
6192  064602  050117  051105  051040
6193  064610  043505  051511  042524
6194  064616  020122  044103  047101
6195  064624  042507  005015
6196  064630  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
6197  064636  052101  020101  044507
6198  064644  042526  020123  044127
6199  064652  052101  051440  047510
6200  064660  046125  020104  042502
6201  064666  052040  042510  042522
6202  064674  005015
6203  064676  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER 3 INDEX PULSES/
6204  064704  042105  042040  052101
6205  064712  020101  044507  042526
6206  064720  020123  042522  044507
6207  064726  052123  051105  041440
6208  064734  047117  042524  052116
6209  064742  020123  043101  042524
6210  064750  020122  020063  047111
6211  064756  042504  020130  052520
6212  064764  051514  051505     000
6213  064771     127  044510  042514  EM72:   .ASCII  /WHILE USING UNIBUS B/<15><12>
6214  064776  052440  044523  043516
6215  065004  052440  044516  052502
6216  065012  020123  006502     012
6217  065017     122  040505  020104          .ASCII  /READ DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
6218  065024  040504  040524  041440
6219  065032  052501  042523  020104
6220  065040  046511  051120  050117
6221  065046  051105  051040  043505
6222  065054  051511  042524  020122
6223  065062  044103  047101  042507
6224  065070  005015
6225  065072  047507  042117  042040          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
6226  065100  052101  020101  044507
6227  065106  042526  020123  044127
6228  065114  052101  051440  047510
6229  065122  046125  020104  042502
6230  065130  052040  042510  042522
6231  065136  005015
6232  065140  042522  042503  053111          .ASCIZ  /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
6233  065146  042105  042040  052101
6234  065154  020101  044507  042526
6235  065162  020123  044127  052101
6236  065170  053440  051501  052040
6237  065176  042510  042522  040440
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 6238  065204  052106  051105  041440
 6239  065212  046517  040515  042116
 6240  065220     000
 6241  065221     127  044510  042514  EM73:   .ASCII  /WHILE USING UNIBUS B/<15><12>
 6242  065226  052440  044523  043516
 6243  065234  052440  044516  052502
 6244  065242  020123  006502     012
 6245  065247     122  040505  020104          .ASCIZ  /READ DATA INCORRECT/
 6246  065254  040504  040524  044440
 6247  065262  041516  051117  042522
 6248  065270  052103     000
 6249  065273     127  044510  042514  EM74:   .ASCII  /WHILE USING UNIBUS B/<15><12>
 6250  065300  052440  044523  043516
 6251  065306  052440  044516  052502
 6252  065314  020123  006502     012
 6253  065321     127  044522  042524          .ASCII  /WRITE DATA COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>
 6254  065326  042040  052101  020101
 6255  065334  047503  046515  047101
 6256  065342  020104  040503  051525
 6257  065350  042105  044440  050115
 6258  065356  047522  042520  020122
 6259  065364  042522  044507  052123
 6260  065372  051105  041440  040510
 6261  065400  043516  006505     012
 6262  065405     107  047517  020104          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
 6263  065412  040504  040524  043440
 6264  065420  053111  051505  053440
 6265  065426  040510  020124  044123
 6266  065434  052517  042114  041040
 6267  065442  020105  044124  051105
 6268  065450  006505     012
 6269  065453     122  041505  044505          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
 6270  065460  042526  020104  040504
 6271  065466  040524  043440  053111
 6272  065474  051506  051040  043505
 6273  065502  051511  042524  020122
 6274  065510  047503  052116  047105
 6275  065516  051524  040440  052106
 6276  065524  051105  041440  046517
 6277  065532  040515  042116     000
 6278  065537     127  044510  042514  EM75:   .ASCII  /WHILE USING UNIBUS B/<15><12>
 6279  065544  052440  044523  043516
 6280  065552  052440  044516  052502
 6281  065560  020123  006502     012
 6282  065565     127  044522  042524          .ASCIZ  /WRITE DATA COMMAND CHANGED WRITE FROM BUFFER/
 6283  065572  042040  052101  020101
 6284  065600  047503  046515  047101
 6285  065606  020104  044103  047101
 6286  065614  042507  020104  051127
 6287  065622  052111  020105  051106
 6288  065630  046517  041040  043125
 6289  065636  042506  000122
 6290  065642  044127  046111  020105  EM76:   .ASCII  /WHILE USING UNIBUS B/<15><12>
 6291  065650  051525  047111  020107
 6292  065656  047125  041111  051525
 6293  065664  041040  005015
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6294  065670  051127  052111  020105          .ASCII  /WRITE CHECK CAUSED IMPROPER REGISTER CHANGE/<15><12>
6295  065676  044103  041505  020113
6296  065704  040503  051523  042105
6297  065712  044440  050115  047522
6298  065720  042520  020122  042522
6299  065726  044507  052123  051105
6300  065734  041440  040510  043516
6301  065742  006505  000012
6302  065745  000107  047517  020104          .ASCII  /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
6303  065752  040504  040524  043440
6304  065760  053111  051505  053440
6305  065766  040510  020124  044123
6306  065774  052517  042114  041040
6307  066002  020105  044124  051105
6308  066010  006505  000012
6309  066013  000122  041505  044505          .ASCIZ  /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
6310  066020  042526  020104  040504
6311  066026  040524  043440  053111
6312  066034  051505  051040  043505
6313  066042  051511  042524  020122
6314  066050  047503  052116  047105
6315  066056  051524  040440  052106
6316  066064  051105  041440  046517
6317  066072  040515  042116  000000
6318  066077  000120  042522  047514  EM77:   .ASCII  /PRELOADING 'RHCC' PRIOR TO DOING NEXT TEST DOES NOT PRODUCE CORRECT RES
6319  066104  042101  047111  020107
6320  066112  051047  041510  023503
6321  066120  050040  044522  051117
6322  066126  052040  020117  047504
6323  066134  047111  020107  042516
6324  066142  052130  052040  051505
6325  066150  020124  047504  051505
6326  066156  047040  052117  050040
6327  066164  047522  052504  042503
6328  066172  041440  051117  042522
6329  066200  052103  051040  051505
6330  066206  046125  006524  000012
6331  066213  000124  042510  042522          .ASCIZ  /THEREFORE NEXT TEST RESULTS ARE SUSPECT WITH REGARD TO 'RHCC' CONTENTS/
6332  066220  047506  042522  047040
6333  066226  054105  020124  042524
6334  066234  052123  051040  051505
6335  066242  046125  051524  040440
6336  066250  042522  051440  051525
6337  066256  042520  052103  053440
6338  066264  052111  020110  042522
6339  066272  040507  042122  052040
6340  066300  020117  051047  041510
6341  066306  023503  041440  047117
6342  066314  042524  052116  000123
6343
6344  066322  042101  051104  051505  EM100:  .ASCIZ  /ADDRESS PLUG CHANGE RESULTED IN BAD REGISTER DATA/
6345  066330  020123  046120  043525
6346  066336  041440  040510  043516
6347  066344  020105  042522  052523
6348  066352  052114  042105  044440
6349  066360  020116  040502  020104
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6350   066366  042522  044507  052123
6351   066374  051105  042040  052101
6352   066402  000101
6353   066404  047125  052111  042040  EM101:  .ASCIZ  /UNIT DID NOT GO OFFLINE WHEN ADDRESS PLUG REMOVED/
6354   066412  042111  047040  052117
6355   066420  043440  020117  043117
6356   066426  046105  047111  020105
6357   066434  044127  047105  040440
6358   066442  042104  042522  051523
6359   066450  050040  052514  020107
6360   066456  042522  047515  042526
6361   066464  000104
6362   066466  047125  052111  047040  EM102:  .ASCIZ  /UNIT NOT AVAILABLE AFTER ADDRESS PLUG REPLACED/
6363   066474  052117  040440  040526
6364   066502  046111  041101  042514
6365   066510  040440  052106  051105
6366   066516  040440  042104  042522
6367   066524  051523  050040  052514
6368   066532  020107  042522  046120
6369   066540  041501  042105  000
6370   066545  122  043505  051511  EM103:  .ASCIZ  /REGISTER CONTENTS INCORRECT BEFORE A DIAG MODE SEEK/
6371   066552  042524  020122  047503
6372   066560  052116  047105  051524
6373   066566  044440  041516  051117
6374   066574  042522  052103  041040
6375   066602  043105  051117  020105
6376   066610  020101  044504  043501
6377   066616  046440  042117  020105
6378   066624  042523  045505  000
6379   066631  122  043505  051511  EM104:  .ASCIZ  /REGISTER CONTENTS INCORRECT AFTER A DIAG MODE SEEK/
6380   066636  042524  020122  047503
6381   066644  052116  047105  051524
6382   066652  044440  041516  051117
6383   066660  042522  052103  040440
6384   066666  052106  051105  040440
6385   066674  042040  040511  020107
6386   066702  047515  042504  051440
6387   066710  042505  000113
```

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6388
6389
6390  066714  040506  040524  020114  CPHALT: .ASCII  /FATAL ERROR - SEE DOCUMENT LISTING/<15><12><15><12>
6391  066722  051105  047522  020122
6392  066730  020055  042523  020105
6393  066736  047504  052503  042515
6394  066744  052116  046040  051511
6395  066752  044524  043516  005015
6396  066760  005015
6397  066762  044124  020105  047503          .ASCII  /THE CONTROLLER OR DEVICE HAS GONE OFFLINE, LOST/<15><12>
6398  066770  052116  047522  046114
6399  066776  051105  047440  020122
6400  067004  042504  044526  042503
6401  067012  044040  051501  043440
6402  067020  047117  020105  043117
6403  067026  046106  047111  026105
6404  067034  046040  051517  006524
6405  067042     012
6406  067043     047  042522  042101          .ASCII  /'READY', BECOME UNAVAILABLE, OR HAS STATUS BITS/<15><12>
6407  067050  023531  020054  042502
6408  067056  047503  042515  052440
6409  067064  040516  040526  046111
6410  067072  041101  042514  020054
6411  067100  051117  044040  051501
6412  067106  051440  040524  052524
6413  067114  020123  044502  051524
6414  067122  005015
6415  067124  044127  041511  020110          .ASCIZ  /WHICH CANNOT BE CLEARED/
6416  067132  040503  047116  052117
6417  067140  041040  020105  046103
6418  067146  040505  042522  000104
6419
6420
6421
6422
6423  067154  041520  020040  020040  DH1:    .ASCII  /PC      TEST    WAT     BIT     REG     REG     RHCS1/<15><12>
6424  067162  020040  042524  052123
6425  067170  020040  020040  040527
6426  067176  020124  020040  020040
6427  067204  044502  020124  020040
6428  067212  020040  042522  020107
6429  067220  020040  020040  042522
6430  067226  020107  020040  020040
6431  067234  044122  051503  006461
6432  067242     012
6433  067243     040  020040  020040          .ASCIZ  /       NO      PC      EXPECT  ADDRESS CONTENT CONTENT/
6434  067250  020040  047040  020117
6435  067256  020040  020040  050040
6436  067264  020103  020040  020040
6437  067272  042440  050130  041505
6438  067300  020124  040440  042104
6439  067306  042522  051523  041440
6440  067314  047117  042524  052116
6441  067322  041440  047117  042524
6442  067330  052116     000
6443  067333     120  020103  020040  DH4:    .ASCII  /PC      TEST    WAT     BIT     REG     TIME IN/<15><12>
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6444   067340   020040   052040   051505
6445   067346   020124   020040   053440
6446   067354   052101   020040   020040
6447   067362   041040   052111   020040
6448   067370   020040   051040   043505
6449   067376   020040   020040   052040
6450   067404   046511   020105   047111
6451   067412   005015
6452   067414   020040   020040   020040          .ASCIZ  /       NO      PC      EXPECT  ADDRESS 10 MSEC/
6453   067422   020040   047516   020040
6454   067430   020040   020040   041520
6455   067436   020040   020040   020040
6456   067444   054105   042520   052103
6457   067452   020040   042101   051104
6458   067460   051505   020123   030061
6459   067466   046440   042523   000103
6460   067474   041520   020040   020040  DH5:    .ASCII  /PC      TEST    REG     GOOD    RECEIVED/<15><12>
6461   067502   020040   042524   052123
6462   067510   020040   020040   042522
6463   067516   020107   020040   020040
6464   067524   047507   042117   020040
6465   067532   020040   042522   042503
6466   067540   053111   042105   005015
6467   067546   020040   020040   020040          .ASCIZ  /       NO      ADDRESS DATA    DATA/
6468   067554   020040   047516   020040
6469   067562   020040   020040   042101
6470   067570   051104   051505   020123
6471   067576   040504   040524   020040
6472   067604   020040   040504   040524
6473   067612      000
6474   067613      120   020103   020040  DH6:    .ASCII  /PC      TEST    REG     RECEIVED/<15><12>
6475   067620   020040   052040   051505
6476   067626   020124   020040   051040
6477   067634   043505   020040   020040
6478   067642   051040   041505   044505
6479   067650   042526   006504      012
6480   067655      040   020040   020040          .ASCIZ  /       NO      ADDRESS DATA/
6481   067662   020040   047040   020117
6482   067670   020040   020040   040440
6483   067676   042104   042522   051523
6484   067704   042040   052101   000101
6485   067712   041520   020040   020040  DH7:    .ASCIZ  /PC      TEST    REG     ADDRESS/
6486   067720   020040   042524   052123
6487   067726   020040   020040   042522
6488   067734   020107   020040   020040
6489   067742   042101   051104   051505
6490   067750   000123
6491
6492   067752   041520   020040   020040  DH10:   .ASCII  /PC      TEST    FAILING CONTENT CONTENT CONTENT CONTENT/<15><12>
6493   067760   020040   042524   052123
6494   067766   020040   020040   040506
6495   067774   046111   047111   020107
6496   070002   047503   052116   047105
6497   070010   020124   047503   052116
6498   070016   047105   020124   047503
6499   070024   052116   047105   020124
```

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6500  070032  047503  052116  047105
6501  070040  006524     012
6502  070043     040  020040  020040          .ASCIZ  /       NO      REG.    RHCS1   RHCS1   RHDS1   RHER1/
6503  070050  020040  047040  020117
6504  070056  020040  020040  051040
6505  070064  043505  020056  020040
6506  070072  051040  041510  030523
6507  070100  020040  051040  041510
6508  070106  030523  020040  051040
6509  070114  042110  030523  020040
6510  070122  051040  042510  030522
6511  070130     000
6512  070131     120  020103  020040  DH26:   .ASCII  /PC     TEST    CONT OF CONT OF CONT OF CONT OF CONT OF CONT OF/<15><12
6513  070136  020040  052040  051505
6514  070144  020124  020040  041440
6515  070152  047117  020124  043117
6516  070160  041440  047117  020124
6517  070166  043117  041440  047117
6518  070174  020124  043117  041440
6519  070202  047117  020124  043117
6520  070210  041440  047117  020124
6521  070216  043117  041440  047117
6522  070224  020124  043117  005015
6523  070232  020040  020040  020040          .ASCIZ  /       NO      RHCS1   RHCS2   RHDS1   RHER1   RHER2   RHER3/
6524  070240  020040  047516  020040
6525  070246  020040  020040  044122
6526  070254  051503  020061  020040
6527  070262  044122  051503  020062
6528  070270  020040  044122  051504
6529  070276  020061  020040  044122
6530  070304  051105  020061  020040
6531  070312  044122  051105  020062
6532  070320  020040  044122  051105
6533  070326  000063
6534  070330  041520  020040  020040  DH30:   .ASCII  /PC     TEST    WORD    GOOD    BAD/<15><12>
6535  070336  020040  042524  052123
6536  070344  020040  020040  047527
6537  070352  042122  020040  020040
6538  070360  047507  042117  020040
6539  070366  020040  040502  006504
6540  070374     012
6541  070375     040  020040  020040          .ASCIZ  /       NO      NO      DATA    DATA/<15><12>
6542  070402  020040  047040  020117
6543  070410  020040  020040  047040
6544  070416  020117  020040  020040
6545  070424  042040  052101  020101
6546  070432  020040  042040  052101
6547  070440  006501  000012
6548
6549  070444  041520  020040  020040  DH51:   .ASCII  /PC     TEST    REG     GOOD    RECVD   ILLEGL/<15><12>
6550  070452  020040  042524  052123
6551  070460  020040  020040  042522
6552  070466  020107  020040  020040
6553  070474  047507  042117  020040
6554  070502  020040  042522  053103
6555  070510  020104  020040  046111
```

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6556  070516  042514  046107  005015
6557  070524  020040  020040  020040          .ASCIZ  /       NO      ADDRESS DATA    DATA    FUNCTN/
6558  070532  020040  047516  020040
6559  070540  020040  020040  042101
6560  070546  051104  051505  020123
6561  070554  040504  040524  020040
6562  070562  020040  040504  040524
6563  070570  020040  020040  052506
6564  070576  041516  047124     000
6565
6566  070603     120  020103  020040  DH60:   .ASCII  /PC     TEST    REG     GOOD    RECVD   MODFING/<15><12>
6567  070610  020040  052040  051505
6568  070616  020124  020040  051040
6569  070624  043505  020040  020040
6570  070632  043440  047517  020104
6571  070640  020040  051040  041505
6572  070646  042126  020040  046440
6573  070654  042117  044506  043516
6574  070662  005015
6575  070664  020040  020040  020040          .ASCIZ  /       NO      ADDRESS DATA    DATA    REG/
6576  070672  020040  047516  020040
6577  070700  020040  020040  042101
6578  070706  051104  051505  020123
6579  070714  040504  040524  020040
6580  070722  020040  040504  040524
6581  070730  020040  020040  042522
6582  070736  000107
6583  070740  041520  020040  020040  DH61:   .ASCII  /PC     TEST    PC OF   RHCS1/<15><12>
6584  070746  020040  042524  052123
6585  070754  020040  020040  041520
6586  070762  047440  020106  020040
6587  070770  044122  051503  006461
6588  070776     012
6589  070777     040  020040  020040          .ASCIZ  /       NO      JSR     WAS/
6590  071004  020040  047040  020117
6591  071012  020040  020040  045040
6592  071020  051123  020040  020040
6593  071026  053440  051501     000
6594  071033     120  020103  020040  DH62:   .ASCII  /PC     TEST    PC OF   RHDS1/<15><12>
6595  071040  020040  052040  051505
6596  071046  020124  020040  050040
6597  071054  020103  043117  020040
6598  071062  051040  042110  030523
6599  071070  005015
6600  071072  020040  020040  020040          .ASCIZ  /       NO      JSR     WAS/
6601  071100  020040  047516  020040
6602  071106  020040  020040  051512
6603  071114  020122  020040  020040
6604  071122  040527  000123
6605  071126  041520  020040  020040  DH65:   .ASCII  /PC     TEST    CONT    CONT    CONT    /<15><12>
6606  071134  020040  042524  052123
6607  071142  020040  020040  047503
6608  071150  052116  020040  020040
6609  071156  047503  052116  020040
6610  071164  020040  047503  052116
6611  071172  020040  020040  005015
```

```
 6612  071200  020040  020040  020040          .ASCIZ  /       NO      RHCS1   RHAS    RHDS1   /
 6613  071206  020040  047516  020040
 6614  071214  020040  020040  044122
 6615  071222  051503  020061  020040
 6616  071230  044122  051501  020040
 6617  071236  020040  044122  051504
 6618  071244  020061  020040     000
 6619  071251     120  020103  020040  DH66:   .ASCIZ  /PC      TEST    RHDST   RHER1   RHER2   RHER3   RHCS1   RHCS2/
 6620  071256  020040  052040  051505
 6621  071264  020124  020040  051040
 6622  071272  042110  052123  020040
 6623  071300  051040  042510  030522
 6624  071306  020040  051040  042510
 6625  071314  031122  020040  051040
 6626  071322  042510  031522  020040
 6627  071330  051040  041510  030523
 6628  071336  020040  051040  041510
 6629  071344  031123     000
 6630
 6631  071347     120  020103  020040  DH77:   .ASCII  /PC      TEST    PC OF   REG.    GOOD    BAD/<15><12>
 6632  071354  020040  052040  051505
 6633  071362  020124  020040  050040
 6634  071370  020103  043117  020040
 6635  071376  051040  043505  020056
 6636  071404  020040  043440  047517
 6637  071412  020104  020040  041040
 6638  071420  042101  005015
 6639  071424  020040  020040  020040          .ASCIZ  /       NO      JSR     ADDR    DATA    DATA/
 6640  071432  020040  047516  020040
 6641  071440  020040  020040  051512
 6642  071446  020122  020040  020040
 6643  071454  042101  051104  020040
 6644  071462  020040  040504  040524
 6645  071470  020040  020040  040504
 6646  071476  040524     000
 6647
 6648          071502                  .EVEN
 6649
 6650  071502  001116  004604  041702  DT1:    .WORD   $ERRPC,TSTNM,WAITPC,WAITBT,WAITRE,$BDDAT,CS1,0
 6651  071510  041706  041704  001126
 6652  071516  002362  000000
 6653  071522  001116  004604  041702  DT4:    .WORD   $ERRPC,TSTNM,WAITPC,WAITBT,WAITRE,$BDDAT,WAITTM,0
 6654  071530  041706  041704  001126
 6655  071536  041710  000000
 6656  071542  001116  004604  004600  DT5:    .WORD   $ERRPC,TSTNM,REGADR,$GDDAT,$BDDAT,0
 6657  071550  001124  001126  000000
 6658  071556  001116  004604  004600  DT6:    .WORD   $ERRPC,TSTNM,REGADR,$BDDAT,0
 6659  071564  001126  000000
 6660  071570  001116  004604  001200  DT7:    .WORD   $ERRPC,TSTNM,$TMP1,0
 6661  071576  000000
 6662
 6663  071600  001116  004604  001122  DT10:   .WORD   $ERRPC,TSTNM,$BDADR,CS1,CS2,DS1,ER1,0
 6664  071606  002362  002360  002404
 6665  071614  002364  000000
 6666  071620  001116  004604  002362  DT26:   .WORD   $ERRPC,TSTNM,CS1,CS2,DS1,ER1,ER2,ER3,0
 6667  071626  002360  002404  002364
```

```
 6668  071634  002370  002376  000000
 6669  071642  001116  004604  004602  DT30:   .WORD   $ERRPC,TSTNM,ERWORD,$GDDAT,$BDDAT,0
 6670  071650  001124  001126  000000
 6671
 6672  071656  001116  004604  004600  DT51:   .WORD   $ERRPC,TSTNM,REGADR,$GDDAT,$BDDAT,ILLEGL,0
 6673  071664  001124  001126  002464
 6674  071672  000000
 6675
 6676  071674  001116  004604  004600  DT60:   .WORD   $ERRPC,TSTNM,REGADR,$GDDAT,$BDDAT,$BDADR,0
 6677  071702  001124  001126  001122
 6678  071710  000000
 6679  071712  001116  004604  041506  DT61:   .WORD   $ERRPC,TSTNM,PCJSR,$BDADR,0
 6680  071720  001122  000000
 6681  071724  001116  004604  041506  DT62:   .WORD   $ERRPC,TSTNM,PCJSR,$BDADR,0
 6682  071732  001122  000000
 6683  071736  001116  004604  002362  DT65:   .WORD   $ERRPC,TSTNM,CS1,AS,DS1,0
 6684  071744  002400  002404  000000
 6685  071752  001116  004604  002364  DT66:   .WORD   $ERRPC,TSTNM,ER1,ER2,ER3,CS1,CS2,0
 6686  071760  002370  002376  002362
 6687  071766  002360  000000
 6688
 6689  071772  001116  004604  041506  DT77:   .WORD   $ERRPC,TSTNM,PCJSR,REGADR,$GDDAT,$BDDAT,0
 6690  072000  004600  001124  001126
 6691  072006  000000
 6692
 6693  072010     000     000     000  DF1:    .BYTE   0,0,0,0,0,0,0
 6694  072013     000     000     000
 6695  072016     000
 6696  072017     000     000     000  DF4:    .BYTE   0,0,0,0,0,1,0
 6697  072022     000     000     001
 6698  072025     000
 6699  072026     000     000     000  DF5:    .BYTE   0,0,0,0,0
 6700  072031     000     000
 6701  072033     000     000     000  DF6:    .BYTE   0,0,0,0
 6702  072036     000
 6703  072037     000     000     000  DF7:    .BYTE   0,0,0
 6704
 6705  072042     000     000     000  DF10:   .BYTE   0,0,0,0,0,0,0
 6706  072045     000     000     000
 6707  072050     000
 6708
 6709  072051     000     000     000  DF26:   .BYTE   0,0,0,0,0,0,0,0
 6710  072054     000     000     000
 6711  072057     000     000
 6712
 6713  072061     000     000     000  DF30:   .BYTE   0,0,0,0,0
 6714  072064     000     000
 6715
 6716  072066     000     000     000  DF51:   .BYTE   0,0,0,0,0,0
 6717  072071     000     000     000
 6718
 6719  072074     000     000     000  DF60:   .BYTE   0,0,0,0,0,0
 6720  072077     000     000     000
 6721  072102     000     000     000  DF61:   .BYTE   0,0,0,0
 6722  072105     000
 6723  072106     000     000     000  DF62:   .BYTE   0,0,0,0
```

```
 6724  072111  000
 6725  072112  000     000     000  DF65:   .BYTE   0,0,0,0,0
 6726  072115  000     000
 6727  072117  000     000     000  DF66:   .BYTE   0,0,0,0,0,0,0,0
 6728  072122  000     000     000
 6729  072125  000     000
 6730
 6731  072127  000     000     000  DF77:   .BYTE   0,0,0,0,0,0
 6732  072132  000     000     000
 6733
 6734          072136                   .EVEN
 6735
 6736
 6737          000001                   .END
```

```
ACE    = 020000            1627#  2421   2441
ACL    = 000040            1625#
ACU    = 100000            1585#
ADDMOD   000204             631#  1938
ADTIMO   044572            4999   5019#
AOE    = 001000            1507#
AS       002400            1721#  4831*  5061   6683
ATA    = 100000            1495#  2421   2441   2583   2817   2919   2970   2995   3843   3896   4255   4561
ATABLE   004666            1790#  2117
ATTENT   004740            1814#  2064*  2117*  2422   2442   2583   2625   2672   2718   2781   2817   2927   2970
                           2979   2995   3843   3896   4255
ATO    = 000001            1527#
AT1    = 000002            1528#
AT2    = 000004            1529#
AT3    = 000010            1530#
AT4    = 000020            1531#
AT5    = 000040            1532#
AT6    = 000100            1533#
AT7    = 000200            1534#
A16    = 000400            1470#
A17    = 001000            1471#
BA       002356            1710#  5061
BAI    = 000010            1443#  2616   2619
BASECH   043606             631   4992#  5021
BEGIN    005012             630   1845#  5018   5118
BEGIN1   004762             634   1839#
BEGIN2   004776             632   1842#
BIRD     020156            2802   2809#
BITO   = 000001             624#
BITOO  = 000001             624#
BIT01  = 000002             624#
BIT02  = 000004             624#
BIT03  = 000010             624#
BIT04  = 000020             624#
BIT05  = 000040             624#
BIT06  = 000100             624#
BIT07  = 000200             624#
BIT08  = 000400             624#   5033
BIT09  = 001000             624#   5033   5034
BIT1   = 000002             624#
BIT10  = 002000             624#   5034
BIT11  = 004000             624#   5033
BIT12  = 010000             624#
BIT13  = 020000             624#   5034
BIT14  = 040000             624#   5033
BIT15  = 100000             624#   2995
BIT2   = 000004             624#
BIT3   = 000010             624#
BIT4   = 000020             624#   4642
BIT5   = 000040             624#
BIT6   = 000100             624#
BIT7   = 000200             624#
BIT8   = 000400             624#
BIT9   = 001000             624#
BPTVEC= 000014              624#
CA       002374            1719#  5061
```

```
DF6     072033          721    6701#
DF60    072074         1199    6719#
DF61    072102         1208    6721#
DF62    072106         1217    6723#
DF65    072112         1249    6725#
DF66    072117         1267    6727#
DF7     072037          729    6703#
DF77    072127         1361    6731#
DH1     067154          658     670     682    6423#
DH10    067752          734     748     762     778    6492#
DH26    070131          897    1375    1387    1399    1411    6512#
DH30    070330          921     943     959     976    1037    1071    1095    1131    1167    1276    1287    1318    1337
                       6534#
DH4     067333          695    6443#
DH5     067474          706     791     803     817     831     843     854     861     871     880     891     914     935
                        953     969     987     998    1012    1024    1049    1062    1084    1124    1143    1155    1180
                       1223    1235    1298    1311    1329    1349    1365    6460#
DH51    070444         1106    6549#
DH6     067613          717    6474#
DH60    070603         1193    6566#
DH61    070740         1203    6583#
DH62    071033         1212    6594#
DH65    071126         1243    6605#
DH66    071251         1259    6619#
DH7     067712          726    6485#
DH77    071347         1355    6631#
DIGB  = 000004         1482#
DISPLA  001142          650#   1851#   5033#   5034#
DISPRE  000174          625#   1851
DLT   = 100000         1455#
DL64  = 000020         1484#
DMD   = 000001         1517#   2348    2351    2367    2441    2764    2768    2802    2806    4381
DOG     017346         2759    2767#
DPR   = 000400         1488#   2243    2319    2408    2778    2815    2886    2913    2967    2992    3048    3086    3126
                       3168    3208    3253    3292    3335    3375    3424    3481    3537    3580    3634    3673    3746
                       3781    3840    3893    4049    4108    4176    4562
DRY   = 000200         1487#   2245    2319    2412    2778    2815    2919    2967    2992    3016    3020    3719    3840
                       3885    3893    3942    4074    4138    4562
DST     002366         1716#   5061
DSWR  = 177570          624#    650    1851
DS1     002404         1723#   2408    2412    4384    4396    5061    6663    6666    6683
DT      002406         1724#   2157#   2630    5061
DTE   = 010000         1510#
DTSY  = 001000         1523#
DT1     071502          664     676     687    6650#
DT10    071600          741     755     769     785    6663#
DT26    071620          904    1381    1393    1405    1417    6666#
DT30    071642          925     944     960     977    1038    1072    1096    1132    1168    1277    1288    1319    1338
                       6669#
DT4     071522          700    6653#
DT5     071542          710     795     807     821     835     847     855     862     872     881     892     915     936
                        954     970     988     999    1013    1025    1050    1063    1085    1125    1144    1156    1181
                       1224    1236    1302    1312    1330    1350    1369    6656#
DT51    071656         1111    6672#
DT6     071556          720    6658#
DT60    071674         1198    6676#
```

```
DT61    071712          1207    6679#
DT62    071724          1216    6681#
DT65    071736          1248    6683#
DT66    071752          1266    6685#
DT7     071570           728    6660#
DT77    071772          1360    6689#
DVA   = 004000          1473#   2185    2256    2319    2410    2778    2815    2867    2967    2992    3048    3086    3126
                        3168    3208    3253    3292    3335    3375    3424    3481    3537    3580    3634    3673    3746
                        3781    3840    3893    4049    4108    4176    4553
ECH   = 000100          1504#
ECI   = 004000          1598#   2688    2734    2995    3039    3079    3119    3159    3201    3244    3285    3326    3368
                        3414    3473    3529    3571    3625    3666    3735    3773    3865    3919    3976    4001    4041
                        4102    4165    4205    4241    4280
EC1     002412          1726#   5061
EC2     002414          1727#   5061
EMTVEC= 000030           624#   1851*   1920*   1950*
EM1     051114           656    5127#
EM10    051634           732    5187#
EM100   066322          1364    6344#
EM101   066404          1373    6353#
EM102   066466          1385    6362#
EM103   066545          1397    6370#
EM104   066631          1409    6379#
EM11    051703           745    5194#
EM12    052010           759    5206#
EM13    052116           773    5218#
EM14    052240           789    5232#
EM15    052313           799    5240#
EM16    052454           811    5258#
EM17    052602           825    5274#
EM2     051143           668    5131#
EM20    052737           839    5292#
EM21    053103           852    5310#
EM22    053156           859    5318#
EM23    053231           866    5326#
EM24    053374           876    5344#
EM25    053537           885    5362#
EM26    053721           896    5382#
EM27    054011           908    5392#
EM3     051232           680    5141#
EM30    054227           919    5419#
EM31    054307           929    5428#
EM32    054524           940    5454#
EM33    054633           948    5466#
EM34    055035           958    5490#
EM35    055061           964    5494#
EM36    055277           974    5519#
EM37    055354           981    5527#
EM4     051313           691    5150#
EM40    055571           992    5553#
EM41    056000          1003    5577#
EM42    056261          1017    5608#
EM43    056537          1029    5639#
EM44    057101          1042    5679#
EM45    057373          1054    5712#
EM46    057667          1067    5745#
```

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EM47    060002          1076    5758#
EM5     051424           704    5163#
EM50    060264          1089    5790#
EM51    060503          1100    5816#
EM52    060750          1116    5845#
EM53    061225          1129    5875#
EM54    061313          1136    5885#
EM55    061560          1148    5914#
EM56    062046          1160    5946#
EM57    062256          1172    5970#
EM6     051476           714    5170#
EM60    062550          1185    6004#
EM61    063161          1202    6051#
EM62    063242          1211    6060#
EM63    063323          1221    6069#
EM64    063377          1229    6077#
EM65    063616          1242    6102#
EM66    063640          1253    6105#
EM67    064032          1269    6126#
EM7     051564           724    5179#
EM70    064322          1280    6159#
EM71    064530          1292    6184#
EM72    064771          6213#
EM73    065221          1316    6241#
EM74    065273          1305    1323    6249#
EM75    065537          1334    6278#
EM76    065642          1342    6290#
EM77    066077          1354    6318#
ERFLG$  004734          1810#   5034*
ERR     = 040000        1494#   2421    2441    3016    4255    4384    4396
ERRVEC= 000004           624#   1851*   1922*   1930*   1952*   5033*
ERWORD  004602          1769#   4970*   4976*   6669
ER1     002364          1715#   5061    6663    6666    6685
ER2     002370          1717#   5061    6666    6685
ER3     002376          1720#   5061    6666    6685
EXT1    = 000001        1552#
EXT10   = 000010        1555#
EXT2    = 000002        1553#
EXT20   = 000020        1556#
EXT4    = 000004        1554#
EXT40   = 000040        1557#
FEN     = 000200        1578#
FER     = 000020        1502#
FILL    042376          4794#
FILLRE  041354          2610    2623    2627    2629    2635    2688    2734    2781    2817    2995    3051    3089    3129
                        3171    3211    3256    3295    3338    3378    3442    3484    3540    3583    3637    3675    3749
                        3750    3784    3843    3896    3985    4011    4052    4111    4179    4255    4471#
FINACC  004664          1784#   4617*
FINALA  004662          1783#   4618*
FIRST   004736          1811#   1862    1871*
FISH    017402          2764    2772#
FLHEAD  041276          3027    3036    3514    3518    3526    3568    3610    3614    3622    3664    3723    3729    3769
                        3863    3917    3944    3971    4424#
FMT22 = 010000          1599#   2688    2734    2995    3039    3079    3119    3159    3201    3244    3285    3326    3368
                        3414    3473    3529    3571    3625    3666    3735    3773    3865    3919    3976    4001    4041
                        4102    4165    4205    4241    4280
```

```
FUTABL  002422                1736#
GNS     = ******  U             625   1868   1869   1870   1909   1937   1947   1950   1974   1997   2038   2040   2042
                              2086   2118   2120   2146   2148   2150   2164   2166   2219   2221   2238   2240   2383
                              2385   2401   2403   2484   2494   2496   2514   2516   2531   2653   2659   2837   2903
                              2940   2942   3433   3437   4215   4217   4302   4304   4327   4329   4879   4881   4884
                              4887   4993   4995   5008   5010   5012   5014   5016   5018   5020   5026   5061   5117
GO      = 000001              1467#  2279   2318   2463   2530   2548   2572   2606   2680   2683   2726   2729   2778
                              2815   2842   2855   2867   2923   2950   2966   2967   2991   2992   3016   3020   3045
                              3048   3085   3086   3126   3126   3165   3168   3207   3208   3250   3253   3291   3292
                              3332   3335   3374   3375   3421   3424   3480   3481   3534   3537   3577   3580   3631
                              3634   3672   3673   3719   3741   3746   3780   3781   3838   3840   3868   3884   3891
                              3893   3923   3941   3982   4007   4048   4049   4073   4107   4108   4137   4175   4176
                              4208   4245   4282   4389   4642
GRV     = 000010              1483#
GTSWR   = 104406              1873   5117#
HCE     = 000200              1505#
HCI     = 002000              1597#  2688   2734   2995   3039   3079   3119   3159   3201   3244   3285   3326   3368
                              3414   3473   3529   3571   3625   3666   3735   3773   3865   3919   3976   4001   4041
                              4102   4165   4205   4241   4280
HCRC    = 000400              1506#
HT      = 000011               624#  5033
HT.     = 003323              2280#  2319#  2463#  2530#  2549#  2573#  2607#  2685#  2731#  2778#  2815#  2843#  2950#
                              2967#  2992#  3016#  3020#  3040#  3086#  3126#  3168#  3208#  3253#  3292#  3335#  3375#
                              3424#  3481#  3537#  3580#  3634#  3673#  3719#  3746#  3781#  3840#  3869#  3885#  3893#
                              3923#  3942#  3983#  4008#  4049#  4074#  4108#  4138#  4176#  4210#  4246#  4283#
IAE     = 002000              1508#
IE      = 000100              1468#  2175   2199   2683   2729   2778   2815   2871   2872   2966   2967   2991   2992
                              3016   3020   3045   3048   3085   3086   3125   3126   3165   3168   3207   3208   3250
                              3253   3291   3292   3332   3335   3374   3375   3421   3424   3480   3481   3534   3537
                              3577   3580   3631   3634   3672   3673   3719   3741   3746   3780   3781   3838   3840
                              3868   3884   3891   3893   3922   3941   3982   4007   4048   4049   4073   4107   4108
                              4137   4175   4176   4208   4245   4282   4664   4676   4738   4751
ILF     = 000001              1498#
ILLEGL  002464                1754#  6672
ILR     = 000002              1499#
INUNIT  004752                1821#  2487*  2520
IOTVEC= 000020                 624#  1851*
IR      = 000100              1446#  2228   2616   2619   4252   4253
IXE     = 004000              1582#
KIPAR0= 172340                 649#
KIPAR1= 172342                 649#
KIPAR2= 172344                 649#
KIPAR3= 172346                 649#
KIPAR4= 172350                 649#
KIPAR5= 172352                 649#
KIPAR6= 172354                 649#
KIPAR7= 172356                 649#
KIPDR0= 172300                 649#
KIPDR1= 172302                 649#
KIPDR2= 172304                 649#
KIPDR3= 172306                 649#
KIPDR4= 172310                 649#
KIPDR5= 172312                 649#
KIPDR6= 172314                 649#
KIPDR7= 172316                 649#
LA      002420                1729#  5061
```

```
LBT     = 002000          1490#  4561
LF      = 000012           624#  5033
LT.     = 000105          2280#  2319#  2463#  2530#  2549#  2573#  2607#  2685#  2731#  2778#  2815#  2843#  2950#
                          2967#  2992#  3016#  3020#  3048#  3086#  3126#  3168#  3208#  3253#  3292#  3335#  3375#
                          3424#  3481#  3537#  3580#  3634#  3673#  3719#  3746#  3781#  3840#  3869#  3885#  3893#
                          3923#  3942#  3983#  4008#  4049#  4074#  4108#  4138#  4176#  4210#  4246#  4283#
MAKECY  041122            2348   2351   2764   2768   2802   2806   4374#
MCLK    = 000002          1518#
MCPE    = 020000          1474#  2254   2421   2441
MHS     = 001000          1580#
MINX    = 000004          1519#
MMVEC   = 000250           649#
MOL     = 010000          1492#  2163   2164   2222   2241   2319   2656   2664   2778   2815   2835   2888   2889
                          2915   2916   2967   2992   3048   3086   3126   3168   3208   3253   3292   3335   3375
                          3424   3481   3537   3580   3634   3673   3746   3781   3840   3893   4049   4108   4176
                          4562
MPE     = 000400          1448#
MR      = 002402          1722#  5061
MRD     = 000020          1521#
MSE     = 000020          1575#
MSTCK   = 000010          1520#
MWR     = 000040          1522#
MXF     = 001000          1449#  2616
NED     = 010000          1452#  2391   2421   2441   2509
NEM     = 004000          1451#  3430
NHS     = 002000          1581#
NOPERA  002422            1737#  2543   2548   2567   2572
NOPUSH  004724            1804#  1839*  1843*  1846*  2219   2363   2482   2652   2829   4200
NOUNIT  004720            1800#  2012*  2048*  2055   2090*  4345*
NUNIT   004722            1802#  2055*  2056*  2578   2619   2778   2868   2924   2967   2992
OCYL    = 100000          1629#
OF      002372            1718#  5061
OFREV   = 000200          1596#
OFSET   041436            3016   4514#
OFSETC  002454            1750#  2961   2966   2967   3016   4515
OFSTVL  004610            1776#  2951*  2952*  2959   3005*  3006   3008*  3009
OF100   = 000004          1591#
OF200   = 000010          1592#
OF25    = 000001          1589#
OF400   = 000020          1593#
OF50    = 000002          1590#
OF800   = 000040          1594#
OPERSE  042576            4876#  5033
OPI     = 020000          1511#
OR      = 000200          1447#  4252   4253
PAR     = 000010          1501#  2635
PCJSR   041506            4375#  4376#  4539#  4541#  4542#  4547#  4548#  6679   6681   6689
PCLBUF  002346            1690#  4641#
PCLCSR  002344            1689#  4615#  4642#
PCLCTR  002350            1691#  4616
PGE     = 002000          1450#
PIP     = 020000          1493#  2778   2815   2886   2913   2967   2992   3840   3893
PIRQ    = 177772           624#
PIRQVE= 000240             624#
PKACK   002460            1752#  2274   2279   2313   2318   2319   2463   2530   2842   2950
PLU     = 020000          1584#
```

```
PRE    = 000020          1624#
PRITEM  047270          1903#  2301#  2500#  2709#  2943#  4322#  4344#  4878#  5051#  5061#  5078   5082#
PROG   = 001000          1489#
PR0    = 000000           624#
PR1    = 000040           624#
PR2    = 000100           624#
PR3    = 000140           624#
PR4    = 000200           624#
PR5    = 000240           624#
PR6    = 000300           624#
PR7    = 000340           624#
PS     = 177776           624#  1854#  2174#  2198#  2217#  4325#  4677#
PSEL   = 002000          1472#  3414   3421   3424   3473   3480   3481   4167   4175   4176
PSU    = 000001          1621#
PSW    = 177776           624#
PUTREG  043364          2390   2407   2508   4383   4395   4830   4905#
PWRVEC= 000024           624#  1851#  5118#
RA      000200           630#  5016
RDCHR  = 104410          5033   5117#
RDLIN  = 104411          5034   5117#
RDOCT  = 104412          1909   4884   4887   4996   5010   5117#
RDY    = 000200          1469#  2175   2185   2199   2256   2319   2421   2549   2573   2607   2731   2778   2815
                         2858   2867   2967   2992   3048   3086   3126   3168   3208   3253   3292   3335   3375
                         3424   3481   3537   3580   3634   3673   3746   3781   3840   3869   3893   3923   3983
                         4008   4049   4108   4176   4210   4246   4283   4553
READAT  002446          1747#  3119   3125   3126   3201   3207   3208   3285   3291   3292   3368   3374   3375
                         3473   3480   3481   4280   4282
READIN  002462          1753#  2673   2680   2683   2719   2726   2729
RECALI  002426          1739#  2775   2778   2812   2815   3020   3719   3884
REFOR   002450          1748#  3079   3085   3086   3571   3577   3580   3666   3672   3673   3773   3780   3781
                         3865   3868   3919   3922   4001   4007
REGADR  004600          1768#  1963#  2267#  2319#  2778#  2815#  2881#  2897#  2967#  2992#  3048#  3086#  3126#
                         3168#  3208#  3253#  3292#  3335#  3375#  3424#  3481#  3537#  3580#  3634#  3673#  3746#
                         3781#  3840#  3893#  4049#  4108#  4176#  4406#  4839#  6656   6658   6672   6676   6689
REGSAV  047124          5034#
REGSA1  047132          1920   5034#
REINTO  003534          1762#  3036   3068   3076   3079   3089   3105   3119   3129   3142   3156   3186   3195
                         3201   3211   3225   3241   3271   3279   3285   3295   3309   3323   3353   3362   3368
                         3378   3392   3411   3458   3467   3473   3484   3499   3526   3557   3565   3571   3583
                         3600   3622   3654   3662   3666   3675   3691   3765   3773   3784   3798   3861   3865
                         3871   3914   3919   3925   3974   4001   4011   4029   4276   4280   4285
RELEAS  002432          1741#
RESVEC= 000010           624#
RETCL   002456          1751#  2986   2991   2992
RHAS    002316          1671#  1958   1974   2672#  2718#  2979#
RHBA    002274          1659#  2610   3051   3089   3129   3171   3211   3256   3295   3338   3378   3442   3484
                         3540   3583   3637   3675   3749   3784   3985   4011   4052   4111   4179   4250   4932#
RHBAE   002340          1683#  1945
RHCA    002312          1669#  2623   2688   2734   3637   3750   4378#  4487#  4505#  4929#
RHCC    002334          1678#  2265   2267   2269   2604   2781   2817   3637   3750   3843   3896   4402   4406
                         4617   4908
RHCS1   002300          1664#  2274#  2279#  2313#  2318#  2421   2441   2463#  2530#  2543#  2548#  2549   2567#
                         2572#  2573   2606#  2607   2616   2635   2673#  2680#  2683#  2719#  2726#  2729#  2731
                         2775#  2778#  2781   2812#  2815#  2817   2842#  2850#  2855#  2857   2923   2926   2950#
                         2961#  2966#  2970   2986#  2991#  2995   3016#  3020#  3045#  3048   3085#  3086   3125#
                         3126   3165#  3168   3207#  3208   3250#  3253   3291#  3292   3332#  3335   3374#  3375
```

		3414* 3421* 3424 3473* 3480* 3481 3534* 3537 3577* 3580 3631* 3634 3672*
		3673 3719* 3741* 3746 3780* 3781 3838* 3843 3868* 3869 3884* 3891* 3896
		3922* 3923 3941* 3982* 3983 4007* 4008 4048* 4049 4073* 4107* 4108 4137*
		4167* 4175* 4176 4208* 4210 4245* 4246 4255 4282* 4283 4380* 4389* 4489*
		4506* 4515* 4519 4664 4676 4738 4751 4938* 4993 5000 5003 5012
RHCS2	002276	1660* 1975 2018* 2097* 2421 2441 2616 2619 3430 4251 4520 4935*
RHCS3	002342	1684*
RHDB	002270	1657* 1925 4997
RHDST	002304	1666* 2389 2507 2623 2688 2734 3051 3089 3129 3171 3211 3256 3295
		3338 3378 3442 3484 3540 3583 3637 3675 3750 3784 3985 4011 4052
		4111 4179 4255 4379* 4488* 4930*
RHDS1	002322	1673* 2280 2281 2319 2421 2441 2463 2530 2583 2629 2685 2688 2734
		2778 2781 2815 2817 2833 2843 2914 2950 2967 2970 2992 2995 3016
		3020 3719 3840 3843 3885 3893 3896 3942 4074 4138 4220 4255 4307
		4521
RHDT	002324	1674* 2019 2021 2024 2026 2029 2031 2040 2098 2100 2107 2109 2120
		2124 2126 2129 2131 2134 2136 2155 2157
RHEC1	002330	1676* 2635
RHEC2	002332	1677* 2635
RHER1	002302	1665* 1978 2623 4255 4522
RHER2	002306	1667* 2623
RHER3	002314	1670* 2421 2441 2623
RHLA	002336	1679* 4618
RHMR	002320	1672* 2348* 2351* 2367* 2441 2627 2764* 2768* 2802* 2806* 4381*
RHOF	002310	1668* 2623 2688 2734 2781 2995 4514* 4936*
RHSN	002326	1675* 2120 2154 2156
RHWC	002272	1658* 2277 2316 2371 2546 2565 2570 2602 2610 2666 2676 2712 2722
		2773 2778 2810 2815 2846 2853 2956 2964 2989 3042 3051 3082 3089
		3122 3129 3162 3171 3204 3211 3247 3256 3288 3295 3329 3338 3371
		3378 3419 3442 3478 3484 3531 3540 3574 3583 3628 3637 3669 3675
		3738 3749 3777 3784 3836 3889 3979 3985 4004 4011 4045 4052 4104
		4111 4171 4179 4214 4243 4249 4300 4474 4771 4839 4906 4908 4931*
RH70	004750	1819* 1876* 1946* 2576 2613 2678 2724 3401 4127
RH70CK	006146	1874*
RMR =	000004	1500*
RPTRP1	011454	2171 2184*
RPTRP2	011562	2195 2208*
RPVEC	002266	1424* 1856 2170 2194 2278* 2317* 2547* 2571* 2605* 2677* 2723* 2778* 2815*
		2854* 2965* 2990* 3044* 3084* 3124* 3164* 3206* 3249* 3290* 3331* 3373* 3421*
		3480* 3533* 3576* 3630* 3671* 3719* 3740* 3779* 3837* 3867* 3883* 3890* 3921*
		3940* 3981* 4006* 4047* 4072* 4106* 4136* 4173* 4207* 4244* 4281* 5008 5011*
		5014 5027*
RPVECT	044662	1857 5025* 5027
RP05	004746	1818* 2106* 2112* 2341 2357 2470
RP06	004744	1817* 2096* 2103* 2339 2355 2468 2756 2795
RP4VEC	004606	1771* 1902* 2278 2317 2547 2571 2605 2677 2723 2778 2815 2854 2965
		2990 3044 3084 3124 3164 3206 3249 3290 3331 3373 3421 3480 3533
		3576 3630 3671 3719 3740 3779 3837 3867 3883 3890 3921 3940 3981
		4006 4047 4072 4106 4136 4173 4207 4244 4281
RTN	006634	1947 1950*
RUN	043424	3039 3079 3119 3159 3201 3244 3285 3326 3368 3414 3473 3529 3571
		3625 3666 3735 3773 3865 3919 3976 4001 4041 4102 4165 4205 4241
		4280 4929*
SAVER	041620	2277 2316 2371 2546 2570 2676 2722 2778 2815 2853 2964 2989 3042
		3082 3122 3162 3204 3247 3288 3329 3371 3419 3478 3531 3574 3628
		3669 3738 3777 3836 3889 3979 4004 4045 4104 4171 4214 4243 4300

```
                    4586#
SAVERE  004612      1779#  2277   2285   2316   2324   2371   2422*  2423*  2428   2442*  2448   2546   2552
                    2570   2580*  2583*  2588   2604*  2610*  2611*  2621*  2626*  2630*  2632*  2640   2676
                    2693   2722   2739   2778   2781*  2785   2815   2817*  2820   2853   2920*  2927*  2931
                    2964   2970*  2973   2989   2995*  2997   3042   3055   3082   3093   3122   3133   3162
                    3175   3204   3215   3247   3260   3288   3299   3329   3342   3371   3382   3419   3446
                    3478   3488   3531   3544   3574   3587   3628   3641   3669   3678   3738   3754   3777
                    3788   3836   3843*  3845   3889   3896*  3898   3979   3989   4004   4016   4045   4056
                    4104   4115   4171   4182   4214   4223   4243   4249*  4250*  4253*  4254*  4255*  4259
                    4300   4311   4475*  4774*  4776*  4831
SC      = 100000    1476#  2254   2421   2441   2580   2616   2621   2778   2817   2874   2926   2967   2970
                    2992   2995   3843   3896   4255
SC1     = 000100    1558#
SC10    = 001000    1561#
SC2     = 000200    1559#
SC20    = 002000    1562#
SC4     = 000400    1560#
SEECOM  002452      1749#  3838   3840   3891   3893   3941   4073   4137   4380   4506
SEEKCY  041422      3834   3887   3939   4071   4135   4505#
SELECT  004726      1806#  1840*  1842*  1845*  1908   2059   2072   4333
SELTST  010014      1993   2059#
SERCH   002434      1742#  4489
SKI     = 040000    1628#
SN      002410      1725#  2156*  2632   5061
SND1    006110      1865   1871#
SRCH    041402      4487#
SR0     = 177572     649#
SR1     = 177574     649#
SR2     = 177576     649#
SR3     = 172516     649#
STACK   = 001000     624#  1851   1919   1956   2064   2168   2192   2217   2313   2348   2351   2363   2482
                    2542   2599   2652   2712   2764   2768   2773   2802   2806   2810   2829   2951   3016
                    3024   3113   3148   3233   3315   3401   3512   3608   3700   3881   3937   4068   4127
                    4200
START   005022      1841   1844   1849#
STKLMT= 177774       624#
ST1     032534      3706#  3722#  3813*  3826
ST10    033136      3714#  3769#  3821*
ST11    033162      3715*  3772#  3822*
ST12    033416      3788   3789#
ST13    033422      3788   3797#
ST14    033440      3798   3799#
ST15    033444      3798   3813#
ST16    033532      3824   3826#
ST17    033536      3825   3833#
ST18    033766      3845   3846#
ST19    033772      3845   3860#
ST2     032554      3707*  3725#  3814*
ST20    040342      4301#
ST25    035624      4044#
ST26    034156      3871   3872#
ST27    034162      3871   3877#
ST3     032566      3708*  3728#  3815*
ST4     032606      3709*  3731#  3816*
ST5     032620      3710*  3734#  3817*
ST6     033026      3711*  3712*  3749#  3818*  3819*
```

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ST7      033074            3754#
ST8      033100            3754   3764#
ST9      033116            3713#  3768#  3820#
SWR      001140             650#  1851#  1873   1874   1934   1972   1991   2478   4843   4979   5033#  5034   5053
                           5118#
SWREG    000176             625#  1851   1873   5033
SW0    = 000001             624#
SW00   = 000001             624#
SW01   = 000002             624#
SW02   = 000004             624#
SW03   = 000010             624#
SW04   = 000020             624#
SW05   = 000040             624#
SW06   = 000100             624#  5055
SW07   = 000200             624#  4845   4981
SW08   = 000400             624#
SW09   = 001000             624#
SW1    = 000002             624#
SW10   = 002000             624#
SW11   = 004000             624#
SW12   = 010000             624#  1874
SW13   = 020000             624#  1934   1972   1991
SW14   = 040000             624#
SW15   = 100000             624#
SW2    = 000004             624#
SW3    = 000010             624#
SW4    = 000020             624#
SW5    = 000040             624#  2478
SW6    = 000100             624#
SW7    = 000200             624#
SW8    = 000400             624#
SW9    = 001000             624#
TBITVE= 000014              624#
TDF    = 000040            1576#
TESTAD   042574            4875#
TIMCNT   042150            2177   2201   4653   4658   4715#  4727   4732
TIME1    041652            4615#
TIME2    041664            1902   4617#
TKVEC  = 000060             624#  5033#
TMP0     004754            1828#
TMP1     004756            1829#  3014#  3020#
TMP4     004760            1830#  2778#  2870#  2871#  2873   2887#  2888#  2890   2914#  2915#  2917   2967#  2992#
TN     = 000050            2064#  2217#  2313#  2363#  2482#  2542#  2599#  2652#  2712#  2773#  2810#  2829#  2951#
                           3016#  3024#  3113#  3148#  3233#  3315#  3401#  3512#  3608#  3700#  3881#  3937#  4068#
                           4127#  4200#
TOTALA   004742            1815#  1984#  1986#  2566   2603   2623   2671   2774   2850   2961
TPVEC  = 000064             624#
TRAPVE= 000034              624#  1851#  1855#
TRE    = 040000            1475#  2254   2421   2441   4255
TRK1   = 004000            1563#
TRK10  = 040000            1566#
TRK2   = 010000            1564#
TRK20  = 100000            1567#
TRK4   = 020000            1565#
TRP      006574            1944   1948#
TRTVEC= 000014               624#
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TSTNM   004604          1770#  1919#  1957#  1969#  2064#  2162#  2168#  2192#  2217#  2313#  2348#  2351#  2363#
                        2482#  2542#  2599#  2652#  2712#  2764#  2768#  2773#  2802#  2806#  2810#  2829#  2951#
                        3016#  3024#  3113#  3148#  3233#  3315#  3401#  3512#  3608#  3700#  3881#  3937#  4068#
                        4127#  4200#  4879   6650   6653   6656   6658   6660   6663   6666   6669   6672   6676
                        6679   6681   6683   6685   6689
TST1    006312          1909   1916   1919#  4360
TST10   011572          2207   2217#
TST11   012352          2219   2306#
TST12   012634          2348#
TST13   012674          2345   2351#
TST14   012730          2349   2354#
TST15   013742          2361   2363   2417   2467#
TST16   014750          2343   2474   2480   2482   2542#
TST17   015406          2599#
TST2    006650          1956#
TST20   016174          2652#
TST21   016740          2652   2712#
TST22   017306          2764#
TST23   017346          2768#
TST24   017402          2773#
TST25   020062          2802#
TST26   020122          2806#
TST27   020156          2810#
TST3    006724          1961   1969#
TST30   020524          2828#
TST31   022040          2829   2951#
TST32   023102          3012   3014#
TST33   023254          3021   3024#
TST34   024142          3113#
TST35   024456          3148#
TST36   025366          3233#
TST37   026226          3315#
TST4    010030          2060   2064#  4342   4353
TST40   027136          3401#
TST41   030306          3401   3512#
TST42   031316          3608#
TST43   032346          3700#
TST44   034162          3881#
TST45   034666          3937#
TST46   036042          4068#
TST47   036556          4127#
TST5    011016          2162#
TST50   037324          4127   4199#
TST51   040550          4200   4325#
TST6    011362          2164   2167#
TST7    011472          2183   2186   2191#
TUF     = 000100        1577#
TYPDS   = 104405        2039   2047   2119   2220   2239   2384   2402   2495   2515   2654   2661   2941   4216
                        4303   4328   4330   4340   4360   5104   5117#
TYPE    = 104401        1868   1869   1870   1909   1937   1947   1950   1974   1997   2038   2040   2042   2045
                        2086   2118   2120   2146   2148   2150   2164   2166   2219   2221   2238   2240   2274
                        2313   2363   2383   2385   2401   2403   2482   2484   2494   2496   2514   2516   2531
                        2542   2567   2599   2652   2655   2659   2662   2666   2712   2773   2810   2829   2837
                        2839   2903   2940   2942   2951   3016   3043   3083   3123   3163   3205   3248   3289
                        3330   3372   3420   3433   3434   3437   3438   3479   3532   3575   3629   3670   3739
                        3778   3866   3920   3937   3980   4005   4046   4068   4105   4127   4172   4206   4215
```

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TYPERR  050232
TYPOC = 104402
TYPON = 104404
TYPOS = 104403
UBUSB   004732
UNIB  = 000020
UNIT    004716
UNITS   004676
UNITSL  004730
UNLOAD  002424
UNS   = 040000
UPE   = 020000
US1   = 000001
US2   = 000002
US4   = 000004
UWR   = 000010
VUF   = 000002
VU30  = 010000
VV    = 000100
WAITBT  041706
WAITPC  041702
WAITRE  041704
WAITTM  041710
WAIT.P  041712
WAIT.T  042152
WAT   = 104413
WC      002354
WCE   = 040000
WCF   = 000040
WCU   = 000001
WLE   = 004000
WRCHDT  002440
WRCHEK  002436
WRFROM  002470

4217  4302  4304  4327  4329  4338  4341  4360  4879  4881  4883  4884  4887
4993  4995  5008  5010  5012  5014  5016  5018  5020  5026  5033  5034  5061
5063  5085  5087  5090  5092  5107  5117* 5118
5058  5062*
1940  2041  2120  4880  4882  4994  5009  5013  5015  5017  5026  5033  5061
5071  5100  5117*
5117*
5117*
1808*  3402*  3432*  4128
1444*
1799*  1911*  1916*  2054*  2060*  2066  2089*  2092  2118  2219  2227  2238  2383
2401  2487  2494  2501*  2502*  2514  2520  2611  2653  2660  2940  4215  4302
4327  4347  4352*  4525  4933
1798*  2006  2010  2054  2079  4348
1807*  1912*  1916  2060
1738*  2850  2855  2866
1512*
1453*
1440*
1441*
1442*
1623*
1622*
1583*
1486*  2247  2280  2281  2319  2421  2463  2530  2685  2688  2734  2778  2815
2835  2843  2888  2889  2915  2916  2950  2967  2992  3048  3086  3126  3168
3208  3253  3292  3335  3375  3424  3481  3537  3580  3634  3673  3746  3781
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4638*  4647*  4654  4659  4722*  4728  4733  6650  6653
4636*  4644*  4645*  4719*  4720*  6650  6653
4637*  4646*  4654  4659  4663  4675  4721*  4728  4733  4737  4753  6650  6653
4616*  4639*  4640*  4683  4693  6653
4640*
4717*  5117
2280  2319  2463  2530  2549  2573  2607  2685  2731  2778  2815  2843  2856
2950  2967  2992  3016  3020  3048  3086  3126  3168  3208  3253  3292  3335
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5117*
1709*  2285  2324  2428  2448  2552  2588  2640  2693  2739  2785  2820  2931
2973  2997  3055  3093  3133  3175  3215  3260  3299  3342  3382  3446  3488
3544  3587  3641  3678  3754  3788  3845  3898  3989  4016  4056  4115  4182
4223  4259  4311  4907  5061
1454*
1503*
1571*
1509*  4255
1744*  4041  4048  4049
1743*  4102  4107  4108  4165  4175  4176
1761*  3027  3030  3039  3051  3068  3105  3116  3142  3151  3159  3171  3186
3198  3225  3236  3244  3256  3271  3282  3309  3318  3326  3338  3353  3365
3392  3406  3414  3442  3458  3470  3499  3514  3516  3518  3520  3529  3540
3557  3568  3600  3610  3612  3614  3616  3625  3637  3654  3664  3691  3723
3726  3729  3732  3735  3749  3769  3770  3798  3863  3871  3917  3925  3944
3948  3953  3971  3976  3985  4029  4041  4052  4078  4083  4100  4102  4111
4142  4147  4163  4165  4179  4203  4205  4239  4241  4278  4285
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                        4205   4208  4241  4245
WRIFOR  002444          1746#  3039  3045  3048  3529  3534  3537  3625  3631  3634  3735  3741  3746
                        3976   3982
WRL   = 004000          1491#  4220  4307
WRU   = 000400          1579#
WSU   = 000004          1573#
XE2     007456          1989   2004#
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$BDADR  001122           650#  2224#  2232#  2249#  2259#  4556#  4564#  6663  6676  6679  6681
$BDDAT  001126           650#  1961#  2269#  2319#  2778#  2815#  2880#  2896#  2967#  2992#  3048#  3086#  3126#
                        3168#  3208#  3253#  3292#  3335#  3375#  3424#  3481#  3537#  3580#  3634#  3673#  3746#
                        3781#  3840#  3893#  4049#  4108#  4176#  4402#  4403  4663#  4675#  4737#  4753#  4838#
                        4975#  6650  6653  6656  6658  6669  6672  6676  6689
$BELL   001216           650#  5033  5034
$CHARC  045636          5033#*
$CKSWR  046150          5033#  5117
$CMTAG  001100           650#  1851
$CM1  = 000006           650#
$CM2  = 000014           650#
$CM3  = 000006           650#
$CM4  = 000006           650#
$CNTLC  046721          5033#
$CNTLG  046733          5033#
$CNTLU  046726          5033#
$CRLF   001223           650#  2045  2655  2662  3433  3434  3437  3438  4883  5033  5034  5063  5087
                        5092
$DBLK   045412          5033#
$DOAGN  041076          4360#
$DTBL   045402          5033#
$ENDAD  041066           626  4360#
$ENDCT  041034          4360#
$ENDMG  041105          4338  4360#
$ENULL  041102          4341  4360#
$EOP    041000          1942  1998  4346  4360#
$EOPCT  041026          4360#
$ERFLG  001103           650#  5033#  5034#
$ERMAX  001115           650#  1851#  5033#
$ERROR  047122          1851   1950  5034#
$ERRPC  001116           650#  5034#  5069  6650  6653  6656  6658  6660  6663  6666  6669  6672  6676
                        6679   6681  6683  6685  6689
$ERRTB  001226           650#  5077
$ERRTY  047272          5034   5053#
$ERTTL  001112           650#  4329  4331#  5034#
$ESCAP  001214           650#  1851#  5033  5034
$FILLC  001156           650#  5033
$FILLS  001155           650#  5033
$GDADR  001120           650#
$GDDAT  001124           650#  1962#  2268#  2319#  2778#  2815#  2876#  2892#  2967#  2992#  3048#  3086#  3126#
                        3168#  3208#  3253#  3292#  3335#  3375#  3424#  3481#  3537#  3580#  3634#  3673#  3746#
                        3781#  3840#  3893#  4049#  4108#  4176#  4405#  4837#  4974#  6656  6669  6672  6676
                        6689
$GET42  041056          4360#
$GTSWR  046240          5033#  5117
$HD   = 000000           604
$HIOCT  047120          5034#*
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$ICNT   001104            650#  5033#
$ILLUP  051076           5118#
$INTAG  001135            650#  5033#
$ITEMB  001114            650#  5034#  5066
$LF     001224            650#  5033   5034
$LPADR  001106            650#  1851#  2064#  2951#  4886#  4889   5033#
$LPERR  001110            650#  1851#  4237#  4881   4888#  5033#  5034
$MAIL = ****** U          1851   1873   5033   5034
$MNEW   046751           5033#
$MSWR   046740           5033#
$MXCNT  045174           5033#
$NULL   001154            650#  5033
$NWTST= 000001           1919#  1956#  1969#  2064#  2162#  2167#  2191#  2217#  2306#  2348#  2351#  2354#  2467#
                         2542#  2599#  2652#  2712#  2764#  2768#  2773#  2802#  2806#  2810#  2828#  2951#  3014#
                         3024#  3113#  3148#  3233#  3315#  3401#  3512#  3608#  3700#  3881#  3937#  4068#  4127#
                         4199#  4325#
$OCNT   050642           5117#*
$OMODE  050644           5117#*
$OVER   045160           5033#
$PASS   001100            650#  2219   2363   2482   2652   2829   4200   4337*  4339   4360*  5033
$POWER  051104           5118#
$PWRAD  051072           5118#
$PWRDN  050732           1851   5118#
$PWRMG  051066           5118#
$PWRUP  051004           5118#
$QUES   001222            650#  5033   5034
$RDCHR  046512           5033#  5117
$RDDEC= ****** U         5117
$RDLIN  046602           5033#  5117
$RDOCT  046762           5034#  5117
$RDSZ = 000011           5033#
$REGAD  001160            650#
$REGO   001162            650#
$REG1   001164            650#
$REG2   001166            650#
$REG3   001170            650#
$REG4   001172            650#
$REG5   001174            650#
$RTNAD  041100           4360#
$R2A  = ****** U         5117
$SAVRE= ****** U         5117
$SAVR6  051102           5118#*
$SCOPE  044724           1851   5033#
$SETUP= 000117           1850#  1851   1873   4360   5033   5034
$SS1  = 000000           1853#
$STUP = 177777           1850#
$SVLAD  045132           5033#
$SVPC = 000200            626#
$SWR  = 167770            604#   622    650   1851   1919   1956   1969   2064   2162   2167   2191   2217   2306
                         2348   2351   2354   2467   2542   2599   2652   2712   2764   2768   2773   2802   2806
                         2810   2828   2951   3014   3024   3113   3148   3233   3315   3401   3512   3608   3700
                         3881   3937   4068   4127   4199   4325   4360   5033   5034   5118
$SWRMK= 000000            622   5033
$TIMES  001212            650#  1851*  1919*  1956*  1969*  2064*  2354*  2467*  3401*  4325*  4360*  5033*
$TKB    001146            650#  5033
$TKCNT  045642           5033#*
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$TKINT  045662          1861    1970    2310    4995    5033#
$TKQEN= 045661          5033#
$TKQIN  045644          5033#*
$TKQOU  045646          5033#*
$TKQSR  045650          5033#
$TKS    001144           650#   5033*
$TKSRV  045732          5033#
$TMP0   001176           650#   2014*   2015*
$TMP1   001200           650#   1932*   2177*   2178*   2201*   2202*   3719*   3823*   6660
$TMP2   001202           650#
$TMP3   001204           650#
$TMP4   001206           650#
$TMP5   001210           650#
$TN   = 000052           604#   1909    1916    1919#   1956#   1957    1961    1969#   2060    2064#   2162#   2164    2167#
                        2168    2183    2186    2191#   2192    2207    2217#   2219    2306#   2313    2343    2344    2348#
                        2349    2351#   2354#   2361    2363    2417    2467#   2474    2480    2482    2542#   2599#   2652#
                        2712#   2764#   2768#   2773#   2802#   2806#   2810#   2828#   2829    2951#   3012    3014#   3016
                        3021    3024#   3113#   3148#   3233#   3315#   3401#   3512#   3608#   3700#   3881#   3937#   4068#
                        4127#   4199#   4200    4325#
$TPB    001152           650#   5033*
$TPFLG  001157           650#   5033
$TPS    001150           650#   5033
$TRAP   050646          1851    5117#
$TRAP2  050670          5117#
$TRP  = 000014          5117#
$TRPAD  050702          5117#
$TSTNM  001102           650#   4332*   4360*   5033*   5034
$TTYIN  046710          5033#
$TYPBN= ****** U        5117
$TYPDS  045176          5033#   5117
$TYPE   045422          5033#   5117
$TYPEC  045572          5033#
$TYPEX  045640          5033#
$TYPOC  050444          5117#
$TYPON  050460          5117#
$TYPOS  050420          5117#
$XTSTR  044736          5033#
$$GET4= 000000          4360#
$0FILL  050643          5117#*
$40CAT= ****** U        5033    5034
.     = 072136           625#    626#    629#    633#    649#    650#   1760#   1761#   1762#   1779#   1798#   1851    1868#
                       1869#   1870#   1937#   1947#   1950#   1997#   2038#   2040#   2042#   2086#   2118#   2146#   2148#
                       2150#   2164#   2166#   2221#   2484#   2494#   2496#   2531#   2837#   2942#   3437#   4215#   4217#
                       4302#   4329#   4360    4884#   4887#   5008#   5016#   5020#   5033#   5034    5061#   5114#   5118
                       6648#   6734#
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ALLREG   622#  5060  5061
CHANGR   622#  2281  2319  2421  2441  2582  2583  2616  2618  2635  2688  2734  2781  2817  2923
        2926  2970  2995  3843  3896  4220  4255  4307
CHECKD   622#  2363  2482  2542  2567  2599  2773  2810  2829  3016  3043  3083  3123  3163  3205
        3248  3289  3330  3372  3420  3479  3532  3575  3629  3670  3739  3778  3866  3920  3937
        3980  4005  4046  4068  4105  4127  4172  4206
CHECKV   622#  2274  2313  2666  2712  2839  2951
CHKCNT   622#  2844  2956  2986
CKCNTV   622#  2945
CLEARA   622#  3030  3036  3076  3116  3151  3156  3195  3198  3236  3241  3279  3282  3318  3323
        3362  3365  3406  3411  3467  3470  3516  3520  3526  3565  3568  3612  3616  3622  3662
        3664  3725  3731  3765  3769  3770  3860  3863  3914  3917  3948  3971  3974  4078  4100
        4142  4163  4203  4239  4276  4278
CMPBLK   622#  3067  3104  3141  3185  3224  3270  3308  3352  3391  3457  3498  3556  3599  3653
        3690  3797  3871  3925  4028  4285
CMREGI   622#  2285  2324  2428  2448  2552  2588  2640  2693  2739  2785  2820  2931  2973  2997
        3055  3093  3133  3175  3215  3260  3299  3342  3382  3446  3488  3544  3587  3641  3678
        3754  3788  3845  3898  3989  4016  4056  4115  4182  4223  4259  4311
COMMEN   605   624#
DATACO   622#  3039  3079  3119  3159  3201  3244  3285  3326  3368  3414  3473  3529  3571  3625
        3666  3734  3772  3865  3919  3976  4001  4041  4102  4165  4205  4241  4280
DISREG   622#
DUM      622#  2274  2313  2543  2567  2673  2719  2775  2812  2850  2961  2986
ENDCOM   610   624#
ERROR    624#  1933  1965  2181  2186  2209  2225  2233  2250  2260  2270  2286  2319  2325  2394
        2415  2429  2449  2512  2553  2589  2641  2694  2740  2778  2786  2815  2821  2882  2898
        2932  2967  2974  2992  2997  3018  3048  3056  3069  3086  3094  3106  3126  3134  3143
        3168  3176  3187  3208  3216  3226  3253  3261  3272  3292  3300  3310  3335  3343  3354
        3375  3383  3393  3424  3447  3459  3481  3489  3500  3537  3545  3558  3580  3589  3602
        3634  3642  3655  3673  3680  3693  3746  3754  3781  3789  3799  3840  3846  3872  3893
        3899  3926  3990  4018  4031  4049  4057  4108  4115  4176  4183  4224  4260  4286  4312
        4386  4398  4407  4557  4565  4666  4668  4678  4687  4696  4740  4743  4754
ESCAPE   624#
FIHEAD   622#  3027  3036  3514  3518  3526  3568  3610  3614  3622  3664  3722  3728  3768  3863
        3917  3944  3971
FILLBL   622#
FLSVRE   622#  2610  2623  2627  2628  2635  2688  2734  2781  2817  2995  3051  3089  3129  3171
        3211  3256  3295  3338  3378  3442  3484  3540  3583  3637  3675  3749  3750  3784  3843
        3896  3985  4011  4052  4111  4179  4255
GETPRI   624#
GETSWR   604#   624#  1873
GOO      622#  2279  2318  2463  2530  2548  2572  2606  2680  2682  2726  2728  2778  2815  2842
        2855  2950  2966  2991  3016  3020  3045  3085  3125  3165  3207  3250  3291  3332  3374
        3421  3480  3534  3577  3631  3672  3719  3741  3780  3838  3868  3884  3891  3922  3941
        3982  4007  4048  4073  4107  4137  4175  4208  4245  4282
LOAD     622#  2566  2603  2671  2717  2774  2812  2850  2957  2961
MAKECL   622#  2348  2351  2764  2767  2802  2805
MANUAL   622#  2219  2363  2482  2652  2829  4200
MSG     1918#  1919  1955#  1956  1968#  1969  2063#  2064  2161#  2162  2166#  2167  2190#  2191  2217#
        2305#  2306  2353#  2354  2466#  2467  2541#  2542  2599#  2651#  2652  2710#  2712  2771#  2773
        2808#  2810  2828#  2951#  3014#  3024#  3112#  3113  3147#  3148  3233#  3315#  3401#  3511#  3512
        3607#  3608  3699#  3700  3880#  3881  3937#  4067#  4068  4126#  4127  4198#  4199  4325#
MULT     624#
NEWTST   624#  1919  1956  1969  2064  2162  2167  2191  2217  2306  2348  2351  2354  2467  2542
        2599  2652  2712  2764  2768  2772  2802  2806  2809  2828  2951  3014  3024  3113  3148
        3233  3315  3401  3512  3608  3700  3881  3937  4068  4127  4199  4325
```

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OFFST    622#  3016
POP      624#  2566  2603  2671  2774  2850  2961  3967  4097  4161  4409  4433  4456  4476  4593
       4698  4758  4779  4804  4850  4912  4985  5033  5034  5118
PUSH     624#  2566  2603  2671  2774  2850  2961  3951  4081  4145  4374  4424  4449  4471  4586
       4643  4717  4768  4794  4823  4905  4962  5033  5034  5118
REPORT   624#
RFORGC   622#
RHCLEA   622#  2064  2169  2193  2217  2237  2273  2313  2363  2437  2482  2503  2542  2564  2599
       2652  2666  2712  2773  2810  2829  2839  2951  2955  3004  3016  3020  3024  3075  3113
       3148  3194  3233  3278  3315  3361  3401  3466  3512  3564  3608  3661  3700  3720  3764
       3833  3881  3913  3937  3942  4000  4040  4068  4075  4127  4139  4200  4239  4273
RH70CK   622#  3401  4127
SAVE     622#  5034
SAVTST   622#  1919  1957  1969  2162  2168  2192  2348  2351  2764  2768  2802  2806
SCH      622#
SCOPE    624#  1919  1956  1969  2064  2162  2167  2191  2217  2306  2348  2351  2354  2467  2542
       2599  2652  2712  2764  2768  2773  2802  2806  2810  2828  2951  3014  3019  3024  3113
       3148  3233  3315  3401  3512  3608  3700  3881  3937  4068  4127  4199  4325  4360
SEEKCO   622#  3834  3887  3939  4071  4134
SETPRI   624#  5033
SETTRA  5117#
SETUP    624#  1851
SKIP     622#   624#  1909  1916  1961  2060  2164  2183  2186  2207  3012  3021
SLASH    624#
SPACE    624#
SREGIS   622#  2277  2316  2371  2546  2570  2676  2722  2778  2815  2853  2964  2989  3042  3082
       3122  3162  3204  3247  3288  3329  3371  3419  3478  3531  3574  3628  3669  3738  3777
       3836  3889  3979  4004  4044  4104  4171  4214  4243  4299
STARS     616   621   624#   626   649   650  1421  1422  1461  1462  1702  1706  1878  1899  1919
       1956  1969  2024  2033  2064  2096  2114  2124  2150  2162  2167  2191  2217  2306  2339
       2346  2348  2351  2354  2355  2362  2467  2468  2475  2542  2599  2652  2712  2756  2761
       2764  2768  2773  2795  2800  2802  2806  2810  2828  2951  2985  3014  3024  3113  3148
       3233  3315  3401  3512  3608  3700  3881  3937  4068  4127  4199  4325  4360  5024  5029
       5033  5034  5117  5118
STARTT   622#  2064  2217  2313  2363  2482  2542  2599  2652  2712  2773  2810  2829  2951  3015
       3024  3113  3148  3233  3315  3401  3512  3608  3700  3881  3937  4068  4127  4200
SWRSU    624#  1851#
TJUMP    622#  2219  2343  2344  2349  2361  2363  2417  2474  2480  2482  2652  2829  3401  4127
       4200
TRMTRP  5117#
TSCLR2   622#
TSCLR5   622#
TTSTNO   622#  2064  2217  2313  2363  2482  2542  2599  2652  2712  2773  2810  2829  2951  3016
       3024  3113  3148  3233  3315  3401  3512  3608  3700  3881  3937  4068  4127  4200
TYPBIN   624#
TYPDEC   624#  4360
TYPNAM   624#
TYPNUM   624#
TYPOCS   624#
TYPOCT   624#  2120  5033
TYPTXT   624#  1867  1868  1869  1870  1909  1937  1947  1950  1974  1996  1997  2038  2040  2042
       2085  2086  2118  2120  2145  2147  2149  2164  2166  2219  2221  2238  2240  2383  2385
       2401  2403  2484  2493  2496  2514  2516  2531  2652  2659  2837  2903  2939  2942  3433
       3436  4215  4217  4301  4304  4327  4329  4879  4881  4884  4887  4992  4995  5007  5010
       5012  5014  5016  5018  5019  5025  5061
VECSET   622#  2278  2317  2547  2571  2605  2677  2723  2778  2815  2854  2965  2990  3044  3084
```

```
                3124    3164    3206    3249    3290    3331    3373    3421    3480    3533    3576    3630    3671    3719    3740
                3779    3837    3867    3883    3890    3921    3940    3981    4006    4047    4072    4106    4136    4173    4207
                4244    4281
WT               622#   2280    2319    2463    2530    2549    2573    2607    2684    2730    2778    2815    2843    2950    2967
                2992    3016    3020    3048    3086    3126    3168    3208    3253    3292    3335    3375    3424    3481    3537
                3580    3634    3673    3719    3746    3781    3840    3869    3885    3893    3923    3942    3983    4008    4049
                4074    4108    4138    4176    4210    4246    4283
WTT              622#   2280    2319    2463    2530    2549    2573    2607    2685    2731    2778    2815    2843    2950    2967
                2992    3016    3020    3048    3086    3126    3168    3208    3253    3292    3335    3375    3424    3481    3537
                3580    3634    3673    3719    3746    3781    3840    3869    3885    3893    3923    3942    3983    4008    4049
                4074    4108    4138    4176    4210    4246    4283
$$CMRE           650#
$$CMTM           650#
$$ESCA           624#
$$NEWT           624#   1919    1956    1969    2064    2162    2167    2191    2217    2306    2348    2351    2354    2467    2542
                2599    2652    2712    2764    2768    2773    2802    2806    2810    2828    2951    3014    3024    3113    3148
                3233    3315    3401    3512    3608    3700    3881    3937    4068    4127    4199    4325
$$SET            5117#
$$SKIP           624#
.EQUAT           604#    624
.HEADE           604#
.KT11            604#    649
.SETUP           604#   1849
.SWRHI           604#    622
.SWRLO           604#    622#    623
.$ACT1           604#    626
.$CATC           604#    625
.$CMTA           604#    650
.$EOP            604#   4360
.$ERRO           604#   5034
.$ERRT           604#
.$POWE           604#   5118
.$RDOC           604#   5034
.$READ           604#   5033
.$SCOP           604#   5033
.$TRAP           604#   5117
.$TYPD           604#   5033
.$TYPE           604#   5033
.$TYPO           604#   5117

. ABS.  072136     000

 ERRORS DETECTED:  0

RM03:CZRJIB,CZRJIB.SEQ/CRF/SOL/NL:MC:ME:CND=RM03:CZRJIB.P11
RUN-TIME:  44 36  2 SECONDS
RUN-TIME RATIO: 573/83=6.9
CORE USED:  29K  (57 PAGES)
```