

RP04

FNCTNL CONT TEST 1 STAT
MD-11-DERPU-B

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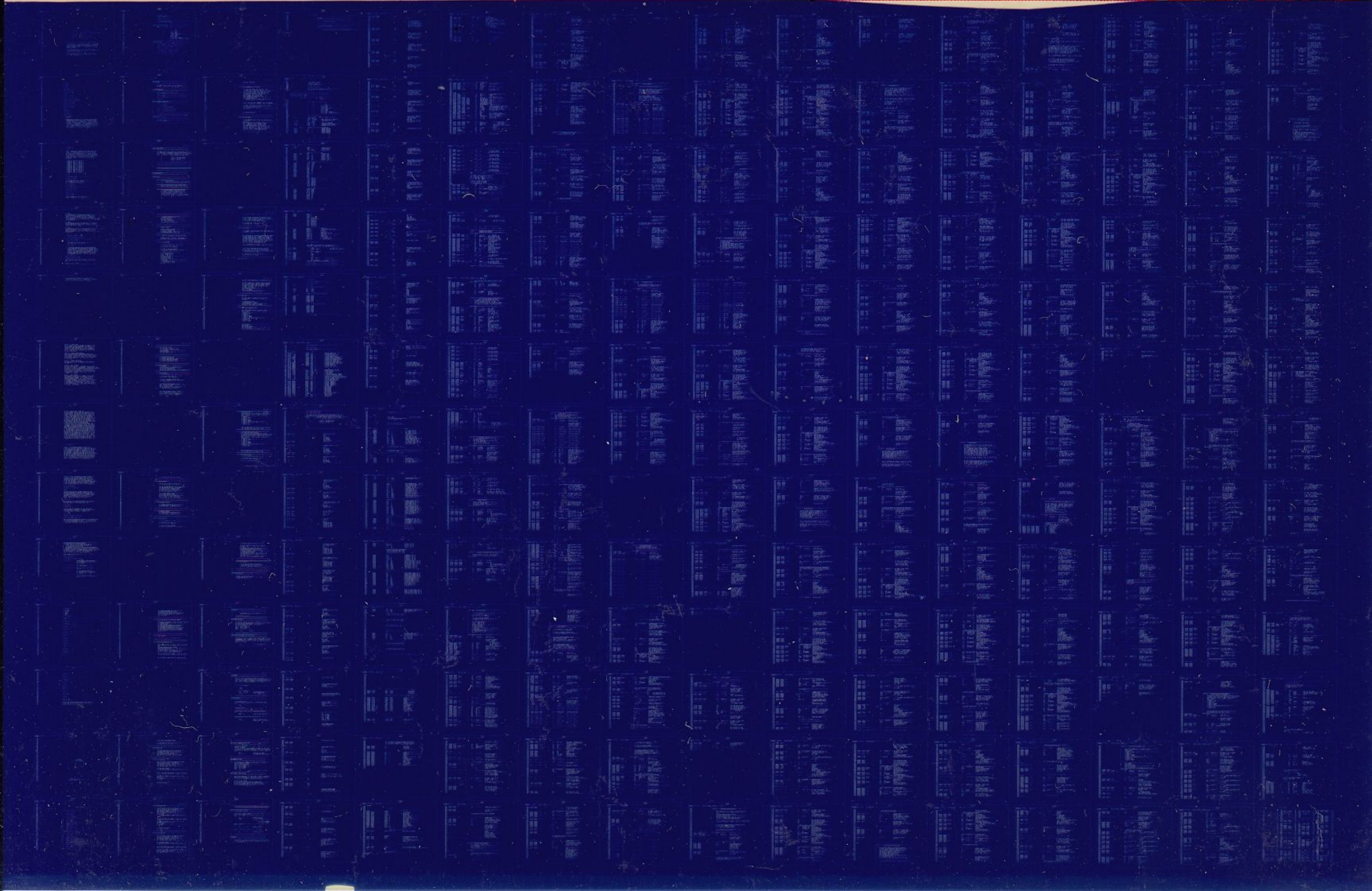


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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DERPU-B-D
PRODUCT NAME:	RPO4 FUNCTIONAL CONTROLLER TEST PART I (STATIC 2A)
DATE RELEASED:	MARCH 21, 1976
MAINTAINER:	DIAGNOSTIC ENGINEERING
AUTHOR:	SUB MALLICK

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2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11 COMPUTER WITH CONSOLE TELETYPE, AND A RPO4 DISK SYSTEM. THE RPO4 DISK SYSTEM WILL CONSIST OF AN RH70 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 19, 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-DZRPS- (LATEST REV) HAS BEEN RUN WITHOUT ERRORS. AND IT ASSUMES THAT MAINDEC-11-DZRPT- (LATEST REV) HAS BEEN RUN WITHOUT ERRORS.

3.0 LOADING PROCEDURE

USE STANDARD PROCEDURE FOR LOADING .ABS TAPES

4.0 STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

SEE SECTION 5.1

4.2 STARTING ADDRESS

- START AT ADDRESS 200---FOR NORMAL RUN
- START AT ADDRESS 210---FOR UNIT SELECTION
- START AT ADDRESS 220---FOR NO MANUAL INTERVENTION

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200 START
ALL SWITCHES MUST BE DOWN FOR WORST CASE RUN. WITH THIS STARTING ADDRESS ALL THE RPO4S 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.

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 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

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

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THEN THE APPROPRIATE 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.

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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 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

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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 APPROPRIATE
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 MEANING 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.

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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 RPO4
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.

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.

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 EXPLANATION 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.

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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.

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

Handwritten marks

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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

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

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C6, TO, SO
TT31-W,R

C6, T18, S21
TT31-W

C7, TO, SO
TT31-W,R

C7, T18, S18
TT31-W

C8, TO, SO
TT31-W,R

C8, T18, S21
TT31-W

C9, TO, SO
TT31-W

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

C10, TO, SO
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.

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22	OPERATIONAL SWITCH SETTINGS
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1546 *****
1657 *****
TEST 4 TYPE SERIAL NUMBER AND DRIVE TYPE
      SET APPROPRIATE ATTENTION BIT OF UNIT UNDER TEST IN 'ATT
      TYPE UNIT UNDER TEST
      READ SERIAL NUMBER AND DRIVE TYPE REGISTERS
      TYPE IT OUT AND PROCEED
      TO LOOP HERE SET SWITCH 8, AND THIS TEST NUMBER ON
      SWITCHES 0 THRU 7 AND RESTART

1666 *****
1709 *****
TEST 5 PROGRAM INTERRUPT

1712 PROGRAM INTERRUPT IS TESTED BY SETTING RDY AND IE
      IN RHCS1 AT THE SAME TIME
      THIS SHOULD INTERRUPT THROUGH LOCATION 254
      THE PROCESSOR PRIORITY IS SET TO 4
*****

1751 *****
TEST 6 INTERRUPT AT PROCESSOR AND DISK PRIORITY SAME

1754 PROCESSOR PRIORITY IS SET AT 5 (SAME AS THE DISK)
      IE AND RDY IS SET. THIS SHOULD NOT INTERRUPT
*****

1789 *****
TEST 7 PACK ACKNOWLEDGE

1792 IF STARTING ADDRESS 220 IS USED THIS TEST WILL NOT BE PE
      IF THE PROGRAM WORKS UNDER ACT-11 MONITOR
      THEN THIS TEST IS NOT PERFORMED

      IF NO ACT-11 MONITOR IS PRESENT
      THEN THIS TEST IS PERFORMED ONLY ON THE FIRST PASS
      ON SUBSEQUENT PASSES THIS TEST IS NOT DONE

      THIS TESTS THE ACKNOWLEDGE COMMAND=44
      VV BIT - RHDS1 BIT #6
      MOL BIT - RHDS1 BIT #12
      DVA BIT - RHCS1 BIT #11
      THE DRIVE IS STOPED MOL IS CHECKED TO BE 0
      AND DVA SHOULD BE 0
      THE DRIVE IS POWERED UP
      VV SHOULD BE 0, MOL SHOULD BE 1, DVA SHOULD BE 1
      GO SHOULD BE 0
      ALL REGISTERS EXCEPT RHDB, RHLA AND RHCC ARE STORED
      PACK ACKNOWLEDGE IS ISSUED
      ALL STORED REGISTERS SHOULD BE UNCHANGED
      EXCEPT VV

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1815 *****
1993 *****
TEST 10 SET VV BIT #6 IN RHDS1
      THIS TEST SETS VV IN RHDS1 INCASE
      ACT-11 MONITOR IS PRESENT AND THE PREVIOUS TEST
      IS NOT PERFORMED
      THERE IS A RESET AT THE BEGINING OF THIS TEST
      FOR ERROR RECOVERY ONLY.
2001 *****
2119 *****
TEST 11 NO OPERATION FUNCTION TEST
      ALL POSSIBLE REGISTERS ARE CLEARED THEN A "NOP"=0
      IS GIVEN NO CHANGE SHOULD HAPPEN
      ALL POSSIBLE REGISTERS ARE FILLED WITH ONES THEN A "NOP"
      IS GIVEN NO CHANGE SHOULD HAPPEN
2126 *****
2323 *****
TEST 12 DRIVE CLEAR
      ALL WRITE BITS OF ALL REGISTERS ARE FILLED
      WITH ONES EXCEPT GO, CLR, IE, PAT, MCPE, UPE
      THEN A DRIVE CLEAR IS GIVEN
      THEN ALL REGISTERS ARE CHECKED TO HAVE APPROPIAVE VALUE
*****
2513 *****
TEST 13 READ-IN-PRESET
      IF STARTING ADDRESS 220 IS USED THIS TEST WILL NOT BE PE
      IF THE PROGRAM WORKS UNDER ACT-11 MONITOR
      THEN THIS TEST IS NOT PERFORMED
      IF NO ACT-11 MONITOR IS PRESENT THEN
      THIS TEST IS PERFORMED ONLY ON THE FIRST PASS
      ON SUBSEQUENT PASSES THIS TEST IS NOT DONE
      THIS TESTS THE READ-IN-PRESET COMMAND
      FIRST THE DRIVE IS POWERED DOWN AND UP IN ORDER TO
      RESET VV-BIT #6 IN RHDS1
      THEN ALL WRITE BITS OF ALL REGISTERS ARE FILLED
      WITH ONES EXCEPT GO, CLR, IE, PAT, MCPE, UPE
      ATA FOR DRIVE UNDER TEST IS MADE = 0
      THEN A READ-IN-PRESET COMMAND = 20 IS GIVEN
      THEN ALL REGISTERS ARE TESTED
      THE FOLLOWING SHOULD BE THE REGISTER CONTENTS
      RHCA = 0, RHDST = 0, RHOF SHOULD HAVE
      FMT22 = 0, ECI = 0, HCI = 0, RHDS1 SHOULD HAVE VV = 1

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ALL OTHER REGISTERS SHOULD BE UNCHANGED

2540 *****

2724 *****
TEST 14 READ-IN-PRESET

2727 THIS TEST IS THE SAME AS THE PREVIOUS TEST EXCEPT
THAT IT DOES NOT TEST THE SETTING OF VV

THIS TEST IS HERE BECAUSE IF ACT-11 MONITOR IS PRESENT
THEN THE PREVIOUS TEST WILL NOT BE PERFORMED
THIS TESTS THE READ-IN-PRESET COMMAND
ALL WRITE BITS OF ALL REGISTERS ARE FILLED
WITH ONES EXCEPT GO, CLR, IE, PAT, MCPE, UPE
ATA FOR DRIVE UNDER TEST IS MADE = 0

THEN A READ-IN-PRESET COMMAND = 20 IS GIVEN
THEN ALL REGISTERS ARE TESTED
THE FOLLOWING SHOULD BE THE REGISTER CONTENTS
RHCA = 0, RHDST = 0, RHOF SHOULD HAVE
FMT22 = 0, ECI = 0, HCI = 0, RHDS1 SHOULD HAVE VV = 1
ALL OTHER REGISTERS SHOULD BE UNCHANGED

2744 *****

2872 *****
TEST 15 RECALIBRATE COMMAND

2875 ALL POSSIBLE REGISTERS ARE FILLED WITH ONES
THEN A RECALIBRATE = 6 COMMAND IS GIVEN
NO REGISTERS SHOULD CHANGE EXCEPT RHCC = 0

2879 *****

3047 *****
TEST 16 RECALIBRATE COMMAND
ALL POSSIBLE REGISTERS ARE FILLED WITH 0
THEN A RECALIBRATE =6 COMMAND IS GIVEN
NO REGISTERS SHOULD CHANGE EXCEPT RHCC=0

3053 *****

3210 *****
TEST 17 UNLOAD COMMAND

3213 IF STARTING ADDRESS 220 IS USED THIS TEST WILL NOT BE PE
IF THE PROGRAM WORKS UNDER ACT-11 MONITOR
THEN THIS TEST IS NOT PERFORMED

IF NO ACT-11 MONITOR IS PRESENT
THEN THIS TEST IS PERFORMED ONLY ON THE FIRST PASS
ON SUBSEQUENT PASSES THIS TEST IS NOT DONE

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ALL POSSIBLE REGISTERS ARE FILLED WITH ONES
THEN AN UNLOAD COMMAND =2 IS GIVEN
NO REGISTERS SHOULD CHANGE EXCEPT MOL SHOULD=0
THEN THE DRIVE IS POWERED UP BY OPERATOR
AND A PACK ACKNOWLEDGE COMMAND (ALREADY TESTED)
SETS VV-IN RHDS1

3230 *****

3517 *****
TEST 20 OFFSET AND RETURN TO CENTER LINE COMMAND

3520 THIS TESTS TWO COMMANDS (1)OFFSET (2)RETURN-TO-CENTER-LI
ALL POSSIBLE REGISTERS ARE FILLED WITH ONES (EXCEPT RHOF
AN OFFSET IS GIVEN
ALL REGISTERS ARE COMPARED ONLY ATA SHOULD SET
ALL OTHER REGISTERS SHOULD REMAIN UNCHANGED
THEN A RETURN-TO-CENTER-LINE IS GIVEN
ALL REGISTERS ARE COMPARED ONLY ATA SHOULD SET
AND RHOF SHOULD CLEAR (EXCEPT HCI,ECI,FMT22)
ALL OTHER REGISTERS SHOULD REMAIN UNCHANGED
THE ABOVE PROCESS IS REPEATED FOR OFFSET REGISTER
VALUE 1 TO 377

3532 *****

3836 *****
TEST 21 OFFSET COMMAND

3839 THIS TEST WILL ONLY GIVE REPEATED OFFSETS

3841 *****

3901 *****
TEST 22 WRITE/READ HEADER AND DATA

3904 WRITE HEADER AND DATA CYLINDER 0, FORMAT 16 BITS PER WOR
TRACK 0, SECTOR 0, KEYS=0, NUMBER OF WORDS 256 WORDS
OF 0
THEN READ HEADER AND DATA FOR ABOVE.
WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
1000,0,0,0, AND 256 OF 0
THE WRITE COMMAND IS THEN LOADED INTO THE REGISTERS EXCE
THE GO BIT, AND ALL THE REGISTERS ARE SAVED
THEN GO IS GIVEN FOR WRITE HEADER AND DATA

THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER CH
THEN WRITE FROM BUFFER IS CHECKED TO SEE THAT NOTHING CH

NOW FOR THE READ COMMAND READ INTO BUFFER IS FILLED
WITH ALL ONES, COMMAND IS LOADED INTO REGISTERS EXCEPT

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GO BIT AND ALL REGISTERS ARE SAVED
GO IS GIVEN FOR THE READ COMMAND

ALL REGISTERS ARE CHECKED FOR IMPROPER CHANGE
THEN THE READ DATA IS COMPARED.

3926 *****

4232 *****
TEST 23 READ DATA

4235 THIS TEST READS DATA WRITTEN BY THE PREVIOUS TEST
THE WRITE FROM BUFFER IS FILLED WITH ALL OS
THE COMMAND IS FILLED, THEN ALL REGISTERS SAVED
THEN READ DATA COMMAND IS GIVEN
ALL REGISTERS ARE COMPARED FOR PROPER VALUES
READ DATA INTO 'READ INTO' BUFFER IS CHECKED

4242 *****

4378 *****
TEST 24 WRITE/READ DATA

4381 THIS TEST GIVES A WRITE DATA COMMAND FRO CYLINDER 0
TRACK 0, SECTOR 0, KEYS 0, 200 WORDS OF ALL ONES
THIS SECTOR IS FORMATED BY PREVIOUS TEST
THEN READ DATA COMMAND IS GIVEN FOR 256 WORDS IN
SAME CYLINDER, TRACK, SECTOR, KEYS
WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH

4387 200 ONES AND 56 125252
THE WRITE DATA COMMAND IS LOADED EXCEPT GO AND IE
ALL REGISTERS ARE SAVED AND THEN GO IS GIVEN TO WRITE DA

THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER
CHANGE, THEN WRITE FROM BUFFER IS CHECKED FOR NO CHANGE

THEN READ INTO BUFFER IS FILLED WITH 200 OF ZEROS
AND 56 OF 377, WRITE FROM BUFFER IS FILLED WITH 200 ONES
AND 56 OF 377.
THE COMMAND EXCEPT GO IS LOADED, ALL REGISTERS ARE SAVED
GO IS GIVEN

ALL REGISTERS ARE CHECKED
READ DATA IS CHECKED

4405 *****

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TEST 25 WRITE/READ DATA

4719

THIS TEST GIVES A WRITE DATA COMMAND FOR CYLINDER 0
TRACK 0, SECTOR 0, KEYS 0, 256 WORDS OF 125252
THIS SECTOR IS FORMATED BY PREVIOUS TEST
THEN READ DATA COMMAND IS GIVEN FOR 256 WORDS IN
SAME CYLINDER, TRACK, SECTOR, KEYS
WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
256 OF 125252
THE WRITE DATA COMMAND IS LOADED EXCEPT GO AND IE
ALL REGISTERS ARE SAVED AND THEN GO IS GIVEN TO WRITE DA

THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER
CHANGE, THEN WRITE FROM BUFFER IS CHECKED FOR NO CHANGE

THEN READ INTO BUFFER IS FILLED WITH 256 OF ZEROS
WRITE FROM BUFFER IS FILLED WITH
256 OF 125252
THE COMMAND EXCEPT GO IS LOADED, ALL REGISTERS ARE SAVED
GO IS GIVEN

ALL REGISTERS ARE CHECKED
READ DATA IS CHECKED

4743

5031

TEST 26 WRITE/READ DATA

5034

THIS TEST GIVES A WRITE DATA COMMAND FOR CYLINDER 0
TRACK 0, SECTOR 0, KEYS 0, 200 WORDS OF 052525
THIS SECTOR IS FORMATED BY PREVIOUS TEST
THEN READ DATA COMMAND IS GIVEN FOR 256 WORDS IN
SAME CYLINDER, TRACK, SECTOR, KEYS
WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH

5040

200 OF 052525 AND 56 OF 377
THE WRITE DATA COMMAND IS LOADED EXCEPT GO AND IE
ALL REGISTERS ARE SAVED AND THEN GO IS TO WRITE DATI

THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER
CHANGE, THEN WRITE FROM BUFFER IS CHECKED FOR NO CHANGE

THEN READ INTO BUFFER IS FILLED WITH 200 IF ZEROS
AND 56 ALL ONES, WRITE FROM BUFFER IS FILLED WITH 200
WORDS OF 52525 AND 56 WORDS OF 0
THE COMMAND EXCEPT GO IS LOADED, ALL REGISTERS ARE SAVED
GO IS GIVEN

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ALL REGISTER ARE CHECKED
READ DATA IS CHECKED

5058 *****

5369 *****
TEST 27 WRITE/READ DATA USING UNIBUS B

5372 THIS TEST USES UNIBUS B IF CONNECTED TO THE RH
IF UNIBUS B IS NOT CONNECTED THEN THIS TEST IS NOT PERFO
THIS TEST GIVES A WRITE DATA COMMAND FOR CYLINDER 0
TRACK 0, SECTOR 0, KEYS 0, 200 WORDS OF 052525
THIS SECTOR IS FORMATED BY PREVIOUS TEST
THEN READ DATA COMMAND IS GIVEN FOR 256 WORDS IN
SAME CYLINDER, TRACK, SECTOR, KEYS
THESE COMMANDS USE UNIBUS B FOR DATA
WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
200 OF 052525 AND 56 OF 377
THE WRITE DATA COMMAND IS LOADED EXCEPT GO AND IE
ALL REGISTERS ARE SAVED AND THEN GO IS GIVEN TO WRITE DA

THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER
CHANGE, THEN WRITE FROM BUFFER IS CHECKED FOR NO CHANGE

THEN READ INTO BUFFER IS FILLED WITH 200 IF ZEROS
AND 56 ALL ONES, WRITE FROM BUFFER IS FILLED WITH 200
WORDS OF 52525 AND 56 WORDS OF 0
THE COMMAND EXCEPT GO IS LOADED, ALL REGISTERS ARE SAVED
GO IS GIVEN

ALL REGISTER ARE CHECKED
READ DATA IS CHECKED

5399 *****

5751 *****
TEST 30 IMPLIED SEARCH

5754 ONLY NEW ADDITION IN THIS TEST IS AN IMPLIED SEARCH
A WRITE HEADER AND DATA IS GIVEN FOR MORE THAN ONE SECTO
OF WORDS
WRITE HEADER AND DATA CYLINDER 0, FORMAT 16 BITS PER WOR
TRACK 0, SECTOR 0, KEYS=0, NUMBER OF WORDS
266 (4 HEADER 256 DATA=0 4. HEADER 2 DATA=1
THEN READ HEADER AND DATA FOR ABOVE SECTOR 1 ONLY
WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
10000,0,0,0 AND 256 OF 0, 10000,1,0,0, AND 2 OF 1
THE WRITE COMMAND IS THEN LOADED INTO THE REGISTERS EXCE
THE GO BIT, AND ALL THE REGISTERS ARE SAVED
THEN GO IS GIVEN FOR WRITE HEADER AND DATA

THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER CH

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THEN WRITE FROM BUFFER IS CHECKED TO SEE THAT NOTHING CH

NOW FOR THE READ COMMAND READ INTO BUFFER IS FILLED WITH 377, WRITE FROM BUFFER IS FILLED WITH 1000010001 AND 254 OF ZEROS COMMAND IS LOADED INTO REGISTERS EXCEPT GO AND IE THEN ALL REGISTERS ARE SAVED GO IS GIVEN FOR THE READ COMMAND 256 WORDS

ALL REGISTERS ARE CHECKED FOR IMPROPER CHANGE THEN THE READ DATA IS COMPARED

5780 *****

6134 *****
TEST 31 IMPLIED SEEK

6137 ONLY NEW ADDITION IN THIS TEST IS AN IMPLIED SEEK FROM C TO CYLINDER 1, A WRITE HEADER AND DATA IS GIVEN FOR MORE ONE SECTOR OF WORDS

WRITE HEADER AND DATA CYLINDER 0, FORMAT 16 BITS PER WORD TRACK 18, SECTOR 21, KEYS=0, NUMBER OF WORDS 266 WORDS (4 HEADER, 256 DATA=1125, 4 HEADER 2 DATA = 2000 THEN READ HEADER AND DATA FOR ABOVE, TRACK 0, SECTOR 0, WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH 1000010001 AND 256 OF 1125, 100010001 AND 2 OF 2000 THE WRITE COMMAND IS THEN LOADED INTO THE REGISTERS EXCEPT THE GO BIT, AND ALL THE REGISTERS ARE SAVED THEN GO IS GIVEN FOR WRITE HEADER AND DATA

THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER CH THEN WRITE FROM BUFFER IS CHECKED TO SEE THAT NOTHING CH

NOW FOR READ COMMAND READ INTO BUFFER IS FILLED WITH ALL ONES, WRITE FROM BUFFER IS LOADED WITH 100010001 AND 2 OF 2000, 254 OF ZEROS COMMAND IS LOADED INTO REGISTERS EXCEPT GO AND IE ALL REGISTERS ARE SAVED GO IS GIVEN FOR THE READ COMMAND

ALL REGISTERS ARE CHECKED FOR IMPROPER CHANGE THEN THE READ DATA IS COMPARED.

6165 *****

6524 *****
TEST 32 SEEK TEST

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6527

THIS TEST GETS THE HEADS OUT TO CYLINDER 10 NOT BY ONE SEEK BUT BY TEN IMPLIED SEEKS ONE CYLINDER AT A TIME

THIS TEST STARTS WITH A (ALREADY TESTED) RECALIBRATE THAT IS CYLINDER ZERO. THEN ON CYLINDER 0 SECTOR #21 TRACK #18 IT WRITES 266 WORDS THERE BY GETTING THE HEAD TO CYLINDER 1 THEN IT WRITES 266 WORDS ON CYLINDER 1 SECTOR #21 TRACK #18 THERE BY GETTING THE HEADS TO CYLINDER 2.

THIS IS REPEATED 10 TIMES GETTING THE HEADS TO CYLINDER 10 THEN A SEEK COMMAND IS GIVEN TO CYLINDER 0 AND DATA ALREADY WRITTEN IS CHECKED

6541

7135

TEST 33 SEEK TEST

7138

THIS TEST DEPENDS ON HEADER AND DATA WRITTEN BY THE PREVIOUS TEST. AT THIS POINT THE HEADS ARE ON CYLINDER 0

ALL REGISTERS ARE SAVED
A SEEK IS GIVEN TO CYLINDER 9
ALL REGISTERS ARE CHECKED FOR IMPROPER CHANGE
DATA WRITTEN ON CYLINDER 9 IS CHECKED

7383

TEST 34 WRITE CHECK HEADER AND DATA

7386

WRITE CHECK HEADER AND DATA CYLINDER 5 FORMAT 16 BITS PE TRACK 7, SECTOR 4, KEYS 0, NUMBER OF WORDS 266 CONSISTING OF
10 WORDS OF 12344 (6 BITS FOR CYL, 5 FOR TRACK, 5 FOR SE)
10 WORDS OF 177777
10 WORDS OF 0
10 WORDS OF 052525
10 WORDS OF 125252
16 WORDS OF LEFT ROTATING ZERO (EG 177776,177775)
16 WORDS OF LEFT ROTATING ONE (EG 1,2,4,10)
174 WORDS OF 377
4 WORDS OF HEADER
2 WORDS OF 12345

FIRST THE ABOVE DATA IS WRITTEN BY A WRITE HEADER AND DATA COMMAND
CHECK FOR NO ERRORS
THEN THE ABOVE DATA IS READ BY A READ HEADER AND DATA CHECK FOR NO ERRORS
THEN THE ABOVE WRITE CHECK HEADER AND DATA IS GIVEN

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7843

 TEST 35 WRITE CHECK DATA
 THE DATA FOR THIS TEST IS WRITTEN ON DISK BY PREVIOUS TE
 WRITE CHECK DATA CYLINDER 5, FORMAT 16 BITS PER WORDS
 TRACK 7, SECTOR 4, KEYS 0, NUMBER OF WORDS 258
 CONSISTING OF
 10 WORDS OF 12344 (6 BITS FOR CYL, 5 FOR TRACK, 5 FOR SE
 10 WORDS OF 177777
 10 WORDS OF 0
 10 WORDS OF 052525
 10 WORD OF 125252
 16 WORDS OF LEFT ROTATING ZERO (EG177776,177775)
 16 WORDS OF LEFT ROTATING ONE (EG 1,2,4,10)
 174 WORDS OF 377
 2 WORDS OF 12345

FIRST THE ABOVE DATA IS FILLED INTO WRITE FROM BUFFER
THEN THE ABOVE WRITE CHECK DATA IS GIVEN

8068

 TEST 36 WRITE CHECK DATA USING UNIBUS B
 THIS TEST USES UNIBUS B IF CONNECTED TO THE RH
 IF UNIBUS B IS NOT CONNECTED THEN THIS TEST IS NOT PERFO
 THE DATA FOR THIS TEST IS WRITTEN ON DISK BY PREVIOUS TE
 WRITE CHECK DATA CYLINDER 5, FORMAT 16 BITS PER WORDS
 TRACK 7, SECTOR 4, KEYS 0, NUMBER OF WORDS 258
 CONSISTING OF
 10 WORDS OF 12344 (6 BITS FOR CYL, 5 FOR TRACK, 5 FOR SE
 10 WORDS OF 177777
 10 WORDS OF 0
 10 WORDS OF 052525
 10 WORD OF 125252
 16 WORDS OF LEFT ROTATING ZERO (EG177776,177775)
 16 WORDS OF LEFT ROTATING ONE (EG 1,2,4,10)
 174 WORDS OF 377
 2 WORDS OF 12345

FIRST THE ABOVE DATA IS FILLED INTO WRITE FROM BUFFER
THEN THE ABOVE WRITE CHECK DATA IS GIVEN

8085

 TEST 37 WRITE PROTECT BUTTON
 IF STARTING ADDRESS 220 IS USED THIS TEST WILL NOT BE PE
 IF THE PROGRAM WORKS UNDER ACT-11 MONITOR
 THEN THIS TEST IS NOT PERFORMED
 IF NO ACT-11 MONITOR IS PRESENT
 THEN THIS TEST IS PERFORMED ONLY ON THE FIRST PASS

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ON SUBSEQUENT PASSES THIS TEST IS NOT DONE

WRITE FROM BUFFER IS FILLED WITH ALL ONES AND
SECTOR 0, TRACK 0, CYLINDER 0 IS FILLED WITH
ALL ONES

ALL REGISTERS ARE SAVED THEN WRITE LOCK BUTTON IS
PRESSED AND ALL REGISTERS ARE CHECKED.

WRITE FROM BUFFER IS FILLED WITH 377 AND A WRITE IS
ATTEMPTED TO SECTOR 0, TRACK 0, CYLINDER 0 70. WORDS
ALL REGISTERS ARE CHECKED

THE SAME SECTOR IS READ AND DATA COMPARED TO SEE
THAT NOTHING GOT DESTROYED (READ DATA SHOULD BE ALL
ONES AND NCT 377)

THEN WRITE LOCK BUTTON IS PRESSED TO UNLOCK
WRITE LOCKS AND ALL REGISTERS ARE COMPARED

8335 *****

8724 *****

TEST 40 END OF DRIVE

8728 THIS IS THE END OF TEST FOR ONE DRIVE *Log*
IF THERE ARE MORE DRIVES THEN THE PROGRAM *2/1*
JUMPS TO TEST 5 FOR NEXT DRIVE TEST
END PASS IS REACHED ONLY AFTER ALL DRIVES ARE COMPLETE

8733 *****

8769 *****

8771 *****
END OF PASS ROUTINE

8773 INCREMENT THE PASS NUMBER (\$PASS)
TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
IF THERES A MONITOR GO TO IT
IF THERE ISN'T JUMP TO TST1

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SUBROUTINES

9478

THIS ROUTINE WILL ALLOW THE CHANGE OF THE BASE
ADDRESS FROM 176700 TO ANY TYPED VALUE

9545

9548

SCOPE HANDLER ROUTINE

9550

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

SCOPE ;:SCOPE=IOT

9609

9611

CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

9613

THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIG
SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER
NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE T
BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS
REPLACED WITH SPACES.

CALL:

MOV NUM,-(SP) ;:PUT THE BINARY NUMBER ON THE S
TYPDS ;:GO TO THE ROUTINE

9677

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9679

TYPE ROUTINE

9681 ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 8
THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE
NOTE1: \$NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CH
NOTE2: \$FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED
NOTE3: \$FILLC CONTAINS THE CHARACTER TO FILL AFTER.

CALL:
1) USING A TRAP INSTRUCTION
TYPE ,MESADR ;;MESADR IS FIRST ADDRESS OF AN
OR
TYPE
MESADR
2) USING A JSR INSTRUCTION
MOV PS, -(SP) ;;PUSH PROCESSOR STATUS WORD ON
JSR PC, \$TYPE ;;CALL TYPE ROUTINE
MESADDR ;;FIRST ADDRESS OF MESSAGE

9724

9726

TTY INPUT ROUTINE

9735 TK INITIALIZE ROUTINE
THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
CALL

JSR PC, \$TKINT
RETURN

9752

TK SERVICE ROUTINE
THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT

9774

THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY

CALL:
RDCHR ;;INPUT A SINGLE CHARACTER FROM
RETURN HERE ;;CHARACTER IS ON THE STACK

9794

THIS ROUTINE WILL INPUT A STRING FROM THE TTY

CALL:
RDLIN ;;INPUT A STRING FROM THE TTY
RETURN HERE ;;ADDRESS OF FIRST CHARACTER WIL
;;TERMINATOR WILL BE A BYTE OF A

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DECDOC VER 00.04

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9830 *****
*****
9832 READ AN OCTAL NUMBER FROM THE TTY
*****
9834 THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
CHANGE IT TO BINARY.
THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPE
FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUS
THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RE
CALL:
          RDOCT                ;;READ AN OCTAL NUMBER
          RETURN HERE          ;;LOW ORDER BITS ARE ON TOP OF T
                               ;;HIGH ORDER BITS ARE IN $HIOCT
9884 *****
*****
9886 ERROR HANDLER ROUTINE
*****
9888 THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
AND GO TO $ERRTYP ON ERROR
THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
SW15=1 HALT ON ERROR
SW13=1 INHIBIT ERROR TYPEOUTS
SW10=1 BELL ON ERROR
SW09=1 LOOP ON ERROR
CALL      ERROR N          ;;ERROR=EMT AND N=ERROR ITEM NUMBER
9933 *****
*****
9934 THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE
ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE
AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
IT IS A COPY OF THE $ERRTYP SUBROUTINE FROM SYSMAC.
9938 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.

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DECDOC VER 00.04

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10159 *****

10163 *****
BINARY TO OCTAL (ASCII) AND TYPE

10165 THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIG
OCTAL (ASCII) NUMBER AND TYPE IT.
\$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS
CALL:
MOV NUM,-(SP) ;:NUMBER TO BE TYPED
TYPOS ;:CALL FOR TYPEOUT
.BYTE N ;:N=1 TO 6 FOR NUMBER OF DIGITS
.BYTE M ;:M=1 OR 0
;:1=TYPE LEADING ZEROS
;:0=SUPPRESS LEADING ZER

\$TYPON---ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE
\$TYPOS OR \$TYPOC
CALL:
MOV NUM,-(SP) ;:NUMBER TO BE TYPED
TYPON ;:CALL FOR TYPEOUT

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

10239 *****

10241 *****
TRAP DECODER

10243 THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTIO
AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDR
OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
GO TO THAT ROUTINE.

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02100000000000000000
4 1 1 1 1 1 1 1 1 1 1 1 1
00010010000000000000

10256

TRAP TABLE

10258

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

10276

10278

POWER DOWN AND UP ROUTINES

10318

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11050
11051
11052
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11057
11058
11059
11060

;%
:TITLE MAINDEC-11-DERPU-B
:*COPYRIGHT (C) 1975
:*DIGITAL EQUIPMENT CORP.
:*MAYNARD, MASS. 01754
:*
:*PROGRAM BY SUB MALLICK
:*
:*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
:*PACKAGE (MAINDEC-11-DZQAC-B1),AUG 29,1975.
:*

:/:*/:
:/:*/:
:/:*/:
:DRIVE MUST BE LOCKED IN A OR B
:/:*/:
:/:*/:
:/:*/:

11070
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16000
16001
16002
16003
16004
16005

.SBTTL OPERATIONAL SWITCH SETTINGS
:*
:* SWITCH USE
:-----
:* 15 HALT ON ERROR
:* 14 LOOP ON TEST
:* 13 INHIBIT ERROR TYPEOUTS
:* 11 INHIBIT ITERATIONS
:* 10 BELL ON ERROR
:* 9 LOOP ON ERROR
:* 8 LOOP ON TEST IN SWR<7:0>
:* 7 STOP FURTHER COMPARES IF SW08 IS LOW
:* 6 TYPE ALL REG. WITH ERROR IF SW8 LOW

.SBTTL BASIC DEFINITIONS
:*INITIAL ADDRESS OF THE STACK POINTER *** 1000 ***
:STACK= 1000
:EQUIV EMT,ERROR ;;BASIC DEFINITION OF ERROR CALL
:EQUIV IOT,SCOPE ;;BASIC DEFINITION OF SCOPE CALL
:PS= 177776 ;;PROCESSOR STATUS WORD
:EQUIV PS,PSW
:STKLMT= 177774 ;;STACK LIMIT REGISTER
:PIRG= 177772 ;;PROGRAM INTERRUPT REQUEST REGISTER
:DSWR= 177570 ;;HARDWARE SWITCH REGISTER
:DDISP= 177570 ;;HARDWARE DISPLAY REGISTER

.*GENERAL PURPOSE REGISTER DEFINITIONS
:R0= %0 ;;GENERAL REGISTER
:R1= %1 ;;GENERAL REGISTER
:R2= %2 ;;GENERAL REGISTER
:R3= %3 ;;GENERAL REGISTER
:R4= %4 ;;GENERAL REGISTER
:R5= %5 ;;GENERAL REGISTER

001000
177776
177774
177772
177570
177570
000000
000001
000002
000003
000004
000005

1606 000006
 1607 000007
 1608
 1609
 1610
 1611
 1612 000000
 1613 000040
 1614 000100
 1615 000140
 1616 000200
 1617 000240
 1618 000300
 1619 000340
 1620
 1621
 1622 100000
 1623 040000
 1624 020000
 1625 010000
 1626 004000
 1627 002000
 1628 001000
 1629 000400
 1630 000200
 1631 000100
 1632 000040
 1633 000020
 1634 000010
 1635 000004
 1636 000002
 1637 000001
 1638
 1639
 1640
 1641
 1642
 1643
 1644
 1645
 1646
 1647
 1648
 1649
 1650 100000
 1651 040000
 1652 020000
 1653 010000
 1654 004000
 1655 002000
 1656 001000
 1657 000400
 1658 000200
 1659 000100
 1660 000040
 1661 000020

R6= %6 ;: GENERAL REGISTER
 R7= %7 ;: GENERAL REGISTER
 .EQUIV R6,SP ;: STACK POINTER
 .EQUIV R7,PC ;: PROGRAM COUNTER

.*PRIORITY LEVEL DEFINITIONS
 PR0= 0 ;: PRIORITY LEVEL 0
 PR1= 40 ;: PRIORITY LEVEL 1
 PR2= 100 ;: PRIORITY LEVEL 2
 PR3= 140 ;: PRIORITY LEVEL 3
 PR4= 200 ;: PRIORITY LEVEL 4
 PR5= 240 ;: PRIORITY LEVEL 5
 PR6= 300 ;: PRIORITY LEVEL 6
 PR7= 340 ;: PRIORITY LEVEL 7

.*"SWITCH REGISTER" SWITCH DEFINITIONS
 SW15= 100000
 SW14= 40000
 SW13= 20000
 SW12= 10000
 SW11= 4000
 SW10= 2000
 SW09= 1000
 SW08= 400
 SW07= 200
 SW06= 100
 SW05= 40
 SW04= 20
 SW03= 10
 SW02= 4
 SW01= 2
 SW00= 1
 .EQUIV SW09,SW9
 .EQUIV SW08,SW8
 .EQUIV SW07,SW7
 .EQUIV SW06,SW6
 .EQUIV SW05,SW5
 .EQUIV SW04,SW4
 .EQUIV SW03,SW3
 .EQUIV SW02,SW2
 .EQUIV SW01,SW1
 .EQUIV SW00,SW0

.*DATA BIT DEFINITIONS (BIT00 TO BIT15)
 BIT15= 100000
 BIT14= 40000
 BIT13= 20000
 BIT12= 10000
 BIT11= 4000
 BIT10= 2000
 BIT09= 1000
 BIT08= 400
 BIT07= 200
 BIT06= 100
 BIT05= 40
 BIT04= 20

1662 000010
1663 000004
1664 000002
1665 000001
1666
1667
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1671
1672
1673
1674
1675
1676
1677
1678 000004
1679 000010
1680 000014
1681 000014
1682 000014
1683 000020
1684 000024
1685 000030
1686 000034
1687 000060
1688 000064
1689 000240
1690
1691
1692
1693
1694 000000
1695
1696
1697
1698 000174
1699 000174 000000
1700 000176 000000
1701
1702
1703 000200 000137 004712
1704 000046
1705 000046 034346
1706 000052
1707 000052 040000
1708 000210
1709 000210 000137 004676
1710 000220
1711 000220 000137 004662
1712
1713
1714
1715
1716
1717

BIT03= 10
BIT02= 4
BIT01= 2
BIT00= 1
.EQUIV BIT09,BIT9
.EQUIV BIT08,BIT8
.EQUIV BIT07,BIT7
.EQUIV BIT06,BIT6
.EQUIV BIT05,BIT5
.EQUIV BIT04,BIT4
.EQUIV BIT03,BIT3
.EQUIV BIT02,BIT2
.EQUIV BIT01,BIT1
.EQUIV BIT00,BIT0

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

.SBTTL TRAP CATCHER

.=0
.*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
.*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
.*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS

.=174
DISPREG: .WORD 0 ;: SOFTWARE DISPLAY REGISTER
SWREG: .WORD 0 ;: SOFTWARE SWITCH REGISTER

.SBTTL STARTING ADDRESS(ES)

JMP @#BEGIN ;: JUMP TO STARTING ADDRESS OF PROGRAM
.=46
\$ENDAD
.=52
40000
.=210
JMP @#BEGIN2 ; JUMP SELECT TEST
.=220
JMP @#BEGIN1 ; JUMP TO NO OPERATOR TESTS

.*STARTING ADDRESS 200 FOR NORMAL STARTS
.*THIS WILL TEST ALL RPO4'S ON THE SYSTEM A SINGLE DRIVE AT A TIME
.*
.*STARTING ADDRESS 210 WILL TEST ONLY ONE SPECIFIED DRIVE
.*
.*STARTING ADDRESS 220 WILL JUMP OVER THE TESTS REQUIRING AN OPERATOR

```

1718      : *AT THE DRIVE
1719
1720      .SBTTL MEMORY MANAGEMENT DEFINITIONS
1721
1722      : *KT11 VECTOR ADDRESS
1723
1724      000250      MMVEC= 250
1725
1726      : *KT11 STATUS REGISTER ADDRESSES
1727
1728      177572      SR0= 177572
1729      177574      SR1= 177574
1730      177576      SR2= 177576
1731      172516      SR3= 172516
1732
1733      : *KERNAL "I" PAGE DESCRIPTOR REGISTERS
1734
1735      172300      KIPDR0= 172300
1736      172302      KIPDR1= 172302
1737      172304      KIPDR2= 172304
1738      172306      KIPDR3= 172306
1739      172310      KIPDR4= 172310
1740      172312      KIPDR5= 172312
1741      172314      KIPDR6= 172314
1742      172316      KIPDR7= 172316
1743
1744      : *KERNAL "I" PAGE ADDRESS REGISTERS
1745
1746      172340      KIPAR0= 172340
1747      172342      KIPAR1= 172342
1748      172344      KIPAR2= 172344
1749      172346      KIPAR3= 172346
1750      172350      KIPAR4= 172350
1751      172352      KIPAR5= 172352
1752      172354      KIPAR6= 172354
1753      172356      KIPAR7= 172356
1754
1755      : *****
1756      001110      . =1110

```

Handwritten scribbles

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1757 ;*****
1758
1759 .SBTTL COMMON TAGS
1760
1761 ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
1762 ;*USED IN THE PROGRAM.
1763
1764 001100 . =1100
1765 001100 000000 $CMTAG: .WORD 0 ; START OF COMMON TAGS
1766 001102 000 $PASS: .WORD 0 ; CONTAINS PASS COUNT
1767 001103 000 $TSTNM: .BYTE 00 ; CONTAINS THE TEST NUMBER
1768 001104 000000 $ERFLG: .BYTE 00 ; CONTAINS ERROR FLAG
1769 001106 000000 $ICNT: .WORD 00 ; CONTAINS SUBTEST ITERATION COUNT
1770 001106 000000 $LPADR: .WORD 00 ; CONTAINS SCOPE LOOP ADDRESS
1771 001110 000000 $LPERR: .WORD 00 ; CONTAINS SCOPE RETURN FOR ERRORS
1772 001112 000000 $ERTTL: .WORD 00 ; CONTAINS TOTAL ERRORS DETECTED
1773 001114 000 $ITEMB: .BYTE 0 ; CONTAINS ITEM CONTROL BYTE
1774 001115 001 $ERMAX: .BYTE 1 ; CONTAINS MAX. ERRORS PER TEST
1775 001116 000000 $ERRPC: .WORD 0 ; CONTAINS PC OF LAST ERROR INSTRUCTION
1776 001120 000000 $GDADR: .WORD 00 ; CONTAINS ADDRESS OF 'GOOD' DATA
1777 001122 000000 $BDADR: .WORD 00 ; CONTAINS ADDRESS OF 'BAD' DATA
1778 001124 000000 $GDDAT: .WORD 00 ; CONTAINS 'GOOD' DATA
1779 001126 000000 $BDDAT: .WORD 00 ; CONTAINS 'BAD' DATA
1780 001130 000000 .WORD 00 ; RESERVED--NOT TO BE USED
1781 001132 000000 .WORD 00
1782 001134 000000 .WORD 0
1783 001136 177570 $SWR: .WORD DSWR ; ADDRESS OF SWITCH REGISTER
1784 001140 177570 $DISPLAY: .WORD DDISP ; ADDRESS OF DISPLAY REGISTER
1785 001142 177560 $TKS: 177560 ; TTY KBD STATUS
1786 001144 177562 $TKB: 177562 ; TTY KBD BUFFER
1787 001146 177564 $TPS: 177564 ; TTY PRINTER STATUS REG. ADDRESS
1788 001150 177566 $TPB: 177566 ; TTY PRINTER BUFFER REG. ADDRESS
1789 001152 000 $NULL: .BYTE 0 ; CONTAINS NULL CHARACTER FOR FILLS
1790 001153 002 $FILLS: .BYTE 2 ; CONTAINS # OF FILLER CHARACTERS REQUIRED
1791 001154 012 $FILLC: .BYTE 12 ; INSERT FILL CHARS. AFTER A "LINE FEED"
1792 001155 000 $TPFLG: .BYTE 0 ; "TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
1793 001156 000000 $REGAD: .WORD 0 ; CONTAINS THE ADDRESS FROM
1794 ; WHICH ($REGAD) WAS OBTAINED
1795 001160 000000 $REG0: .WORD 0 ; CONTAINS (($REGAD)+0)
1796 001162 000000 $REG1: .WORD 0 ; CONTAINS (($REGAD)+2)
1797 001164 000000 $REG2: .WORD 0 ; CONTAINS (($REGAD)+4)
1798 001166 000000 $REG3: .WORD 0 ; CONTAINS (($REGAD)+6)
1799 001170 000000 $REG4: .WORD 0 ; CONTAINS (($REGAD)+10)
1800 001172 000000 $REG5: .WORD 0 ; CONTAINS (($REGAD)+12)
1801 001174 000000 $TMP0: .WORD 0 ; USER DEFINED
1802 001176 000000 $TMP1: .WORD 0 ; USER DEFINED
1803 001200 000000 $TMP2: .WORD 0 ; USER DEFINED
1804 001202 000000 $TMP3: .WORD 0 ; USER DEFINED
1805 001204 000000 $TMP4: .WORD 0 ; USER DEFINED
1806 001206 000000 $TMP5: .WORD 0 ; USER DEFINED
1807 001210 000000 $TIMES: 0 ; MAX. NUMBER OF ITERATIONS
1808 001212 000000 $ESCAPE: 0 ; ESCAPE ON ERROR ADDRESS
1809 001214 177607 000377 $BELL: .ASCIZ <207><377><377> ; CODE FOR BELL
1810 001220 077 $QUES: .ASCII /?/ ; QUESTION MARK
1811 001221 015 $CRLF: .ASCII <15> ; CARRIAGE RETURN
1812 001222 000012 $LF: .ASCIZ <12> ; LINE FEED

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001224

001224 043172
001226 060100

001230 062022
001232 062262

001234 043221
001236 060100

001240 062022
001242 062262

001244 043310
001246 060100

001250 062022

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

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

$ERRTB:

*****
;
; ITEM1
;          EM1      ; RPO4 DID NOT INTERRUPT
;          DH1      ; WAITED ON BIT DID NOT OCCUR
;          DT1      ; PC
;          DF1      ; WAT PC
;                   ; BIT WAITED
;                   ; REG ADDRESS
;                   ; REG CONTENTS
;                   ; RHCSI CONTENTS
;                   ; $ERRPC, WAITPC, WAITBT, WAITRE, $BDDAT, CSI
;                   ; 0,0,0,0,0,0

; ITEM2
;          EM2      ; INTERRUPT ENABLE BIT DOWN BUT
;          DH1      ; WAITED ON BIT DID NOT OCCUR
;          DT1      ; PC
;          DF1      ; WAT PC
;                   ; BIT WAITED
;                   ; REG ADDRESS
;                   ; REG CONTENTS
;                   ; RHCSI CONTENTS
;                   ; $ERRPC, WAITPC, WAITBT, WAITRE, $BDDAT, CSI
;                   ; 0,0,0,0,0,0

; ITEM3
;          EM3      ; RPO4 DID NOT INTERRUPT WHEN
;          DH1      ; WAITED ON BIT DID SET
;          DT1      ; PC
;          DF1      ; WAT PC
;                   ; BIT WAITED
;                   ; REG ADDRESS
;                   ; RHCSI CONTENTS
;                   ; $ERRPC, WAITPC, WAITBT, WAITRE, $BDDAT, CSI
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1869	001252	062262	DF1		;0,0,0,0,0,0
1870					
1871				;ITEM4	
1872	001254	043371	EM4		;WAITED ON BIT DID SET BUT ;TIME IS IN ERROR ;TIME IS GIVEN IN 10 MICRO SEC. ;(DECIMAL)
1873					
1874					
1875					
1876	001256	060240	DH4		;PC ;WAT PC ;BIT WAITED ;REG ADDRESS ;TIME IN 10 MSEC
1877					
1878					
1879					
1880					
1881	001260	062040	DT4		;SERRPC, WAITPC, WAITBT, WAITRE, \$BDDAT, WAITIM
1882	001262	062270	DF4		;0,0,0,0,0,1
1883					
1884				;ITEM5	
1885	001264	043500	EM5		;RHAS DOES NOT CLEAR BY ;MOVING IN ALL ONES
1886					
1887	001266	060363	DH5		;PC ;REG. ADDR. ;GOOD DATA ;RECEIVED DATA
1888					
1889					
1890					
1891	001270	062056	DT5		;SERRPC, REGADR, \$GDDAT, \$BDDAT
1892	001272	062276	DF5		;0,0,0,0
1893					
1894				;ITEM6	
1895	001274	043552	EM6		;LOADING RHER1 FOR ALL ;UNITS DID NOT SET ANY BITS ;IN RHAS-NO UNITS PRESENT
1896					
1897					
1898	001276	060462	DH6		;PC ;REG ADDR ;RECEIVED DATA
1899					
1900					
1901	001300	062070	DT6		;SERRPC, REGADR, \$BDDAT
1902	001302	062302	DF6		;0,0,0
1903					
1904				;ITEM7	
1905	001304	043640	EM7		;SPECIFIED REGISTER NONEXISTANT ;SO ABORT PROGRAM
1906					
1907	001306	060541	DH7		;PC ;ADDR. OF REG. ;SERRPC, TEMP1
1908					
1909	001310	062100	DT7		;0,0
1910	001312	062305	DF7		
1911					
1912				;ITEM10	
1913	001314	043722	EM10		;STOPED DRIVE HAS MOL BIT ;IN RHDS1 = 1
1914					
1915	001316	060571	DH10		;PC ;TEST NO ;FAILING REG ADDR ;CONTENTS OF RHCS1 ;CONTENTS OF RHCS2 ;CONTENTS OF RHDS1 ;CONTENTS OF RHER1
1916					
1917					
1918					
1919					
1920					
1921					
1922	001320	062106	DT10		;SERRPC, \$STNM, \$BDADR, CS1, CS2, DS1, ER1
1923	001322	062307	DF10		;0,0,0,0,0,0,0
1924					

1925			; ITEM11		
1926	001324	043771		EM11	: WITH SPINDLE POWERED DOWN
1927					: RHCS2 SHOULD HAVE ONLY
1928					: UNIT NUMBER AND IR HIGH
1929	001326	060571		DH10	: PC
1930					: TEST NO
1931					: FAILING REG. ADR
1932					: CONTENTS OF RHCS1
1933					: CONTENTS OF RHCS2
1934					: CONTENTS OF RHDS1
1935					: CONTENTS OF RHER1
1936	001330	062106		DT10	: \$ERRPC, \$STSTNM, \$BDADR, CS1, CS2, DS1, ER1
1937	001332	062307		DF10	: 0,0,0,0,0,0,0
1938					
1939			; ITEM12		
1940	001334	044076		EM12	: AFTER A POWER UP WITH
1941					: NO PACK ACKNOWLEDGE COMMAND
1942					: RHDS1 SHOULD HAVE MOL=1, VV=0
1943	001336	060571		DH10	: PC
1944					: TEST NO
1945					: FAILING REGISTER ADDR.
1946					: CONTENTS OF RHCS1
1947					: CONTENTS OF RHCS2
1948					: CONTENTS OF RHDS1
1949					: CONTENTS OF RHER1
1950	001340	062106		DT10	: \$ERRPC, \$STSTNM, \$BDADR, CS1, CS2, DS1, ER1
1951	001342	062307		DF10	: 0,0,0,0,0,0,0
1952					
1953			; ITEM13		
1954	001344	044204		EM13	: AFTER A POWER UP WITHOUT
1955					: ANY INIT RHCS1 SHOULD
1956					: HAVE GO=0, DVA=1, RDY=1
1957					: IE=0, DISREGARD
1958					: ALL OTHER BITS
1959	001346	060571		DH10	: PC
1960					: TEST NO
1961					: FAILING REGISTER ADDR.
1962					: CONTENTS OF RHCS1
1963					: CONTENTS OF RHCS2
1964					: CONTENTS OF RHDS1
1965					: CONTENTS OF RHER1
1966	001350	062106		DT10	: \$ERRPC, \$STSTNM, \$BDADR, CS1, CS2, DS1, ER1
1967	001352	062307		DF10	: 0,0,0,0,0,0,0
1968					
1969			; ITEM14		
1970	001354	044323		EM14	: AFTER POWER UP RHCC
1971					: SHOULD BE=0
1972	001356	060363		DH5	: PC
1973					: REG. ADDR.
1974					: GOOD DATA
1975					: RECEIVED DATA
1976	001360	062056		DT5	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT
1977	001362	062276		DF5	: 0,0,0,0
1978					
1979			; ITEM15		
1980	001364	044375		EM15	: PACK ACKNOWLEDGE CAUSED

1981				: AN ERROR
1982				: GOOD DATA IS BEFORE COMMAND
1983				: RECEIVED DATA IS AFTER COMMAND
1984	001366	060363	DH5	: PC
1985				: REG. ADDR.
1986				: GOOD DATA
1987				: RECEIVED DATA
1988	001370	062056	DT5	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT
1989	001372	062276	DF5	: 0,0,0,0
1990				
1991			: ITEM16	
1992	001374	044536	EM16	: GIVING A NO-OP COMMAND CAUSED
1993				: AN ERROR
1994				: GOOD DATA GIVES REGISTER
1995				: CONTENTS BEFORE COMMAND
1996				: RECEIVED DATA GIVES REGISTER
1997				: CONTENTS AFTER COMMAND
1998	001376	060363	DH5	: PC
1999				: REG. ADDR.
2000				: GOOD DATA
2001				: RECEIVED DATA
2002	001400	062056	DT5	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT
2003	001402	062276	DF5	: 0,0,0,0
2004				
2005			: ITEM17	
2006	001404	044664	EM17	: DRIVE CLEAR COMMAND
2007				: CAUSED AN ERROR
2008				: GOOD DATA GIVES WHAT SHOULD
2009				: BE THERE
2010				: RECEIVED DATA GIVES WHAT WAS
2011				: THERE AFTER COMMAND
2012	001406	060363	DH5	: PC
2013				: REG. ADDR.
2014				: GOOD DATA
2015				: RECEIVED DATA
2016	001410	062056	DT5	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT
2017	001412	062276	DF5	: 0,0,0,0
2018				
2019			: ITEM20	
2020	001414	045021	EM20	: READ-IN COMMAND GAVE AN ERROR
2021				: GOOD DATA HAS WHAT SHOULD BE THERE
2022				: RECEIVED DATA HAS WHAT WAS
2023				: AFTER COMMAND
2024	001416	060363	DH5	: PC
2025				: REG. ADDR.
2026				: GOOD DATA
2027				: RECEIVED DATA
2028	001420	062056	DT5	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT
2029	001422	062276	DF5	: 0,0,0,0
2030				
2031				
2032			: ITEM 21	
2033	001424	045170	EM21	: RHCS1 CONTENTS DURING
2034				: COMMAND WAS IN ERROR
2035	001426	060363	DH5	
2036	001430	062056	DT5	

2037	001432	062276	DF5	
2038				
2039				
2040	001434	045243	; ITEM 22 EM22	: RHDS1 CONTENTS DURING : COMM ANS WAS IN ERROR
2041				
2042	001436	060363	DH5	
2043	001440	062056	DT5	
2044	001442	062276	DF5	
2045				
2046				
2047	001444	045316	; ITEM 23 EM23	: UNLOAD COMMAND GAVE AN ERROR : GOOD DATA GIVES WHAT SHOULD : BE THERE : RECEIVED DATA GIVES WHAT WAS : THERE AFTER COMMAND
2048				
2049				
2050				
2051				
2052	001446	060363	DH5	
2053	001450	062056	DT5	
2054	001452	062276	DF5	
2055				
2056				
2057	001454	045465	; ITEM 24 EM24	: OFFSET COMMAND CAUSED AN ERROR : GOOD DATA IS WHAT SHOULD BE THERE : RECEIVED DATA GIVES WHAT WAS THERE : AFTER AN OFFSET COMMAND
2058				
2059				
2060				
2061	001456	060363	DH5	
2062	001460	062056	DT5	
2063	001462	062276	DF5	
2064				
2065				
2066	001464	045630	; ITEM 25 EM25	: RETURN TO CENTER LINE COMMAND : CAUSED AN ERROR : GOOD DATA GIVES WHAT SHOULD BE : THERE : RECEIVED DATA GIVES WHAT WAS : THERE AFTER COMMAND
2067				
2068				
2069				
2070				
2071				
2072	001466	060363	DH5	
2073	001470	062056	DT5	
2074	001472	062276	DF5	
2075				
2076				
2077	001474	046012	; ITEM 26 EM26	: 500 OFFSETS CAUSED AN ERROR
2078	001476	060750	DH26	: PC : CONT. OF RHCS1 : CONT. OF RHCS2 : CONT. OF RHDS1 : CONT. OF RHER1 : CONT. OF RHER2 : CONT. OF RHER3 : \$ERRPC, CS1, CS2, DS1, ER1, ER2, ER3 : 0,0,0,0,0,0,0
2079				
2080				
2081				
2082				
2083				
2084				
2085	001500	062126	DT26	
2086	001502	062316	DF26	
2087				
2088				
2089	001504	046102	; ITEM 27 EM27	: WRITE HEADER AND DATA : CAUSED IMPROPER REGISTER CHANGE : GOOD DATA GIVES WHAT : SHOULD BE THERE
2090				
2091				
2092				

2093				:RECEIVED DATA GIVES WHAT
2094				:WAS THERE AFTER COMMAND
2095	001506	060363	DH5	
2096	001510	062056	DT5	
2097	001512	062276	DF5	
2098				
2099				
2100	001514	046320	EM30	:WRITE HEADER AND DATA
2101				:CHANGED WRITE FROM BUFFER
2102	001516	061127	DH30	:PC
2103				:WORD NO
2104				:GOOD DATA
2105				:BAD DATA
2106	001520	062146	DT30	:SERRPC, ERWORD, \$GDDAT, \$BDDAT
2107	001522	062325	DF30	:0,0,0,0
2108				
2109				
2110	001524	046400	EM31	:READ HEADER AND DATA CAUSED
2111				:IMPROPER REGISTER CHANGE
2112				:GOOD DATA HAS WHAT SHOULD
2113				:BE THERE
2114				:RECEIVED DATA GIVES WHAT
2115				:WAS THERE AFTER COMMAND
2116	001526	060363	DH5	
2117	001530	062056	DT5	
2118	001532	062276	DF5	
2119				
2120				
2121	001534	046615	EM32	:WRITE HEADER AND DATA FOLLOWED
2122				:BY A READ HEADER AND DATA
2123				:CAUSED A READ/WRITE ERROR
2124	001536	061127	DH30	
2125	001540	062146	DT30	
2126	001542	062325	DF30	
2127				
2128				
2129	001544	046722	EM33	:READ DATA CAUSED IMPROPER REGISTER
2130				:CHANGE
2131				:GOOD DATA GIVES WHAT SHOULD BE THERE
2132				:RECEIVED DATA GIVES WHAT WAS THERE AFTER
2133				:COMMAND
2134	001546	060363	DH5	
2135	001550	062056	DT5	
2136	001552	062276	DF5	
2137				
2138				
2139	001554	047124	EM34	:READ DATA INCORRECT
2140	001556	061127	DH30	
2141	001560	062146	DT30	
2142	001562	062325	DF30	
2143				
2144				
2145	001564	047150	EM35	:WRITE DATA COMMAND CAUSED
2146				:IMPROPER REGISTER CHANGE
2147				:GOOD DATA GIVES WHAT SHOULD BE THERE
2148				:RECEIVED DATA GIVES REGISTER

2149					
2150	001566	060363			
2151	001570	062056			
2152	001572	062276			
2153					
2154					
2155	001574	047366			
2156					
2157	001576	061127			
2158	001600	062146			
2159	001602	062325			
2160					
2161					
2162	001604	047443			
2163					
2164					
2165					
2166					
2167					
2168	001606	060363			
2169	001610	062056			
2170	001612	062276			
2171					
2172					
2173	001614	047660			
2174					
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2178					
2179	001616	060363			
2180	001620	062056			
2181	001622	062276			
2182					
2183					
2184	001624	050067			
2185					
2186					
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2189					
2190					
2191					
2192					
2193	001626	060363			
2194	001630	062056			
2195	001632	062276			
2196					
2197					
2198	001634	050350			
2199					
2200					
2201					
2202					
2203					
2204					

;CONTENTS AFTER WRITE DATA

DH5
DT5
DF5

;ITEM 36
EM36

;WRITE DATA COMMAND CHANGED
;WRITE FROM BUFFER

DH30
DT30
DF30

;ITEM 37
EM37

;SEEK COMMAND CAUSED AN
;ERROR
;GOOD DATA GIVES WHAT SHOULD
;BE THERE
;RECEIVED DATA GIVES WHAT
;WAS THERE AFTER SEEK COMMAND.

DH5
DT5
DF5

;ITEM 40
EM40

;WRITE CHECK CAUSED AN
;IMPROPER REGISTER CHANGE
;GOOD DATA GIVES WHAT SHOULD
;BE THERE
;RECEIVED DATA GIVES WHAT WAS
;THERE AFTER COMMAND

DH5
DT5
DF5

;ITEM 41
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

DH5
DT5
DF5

;ITEM 42
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

001636	060363	DH5			
001640	062056	DT5			
001642	062276	DF5			
			: ITEM 43		: WRITING WITH WRITE LOCKED
001644	050626		EM43		: 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
001646	061127	DH30			
001650	062146	DT30			
001652	062325	DF30			
			: ITEM 44		
001654	051164		EM44		: ENABLING WRITES BY WRITE LOCK
					: BUTTON CAUSED AN ERROR
					: GOOD DATA GIVES WHAT SHOULD
					: BE THERE
					: RECEIVED DATA GIVES WHAT WAS
					: THERE AFTER WRITE LOCK
					: BUTTON ENABLED WRITES
001656	060363	DH5			
001660	062056	DT5			
001662	062276	DF5			
			: ITEM 45		
001664	051456		EM45		: TRANSFERRING ON LAST BLOCK IE. CYLINDER
					: 410, SECTOR 21, TRACK 18
					: CAUSED IMPROPER REGISTER
					: CHANGE
					: GOOD DATA GIVES WHAT SHOULD
					: BE THERE
					: RECEIVED DATA GIVES WHAT WAS
					: THERE AFTER TRANSFER
001666	060363	DH5			
001670	062056	DT5			
001672	062276	DF5			
			: ITEM 46		
001674	051752		EM46		: DATA READ FROM LAST
					: BLOCK IE. CYLINDER 410
					: SECTOR 21, TRACK 18 IS IN
					: ERROR
001676	061127	DH30			
001700	062146	DT30			
001702	062325	DF30			
			: ITEM 47		
001704	052065		EM47		: TRANSFERRING FROM NONEXISTANT
					: SECTOR CAUSED IMPROPER
					: REGISTER CHANGE
					: GOOD DATA GIVES WHAT SHOULD

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2500

001706 060363
001710 062056
001712 062276

DH5
DT5
DF5

:BE THERE
:RECEIVED DATA GIVES WHAT WAS
:THERE AFTER ATTEMPTED
:TRANSFER

001714 052347

:ITEM 50
EM50

:TRANSFERRING FROM NONEXISTANT
:SECTOR CAUSED DATA ERROR
:GOOD DATA GIVES WHAT
:SHOULD BE IN BUFFER
:RECEIVED DATA GIVES WHAT WAS
:IN BUFFER AFTER TRANSFER

001716 061127
001720 062146
001722 062325

DH30
DT30
DF30

001724 052566

:ITEM 51
EM51

:GIVING ILLEGAL FUNCTION CAUSED
:IMPROPER REGISTER CHANGE
:GOOD DATA GIVES WHAT SHOULD BE
:THERE
:RECEIVED DATA GIVES REGISTER
:CONTENTS AFTER ILLEGAL FUNCTION
:PC
:REG. ADDR.
:GOOD DATA
:RECEIVED DATA
:ILLEGAL FUNCTION
:\$ERRPC,REGADR,\$GDDAT,\$BDDAT,ILLEGL
:0,0,0,0,0

001726 061221

DH51

001730 062160
001732 062331

DT51
DF51

001734 053033

:ITEM 52
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

001736 060363
001740 062056
001742 062276

DH5
DT5
DF5

001744 053304

:ITEM 53
EM53

:READ HEADER AND DATA AFTER
:A SEARCH CAUSED AN ERROR

001746 061127
001750 062146
001752 062325

DH30
DT30
DF30

:ITEM 54



2317	001754	053372	EMS4	: ATTEMPTED OPERATION WITH : INVALID ADDRESS CAUSED : IMPROPER REGISTER CHANGE : GOOD DATA GIVES WHAT SHOULD : BE THERE : RECEIVED DATA GIVES WHAT WAS : THERE AFTER OPERATION
2318				
2319				
2320				
2321				
2322				
2323				
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2372				

: ITEM 55
EMS5

: 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

: ITEM 56
EMS6

: 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

: ITEM 57
EMS7

: 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

: ITEM 60
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

2373					: WAS COMPLETE
2374	002016	061340		DH60	: PC
2375					: REG. ADDR.
2376					: GOOD DATA
2377					: RECEIVED DATA
2378					: MODIFYING REGISTER
2379	002020	062174		DT60	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT, \$BDADR
2380	002022	062336		DF60	: 0,0,0,0,0
2381					
2382					: ITEM 61
2383	002024	055236		EM61	: DEVICE NOT AVAILBE BEFOR COMMAND WAS TO BE GIVEN
2384	002026	061455		DH61	: PC
2385					: PC OF JSR
2386					: RHDS1
2387	002030	062210		DT61	: \$ERRPC, PCJSR, \$BDADR
2388	002032	062343		DF61	: 0,0,0
2389					
2390					: ITEM 62
2391	002034	055236		EM61	: DEVICE NOT AVAILBE BEFOR COMMAND WAS TO BE GIVEN
2392	002036	061540		DH62	: PC
2393					: PC OF JSR
2394					: RHCS1 WAS
2395	002040	062220		DT62	: \$ERRPC, PCJSR, \$BDADR
2396	002042	062346		DF62	: 0,0,0
2397					
2398					: ITEM 63
2399					
2400	002044	055322		EM63	: RHDS1 CONTENTS DURING
2401					: COMMAND WAS IN ERROR
2402	002046	060363		DH5	
2403	002050	062056		DT5	
2404	002052	062276		DF5	
2405					
2406					: ITEM 64
2407					
2408	002054	055375		EM64	: RECALIBRATE COMMAND CAUSED
2409					: IMPROPER REGISTER CHANGE.
2410					: GOOD DATA GIVES WHAT SHOULD BE
2411					: THERE.
2412					: RECEIVED DATA GIVES WHAT WAS THERE
2413					: AFTER COMMAND
2414	002056	060363		DH5	
2415	002060	062056		DT5	
2416	002062	062276		DF5	
2417					
2418					: ITEM65
2419					
2420					
2421	002064	055614		EM65	: INTERRUPT FAILING
2422	002066	061613		DH65	: PC
2423					: TEST NO
2424					: CONTENTS OF RHCS1
2425					: CONTENTS OF RHAS
2426					: CONTENTS OF RHDS1
2427	002070	062230		DT65	: \$ERRPC, TSTNM, CS1, AS, DS1
2428	002072	062351		DF65	: 0,0,0,0,0

2485				: READ DATA CAUSED IMPROPER REGISTER
2486				: CHANGE
2487				: GOOD DATA GIVES WHAT SHOULD BE THERE
2488				: RECEIVED DATA GIVES WHAT WAS THERE AFTER
2489				: COMMAND
2490	002136	060363	DH5	
2491	002140	062056	DT5	
2492	002142	062276	DF5	
2493				
2494				
2495	002144	057222	: ITEM 73	: WHILE USING UNIBUS B
2496			EM73	: READ DATA INCORRECT
2497	002146	061127	DH30	
2498	002150	062146	DT30	
2499	002152	062325	DF30	
2500				
2501				
2502	002154	057274	: ITEM 74	: WHILE USING UNIBUS B
2503			EM74	: WRITE DATA COMMAND CAUSED
2504				: IMPROPER REGISTER CHANGE
2505				: GOOD DATA GIVES WHAT SHOULD BE THERE
2506				: RECEIVED DATA GIVES REGISTER
2507				: CONTENTS AFTER WRITE DATA
2508	002156	060363	DH5	
2509	002160	062056	DT5	
2510	002162	062276	DF5	
2511				
2512				
2513	002164	057540	: ITEM 75	: WHILE USING UNIBUS B
2514			EM75	: WRITE DATA COMMAND CHANGED
2515				: WRITE FROM BUFFER
2516	002166	061127	DH30	
2517	002170	062146	DT30	
2518	002172	062325	DF30	
2519				
2520				
2521	002174	057643	: ITEM 76	: WHILE USING UNIBUS B
2522			EM76	: WRITE CHECK CAUSED AN
2523				: IMPROPER REGISTER CHANGE
2524				: GOOD DATA GIVES WHAT SHOULD
2525				: BE THERE
2526				: RECEIVED DATA GIVES WHAT WAS
2527				: THERE AFTER COMMAND
2528	002176	060363	DH5	
2529	002200	062056	DT5	
2530	002202	062276	DF5	

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2580
2581
2582
2583
2584
2585
2586

002204 000254

000001
000002
000004
000010
000020
000040
000100
000200
000400
001000
002000
004000
010000
020000
040000
100000

;RH11 REGISTERS

RPVEC: 254 ;RPO4 VECTOR ADDRESS

;WORD COUNT REGISTER (RHWC)
;EACH BIT IS CALLED BY BIT NUMBER

;BUS ADDRESS REGISTER (RHBA)
;EACH BIT IS CALLED BY BIT NUMBER

;CONTROL AND STATUS REGISTER 2 (RHCS2)

US1= 1	;UNIT SELECT (BIT #0)
US2= 2	;UNIT SELECT (BIT #1)
US4= 4	;UNIT SELECT (BIT #2)
BAI= 10	;BUS ADDRESS INCREMENT INHIBIT (BIT #3)
UNIB= 20	;UNIBUS B DC LO (BIT #4)
CLR= 40	;CLEAR (BIT #5)
IR= 100	;INPUT READY (BIT #6)
OR= 200	;OUTPUT READY (BIT #7)
MPE= 400	;MASS BUS PARITY ERROR (BIT #8)
MXF= 1000	;MISSED TRANSFER ERROR (BIT #9)
PGE= 2000	;PROGRAM ERROR (BIT #10)
NEM= 4000	;NON EXISTANT MEMORY (BIT #11)
NED= 10000	;NON EXISTANT DRIVE (BIT #12)
UPE= 20000	;UNIBUS PARITY ERROR (BIT #13)
WCE= 40000	;WRITE CHECK ERROR (BIT #14)
DLT= 100000	;DATA LATE (BIT #15)

;DATA BUFFER REGISTER (RHDB)
;EACH BIT IS CALLED BY BIT NUMBER

;RPO4 REGISTERS

;CONTROL AND STATUS 1 REGISTER. (#00)

GO= 1	;GO (BIT #0)
IE= 100	;INTERRUPT ENABLE (BIT #6)
RDY= 200	;READY (BIT #7)
A16= 400	;HIGH ORDER UNIBUS BITS (BIT #8)
A17= 1000	;HIGH ORDER UNIBUS BITS (BIT #9)
PSEL= 0	;PORT SELECT (BIT #10)
DVA= 4000	;DEVICE AVAILABLE (BIT #11)

2587	020000	MCPE= 20000	;MASSBUSS PARITY ERROR (BIT #13)
2588	040000	TRE= 40000	;TRANSFER ERROR (BIT #14)
2589	100000	SC= 100000	;SPECIAL CONDITION (BIT #15)
2590			
2591			
2592			
2593	000001	DFF5= 1	;DRIVE FORWARD 5"/SEC. (BIT #0)
2594	000002	DFF20= 2	;DRIVE FORWARD 20"/SEC. (BIT #1)
2595	000004	DIGB= 4	;DRIVE TO INNER GAVRD BAND (BIT #2)
2596	000010	GRV= 10	;GO REVERSE (BIT #3)
2597	000020	DL64= 20	;DIFFERENCE LESS THAN 64 (BIT #4)
2598	000040	DE1= 40	;DIFFERENCE EQUALS 1 (BIT #5)
2599	000100	VV= 100	;VOLUME VALID (BIT #6)
2600	000200	DRY= 200	;DRIVE READY (BIT #7)
2601	000400	DPR= 400	;DRIVE PRESENT (BIT #8)
2602	001000	PROG= 1000	;PROGRAMABLE (BIT #9)
2603	002000	LBT= 2000	;LAST SECTOR TRANSFERRED (BIT #10)
2604	004000	WRL= 4000	;WRITE LOCK (BIT #11)
2605	010000	MOL= 10000	;MEDIUM ON-LINE (BIT #12)
2606	020000	PIP= 20000	;POSITIONING OPERATION IN PROGRESS (BIT #13)
2607	040000	ERR= 40000	;COMPOSIT ERROR. (BIT #14)
2608	100000	ATA= 100000	;ATTENTION ACTIVE (BIT #15)
2609			
2610			
2611	000001		
2612	000002		
2613	000004		
2614	000010		
2615	000020		
2616	000040		
2617	000100		
2618	000200		
2619	000400		
2620	001000		
2621	002000		
2622	004000		
2623	010000		
2624	020000		
2625	040000		
2626	100000		
2627			
2628			
2629			
2630	000001		
2631	000002		
2632	000004		
2633	000010		
2634	000020		
2635	000040		
2636	001000		
2637			
2638			
2639			
2640	000001		
2641	000002		
2642	000004		

;STATUS REGISTER (RHDS1) (#01)

;ERROR REGISTER #01 (RHER1) (#02)

;MAINTAINABILITY REGISTER (RHMR)(#03)

;ATTENTION SUMMARY PSEUDO-REGISTER (RHAS) (#04)



2643 000010
 2644 000020
 2645 000040
 2646 000100
 2647 000200
 2648
 2649
 2650
 2651
 2652
 2653
 2654
 2655 000001
 2656 000002
 2657 000004
 2658 000010
 2659 000020
 2660 000040
 2661 000100
 2662 000200
 2663 000400
 2664 001000
 2665 002000
 2666 004000
 2667 010000
 2668 020000
 2669 040000
 2670 100000
 2671
 2672
 2673
 2674 000001
 2675 000002
 2676 000004
 2677 000010
 2678 000020
 2679 000040
 2680 000100
 2681 000200
 2682 000400
 2683 001000
 2684 002000
 2685 004000
 2686 010000
 2687 020000
 2688 100000
 2689
 2690
 2691
 2692 000001
 2693 000002
 2694 000004
 2695 000010
 2696 000020
 2697 000040
 2698

AT3= 10
 AT4= 20
 AT5= 40
 AT6= 100
 AT7= 200

;DEVICE 3 (BIT #3)
 ;DEVICE 4 (BIT #4)
 ;DEVICE 5 (BIT #5)
 ;DEVICE 6 (BIT #6)
 ;DEVICE 7 (BIT #7)

;DESIRED SECTOR/TRACK ADDRESS REGISTER (RHDST) (#1)
 ;EACH BIT IS CALLED BY BIT NUMBER
 ;DRIVE TYPE REGISTER (RHDT) (#06)
 ;EACH BIT IS CALLED BY BIT NUMBER
 ;LOOK-AHEAD REGISTER (RHLA) (#07)

EXT1= 1
 EXT2= 2
 EXT4= 4
 EXT10= 10
 EXT20= 20
 EXT40= 40
 SC1= 100
 SC2= 200
 SC4= 400
 SC10= 1000
 SC20= 2000
 TRK1= 4000
 TRK2= 10000
 TRK4= 20000
 TRK10= 40000
 TRK20= 100000

;EXTENSION 1 (BIT #0)
 ;EXTENSION 2 (BIT #1)
 ;EXTENSION 3 (BIT #2)
 ;EXTENSION 4 (BIT #3)
 ;EXTENSION 5 (BIT #4)
 ;EXTENSION 6 (BIT #5)
 ;SECTOR COUNT FIELD 0 (BIT #6)
 ;SECTOR COUNT FIELD 1 (BIT #7)
 ;SECTOR COUNT FIELD 2 (BIT #8)
 ;SECTOR COUNT FIELD 3 (BIT #9)
 ;SECTOR COUNT FIELD 4 (BIT #10)
 ;TRACK FIELD 1 (BIT #11)
 ;TRACK FIELD 2 (BIT #12)
 ;TRACK FIELD 3 (BIT #13)
 ;TRACK FIELD 4 (BIT #14)
 ;TRACK FIELD 5 (BIT #15)

;ERROR REGISTER #2 (RHER2) (#10)

WCU= 1
 CSF= 2
 WSU= 4
 CSU= 10
 MSE= 20
 TDF= 40
 TUF= 100
 FEN= 200
 WRU= 400
 MHS= 1000
 NHS= 2000
 IXE= 4000
 VU30= 10000
 PLU= 20000
 ACU= 100000

;WRITE CURRENT UNSAFE (BIT #0)
 ;CURRENT SINK FAILURE (BIT #1)
 ;WRITE SELECT UNSAFE (BIT #2)
 ;CURRENT SWITCH UNSAFE (BIT #3)
 ;MOTOR SEQUENCE ERROR (BIT #4)
 ;TRANSITIONS DETECTOR FAILURE (BIT #5)
 ;TRANSITIONS UNSAFE (BIT #6)
 ;FAILSAFE ENABLED (BIT #7)
 ;WRITE READY UNSAFE (BIT #8)
 ;MULTIPLE HEAD SELECT (BIT #9)
 ;NO HEAD SELECTION (BIT #10)
 ;INDEX ERROR (BIT #11)
 ;30VOLT UNSAFE (BIT #12)
 ;PLO UNSAFE (BIT #13)
 ;ACUNSAFE (BIT #15)

;OFFSET REGISTER (RHOF) (#11)

OF25= 1
 OF50= 2
 OF100= 4
 OF200= 10
 OF400= 20
 OF800= 40

;OFFSET 25 MICRO INCHES (BIT #0)
 ;OFFSET 50 MICRO INCHES (BIT #1)
 ;OFFSET 100 MICRO INCHES (BIT #2)
 ;OFFSET 200 MICRO INCHES (BIT #3)
 ;OFFSET 400 MICRO INCHES (BIT #4)
 ;OFFSET 800 MICRO INCHES (BIT #5)



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2699      000200      OFREV= 200      ;OFFSET NEGATIVE (REVERSE) (BIT #5)
2700      002000      HCI= 2000      ;HEADER COMPARE INHIBIT (BIT #10)
2701      004000      ECI= 4000      ;ERROR CORRECTION CODE INHIBIT (BIT #11)
2702      010000      FMT22= 10000    ;FORMAT BIT (BIT #12)
2703
2704      ;DESIRED CYLINDER ADDRESS (RHCA) (#12)
2705      ;EACH BIT IS CALLED BY BIT NUMBER.
2706
2707
2708
2709
2710      ;CURRENT CYLINDER ADDRESS (RHCC) (#13)
2711      ;EACH BIT IS CALLED BY BIT NUMBER
2712
2713
2714
2715
2716      ;SERIAL NUMBER REGISTER (RHSN) (#14)
2717      ;EACH IS CALLED BY BIT NUMBER
2718
2719
2720
2721
2722
2723      ;ERROR REGISTER #03 (RHER3) (#15)
2724      000001      PSU= 1      ;PACK SPEED UNSAFE (BIT #0)
2725      000002      VUF= 2      ;VELOCITY UNSAFE (BIT #1)
2726      000010      UWR= 10     ;ANY UNSAFE EXCEPT READ/WRITE (BIT #3)
2727      000020      PRE= 20     ;DISK PACK ROTATION ERROR (BIT #4)
2728      000040      ACL= 40     ;AC LOW (BIT #5)
2729      000100      DCL= 100    ;DC LOW (BIT #6)
2730      040000      SKI= 40000   ;SEEK INCOMPLETE (BIT #14)
2731      100000      OCYL= 100000  ;OFF CYLINDER (BIT #15)
2732
2733
2734
2735      ;ECC POSITION REGISTER (RHEC1) (#16)
2736      ;EACH BIT IS CALLED BY BIT NUMBER
2737
2738
2739
2740
2741      ;ECC PATTERN REGISTER (RHEC2) (#17)
2742      ;EACH BIT IS CALLED BY BIT NUMBER
2743
2744
2745
2746
2747      ;*****
2748

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.SBTTL REGISTER ADDRESSES

;RPO4 DISK I/O REGISTERS LOCATED IN THE RH11 CONTROLLER

002206 176722
002210 176702
002212 176704
002214 176710

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

;RPO4 DISK I/O REGISTERS LOCATED IN THE RPO4 DEVICE LOGIC

002216 176700
002220 176714
002222 176706
002224 176740
002226 176732
002230 176734
002232 176742
002234 176716
002236 176724
002240 176712
002242 176726
002244 176730
002246 176744
002250 176746
002252 176736
002254 176720

RHCS1: 176700 ; CONTROL AND STATUS 1
 RHER1: 176714 ; ERROR #1
 RHDST: 176706 ; DESIRED SECTOR/TRACK ADDRESS
 RHER2: 176740 ; ERROR #2
 RHOF: 176732 ; OFFSET
 RHCA: 176734 ; DESIRED CYLINDER ADDRESS
 RHER3: 176742 ; ERROR #3
 RHAS: 176716 ; ATTENTION SUMMARY
 RHMR: 176724 ; MAINTAINABILITY
 RHDS1: 176712 ; DRIVE STATUS
 RHDT: 176726 ; DRIVE TYPE
 RHSN: 176730 ; SERIAL NUMBER
 RHEC1: 176744 ; ECC POSITION
 RHEC2: 176746 ; ECC PATTERN
 RHCC: 176736 ; CURRENT CYLINDER ADDRESS
 RHLA: 176720 ; LOOK-AHEAD

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

002256 172540
002260 172542
002262 172544

PCLCSR: 172540 ; CONTROL AND STATUS REGISTERS
 PCLBUF: 172542 ; COUNT SET BUFFER
 PCLCTR: 172544 ; COUNTER

2800
 2801
 2802
 2803
 2804
 2805
 2806 002264 000000
 2807 002266 000000
 2808 002270 000000
 2809 002272 000000
 2810
 2811
 2812 002274 000000
 2813 002276 000000
 2814 002300 000000
 2815 002302 000000
 2816 002304 000000
 2817 002306 000000
 2818 002310 000000
 2819 002312 000000
 2820 002314 000000
 2821 002316 000000
 2822 002320 000000
 2823 002322 000000
 2824 002324 000000
 2825 002326 000000
 2826 002330 000000
 2827 002332 000000
 2828
 2829
 2830

;THE FOLLOWING LOCATIONS ARE RESERVED FOR REGISTERS
 ;ANY TIME THERE IS AN ERROR ALL THESE WILL BE FILLED
 ;ONLY SOME MAY BE PRINTED BUT ALL WILL BE FILLED TRUE
 ;FOR THE TIME JUST AFTER THE "ERROR" ERROR COMMAND

DB:	0	; DATA BUFFER
WC:	00	; WORD COUNT
BA:	00	; BUS ADDRESS
CS2:	0	; CONTROL AND STATUS 2
CS1:	0	; CONTROL AND STATUS 1
ER1:	00	; ERROR #1
DST:	00000000	; DESIRED SECTOR/TRACK ADDRESS
ER2:	00000000	; ERROR #2
OF:	00000000	; OFFSET
CA:	00000000	; DESIRED CYLINDER ADDRESS
ER3:	00000000	; ERROR #3
AS:	00000000	; ATTENTION SUMMARY
MR:	00000000	; MAINTAINABILITY
DS1:	00000000	; DRIVE STATUS
DT:	00000000	; DRIVE TYPE
SN:	00000000	; SERIAL NUMBER
EC1:	00000000	; ECC POSITION
EC2:	00000000	; ECC PATTERN
CC:	00000000	; CURRENT CYLINDER ADDRESS
LA:	0	; LOOK-AHEAD

2831
2832
2833
2834
2835
2836 002334
2837 002334 000000
2838 002336 000002
2839 002340 000006
2840 002342 000010
2841 002344 000012
2842 002346 000030
2843 002350 000050
2844 002352 000052
2845 002354 000060
2846 002356 000062
2847 002360 000070
2848 002362 000072
2849 002364 000004
2850 002366 000014
2851 002370 000016
2852 002372 000022
2853 002374 000020
2854 002376 000000
2855
2856
2857 002400 000422
2858 003444 000422
2859
2860
2861
2862
2863 004510 000000
2864 004512 000000
2865 004514 000000
2866 004516 000000
2867
2868
2869
2870
2871 004520 000000
2872
2873
2874 004522 000024
2875 004572 000000
2876 004574 000000
2877
2878
2879
2880
2881 004576 001 002 004
2882 004601 010 020 040
2883 004604 100 200
2884
2885
2886

;FUNCTION EQUATES

;TABLE OF FUNCTIONS FOR RHCS1 THEN "GO" BIT HAS TO BE SET

FUTABL:
NOPERA: 0 ;NO OPERATION
UNLOAD: 2 ;UNLOAD (STAND BY)
RECALI: 6 ;RECALIBRATE
DCLEAR: 10 ;DRIVE CLEAR
RELEAS: 12 ;RELEASE (DUAL-PORT OPERATION)
SERCH: 30 ;SEARCH COMMAND
WRCHK: 50 ;WRITE CHECK DATA
WRCHDT: 52 ;WRITE CHECK HEADER AND DATA
WRIDAT: 60 ;WRITE DATA
WRIFOR: 62 ;WRITE HEADER AND DATA (FORMAT)
READAT: 70 ;READ DATA
REFOR: 72 ;READ HEADER AND DATA
SEECOM: 4 ;SEEK COMMAND
OFSETC: 14 ;OFFSET COMMAND
RETCL: 16 ;RETURN TO CENTERLINE
PKACK: 22 ;PACK ACKNOWLEDGE
READIN: 20 ;READ IN
ILLEGL: .WORD 0 ;COMPUTED ILLEGAL FUNCTION

;DATA BUFFER FOR READ WRITE

WRFROM: .BLKW 274. ;WRITE FROM THIS BUFFER
REINTO: .BLKW 274. ;READ INTO THIS BUFFER

;RESERVED LOCATIONS

REGADR: 0 ;SAVE REGISTER ADDRESS HERE
ERWORD: 0 ;SAVE ERROR WORD NUMBER HERE
TSTNM: 0 ;TEST NUMBER
RP4VEC: 0 ;CONTAINS ADDRESS OF LOCATION
;WHERE AN RPO4 INTERRUPT IS TO VECTOR TO
;THIS MUST BE MOVED INTO 'RPVEC' TO BE
;EFFECTIVE.

OFSTVL: 0 ;OFFSET VALUE USED IN OFFSET TEST

SAVERE: .BLKW 20. ;BLOCK TO SAVE REGISTERS
FINALA: 0 ;SAVE LOOK AHEAD REGISTER AT END OF OPERATION
FINACC: 0 ;SAVE CURRENT CYLINDER REGISTER AT END OF OPERATION

;TABLE FOR ATTENTION BITS

;ATTENTION TABLE
ATABLE: .BYTE 1,2,4,10,20,40,100,200

```

004606 000010
004608 000000
004610 000000
004632 000000
004634 000000
004636 000000
004638 000000
004640 000000
004644 000000
004646 000000
004650 000000
004652 000000
004654 000000
004656 000000
004660 000000

```

```

:RESERVED LOCATIONS FOR UNIT SELECT
UNITS: .BLKW 8. :THIS IS FILLED WITH -1
UNIT: .WORD 0 :UNIT UNDER TEST
NOUNIT: .WORD 0 :NUMBER OF UNITS PRESENT
:NUSED TO KEEP TRACK OF UNIT UNDER TEST
NUNIT: .WORD 0 :USED TO DETERMIN IF THERE ARE MORE
:N THAN ONE UNIT
NOPUSH: 0 :ALL ONES INDICATE NONE OF THE OPERATOR
:INTERVENTION TESTE WILL BE PERFORMED
SELECT: .WORD 0 :ALL ONES INDICATE UNIT TO BE SELECTED
UNITSL: .WORD 0 :UNIT NO. SELECTED
UBUSB: 0 :IF ZERO UBIBUS PRESENT
:IF ONES NO UNIBUS B

ERRFLG: 0 :ERROR FLAG
FIRST: 0 :IF ZERO WILL TYPE HEADER
:IF ONES WILL NOT TYPE HEADER

ATTENT: 0 :ATTENTION BIT FOR PRESENT UNIT
TOTALAT: 0 :TATAL ATTENTION BITS

TMP0: .WORD 0 :TEMP STORAGE
TMP1: .WORD 0 :TEMP STORAGE
TMP4: .WORD 0 :TEMP STORAGE

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2915 .SBTTL REGISTER TEST
2916 004662 012737 177777 004634 BEGIN1: MOV #-1, @#NOPUSH ; JUMP OVER OPERATOR REQUIRED TESTS
2917 004670 005037 004636 CLR @#SELECT ; DO NOT SELECT UNIT
2918 004674 000412 BR START
2919 004676 012737 177777 004636 BEGIN2: MOV #-1, @#SELECT ; SELECT UNIT
2920 004704 005037 004634 CLR @#NOPUSH ; DO NOT JUMP OVER ANY TEST
2921 004710 000404 BR START
2922 004712 005037 004636 BEGIN: CLR @#SELECT ; DO NOT SELECT UNIT
2923 004715 005037 004634 CLR @#NOPUSH ; DO NOT JUMP OVER ANY TEST
2924 ; NORMAL RUN
2925
2926 START:
2927 004722 0127 001100 MOV #SCMTAG, R6 ; FIRST LOCATION TO BE CLEARED
2928 004726 00502 CLR (R6)+ ; CLEAR MEMORY LOCATION
2929 004730 022706 001126 CMP #SBDDAT, R6 ; DONE?
2930 004734 001374 BNE .-6 ; LOOP BACK IF NO
2931 004736 012706 001000 MOV #STACK, SP ; SETUP THE STACK POINTER
2932 004742 012737 037560 000020 MOV #SCOPE, @#IOTVEC ; IOT VECTOR FOR SCOPE ROUTINE
2933 004750 012737 000340 000022 MOV #340, @#IOTVEC+2 ; LEVEL 7
2934 004756 012737 041242 000030 MOV #ERROR, @#EMTVEC ; EMT VECTOR FOR ERROR ROUTINE
2935 004764 012737 000340 000032 MOV #340, @#EMTVEC+2 ; LEVEL 7
2936 004772 012737 042762 000034 MOV #TRAP, @#TRAPVEC ; TRAP VECTOR FOR TRAP CALLS
2937 005000 012737 000340 000036 MOV #340, @#TRAPVEC+2 ; LEVEL 7
2938 005006 012737 043026 000024 MOV #SPWRDN, @#PWRVEC ; POWER FAILURE VECTOR
2939 005014 012737 000340 000026 MOV #340, @#PWRVEC+2 ; LEVEL 7
2940 005022 005067 174162 CLR $TIMES ; INITIALIZE NUMBER OF ITERATIONS
2941 005026 005067 174160 CLR $ESCAPE ; CLEAR THE ESCAPE ON ERROR ADDRESS
2942 005032 112767 000001 174055 MOV #1, $ERMAX ; ALLOW ONE ERROR PER TEST
2943 005040 012767 005040 174040 MOV #., $LPADR ; INITIALIZE THE LOOP ADDRESS FOR SCOPE
2944 005046 012767 005046 174034 MOV #., $LPERR ; SETUP THE ERROR LOOP ADDRESS
2945 005054 013746 000004 MOV @#4, -(SP) ; SAVE ERROR VECTOR
2946 005060 013746 000006 MOV @#6, -(SP)
2947 005064 012767 005100 172712 MOV #64$, 4 ; SET UP TIME OUT VECTOR
2948 005072 005777 174040 TST @SWR ; TRY TO REFERENCE HARDWARE SWR
2949 005076 000407 BR 65$ ; BRANCH IF NO TIMEOUT TRAP OCCURS
2950 005100 012767 000176 174030 64$: MOV #SWREG, SWR ; POINT TO SOFTWARE SWR
2951 005106 012767 000174 174024 MOV #DISPREG, DISPLAY ; POINT TO SOFTWARE DISPLAY REG
2952 005114 022626 CMP (SP)+, (SP)+ ; RESTORE STACK
2953 005116 012637 000006 65$: MOV (SP)+, @#6 ; RESTORE ERROR VECTOR
2954 005122 012637 000004 MOV (SP)+, @#4
2955
2956
2957 005126 012767 000000 172642 MOV #0, PS ; SET PROCESSOR STATUS TO 0
2958 005134 012737 000200 000036 MOV #200, @#TRAPVEC+2 ; TRAP PRIORITY = 4
2959 005142 013700 002204 MOV @#RPVEC, R0 ; GET RP VECTOR ADDRESS
2960 005146 012720 037516 MOV #RPVECT, (R0)+ ; THIS IS FOR UNTIMELY INTERRUPTS
2961 005152 012710 000340 MOV #340, (R0) ; RPO4 INTERRUPT SERVICE ROUTINE
2962 ; PRIORITY = 7
2963
2964 005156 004737 040510 JSR PC, @#STKINT ; INITILIZE THE TK
2965 005162 005737 004646 TST @#FIRST ; IS THIS FIRST TIME ROUND
2966 005166 001001 BNE 1$ ; BRANCH IF NOT
2967 005170 000402 BR 2$
2968 005172 000137 005776 1$: JMP @#SND1
2969 005176 104400 005204 2$: TYPE .+4 ; TYPE ASCIZ STRING
2970 005202 000440 BR 66$ ; GET OVER THE ASCIZ

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2971      005304      104400      005312      66$:  ;;.ASCIZ      <15><12>/RPO4 FUNCTIONAL CONTROLLER TEST PART I (STATIC 2A) - DERP
2972      005304      104400      005312      TYPE      +4      ;;TYPE ASCIZ STRING
2973      005304      104400      005312      BR      67$      ;;GET OVER THE ASCIZ
2974      005310      000435      005312      ;;.ASCIZ      <15><12>/MAKE SURE PORT SWITCH ON DRIVE IS LOCKED ON EITHER PORT/
2975      005404      104400      005412      67$:  TYPE      +4      ;;TYPE ASCIZ STRING
2976      005404      104400      005412      BR      68$      ;;GET OVER THE ASCIZ
2977      005410      000440      005412      ;;.ASCIZ      <15><12>/IF CHANGE IS REQUIRED ON PORT SWITCH POWER DRIVE DOWN AND
2978      005512      104400      005520      68$:  TYPE      +4      ;;TYPE ASCIZ STRING
2979      005512      104400      005520      BR      69$      ;;GET OVER THE ASCIZ
2980      005516      000416      005520      ;;.ASCIZ      <15><12>/AGAIN AFTER SWITCH CHANGE/
2981      005554      104400      005562      69$:  TYPE      +4      ;;TYPE ASCIZ STRING
2982      005554      104400      005562      BR      70$      ;;GET OVER THE ASCIZ
2983      005560      000432      005562      ;;.ASCIZ      <15><12>/ALL DCL UNDER TEST MUST BE LOCKED ON CORRECT PORT/
2984      005646      104400      005654      70$:  TYPE      +4      ;;TYPE ASCIZ STRING
2985      005646      104400      005654      BR      71$      ;;GET OVER THE ASCIZ
2986      005652      000427      005654      ;;.ASCIZ      <15><12>/ALL DCL NOT UNDER TEST MUST BE SWITCHED OFF/
2987      005732      104400      005740      71$:  TYPE      +4      ;;TYPE ASCIZ STRING
2988      005732      104400      005740      BR      72$      ;;GET OVER THE ASCIZ
2989      005736      000417      005740      ;;.ASCIZ      <15><12>/OR LOCKED ON THE OTHER PORT/
2990      005776      012737      177777      004646      72$:  SND1:  MOV      #-1,2#FIRST      ;NEXT TIME DO NOT GIVE HEADER
2991      005776      012737      177777      004646      ;IS THERE A P-CLOCK (KW11-P) ON THE SYSTEM
2992      005776      012737      177777      004646      ;IF SO MAKE 'WAT' TRAPS GO TO 'WAIT.P'
2993      005776      012737      177777      004646      ;IF SO MAKE RPO4 INTERRUPTS GO TO 'TIME 1'
2994      005776      012737      177777      004646      ;IF NOT MAKE 'WAT' TRAPS GO TO 'WAIT.T'
2995      005776      012737      177777      004646      ;IF NOT MAKE RPO4 INTERRUPTS GO TO 'TIME 2'
2996      005776      012737      177777      004646      ;THE NEXT LINE IS TO BE ADDED LATER
2997      005776      012737      177777      004646      ;AND THE JUMP AND NOP REMOVED
2998      005776      012737      177777      004646      ;FOR NOW NO CLOCK WILL BE USED
2999      005776      012737      177777      004646      ;MOV2#1$,2#ERRVEC;SET TIME-OUT VECOTR
3000      006004      000137      006034      JMP      2#1$      ;DO NOT USE CLOCK
3001      006010      000240      006034      NOP
3002      006012      005737      002256      TST      2#PCLCSR      ;REFERENCE P-CLOCK STATUS REGISTER
3003      006016      012737      035010      043024      MOV      #WAIT.P,2#STRPAD+20 ;ADDRESS = 172540
3004      006024      012737      034750      004516      MOV      #TIME1,2#RP4VEC ;THERE IS A P-CLOCK
3005      006032      000406      000406      BR      2$      ;THERE IS A P CLOCK SO
3006      006034      012737      035250      043024      1$:  BR      2$      ;VECTOR TO TME1
3007      006034      012737      034762      004516      MOV      #WAIT.T,2#STRPAD+20 ;THERE IS NO P-CLOCK
3008      006042      012737      034762      004516      MOV      #TIME2,2#RP4VEC
3009      006050      012737      177777      041404      2$:  MOV      #-1,2#PRITEM      ;CLEAR PREVIOUS ITEM NUMBER.
3010      006056      005737      004636      TST      2#SELECT      ;WAS IT A 200 START
3011      006062      001442      BEQ      .TST1      ;BRANCH IF STARTING FROM 200
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3027 006064 104400 006072          TYPE          +4          ;;TYPE ASCIZ STRING
3028 006070 000424          BR          64$          ;;GET OVER THE ASCIZ
3029          ;;.ASCIZ          <15><12>/SELECT UNIT NUMBER TO BE TESTED ? /<15><12>
3030 006142          64$:
3031 006142 104407          RDOCT
3032 006144 042716 177770          BIC          #177770,(SP)          ;ONLY KEEP LAST 3 BITS
3033 006150 011637 004626          MOV          (SP),@#UNIT          ;SAVE UNIT TO BE TESTED
3034 006154 012637 004640          MOV          (SP)+,@#UNITSL        ;SAVE UNIT TO BE TESTED
3035
3036
3037
3038
3039 006160 001403          BEQ          TST1          ;BRANCH IF STARTING FROM 200
3040
3041 006162 013737 004640 004626          MOV          @#UNITSL,@#UNIT        ;SET UNIT NUMBER
3042
3043          ;*****
3044          ;*TEST 1          REFERENCE EACH REGISTER
3045          ;*          REFERENCE EACH REGISTER BY A MOVE INSTRUCTION
3046          ;*****
3047 006170 000004          TST1: SCOPE
3048 006172 012767 000001 173010          MOV          #1,$TIMES          ;;DO 1 ITERATION
3049 006200 012706 001000          MOV          #STACK,$SP          ;SET UP STACK POINTER
3050 006204 012737 041250 000030          MOV          #REGSA1,@#EMTVEC      ;ERROR VECTOR SO THAT
3051          ;NO REGISTERS ARE SAVED
3052 006212 012737 006240 000004          MOV          #2$, @#ERRVEC        ;SET UP FOR BUS TIMEOUT
3053 006220 012700 000024          MOV          #24,$R0          ;THERE ARE 24 REG TO TEST
3054 006224 012701 002206          MOV          #RH0B,$R1          ;R1 NOW HAS ADDR OF ADDR OF FIRST REG.
3055 006230 013102          1$: MOV          @($R1)+,$R2          ;READ HARDWARE REG.
3056 006232 005300          DEC          $R0          ;COUNT DOWN
3057 006234 001375          BNE          1$          ;BRANCH IF 24 NOT DONE
3058 006236 000471          BR          3$          ;BRANCH IF 24 DONE
3059 006240 012737 000006 000004          2$: MOV          #ERRVEC+2,@#ERRVEC ;RESTORE TRAP CATCHER
3060 006246 022626          CMP          (SP)+,(SP)+          ;CLEAN STACK
3061 006250 016167 177776 172720          MOV          -2($R1),$TMP1        ;STORE FAILING REG ADDR
3062 006256 104007          ERROR          7          ;REGISTER NON EXISTANT
3063 006260 032737 020000 001136          BIT          #SW13,@#SWR          ;INHIBIT ERROR PRINTOUT ?
3064 006266 001053          BNE          4$          ;BRANCH IF YES
3065 006270 104400 006276          TYPE          .+4          ;;TYPE ASCIZ STRING
3066 006274 000431          BR          64$          ;;GET OVER THE ASCIZ
3067          ;;.ASCIZ          <15><12>/IF BASE ADDRESS IS TO BE CHANGED HALT PROGRAM /
3068 006360          64$:
3069 006360 104400 006366          TYPE          .+4          ;;TYPE ASCIZ STRING
3070 006364 000411          BR          65$          ;;GET OVER THE ASCIZ
3071          ;;.ASCIZ          <15><12>/AND RESTART AT /
3072 006410          65$:
3073 006410 012746 036714          MOV          #BASECH,-(SP)        ;GET READY TO TYPE STARTING ADDRESS
3074          ;OF "CHANGE OF BASE ADDRESS" ROUTINE
3075 006414 104401          TYPOC
3076 006416 000137 034260          4$: JMP          @#$EOP          ;GO TO END OF PROGRAM
3077 006422 012737 041242 000030          3$: MOV          #$ERROR,@#EMTVEC    ;RESTORE ERROR VECTOR
3078          ;SO THAT REGISTERS ARE SAVED
3079 006430 012737 000006 000004          MOV          #ERRVEC+2,@#ERRVEC    ;RESTORE TRAP CATCHER
3080
3081          ;*****
3082          ;*TEST 2          PARTIAL TEST FOR RHAS FOR UNIT NUMBERS PRESENT

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3095 006436 000004
3096 006440 012767 000001 172542
3097 006446 012706 001000
3098 006452 013701 002234
3099 006456 012711 177777
3090 006462 105711
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3092 006464 001407
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3094 006466 011137 001126
3095 006472 005037 001124
3096 006476 010137 004510
3097 006502 104005
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3111 006504 000004
3112 006506 012767 000001 172474
3113 006514 000005
3114 006516 004737 040510
3115 006522 032737 020000 001136
3116 006530 001030
3117 006532 104400 006540
3118 006536 000425
3119
3120 006612
3121 006612 013701 002234
3122 006616 013702 002214
3123 006622 005012
3124 006624 012700 000010
3125 006630 013704 002220
3126 006634 012714 177777
3127 006640 005212
3128 006642 005300
3129 006644 001373
3130 006646 111137 004652
3131
3132 006652 105037 004653
3133 006656 105711
3134 006660 001402
3135 006662 000167 000420
3136 006666 032737 020000 001136 2$:
3137 006674 001402
3138 006676 000167 000670

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:* CHECK THAT RHAS CAN BE CLEARED BY MOVING ALL ONES
*****
↑TST2: SCOPE
MOV #1,$TIMES ;;DO 1 ITERATION
MOV #STACK,SP ;;SET STACK POINTER
MOV @RHAS,R1 ;;R1 HAS ADDRESS OF RHAS
MOV #-1,@R1 ;THIS CLEARS RHAS (SURPRISED!)
TSTB @R1
BEQ TST3 ;BRANCH IF GOOD
MOV @R1,@#$BDDAT ;BAD DATA
CLR @#$GDDAT ;GOOD DATA
MOV PI,@#REGADR ;FAILING REG. RHAS
ERROR 5 ;RHAS DOES NOT CLEAR
;WITH ONES
*****
:*TEST 3 TEST FOR DRIVES PRESENT USING RHAS AND RHCS2
:* THE NUMBER OF RPO4 DRIVES PRESENT ARE FOUND
:* BY MOVING ALL ONES INTO RHER1 WITH UNIT NUMBER
:* IN RHCS2 INCREMENTED FROM ZERO TO SEVEN
:* THEN THE SET BITS IN RHAS WILL GIVE DRIVES PRESENT
:* THE DRIVE TYPE IS CHECKED TO HAVE 2020 OR 24020 AND THEN
:* UNITS PRESENT ARE STORED IN A TABLE CALLED 'UNITS'
*****
↑TST3: SCOPE
MOV #1,$TIMES ;;DO 1 ITERATION
RESET ;START WITH AN INIT
JSR PC,@#STKINT ;INITILIZE TK
BIT #SW13,@#SWR ;INHIBIT ERROR TYPEOUT?
BNE 4$ ;BRANCH IF YES
TYPE 64$ ;TYPE ASCIZ STRING
BR 64$ ;GET OVER THE ASCIZ
;;.ASCIZ <15><12>/LOOKING AT RHAS - RPO4 DRIVES PRESENT /
64$:
4$: MOV @RHAS,R1 ;R1 HAS ADDR. OF RHAS
MOV @RHCS2,R2 ;R2 HAS ADDR. OF RHCS2
CLR @R2 ;CLEAR RHCS2
MOV #8,@R0 ;COUNT
MOV @RHER1,R4 ;R4 HAS ADDR. OF RHER1
MOV #-1,@R4 ;MOVE ERRORS INTO RHER1
INC @R2 ;INCREMENT UNIT NO.
DEC @R0 ;COUNT
BNE 1$ ;BRANCH IF 8 NOT DONE
MOV @R1,@#TOTALAT ;SAVE TOTAL ATTENTION
CLR @#TOTALAT+1 ;USED IN DRIVE CLEAR TEST
TSTB @R1 ;CLEAR UPPER BYTE
BEQ 2$ ;TEST FOR ANY DRIVES PRESENT
JMP XE2 ;IF SOME NOT THERE BRANCH
2$: BIT #SW13,@#SWR ;NONE THERE
;INHIBIT ERROR TYPE OUT?
BEQ 3$ ;BRANCH IF NO
3$:
JMP TST4 ;OUT

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3139	006702			3\$:			
3140	006702	104400	006710		TYPE	+4	::TYPE ASCIZ STRING
3141	006706	000412			BR	65\$::GET OVER THE ASCIZ
3142					::.ASCIZ	<15><12>/NO	DRIVES-RHAS=0/
3143	006734			65\$:			
3144	006734	104400	006742		TYPE	+4	::TYPE ASCIZ STRING
3145	006740	000436			BR	66\$::GET OVER THE ASCIZ
3146					::.ASCIZ	<15><12>/WRITING	ONES INTO ERROR REGISTER #1 FOR ALL UNIT NUMBERS/
3147	007036			66\$:			
3148	007036	104400	007044		TYPE	+4	::TYPE ASCIZ STRING
3149	007042	000441			BR	67\$::GET OVER THE ASCIZ
3150					::.ASCIZ	<15><12>/DOES NOT	SET ANY BIT IN THE ATTENTION REGISTER SO ABCRT P
3151	007146			67\$:			
3152	007146	104400	007154		TYPE	+4	::TYPE ASCIZ STRING
3153	007152	000442			BR	68\$::GET OVER THE ASCIZ
3154					::.ASCIZ	<15><12>/TO LOOP	ON THIS TEST WITHOUT PRINTOUT SET SWITCHS 13 9
3155	007260			68\$:			
3156	007260	000137	034260		JMP	Q#SEOP	;GO OUT
3157	007264	005037	004606		CLR	Q#UNITS	
3158	007270	012767	000001	175332	MOV	#1,NOUNIT	;NO. UNITS PRESENT=1
3159	007276	005037	004626		CLR	Q#UNIT	
3160	007302	000137	034260		JMP	Q#SEOP	;JUMP OUT
3161	007306			XE2:			
3162	007306	012700	000010	2\$:	MOV	#8, R0	;COUNTER
3163	007312	012703	004606		MOV	#UNITS,R3	;POINTER
3164	007316	012723	177777	3\$:	MOV	#-1,(R3)+	;PRESET BLOCK TO ALL ONES
3165	007322	005300			DEC	R0	;COUNT
3166	007324	001374			BNE	3\$;BRANCH IF 8 NOT DONE
3167	007326	012703	004606		MOV	#UNITS,R3	;POINTER
3168	007332	005005			CLR	R5	
3169	007334	005037	004630		CLR	Q#NOUNIT	;NO. OF UNITS PRESENT
3170	007340	012700	000010		MOV	#8, R0	;COUNTER
3171	007344	011137	001174		MOV	Q#R1,Q#STMPD	;TEMPORARY STORAGE
3172	007350	006037	001174	4\$:	ROR	Q#STMPD	;SET CARRY IF ONE IN 0 BIT
3173							
3174	007354	103065			BCC	5\$	
3175	007356	010577	172632		MOV	R5,Q#RHCS2	;INSERT UNIT NUMBER
3176	007362	022777	024020	172652	CMP	#24020,Q#RHDT	;IS THIS A DUAL PORT RPO4
3177	007370	001450			BEQ	6\$;BRANCH IF YES
3178	007372	022777	020020	172642	CMP	#20020,Q#RHDT	;IS THIS A SINGLE PORT RPO4
3179	007400	001444			BEQ	6\$;BRANCH IF YES
3180	007402	104400	007410		TYPE	+4	::TYPE ASCIZ STRING
3181	007406	000410			BR	64\$::GET OVER THE ASCIZ
3182					::.ASCIZ	<15><12>/UNIT	NUMBER /
3183	007430			64\$:			
3184	007430	010546			MOV	R5,-(SP)	;GET READY TO TYPE UNIT NUMBER
3185	007432	104404			TYPDS		
3186	007434	104400	007442		TYPE	+4	::TYPE ASCIZ STRING
3187	007440	000405			BR	65\$::GET OVER THE ASCIZ
3188					::.ASCIZ	/, RHDT=	/
3189	007454			65\$:			
3190	007454	017746	172562		MOV	Q#RHDT,-(SP)	;GET READY TO TYPE RHDT
3191	007460	104401			TYPDC		
3192	007462	104400	007470		TYPE	+4	::TYPE ASCIZ STRING
3193	007466	000410			BR	66\$::GET OVER THE ASCIZ
3194					::.ASCIZ	/ ---NOT AN	RPO4/

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3195 007510          66$:
3196 007510 000407   BR          5$          ;NO RPO4 FOUND SO BRANCH
3197 007512 010523   6$:      MOV          R5,(R3)+
3198 007514 104400 001221   TYPE      $CRLF
3199 007520 010546   MOV          R5,-(SP)
3200 007522 104404          TYPDS          ;TYPE DRIVE NO.
3201 007524 005237 004630   INC          @#NUNIT
3202 007530 005205   5$:      INC          R5
3203 007532 005300   DEC          R0
3204 007534 001305   BNE          4$
3205 007536 013737 004606 004626   MOV          @#UNITS,@#UNIT
3206 007544 013737 004630 004632   MOV          @#NUNIT,@#NUNIT ;SAVE NO. OF UNITS
3207 007552 005337 004632   DEC          @#NUNIT ;IF NUNIT = 0 THEN ONLY ONE UNIT
3208          ;IF NUNIT MORE THAN 0 THEN MORE THAN ONE UNIT
3209 007556 005737 004636   TST          @#SELECT ;STARTING ADDRESS 200 ?
3210
3211 007562 001403   BEQ          TST4 ;BRANCH IF STARTING FROM 200
3212
3213 007564 013737 004640 004626   MOV          @#UNITSL,@#UNIT ;SET UNIT NUMBER
3214
3215
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3221 *****
3222 *TEST 4 TYPE SERIAL NUMBER AND DRIVE TYPE
3223 * SET APPROPRIATE ATTENTION BIT OF UNIT UNDER TEST IN 'ATTENT'
3224 * TYPE UNIT UNDER TEST
3225 * READ SERIAL NUMBER AND DRIVE TYPE REGISTERS
3226 * TYPE IT OUT AND PROCEED
3227 * TO LOOP HERE SET SWITCH 8, AND THIS TEST NUMBER ON
3228 * SWITCHES 0 THRU 7 AND RESTART
3229 *****
3230
3231 007572 000004   TST4:  SCOPE
3232 007574 012767 000001 171406   MOV          #1,$TIMES ;DO 1 ITERATION
3233 007602 012767 010016 171276   MOV          #1,$SLPADR ;SET SCOPE LOOP ADDRESS
3234 007610 012706 001000   MOV          #STACK,SP ;RESET STACK
3235 007614 012737 000004 004514   MOV          #4,@#TSTNM ;SAVE TEST NUMBER
3236
3237 007622 004737 034556   JSR          PC,@#CLDISK ;SET R1-RHCS1, R2-RHCS2
3238          ;R3-RHDS1, R4-RHER1
3239          ;GIVE RH-11 INITIALIZE
3240          ;SETUP UNIT NUBER
3241 007626 005037 004650   CLR          @#ATTENT ;CLEAR
3242 007632 013700 004626   MOV          @#UNIT,R0 ;R0 CONTAINS UNIT NO
3243 007636 116037 004576 004650   MOVB        ATABLE(R0),@#ATTENT ;SET APPROPRIATE ATTENTION BIT
3244 007644 104400 007652   TYPE          +4 ;TYPE ASCIZ STRING
3245 007650 000415   BR          64$ ;GET OVER THE ASCIZ
3246          ;;.ASCIZ <15><12>/TESTING DRIVE NUMBER /
3247
3248 007704          64$:
3249 007704 013746 004626   MOV          @#UNIT,-(SP) ;UNIT NO. TO STACK
3250 007710 104401   TYPOC          ;TYPE DRIVE NO.
3251 007712 104400 001221   TYPE          , $CRLF

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MAINDEC-11-DERPU-8
DERPUB.P11 T4

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TYPE SERIAL NUMBER AND DRIVE TYPE

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3251 007716 104400 007724      TYPE      +4      ;;TYPE ASCIZ STRING
3252 007722 000410      BR      65$      ;;GET OVER THE ASCIZ
3253      ;;ASCIZ      <15><12>/SERIAL NO. - /
3254 007744      65$:      MOV      @RHSN,-(SP)      ;;SAVE @RHSN FOR TYPEOUT
3255 007744 017746 172274      TYPOC      ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3256 007750 104401
3257 007752 104400 001221      TYPE      ,SCLRF
3258 007756 104400 007764      TYPE      +4      ;;TYPE ASCIZ STRING
3259 007762 000410      BR      66$      ;;GET OVER THE ASCIZ
3260      ;;ASCIZ      <15><12>/DRIVE TYPE = /
3261 010004      66$:      MOV      @RHDT,-(SP)      ;;SAVE @RHDT FOR TYPEOUT
3262 010004 017746 172232      TYPOC      ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3263 010010 104401
3264 010012 104400 001221      TYPE      ,SCLRF
3265 010016 005777 172222      1$:      TST      @RHSN      ;READ SERIAL NO. AND DRIVE TYPE
3266 010022 005777 172214      TST      @RHDT      ;THESE TWO ARE TO HELP SCOPE LOOPS
3267 010026 017737 172212 002322      MOV      @RHSN,@#SN      ;SAVE TO CHECK IF DRIVE CLEAR CLEARS ANY BITS
3268 010034 017737 172202 002320      MOV      @RHDT,@#DT      ;SAVE TO CHECK IF DRIVE CLEAR CLEARS ANY BITS
3269
3270
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3272
3273      ;*****
3274      ;*TEST 5      PROGRAM INTERRUPT
3275
3276      ;*      PROGRAM INTERRUPT IS TESTED BY SETTING R0Y AND IE
3277      ;*      IN RHCS1 AT THE SAME TIME
3278      ;*      THIS SHOULD INTERRUPT THROUGH LOCATION 254
3279      ;*      THE PROCESSOR PRIORITY IS SET TO 4
3280      ;*****
3281 010042 000004      TST5:      SCOPE
3282
3283
3284 010044 012737 000005 004514      MOV      #6-1,@#TSTNM      ;THIS SAVES TEST NUMBER
3285
3286 010052 012706 001000      MOV      #STACK,SP      ;RESET STACK
3287 010056 004737 034556      JSR      PC,@#CLDISK      ;CLEAR DISK
3288 010062 013700 002204      MOV      @#RPVEC,R0      ;GET RP VECTOR ADDRESS
3289 010066 012720 010130      MOV      @#RTRP1,(R0)+      ;THIS IS FOR TIMELY INTERRUPTS
3290 010072 012710 000340      MOV      #340,(R0)      ;RPO4 INTERRUPT SERVICE ROUTINE
3291      ;PRIORITY = 7
3292
3293 010076 012767 000200 167672      MOV      #200,PS      ;SET PROCESSOR PRIORITY
3294 010104 012711 000300      MOV      #RDY!IE,@R1      ;RDY, IE IN RHCS1 SHOULD CAUSE INTERRUPT
3295 010110 013737 035246 001176      MOV      @#TIMCNT,@#STMP1 ;COUNTER
3296 010116 005337 001176      1$:      DEC      @#STMP1      ;WAIT FOR INTERRUPT
3297 010122 001375      BNE      1$      ;BRANCH IF NOT ZERO
3298      ;BEFORE THIS IS ZERO INTERRUPT SHOULD
3299      ;OCCUR
3300 010124 104065      ERROR      65      ;INTERRUPT DID NOT OCCUR
3301
3302
3303 010126 000405      BR      TST6      ;BRANCH TO NEXT TEST
3304
3305
3306 010130 022626      RPTRP1: CMP      (SP)+,(SP)+      ;RESTORE STACK

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3384 010246 004737 034556
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3388 010252 012767 000000 167516
3389 010260 005737 004634
3390 010264 001007
3391 010266 005737 000042
3392 010272 001004
3393 010274 005737 001100
3394 010300 001001
3395 010302 000402
3396 010304
3397 010304 000167 000506
3398 010310
3399 010310 104400 010316
3400 010314 000407
3401
3402 010334
3403 010334 013746 004626
3404 010340 104404
3405 010342 104400 010350
3406 010346 000413
3407
3408 010376

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:*****
;*TEST 7 PACK ACKNOWLEDGE

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;* IF STARTING ADDRESS 220 IS USED THIS TEST WILL NOT BE PERFORMED
;*
;* IF THE PROGRAM WORKS UNDER ACT-11 MONITOR
;* THEN THIS TEST IS NOT PERFORMED
;*
;* IF NO ACT-11 MONITOR IS PRESENT
;* THEN THIS TEST IS PERFORMED ONLY ON THE FIRST PASS
;* ON SUBSEQUENT PASSES THIS TEST IS NOT DONE
;*
;* THIS TESTS THE ACKNOWLEDGE COMMAND=44
;* VV BIT - RHDS1 BIT #6
;* MOL BIT - RHDS1 BIT #12
;* DVA BIT - RHCS1 BIT #11
;* THE DRIVE IS STOPED MOL IS CHECKED TO BE 0
;* AND DVA SHOULD BE 0
;* THE DRIVE IS POWERED UP
;* VV SHOULD BE 0, MOL SHOULD BE 1, DVA SHOULD BE 1
;* GO SHOULD BE 0
;* ALL REGISTERS EXCEPT RHDB, RHLA AND RHCC ARE STORED
;* PACK ACKNOWLEDGE IS ISSUED
;* ALL STORED REGISTERS SHOULD BE UNCHANGED
;* EXCEPT VV

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TST7: SCOPE
MOV #STACK,SP ;RESET STACK
MOV #7, J#TSTNM ;SAVE TEST NUMBER
JSR PC, J#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUBER
MOV #0, PS ;SET PROSESSER STATUS TO 0
TST J#NOPUSH ;IS THIS 220 START
BNE 1$ ;BRANCH IF YES
TST J#42 ;MONITOR (ACT-11) RETURN ADDRESS
BNE 1$ ;BRANCH IF MONITOR PRESENT
TST J#$PASS ;IS THIS FIRST PASS
BNE 1$ ;BRANCH IF NOT FIRST PASS
BR 2$ ;BRANCH TO CONTINUE TEST
1$: JMP TST10 ;JUMP TO NEXT TEST
2$: TYPE +4 ;:TYPE ASCIZ STRING
BR 64$ ;:GET OVER THE ASCIZ
;: .ASCIZ <15><12>/STOP DRIVE /
64$: MOV J#UNIT, -(SP) ;GET UNIT UNDER TEST
TYPDS
TYPE +4 ;:TYPE ASCIZ STRING
BR 65$ ;:GET OVER THE ASCIZ
;: .ASCIZ / THEN HIT CONTINUE/<15><12>
65$:

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3521 010752 004037 035440 JSR RO,#CHREG ;CHANGE BITS IN SAVED REGISTER
3522 010756 002240 RHDS1 ;CHANGE RHDS1 REGISTER
3523
3524 010760 000001 1 ;1 BIT/BITS TO BE CHANGED
3525 010762 000001 1 ;NEW VALUE OF VV IS 1
3526 010764 000100 VV ;CHANGE VV BIT
3527
3528 ;NOW COMPARE REGISTERS SO THAT NO REGISTERS
3529 ;CHANGED EXCEPT VV IN RHDS1 AND IE IN RHCS1
3530
3531
3532 010766 004037 035546 JSR RO,#COMREG ;COMPARE SAVED REGISTERS WITH
3533 ;PRESENT VALUE
3534 010772 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
3535 010774 002266 WC ;TEST DATA STARTING FROM 'RHWC'
3536 010776 000022 18. ;18. REGISTERS TO BE COMPARED
3537 011000 011004 11$ ;RETURN TO 11$ ON ERROR
3538 011002 011010 12$ ;RETURN TO 12$ ON NO ERROR
3539
3540 011004 104015 11$: ERROR 15 ;GIVING A PACK ACKNOWLEDGE
3541 011006 000207 RTS PC ;CAUSED AN ERROR
3542 ;PACK ACKNOWLEDGE SHOULD
3543 ;SET VV IN RHDS1
3544 ;INTERRUPT SHOULD MAKE
3545 ;IE = 0
3546 ;NO OTHER REGISTERS SHOULD
3547 ;CHANGE
3548 ;GOOD DATA GIVES
3549 ;CONTENTS OF REGISTER BEFORE
3550 ;PACK ACKNOWLEDGE
3551 ;RECEIVED DATA GIVES
3552 ;CONTENTS OF REGISTER
3553 ;AFTER PACK ACKNOWLEDGE
3554 011010 012737 177777 041404 12$: MOV #-1,#PRITEM ;CLEAR PREVIOUS ITEM NUMBER
3555
3556
3557
3558
3559
3560 ;*****
3561 ;*TEST 10 SET VV BIT #6 IN RHDS1
3562 ;* THIS TEST SETS VV IN RHDS1 INCASE
3563 ;* ACT-11 MONITOR IS PRESENT AND THE PREVIOUS TEST
3564 ;* IS NOT PERFORMED
3565 ;* THERE IS A RESET AT THE BEGINING OF THIS TEST
3566 ;* FOR ERROR RECOVERY ONLY.
3567 ;*****
3568 011016 000004 TST10: SCOPE
3569
3570 ;IN CASE THERE IS ANY DRIVE ERRORS DURING POWER UP
3571 ;OR POWER DOWN OR ANY PARITY ERRORS A RESET IS GIVEN
3572 011020 000005 RESET
3573 011022 004737 040510 JSR PC,#$TKINT ;INITILIZE TK
3574
3575
3576 011026 012706 001000 MOV #STACK,SP ;RESET STACK

```



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011032 012737 000010 004514      MOV      #10,3#TSTNM      ;SAVE TEST NUMBER
011040 004737 034556              JSR      PC,3#CLDISK     ;SET R1-RHCS1, R2-RHCS2
                                ;R3-RHDS1, R4-RHER1
                                ;GIVE RH-11 INITIALIZE
011044 004737 034614              JSR      PC,3#CHECK      ;SETUP UNIT NUMBER
                                ;CHECK DVA,RDY,MOL,DPR,DRY
011050 013777 002372 171140      MOV      3#PKACK,3RHCS1 ;GET READY FOR PKACK
                                ;PACK ACKNOWLEDGE WITH 22 IN RHCS1

                                ;NOW SAVE REGISTERS FOR COMPARISON AFTER PACK ACKNOWLEDGE
011056 004037 034716              JSR      R0,3#SAVER      ;SAVE REGISTERS
                                ;RHWC IS THE FIRST REGISTER SAVED
011058 002010              RHWC      ;STARTING ADDRESS OF WHERE
011064 004037              SAVERE     ;THE REGISTERS ARE SAVED
                                ;NUMBER OF REGISTERS
011066 000022              18.         ;SAVED = 18.

011070 013777 004516 171106      MOV      3#RP4VEC,3RPVEC ;SET RP04 VECTOR ADDRESS
                                ;TO 'TIME1' IF P-CLOCK IS PRESENT
                                ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
                                ;'TIME' WILL ONLY SAVE
                                ;CURRENT CYLINDER ADDRESS
                                ;AND LOOK AHEAD REGISTERS

011076 013746 002372              MOV      3#PKACK,-(SP)   ;GET READY TO MOVE COMMAND
011102 052716 000001              BIS      #GO,(SP)       ;GET READY TO SET GO
                                ;WITHOUT INTERRUPT ENABLE
011106 012677 171104              MOV      (SP)+,3RHCS1   ;GO WITH
                                ;22 IN RHCS1 FOR PACK ACKNOWLEDGE
                                ;WITH INTERRUPT DISABLED

011112 011100              MOV      3R1,R0         ;SAVE RHCS1 DURING ABOVE OPERATION
011114 011305              MOV      3R3,R5         ;SAVE RHDS1 DURING ABOVE OPERATION

011116 104410              WAIT      ;WAIT FOR VV BIT TO SET
011120 002240              RHDS1     ;WAIT FOR RHDS1 REGISTER
011122 000100              VV        ;WAIT FOR VV BIT IN RHDS1 REGISTER
011124 000001              1.         ;ALLOW 10 MICRO SECONDS
011126 000001              1.         ;VV MUST SET BETWEEN
                                ;00 AND 20 MICRO SECONDS

                                ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
                                ;R0 AND R5 IMMEDIATELY AFTER GO
011130 013746 002372              MOV      3#PKACK,-(SP)   ;SAVE COMMAND
011134 052716 004200              BIS      #DVA!RDY,(SP)  ;INCLUDE DVA!RDY
011140 011637 001124              MOV      (SP),3#SGDDAT  ;SAVE FOR PRINTOUT
011144 022600              CMP      (SP)+,R0       ;DURING ABOVE OPERATION ONLY DVA!RDY
                                ;AND COMMAND SHOULD BE SET
011146 001405              BEQ      64$           ;BRANCH IF GOOD
011150 010037 001126              MOV      R0,3#SDDAT     ;BAD DATA
011154 010137 004510              MOV      R1,3#REGADR    ;FAILING REGISTER RHCS1

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3633 011160 104021          ERROR 21          ; DURING ABOVE OPERATION ONLY
3634          ; COMMAND AND DVA!RDY SHOULD BE SET
3635 011162 012746 010700    64$: MOV #MOL!DPR!DRY!VV, -(SP) ; SAVE BITS SET DURING OPERATION IN RHDS1
3636 011166 011637 001124    MOV (SP), @#$GDDAT ; SAVE FOR PRINTOUT
3637 011172 022605          CMP (SP)+, R5 ; DURING ABOVE OPERATION ONLY MOL!DPR!DRY!VV
3638          ; SHOULD BE SET
3639 011174 001405          BEQ 66$ ; BRANCH IF GOOD
3640 011176 010537 001126    MOV R5, @#$BDDAT ; BAD DATA
3641 011202 010337 004510    MOV R3, @#$REGADR ; FAILING REGISTER RHDS!
3642 011206 104063          ERROR 63 ; DURING ABOVE OPERATION ONLY
3643          ; MOL!DPR!DRY!VV SHOULD BE SET
3644
3645 011210          66$:
3646
3647 011210 004037 035440    JSR RO, @#CHREG ; CHANGE BITS IN SAVED REGISTER
3648 011214 002240          RHDS1 ; CHANGE RHDS1 REGISTER
3649
3650 011216 000001          1 ; 1 BIT/BITS TO BE CHANGED
3651 011220 000001          1 ; NEW VALUE OF VV IS 1
3652 011222 000100          VV ; CHANGE VV BIT
3653
3654          ; NOW COMPARE REGISTERS BEFORE PACK ACKNOWLEDGE
3655          ; WITH AFTER PACK ACKNOWLEDGE
3656
3657 011224 004037 035546    JSR RO, @#COMREG ; COMPARE SAVED REGISTERS WITH
3658          ; PRESENT VALUE
3659 011230 004522          SAVERE ; GOOD DATA SAVED IN 'SAVERE'
3660 011232 002266          WC ; TEST DATA STARTING FROM 'RHWC'
3661 011234 000022          18. ; 18. REGISTERS TO BE COMPARED
3662 011236 011242          1$ ; RETURN TO 1$ ON ERROR
3663 011240 011246          2$ ; RETURN TO 2$ ON NO ERROR
3664
3665 011242 104015          1$: ERROR 15 ; GIVING A PACK ACKNOWLEDGE
3666 011244 000207          RTS PC ; CAUSED AN ERROR
3667          ; PACK ACKNOWLEDGE SHOULD
3668          ; SET VV IN RHDS1
3669          ; INTERRUPT SHOULD MAKE
3670          ; IE = 0
3671          ; NO OTHER REGISTERS SHOULD
3672          ; CHANGE
3673          ; GOOD DATA GIVES CONTENTS
3674          ; OF REGISTER BEFORE COMMAND
3675          ; RECEIVED DATA GIVES CONTENTS
3676          ; OF REGISTER AFTER COMMAND
3677
3678 011246          2$:
3679
3680
3681
3682
3683
3684
3685
3686
3687
3688

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*****
*TEST 11 NO OPERATION FUNCTION TEST
* ALL POSSIBLE REGISTERS ARE CLEARED THEN A"NOP"=0
* IS GIVEN NO CHANGE SHOULD HAPPEN

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3689          :*      ALL POSSIBLE REGISTERS ARE FILLED WITH ONES THEN A "NOP"
3690          :*      IS GIVEN NO CHANGE SHOULD HAPPEN
3691
3692          :*****
3693 011246 000004          †ST11: SCOPE
3694 011250 012706 001000      MOV      #STACK,SP          ;RESET STACK
3695 011254 012737 000011 004514      MOV      #11,#†STNM        ;SAVE TEST NUMBER
3696
3697 011262 004737 034556          JSR      PC,#CLDISK        ;SET R1-RHCS1, R2-RHCS2
3698                                ;R3-RHDS1, R4-RHER1
3699                                ;GIVE RH-11 INITIALIZE
3700                                ;SETUP UNIT NUBER
3701 011266 004737 034636          JSR      PC,#CHECKT        ;CHECK DVA,RDY,MOL,DPR,DRY,VV
3702
3703
3704 011272 013777 002334 170716      MOV      @#NOPERA,@RHCS1  ;GET READY FOR NOPERA
3705                                ;NO OPERATION WITH 0 IN RHCS1
3706
3707
3708                                ;NOW SAVE REGISTERS FOR COMPARISON AFTER NO OPERATION
3709
3710 011300 004037 034716          JSR      RD,@SAVER         ;SAVE REGISTERS
3711 011304 002210          RHWC          ;RHWC IS THE FIRST REGISTER SAVED
3712 011306 004522          SAVERE        ;STARTING ADDRES OF WHERE
3713                                ;THE REGISTERS ARE SAVED
3714 011310 000022          18.          ;NUMBER OF REGISTERS
3715                                ;SAVED = 18.
3716
3717 011312 013777 004516 170664      MOV      @#RP4VEC,@RPVEC  ;SET RP04 VECTOR ADDRESS
3718                                ;TO 'TIME1' IF P-CLOCK IS PRESENT
3719                                ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
3720                                ;'TIME' WILL ONLY SAVE
3721                                ;CURRENT CYLINDER ADDRESS
3722                                ;AND LOOK AHEAD REGISTERS
3723
3724
3725 011320 013746 002334          MOV      @#NOPERA,-(SP)   ;GET READY TO MOVE COMMAND
3726 011324 052716 000001          BIS      #GO,(SP)        ;GET READY TO SET GO
3727                                ;WITHOUT INTERRUPT ENABLE
3728 011330 012677 170662          MOV      (SP)+,@RHCS1    ;GO WITH
3729                                ;0 IN RHCS1 FOR NO-OPERATION
3730                                ;WITH INTERRUPT DISABLED
3731
3732
3733
3734 011334 104410          WAT          ;WAIT FOR RDY BIT TO SET
3735 011336 002216          RHCS1        ;WAIT FOR RHCS1 REGISTER
3736 011340 000200          RDY          ;WAIT FOR RDY BIT IN RHCS1 REGISTER
3737 011342 000001          1.          ;ALLOW 10 MICRO SECONDS
3738 011344 000001          1.          ;RDY MUST SET BETWEEN
3739                                ;00 AND 20 MICRO SECONDS
3740
3741
3742                                ;NOW COMPARE REGISTERS BEFORE NO-OP COMMAND
3743                                ;WITH AFTER NO-OP COMMAND
3744 011346 004037 035546          JSR      RD,@COMREG       ;COMPARE SAVED REGISTERS WITH

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3745
3746 011352 004522          SAVERE          ;PRESENT VALUE
3747 011354 002266          WC             ;GOOD DATA SAVED IN 'SAVERE'
3748 011356 000022          18.           ;TEST DATA STARTING FROM 'RHWC'
3749 011360 011364          1$            ;18. REGISTERS TO BE COMPARED
3750 011362 011370          2$            ;RETURN TO 1$ ON ERROR
3751
3752 011364 104016          1$:          ERROR 16      ;GIVING A NO-OP COMMAND
3753 011366 000207          RTS          PC      ;CAUSED AN ERROR
3754
3755
3756
3757
3758
3759
3760
3761 011370          2$:          ;NOW REPEAT TEST BY MOVING IN ALL POSSIBLE ONES
3762
3763 011370 004737 034556      JSR          PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
3764
3765
3766
3767 011374 012700 002210      MOV          #RHWC, RO  ;R3-RHDS1, R4-RHER1
3768 011400 012730 177777      MOV          #177777, @RO+ ;GIVE RH-11 INITIALIZE
3769
3770 011404 012730 177777      MOV          #177777, @RO+ ;SETUP UNIT NUMBER
3771
3772 011410 052730 043010      BIS          #43010, @RO+ ;ADDR. OF ADDR OF RHWC IN RO
3773 011414 012730 001400      MOV          #1400, @RO+  ;LOAD 177777 INTO RHWC
3774
3775 011420 012730 000000      MOV          #0, @RO+    ;LOAD 177777 INTO RHBA
3776
3777 011424 012730 177777      MOV          #177777, @RO+ ;LOAD 43010 INTO RHCS2
3778
3779 011430 012730 000000      MOV          #0, @RO+    ;LOAD 1400 INTO RHCS1
3780
3781 011434 012730 177777      MOV          #177777, @RO+ ;LOAD 0 INTO RHER1
3782
3783 011440 012730 177777      MOV          #177777, @RO+ ;LOAD 177777 INTO RHDST
3784
3785 011444 012730 000000      MOV          #0, @RO+    ;LOAD 0 INTO RHER2
3786
3787
3788
3789 011450 010046          ;NOW SET BITS IN RHAS FOR ALL DRIVES PRESENT
3790 011452 011446          MOV          RO, -(SP)   ;: PUSH RO ON STACK
3791 011454 011246          MOV          @R4, -(SP) ;SAVE RHER1 TO REINSTATE LATER
3792
3793 011456 013700 004652      MOV          @#TOTALAT, RO ;SAVE RHCS2 TO BE REINSTATED
3794 011462 005012          CLR          @R2        ;AFTER ALL ATA BITS HAVE BEEN SET
3795 011464 012705 000010      MOV          #8., RE    ;GET DRIVES PRESENT
3796 011470 006000          87$:        ROR          RO    ;CLEAR RHCS2 AND CARRY
3797 011472 103002          BCC         88$        ;COUNTER
3798 011474 012714 177777      MOV          #-1, @R4   ;GET BIT INTO CARRY
3799
3800 011500 005212          88$:        INC          @R2   ;GET BIT INTO CARRY
                                ;BRANCH IF NO UNIT ON THIS BIT
                                ;MOVE INTO ERROR REGISTER
                                ;TO SET ATA BIT
                                ;INCREMENT RHCS2 TO NEXT UNIT

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3857
3858 011616 043737 004650 004546      BIC      @#ATTENT,@#SAVERE+24      ;CLEAR APPROPRIATE ATA BITS
3859                                     ;FOR WORKING DRIVE IN SAVED RHAS
3860
3861 011624 004037 035440      JSR      RO,@#CHREG      ;CHANGE BITS IN SAVED REGISTER
3862 011630 002240      RHDS1    ;CHANGE RHDS1 REGISTER
3863
3864 011632 000001      1      ;1 BIT/BITS TO BE CHANGED
3865 011634 000000      0      ;NEW VALUE OF ATA IS 0
3866 011636 100000      ATA    ;CHANGE ATA BIT
3867
3868
3869                                     ;NOW COMPARE REGISTERS BEFORE NO-OP WITH
3870                                     ;AFTER NO-OP COMMAND
3871
3872
3873 011640 004037 035546      JSR      RO,@#COMREG      ;COMPARE SAVED REGISTERS WITH
3874                                     ;PRESENT VALUE
3875 011644 004522      SAVERE  ;GOOD DATA SAVED IN 'SAVERE'
3876 011646 002266      WC      ;TEST DATA STARTING FROM 'RHWC'
3877 011650 000022      18.    ;18. REGISTERS TO BE COMPARED
3878 011652 011656      3$     ;RETURN TO 3$ ON ERROR
3879 011654 011662      4$     ;RETURN TO 4$ ON NO ERROR
3880
3881 011656 104016      3$:    ERROR 16      ;GIVING A NO-OP COMMAND
3882 011660 000207      RTS    PC          ;CAUSED AN ERROR
3883                                     ;NO REGISTERS SHOULD CHANGE
3884                                     ;GOOD DATA GIVES REGISTER
3885                                     ;CONTENTS BEFORE COMMAND
3886                                     ;RECEIVED DATA GIVES REGISTER
3887                                     ;CONTENTS AFTER COMMAND
3888 011662      4$:
3889
3890
3891

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3892
3893
3894
3895
3896
3897
3898
3899 011662 000004
3900 011664 012706 001000
3901 011670 012737 000012 004514
3902
3903 011676 004737 034556
3904
3905
3906
3907 011702 004737 034636
3908
3909 011706 012700 002210
3910 011712 012730 177777
3911
3912 011716 012730 177776
3913
3914 011722 052730 043010
3915 011726 012730 001400
3916
3917 011732 012730 000000
3918
3919 011736 012730 177777
3920
3921 011742 012730 000000
3922
3923 011746 012730 177777
3924
3925 011752 012730 177777
3926
3927 011756 012730 000000
3928
3929
3930
3931 011762 010046
3932 011764 011446
3933 011766 011246
3934
3935 011770 013700 004652
3936 011774 005012
3937 011776 012705 000010
3938 012002 005000 84$:
3939 012004 103002
3940 012006 012714 177777
3941
3942 012012 005212 85$:
3943 012014 005305
3944 012016 001371
3945 012020 012612
3946 012022 012614
3947 012024 012600

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*****
*TEST 12 DRIVE CLEAR
* ALL WRITE BITS OF ALL REGISTERS ARE FILLED
* WITH ONES EXCEPT GO, CLR, IE, PAT, MCPE, UPE
* THEN A DRIVE CLEAR IS GIVEN
* THEN ALL REGISTERS ARE CHECKED TO HAVE APPROPRIATE VALUE
*****
TST12: SCOPE
MOV #STACK, SP ;RESET STACK
MOV #12, @TSTNM ;SAVE TEST NUMBER
JSR PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUMBER
JSR PC, @#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV
MOV #RHC, RO ;ADDR. OF ADDR. OF RHC IN RO
MOV #177777, @RO+ ;LOAD 177777 INTO RHC
MOV #177776, @RO+ ;LOAD 177776 INTO RHBA
BIS #43010, @RO+ ;LOAD 43010 INTO RHCS2
MOV #1400, @RO+ ;LOAD 1400 INTO RHCS1
MOV #0, @RO+ ;LOAD 0 INTO RHER1
MOV #177777, @RO+ ;LOAD 177777 INTO RHDST
MOV #0, @RO+ ;LOAD 0 INTO RHER2
MOV #177777, @RO+ ;LOAD 177777 INTO RHCF
MOV #177777, @RO+ ;LOAD 177777 INTO RHCA
MOV #0, @RO+ ;LOAD 0 INTO RHER3
;NOW SET BITS IN RHAS FOR ALL DRIVES PRESENT
MOV RO, -(SP) ;.PUSH RO ON STACK
MOV @R4, -(SP) ;SAVE RHER1 TO REINSTATE LATER
MOV @R2, -(SP) ;SAVE RHCS2 TO BE REINSTATED
;AFTER ALL ATA BITS HAVE BEEN SET
MOV @TOTALAT, RO ;GET DRIVES PRESENT
CLR @R2 ;CLEAR RHCS2 AND CARRY
MOV #8, R5 ;COUNTER
ROR RO ;GET BIT INTO CARRY
BCC 85$ ;BRANCH IF NO UNIT ON THIS BIT.
MOV INTO ERROR REGISTER
TO SET ATA BIT
85$: INC @R2 ;INCREMENT RHCS2 TO NEXT UNIT
DEC R5 ;COUNT
BNE 84$ ;BRANCH IF 8 NOT DONE
MOV (SP)+, @R2 ;REINSTATE RHCS2
MOV (SP)+, @R4 ;REINSTATE RHER1
MOV (SP)+, RO ;.POP STACK INTO RO

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Handwritten note: 84\$ 85\$

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3948 012026 005720          TST      (RO)+          ;GET OVER PHAS IN RO
3949
3950
3951 012030 012730 177776    MOV      #177776,(RO)+ ;LOAD 177776 INTO RHMR
3952
3953
3954 012034 017737 170212 004564  MOV      @RHCC,@#SAVERE+42 ;SAVE RHCC IN SAVERE TABLE
3955 012042 013777 004516 170134  MOV      @#RP4VEC,@RPVEC ;SET RPO4 VECTOR ADDRESS
3956                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
3957                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
3958                                     ;'TIME' WILL ONLY SAVE
3959                                     ;CURRENT CYLINDER ADDRESS
3960                                     ;AND LOOK AHEAD REGISTERS
3961
3962
3963 012050 013746 002342    MOV      @#DCLEAR,-(SP) ;GET READY TO MOVE COMMAND
3964 012054 052716 000001    BIS      #GO,(SP)      ;GET READY TO SET GO
3965                                     ;WITHOUT INTERRUPT ENABLE
3966 012060 012677 170132    MOV      (SP)+,@RHCSI  ;GO WITH
3967                                     ;10 IN RHCSI FOR DRIVE CLEAR
3968                                     ;WITH INTERRUPT DISABLED
3969
3970
3971
3972 012064 104410          WAT                      ;WAIT FOR RDY BIT TO SET
3973 012066 002216          RHCSI                   ;WAIT FOR RHCSI REGISTER
3974 012070 000200          RDY                     ;WAIT FOR RDY BIT IN RHCSI REGISTER
3975 012072 000001          1.                      ;ALLOW 10 MICRO SECONDS
3976 012074 000001          1.                      ;RDY MUST SET BETWEEN
3977                                     ;00 AND 20 MICRO SECONDS
3978 012076 005737 004632    TST      @#NUNIT
3979 012102 001003          BNE
3980 012104 042737 100000 004530  BIC      #100000,@#SAVERE+6
3981
3982                                     ;NOW LOAD 'SAVERE' WITH EXPECTED VALUES
3983 012112 004037 034460    JSR      RO,@#FILLRE    ;MOV 177777 INTO SAVED RHWC
3984 012116 002210          RHWC                   ;SAVED REGISTER TO CHANGE
3985 012120 177777          177777                 ;DATA
3986 012122 004037 034460    JSR      RO,@#FILLRE    ;MOV 177776 INTO SAVED RHBA
3987 012126 002212          RHBA                   ;SAVED REGISTER TO CHANGE
3988 012130 177776          177776                 ;DATA
3989 012132 005037 004526    CLR      @#SAVERE+4     ;CLEAR LOCATION FOR RHCS2
3990 012136 053737 004626 004526  BIS      @#UNIT,@#SAVERE+4 ;PUT UNIT # BACK IN THE SAVED RHCS2
3991
3992 012144 004037 035440    JSR      RO,@#CHREG     ;CHANGE BITS IN SAVED REGISTER
3993 012150 002214          RHCS2                  ;CHANGE RHCS2 REGISTER
3994
3995 012152 000002          2                       ;2 BIT/BITS TO BE CHANGED
3996 012154 000001          1                       ;NEW VALUE OF IR IS 1
3997 012156 000100          IR                     ;CHANGE IR BIT
3998 012160 000001          1                       ;NEW VALUE OF BAI IS 1
3999 012162 000010          BAI                     ;CHANGE BAI BIT
4000 012164 004037 034460    JSR      RO,@#FILLRE    ;MOV 0 INTO SAVED RHER1
4001 012170 002220          RHER1                  ;SAVED REGISTER TO CHANGE
4002 012172 000000          0                       ;DATA
4003 012174 004037 034460    JSR      RO,@#FILLRE    ;MOV 17437 INTO SAVED RHDST

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4004	012200	002222		RHDST		:SAVED REGISTER TO CHANGE
4005	012202	017437		17437		:DATA
4006	012204	004037	034460	JSR	RO, @#FILLRE	:MOV 0 INTO SAVED RHER2
4007	012210	002224		RHER2		:SAVED REGISTER TO CHANGE
4008	012212	000000		0		:DATA
4009	012214	004037	034460	JSR	RO, @#FILLRE	:MOV 116000 INTO SAVED RHOF
4010	012220	002226		RHOF		:SAVED REGISTER TO CHANGE
4011	012222	116000		116000		:DATA
4012	012224	004037	034460	JSR	RO, @#FILLRE	:MOV 1777 INTO SAVED RHCA
4013	012230	002230		RHCA		:SAVED REGISTER TO CHANGE
4014	012232	001777		1777		:DATA
4015	012234	004037	034460	JSR	RO, @#FILLRE	:MOV 0 INTO SAVED RHER3
4016	012240	002232		RHER3		:SAVED REGISTER TO CHANGE
4017	012242	000000		0		:DATA
4018	012244	013746	004652	MOV	@#TOTALAT, -(SP)	:GET ALL BITS OF DRIVE & PRESENT
4019						:IN RHAS
4020	012250	043716	004650	BIC	@#ATTENT, (SP)	:CLEAR WORKING DRIVE BIT
4021	012254	012637	004546	MOV	(SP)+, @#SAVERE+24	:MOVE THIS INTO RHAS POSITION
4022						:OF SAVERE TABLE
4023						
4024	012260	004037	034460	JSR	RO, @#FILLRE	:MOV 400 INTO SAVED RHMR
4025	012264	002236		RHMR		:SAVED REGISTER TO CHANGE
4026	012266	000400		400		:DATA
4027						
4028	012270					3\$:
4029	012270	004037	034460	JSR	RO, @#FILLRE	:MOV 10700 INTO SAVED RHDS1
4030	012274	002240		RHDS1		:SAVED REGISTER TO CHANGE
4031	012276	010700		10700		:DATA
4032						
4033	012300	013737	002320	004554	4\$:	MOV @#DT, @#SAVERE+32
4034						:MOVE DRIVE TYPE INTO RHD
4035	012306	013737	002322	004556		MOV @#SN, @#SAVERE+34
4036						:POSITION OF SAVRE TABLE
4037						:MOVE SERIAL NUMBER INTO RHSN
4038	012314	004037	034460	JSR	RO, @#FILLRE	:MOV 0 INTO SAVED RHEC1
4039	012320	002246		RHEC1		:SAVED REGISTER TO CHANGE
4040	012322	000000		0		:DATA
4041	012324	004037	034460	JSR	RO, @#FILLRE	:MOV 0 INTO SAVED RHEC2
4042	012330	002250		RHEC2		:SAVED REGISTER TO CHANGE
4043	012332	000000		0		:DATA
4044						
4045	012334	004037	035440	JSR	RO, @#CHREG	:CHANGE BITS IN SAVED REGISTER
4046	012340	002216		RHCS1		:CHANGE RHCS1 REGISTER
4047						
4048	012342	000001		1		:1 BIT/BITS TO BE CHANGED
4049	012344	000001		1		:NEW VALUE OF PAR IS 1
4050	012346	000010		PAR		:CHANGE PAR BIT
4051						
4052						
4053						:NOW THAT SAVERE TABLE HAS BEEN LOADED WITH
4054						:EXPECTED VALUES, THE REGISTERS WILL BE COMPARED
4055						:WITH SAVERE TABLE
4056						
4057	012350	004037	035546	JSR	RO, @#COMREG	:COMPARE SAVED REGISTERS WITH
4058						:PRESENT VALUE
4059	012354	004 .P2		SAVERE		:GOOD DATA SAVED IN 'SAVERE'

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4060 012356 002266 WC ;TEST DATA STARTING FROM 'RHWC'
4061 012360 000022 18. ;18. REGISTERS TO BE COMPARED
4062 012362 012366 5$ ;RETURN TO 5$ ON ERROR
4063 012364 012372 6$ ;RETURN TO 6$ ON NO ERROR
4064
4065 012366 104017 5$: ERROR 17 ;DRIVE CLEAR COMMAND
4066 012370 000207 RTS PC ;GAVE AN ERROR
4067 ;GOOD DATA HAS WHAT SHOULD
4068 ;BE IN REGISTER AFTER A
4069 ;DRIVE CLEAR
4070 ;RECEIVED DATA HAS WHAT
4071 ;THE REGISTER ACTUALLY
4072 ;CONTAINED
4073 012372 6$:

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*****
*TEST 13 READ-IN-PRESET
* IF STARTING ADDRESS 220 IS USED THIS TEST WILL NOT BE PERFORMED
*
* IF THE PROGRAM WORKS UNDER ACT-11 MONITOR
* THEN THIS TEST IS NOT PERFORMED
*
* IF NO ACT-11 MONITOR IS PRESENT THEN
* THIS TEST IS PERFORMED ONLY ON THE FIRST PASS
* ON SUBSEQUENT PASSES THIS TEST IS NOT DONE
*
* THIS TESTS THE READ-IN-PRESET COMMAND
* FIRST THE DRIVE IS POWERED DOWN AND UP IN ORDER TO
* RESET VV-BIT #6 IN RHDS1
* THEN ALL WRITE BITS OF ALL REGISTERS ARE FILLED
* WITH ONES EXCEPT GO, CLR, IE, PAT, MCPE, UPE
* ATA FOR DRIVE UNDER TEST IS MADE = 0
*
* THEN A READ-IN-PRESET COMMAND = 20 IS GIVEN
* THEN ALL REGISTERS ARE TESTED
* THE FOLLOWING SHOULD BE THE REGISTER CONTENTS
* RHCA = 0, RHDST = 0, RHOF SHOULD HAVE
* FMT22 = 0, ECI = 0, HCI = 0, RHDS1 SHOULD HAVE VV = 1
* ALL OTHER REGISTERS SHOULD BE UNCHANGED

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4103 *****
4104 012372 000004 TST13: SCOPE
4105 012374 012706 001000 MOV #STACK, SP ;RESET STACK
4106 012400 012737 000013 004514 MOV #13, @#TSTNM ;SAVE TEST NUMBER
4107
4108 012406 004737 034556 JSR PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
4109 ;R3-RHDS1, R4-RHER1
4110 ;GIVE RH-11 INITIALIZE
4111 ;SETUP UNIT NUBER
4112 012412 005737 004634 TST @#NOPUSH ;IS THIS 220 START
4113 012416 001402 BEQ 7$ ;BRANCH IF NO
4114 012420 000167 000462 JMP TST14 ;JUMP TO NEXT TEST
4115 012424 005737 000042 7$: TST @#42 ;MONITOR (ACT-11) RETURN ADDRESS

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4116 012430 001004      BNE      1$          ;BRANCH IF NO MONITOR
4117 012432 005737 001100  TST      @#$PASS    ;IS THIS FIRST PASS
4118 012436 001001      BNE      1$          ;BRANCH IF NOT FIRST PASS
4119 012440 000402      BR       2$          ;BRANCH TO CONTINUE TEST
4120 012442                1$:
4121 012442 000167 000440  JMP      TST14      ;JUMP TO NEXT TEST
4122 012446                2$:
4123 012446 104400 012454  TYPE     ,+4        ;;TYPE ASCIZ STRING
4124 012452 000407      BR       64$        ;;GET OVER THE ASCIZ
4125                ;;.ASCIZ      <15><12>/STOP DRIVE /
4126 012472                64$:
4127 012472 013746 004626  MOV      @#UNIT,-(SP) ;GET UNIT UNDER TEST
4128 012476 104404      TYPDS
4129 012500 104400 001221  TYPE     ,SCLF
4130 012504 032713 010000  3$:      BIT      #MOL,@R3    ;MOL WILL BE HIGH TILL STOP IS HIT
4131 012510 001375      BNE      3$          ;WAIT TILL STOP IS HIT
4132 012512 104400 012520  TYPE     ,+4        ;;TYPE ASCIZ STRING
4133 012516 000407      BR       65$        ;;GET OVER THE ASCIZ
4134                ;;.ASCIZ      <15><12>/START DRIVE/
4135 012536                65$:
4136 012536 013746 004626  MOV      @#UNIT,-(SP) ;GET UNIT UNDER TEST
4137 012542 104404      TYPDS
4138 012544 104400 001221  TYPE     ,SCLF
4139 012550 032713 010000  4$:      BIT      #MOL,@R3    ;MOL WILL BE LOW TILL FILE READY
4140 012554 001775      BEQ     4$          ;WAIT TILL FILE READY
4141
4142 012556 004737 034556  JSR     PC,@#CLDISK ;SET R1-RHCS1, R2-RHCS2
4143                ;R3-RHDS1, R4-RHER1
4144                ;GIVE RH-11 INITIALIZE
4145                ;SETUP UNIT NUBER
4146 012562 004737 034614  .TSR    PC,@#CHECK  ;CHECK DVA,RDY,MOL,DPR,DRY
4147
4148 012566 012700 002210  MOV     #RHWC,RO    ;ADDR. OF ADDR. OF RHWC IN RO
4149
4150 012572 012730 177777  MOV     #177777,@(RO)+ ;LOAD 177777 INTO RHWC
4151
4152 012576 012730 177777  MOV     #177777,@(RO)+ ;LOAD 177777 INTO RHBA
4153
4154 012602 052730 043010  BIS     #43010,@(RO)+ ;LOAD 43010 INTO RHCS2
4155 012606 012730 001400  MOV     #1400,@(RO)+ ;LOAD 1400 INTO RHCS1
4156
4157 012612 012730 000000  MOV     #0,@(RO)+    ;LOAD 0 INTO RHER1
4158
4159 012616 012730 177777  MOV     #177777,@(RO)+ ;LOAD 177777 INTO RHDST
4160
4161 012622 012730 000000  MOV     #0,@(RO)+    ;LOAD 0 INTO RHER2
4162
4163 012626 012730 177777  MOV     #177777,@(RO)+ ;LOAD 177777 INTO RHOF
4164
4165 012632 012730 177777  MOV     #177777,@(RO)+ ;LOAD 177777 INTO RHCA
4166
4167 012636 012730 000000  MOV     #0,@(RO)+    ;LOAD 0 INTO RHER3
4168
4169                ;NOW SET BITS IN RHAS FOR ALL DRIVES PRESENT
4170
4171 012642 010046  MOV     RO,-(SP)     ;;PUSH RO ON STACK

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4172 012644 011446          MOV      @R4,-(SP)      ;SAVE RHER1 TO REINSTATE LATER
4173 012646 011246          MOV      @R2,-(SP)      ;SAVE RHCS2 TO BE REINSTATED
4174                                ;AFTER ALL ATA BITS HAVE BEEN SET
4175 012650 013700 004652    MOV      @#TOTALAT,R0   ;GET DRIVES PRESENT
4176 012654 005012          CLR      @R2           ;CLEAR RHCS2 AND CARRY
4177 012656 012705 000010    MOV      #8.,R5        ;COUNTER
4178 012662 006000          ROR      R0            ;GET BIT INTO CARRY
4179 012664 103002          BCC      @R5           ;BRANCH IF NO UNIT ON THIS BIT
4180 012666 012714 177777    MOV      #-1,@R4       ;MOVE INTO ERROR REGISTER
4181                                ;TO SET ATA BIT
4182 012672 005212          INC      @R2           ;INCREMENT RHCS2 TO NEXT UNIT
4183 012674 005305          DEC      R5            ;COUNT
4184 012676 001371          BNE      @R5           ;BRANCH IF 8 NOT DONE
4185 012700 012612          MOV      (SP)+,@R2     ;REINSTATE RHCS2
4186 012702 012614          MOV      (SP)+,@R4     ;REINSTATE RHER1
4187 012704 012600          MOV      (SP)+,R0      ;POP STACK INTO R0
4188 012706 005720          TST      (R0)+        ;GET OVER PHAS IN R0
4189
4190
4191 012710 012730 177776    MOV      #177776,@(R0)+ ;LOAD 177776 INTO RHMR
4192
4193
4194 012714 053777 004650 167312  BIS      @#ATTENT,@RHAS ;CLEAR WORKING DRIVE ATA
4195                                ;BIT IN RHAS
4196
4197 012722 013777 002374 167266  MOV      @#READIN,@RHCS1 ;GET READY FOR READIN
4198                                ;READ IN WITH 20 IN RHCS1
4199
4200
4201                                ;NOW SAVE REGISTERS FOR COMPARISON AFTER READ-IN COMMAND
4202 012730 004037 034716    JSR      R0,@#SAVER    ;SAVE REGISTERS
4203 012734 002210          RHWG          ;RHWG IS THE FIRST REGISTER SAVED
4204 012736 004522          SAVERE        ;STARTING ADDRES OF WHERE
4205                                ;THE REGISTERS ARE SAVED
4206 012740 000022          18.          ;NUMBER OF REGISTERS
4207                                ;SAVED = 18.
4208
4209 012742 013777 004516 167234  MOV      @#RP4VEC,@RPVEC ;SET RPO4 VECTOR ADDRESS
4210                                ;TO 'TIME1' IF P-CLOCK IS PRESENT
4211                                ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
4212                                ;'TIME' WILL ONLY SAVE
4213                                ;CURRENT CYLINDER ADDRESS
4214                                ;AND LOOK AHEAD REGISTERS
4215
4216 012750 013746 002374    MOV      @#READIN,-(SP) ;GET READY TO MOVE COMMAND
4217 012754 052716 000001    BIS      #GO,(SP)      ;GET READY TO SET GO
4218                                ;WITHOUT INTERRUPT ENABLE
4219 012760 012677 167232    MOV      (SP)+,@RHCS1  ;GO WITH
4220                                ;20 IN RHCS1 FOR READ IN
4221                                ;WITH INTERRUPT DISABLED
4222
4223
4224
4225 012764 104410          WAT          ;WAIT FOR VV BIT TO SET
4226 012766 002240          RHDS1        ;WAIT FOR RHDS1 REGISTER
4227 012770 000100          VV          ;WAIT FOR VV BIT IN RHDS1 REGISTER

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4228 012772 000001      1.      ;ALLOW 10 MICRO SECONDS
4229 012774 000001      1.      ;VV MUST SET BETWEEN
4230                                     ;00 AND 20 MICRO SECONDS
4231
4232                                     ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
4233 012776 004037 034460 JSR      RO,#FILLRE ;MOV 0 INTO SAVED RHCA
4234 013002 002230      RHCA      ;SAVED REGISTER TO CHANGE
4235 013004 000000      0          ;DATA
4236 013006 004037 034460 JSR      RO,#FILLRE ;MOV 0 INTO SAVED RHDST
4237 013012 002222      RHDST     ;SAVED REGISTER TO CHANGE
4238 013014 000000      0          ;DATA
4239
4240 013016 004037 035440 JSR      RO,#CHREG  ;CHANGE BITS IN SAVED REGISTER
4241 013022 002226      RHOF      ;CHANGE RHOF REGISTER
4242
4243 013024 000003      3          ;3 BIT/BITS TO BE CHANGED
4244 013026 000000      0          ;NEW VALUE OF FMT22 IS 0
4245 013030 010000      FMT22    ;CHANGE FMT22 BIT
4246 013032 000000      0          ;NEW VALUE OF ECI IS 0
4247 013034 004000      ECI      ;CHANGE ECI BIT
4248 013036 000000      0          ;NEW VALUE OF HCI IS 0
4249 013040 002000      HCI      ;CHANGE HCI BIT
4250
4251 013042 004037 035440 JSR      RO,#CHREG  ;CHANGE BITS IN SAVED REGISTER
4252 013046 002240      RHDS1    ;CHANGE RHDS1 REGISTER
4253
4254 013050 000001      1          ;1 BIT/BITS TO BE CHANGED
4255 013052 000001      1          ;NEW VALUE OF VV IS 1
4256 013054 000100      VV      ;CHANGE VV BIT
4257
4258                                     ;NOW THAT SAVERE TABLE WITH SAVED REGISTERS HAVE
4259                                     ;THE EXPECTED VALUE AFTER A READ-IN COMMAND
4260                                     ;COMPARISONS ARE MADE
4261
4262
4263 013056 004037 035546 JSR      RO,#COMREG ;COMPARE SAVED REGISTERS WITH
4264                                     ;PRESENT VALUE
4265 013062 004522      SAVERE   ;GOOD DATA SAVED IN 'SAVERE'
4266 013064 002266      WC      ;TEST DATA STARTING FROM 'RHWC'
4267 013066 000022      18.     ;18. REGISTERS TO BE COMPARED
4268 013070 013074      5$     ;RETURN TO 5$ ON ERROR
4269 013072 013100      6$     ;RETURN TO 6$ ON NO ERROR
4270
4271 013074 104020      5$:     ERROR  20
4272 013076 000207      RTS     PC
4273
4274                                     ;READ IN COMMAND GAVE AN
4275                                     ;ERROR
4276                                     ;GOOD DATA HAS WHAT SHOULD
4277                                     ;BE IN REGISTER AFTER A
4278                                     ;READ-IN COMMAND
4279                                     ;RECEIVED DATA HAS WHAT
4280                                     ;THE REGISTER ACTUALLY CONTAINED
4281                                     ;THE FOLLOWING SHOULD
4282                                     ;BE THE REGISTER CONTENTS
4283                                     ;RHCA=0, RHDST = 0
4284                                     ;RHOF SHOULD HAVE FMT22 = 0,
4285                                     ;HCI = 0, ECI = 0,
4286                                     ;RHDS1 SHOULD HAVE VV = 1

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B08

MAINDEC-11-DERPU-B
DERPUB.P11 T13

MACY11 27(732)
READ-IN-PRESET

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4 4 4
00000
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00000

013100 012737 177777 041404 68: MOV #-1.2#PRITEM

: ALL OTHER BITS SHOULD
: BE UNCHANGED
: CLEAR PREVIOUS ITEM NUMBER

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*TEST 14 READ-IN-PRESET

* THIS TEST IS THE SAME AS THE PREVIOUS TEST EXCEPT
* THAT IT DOES NOT TEST THE SETTING OF VV

* THIS TEST IS HERE BECAUSE IF ACT-11 MONITOR IS PRESENT
* THEN THE PREVIOUS TEST WILL NOT BE PERFORMED
* THIS TESTS THE READ-IN-PRESET COMMAND
* ALL WRITE BITS OF ALL REGISTERS ARE FILLED
* WITH ONES EXCEPT GO, CLR, IE, PAT, MCPE, UPE
* ATA FOR DRIVE UNDER TEST IS MADE = 0

* THEN A READ-IN-PRESET COMMAND = 20 IS GIVEN
* THEN ALL REGISTERS ARE TESTED
* THE FOLLOWING SHOULD BE THE REGISTER CONTENTS
* RHCA = 0, RHDST = 0, RHOF SHOULD HAVE
* FMT22 = 0, ECI = 0, HCI = 0, RHDS1 SHOULD HAVE VV = 1
* ALL OTHER REGISTERS SHOULD BE UNCHANGED

013106 000004
013110 012706 001000
013114 012737 000014 004514

013122 004737 034556

013126 004737 034614
013132 012700 002210
013136 012730 177777
013142 012730 177777
013146 052730 043010
013152 012730 001400
013156 012730 000000
013162 012730 177777
013166 012730 000000
013172 012730 177777
013176 012730 177777
013202 012730 000000
013206 012730 177777
013212 012730 177776

TST14: SCOPE
MOV #STACK, SP ;RESET STACK
MOV #14, 2#TSTNM ;SAVE TEST NUMBER

JSR PC, 2#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUMBER
JSR PC, 2#CHECK ;CHECK DVA, RDY, MOL, DPR, DRY

MOV #RHWC, RD ;ADDR. OF ADDR. OF RHWC IN RD
MOV #177777, 2(RD)+ ;LOAD 177777 INTO RHWC
MOV #177777, 2(RD)+ ;LOAD 177777 INTO RHBA
BIS #43010, 2(RD)+ ;LOAD 43010 INTO RHCS2
MOV #1400, 2(RD)+ ;LOAD 1400 INTO RHCS1
MOV #0, 2(RD)+ ;LOAD 0 INTO RHER1
MOV #177777, 2(RD)+ ;LOAD 177777 INTO RHDST
MOV #0, 2(RD)+ ;LOAD 0 INTO RHER2
MOV #177777, 2(RD)+ ;LOAD 177777 INTO RHOF
MOV #177777, 2(RD)+ ;LOAD 177777 INTO RHCA
MOV #0, 2(RD)+ ;LOAD 0 INTO RHER3
MOV #-1, 2(RD)+ ;CLEAR ALL BITS OF RHAS
MOV #177776, 2(RD)+ ;LOAD 177776 INTO RHMR

4344	013216	053777	004650	167010	BIS	Q#ATTENT,QRHAS	:CLEAR WORKING DRIVE ATA :BIT IN RHAS
4345							
4346							
4347	013224	013777	002374	166764	MOV	Q#READIN,QRHCS1	:GET READY FOR READIN :READ IN WITH 20 IN RHCS1
4348							
4349							
4350							
4351							
4352	013232	004037	034716		JSR	RO,Q#SAVER	:NOW SAVE REGISTERS FOR COMPARISON AFTER READ-IN COMMAND :SAVE REGISTERS
4353	013236	002210			RHWC		:RHWC IS THE FIRST REGISTER SAVED
4354	013240	004522			SAVERE		:STARTING ADDRESS OF WHERE :THE REGISTERS ARE SAVED
4355							:NUMBER OF REGISTERS :SAVED = 18.
4356	013242	000022			18.		
4357							
4358							
4359	013244	013777	004516	166732	MOV	Q#RP4VEC,QRPVEC	:SET RP04 VECTOR ADDRESS :TO 'TIME1' IF P-CLOCK IS PRESENT :OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT :'TIME' WILL ONLY SAVE :CURRENT CYLINDER ADDRESS :AND LOOK AHEAD REGISTERS
4360							
4361							
4362							
4363							
4364							
4365							
4366	013252	013746	002374		MOV	Q#READINI,-(SP)	:GET READY TO MOVE COMMAND
4367	013256	052716	000001		BIS	#GO,(SP)	:GET READY TO SET GO :WITHOUT INTERRUPT ENABLE
4368							
4369	013262	012677	166730		MOV	(SP)+,QRHCS1	:GO WITH :WITH INTERRUPT DISABLED
4370							
4371							
4372							
4373							
4374	013266	104410			WAT		:WAIT FOR RDY BIT TO SET
4375	013270	002216			RHCS1		:WAIT FOR RHCS1 REGISTER
4376	013272	000200			RDY		:WAIT FOR RDY BIT IN RHCS1 REGISTER
4377	013274	000001			1.		:ALLOW 10 MICRO SECONDS
4378	013276	000001			1.		:RDY MUST SET BETWEEN :00 AND 20 MICRO SECONDS
4379							
4380							
4381							
4382	013300	004037	034460		JSR	RO,Q#FILLRE	:NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE :MOV 0 INTO SAVED RHCA
4383	013304	002230			RHCA		:SAVED REGISTER TO CHANGE
4384	013306	000000			0		:DATA
4385	013310	004037	034460		JSR	RO,Q#FILLRE	:MOV 0 INTO SAVED RHDST
4386	013314	002222			RHDST		:SAVED REGISTER TO CHANGE
4387	013316	000000			0		:DATA
4388							
4389	013320	004037	035440		JSR	RO,Q#CHREG	:CHANGE BITS IN SAVED REGISTER
4390	013324	002226			RHOF		:CHANGE RHOF REGISTER
4391							
4392	013326	000003			3		:3 BIT/BITS TO BE CHANGED
4393	013330	000000			0		:NEW VALUE OF FMT22 IS 0
4394	013332	010000			FMT22		:CHANGE FMT22 BIT
4395	013334	000000			0		:NEW VALUE OF ECI IS 0
4396	013336	004000			ECI		:CHANGE ECI BIT
4397	013340	000000			0		:NEW VALUE OF HCI IS 0
4398	013342	002000			HCI		:CHANGE HCI BIT
4399							


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4400 013344 004037 035440 JSR RO,2#CHREG ;CHANGE BITS IN SAVED REGISTER
4401 013350 002240 RHDS1 ;CHANGE RHDS1 REGISTER
4402
4403 013352 000001 1 ;1 BIT/BITS TO BE CHANGED
4404 013354 000001 1 ;NEW VALUE OF VV IS 1
4405 013356 000100 VV ;CHANGE VV BIT
4406
4407
4408 ;NOW THAT SAVERE TABLE WITH SAVED REGISTERS HAVE
4409 ;THE EXPECTED VALUE AFTER A READ-IN COMMAND
4410 ;COMPARISONS ARE MADE
4411
4412 013360 004037 035546 JSR RO,2#COMREG ;COMPARE SAVED REGISTERS WITH
4413 ;PRESENT VALUE
4414 013364 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
4415 013366 002266 WC ;TEST DATA STARTING FROM 'RAWC'
4416 013370 000022 18. ;18. REGISTERS TO BE COMPARED
4417 013372 013376 5$ ;RETURN TO 5$ ON ERROR
4418 013374 013402 6$ ;RETURN TO 6$ ON NO ERROR
4419
4420 013376 104020 5$: ERROR 20 ;READ-IN COMMAND GAVE AN
4421 013400 000207 RTS PC ;ERROR
4422 ;GOOD DATA HAS WHAT SHOULD
4423 ;BE IN REGISTER AFTER A
4424 ;READ-IN COMMAND
4425 ;RECEIVED DATA HAS WHAT
4426 ;THE REGISTER ACTUALLY CONTAINS
4427 ;THE FOLLOWING SHOULD
4428 ;BE THE REGISTER CONTENTS
4429 ;RHCA = 0, RHDST = 0
4430 ;RHOF SHOULD HAVE FMT22 = 0,
4431 ;HCI = 0, ECI = 0
4432 ;RHDS1 SHOULD HAVE VV = 1
4433 ;ALL OTHER BITS SHOULD
4434 ;BE UNCHANGED
4435
4436 013402 6$:

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4437 ;*****
4438 ;*TEST 15 RECALIBRATE COMMAND
4439
4440 ;* ALL POSSIBLE REGISTERS ARE FILLED WITH ONES
4441 ;* THEN A RECALIBRATE = 6 COMMAND IS GIVEN
4442 ;* NO REGISTERS SHOULD CHANGE EXCEPT RHCC = 0
4443
4444 ;*****
4445 †ST15: SCOPE
4446 013402 000004 MOV #STACK,SP ;RESET STACK
4447 013404 012706 001000 MOV #15,‡#†STNM ;SAVE TEST NUMBER
4448 013410 012737 000015 004514
4449 013416 004737 034556 JSR PC,‡#CLDISK ;SET R1-RHCS1, R2-RHCS2
4450 ;R3-RHDS1, R4-RHER1
4451 ;GIVE RH-11 INITIALIZE
4452 ;SETUP UNIT NUBER
4453 013422 004737 034636 JSR PC,‡#CHECKT ;CHECK DVA,RDY,MOL,DPR,DRY,VV
4454
4455 013426 012700 002210 MOV #RHWC,RO ;ADDR. OF ADDR. OF RHWC IN RO
4456
4457 013432 012730 177777 MOV #177777,‡(RO)+ ;LOAD 177777 INTO RHWC
4458
4459 013436 012730 177776 MOV #177776,‡(RO)+ ;LOAD 177776 INTO RHBA
4460
4461 013442 052730 000010 BIS #010,‡(RO)+ ;LOAD 010 INTO RHCS2
4462 013446 012730 001400 MOV #1400,‡(RO)+ ;LOAD 1400 INTO RHCS1
4463
4464 013452 012730 000000 MOV #0,‡(RO)+ ;LOAD 0 INTO RHER1
4465
4466 013456 012730 177777 MOV #177777,‡(RO)+ ;LOAD 177777 INTO RHDST
4467
4468 013462 012730 000000 MOV #0,‡(RO)+ ;LOAD 0 INTO RHER2
4469
4470 013466 012730 177777 MOV #177777,‡(RO)+ ;LOAD 177777 INTO RHOF
4471
4472 013472 012730 177777 MOV #177777,‡(RO)+ ;LOAD 177777 INTO RHCA
4473
4474 013476 012730 000000 MOV #0,‡(RO)+ ;LOAD 0 INTO RHER3
4475
4476 ;NOW SET BITS IN RHAS FOR ALL DRIVES PRESENT
4477
4478 013502 010046 MOV RO,-(SP) ;:PUSH RO ON STACK
4479 013504 011446 MOV ‡R4,-(SP) ;:SAVE RHER1 TO REINSTATE LATER
4480 013506 011246 MOV ‡R2,-(SP) ;:SAVE RHCS2 TO BE REINSTATED
4481 ;:AFTER ALL ATA BITS HAVE BEEN SET
4482 013510 013700 004652 MOV ‡#TOTALAT,RO ;:GET DRIVES PRESENT
4483 013514 005012 CLR ‡R2 ;:CLEAR RHCS2 AND CARRY
4484 013516 012705 000010 MOV #8,R5 ;:COUNTER
4485 013522 006000 84$: ROR RO ;:GET BIT INTO CARRY
4486 013524 103002 BCC 85$ ;:BRANCH IF NO UNIT ON THIS BIT
4487 013526 012714 177777 MOV #-1,‡R4 ;:MOVE INTO ERROR REGISTER
4488 ;:TO SET ATA BIT
4489 013532 005212 85$: INC ‡R2 ;:INCREMENT RHCS2 TO NEXT UNIT
4490 013534 005305 DEC R5 ;:COUNT
4491 013536 001371 BNE 84$ ;:BRANCH IF 8 NOT DONE
4492 013540 012612 MOV (SP)+,‡R2 ;:REINSTATE RHCS2

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4493 013542 012614      MOV      (SP)+,R4      ;REINSTATE RHER1
4494 013544 012600      MOV      (SP)+,R0      ;POP STACK INTO R0
4495 013546 005720      TST      (R0)+        ;GET OVER PHAS IN R0
4496
4497
4498 013550 012730 177776  MOV      #177776,R0+   ;LOAD 177776 INTO RHMR
4499
4500
4501
4502 013554 013777 002340 166434  MOV      @#RECALI,@RHCS1 ;GET READY FOR RECALI
4503                                     ;RECALIBRATE WITH 6 IN RHCS1
4504
4505                                     ;NOW SAVE REGISTERS FOR COMPARISON AFTER RECALIBRATE
4506 013562 004037 034716  JSR      R0,@#SAVER    ;SAVE REGISTERS
4507 013566 002210      RHW     ;RHW IS THE FIRST REGISTER SAVED
4508 013570 004522      SAVER   ;STARTING ADDRESS OF WHERE
4509                                     ;THE REGISTERS ARE SAVED
4510 013572 000022      18.      ;NUMBER OF REGISTERS
4511                                     ;SAVED = 18.
4512
4513 013574 013777 004516 166402  MOV      @#RP4VEC,@RPVEC ;SET RP04 VECTOR ADDRESS
4514                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
4515                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
4516                                     ;'TIME' WILL ONLY SAVE
4517                                     ;CURRENT CYLINDER ADDRESS
4518                                     ;AND LOOK AHEAD REGISTERS
4519
4520
4521 013602 013746 002340  MOV      @#RECALI,-(SP) ;GET READY TO MOVE COMMAND
4522 013606 052716 000101  BIS      #GO!IE,(SP)   ;GET READY TO SET GO AND
4523                                     ;ENABLE INTERRUPT
4524 013612 012677 166400  MOV      (SP)+,@RHCS1  ;GO WITH
4525                                     ;6 IN RHCS1 FOR RECALIBRATE
4526                                     ;WITH INTERRUPT ENABLED
4527 013616 011100      MOV      @R1,R0        ;SAVE RHCS1 DURING ABOVE OPERATION
4528 013620 011305      MOV      @R3,R5        ;SAVE RHDS1 DURING ABOVE OPERATION
4529
4530
4531 013622 104410      WAT                                     ;WAIT FOR DRY BIT TO SET
4532 013624 002240      RHDS1    ;WAIT FOR RHDS1 REGISTER
4533 013626 000200      DRY      ;WAIT FOR DRY BIT IN RHDS1 REGISTER
4534 013630 076377      31999.  ;ALLOW 319990 MICRO SECONDS
4535 013632 056701      24001.  ;DRY MUST SET BETWEEN
4536                                     ;79980 AND 560000 MICRO SECONDS
4537                                     ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
4538                                     ;R0 AND R5 IMMEDIATELY AFTER GO
4539 013634 013746 002340  MOV      @#RECALI,-(SP) ;SAVE COMMAND
4540 013640 052716 004301  BIS      #DVA!GO!IE!RDY,(SP) ;INCLUDE DVA!GO!IE!RDY
4541 013644 005737 004632  TST      @#NUNIT      ;ARE THERE MORE THAN ONE UNIT
4542 013650 001413      BEQ     89$          ;BRANCH IF ONLY ONE UNIT
4543 013652 010037 004660  MOV      R0,@#TMP4    ;GET RHCS1
4544 013656 042737 177677 004660  BIC      #!CIE,@#TMP4  ;KEEP IE BIT
4545 013664 042716 000100  BIC      #IE,(SP)     ;CLEAR IE IN GOOD DATA
4546 013670 053716 004660  BIS      @#TMP4,(SP)  ;GET IE AS IS
4547 013674 052716 100000  BIS      #SC,(SP)    ;SET SC IN RHCS1
4548 013700

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89\$:

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MAINDEC-11-DERPU-B
DERPUB.P11 T15

MACY11 27(732) 17-SEP-76 13:23 PAGE 99
RECALIBRATE COMMAND

4605 014040
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25:

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4612 ;*****
4613 ;*TEST 16 RECALIBRATE COMMAND
4614 ;* ALL POSSIBLE REGISTERS ARE FILLED WITH 0
4615 ;* THEN A RECALIBRATE =6 COMMAND IS GIVEN
4616 ;* NO REGISTERS SHOULD CHANGE EXCEPT RHCC=0
4617 ;*****
4618
4619 014040 000004          †ST16: SCOPE
4620 014042 012706 001000  MOV #STACK,SP ;RESET STACK
4621 014046 012737 000016 004514  MOV #16,‡#†STNUM ;SAVE TEST NUMBER
4622
4623 014054 004737 034556  JSR PC,‡#CLDISK ;SET R1-RHCS1, R2-RHCS2
4624 ;R3-RHDS1, R4-RHER1
4625 ;GIVE RH-11 INITIALIZE
4626 ;SETUP UNIT NUMBER
4627 014060 004737 034636  JSR PC,‡#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV
4628
4629 014064 012700 002210  MOV #RHWC,RO ;ADDR. OF ADDR OF RHWC IN RO
4630
4631
4632 014070 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHWC
4633
4634
4635
4636 014074 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHBA
4637
4638
4639
4640 014100 052730 000000  BIS #0,‡(RO)+ ;LOAD 0 INTO RHCS2
4641
4642
4643 014104 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHCS1
4644
4645
4646
4647 014110 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHER1
4648
4649
4650
4651 014114 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHDST
4652
4653
4654
4655 014120 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHER2
4656
4657
4658
4659 014124 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHOF
4660
4661
4662
4663 014130 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHCA
4664
4665
4666
4667 014134 012730 000000  MOV #0,‡(RO)+ ;LOAD 0 INTO RHER3

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4668
4669
4670
4671 014140 012730 177777      MOV      #-1,@(RO)+      ;CLEAR ALL BITS OF RHAS
4672
4673
4674 014144 012730 000000      MOV      #0,@(RO)+      ;LOAD 0 INTO RHMR
4675
4676
4677 014150 013777 002340 166040  MOV      @#RECALI,@RHCSI ;GET READY FOR RECALI
4678                                     ;RECALIBRATE WITH 6 IN RHCSI
4679
4680
4681                                     ;NOW SAVE REGISTERS FOR COMPARISON AFTER RECALIBRATE
4682 014156 004037 034716      JSR      RO,@#SAVER      ;SAVE REGISTERS
4683 014162 002210              RHWC      ;RHWC IS THE FIRST REGISTER SAVED
4684 014164 004522              SAVERE    ;STARTING ADDRESS OF WHERE
4685                                     ;THE REGISTERS ARE SAVED
4686 014166 000022              18.      ;NUMBER OF REGISTERS
4687                                     ;SAVED = 18.
4688
4689 014170 013777 004516 166006  MOV      @#RP4VEC,@RPVEC ;SET RPO4 VECTOR ADDRESS
4690                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
4691                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
4692                                     ;'TIME' WILL ONLY SAVE
4693                                     ;CURRENT CYLINDER ADDRESS
4694                                     ;AND LOOK AHEAD REGISTERS
4695
4696
4697 014176 013746 002340      MOV      @#RECALI,-(SP)  ;GET READY TO MOVE COMMAND
4698 014202 052716 000101      BIS      #GO!IE,(SP)    ;GET READY TO SET GO AND
4699                                     ;ENABLE INTERRUPT
4700 014206 012677 166004      MOV      (SP)+,@RHCSI   ;GO WITH
4701                                     ;6 IN RHCSI FOR RECALIBRATE
4702                                     ;WITH INTERRUPT ENABLED
4703 014212 011100              MOV      @R1,RO         ;SAVE RHCSI DURING ABOVE OPERATION
4704 014214 011305              MOV      @R3,R5         ;SAVE RHDS1 DURING ABOVE OPERATION
4705
4706
4707 014216 104410              WAT      ;WAIT FOR DRY BIT TO SET
4708 014220 002240              RHDS1    ;WAIT FOR RHDS1 REGISTER
4709 014222 000200              DRY      ;WAIT FOR DRY BIT IN RHDS1 REGISTER
4710 014224 076377              31999.  ;ALLOW 319990 MICRO SECONDS
4711 014226 056701              24001.  ;DRY MUST SET BETWEEN
4712                                     ;79980 AND 560000 MICRO SECONDS
4713                                     ;COMPARE CONTENTS OF RHCSI AND RHDS1 ALREADY SAVED IN
4714                                     ;RO AND R5 IMMEDIATELY AFTER GO
4715 014230 013746 002340      MOV      @#RECALI,-(SP)  ;SAVE COMMAND
4716 014234 052716 004301      BIS      #DVA!GO!IE!RDY,(SP) ;INCLUDE DVA!GO!IE!RDY
4717 014240 011637 001124      MOV      (SP),@#$GDDAT  ;SAVE FOR PRINTOUT
4718 014244 022600              CMP      (SP)+,RO       ;DURING ABOVE OPERATION ONLY DVA!GO!IE!RDY
4719                                     ;AND COMMAND SHOULD BE SET
4720 014246 001405              BEQ      88$           ;BRANCH IF GOOD
4721 014250 010037 001126      MOV      RO,@#$BDDAT    ;BAD DATA
4722 014254 010137 004510      MOV      R1,@#REGADR    ;FAILING REGISTER RHCSI
4723 014260 104021              ERROR    21            ;DURING ABOVE OPERATION ONLY

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4724                                     ;COMMAND AND DVA!GO!IE!RDY SHOULD BE SET
4725 014262 012746 030500 88$: MOV #MOL!DPR!VV!PIP, -(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
4726 014266 011637 001124 MOV (SP), @#$GDDAT ;SAVE FOR PRINTOUT
4727 014272 022605 CMP (SP)+, R5 ;DURING ABOVE OPERATION ONLY MOL!DPR!VV!PIP
4728                                     ;SHOULD BE SET
4729 014274 001405 BEQ 90$ ;BRANCH IF GOOD
4730 014276 010537 001126 MOV R5, @#$BDDAT ;BAD DATA
4731 014302 010337 004510 MOV R3, @#$REGADR ;FAILING REGISTER RHDS1
4732 014306 104063 ERROR 63 ;DURING ABOVE OPERATION ONLY
4733                                     ;MOL!DPR!VV!PIP SHOULD BE SET
4734 014310 90$:
4735
4736 ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
4737 014310 004037 034460 JSR RO, @#$FILLRE ;MOV 0 INTO SAVED RHCC
4738 014314 002252 RHCC ;SAVED REGISTER TO CHANGE
4739 014316 000000 0 ;DATA
4740
4741 014320 053737 004650 004546 BIS @#$ATTENT, @#$SAVERE+24 ;SET APPROPRIATE ATA BITS
4742                                     ;FOR WORKING DRIVE IN
4743                                     ;SAVED RHAS LOACTION
4744
4745 014326 004037 035440 JSR RO, @#$CHREG ;CHANGE BITS IN SAVED REGISTER
4746 014332 002240 RHDS1 ;CHANGE RHDS1 REGISTER
4747
4748 014334 000001 1 ;1 BIT/BITS TO BE CHANGED
4749 014336 000001 1 ;NEW VALUE OF ATA IS 1
4750 014340 100000 ATA ;CHANGE ATA BIT
4751
4752 014342 004037 035440 JSR RO, @#$CHREG ;CHANGE BITS IN SAVED REGISTER
4753 014346 002216 RHCS1 ;CHANGE RHCS1 REGISTER
4754
4755 014350 000001 1 ;1 BIT/BITS TO BE CHANGED
4756 014352 000001 1 ;NEW VALUE OF SC IS 1
4757 014354 100000 SC ;CHANGE SC BIT
4758 ;NOW COMPARE REGISTERS AFTER A RECALIBRATE COMMAND
4759
4760 014356 004037 035546 JSR RO, @#$COMREG ;COMPARE SAVED REGISTERS WITH
4761                                     ;PRESENT VALUE
4762 014362 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
4763 014364 002266 WC ;TEST DATA STARTING FROM 'RHWC'
4764 014366 000022 18. ;18. REGISTERS TO BE COMPARED
4765 014370 014374 1$ ;RETURN TO 1$ ON ERROR
4766 014372 014400 2$ ;RETURN TO 2$ ON NO ERROR
4767
4768 014374 104064 1$: ERROR 64 ;RECALIBRATE COMMAND CAUSED
4769 014376 000207 RTS PC ;AN ERROR
4770                                     ;GOOD DATA GIVES WHAT SHOULD BE
4771                                     ;THERE
4772                                     ;RECEIVED DATA GIVES WHAT WAS
4773 014400 2$: ;THERE AFTER A RECALIBRATE
4774
4775 ;*****
4776 ;*TEST 17 UNLOAD COMMAND
4777
4778 ;* IF STARTING ADDRESS 220 IS USED THIS TEST WILL NOT BE PERFORMED
4779 ;*

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014400 000004
014402 012706 001000
014406 012737 000017 004514
014414 004737 034556
014420 005737 004634
014424 001402
014426 000167 001212
014432 005737 000042
014436 001004
014440 005737 001100
014444 001001
014446 000402
014450
014450 000167 001170
014454 017746 165560
014460 042716 167677
014464 022726 010100
014470 001501
014472 104400 014500
014476 000427
014556
014556 104400 014564
014562 000424
014634
014634 000000
014636 004737 034556
014642 004737 034614

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:*      IF THE PROGRAM WORKS UNDER ACT-11 MONITOR
:*      THEN THIS TEST IS NOT PERFORMED
:*
:*      IF NO ACT-11 MONITOR IS PRESENT
:*      THEN THIS TEST IS PERFORMED ONLY ON THE FIRST PASS
:*      ON SUBSEQUENT PASSES THIS TEST IS NOT DONE
:*
:*      ALL POSSIBLE REGISTERS ARE FILLED WITH ONES
:*      THEN AN UNLOAD COMMAND =2 IS GIVEN
:*      NO REGISTERS SHOULD CHANGE EXCEPT MOL SHOULD=0
:*      THEN THE DRIVE IS POWERED UP BY OPERATOR
:*      AND A PACK ACKNOWLEDGE COMMAND (ALREADY TESTED)
:*      SETS VV-IN RHDS1
*****
TST17: SCOPE
MOV      #STACK, SP      ;RESET STACK
MOV      #17, @#TSTNM    ;SAVE TEST NUMBER
JSR      PC, @#CLDISK    ;SET R1-RHCS1, R2-RHCS2
                                ;R3-RHDS1, R4-RHER1
                                ;GIVE RH-11 INITIALIZE
                                ;SETUP UNIT NUBER
TST      @#NOPUSH        ;IS THIS 220 START
BEQ      8$              ;BRANCH IF NO
JMP      TST20           ;JUMP TO NEXT TEST
8$:      TST      @#42      ;MONITOR (ACT-11) RETURN ADDRESS
BNE      1$              ;BRANCH IF MONITOR PRESENT
TST      @#$PASS        ;IS THIS FIRST PASS
BNE      1$              ;BRANCH IF NOT FIRST PASS
BR       2$              ;BRANCH TO CONTINUE TEST
1$:      JMP      TST20    ;JUMP TO NEXT TEST
;THIS SETTING OF VV IS FOR LOOP ON ERROR ONLY
;WHERE UNLOAD TAKES EFFECT AND POWER UP BRINGS VV DOWN
2$:      MOV      @RHDS1, -(SP) ;GET RHDS1
BIC      #167677, (SP) ;CLEAR EVERYTHING EXCEPT VV AND MOL
CMP      #VV!MOL, (SP)+ ;ARE VV AND MOL SET
BEQ      6$              ;BRANCH IF YES
TYPE     @+4             ;TYPE ASCIZ STRING
BR       @4$            ;GET OVER THE ASCIZ
64$:     ;;.ASCIZ      <15><12>/GET DRIVE HEADS LOADED THEN HIT "CONTINUE"/
TYPE     @+4             ;TYPE ASCIZ STRING
BR       @5$            ;GET OVER THE ASCIZ
65$:     ;;.ASCIZ      <15><12>/IF ALREADY LOADED THEN HIT "CONTINUE"/
HALT                                ;WAIT FOR CONTINUE
JSR      PC, @#CLDISK    ;SET R1-RHCS1, R2-RHCS2
                                ;R3-RHDS1, R4-RHER1
                                ;GIVE RH-11 INITIALIZE
                                ;SETUP UNIT NUBER
JSR      PC, @#CHECK     ;CHECK DVA, RDY, MOL, DPR, DRY

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4836                                     ;SET VV IN RHDS1 WITH PACK ACKNOWLEDGE
4837
4838
4839 014646 013746 002372      MOV      @#PKACK,-(SP)      ;GET READY TO MOVE COMMAND
4840 014652 052716 000001      BIS      #GO,(SP)         ;GET READY TO SET GO
4841                                     ;WITHOUT INTERRUPT ENABLE
4842 014656 012677 165334      MOV      (SP)+,@RHCS1     ;GO WITH
4843                                     ;22 IN RHCS1 FOR PACK ACKNOWLEDGE
4844                                     ;WITH INTERRUPT DISABLED
4845
4846
4847
4848 014662 104410              WAT                                     ;WAIT FOR VV BIT TO SET
4849 014664 002240              RHDS1                                ;WAIT FOR RHDS1 REGISTER
4850 014666 000100              VV                                  ;WAIT FOR VV BIT IN RHDS1 REGISTER
4851 014670 000001              1.                                  ;ALLOW 10 MICRO SECONDS
4852 014672 000001              1.                                  ;VV MUST SET BETWEEN
4853                                     ;00 AND 20 MICRO SECONDS
4854 014674                                     6$:
4855 014674 004737 034636      JSR      PC,@#CHECKT      ;CHECK DVA,RDY,MOL,DPR,DRY,VV
4856
4857
4858 014700 012700 002210      MOV      #RHWC,RO         ;ADDR. OF ADDR OFRHWC IN RO
4859                                     ;LOAD ALL POSSIBLE REGISTERS WITH ONES
4860
4861 014704 012730 177777      MOV      #177777,@(RO)+   ;LOAD 177777 INTO RHWC
4862
4863
4864
4865 014710 012730 177777      MOV      #177777,@(RO)+   ;LOAD 177777 INTO RHBA
4866
4867
4868
4869
4870 014714 052730 000010      BIS      #10,@(RO)+       ;LOAD 10 INTO RHCS2
4871
4872
4873 014720 012730 001400      MOV      #1400,@(RO)+     ;LOAD 1400 INTO RHCS1
4874
4875
4876
4877 014724 012730 000000      MOV      #0,@(RO)+        ;LOAD 0 INTO RHER1
4878
4879
4880
4881 014730 012730 177777      MOV      #177777,@(RO)+   ;LOAD 177777 INTO RHDST
4882
4883
4884
4885 014734 012730 000000      MOV      #0,@(RO)+        ;LOAD 0 INTO RHER2
4886
4887
4888
4889 014740 012730 177777      MOV      #177777,@(RO)+   ;LOAD 177777 INTO RHOF
4890
4891

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4948 015060 052716 000001      BIS      #GO, (SP)      ;GET READY TO SET GO
4949 015064 012677 165126      MOV      (SP)+, @RHCS1 ;WITHOUT INTERRUPT ENABLE
4950 015070 011100      MOV      @R1, R0      ;SAVE RHCS1 DURING ABOVE OPERATION
4951 015072 011305      MOV      @R3, R5      ;SAVE RHDS1 DURING ABOVE OPERATION
4952 015074 104410      WAT                      ;WAIT FOR RDY BIT TO SET
4953 015076 002216      RHCS1                    ;WAIT FOR RHCS1 REGISTER
4954 015100 000200      RDY                      ;WAIT FOR RDY BIT IN RHCS1 REGISTER
4955 015102 000001      1.                      ;ALLOW 10 MICRO SECONDS
4956 015104 000001      1.                      ;RDY MUST SET BETWEEN
4957 015106 013746 002336      ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
4958 015112 052716 004201      ;RD AND R5 IMMEDIATELY AFTER GO
4959 015116 005737 004632      MOV      @#UNLOAD, -(SP) ;SAVE COMMAND
4960 015122 001413      BIS      #DVA!GO!RDY, (SP) ;INCLUDE DVA!GO!RDY
4961 015124 010037 004660      TST      @#NUNIT        ;ARE THERE MORE THAN ONE UNIT
4962 015130 042737 177677      BEQ      94$            ;BRANCH IF ONLY ONE UNIT
4963 015136 042716 000100      MOV      R0, @#TMP4    ;GET RHCS1
4964 015142 053716 004660      BIC      #!IE, @#TMP4   ;KEEP IE BIT
4965 015146 052716 100000      BIC      #IE, (SP)     ;CLEAR IE IN GOOD DATA
4966 015152 011637 001124      BIS      @#TMP4, (SP)  ;GET IE AS IS
4967 015156 022600      BIS      #SC, (SP)    ;SET SC IN RHCS1
4968 015160 001405      94$: MOV      (SP), @#$GDDAT ;SAVE FOR PRINTOUT
4969 015162 010037 001126      CMP      (SP)+, R0     ;DURING ABOVE OPERATION ONLY DVA!GO!RDY
4970 015166 010137 004510      BEQ      93$            ;AND COMMAND SHOULD BE SET
4971 015172 104021      MOV      R0, @#$BDDAT  ;BRANCH IF GOOD
4972 015174 012746 020500      MOV      R1, @#REGADR  ;BAD DATA
4973 015200 011637 001124      ERROR   21            ;FAILING REGISTER RHCS1
4974 015204 022605      ;DURING ABOVE OPERATION ONLY
4975 015206 001405      93$: MOV      #PIP!DPR!VV, -(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
4976 015210 010537 001126      MOV      (SP), @#$GDDAT ;SAVE FOR PRINTOUT
4977 015214 010337 004510      CMP      (SP)+, R5     ;DURING ABOVE OPERATION ONLY PIP!DPR!VV
4978 015220 104063      BEQ      95$            ;SHOULD BE SET
4979 015222      ;BRANCH IF GOOD
4980 015226 004037 035440      MOV      R5, @#$BDDAT  ;BAD DATA
4981 015230 000002      MOV      R3, @#REGADR  ;FAILING REGISTER RHDS1
4982 015232 000000      ERROR   63            ;DURING ABOVE OPERATION ONLY
4983 015234 110200      ;PIP!DPR!VV SHOULD BE SET
4984 015236 000001      ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
4985 015238 000000      JSR      R0, @#CHREG   ;CHANGE BITS IN SAVED REGISTER
4986 015240 000000      RHDS1                ;CHANGE RHDS1 REGISTER
4987 015242 000000      2                    ;2 BIT/BITS TO BE CHANGED
4988 015244 110200      0                    ;NEW VALUE OF ATA!MOL!DRY IS 0
4989 015246 000001      ATA!MOL!DRY          ;CHANGE ATA!MOL!DRY BIT
4990 015248 000001      1                    ;NEW VALUE OF PIP IS 1

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5004 015240 020000 PIP ;CHANGE PIP BIT
5005
5006 015242 004037 035440 JSR RO,2#CHREG ;CHANGE BITS IN SAVED REGISTER
5007 015246 002216 RHCS1 ;CHANGE RHCS1 REGISTER
5008
5009 015250 000001 1 ;1 BIT/BITS TO BE CHANGED
5010 015252 000001 1 ;NEW VALUE OF GO IS 1
5011 015254 000001 GO ;CHANGE GO BIT
5012 015256 005737 004632 TST 2#NUNIT ;ARE THERE MORE THAN ONE UNIT
5013 015262 001006 BNE 7$ ;BRANCH IF MORE THAN ONE UNIT
5014
5015 015264 004037 035440 JSR RO,2#CHREG ;CHANGE BITS IN SAVED REGISTER
5016 015270 002216 RHCS1 ;CHANGE RHCS1 REGISTER
5017
5018 015272 000001 1 ;1 BIT/BITS TO BE CHANGED
5019 015274 000000 0 ;NEW VALUE OF SC IS 0
5020 015276 100000 SC ;CHANGE SC BIT
5021 015300 7$:
5022
5023 015300 043737 004650 004546 BIC 2#ATTENT,2#SAVERE+24 ;CLEAR APPROPRIATE ATA BITS
5024 ;FOR WORKING DRIVE IN SAVED RHAS
5025
5026 ;NOW COMPARE REGISTERS AFTER AN UNLOAD COMMAND
5027
5028 015306 004037 035546 JSR RO,2#COMREG ;COMPARE SAVED REGISTERS WITH
5029 ;PRESENT VALUE
5030 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
5031 WC ;TEST DATA STARTING FROM 'RHWC'
5032 17. ;17. REGISTERS TO BE COMPARED
5033 3$ ;RETURN TO 3$ ON ERROR
5034 4$ ;RETURN TO 4$ ON NO ERROR
5035
5036 015324 104023 3$: ERROR 23 ;UNLOAD COMMAND GAVE
5037 015326 000207 RTS PC ;AN ERROR
5038 ;GOOD DATA GIVES WHAT SHOULD
5039 ;BE THERE
5040 ;RECEIVED DATA GIVES WHAT WAS
5041 ;THERE AFTER UNLOAD COMMAND
5042
5043 015330 4$:
5044 015330 104400 015336 TYPE +4 ;:TYPE ASCIZ STRING
5045 015334 000406 BR 96$ ;:GET OVER THE ASCIZ
5046 ;:ASCIZ <15><12>/ON DRIVE /
5047
5048 015352 013746 004626 96$: MOV 2#UNIT,-(SP) ;GET UNIT UNDER TEST
5049 TYPDS
5050 015360 104400 015366 TYPE +4 ;:TYPE ASCIZ STRING
5051 015364 000446 BR 97$ ;:GET OVER THE ASCIZ
5052 ;:ASCIZ <15><12>/IF STANDBY BUTTON LIT THEN HIT STANDBY. ... AFTER HEAD LOAD
5053
5054 015502 104400 015510 97$: TYPE +4 ;:TYPE ASCIZ STRING
5055 015506 000434 BR 98$ ;:GET OVER THE ASCIZ
5056 ;:ASCIZ <15><12>/IF STAND-BY NOT LIT THEN-ERROR AFTER UNLOAD COMMAND/<15><
5057
5058 015600 005037 041404 98$: CLR 2#PRITEM ;CLEAR PREVIOUS ERROR NUMBER
5059 015604 000000 HALT ;WAIT FOR CONTINUE
015606 004737 034614 JSR PC,2#CHECK ;CHECK DVA,RDY,MOL,DPR,DRY

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```

5060
5061
5062
5063
5064 ;SET VV IN RHDS1
5065 015612 013746 002372 MOV 2#PKACK, -(SP) ;GET READY TO MOVE COMMAND
5066 015616 052716 000001 BIS #GO, (SP) ;GET READY TO SET GO
5067 ;WITHOUT INTERRUPT ENABLE
5068 015622 012677 164370 MOV (SP)+, 2#RHCS1 ;GO WITH
5069 ;22 IN RHCS1 FOR PACK ACKNOWLEDGE
5070 ;WITH INTERRUPT DISABLED
5071
5072 015626 011100 MOV 2#R1, R0 ;SAVE RHCS1 DURING ABOVE OPERATION
5073 015630 011305 MOV 2#R3, R5 ;SAVE RHDS1 DURING ABOVE OPERATION
5074
5075 015632 104410 WAT ;WAIT FOR VV BIT TO SET
5076 015634 002240 RHDS1 ;WAIT FOR RHDS1 REGISTER
5077 015636 000100 VV ;WAIT FOR VV BIT IN RHDS1 REGISTER
5078 015640 000001 1. ;ALLOW 10 MICRO SECONDS
5079 015642 000001 1. ;VV MUST SET BETWEEN
5080 ;00 AND 20 MICRO SECONDS

```

```

*****
*TEST 20 OFFSET AND RETURN TO CENTER LINE COMMAND

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* THIS TESTS TWO COMMANDS (1)OFFSET (2)RETURN-TO-CENTER-LINE
* ALL POSSIBLE REGISTERS ARE FILLED WITH ONES (EXCEPT RHOF)
* AN OFFSET IS GIVEN
* ALL REGISTERS ARE COMPARED ONLY ATA SHOULD SET
* ALL OTHER REGISTERS SHOULD REMAIN UNCHANGED
* THEN A RETURN-TO-CENTER-LINE IS GIVEN
* ALL REGISTERS ARE COMPARED ONLY ATA SHOULD SET
* AND RHOF SHOULD CLEAR (EXCEPT HCI, ECI, FMT22)
* ALL OTHER REGISTERS SHOULD REMAIN UNCHANGED
* THE ABOVE PROCESS IS REPEATED FOR OFFSET REGISTER
* VALUE 1 TO 377

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*****

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```

5098 015644 000004 ;TEST2: SCOPE
5099 015646 012767 015706 163232 MOV #1$, $LPADR ;SET SCOPE LOOP ADDRESS
5100 015654 012706 001000 MOV #STACK, SP ;RESET STACK
5101 015660 012737 000020 004514 MOV #20, 2#TSTNM ;SAVE TEST NUMBER
5102
5103 015666 004737 034556 JSR PC, 2#CLDISK ;SET R1-RHCS1, R2-RHCS2
5104 ;R3-RHDS1, R4-RHER1
5105 ;GIVE RH-11 INITIALIZE
5106 ;SETUP UNIT NUMBER
5107 015672 112737 000001 004520 MOVB #1, 2#OFSTVL ;SET OFFSET VALUE TO 1
5108 015700 112737 000034 004521 MOVB #34, 2#OFSTVL+1 ;SET HCI, ECI, FMT22
5109
5110
5111 015706 1$:
5112
5113 015706 004737 034556 JSR PC, 2#CLDISK ;SET R1-RHCS1, R2-RHCS2
5114 ;R3-RHDS1, R4-RHER1
5115 ;GIVE RH-11 INITIALIZE

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S116
S117 015712 004737 034636 JSR PC, @#CHECKT ; SETUP UNIT NUBER
S118 015716 012700 002210 MOV #RHWC, R0 ; CHECK DVA, RDY, MOL, DPR, DRY, VV
S119 015722 012730 177777 MOV #177777, @ (R0)+ ; ADDR. OF ADDR OF RHWC IN R0
S120
S121 015726 012730 177777 MOV #177777, @ (R0)+ ; LOAD 177777 INTO RHWC
S122
S123 015732 052730 000010 BIS #10, @ (R0)+ ; LOAD 10 INTO RHCS2
S124
S125 015736 012730 001400 MOV #1400, @ (R0)+ ; LOAD 1400 INTO RHCS1
S126
S127 015742 012730 000000 MOV #0, @ (R0)+ ; LOAD 0 INTO RHER1
S128
S129 015746 012730 177777 MOV #177777, @ (R0)+ ; LOAD 177777 INTO RHDST
S130
S131 015752 012730 000000 MOV #0, @ (R0)+ ; LOAD 0 INTO RHER2
S132
S133 ; THE OFFSET REGISTER WILL BE INCREMENTED FROM 0 TO 377
S134 015756 013730 004520 MOV @#OFSTVL, @ (R0)+ ; SET OFFSET REGISTER
S135
S136 015762 012730 177777 MOV #177777, @ (R0)+ ; LOAD 177777 INTO RHCA
S137
S138 015766 012730 000000 MOV #0, @ (R0)+ ; LOAD 0 INTO RHER3
S139
S140 ; NOW SET BITS IN RHAS FOR ALL DRIVES PRESENT
S141
S142 015772 010046 MOV R0, -(SP) ; PUSH R0 ON STACK
S143 015774 011446 MOV @R4, -(SP) ; SAVE RHER1 TO REINSTATE LATER
S144 015776 011246 MOV @R2, -(SP) ; SAVE RHCS2 TO BE REINSTATED
S145
S146 016000 013700 004652 MOV @#TOTALAT, R0 ; AFTER ALL ATA BITS HAVE BEEN SET
S147 016004 005012 CLR @R2 ; GET DRIVES PRESENT
S148 016006 012705 000010 MOV #8, R5 ; CLEAR RHCS2 AND CARRY
S149 016012 006000 82$: ROR R0 ; COUNTER
S150 016014 103002 BCC 83$ ; GET BIT INTO CARRY
S151 016016 012714 177777 MOV #-1, @R4 ; BRANCH IF NO UNIT ON THIS BIT
S152
S153 016022 005212 83$: INC @R2 ; MOVE INTO ERROR REGISTER
S154 016024 005305 DEC R5 ; TO SET ATA BIT
S155 016026 001371 BNE 82$ ; INCREMENT RHCS2 TO NEXT UNIT
S156 016030 012612 MOV (SP)+, @R2 ; COUNT
S157 016032 012614 MOV (SP)+, @R4 ; BRANCH IF 8 NOT DONE
S158 016034 012600 MOV (SP)+, R0 ; REINSTATE RHCS2
S159 016036 005720 TST (R0)+ ; REINSTATE RHER1
S160
S161 016040 012730 177776 MOV #177776, @ (R0)+ ; POP STACK INTO R0
S162
S163 016044 013777 002366 164144 MOV @#OFSETC, @RHCS1 ; GET OVER PHAS IN R0
S164
S165
S166
S167
S168
S169
S170
S171

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5172
5173
5174
5175 016052 004037 034716
5176 016055 002210
5177 016060 004522
5178
5179 016062 000022
5180
5181
5182 016064 013777 004516 164112
5183
5184
5185
5186
5187
5188
5189
5190 016072 013746 002366
5191 016076 052716 000101
5192
5193 016102 012677 164110
5194
5195
5196 016106 011100
5197 016110 011305
5198
5199
5200 016112 104410
5201 016114 002240
5202 016116 000200
5203 016120 001750
5204 016122 000454
5205
5206
5207
5208 016124 013746 002366
5209 016130 052716 004301
5210 016134 005737 004632
5211 016140 001413
5212 016142 010037 004660
5213 016146 042737 177677 004660
5214 016154 042716 000100
5215 016160 053716 004660
5216 016164 052716 100000
5217 016170
5218 016170 011637 001124
5219 016174 022600
5220
5221 016176 001405
5222 016200 010037 001126
5223 016204 010137 004510
5224 016210 104021
5225
5226 016212 012746 030500
5227 016216 011637 001124

```

```

; NOW SAVE REGISTERS FOR COMPARISON AFTER OFFSET
JSR      RO, @#SAVER      ; SAVE REGISTERS
RHWC     ; RHWC IS THE FIRST REGISTER SAVED
SAVERE   ; STARTING ADDRESS OF WHERE
          ; THE REGISTERS ARE SAVED
          ; NUMBER OF REGISTERS
          ; SAVED = 18.

MOV      @#RP4VEC, @RPVEC ; SET RP04 VECTOR ADDRESS
          ; TO 'TIME1' IF P-CLOCK IS PRESENT
          ; OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
          ; 'TIME' WILL ONLY SAVE
          ; CURRENT CYLINDER ADDRESS
          ; AND LOOK AHEAD REGISTERS

MOV      @#OFSETC, -(SP)  ; GET READY TO MOVE COMMAND
BIS      #GO!IE, (SP)    ; GET READY TO SET GO AND
          ; ENABLE INTERRUPT
MOV      (SP)+, @RHCS1   ; GO WITH
          ; 14 IN RHCS1 FOR OFFSET
          ; WITH INTERRUPT ENABLED
MOV      @R1, RO         ; SAVE RHCS1 DURING ABOVE OPERATION
MOV      @R3, RS         ; SAVE RHDS1 DURING ABOVE OPERATION

WAT      ; WAIT FOR DRY BIT TO SET
RHDS1    ; WAIT FOR RHDS1 REGISTER
DRY      ; WAIT FOR DRY BIT IN RHDS1 REGISTER
1000.    ; ALLOW 10000 MICRO SECONDS
300.     ; DRY MUST SET BETWEEN
          ; 7000 AND 13000 MICRO SECONDS

; COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
; RO AND RS IMMEDIATELY AFTER GO
MOV      @#OFSETC, -(SP) ; SAVE COMMAND
BIS      #DVA!GO!IE!RDY, (SP) ; INCLUDE DVA!GO!IE!RDY
TST      @#NUNIT         ; ARE THERE MORE THAN ONE UNIT
BEQ      87$             ; BRANCH IF ONLY ONE UNIT
MOV      RO, @#TMP4      ; GET RHCS1
BIC      #!CIE, @#TMP4   ; KEEP IE BIT
BIC      #IE, (SP)       ; CLEAR IE IN GOOD DATA
BIS      @#TMP4, (SP)    ; GET IE AS IS
BIS      #SC, (SP)       ; SET SC IN RHCS1

87$:     MOV      (SP), @#$GDDAT ; SAVE FOR PRINTOUT
          CMP      (SP)+, RO    ; DURING ABOVE OPERATION ONLY DVA!GO!IE!RDY
          ; AND COMMAND SHOULD BE SET
          BEQ      86$         ; BRANCH IF GOOD
          MOV      RO, @#$BDDAT ; BAD DATA
          MOV      R1, @#REGADR ; FAILING REGISTER RHCS1
          ERROR    21         ; DURING ABOVE OPERATION ONLY
          ; COMMAND AND DVA!GO!IE!RDY SHOULD BE SET
          MOV      #PIP!MOL!DPR!VV, -(SP) ; SAVE BITS SET DURING OPERATION IN RHDS1
          MOV      (SP), @#$GDDAT ; SAVE FOR PRINTOUT

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Handwritten mark resembling a stylized '3' or '4'.

Handwritten mark resembling a stylized '8' or '9'.

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5228 016222 022605          CMP      (SP)+,R5      ;DURING ABOVE OPERATION ONLY PIP!MOL!DPR!VV
5229                                ;SHOULD BE SET
5230 016224 001405          BEQ      88$          ;BRANCH IF GOOD
5231 016226 010537 001126    MOV      R5,2#$BDDAT ;BAD DATA
5232 016232 010337 004510    MOV      R3,2#$REGADR ;FAILING REGISTER RHDS1
5233 016236 104063          ERROR    63          ;DURING ABOVE OPERATION ONLY
5234                                ;PIP!MOL!DPR!VV SHOULD BE SET
5235 016240                    88$:
5236
5237                                ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
5238
5239 016240 004037 035440      JSR      RO,2$CHREG   ;CHANGE BITS IN SAVED REGISTER
5240 016244 002216          RHCS1          ;CHANGE RHCS1 REGISTER
5241
5242 016246 000001          1           ;1 BIT/BITS TO BE CHANGED
5243 016250 000001          1           ;NEW VALUE OF SC IS 1
5244 016252 100000          SC          ;CHANGE SC BIT
5245
5246 016254 004037 035440      JSR      RO,2$CHREG   ;CHANGE BITS IN SAVED REGISTER
5247 016260 002240          RHDS1          ;CHANGE RHDS1 REGISTER
5248
5249 016262 000001          1           ;1 BIT/BITS TO BE CHANGED
5250 016264 000001          1           ;NEW VALUE OF ATA IS 1
5251 016266 100000          ATA          ;CHANGE ATA BIT
5252
5253 016270 053737 004650 004546  BIS      2$ATTENT,2$SAVERE+24 ;SET APPROPRIATE ATA BITS
5254                                ;FOR WORKING DRIVE IN
5255                                ;SAVED RHAS LOACTION
5256
5257                                ;NOW COMPARE REGISTERS AFTER AN OFSET COMMAND
5258
5259 016276 004037 035546      JSR      RO,2$COMREG   ;COMPARE SAVED REGISTERS WITH
5260                                ;PRESENT VALUE
5261 016302 004522          SAVERE        ;GOOD DATA SAVED IN 'SAVERE'
5262 016304 002266          WC          ;TEST DATA STARTING FROM 'RHWC'
5263 016306 000022          18.         ;18. REGISTERS TO BE COMPARED
5264 016310 016314          2$          ;RETURN TO 2$ ON ERROR
5265 016312 016320          3$          ;RETURN TO 3$ ON NO ERROR
5266
5267 016314 104024          2$:          ;OFFSET COMMAND CAUSED AN ERROR
5268 016316 000207          RTS      PC          ;GOOD DATA IS WHAT SHOULD BE THERE
5269                                ;RECEIVED DATA GIVES WHAT WAS THERE
5270                                ;AFTER AN OFFSET COMMAND
5271 016320 013777 004650 163706 3$:  MOV      2$ATTENT,2$RHAS ;CLEAR WORKING DRIVE ATTENTION
5272
5273                                ;NOW A RETURN TO CENTER LINE COMMAND WILL BE GIVEN
5274
5275 016326 004737 034636      JSR      PC,2$CHECKT  ;CHECK DVA,RDY,MOL,DPR,DRY,VV
5276
5277 016332 013777 002370 163656  MOV      2$RETCL,2$RHCS1 ;GET READY FOR RETCL
5278                                ;RETURN TO CENTER LINE WITH 16 IN RHCS1
5279
5280
5281                                ;NOW REGISTERS ARE SAVED FOR COMPARISON AFTER COMMAND
5282 016340 004037 034716      JSR      RO,2$SAVER   ;SAVE REGISTERS
5283 016344 002210          RHWC          ;RHWC IS THE FIRST REGISTER SAVED

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5284	016346	004522		SAVERE		; STARTING ADDRES OF WHERE
5285						; THE REGISTERS ARE SAVED
5286	016350	000022		18.		; NUMBER OF REGISTERS
5287						; SAVED = 18.
5288						
5289	016352	013777	004516	163624	MOV @#RP4VEC, @RPVEC	; SET RPO4 VECTOR ADDRESS
5290						; TO 'TIME1' IF P-CLOCK IS PRESENT
5291						; OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
5292						; 'TIME' WILL ONLY SAVE
5293						; CURRENT CYLINDER ADDRESS
5294						; AND LOOK AHEAD REGISTERS
5295						
5296						
5297	016360	013746	002370		MOV @#RETCL, -(SP)	; GET READY TO MOVE COMMAND
5298	016364	052716	000101		BIS #GO!IE, (SP)	; GET READY TO SET GO AND
5299						; ENABLE INTERRUPT
5300	016370	012677	163622		MOV (SP)+, @RHCS1	; GO WITH
5301						; 16 IN RHCS1 FOR RETURN TO CENTER LINE
5302						; WITH INTERRUPT ENABLED
5303	016374	011100			MOV @R1, R0	; SAVE RHCS1 DURING ABOVE OPERATION
5304	016376	011305			MOV @R3, R5	; SAVE RHDS1 DURING ABOVE OPERATION
5305						
5306						
5307	016400	104410			WAT	; WAIT FOR DRY BIT TO SET
5308	016402	002240			RHDS1	; WAIT FOR RHDS1 REGISTER
5309	016404	000200			DRY	; WAIT FOR DRY BIT IN RHDS1 REGISTER
5310	016406	001750			1000.	; ALLOW 1000 MICRO SECONDS
5311	016410	001750			1000.	; DRY MUST SET BETWEEN
5312						; 00 AND 2000 MICRO SECONDS
5313						; COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
5314						; R0 AND R5 IMMEDIATELY AFTER GO
5315	016412	013746	002370		MOV @#RETCL, -(SP)	; SAVE COMMAND
5316	016416	052716	004301		BIS #DVA!GO!IE!RDY, (SP)	; INCLUDE DVA!GO!IE!RDY
5317	016422	005737	004632		TST @#NUNIT	; ARE THERE MORE THAN ONE UNIT
5318	016426	001413			BEQ 90\$; BRANCH IF ONLY ONE UNIT
5319	016430	010037	004660		MOV R0, @#TMP4	; GET RHCS1
5320	016434	042737	177677	004660	BIC #!CIE, @#TMP4	; KEEP IE BIT
5321	016442	042716	000100		BIC #IE, (SP)	; CLEAR IE IN GOOD DATA
5322	016446	053716	004660		BIS @#TMP4, (SP)	; GET IE AS IS
5323	016452	052716	100000		BIS #SC, (SP)	; SET SC IN RHCS1
5324	016456					
5325	016456	011637	001124		MOV (SP), @#SGDDAT	; SAVE FOR PRINTOUT
5326	016462	022600			CMP (SP)+, R0	; DURING ABOVE OPERATION ONLY DVA!GO!IE!RDY
5327						; AND COMMAND SHOULD BE SET
5328	016464	001405			BEQ 89\$; BRANCH IF GOOD
5329	016466	010037	001126		MOV R0, @#SBDDAT	; BAD DATA
5330	016472	010137	004510		MOV R1, @#REGADR	; FAILING REGISTER RHCS1
5331	016475	104021			ERROR 21	; DURING ABOVE OPERATION ONLY
5332						; COMMAND AND DVA!GO!IE!RDY SHOULD BE SET
5333	016500	012746	030500		MOV #PIP!MOL!DPR!VV, -(SP)	; SAVE BITS SET DURING OPERATION IN RHDS1
5334	016504	011637	001124		MOV (SP), @#SGDDAT	; SAVE FOR PRINTOUT
5335	016510	022605			CMP (SP)+, R5	; DURING ABOVE OPERATION ONLY PIP!MOL!DPR!VV
5336						; SHOULD BE SET
5337	016512	001405			BEQ 91\$; BRANCH IF GOOD
5338	016514	010537	001126		MOV R5, @#SBDDAT	; BAD DATA
5339	016520	010337	004510		MOV R3, @#REGADR	; FAILING REGISTER RHDS1

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5340 016524 104063          ERROR 63          ;DURING ABOVE OPERATION ONLY
5341                                     ;PIP!MOL!DPR!VV SHOULD BE SET
5342 016526          91$:
5343
5344                                     ;NOW CHANGE SAVED REGISTER TO EXPECTED VALUE
5345
5346 016526 004037 035440    JSR      RO,#CHREG    ;CHANGE BITS IN SAVED REGISTER
5347 016532 002215          RHCSI          ;CHANGE RHCSI REGISTER
5348
5349 016534 000001          1              ;1 BIT/BITS TO BE CHANGED
5350 016536 000001          1              ;NEW VALUE OF SC IS 1
5351 016540 100000          SC              ;CHANGE SC BIT
5352
5353 016542 004037 035440    JSR      RO,#CHREG    ;CHANGE BITS IN SAVED REGISTER
5354 016546 002240          RHDS1          ;CHANGE RHDS1 REGISTER
5355
5356 016550 000001          1              ;1 BIT/BITS TO BE CHANGED
5357 016552 000001          1              ;NEW VALUE OF ATA IS 1
5358 016554 100000          ATA              ;CHANGE ATA BIT
5359
5360 016556 053737 004650 004546  BIS      @#ATTENT,@#SAVERE+24 ;SET APPROPRIATE ATA BITS
5361                                     ;FOR WORKING DRIVE IN
5362                                     ;SAVED RHAS LOACTION
5363 016564 004037 034460    JSR      RO,@#FILLRE  ;MOV BIT15!HCI!ECI!FMT22 INTO SAVED RHOF
5364 016570 002226          RHOF          ;SAVED REGISTER TO CHANGE
5365 016572 116000          BIT15!HCI!ECI!FMT22 ;DATA
5366
5367                                     ;NOW COMPARE REGISTERS AFTER RETURN-TO-CENTER-LINE
5368
5369 016574 004037 035546    JSR      RO,@#COMREG  ;COMPARE SAVED REGISTERS WITH
5370                                     ;PRESENT VALUE
5371 016600 004522          SAVERE      ;GOOD DATA SAVED IN 'SAVERE'
5372 016602 002266          WC              ;TEST DATA STARTING FROM 'RHWC'
5373 016604 000022          18.         ;18. REGISTERS TO BE COMPARED
5374 016606 016612          4$            ;RETURN TO 4$ ON ERROR
5375 016610 016616          5$            ;RETURN TO 5$ ON NO ERROR
5376 016612 104025          4$:          ;RETURN TO CENTER-LINE
5377 016614 000207          RTS          ;COMMAND CAUSED AN ERROR
5378                                     ;GOOD DATA HAS WHAT SHOULD
5379                                     ;BE THERE
5380                                     ;RECEIVED DATA HAS WHAT WAS
5381                                     ;THERE AFTER COMMAND
5382
5383 016616          5$:
5384
5385 016616 004737 034556    JSR      PC,@#CLDISK ;SET R1-RHCSI, R2-RHCS2
5386                                     ;R3-RHDS1, R4-RHER1
5387                                     ;GIVE RH-11 INITIALIZE
5388                                     ;SETUP UNIT NUBER
5389 016622 105237 004520    INCB     @#OFSTVL    ;GET NEXT OFFSET VALUE
5390 016626 132737 000100 004520  BITB     #100,@#OFSTVL ;SEE IF UNUSED BIT 6 IS ON
5391 016634 001403          BEQ      7$          ;NO SO DO SOME MORE
5392 016636 062737 000100 004520  ADD      #100,@#OFSTVL ;YES SO BY-PASS IT
5393 016644 105737 004520          TSTB     @#OFSTVL    ;IF ZERO ALL COMBINATIONS ARE
5394                                     ;COMPLETE
5395 016650 001001          BNE      6$          ;BRANCH IF 377 NOT DONE

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5401 ;*****
5402 ;*TEST 21      OFFSET COMMAND
5403
5404 ;*      THIS TEST WILL ONLY GIVE REPEATED OFFSETS
5405
5406 ;*****
5407 016660 000004      †ST21: SCOPE
5408 016662 012737 000764 004656      MOV      # 500.,@#TMP1      ;COUNTER
5409 016670      1$:
5410 016670 012706 001000      MOV      #STACK,SP      ;RESET STACK
5411 016674 012737 000021 004514      MOV      #21,@#†STNM      ;SAVE TEST NUMBER
5412
5413 016702 004737 034556      JSR      PC,@#CLDISK      ;SET R1-RHCS1, R2-RHCS2
5414                                ;R3-RHDS1, R4-RHER1
5415                                ;GIVE RH-11 INITIALIZE
5416                                ;SETUP UNIT NUBER
5417 016706 004737 034636      JSR      PC,@#CHECKT      ;CHECK DVA, RDY, MOL, DPR, DRY, VV
5418
5419 016712 004037 034542      JSR      RO,@#OFFSET      ;OFFSET
5420 016716 000260      260      ;260 IN OFFSET REGISTER
5421                                ;OFFSET -1200 MICRO INCHES
5422
5423
5424 016720 013746 002366      MOV      @#OFFSETC,-(SP)      ;GET READY TO MOVE COMMAND
5425 016724 052716 000101      BIS      #GO!IE,(SP)      ;GET READY TO SET GO AND
5426                                ;ENABLE INTERRUPT
5427 016730 012677 163262      MOV      (SP)+,@#RHCS1      ;GO WITH
5428                                ;14 IN RHCS1 FOR OFFSET
5429                                ;WITH INTERRUPT ENABLED
5430
5431 016734 104410      WAT      ;WAIT FOR DRY BIT TO SET
5432 016736 002240      RHDS1    ;WAIT FOR RHDS1 REGISTER
5433 016740 000200      DRY      ;WAIT FOR DRY BIT IN RHDS1 REGISTER
5434 016742 000536      350.    ;ALLOW 3500 MICRO SECONDS
5435 016744 000536      350.    ;DRY MUST SET BETWEEN
5436                                ;00 AND 7000 MICRO SECONDS
5437 016746 032777 040000 163264      BIT      #ERR,@#RHDS1      ;IS ERR SET?
5438 016754 001417      BEQ      2$      ;NO
5439 016756 104026      ERROR   26      ;REPEATED OFFSETS CAUSED AN ERROR
5440 016760 000004      SCOPE
5441
5442 016762 004737 034556      JSR      PC,@#CLDISK      ;SET R1-RHCS1, R2-RHCS2
5443                                ;R3-RHDS1, R4-RHER1
5444                                ;GIVE RH-11 INITIALIZE
5445                                ;SETUP UNIT NUBER
5446
5447 016766 013746 002340      MOV      @#RECALI,-(SP)      ;GET READY TO MOVE COMMAND
5448 016772 052716 000101      BIS      #GO!IE,(SP)      ;GET READY TO SET GO AND
5449                                ;ENABLE INTERRUPT
5450 016776 012677 163214      MOV      (SP)+,@#RHCS1      ;GO WITH
5451                                ;6 IN RHCS1 FOR RECALIBRATE
5452                                ;WITH INTERRUPT ENABLED
5453
5454 017002 104410      WAT      ;WAIT FOR DRY BIT TO SET
5455 017004 002240      RHDS1    ;WAIT FOR RHDS1 REGISTER
5456 017006 000200      DRY      ;WAIT FOR DRY BIT IN RHDS1 REGISTER

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5457	017010	060650			25000.					
5458	017012	060650			25000.					
5459										
5460	017014	005337	004656	2\$:	DEC	2#TMP1				
5461										
5462	017020	001401			BEG	TST22				
5463										
5464	017022	000722			BR	1\$				
5465										

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;ALLOW 250000 MICRO SECONDS
;DRY MUST SET BETWEEN
;00 AND 500000 MICRO SECONDS
;COUNT DOWN
;BRANCH IF DONE
;GO BACK AND DO IT AGIEN

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```

*****
*TEST 22      WRITE/READ HEADER AND DATA
*
* WRITE HEADER AND DATA CYLINDER 0, FORMAT 16 BITS PER WORD
* TRACK 0, SECTOR 0, KEYS=0, NUMBER OF WORDS 256 WORDS
* OF 0
* THEN READ HEADER AND DATA FOR ABOVE.
* WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
* 10000,0,0,0, AND 256 OF 0
* THE WRITE COMMAND IS THEN LOADED INTO THE REGISTERS EXCEPT
* THE GO BIT, AND ALL THE REGISTERS ARE SAVED
* THEN GO IS GIVEN FOR WRITE HEADER AND DATA
*
* THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER CHANGED
* THEN WRITE FROM BUFFER IS CHECKED TO SEE THAT NOTHING CHANGED
*
* NOW FOR THE READ COMMAND READ INTO BUFFER IS FILLED
* WITH ALL ONES, COMMAND IS LOADED INTO REGISTERS EXCEPT
* GO BIT AND ALL REGISTERS ARE SAVED
* GO IS GIVEN FOR THE READ COMMAND
*
* ALL REGISTERS ARE CHECKED FOR IMPROPER CHANGE
* THEN THE READ DATA IS COMPARED.

```

```

017024 000004
017026 012706 001000
017032 012737 000022 004514
017040 004737 034556
017044 004037 034402
017050 002400
017052 000004
017054 010000
017056 000000
017060 000000
017062 000000
017064 004037 034426
017070 002410
017072 000400
017074 000000

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*ST22: SCOPE
MOV #STACK,SP ;RESET STACK
MOV #22,@#TSTNM ;SAVE TEST NUMBER
JSR PC,@#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUBER
;FILL WRITE FROM BUFFER WITH HEADER
JSR RO,@#FLHEAD ;SAVE HEADER DATA IN WRFROM
WRFROM ;LOCATION WHERE SAVED
4 ;NUMBER OF WORDS SAVED
10000 ;FIRST DATA WORD
0 ;SECOND DATA WORD
0 ;THIRD DATA WORD
0 ;FOURTH DATA WORD
;FILL WRITE FROM BUFFER WITH DATA
JSR RO,@#CLAREA ;CLEAR 256. WORDS, FROM WRFROM+10
WRFROM+10 ;STARTING FROM WRFROM+10
256. ;256. WORDS
0 ;FILL WITH 0

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;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

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017076 004037 034402 JSR RO, @#FLHEAD :SAVE HEADER DATA IN REINTO
017102 003444 REINTO :LOCATION WHERE SAVED
017104 000004 4 :NUMBER OF WORDS SAVED
017106 010000 10000 :FIRST DATA WORD
017110 000000 0 :SECOND DATA WORD
017114 000000 0 :THIRD DATA WORD
017118 000000 0 :FOURTH DATA WORD
017122 004037 034426 JSR RO, @#CLAREA :CLEAR 256. WORDS. FROM REINTO+10
017124 004037 REINTO+10 :STARTING FROM REINTO+10
017126 000400 256. :256. WORDS
017128 000000 0 :FILL WITH 0

;NOW THE WRITE HEADER AND DATA COMMAND WILL BE FILLED

017130 004037 036532 JSR RO, @#RUN :SETUP TO RUN FOR DATA COMMAND
017132 000000 0 :CYLINDER 0
017134 000 :SECTOR 0
017136 000 :TRACK 0
017140 177374 -256.-4 :WORD COUNT (DATA)=256.+
:4 HEADER WORDS
017142 002400 WRFROM :BUS ADDRESS
:STARTING ADDRESS OF DATA
017144 000000 0 :BUFFER = WRFROM
017146 010000 FMT22 :DO NOT INHIBIT BUS ADDRESS INCREMENT
:16 BITS PER WORD FORMAT
:DO NOT INHIBIT ECC CORRECTION
:DO NOT INHIBIT HEADER COMPARE
017150 002356 WRIFOR :GET READY TO DO A WRIFOR
:WRITE HEADER AND DATA WITH 62 IN RHCS1

;NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DATA
017152 004037 034716 JSR RO, @#SAVER :SAVE REGISTERS
017156 002210 RHWC :RHWC IS THE FIRST REGISTER SAVED
017160 004522 SAVERE :STARTING ADDRESS OF WHERE
:THE REGISTERS ARE SAVED
017162 000021 17. :NUMBER OF REGISTERS
:SAVED = 17.

017164 004737 034636 JSR PC, @#CHECKT :CHECK DVA, RDY, MOL, DPR, DRY, VV.

017170 013777 004516 163006 MOV @#RPO4VEC, @#RPVEC :SET RPO4 VECTOR ADDRESS
:TO 'TIME1' IF P-CLOCK IS PRESENT
:OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
: 'TIME' WILL ONLY SAVE
:CURRENT CYLINDER ADDRESS
:AND LOOK AHEAD REGISTERS

017176 013746 002356 MOV @#WRIFOR, -(SP) :GET READY TO MOVE COMMAND
017202 052716 000101 BIS #GO! IE, (SP) :GET READY TO SET GO AND
:ENABLE INTERRUPT
017206 012677 163004 MOV (SP)+, @#RHCS1 :GO WITH
    
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.BYTE
.BYTE


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5578                                     :62 IN RHCSI FOR WRITE HEADER AND DATA
5579                                     :WITH INTERRUPT ENABLED
5580 017212 011100 MOV     R1,R0      :SAVE RHCSI DURING ABOVE OPERATION
5581 017214 011305 MOV     R3,R5      :SAVE RHDS1 DURING ABOVE OPERATION
5582                                     :ONE REVOLUTION=16670 MICRO SEC, ONE SECTOR = 760 MICRO SEC
5583
5584 017216 104410 WAT                                     :WAIT FOR RDY BIT TO SET
5585 017220 002216 RHCSI                                :WAIT FOR RHCSI REGISTER
5586 017222 000200 RDY                                     :WAIT FOR RDY BIT IN RHCSI REGISTER
5587 017224 001614 908.                    :ALLOW 9080 MICRO SECONDS
5588 017226 001507 839.                    :RDY MUST SET BETWEEN
5589                                     :690 AND 17470 MICRO SECONDS
5590                                     :COMPARE CONTENTS OF RHCSI AND RHDS1 ALREADY SAVED IN
5591                                     :R0 AND R5 IMMEDIATELY AFTER GO.
5592 017230 013746 002356 MOV     R2,WRIFOR,-(SP) :SAVE COMMAND
5593 017234 052716 004101 BIS     IE!GO!DVA,(SP) :INCLUDE IE!GO!DVA
5594 017240 011637 001124 MOV     (SP),R2,$GDDAT :SAVE FOR PRINTOUT
5595 017244 022600 CMP     (SP)+,R0      :DURING ABOVE OPERATION ONLY IE!GO!DVA
5596                                     :AND COMMAND SHOULD BE SET
5597 017246 001405 BEQ     64$          :BRANCH IF GOOD
5598 017250 010037 001126 MOV     R0,R2,$BDDAT  :BAD DATA
5599 017254 010137 004510 MOV     R1,R2,$REGADR :FAILING REGISTER RHCSI
5600 017260 104021 ERROR 21 :DURING ABOVE OPERATION ONLY
5601                                     :COMMAND AND IE!GO!DVA SHOULD BE SET
5602 017262 012746 010500 64$: MOV     #MOL!DPR!VV,-(SP) :SAVE BITS SET DURING OPERATION IN RHDS1
5603 017266 011637 001124 MOV     (SP),R2,$GDDAT :SAVE FOR PRINTOUT
5604 017272 022605 CMP     (SP)+,R5      :DURING ABOVE OPERATION ONLY MOL!DPR!VV
5605                                     :SHOULD BE SET
5606 017274 001405 BEQ     65$          :BRANCH IF GOOD
5607 017276 010537 001126 MOV     R5,R2,$BDDAT  :BAD DATA
5608 017302 010337 004510 MOV     R3,R2,$REGADR :FAILING REGISTER RHDS1
5609 017306 104053 ERROR 63 :DURING ABOVE OPERATION ONLY
5610                                     :MOL!DPR!VV SHOULD BE SET
5611 017310 65$:
5612
5613                                     :NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
5614 017310 004037 034460 JSR     R0,R2,$FILLRE :MOV 0 INTO SAVED RHWC
5615 017314 002210 RHWC                                :SAVED REGISTER TO CHANGE
5616 017316 000000 0 :DATA
5617 017320 004037 034460 JSR     R0,R2,$FILLRE :MOV WRFROM+<260.*2> INTO SAVED RHBA
5618 017324 002212 RHBA                                :SAVED REGISTER TO CHANGE
5619 017326 003410 WRFROM+<260.*2> :DATA
5620 017330 004037 034460 JSR     R0,R2,$FILLRE :MOV 1 INTO SAVED RHDST
5621 017334 002222 RHDST                            :SAVED REGISTER TO CHANGE
5622 017336 000001 1 :DATA
5623                                     :NOW COMPARE REGISTERS BEFORE WRITE HEADER AND DATA
5624                                     :WITH REGISTERS AFTER COMMAND
5625
5626 017340 004037 035546 JSR     R0,R2,$COMREG :COMPARE SAVED REGISTERS WITH
5627                                     :PRESENT VALUE
5628 017344 004522 SAVERE :GOOD DATA SAVED IN 'SAVERE'
5629 017346 002266 WC :TEST DATA STARTING FROM 'RHWC'
5630 017350 000021 17. :17. REGISTERS TO BE COMPARED
5631 017352 017356 1$ :RETURN TO 1$ ON ERROR
5632 017354 017362 2$ :RETURN TO 2$ ON NO ERROR
5633

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5634 017356 104027      1$:  ERROR 27      :WRITE HEADER AND DATA
5635 017360 000207      RTS   PC      :CAUSED IMPROPER REGISTER
5636                                     :CHANGE
5637                                     :GOOD DATA GIVES WHAT SHOULD
5638                                     :BE THERE
5639                                     :RECEIVED DATA GIVES WHAT
5640                                     :WAS THERE AFTER COMMAND
5641
5642                                     ;NOW WRITE FROM BUFFER WILL BE CHECKED TO SEE THAT
5643                                     ;NOTHER GOT CHANGED
5644 017362      2$:
5645
5646 017362 004037 036576 JSR   RD,2#COMPAR  ;COMPARE TWO BLOCKS OF MEMORY
5647 017366 003444 REINTO ;GOOD DATA   STARTS FROM REINTO
5648 017370 002400 WRFROM ;TEST DATA STARTS FROM WRFROM
5649 017372 000404 260.  ;260. WORDS TO BE COMPARED
5650 017374 017400 3$    ;RETURN TO 3$ ON ERROR
5651 017376 017404 4$    ;RETURN TO 4$ ON NO ERROR
5652
5653
5654 017400 104030      3$:  ERROR 30      :WRITE HEADER AND DATA
5655 017402 000207      RTS   PC      :CHANGED WRITE FROM BUFFER
5656
5657                                     ;NOW A READ HEADER AND DATA COMMAND WILL BE GIVEN
5658                                     ;READ INTO BUFFER IS FILLED WITH ONES
5659
5660      4$:
5661 017404 004737 034556 JSR   PC,2#CLDISK  ;SET R1-RHCS1, R2-RHCS2
5662                                     ;R3-RHDS1, R4-RHER1
5663                                     ;GIVE RH-11 INITIALIZE
5664                                     ;SETUP UNIT NUBER
5665 017410 004037 034426 JSR   RD,2#CLAREA  ;CLEAR 260. WORDS, FROM REINTO
5666 017414 003444 REINTO ;STARTING FROM REINTO
5667 017416 000404 260.  ;260. WORDS
5668 017420 177777 -1    ;FILL WITH -1
5669
5670
5671                                     ;NOW FILL COMMAND
5672
5673 017422 004037 036532 JSR   RD,2#RUN     ;SETUP TO RUN FOR DATA COMMAND
5674 017426 000000 0      ;CYLINDER 0
5675 017430 000 0      ;SECTOR 0
5676 017431 000 0      ;TRACK 0
5677 017432 177374 -256.-4 ;WORD COUNT (DATA)=256.+
5678                                     ;4 HEADER WORDS
5679 017434 003444 REINTO ;BUS ADDRESS
5680                                     ;STARTING ADDRESS OF DATA
5681                                     ;BUFFER = REINTO
5682 017436 000000 0      ;DO NOT INHIBIT BUS ADDRESS INCREMENT
5683 017440 014000 ECI!FMT22 ;16 BITS PER WORD FORMAT
5684                                     ;INHIBIT ECC CORRECTION
5685                                     ;DO NOT INHIBIT HEADER COMPARE
5686 017442 002362 REFOR ;GET READY TO DO A REFOR
5687                                     ;READ HEADER AND DATA WITH 72 IN RHCS1
5688
5689

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5690 ;NOW SAVE REGISTERS FOR COMPARISON AFTER READ HEADER AND DATA
5691 017444 004037 034716 JSR RO, @#SAVER ;SAVE REGISTERS
5692 017450 002210 RHWC ;RHWC IS THE FIRST REGISTER SAVED
5693 017452 004522 SAVERE ;STARTING ADDRESS OF WHERE
5694 ;THE REGISTERS ARE SAVED
5695 017454 000022 18. ;NUMBER OF REGISTERS
5696 ;SAVED = 18.
5697
5698 017456 004737 034636 JSR PC, @#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV
5699
5700
5701 017462 013777 004516 162514 MOV @#RP4VEC, @RPVEC ;SET RPO4 VECTOR ADDRESS
5702 ;TO 'TIME1' IF P-CLOCK IS PRESENT
5703 ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
5704 ;'TIME' WILL ONLY SAVE
5705 ;CURRENT CYLINDER ADDRESS
5706 ;AND LOOK AHEAD REGISTERS
5707
5708
5709 017470 013746 002362 MOV @#REFOR, -(SP) ;GET READY TO MOVE COMMAND
5710 017474 052716 000101 BIS #GO!IE, (SP) ;GET READY TO SET GO AND
5711 ;ENABLE INTERRUPT
5712 017500 012677 162512 MOV (SP)+, @RHCS1 ;GO WITH
5713 ;72 IN RHCS1 FOR READ DATA
5714 ;WITH INTERRUPT ENABLED
5715 017504 011100 MOV @R1, RO ;SAVE RHCS1 DURING ABOVE OPERATION
5716 017506 011305 MOV @R3, R5 ;SAVE RHDS1 DURING ABOVE OPERATION
5717
5718
5719 017510 104410 WAT ;WAIT FOR RDY BIT TO SET
5720 017512 002216 RHCS1 ;WAIT FOR RHCS1 REGISTER
5721 017514 000200 RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
5722 017516 001614 908. ;ALLOW 9080 MICRO SECONDS
5723 017520 001507 839. ;RDY MUST SET BETWEEN
5724 ;690 AND 17470 MICRO SECONDS
5725 ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
5726 ;RO AND R5 IMMEDIATELY AFTER GO
5727 017522 013746 002362 MOV @#REFOR, -(SP) ;SAVE COMMAND
5728 017526 052716 004101 BIS #IE!GO!DVA, (SP) ;INCLUDE IE!GO!DVA
5729 017532 011637 001124 MOV (SP), @#$GDDAT ;SAVE FOR PRINTOUT
5730 017536 022600 CMP (SP)+, RO ;DURING ABOVE OPERATION ONLY IE!GO!DVA
5731 ;AND COMMAND SHOULD BE SET
5732 017540 001405 BEQ 67$ ;BRANCH IF GOOD
5733 017542 010037 001126 MOV RO, @#$BDDAT ;BAD DATA
5734 017546 010137 004510 MOV R1, @#REGADR ;FAILING REGISTER RHCS1
5735 017552 104021 ERROR 21 ;DURING ABOVE OPERATION ONLY
5736 ;COMMAND AND IE!GO!DVA SHOULD BE SET
5737 017554 012746 010500 67$: MOV #MOL!DPR!VV, -(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
5738 017560 011637 001124 MOV (SP), @#$GDDAT ;SAVE FOR PRINTOUT
5739 017564 022605 CMP (SP)+, R5 ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
5740 ;SHOULD BE SET
5741 017566 001405 BEQ 69$ ;BRANCH IF GOOD
5742 017570 010537 001126 MOV R5, @#$BDDAT ;BAD DATA
5743 017574 010337 004510 MOV R3, @#REGADR ;FAILING REGISTER RHDS1
5744 017600 104063 ERROR 63 ;DURING ABOVE OPERATION ONLY
5745 ;MOL!DPR!VV SHOULD BE SET

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5746 017602          69$:
5747
5748                ;CHANGE SAVED REGISTERS TO EXPECTED VALUES
5749 017602 004037 034460 JSR    RO,#FILLRE ;MOV 0 INTO SAVED RHWC
5750 017606 002210        RHWC    ;SAVED REGISTER TO CHANGE
5751 017610 000000        0        ;DATA
5752 017612 004037 034460 JSR    RO,#FILLRE ;MOV REINTO+(260.*2) INTO SAVED RHBA
5753 017616 002212        RHBA    ;SAVED REGISTER TO CHANGE
5754 017620 004454        REINTO+(260.*2) ;DATA
5755 017622 004037 034460 JSR    RO,#FILLRE ;MOV 1 INTO SAVED RHDST
5756 017626 002222        RHDST   ;SAVED REGISTER TO CHANGE
5757 017630 000001        1        ;DATA
5758
5759                ;COMPARE REGISTER BEFORE READ HEADER AND DATA
5760                ;WITH REGISTERS AFTER COMMAND
5761
5762
5763 017632 004037 035546 JSR    RO,#COMREG ;COMPARE SAVED REGISTERS WITH
5764                ;PRESENT VALUE
5765 017636 004522        SAVERE   ;GOOD DATA SAVED IN 'SAVERE'
5766 017640 002266        WC       ;TEST DATA STARTING FROM 'RHWC'
5767 017642 000022        18.     ;18. REGISTERS TO BE COMPARED
5768 017644 017650        5$      ;RETURN TO 5$ ON ERROR
5769 017646 017654        6$      ;RETURN TO 6$ ON NO ERROR
5770
5771 017650 104031        5$:      ERROR 31 ;READ HEADER AND DATA CAUSED
5772 017652 000207        RTS     PC ;IMPROPER REGISTER CHANGE
5773                ;GOOD DATA GIVES WHAT SHOULD
5774                ;BE THERE
5775                ;RECEIVED DATA GIVES WHAT WAS
5776                ;THERE AFTER COMMAND
5777
5778                ;NOW READ INTO BUFFER WILL BE CHECKED TO SEE
5779                ;THE READ WAS GOOD
5780
5781          6$:
5782 017654 004037 036576 JSR    RO,#COMPAR ;COMPARE TWO BLOCKS OF MEMORY
5783 017660 002400        WRFROM   ;GOOD DATA STARTS FROM WRFROM
5784 017662 003444        REINTO   ;TEST DATA STARTS FROM REINTO
5785 017664 000404        260.     ;260. WORDS TO BE COMPARED
5786 017666 017672        7$      ;RETURN TO 7$ ON ERROR
5787 017670 017676        10$     ;RETURN TO 10$ ON NO ERROR
5788
5789
5790 017672 104032        7$:      ERROR 32 ;WRITE HEADER AND DATA
5791 017674 000207        RTS     PC ;FOLLOWED BY A READ HEADER
5792                ;AND DATA GAVE A READ ERROR
5793                ;ERROR MAY BE IN READ OR WRITE
5794
5795          10$:
5796
5797                ;*****
5798                ;*TEST 23      READ DATA
5799
5800                ;*
5801                ;*      THIS TEST READS DATA WRITTEN BY THE PREVIOUS TEST
                    ;*      THE WRITE FROM BUFFER IS FILLED WITH ALL OS

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5858 ;AND LOOK AHEAD REGISTERS
5859
5860
5861 017776 013746 002360 MOV @#READAT, -(SP) ;GET READY TO MOVE COMMAND
5862 020002 052716 000101 BIS #GO!IE, (SP) ;GET READY TO SET GO AND
5863 ;ENABLE INTERRUPT
5864 020006 012677 162204 MOV (SP)+, @RHCSI ;GO WITH
5865 ;70 IN RHCSI FOR READ DATA
5866 ;WITH INTERRUPT ENABLED
5867 020012 011100 MOV @R1, R0 ;SAVE RHCSI DURING ABOVE OPERATION
5868 020014 011305 MOV @R3, R5 ;SAVE RHDS1 DURING ABOVE OPERATION
5869
5870
5871 020016 104410 WAT ;WAIT FOR RDY BIT TO SET
5872 020020 002216 RHCSI ;WAIT FOR RHCSI REGISTER
5873 020022 000200 RDY ;WAIT FOR RDY BIT IN RHCSI REGISTER
5874 020024 001614 908. ;ALLOW 9080 MICRO SECONDS
5875 020026 001507 839. ;RDY MUST SET BETWEEN
5876 ;690 AND 17470 MICRO SECONDS
5877 ;COMPARE CONTENTS OF RHCSI AND RHDS1 ALREADY SAVED IN
5878 ;R0 AND R5 IMMEDIATELY AFTER GO
5879 020030 013746 002360 MOV @#READAT, -(SP) ;SAVE COMMAND
5880 020034 052716 004101 BIS #IE!GO!DVA, (SP) ;INCLUDE IE!GO!DVA
5881 020040 011637 001124 MOV (SP), @#$GDDAT ;SAVE FOR PRINTOUT
5882 020044 022600 CMP (SP)+, R0 ;DURING ABOVE OPERATION ONLY IE!GO!DVA
5883 ;AND COMMAND SHOULD BE SET
5884 020046 001405 BEQ 64$ ;BRANCH IF GOOD
5885 020050 010037 001126 MOV R0, @#$BDDAT ;BAD DATA
5886 020054 010137 004510 MOV R1, @#REGADR ;FAILING REGISTER RHCSI
5887 020060 104021 ERROR 21 ;DURING ABOVE OPERATION ONLY
5888 ;COMMAND AND IE!GO!DVA SHOULD BE SET
5889 020062 012746 010500 64$: MOV #MOL!DPR!VV, -(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
5890 020066 011637 001124 MOV (SP), @#$GDDAT ;SAVE FOR PRINTOUT
5891 020072 022605 CMP (SP)+, R5 ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
5892 ;SHOULD BE SET
5893 020074 001405 BEQ 66$ ;BRANCH IF GOOD
5894 020076 010537 001126 MOV R5, @#$BDDAT ;BAD DATA
5895 020102 010337 004510 MOV R3, @#REGADR ;FAILING REGISTER RHDS1
5896 02010E 104063 ERROR 63 ;DURING ABOVE OPERATION ONLY
5897 ;MOL!DPR!VV SHOULD BE SET
5898 020110 66$:
5899
5900 ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
5901 020110 004037 034460 JSR R0, @#FILLRE ;MOV 0 INTO SAVED RHWC
5902 020114 002210 RHWC ;SAVED REGISTER TO CHANGE
5903 020116 000000 0 ;DATA
5904 020120 004037 034460 JSR R0, @#FILLRE ;MOV REINTO+(256.*2) INTO SAVED RHBA
5905 020124 002212 RHBA ;SAVED REGISTER TO CHANGE
5906 020126 004444 REINTO+(256.*2) ;DATA
5907 020130 004037 034460 JSR R0, @#FILLRE ;MOV 1 INTO SAVED RHDST
5908 020134 002222 RHDST ;SAVED REGISTER TO CHANGE
5909 020136 000001 1 ;DATA
5910
5911 ;NOW COMPARE REGISTERS BEFORE READ DATA WITH
5912 ;AFTER COMMAND
5913

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5914 020140 004037 035546 JSR RD,2#COMREG ;COMPARE SAVED REGISTERS WITH
5915 ;PRESENT VALUE
5916 020144 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
5917 020146 002266 WC ;TEST DATA STARTING FROM 'RHWC'
5918 020150 000022 18. ;18. REGISTERS TO BE COMPARED
5919 020152 020156 1$ ;RETURN TO 1$ ON ERROR
5920 020154 020162 2$ ;RETURN TO 2$ ON NO ERROR
5921
5922 020156 104033 1$: ERROR 33 ;READ DATA CAUSED IMPROPER REGISTER
5923 020160 000207 RTS PC ;CHANGE
5924 ;GOOD DATA GIVES WHAT SHOULD BE THERE
5925 ;RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND
5926 ;NOW READ INTO BUFFER WILL BE CHECKED TO SEE THAT READ
5927 ;WAS GOOD
5928 020162 2$:
5929
5930 020162 004037 036576 JSR RD,2#COMPAR ;COMPARE TWO BLOCKS OF MEMORY
5931 020166 002400 WRFROM ;GOOD DATA STARTS FROM WRFROM
5932 020170 003444 REINTO ;TEST DATA STARTS FROM REINTO
5933 020172 000400 256. ;256. WORDS TO BE COMPARED
5934 020174 020200 3$ ;RETURN TO 3$ ON ERROR
5935 020176 020204 4$ ;RETURN TO 4$ ON NO ERROR
5936
5937
5938 020200 104034 3$: ERROR 34 ;READ DATA COMMAND
5939 020202 000207 RTS PC ;READ INCORRECTLY
5940
5941 020204 4$:
5942
5943 ;*****
5944 ;*TEST 24 WRITE/READ DATA
5945
5946 ;* THIS TEST GIVES A WRITE DATA COMMAND FRO CYLINDER 0
5947 ;* TRACK 0, SECTOR 0, KEYS 0, 200 WORDS OF ALL ONES
5948 ;* THIS SECTOR IS FORMATED BY PREVIOUS TEST
5949 ;* THEN READ DATA COMMAND IS GIVEN FOR 256 WORDS IN
5950 ;* SAME CYLINDER, TRACK, SECTOR, KEYS
5951 ;* WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
5952 ;* 200 ONES AND 56 125252
5953 ;* THE WRITE DATA COMMAND IS LOADED EXCEPT GO AND IE
5954 ;* ALL REGISTERS ARE SAVED AND THEN GO IS GIVEN TO WRITE DATA
5955 ;*
5956 ;*
5957 ;* THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER
5958 ;* CHANGE, THEN WRITE FROM BUFFER IS CHECKED FOR NO CHANGE
5959 ;*
5960 ;* THEN READ INTO BUFFER IS FILLED WITH 200 OF ZEROS
5961 ;* AND 56 OF 377, WRITE FROM BUFFER IS FILLED WITH 200 ONES
5962 ;* AND 56 OF 377.
5963 ;* THE COMMAND EXCEPT GO IS LOADED, ALL REGISTERS ARE SAVED
5964 ;* GO IS GIVEN
5965 ;*
5966 ;*
5967 ;* ALL REGISTERS ARE CHECKED
5968 ;* READ DATA IS CHECKED
5969

```

```

5970 :*****
5971 020204 000004 TST24: SCOPE
5972 020206 012706 001000 MOV #STACK,SP ;RESET STACK
5973 020212 012737 000024 004514 MOV #24,#TSTNM ;SAVE TEST NUMBER
5974
5975 020220 004737 034556 JSR PC,#CLDISK ;SET R1-RHCS1, R2-RHCS2
5976 ;R3-RHDS1, R4-RHER1
5977 ;GIVE RH-11 INITIALIZE
5978 ;SETUP UNIT NUBER
5979
5980 ;NOW FILL WRITE FROM BUFFER -200 OF 1'S AND 56 OF 125252
5981 020224 004037 034426 JSR RO,#CLAREA ;CLEAR 200. WORDS, FROM WRFROM
5982 020230 002400 WRFROM ;STARTING FROM WRFROM
5983 020232 000310 200. ;200. WORDS
5984 020234 177777 -1 ;FILL WITH -1
5985
5986 020236 004037 034426 JSR RO,#CLAREA ;CLEAR 56. WORDS, FROM WRFROM+(200.*2)
5987 020242 003220 WRFROM+(200.*2) ;STARTING FROM WRFROM+(200.*2)
5988 020244 000070 56. ;56. WORDS
5989 020246 125252 125252 ;FILL WITH 125252
5990
5991
5992 ;NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA AS
5993 ;WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
5994 ;CAN BE MADE TO DETERMINE THAT WRITE DID NOT CHANGE BUFFER
5995 020250 004037 034426 JSR RO,#CLAREA ;CLEAR 200. WORDS, FROM REINTO
5996 020254 003444 REINTO ;STARTING FROM REINTO
5997 020256 000310 200. ;200. WORDS
5998 020260 177777 -1 ;FILL WITH -1
5999
6000 020262 004037 034426 JSR RO,#CLAREA ;CLEAR 56. WORDS, FROM REINTO+(200.*2)
6001 020266 004264 REINTO+(200.*2) ;STARTING FROM REINTO+(200.*2)
6002 020270 000070 56. ;56. WORDS
6003 020272 125252 125252 ;FILL WITH 125252
6004
6005
6006 ;NOW WRITE DATA COMMAND WILL BE LOADED
6007
6008 020274 004037 036532 JSR RO,#RUN ;SETUP TO RUN FOR DATA COMMAND
6009 020300 000000 0 ;CYLINDER 0
6010 020302 000 0 ;SECTOR 0
6011 020303 000 0 ;TRACK 0
6012 020304 177470 -200. ;WORD COUNT = 200.
6013 020306 002400 WRFROM ;BUS ADDRESS
6014 ;STARTING ADDRESS OF DATA
6015 ;BUFFER = WRFROM
6016 020310 000000 0 ;DO NOT INHIBIT BUS ADDRESS INCREMENT
6017 020312 010000 FMT22 ;16 BITS PER WORD FORMAT
6018 ;DO NOT INHIBIT ECC CORRECTION
6019 ;DO NOT INHIBIT HEADER COMPARE
6020 020314 002354 WRIDAT ;GET READY TO DO A WRIDAT
6021 ;WRITE DATA WITH 60 IN RHCS1
6022
6023
6024 ;NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE DATA
6025 020316 004037 034716 JSR RO,#SAVER ;SAVE REGISTERS

```



```

6026 020322 002210          RHWC          ;RHWC IS THE FIRST REGISTER SAVED
6027 020324 004522          SAVERE        ;STARTING ADDRESS OF WHERE
6028                               ;THE REGISTERS ARE SAVED
6029 020326 000022          18.           ;NUMBER OF REGISTERS
6030                               ;SAVED = 18.
6031
6032 020330 004737 034636    JSR      PC, @#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV
6033
6034
6035 020334 013777 004516 161642  MOV      @#RP4VEC, @RPVEC ;SET RPO4 VECTOR ADDRESS
6036                               ;TO 'TIME1' IF P-CLOCK IS PRESENT
6037                               ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
6038                               ;'TIME' WILL ONLY SAVE
6039                               ;CURRENT CYLINDER ADDRESS
6040                               ;AND LOOK AHEAD REGISTERS
6041
6042
6043 020342 013746 002354    MOV      @#WRIDAT, -(SP) ;GET READY TO MOVE COMMAND
6044 020346 052716 000101    BIS      #GO!IE, (SP)   ;GET READY TO SET GO AND
6045                               ;ENABLE INTERRUPT
6046 020352 012677 161640    MOV      (SP)+, @RHCS1  ;GO WITH
6047                               ;60 IN RHCS1 FOR WRITE DATA
6048                               ;WITH INTERRUPT ENABLED
6049 020356 011100          MOV      @R1, R0        ;SAVE RHCS1 DURING ABOVE OPERATION
6050 020360 011305          MOV      @R3, R5        ;SAVE RHDS1 DURING ABOVE OPERATION
6051
6052                               ;ONE REVOLUTION = 16670 MICRO SEC, ONE SECTOR=760 MICRO SEC
6053
6054 020362 104410          WAT              ;WAIT FOR RDY BIT TO SET
6055 020364 002216          RHCS1           ;WAIT FOR RHCS1 REGISTER
6056 020366 000200          RDY             ;WAIT FOR RDY BIT IN RHCS1 REGISTER
6057 020370 001614          908.           ;ALLOW 9080 MICRO SECONDS
6058 020372 001507          839.           ;RDY MUST SET BETWEEN
6059                               ;690 AND 17470 MICRO SECONDS
6060                               ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
6061                               ;R0 AND R5 IMMEDIATELY AFTER GO
6062 020374 013746 002354    MOV      @#WRIDAT, -(SP) ;SAVE COMMAND
6063 020400 052716 004101    BIS      #IE!GO!DVA, (SP) ;INCLUDE IE!GO!DVA
6064 020404 011637 001124    MOV      (SP), @#$GDDAT ;SAVE FOR PRINTOUT
6065 020410 022600          CMP      (SP)+, R0      ;DURING ABOVE OPERATION ONLY IE!GO!DVA
6066                               ;AND COMMAND SHOULD BE SET
6067 020412 001405          BEQ      64$         ;BRANCH IF GOOD
6068 020414 010037 001126    MOV      R0, @#$BDDAT  ;BAD DATA
6069 020420 010137 004510    MOV      R1, @#REGADR  ;FAILING REGISTER RHCS1
6070 020424 104021          ERROR      21        ;DURING ABOVE OPERATION ONLY
6071                               ;COMMAND AND IE!GO!DVA SHOULD BE SET
6072 020426 012746 010500    64$: MOV      #MOL!DPR!VV, -(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
6073 020432 011637 001124    MOV      (SP), @#$GDDAT ;SAVE FOR PRINTOUT
6074 020436 022605          CMP      (SP)+, R5     ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
6075                               ;SHOULD BE SET
6076 020440 001405          BEQ      66$         ;BRANCH IF GOOD
6077 020442 010537 001126    MOV      R5, @#$BDDAT  ;BAD DATA
6078 020446 010337 004510    MOV      R3, @#REGADR  ;FAILING REGISTER RHDS1
6079 020452 104063          ERROR      63        ;DURING ABOVE OPERATION ONLY
6080                               ;MOL!DPR!VV SHOULD BE SET
6081 020454          66$:

```

```

6082
6083
6084 020454 004037 034460      ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
        JSR      RO, @#FILLRE      ;MOV 0 INTO SAVED RHWC
        RHWC      ;SAVED REGISTER TO CHANGE
        0          ;DATA
6085 020460 002210
6086 020462 000000
6087 020464 004037 034460      JSR      RO, @#FILLRE      ;MOV WRFROM+<200.*2> INTO SAVED RHBA
        RHBA      ;SAVED REGISTER TO CHANGE
        WRFROM+<200.*2> ;DATA
6088 020470 002212
6089 020472 003220
6090 020474 004037 034460      JSR      RO, @#FILLRE      ;MOV 1 INTO SAVED RHDST
        RHDST     ;SAVED REGISTER TO CHANGE
        1          ;DATA
6091 020500 002222
6092 020502 000001
6093
6094      ;NOW COMPARE REGISTERS BEFORE WRITE DATA WITH REGISTERS
6095      ;AFTER COMMAND
6096
6097 020504 004037 035546      JSR      RO, @#COMREG      ;COMPARE SAVED REGISTERS WITH
        SAVERE     ;PRESENT VALUE
        WC          ;GOOD DATA SAVED IN 'SAVERE'
        18.         ;TEST DATA STARTING FROM 'RHWC'
        1$         ;18. REGISTERS TO BE COMPARED
        2$         ;RETURN TO 1$ ON ERROR
6100 020512 002266
6101 020514 000022
6102 020516 020522
6103 020520 020526
6104
6105 020522 104035 1$:      ERROR 35      ;WRITE DATA COMMAND CAUSED
6106 020524 000207      RTS      PC      ;IMPROPER REGISTER CHANGE
6107
6108
6109
6110
6111
6112
6113 020526 2$:      ;NOW WRITE FROM BUFFER WILL BE CHECKED FOR NO CHANGE
6114
6115 020526 004037 036576      JSR      RO, @#COMPAR      ;COMPARE TWO BLOCKS OF MEMORY
        REINTO     ;GOOD DATA STARTS FROM REINTO
        WRFROM     ;TEST DATA STARTS FROM WRFROM
        256.       ;256. WORDS TO BE COMPARED
        3$         ;RETURN TO 3$ ON ERROR
6116 020532 003444
6117 020534 002400
6118 020536 000400
6119 020540 020544
6120 020542 020550
6121
6122
6123 020544 104036 3$:      ERROR 36      ;WRITE DATA COMMAND CHANGED
6124 020546 000207      RTS      PC      ;WRITE FROM BUFFER
6125
6126
6127      ;NOW A READ DATA COMMAND WILL BE GIVEN
6128
6129 020550 4$:      ;FILL READ INTO BUFFER WITH 200 ZEROS AND 56 OF 377
6130
6131 020550 004737 034556      JSR      PC, @#CLDISK      ;SET R1-RHCS1, R2-RHCS2
6132
6133
6134
6135 020554 004037 034426      JSR      RO, @#CLAREA      ;R3-RHDS1, R4-RHER1
        REINTO     ;GIVE RH-11 INITIALIZE
        200.       ;SETUP UNIT NUBER
6136 020560 003444
6137 020562 000310          ;CLEAR 200. WORDS, FROM REINTO
        ;STARTING FROM REINTO
        ;200. WORDS

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6138 020564 000000          0          ;FILL WITH 0
6139
6140 020566 004037 034426 JSR      RO,@#CLAREA  ;CLEAR 56. WORDS, FROM REINTO+<200.*2>
6141 020572 004264          REINTO+<200.*2>      ;STARTING FROM REINTO+<200.*2>
6142 020574 000070          56.                ;56. WORDS
6143 020576 000377          377                ;FILL WITH 377
6144
6145
6146          ;FILL WRITE FROM BUFFER WITH 200 ONES AND 56 OF 377
6147 020600 004037 034426 JSR      RO,@#CLAREA  ;CLEAR 200. WORDS, FROM WRFROM
6148 020604 002400          WRFROM             ;STARTING FROM WRFROM
6149 020606 000310          200.              ;200. WORDS
6150 020610 177777          -1                ;FILL WITH -1
6151
6152 020612 004037 034426 JSR      RO,@#CLAREA  ;CLEAR 56. WORDS, FROM WRFROM+<200.*2>
6153 020616 003220          WRFROM+<200.*2>    ;STARTING FROM WRFROM+<200.*2>
6154 020620 000070          56.                ;56. WORDS
6155 020622 000377          377                ;FILL WITH 377
6156
6157
6158          ;NOW FILL COMMAND
6159
6160 020624 004037 036532 JSR      RO,@#RUN     ;SETUP TO RUN FOR DATA COMMAND
6161 020630 000000          0                  ;CYLINDER 0
6162 020632 000          .BYTE 0              ;SECTOR 0
6163 020633 000          .BYTE 0              ;TRACK 0
6164 020634 177470          -200.             ;WORD COUNT = 200.
6165 020636 003444          REINTO            ;BUS ADDRESS
6166          ;STARTING ADDRESS OF DATA
6167          ;BUFFER = REINTO
6168 020640 000000          0                  ;DO NOT INHIBIT BUS ADDRESS INCREMENT
6169 020642 014000          ECI!FMT22        ;16 BITS PER WORD FORMAT
6170          ;INHIBIT ECC CORRECTION
6171          ;DO NOT INHIBIT HEADER COMPARE
6172 020644 002360          READAT         ;GET READY TO DO A READAT
6173          ;READ DATA WITH 70 IN RHCS1
6174
6175
6176          ;NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
6177 020646 004037 034716 JSR      RO,@#SAVER  ;SAVE REGISTERS
6178 020652 002210          RHWC              ;RHWC IS THE FIRST REGISTER SAVED
6179 020654 004522          SAVERE          ;STARTING ADDRESS OF WHERE
6180          ;THE REGISTERS ARE SAVED
6181 020656 000022          18.              ;NUMBER OF REGISTERS
6182          ;SAVED = 18.
6183
6184 020660 004737 034636 JSR      PC,@#CHECKT ;CHECK DVA,RDY,MOL,DPR,DRY,VV
6185
6186
6187 020664 013777 004516 161312 MOV     @#RP4VEC,@#RPVEC ;SET RPO4 VECTOR ADDRESS
6188          ;TO 'TIME1' IF P-CLOCK IS PRESENT
6189          ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
6190          ;'TIME' WILL ONLY SAVE
6191          ;CURRENT CYLINDER ADDRESS
6192          ;AND LOOK AHEAD REGISTERS
6193

```

```

6194
6195 020672 013746 002360      MOV      @#READAT,-(SP)    ;GET READY TO MOVE COMMAND
6196 020676 052716 000101      BIS      #GO!IE,(SP)      ;GET READY TO SET GO AND
6197                                ;ENABLE INTERRUPT
6198 020702 012677 161310      MOV      (SP)+,@RHCS1     ;GO WITH
6199                                ;70 IN RHCS1 FOR READ DATA
6200                                ;WITH INTERRUPT ENABLED
6201 020706 011100      MOV      @R1,R0           ;SAVE RHCS1 DURING ABOVE OPERATION
6202 020710 011305      MOV      @R3,R5           ;SAVE RHDS1 DURING ABOVE OPERATION
6203
6204
6205 020712 104410      WAT                                ;WAIT FOR RDY BIT TO SET
6206 020714 002216      RHCS1                          ;WAIT FOR RHCS1 REGISTER
6207 020716 000200      RDY                            ;WAIT FOR RDY BIT IN RHCS1 REGISTER
6208 020720 001614      908.                          ;ALLOW 9080 MICRO SECONDS
6209 020722 001507      839.                          ;RDY MUST SET BETWEEN
6210                                ;690 AND 17470 MICRO SECONDS
6211                                ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
6212                                ;R0 AND R5 IMMEDIATELY AFTER GO
6213 020724 013746 002360      MOV      @#READAT,-(SP)    ;SAVE COMMAND
6214 020730 052716 004101      BIS      #IE!GO!DVA,(SP)  ;INCLUDE IE!GO!DVA
6215 020734 011637 001124      MOV      (SP),@#$GDDAT    ;SAVE FOR PRINTOUT
6216 020740 022600      CMP      (SP)+,R0         ;DURING ABOVE OPERATION ONLY IE!GO!DVA
6217                                ;AND COMMAND SHOULD BE SET
6218 020742 001405      BEQ      67$              ;BRANCH IF GOOD
6219 020744 010037 001126      MOV      R0,@#$BDDAT      ;BAD DATA
6220 020750 010137 004510      MOV      R1,@#REGADR      ;FAILING REGISTER RHCS1
6221 020754 104021      ERROR    21              ;DURING ABOVE OPERATION ONLY
6222                                ;COMMAND AND IE!GO!DVA SHOULD BE SET
6223 020756 012746 010500      67$: MOV      #MOL!DPR!VV,-(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
6224 020762 011637 001124      MOV      (SP),@#$GDDAT    ;SAVE FOR PRINTOUT
6225 020766 022605      CMP      (SP)+,R5         ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
6226                                ;SHOULD BE SET
6227 020770 001405      BEQ      69$              ;BRANCH IF GOOD
6228 020772 010537 001126      MOV      R5,@#$BDDAT      ;BAD DATA
6229 020776 010337 004510      MOV      R3,@#REGADR      ;FAILING REGISTER RHDS1
6230 021002 104063      ERROR    63              ;DURING ABOVE OPERATION ONLY
6231                                ;MOL!DPR!VV SHOULD BE SET
6232 021004      69$:
6233
6234                                ;CHANGE SAVED REGISTERS TO EXPECTED VALUES
6235 021004 004037 034460      JSR      R0,@#FILLRE      ;MOV 0 INTO SAVED RHWC
6236 021010 002210      RHWC                          ;SAVED REGISTER TO CHANGE
6237 021012 000000      0                            ;DATA
6238 021014 004037 034460      JSR      R0,@#FILLRE      ;MOV REINTO+(200.*2) INTO SAVED RHBA
6239 021020 002212      RHBA                          ;SAVED REGISTER TO CHANGE
6240 021022 004264      REINTO+(200.*2)              ;DATA
6241 021024 004037 034460      JSR      R0,@#FILLRE      ;MOV 1 INTO SAVED RHDST
6242 021030 002222      RHDST                          ;SAVED REGISTER TO CHANGE
6243 021032 000001      1                            ;DATA
6244
6245                                ;COMPARE REGISTERS BEFORE READ DATA COMMAND
6246                                ;WITH REGISTERS AFTER COMMAND
6247
6248 021034 004037 035546      JSR      R0,@#COMREG      ;COMPARE SAVED REGISTERS WITH
6249                                ;PRESENT VALUE

```

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021040 004522
021042 003266
021044 000000
021046 000000
021050 021056

021058 104032
021059 000207

021056

021058 004037 036576
021059 002400
021060 003444
021066 000400
021070 021074
021072 021100

021074 104034
021076 000207

021100

SAVERE
WC
10.
59
59

68: ERROR 23
RTS PC

68: :NOW READ INTO BUFFER IS CHECKED FOR GOOD READ

JSR RD,28COMPAR
WAFROM
REINTO
256.
79
108

78: ERROR 24
RTS PC

108:

:GOOD DATA SAVED IN 'SAVERE'
:TEST DATA STARTING FROM 'RHWC'
:18. REGISTERS TO BE COMPARED
:RETURN TO 58 ON ERROR
:RETURN TO 68 ON NO ERROR

:READ DATA CAUSED IMPROPER
:REGISTER CHANGE
:GOOD DATA GIVES WHAT SHOULD BE THERE
:RECEIVED DATA GIVES WHAT WAS THERE
:AFTER COMMAND

:COMPARE TWO BLOCKS OF MEMORY
:GOOD DATA STARTS FROM WAFROM
:TEST DATA STARTS FROM REINTO
:256. WORDS TO BE COMPARED
:RETURN TO 78 ON ERROR
:RETURN TO 108 ON NO ERROR

:INCORRECT DATA AFTER
:WRITE DATA FOLLOWED BY A
:READ DATA

: *TEST 25 WRITE/READ DATA

```

: *
: * THIS TEST GIVES A WRITE DATA COMMAND FOR CYLINDER 0
: * TRACK 0, SECTOR 0, KEYS 0, 256 WORDS OF 125252
: * THIS SECTOR IS FORMATED BY PREVIOUS TEST
: * THEN READ DATA COMMAND IS GIVEN FOR 256 WORDS IN
: * SAME CYLINDER, TRACK, SECTOR, KEYS
: * WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
: * 256 OF 125252
: * THE WRITE DATA COMMAND IS LOADED EXCEPT GO AND IE
: * ALL REGISTERS ARE SAVED AND THEN GO IS GIVEN TO WRITE DATI
: *
: *
: * THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER
: * CHANGE, THEN WRITE FROM BUFFER IS CHECKED FOR NO CHANGE
: *
: * THEN READ INTO BUFFER IS FILLED WITH 256 OF ZEROS
: * WRITE FROM BUFFER IS FILLED WITH
: * 256 OF 125252
: * THE COMMAND EXCEPT GO IS LOADED, ALL REGISTERS ARE SAVED
: * GO IS GIVEN
: *
: *
: * ALL REGISTERS ARE CHECKED
: * READ DATA IS CHECKED
    
```

: *TEST 25:

00000001
00000002
00000003
00000004
00000005
00000006
00000007
00000008
00000009
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00000015
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00000097
00000098
00000099
00000100

```

021100 000004
021102 012706 001000
021106 012737 000025 004514
021114 004737 034556
021120 004037 034426
021124 002400
021126 000400
021130 125252
021132 004037 034426
021136 003444
021140 000400
021142 125252
021144 004037 036532
    
```

```

: *SCOPE
: *MOV #STACK, SP ;RESET STACK
: *MOV #25, #TESTNM ;SAVE TEST NUMBER
: *JSR PC, #CLDISK ;SET R1-RHCS1, R2-RHCS2
: * ;R3-RHDS1, R4-RHER1
: * ;GIVE RH-11 INITIALIZE
: * ;SETUP UNIT NUBER
: *
: *NOW FILL WRITE FROM BUFFER - 256 OF 125252
: *JSR RO, #CLAREA ;CLEAR 256. WORDS, FROM WRFROM
: *WRFROM ;STARTING FROM WRFROM
: *256. ;256. WORDS
: *125252 ;FILL WITH 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
: *JSR RO, #CLAREA ;CLEAR 256. WORDS, FROM REINTO
: *REINTO ;STARTING FROM REINTO
: *256. ;256. WORDS
: *125252 ;FILL WITH 125252
: *
: *NOW WRITE DATA COMMAND WILL BE LOADED
: *JSR RO, #RUN ;SETUP TO RUN FOR DATA COMMAND
    
```

```

6337 021150 000000          0          ;CYLINDER 0
6338 021152 000          0          ;SECTOR 0
6339 021153 000          0          ;TRACK 0
6340 021154 177400        -256.    ;WORD COUNT = 256.
6341 021156 002400        WRFROM   ;BUS ADDRESS
6342          ;STARTING ADDRESS OF DATA
6343          ;BUFFER = WRFROM
6344 021160 000000          0          ;DO NOT INHIBIT BUS ADDRESS INCREMENT
6345 021162 010000        FMT22    ;16 BITS PER WORD FORMAT
6346          ;DO NOT INHIBIT ECC CORRECTION
6347          ;DO NOT INHIBIT HEADER COMPARE
6348 021164 002354        WRIDAT   ;GET READY TO DO A WRIDAT
6349          ;WRITE DATA WITH 60 IN RHCS1
6350
6351          ;NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE DATA
6352 021166 004037 034716   JSR      RO,0#SAVER ;SAVE REGISTERS
6353 021172 002210        RHWC     ;RHWC IS THE FIRST REGISTER SAVED
6354 021174 004522        SAVERE   ;STARTING ADDRESS OF WHERE
6355          ;THE REGISTERS ARE SAVED
6356          ;NUMBER OF REGISTERS
6357 021176 000022        18.      ;SAVED = 18.
6358
6359
6360 021200 004737 034636   JSR      PC,0#CHECKT ;CHECK DVA,RDY,MOL,DPR,DRY,VV
6361
6362
6363 021204 013777 004516 160772 MOV     0#RP4VEC,0RPVEC ;SET RP04 VECTOR ADDRESS
6364          ;TO 'TIME1' IF P-CLOCK IS PRESENT
6365          ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
6366          ;'TIME' WILL ONLY SAVE
6367          ;CURRENT CYLINDER ADDRESS
6368          ;AND LOOK AHEAD REGISTERS
6369
6370
6371 021210 013746 002354   MOV     0#WRIDAT,-(SP) ;GET READY TO MOVE COMMAND
6372 021216 052716 000101   BIS     #GO!IE,(SP)   ;GET READY TO SET GO AND
6373          ;ENABLE INTERRUPT
6374 021222 012677 160770   MOV     (SP)+,0RHCS1 ;GO WITH
6375          ;60 IN RHCS1 FOR WRITE DATA
6376          ;WITH INTERRUPT ENABLED
6377 021226 011100        MOV     0R1,RO        ;SAVE RHCS1 DURING ABOVE OPERATION
6378 021230 011305        MOV     0R3,R5        ;SAVE RHDS1 DURING ABOVE OPERATION
6379
6380          ;ONE REVOLUTION=16670 MICROSEC, ONE SECTOR=760 MICROSEC
6381
6382 021232 104410        WAT          ;WAIT FOR RDY BIT TO SET
6383 021234 002216        RHCS1     ;WAIT FOR RHCS1 REGISTER
6384 021236 000200        RDY      ;WAIT FOR RDY BIT IN RHCS1 REGISTER
6385 021240 001614        908.     ;ALLOW 9080 MICRO SECONDS
6386 021242 001507        839.     ;RDY MUST SET BETWEEN
6387          ;690 AND 17470 MICRO SECONDS
6388          ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
6389          ;RO AND R5 IMMEDIATELY AFTER GO
6390 021244 013746 002354   MOV     0#WRIDAT,-(SP) ;SAVE COMMAND
6391 021250 052716 004101   BIS     #IE!GO!DVA,(SP) ;INCLUDE IE!GO!DVA
6392 021254 011637 001124   MOV     (SP),0#SGDDAT ;SAVE FOR PRINTOUT

```



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6449
6450
6451 021414 104036      3$:  ERROR 36      ;WRITE DATA COMMAND CHANGED
6452 021416 000207      RTS      PC      ;WRITE FROM BUFFER
6453
6454      ;NOW A READ DATA COMMAND WILL BE GIVEN
6455
6456      ;FILL READ INTO BUFFER WITH 256 ZEROS
6457 021420      4$:
6458
6459 021420 004737 034556 JSR      PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2 ..
6460      ;R3-RHDS1, R4-RHER1
6461      ;GIVE RH-11 INITIALIZE
6462      ;SETUP UNIT NUMBER
6463 021424 004037 034426 JSR      RO, @#CLAREA ;CLEAR 256. WORDS, FROM REINTO
6464 021430 003444 REINTO ;STARTING FROM REINTO
6465 021432 000400 256. ;256. WORDS
6466 021434 000000 0 ;FILL WITH 0
6467
6468
6469      ;FILL WRITE FROM BUFFER WITH 256 OF 125252
6470 021436 004037 034426 JSR      RO, @#CLAREA ;CLEAR 256. WORDS, FROM WRFROM
6471 021442 002400 WRFROM ;STARTING FROM WRFROM
6472 021444 000400 256. ;256. WORDS
6473 021446 125252 125252 ;FILL WITH 125252
6474
6475
6476      ;NOW FILL COMMAND
6477
6478 021450 004037 036532 JSR      RO, @#RUN ;SETUP TO RUN FOR DATA COMMAND
6479 021454 000000 0 ;CYLINDER 0
6480 021456 000 .BYTE 0 ;SECTOR 0
6481 021457 000 .BYTE 0 ;TRACK 0
6482 021460 177400 -256. ;WORD COUNT = 256.
6483 021462 003444 REINTO ;BUS ADDRESS
6484      ;STARTING ADDRESS OF DATA
6485      ;BUFFER = REINTO
6486 021464 000000 0 ;DO NOT INHIBIT BUS ADDRESS INCREMENT
6487 021466 014000 ECI!FMT22 ;16 BITS PER WORD FORMAT
6488      ;INHIBIT ECC CORRECTION
6489      ;DO NOT INHIBIT HEADER COMPARE
6490 021470 002360 READAT ;GET READY TO DO A READAT
6491      ;READ DATA WITH 70 IN RHCS1
6492
6493
6494      ;NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
6495 021472 004037 034716 JSR      RO, @#SAVER ;SAVE REGISTERS
6496 021476 002210 RHWC ;RHWC IS THE FIRST REGISTER SAVED
6497 021500 004522 SAVER ;STARTING ADDRESS OF WHERE
6498      ;THE REGISTERS ARE SAVED
6499 021502 000022 18. ;NUMBER OF REGISTERS
6500      ;SAVED = 18.
6501
6502 021504 004737 034636 JSR      PC, @#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV
6503
6504

```

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WRITE/READ DATA

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6505 021510 013777 004516 160466      MOV      @#RP4VEC,@RPVEC ;SET RPO4 VECTOR ADDRESS
6506                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
6507                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
6508                                     ;'TIME' WILL ONLY SAVE
6509                                     ;CURRENT CYLINDER ADDRESS
6510                                     ;AND LOOK AHEAD REGISTERS
6511
6512
6513 021516 013746 002360      MOV      @#READAT,-(SP) ;GET READY TO MOVE COMMAND
6514 021522 052716 000101      BIS      #GO!IE,(SP) ;GET READY TO SET GO AND
6515                                     ;ENABLE INTERRUPT
6516 021526 012677 160464      MOV      (SP)+,@RHCS1 ;GO WITH
6517                                     ;70 IN RHCS1 FOR READ DATA
6518                                     ;WITH INTERRUPT ENABLED
6519 021532 011100      MOV      @R1,R0 ;SAVE RHCS1 DURING ABOVE OPERATION
6520 021534 011305      MOV      @R3,R5 ;SAVE RHDS1 DURING ABOVE OPERATION
6521
6522
6523 021536 104410      WAT                                     ;WAIT FOR RDY BIT TO SET
6524 021540 002216      RHCS1 ;WAIT FOR RHCS1 REGISTER
6525 021542 000200      RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
6526 021544 001614      908. ;ALLOW 9080 MICRO SECONDS
6527 021546 001507      839. ;RDY MUST SET BETWEEN
6528                                     ;690 AND 17470 MICRO SECONDS
6529                                     ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
6530                                     ;R0 AND R5 IMMEDIATELY AFTER GO
6531 021550 013746 002360      MOV      @#READAT,-(SP) ;SAVE COMMAND
6532 021554 052716 004101      BIS      #IE!GO!DVA,(SP) ;INCLUDE IE!GO!DVA
6533 021560 011637 001124      MOV      (SP),@#$GDDAT ;SAVE FOR PRINTOUT
6534 021564 022600      CMP      (SP)+,R0 ;DURING ABOVE OPERATION ONLY IE!GO!DVA
6535                                     ;AND COMMAND SHOULD BE SET
6536 021566 001405      BEQ      67$ ;BRANCH IF GOOD
6537 021570 010037 001126      MOV      R0,@#$BDDAT ;BAD DATA
6538 021574 010137 004510      MOV      R1,@#REGADR ;FAILING REGISTER RHCS1
6539 021600 104021      ERROR   21 ;DURING ABOVE OPERATION ONLY
6540                                     ;COMMAND AND IE!GO!DVA SHOULD BE SET
6541 021602 012746 010500      67$: MOV      #MOL!DPR!VV,-(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
6542 021606 011637 001124      MOV      (SP),@#$GDDAT ;SAVE FOR PRINTOUT
6543 021612 022605      CMP      (SP)+,R5 ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
6544                                     ;SHOULD BE SET
6545 021614 001405      BEQ      69$ ;BRANCH IF GOOD
6546 021616 010537 001126      MOV      R5,@#$BDDAT ;BAD DATA
6547 021622 010337 004510      MOV      R3,@#REGADR ;FAILING REGISTER RHDS1
6548 021626 104063      ERROR   63 ;DURING ABOVE OPERATION ONLY
6549                                     ;MOL!DPR!VV SHOULD BE SET
6550 021630      69$:
6551
6552                                     ;CHANGE SAVED REGISTERS TO EXPECTED VALUES
6553 021630 004037 034460      JSR      R0,@#FILLRE ;MOV 0 INTO SAVED RHWC
6554 021634 002210      RHWC ;SAVED REGISTER TO CHANGE
6555 021636 000000      0 ;DATA
6556 021640 004037 034460      JSR      R0,@#FILLRE ;MOV REINT0+(256.*2) INTO SAVED RHBA
6557 021644 002212      RHBA ;SAVED REGISTER TO CHANGE
6558 021646 004444      REINT0+(256.*2) ;DATA
6559 021650 004037 034460      JSR      R0,@#FILLRE ;MOV 1 INTO SAVED RHDST
6560 021654 002222      RHDST ;SAVED REGISTER TO CHANGE

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6561 021656 000001          1          ;DATA
6562
6563          ;COMPARE REGISTERS BEFORE READ DATA COMMAND
6564          ;WITH REGISTERS AFTER COMMAND
6565
6566 021660 004037 035546    JSR      RD,2#COMREG    ;COMPARE SAVED REGISTERS WITH
6567          ;PRESENT VALUE
6568 021664 004522          SAVERE    ;GOOD DATA SAVED IN 'SAVERE'
6569 021666 002266          WC          ;TEST DATA STARTING FROM 'RHWC'
6570 021670 000022          18.       ;18. REGISTERS TO BE COMPARED
6571 021672 021676          5$         ;RETURN TO 5$ ON ERROR
6572 021674 021702          6$         ;RETURN TO 6$ ON NO ERROR
6573
6574 021676 104033          5$:      ERROR    33      ;READ DATA CAUSED IMPROPER
6575 021700 000207          RTS      PC        ;REGISTER CHANGE
6576          ;GOOD DATA GIVES WHAT SHOULD BE THE
6577          ;RECEIVED DATA GIVES WHAT WAS THERE
6578          ;AFTER COMMAND
6579
6580          ;NOW READ INTO BUFFER IS CHECKED FOR GOOD READ
6581 021702          6$:
6582
6583 021702 004037 036576    JSR      RD,2#COMPAR    ;COMPARE TWO BLOCKS OF MEMORY
6584 021706 002400          WRFROM    ;GOOD DATA STARTS FROM WRFROM
6585 021710 003444          REINTO    ;TEST DATA STARTS FROM REINTO
6586 021712 000400          256.     ;256. WORDS TO BE COMPARED
6587 021714 021720          7$         ;RETURN TO 7$ ON ERROR
6588 021716 021724          10$        ;RETURN TO 10$ ON NO ERROR
6589
6590
6591 021720 104034          7$:      ERROR    34      ;INCORRECT DATA AFTER
6592 021722 000207          RTS      PC        ;WRITE DATA FOLLOWED BY A
6593          ;READ DATA
6594 021724          10$:
6595
6596          ;*****
6597          ;*TEST 26      WRITE/READ DATA
6598
6599          ;*
6600          ;*      THIS TEST GIVES A WRITE DATA COMMAND FOR CYLINDER 0
6601          ;*      TRACK 0, SECTOR 0, KEYS 0, 200 WORDS OF 052525
6602          ;*      THIS SECTOR IS FORMATED BY PREVIOUS TEST
6603          ;*      THEN READ DATA COMMAND IS GIVEN FOR 256 WORDS IN
6604          ;*      SAME CYLINDER, TRACK, SECTOR, KEYS
6605          ;*      WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
6606          ;*      200 OF 052525 AND 56 OF 377
6607          ;*      THE WRITE DATA COMMAND IS LOADED EXCEPT GO AND IE
6608          ;*      ALL REGISTERS ARE SAVED AND THEN GO IS TO WRITE DATA
6609          ;*
6610          ;*
6611          ;*      THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER
6612          ;*      CHANGE, THEN WRITE FROM BUFFER IS CHECKED FOR NO CHANGE
6613          ;*
6614          ;*      THEN READ INTO BUFFER IS FILLED WITH 200 IF ZEROS
6615          ;*      AND 56 ALL ONES, WRITE FROM BUFFER IS FILLED WITH 200
6616          ;*      WORDS OF 52525 AND 56 WORDS OF 0
6617          ;*      THE COMMAND EXCEPT GO IS LOADED, ALL REGISTERS ARE SAVED

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021724 000004
021726 012706 001000
021732 012737 000026 004514

021740 004737 034556

021744 004037 034426
021750 002400
021752 000310
021754 052525

021756 004037 034426
021762 003220
021764 000070
021766 000377

021770 004037 034426
021774 003444
021776 000310
022000 052525

022002 004037 034426
022006 004264
022010 000070
022012 000377

022014 004037 036532
022020 000000
022022 000
022023 000
022024 177470
022026 002400

022030 000000
022032 010000

```

: * GO IS GIVEN
: *
: * ALL REGISTER ARE CHECKED
: * READ DATA IS CHECKED
: *****
TST26: SCOPE
MOV #STACK, SP ;RESET STACK
MOV #26, J#TSTNM ;SAVE TEST NUMBER
JSR PC, J#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUMBER

;NOW FILL WRITE FROM BUFFER-200 OF 52525 AND 56 OF 377
JSR RO, J#CLAREA ;CLEAR 200. WORDS, FROM WRFROM
WRFROM ;STARTING FROM WRFROM
200. ;200. WORDS
52525 ;FILL WITH 52525

JSR RO, J#CLAREA ;CLEAR 56. WORDS, FROM WRFROM+(200.*2)
WRFROM+(200.*2) ;STARTING FROM WRFROM+(200.*2)
56. ;56. WORDS
377 ;FILL WITH 377

;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
JSR RO, J#CLAREA ;CLEAR 200. WORDS, FROM REINTO
REINTO ;STARTING FROM REINTO
200. ;200. WORDS
52525 ;FILL WITH 52525

JSR RO, J#CLAREA ;CLEAR 56. WORDS, FROM REINTO+(200.*2)
REINTO+(200.*2) ;STARTING FROM REINTO+(200.*2)
56. ;56. WORDS
377 ;FILL WITH 377

;NOW WRITE DATA COMMAND WILL BE LOADED
JSR RO, J#RUN ;SETUP TO RUN FOR DATA COMMAND
0 ;CYLINDER 0
0 ;SECTOR 0
0 ;TRACK 0
-200. ;WORD COUNT = 200.
WRFROM ;BUS ADDRESS
;STARTING ADDRESS OF DATA
;BUFFER = WRFROM
0 ;DO NOT INHIBIT BUS ADDRESS INCREMENT
FMT22 ;16 BITS PER WORD FORMAT
;DO NOT INHIBIT ECC CORRECTION
;DO NOT INHIBIT HEADER COMPARE

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.BYTE
.BYTE

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6673 022034 002354 WRIDAT ;GET READY TO DO A WRIDAT
6674 ;WRITE DATA WITH 60 IN RHCS1
6675
6676
6677 ;NOW SAVE REGISTER FOR COMPARISON AFTER WRITE DATA
6678 022036 004037 034716 JSR RO,#SAVER ;SAVE REGISTERS
6679 022042 002210 RHWC ;RHWC IS THE FIRST REGISTER SAVED
6680 022044 004522 SAVERE ;STARTING ADDRESS OF WHERE
6681 ;THE REGISTERS ARE SAVED
6682 022046 000022 18. ;NUMBER OF REGISTERS
6683 ;SAVED = 18.
6684
6685 022050 004737 034636 JSR PC,#CHECKT ;CHECK DVA,RDY,MOL,DPR,DRY,VV
6686
6687
6688 022054 013777 004516 160122 MOV #RP4VEC,#RPVEC ;SET RPO4 VECTOR ADDRESS
6689 ;TO 'TIME1' IF P-CLOCK IS PRESENT
6690 ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
6691 ;'TIME' WILL ONLY SAVE
6692 ;CURRENT CYLINDER ADDRESS
6693 ;AND LOOK AHEAD REGISTERS
6694
6695
6696 022062 013746 002354 MOV #WRIDAT,-(SP) ;GET READY TO MOVE COMMAND
6697 022066 052716 000101 BIS #GO!IE,(SP) ;GET READY TO SET GO AND
6698 ;ENABLE INTERRUPT
6699 022072 012677 160120 MOV (SP)+,#RHCS1 ;GO WITH
6700 ;60 IN RHCS1 FOR WRITE DATA
6701 ;WITH INTERRUPT ENABLED
6702 022076 011100 MOV #R1,R0 ;SAVE RHCS1 DURING ABOVE OPERATION
6703 022100 011305 MOV #R3,R5 ;SAVE RHDS1 DURING ABOVE OPERATION
6704
6705 ;ONE REVOLUTION=16670 MICROSEC, ONE SECTOR=760 MICROSEC
6706
6707 022102 104410 WAT ;WAIT FOR RDY BIT TO SET
6708 022104 002216 RHCS1 ;WAIT FOR RHCS1 REGISTER
6709 022106 000200 RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
6710 022110 001614 908. ;ALLOW 9080 MICRO SECONDS
6711 022112 001507 839. ;RDY MUST SET BETWEEN
6712 ;690 AND 17470 MICRO SECONDS
6713 ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
6714 ;R0 AND R5 IMMEDIATELY AFTER GO
6715 022114 013746 002354 MOV #WRIDAT,-(SP) ;SAVE COMMAND
6716 022120 052716 004101 BIS #IE!GO!DVA,(SP) ;INCLUDE IE!GO!DVA
6717 022124 011637 001124 MOV (SP),#SGDDAT ;SAVE FOR PRINTOUT
6718 022130 022600 CMP (SP)+,R0 ;DURING ABOVE OPERATION ONLY IE!GO!DVA
6719 ;AND COMMAND SHOULD BE SET
6720 022132 001405 BEQ 64$ ;BRANCH IF GOOD
6721 022134 010037 001126 MOV R0,#SBDDAT ;BAD DATA
6722 022140 010137 004510 MOV R1,#REGADR ;FAILING REGISTER RHCS1
6723 022144 104021 ERROR 21 ;DURING ABOVE OPERATION ONLY
6724 ;COMMAND AND IE!GO!DVA SHOULD BE SET
6725 022146 012746 010500 64$: MOV #MOL!DPR!VV,-(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
6726 022152 011637 001124 MOV (SP),#SGDDAT ;SAVE FOR PRINTOUT
6727 022156 022605 CMP (SP)+,R5 ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
6728 ;SHOULD BE SET

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6729 022160 001405          BEQ      66$          ;BRANCH IF GOOD
6730 022162 010537 001126   MOV      R5,3#BDDAT  ;BAD DATA
6731 022166 010337 004510   MOV      R3,3#REGADR ;FAILING REGISTER RHDS!
6732 022172 104053          ERROR    63          ;DURING ABOVE OPERATION ONLY
6733                                     ;MOL!DPR!VV SHOULD BE SET
6734 022174          66$:
6735
6736                                     ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
6737 022174 004037 034460   JSR      RO,3#FILLRE ;MOV 0 INTO SAVED RHWC
6738 022200 002210          RHWC          ;SAVED REGISTER TO CHANGE
6739 022202 000000          0           ;DATA
6740 022204 004037 034460   JSR      RO,3#FILLRE ;MOV WRFROM+(200.*2) INTO SAVED RHBA
6741 022210 002212          RHBA          ;SAVED REGISTER TO CHANGE
6742 022212 003220          WRFROM+(200.*2) ;DATA
6743 022214 004037 034460   JSR      RO,3#FILLRE ;MOV 1 INTO SAVED RHDST
6744 022220 002222          RHDST        ;SAVED REGISTER TO CHANGE
6745 022222 000001          1           ;DATA
6746
6747                                     ;NOW COMPARE REGISTERS BEFORE WRITE DATA WITH REGISTERS
6748                                     ;AFTER COMMAND
6749
6750 022224 004037 035546   JSR      RO,3#COMREG ;COMPARE SAVED REGISTERS WITH
6751                                     ;PRESENT VALUE
6752 022230 004522          SAVERE        ;GOOD DATA SAVED IN 'SAVERE'
6753 022232 002266          WC           ;TEST DATA STARTING FROM 'RHWC'
6754 022234 000022          18.         ;18. REGISTERS TO BE COMPARED
6755 022236 022242          1$          ;RETURN TO 1$ ON ERROR
6756 022240 022246          2$          ;RETURN TO 2$ ON NO ERROR
6757
6758 022242 104035          1$:          ERROR    35          ;WRITE DATA COMMAND CAUSED
6759 022244 000207          RTS      PC       ;IMPROPER REGISTER CHANGE
6760                                     ;GOOD DATA GIVES WHAT SHOULD
6761                                     ;BE
6762                                     ;RECEIVED DATA GIVES WHAT WAS
6763                                     ;THERE AFTER COMMAND
6764
6765                                     ;NOW WRITE FROM BUFFER WILL BE CHECKED FOR NO CHANGE
6766 022246          2$:
6767
6768 022246 004037 036576   JSR      RO,3#COMPAR ;COMPARE TWO BLOCKS OF MEMORY
6769 022252 003444          REINTO        ;GOOD DATA STARTS FROM REINTO
6770 022254 002400          WRFROM        ;TEST DATA STARTS FROM WRFROM
6771 022256 000400          256.         ;256. WORDS TO BE COMPARED
6772 022260 022264          3$          ;RETURN TO 3$ ON ERROR
6773 022262 022270          4$          ;RETURN TO 4$ ON NO ERROR
6774
6775
6776 022264 104036          3$:          ERROR    36          ;WRITE DATA COMMAND CHANGED
6777 022266 000207          RTS      PC       ;WRITE FROM BUFFER
6778
6779                                     ;NOW A READ DATA COMMAND WILL BE GIVEN
6780
6781                                     ;FILL READ INTO BUFFER WITH 200 ZEROS AND 56 OF ALL ONES
6782 022270          4$:
6783
6784 022270 004737 034556   JSR      PC,3#CLDISK ;SET R1-RHCS1, R2-RHCS2

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6785 ;R3-RHDS1, R4-RHER1
6786 ;GIVE RH-11 INITIALIZE
6787 ;SETUP UNIT NUBER
6788 022274 004037 034426 JSR RO,@#CLAREA ;CLEAR 200. WORDS, FROM REINTO
6789 022300 003444 REINTO ;STARTING FROM REINTO
6790 022302 000310 200. ;200. WORDS
6791 022304 000000 0 ;FILL WITH 0
6792
6793 022306 004037 034426 JSR RO,@#CLAREA ;CLEAR 56. WORDS, FROM REINTO+<200.*2>
6794 022312 004264 REINTO+<200.*2> ;STARTING FROM REINTO+<200.*2>
6795 022314 000070 56. ;56. WORDS
6796 022316 000377 377 ;FILL WITH 377
6797
6798
6799 ;FILL WRITE FROM BUFFER WITH 200 OF 52525 AND 56 OF 0
6800 022320 004037 034426 JSR RO,@#CLAREA ;CLEAR 200. WORDS, FROM WRFROM
6801 022324 002400 WRFROM ;STARTING FROM WRFROM
6802 022326 000310 200. ;200. WORDS
6803 022330 052525 52525 ;FILL WITH 52525
6804
6805 022332 004037 034426 JSR RO,@#CLAREA ;CLEAR 56. WORDS, FROM WRFROM+<200.*2>
6806 022336 003220 WRFROM+<200.*2> ;STARTING FROM WRFROM+<200.*2>
6807 022340 000070 56. ;56. WORDS
6808 022342 000377 377 ;FILL WITH 377
6809
6810
6811 ;NOW FILL COMMAND
6812
6813 022344 004037 036532 JSR RO,@#RUN ;SETUP TO RUN FOR DATA COMMAND
6814 022350 000000 0 ;CYLINDER 0
6815 022352 000 .BYTE 0 ;SECTOR 0
6816 022353 000 .BYTE 0 ;TRACK 0
6817 022354 177470 -200. ;WORD COUNT = 200.
6818 022356 003444 REINTO ;BUS ADDRESS
6819 ;STARTING ADDRESS OF DATA
6820 ;BUFFER = REINTO
6821 022360 000000 0 ;DO NOT INHIBIT BUS ADDRESS INCREMENT
6822 022362 014000 ECI!FMT22 ;16 BITS PER WORD FORMAT
6823 ;INHIBIT ECC CORRECTION
6824 ;DO NOT INHIBIT HEADER COMPARE
6825 022364 002360 READAT ;GET READY TO DO A READAT
6826 ;READ DATA WITH 70 IN RHCS1
6827
6828
6829 ;NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
6830 022366 004037 034716 JSR RO,@#SAVER ;SAVE REGISTERS
6831 022372 002210 RHWC ;RHWC IS THE FIRST REGISTER SAVED
6832 022374 004522 SAVERE ;STARTING ADDRES OF WHERE
6833 ;THE REGISTERS ARE SAVED
6834 022376 000022 18. ;NUMBER OF REGISTERS
6835 ;SAVED = 18.
6836
6837 022400 004737 034636 JSR PC,@#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV
6838
6839
6840 022404 013777 004516 157572 MOV @#RP4VEC, @RPVEC ;SET RPO4 VECTOR ADDRESS

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6841                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
6842                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
6843                                     ;'TIME' WILL ONLY SAVE
6844                                     ;CURRENT CYLINDER ADDRESS
6845                                     ;AND LOOK AHEAD REGISTERS
6846
6847
6848 022412 013746 002360      MOV      Q#READAT,-(SP)      ;GET READY TO MOVE COMMAND
6849 022416 052716 000101      BIS      #GO!IE,(SP)        ;GET READY TO SET GO AND
6850                                     ;ENABLE INTERRUPT
6851 022422 012677 157570      MOV      (SP)+,QRHCS1      ;GO WITH
6852                                     ;70 IN RHCS1 FOR READ DATA
6853                                     ;WITH INTERRUPT ENABLED
6854 022426 011100      MOV      QR1,R0            ;SAVE RHCS1 DURING ABOVE OPERATION
6855 022430 011305      MOV      QR3,R5            ;SAVE RHDS1 DURING ABOVE OPERATION
6856
6857
6858 022432 104410      WAT                                     ;WAIT FOR RDY BIT TO SET
6859 022434 002216      RHCS1                                ;WAIT FOR RHCS1 REGISTER
6860 022436 000200      RDY                                    ;WAIT FOR RDY BIT IN RHCS1 REGISTER
6861 022440 001614      908.                                  ;ALLOW 9080 MICRO SECONDS
6862 022442 001507      839.                                  ;RDY MUST SET BETWEEN
6863                                     ;690 AND 17470 MICRO SECONDS
6864                                     ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
6865                                     ;R0 AND R5 IMMEDIATELY AFTER GO
6866 022444 013746 002360      MOV      Q#READAT,-(SP)      ;SAVE COMMAND
6867 022450 052716 004101      BIS      #IE!GO!DVA,(SP)    ;INCLUDE IE!GO!DVA
6868 022454 011637 001124      MOV      (SP),Q#$GDDAT      ;SAVE FOR PRINTOUT
6869 022460 022600      CMP      (SP)+,R0          ;DURING ABOVE OPERATION ONLY IE!GO!DVA
6870                                     ;AND COMMAND SHOULD BE SET
6871 022462 001405      BEQ      67$              ;BRANCH IF GOOD
6872 022464 010037 001126      MOV      R0,Q#$BDDAT        ;BAD DATA
6873 022470 010137 004510      MOV      R1,Q#REGADR        ;FAILING REGISTER RHCS1
6874 022474 104021      ERROR   21                ;DURING ABOVE OPERATION ONLY
6875                                     ;COMMAND AND IE!GO!DVA SHOULD BE SET
6876 022476 012746 010500      67$: MOV      #MOL!DPR!VV,-(SP)  ;SAVE BITS SET DURING OPERATION IN RHDS1
6877 022502 011637 001124      MOV      (SP),Q#$GDDAT      ;SAVE FOR PRINTOUT
6878 022506 022605      CMP      (SP)+,R5          ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
6879                                     ;SHOULD BE SET
6880 022510 001405      BEQ      69$              ;BRANCH IF GOOD
6881 022512 010537 001126      MOV      R5,Q#$BDDAT        ;BAD DATA
6882 022516 010337 004510      MOV      R3,Q#REGADR        ;FAILING REGISTER RHDS1
6883 022522 104063      ERROR   63                ;DURING ABOVE OPERATION ONLY
6884                                     ;MOL!DPR!VV SHOULD BE SET
6885 022524      69$:
6886
6887                                     ;CHANGE SAVED REGISTERS TO EXPECTED VALUES
6888 022524 004037 034460      JSR      R0,Q#FILLRE        ;MOV 0 INTO SAVED RHWC
6889 022530 002210      RHWC                                ;SAVED REGISTER TO CHANGE
6890 022532 000000      0                                     ;DATA
6891 022534 004037 034460      JSR      R0,Q#FILLRE        ;MOV REINTO+<200.*2> INTO SAVED RHBA
6892 022540 002212      RHBA                                ;SAVED REGISTER TO CHANGE
6893 022542 004264      REINTO+<200.*2>              ;DATA
6894 022544 004037 034460      JSR      R0,Q#FILLRE        ;MOV 1 INTO SAVED RHDST
6895 022550 002222      RHDST                            ;SAVED REGISTER TO CHANGE
6896 022552 000001      1                                     ;DATA

```



```

6897
6898 ;COMPARE REGISTERS BEFORE READ DATA COMMAND
6899 ;WITH REGISTERS AFTER COMMAND
6900
6901 022554 004037 035546 JSR RD,2#COMREG ;COMPARE SAVED REGISTERS WITH
6902 ;PRESENT VALUE
6903 022560 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
6904 022562 002266 WC ;TEST DATA STARTING FROM 'RHWC'
6905 022564 000022 18. ;18. REGISTERS TO BE COMPARED
6906 022566 022572 5$ ;RETURN TO 5$ ON ERROR
6907 022570 022576 6$ ;RETURN TO 6$ ON NO ERROR
6908
6909 022572 104033 5$: ERROR 33 ;READ DATA CAUSED IMPROPER
6910 022574 000207 RTS PC ;REGISTER CHANGE
6911 ;GOOD DATA GIVES WHAT SHOULD BE THE
6912 ;RECEIVED DATA GIVES WHAT WAS THERE
6913 ;AFTER COMMAND
6914
6915 ;NOW READ INTO BUFFER IS CHECKED FOR GOOD READ
6916 022576 6$:
6917
6918 022576 004037 036576 JSR RD,2#COMPAR ;COMPARE TWO BLOCKS OF MEMORY
6919 022602 002400 WRFROM ;GOOD DATA STARTS FROM WRFROM
6920 022604 003444 REINTO ;TEST DATA STARTS FROM REINTO
6921 022606 000400 256. ;256. WORDS TO BE COMPARED
6922 022610 022614 7$ ;RETURN TO 7$ ON ERROR
6923 022612 022620 10$ ;RETURN TO 10$ ON NO ERROR
6924
6925
6926 022614 104034 7$: ERROR 34 ;INCORRECT DATA AFTER
6927 022616 000207 RTS PC ;WRITE DATA FOLLOWED BY A
6928 ;READ DATA
6929 022620 10$:
6930
6931
6932
6933
6934 ;*****
6935 ;*TEST 27 WRITE/READ DATA USING UNIBUS B
6936
6937 ;*
6938 ;* THIS TEST USES UNIBUS B IF CONNECTED TO THE RH
6939 ;* IF UNIBUS B IS NOT CONNECTED THEN THIS TEST IS NOT PERFORMED
6940 ;* THIS TEST GIVES A WRITE DATA COMMAND FOR CYLINDER 0
6941 ;* TRACK 0, SECTOR 0, KEYS 0, 200 WORDS OF 052525
6942 ;* THIS SECTOR IS FORMATED BY PREVIOUS TEST
6943 ;* THEN READ DATA COMMAND IS GIVEN FOR 256 WORDS IN
6944 ;* SAME CYLINDER, TRACK, SECTOR, KEYS
6945 ;* THESE COMMANDS USE UNIBUS B FOR DATA
6946 ;* WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
6947 ;* 200 OF 052525 AND 56 OF 377
6948 ;* THE WRITE DATA COMMAND IS LOADED EXCEPT GO AND IE
6949 ;* ALL REGISTERS ARE SAVED AND THEN GO IS GIVEN TO WRITE DATA
6950
6951 ;*
6952 ;* THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER
;* CHANGE, THEN WRITE FROM BUFFER IS CHECKED FOR NO CHANGE

```

THEN READ INTO BUFFER IS FILLED WITH 200 IF ZEROS
AND 56 ALL ONES, WRITE FROM BUFFER IS FILLED WITH 200
WORDS OF 52525 AND 56 WORDS OF 0
THE COMMAND EXCEPT GO IS LOADED, ALL REGISTERS ARE SAVED
GO IS GIVEN

ALL REGISTER ARE CHECKED
READ DATA IS CHECKED

70000
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70002
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70100

```
00000000 000004 000001 156360
00000001 013707 001000
00000002 013706 000027 004514
00000003 013707
022642 004737 034556
022646 000167 001076
022652 005037 004642
022656 004037 034426
022662 002400
022664 000310
022666 052525
022670 004037 034426
022674 003220
022676 000070
022700 000377
022702 004037 034426
022706 003444
022710 000310
022712 052525
022714 004037 034426
022720 004264
022722 000070
022724 000377
022726 004037 036532
022732 000000
022734 000
022735 000
```

```

TST27: SCOPE
MOV #1,STIMES ;:DO 1 ITERATION
MOV #STACK,SP ;:RESET STACK
MOV #27,#TSTNM ;:SAVE TEST NUMBER

JSR PC,#CLDISK ;:SET R1-RHOS1, R2-RHOS2
;:R3-RHOS1, R4-RHER1
;:GIVE RH-11 INITIALIZE
;:SETUP UNIT NUBER

JMP TST30 ;:JUMP TO NEXT TEST FOR RH70
CLR #UBUSB ;:CLEAR UBIBUS INDICATOR

;:NOW FILL WRITE FROM BUFFER-200 OF 52525 AND 56 OF 377
JSR RO,#CLAREA ;:CLEAR 200. WORDS, FROM WRFROM
WRFROM ;:STARTING FROM WRFROM
200. ;:200. WORDS
52525 ;:FILL WITH 52525

JSR RO,#CLAREA ;:CLEAR 56. WORDS, FROM WRFROM+(200.*2)
WRFROM+(200.*2) ;:STARTING FROM WRFROM+(200.*2)
56. ;:56. WORDS
377 ;:FILL WITH 377

;: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
JSR RO,#CLAREA ;:CLEAR 200. WORDS, FROM REINTO
REINTO ;:STARTING FROM REINTO
200. ;:200. WORDS
52525 ;:FILL WITH 52525

JSR RO,#CLAREA ;:CLEAR 56. WORDS, FROM REINTO+(200.*2)
REINTO+(200.*2) ;:STARTING FROM REINTO+(200.*2)
56. ;:56. WORDS
377 ;:FILL WITH 377

;:NOW WRITE DATA COMMAND WILL BE LOADED
JSR RO,#RUN ;:SETUP TO RUN FOR DATA COMMAND
0 ;:CYLINDER 0
0 ;:SECTOR 0
0 ;:TRACK 0
```

.BYTE
.BYTE

```

7009 022736 177470 -200. ;WORD COUNT = 200.
7010 022740 002400 WRFROM ;BUS ADDRESS
7011 ;STARTING ADDRESS OF DATA
7012 ;BUFFER = WRFROM
7013 022742 000000 0. ;DO NOT INHIBIT BUS ADDRESS INCREMENT
7014 022744 010000 FMT22 ;16 BITS PER WORD FORMAT
7015 ;DO NOT INHIBIT ECC CORRECTION
7016 ;DO NOT INHIBIT HEADER COMPARE
7017 022746 002354 WRIDAT ;GET READY TO DO A WRIDAT
7018 ;WRITE DATA WITH 60 IN RHCS1
7019
7020
7021 022750 052777 000000 157240 BIS #PSEL,DRHCS1 ;SET PORT B
7022 ;THAT IS UNIBUS B
7023
7024 ;NOW SAVE REGISTER FOR COMPARISON AFTER WRITE DATA
7025 022756 004037 034716 JSR RO,DRSAVER ;SAVE REGISTERS
7026 022762 002210 RHWC ;RHWC IS THE FIRST REGISTER SAVED
7027 022764 004522 SAVERE ;STARTING ADDRESS OF WHERE
7028 ;THE REGISTERS ARE SAVED
7029 022766 000022 18. ;NUMBER OF REGISTERS
7030 ;SAVED = 18.
7031
7032 022770 004737 034636 JSR PC,DRCHECKT ;CHECK DVA,RDY,MOL,DPR,DRY,VV
7033
7034
7035 022774 013777 004516 157202 MOV DRP4VEC,DRPVEC ;SET RPO4 VECTOR ADDRESS
7036 ;TO 'TIME1' IF P-CLOCK IS PRESENT
7037 ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
7038 ;'TIME' WILL ONLY SAVE
7039 ;CURRENT CYLINDER ADDRESS
7040 ;AND LOOK AHEAD REGISTERS
7041
7042 ;SET PORT SELECT BIT
7043
7044 023002 013746 002354 MOV DRWRIDAT,-(SP) ;GET READY TO MOVE COMMAND
7045 023006 052716 000101 BIS #GO!IE!PSEL,(SP) ;GET READY TO SET GO AND
7046 ;ENABLE INTERRUPT
7047 023012 012677 157200 MOV (SP)+,DRHCS1 ;GO WITH
7048 ;60 IN RHCS1 FOR WRITE DATA
7049 ;WITH INTERRUPT ENABLED
7050 023016 011100 MOV DR1,RO ;SAVE RHCS1 DURING ABOVE OPERATION
7051 023020 011305 MOV DR3,R5 ;SAVE RHDS1 DURING ABOVE OPERATION
7052
7053 ;ONE REVOLUTION=16670 MICROSEC, ONE SECTOR=760 MICROSEC
7054
7055 023022 104410 WAT ;WAIT FOR RDY BIT TO SET
7056 023024 002216 RHCS1 ;WAIT FOR RHCS1 REGISTER
7057 023026 000200 RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
7058 023030 001614 908. ;ALLOW 9080 MICRO SECONDS
7059 023032 001507 939. ;RDY MUST SET BETWEEN
7060 ;690 AND 17470 MICRO SECONDS
7061 ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
7062 ;RO AND R5 IMMEDIATELY AFTER GO
7063 023034 013746 002354 MOV DRWRIDAT,-(SP) ;SAVE COMMAND
7064 023040 052716 004101 BIS #IE!GO!DVA!PSEL,(SP) ;INCLUDE IE!GO!DVA!PSEL

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7065 023044 011637 001124      MOV      (SP),2#SGDDAT      ;SAVE FOR PRINTOUT
7066 023050 022600              CMP      (SP)+,R0          ;DURING ABOVE OPERATION ONLY IE!GO!DVA!PSEL
7067                                ;AND COMMAND SHOULD BE SET
7068 023052 001405              BEQ      64$              ;BRANCH IF GOOD
7069 023054 010037 001126      MOV      R0,2#SBDDAT      ;BAD DATA
7070 023060 010137 004510      MOV      R1,2#REGADR      ;FAILING REGISTER RHCS1
7071 023064 104021              ERROR      2              ;DURING ABOVE OPERATION ONLY
7072                                ;COMMAND AND IE!GO!DVA!PSEL SHOULD BE SET
7073 023066 012746 010500      64$:  MOV      #MOL!DPR!VV, -(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
7074 023072 011637 001124      MOV      (SP),2#SGDDAT      ;SAVE FOR PRINTOUT
7075 023076 022605              CMP      (SP)+,R5          ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
7076                                ;SHOULD BE SET
7077 023100 001405              BEQ      66$              ;BRANCH IF GOOD
7078 023102 010537 001126      MOV      R5,2#SBDDAT      ;BAD DATA
7079 023106 010337 004510      MOV      R3,2#REGADR      ;FAILING REGISTER RHDS1
7080 023112 104063              ERROR      63              ;DURING ABOVE OPERATION ONLY
7081                                ;MOL!DPR!VV SHOULD BE SET
7082 023114              66$:
7083
7084
7085
7086                                ;CHECK IF NEM NON EXISTANT MEMORY IS SET
7087                                ;IF SET IT MEANS UNIBUS B IS NOT CONNECTED
7088                                ;SO THIS TEST IS NOT PERFORMED
7089 023114 032777 004000 157072      BIT      #NEM,2RHCS2      ;TEST NEM
7090 023122 001442              BEQ      11$              ;BRANCH IF UNIBUS B THERE
7091 023124 012737 177777 004642      MOV      #-1,2#UBUSB      ;UNIBUS B NOT THERE
7092 023132 104400 023140      TYPE      +4              ;TYPE ASCIZ STRING
7093 023136 000426              BR      67$              ;GET OVER THE ASCIZ
7094                                ;;.ASCIZ      <15><12>/THE RH DOES NOT HAVE UNI BUS B CONNECTED/
7095 023214              67$:
7096 023214 104400 001221      TYPE      ,SCLF
7097 023220 104400 001221      TYPE      ,SCLF
7098 023224 000137 023750      JMP      2#10$              ;JUMP TO NEXT TEST - NO UNIBUS B
7099 023230              11$:
7100 023230 104400 023236      TYPE      +4              ;TYPE ASCIZ STRING
7101 023234 000424              BR      68$              ;GET OVER THE ASCIZ
7102                                ;;.ASCIZ      <15><12>/THE RH DOES HAVE UNI BUS B CONNECTED/
7103 023306              68$:
7104 023306 104400 001221      TYPE      ,SCLF
7105 023312 104400 001221      TYPE      ,SCLF
7106
7107                                ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
7108 023316 004037 034460      JSR      R0,2#FILLRE      ;MOV 0 INTO SAVED RHWC
7109 023322 002210      RHWC              ;SAVED REGISTER TO CHANGE
7110 023324 000000      0              ;DATA
7111 023326 004037 034460      JSR      R0,2#FILLRE      ;MOV WRFROM+<200.*2> INTO SAVED RHBA
7112 023332 002212      RHBA              ;SAVED REGISTER TO CHANGE
7113 023334 003220      WRFROM+<200.*2> ;DATA
7114 023336 004037 034460      JSR      R0,2#FILLRE      ;MOV 1 INTO SAVED RHDST
7115 023342 002222      RHDST              ;SAVED REGISTER TO CHANGE
7116 023344 000001      1              ;DATA
7117
7118                                ;NOW COMPARE REGISTERS BEFORE WRITE DATA WITH REGISTERS
7119                                ;AFTER COMMAND
7120

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MAINDEC-11-DERPU-B
DERPUB.P11 T27

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WRITE/READ DATA USING UNIBUS B

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7121 023346 004037 035546      JSR      RO,3#COMREG      ;COMPARE SAVED REGISTERS WITH
7122                                ;PRESENT VALUE
7123 023352 004522      SAVERE      ;GOOD DATA SAVED IN 'SAVERE'
7124 023354 002266      WC          ;TEST DATA STARTING FROM 'RHWC'
7125 023356 000022      18.        ;18. REGISTERS TO BE COMPARED
7126 023360 023364      1$         ;RETURN TO 1$ ON ERROR
7127 023362 023370      2$         ;RETURN TO 2$ ON NO ERROR
7128
7129 023364 104074      1$:        ;WHILE USING UNIBUS B
7130                                ;WRITE DATA COMMAND CAUSED
7131 023366 000207      RTS        PC          ;IMPROPER REGISTER CHANGE
7132                                ;GOOD DATA GIVES WHAT SHOULD
7133                                ;BE
7134                                ;RECEIVED DATA GIVES WHAT WAS
7135                                ;THERE AFTER COMMAND
7136
7137                                ;NOW WRITE FROM BUFFER WILL BE CHECKED FOR NO CHANGE
7138 023370      2$:
7139
7140 023370 004037 036576      JSR      RO,2#COMPAR      ;COMPARE TWO BLOCKS OF MEMORY
7141 023374 003444      REINTO     ;GOOD DATA STARTS FROM REINTO
7142 023376 002400      WRFROM     ;TEST DATA STARTS FROM WRFROM
7143 023400 000400      256.      ;256. WORDS TO BE COMPARED
7144 023402 023406      3$         ;RETURN TO 3$ ON ERROR
7145 023404 023412      4$         ;RETURN TO 4$ ON NO ERROR
7146
7147
7148 023406 104075      3$:        ;WHILE USING UNIBUS B
7149                                ;WRITE DATA COMMAND CHANGED
7150 023410 000207      RTS        PC          ;WRITE FROM BUFFER
7151
7152                                ;NOW A READ DATA COMMAND WILL BE GIVEN
7153
7154                                ;FILL READ INTO BUFFER WITH 200 ZEROS AND 56 OF ALL ONES
7155 023412      4$:
7156
7157 023412 004737 034556      JSR      PC,2#CLDISK      ;SET R1-RHCS1, R2-RHCS2
7158                                ;R3-RHDS1, R4-RHER1
7159                                ;GIVE RH-11 INITIALIZE
7160                                ;SETUP UNIT NUMBER
7161 023416 004037 034426      JSR      RO,2#CLAREA      ;CLEAR 200. WORDS, FROM REINTO
7162 023422 003444      REINTO     ;STARTING FROM REINTO
7163 023424 000310      200.      ;200. WORDS
7164 023426 000000      0          ;FILL WITH 0
7165
7166 023430 004037 034426      JSR      RO,2#CLAREA      ;CLEAR 56. WORDS, FROM REINTO+(200.*2)
7167 023434 004264      REINTO+(200.*2) ;STARTING FROM REINTO+(200.*2)
7168 023436 000070      56.        ;56. WORDS
7169 023440 000377      377        ;FILL WITH 377
7170
7171
7172                                ;FILL WRITE FROM BUFFER WITH 200 OF 52525 AND 56 OF 0
7173 023442 004037 034426      JSR      RO,2#CLAREA      ;CLEAR 200. WORDS, FROM WRFROM
7174 023446 002400      WRFROM     ;STARTING FROM WRFROM
7175 023450 000310      200.      ;200. WORDS
7176 023452 052525      52525     ;FILL WITH 52525

```

7177									
7178	023454	004037	034426			JSR	RO, @#CLAREA		; CLEAR 56. WORDS, FROM WRFROM+<200.*2>
7179	023460	003220					WRFROM+<200.*2>		; STARTING FROM WRFROM+<200.*2>
7180	023462	000070					56.		; 56. WORDS
7181	023464	000377					377		; FILL WITH 377
7182									
7183									
7184									; NOW FILL COMMAND
7185									
7186	023466	004037	036532			JSR	RO, @#RUN		; SETUP TO RUN FOR DATA COMMAND
7187	023472	000000					0		; CYLINDER 0
7188	023474	000			.BYTE		0		; SECTOR 0
7189	023475	000			.BYTE		0		; TRACK 0
7190	023476	177470					-200.		; WORD COUNT = 200.
7191	023500	003444					REINTO		; BUS ADDRESS
7192									; STARTING ADDRESS OF DATA
7193									; BUFFER = REINTO
7194	023502	000000					0		; DO NOT INHIBIT BUS ADDRESS INCREMENT
7195	023504	014000					ECI!FMT22		; 16 BITS PER WORD FORMAT
7196									; INHIBIT ECC CORRECTION
7197									; DO NOT INHIBIT HEADER COMPARE
7198	023506	002360					READAT		; GET READY TO DO A READAT
7199									; READ DATA WITH 70 IN RHCS1
7200									
7201									
7202									
7203	023510	052777	000000	156500		BIS	#PSEL, @RHCS1		; SET PORT B
7204									; THAT IS UNIBUS B
7205									
7206									; NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
7207	023516	004037	034716			JSR	RO, @#SAVER		; SAVE REGISTERS
7208	023522	002210					RHWC		; RHWC IS THE FIRST REGISTER SAVED
7209	023524	004522					SAVERE		; STARTING ADDRESS OF WHERE
7210									; THE REGISTERS ARE SAVED
7211	023526	000022					18.		; NUMBER OF REGISTERS
7212									; SAVED = 18.
7213									
7214	023530	004737	034636			JSR	PC, @#CHECKT		; CHECK DVA, RDY, MOL, DPR, DRY, VV
7215									
7216									
7217	023534	013777	004516	156442		MOV	@#RP4VEC, @RPVEC		; SET RP04 VECTOR ADDRESS
7218									; TO 'TIME1' IF P-CLOCK IS PRESENT
7219									; OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
7220									; 'TIME' WILL ONLY SAVE
7221									; CURRENT CYLINDER ADDRESS
7222									; AND LOOK AHEAD REGISTERS
7223									
7224									; SET PORT SELECT
7225									
7226	023542	013746	002360			MOV	@#READAT, -(SP)		; GET READY TO MOVE COMMAND
7227	023546	052716	000101			BIS	#GO!IE!PSEL, (SP)		; GET READY TO SET GO AND
7228									; ENABLE INTERRUPT
7229	023552	012677	156440			MOV	(SP)+, @RHCS1		; GO WITH
7230									; 70 IN RHCS1 FOR READ DATA
7231									; WITH INTERRUPT ENABLED
7232	023556	011100				MOV	@R1, RO		; SAVE RHCS1 DURING ABOVE OPERATION

[Handwritten marks and scribbles on the right side of the page]

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7233 023560 011305          MOV      R3,R5          ;SAVE RHDS1 DURING ABOVE OPERATION
7234
7235
7236 023562 104410          WAT                      ;WAIT FOR RDY BIT TO SET
7237 023564 002216          RHCS1                   ;WAIT FOR RHCS1 REGISTER
7238 023566 000200          RDY                     ;WAIT FOR RDY BIT IN RHCS1 REGISTER
7239 023570 001614          908.                   ;ALLOW 9080 MICRO SECONDS
7240 023572 001507          839.                   ;RDY MUST SET BETWEEN
7241                                     ;690 AND 17470 MICRO SECONDS
7242                                     ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
7243                                     ;R0 AND R5 IMMEDIATELY AFTER GO
7244 023574 013746 002360          MOV      R0,R#READAT,-(SP) ;SAVE COMMAND
7245 023600 052716 004101          BIS      #IE!GO!DVA!PSEL,(SP) ;INCLUDE IE!GO!DVA!PSEL
7246 023604 011637 001124          MOV      (SP),R#SGDDAT ;SAVE FOR PRINTOUT
7247 023610 022600          CMP      (SP)+,R0       ;DURING ABOVE OPERATION ONLY IE!GO!DVA!PSEL
7248                                     ;AND COMMAND SHOULD BE SET
7249 023612 001405          BEQ      69$           ;BRANCH IF GOOD
7250 023614 010037 001126          MOV      R0,R#SBDDAT ;BAD DATA
7251 023620 010137 004510          MOV      R1,R#REGADR ;FAILING REGISTER RHCS1
7252 023624 104021          ERROR   21            ;DURING ABOVE OPERATION ONLY
7253                                     ;COMMAND AND IE!GO!DVA!PSEL SHOULD BE SET
7254 023626 012746 010500          69$: MOV      #MOL!DPR!VV,-(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
7255 023632 011637 001124          MOV      (SP),R#SGDDAT ;SAVE FOR PRINTOUT
7256 023636 022605          CMP      (SP)+,R5       ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
7257                                     ;SHOULD BE SET
7258 023640 001405          BEQ      71$           ;BRANCH IF GOOD
7259 023642 010537 001126          MOV      R5,R#SBDDAT ;BAD DATA
7260 023646 010337 004510          MOV      R3,R#REGADR ;FAILING REGISTER RHDS1
7261 023652 104063          ERROR   63            ;DURING ABOVE OPERATION ONLY
7262                                     ;MOL!DPR!VV SHOULD BE SET
7263 023654          71$:
7264
7265                                     ;CHANGE SAVED REGISTERS TO EXPECTED VALUES
7266 023654 004037 034460          JSR      R0,R#FILLRE ;MOV 0 INTO SAVED RHWC
7267 023660 002210          RHWC                   ;SAVED REGISTER TO CHANGE
7268 023662 000000          0                      ;DATA
7269 023664 004037 034460          JSR      R0,R#FILLRE ;MOV REINT0+(200.*2) INTO SAVED RHBA
7270 023670 002212          RHBA                   ;SAVED REGISTER TO CHANGE
7271 023672 004264          REINT0+(200.*2) ;DATA
7272 023674 004037 034460          JSR      R0,R#FILLRE ;MOV 1 INTO SAVED RHDST
7273 023700 002222          RHDST                   ;SAVED REGISTER TO CHANGE
7274 023702 000001          1                      ;DATA
7275
7276                                     ;COMPARE REGISTERS BEFORE READ DATA COMMAND
7277                                     ;WITH REGISTERS AFTER COMMAND
7278
7279 023704 004037 035546          JSR      R0,R#COMREG ;COMPARE SAVED REGISTERS WITH
7280                                     ;PRESENT VALUE
7281 023710 004522          SAVERE                   ;GOOD DATA SAVED IN 'SAVERE'
7282 023712 002266          WC                      ;TEST DATA STARTING FROM 'RHWC'
7283 023714 000022          18.                   ;18. REGISTERS TO BE COMPARED
7284 023716 023722          5$                      ;RETURN TO 5$ ON ERROR
7285 023720 023726          6$                      ;RETURN TO 6$ ON NO ERROR
7286
7287 023722 104072          5$: ERROR 72          ;WHILE USING UNIBUS B
7288                                     ;READ DATA CAUSED IMPROPER

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7289 023724 000207          RTS    PC          ;REGISTER CHANGE
7290                                ;GOOD DATA GIVES WHAT SHOULD BE THE
7291                                ;RECEIVED DATA GIVES WHAT WAS THERE
7292                                ;AFTER COMMAND
7293
7294                                ;NOW READ INTO BUFFER IS CHECKED FOR GOOD READ
7295 023726          6$:
7296
7297 023726 004037 036576    JSR    RD, @#COMPAR    ;COMPARE TWO BLOCKS OF MEMORY
7298 023732 002400          WRFROM    ;GOOD DATA STARTS FROM WRFROM
7299 023734 003444          REINTO   ;TEST DATA STARTS FROM REINTO
7300 023736 000400          256.      ;256. WORDS TO BE COMPARED
7301 023740 023744          7$       ;RETURN TO 7$ ON ERROR
7302 023742 023750          10$      ;RETURN TO 10$ ON NO ERROR
7303
7304
7305 023744 104073          7$:      ERROR 73    ;WHILE USING UNIBUS B
7306                                ;INCORRECT DATA AFTER
7307 023746 000207          RTS    PC          ;WRITE DATA FOLLOWED BY A
7308                                ;READ DATA
7309 023750          10$:

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;*****
;*TEST 30      IMPLIED SEARCH

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;*
;* ONLY NEW ADDITION IN THIS TEST IS AN IMPLIED SEARCH
;* A WRITE HEADER AND DATA IS GIVEN FOR MORE THAN ONE SECTOR
;* OF WORDS
;* WRITE HEADER AND DATA CYLINDER 0, FORMAT 16 BITS PER WORD
;* TRACK 0, SECTOR 0, KEYS=0, NUMBER OF WORDS
;* 266 (4 HEADER 256 DATA=0 4 HEADER 2 DATA=1
;* THEN READ HEADER AND DATA FOR ABOVE SECTOR 1 ONLY
;* WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
;* 10000 0 0,0 AND 256 OF 0, 10000 1 0,0, AND 2 OF 1
;* THE WRITE COMMAND IS THEN LOADED INTO THE REGISTERS EXCEPT
;* THE GO BIT, AND ALL THE REGISTERS ARE SAVED
;* THEN GO IS GIVEN FOR WRITE HEADER AND DATA

```

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;*
;* THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER CHANGE
;* THEN WRITE FROM BUFFER IS CHECKED TO SEE THAT NOTHING CHANGED

```

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;*
;* NOW FOR THE READ COMMAND READ INTO BUFFER IS FILLED
;* WITH 377, WRITE FROM BUFFER IS FILLED WITH 10000 1 0,0,1,1
;* AND 254 OF ZEROS COMMAND IS LOADED INTO REGISTERS EXCEPT
;* GO AND IE THEN ALL REGISTERS ARE SAVED
;* GO IS GIVEN FOR THE READ COMMAND, 256 WORDS

```

```

;*
;* ALL REGISTERS ARE CHECKED FOR IMPROPER CHANGE
;* THEN THE READ DATA IS COMPARED

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2

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7345
7346
7347 023750 000004
7348 023752 012706 001000
7349 023756 012737 000030 004514
7350
7351 023764 004737 034556
7352
7353
7354
7355
7356
7357
7358 023770 004037 034402
7359 023774 002400
7360 023776 000004
7361 024000 010000
7362 024002 000000
7363 024004 000000
7364 024006 000000
7365
7366
7367 024010 004037 034426
7368 024014 002410
7369 024016 000400
7370 024020 000000
7371
7372
7373
7374
7375 024022 004037 034402
7376 024026 003410
7377 024030 000004
7378 024032 010000
7379 024034 000001
7380 024036 000000
7381 024040 000000
7382
7383
7384 024042 004037 034426
7385 024046 003420
7386 024050 000002
7387 024052 000001
7388
7389
7390
7391
7392
7393
7394
7395 024054 004037 034402
7396 024060 003444
7397 024062 000004
7398 024064 010000
7399 024066 000000
7400 024070 000000

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TST30: SCOPE
MOV #STACK,SP ;RESET STACK
MOV #30,#TSTNM ;SAVE TEST NUMBER
JSR PC,#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUBER
;FILL WRITE FROM BUFFER WITH HEADER
JSR RO,#FLHEAD ;SAVE HEADER DATA IN WRFROM
WRFROM ;LOCATION WHERE SAVED
4 ;NUMBER OF WORDS SAVED
10000 ;FIRST DATA WORD
0 ;SECOND DATA WORD
0 ;THIRD DATA WORD
0 ;FOURTH DATA WORD
;FILL WRITE FROM BUFFER WITH DATA
JSR RO,#CLAREA ;CLEAR 256. WORDS, FROM WRFROM+10
WRFROM+10 ;STARTING FROM WRFROM+10
256. ;256. WORDS
0 ;FILL WITH 0
;FILL WRITE FROM BUFFER WITH NEXT SECTOR HEADER
JSR RO,#FLHEAD ;SAVE HEADER DATA IN WRFROM+(260.*2)
WRFROM+(260.*2) ;LOCATION WHERE SAVED
4 ;NUMBER OF WORDS SAVED
10000 ;FIRST DATA WORD
1 ;SECOND DATA WORD
0 ;THIRD DATA WORD
0 ;FOURTH DATA WORD
;FILL WRITE FROM BUFFER WITH NEXT SECTOR DATA
JSR RO,#CLAREA ;CLEAR 2 WORDS, FROM WRFROM+(264.*2)
WRFROM+(264.*2) ;STARTING FROM WRFROM+(264.*2)
2 ;2 WORDS
1 ;FILL WITH 1
;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.
JSR RO,#FLHEAD ;SAVE HEADER DATA IN REINTO
REINTO ;LOCATION WHERE SAVED
4 ;NUMBER OF WORDS SAVED
10000 ;FIRST DATA WORD
0 ;SECOND DATA WORD
0 ;THIRD DATA WORD

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7401 024072 000000 0 ;FOURTH DATA WORD
7402 024074 004037 034426 JSR RO,#CLAREA ;CLEAR 256. WORDS, FROM REINTO+10
7403 024100 003454 REINTO+10 ;STARTING FROM REINTO+10
7404 024102 000400 256. ;256. WORDS
7405 024104 000000 0 ;FILL WITH 0
7406
7407
7408 024106 004037 034402 JSR RO,#FLHEAD ;SAVE HEADER DATA IN REINTO+(260.*2)
7409 024112 004454 REINTO+(260.*2) ;LOCATION WHERE SAVED
7410 024114 000004 4 ;NUMBER OF WORDS SAVED
7411 024116 010000 10000 ;FIRST DATA WORD
7412 024120 000001 1 ;SECOND DATA WORD
7413 024122 000000 0 ;THIRD DATA WORD
7414 024124 000000 0 ;FOURTH DATA WORD
7415 024126 004037 034426 JSR RO,#CLAREA ;CLEAR 2 WORDS, FROM REINTO+(264.*2)
7416 024132 004464 REINTO+(264.*2) ;STARTING FROM REINTO+(264.*2)
7417 024134 000002 2 ;2 WORDS
7418 024136 000001 1 ;FILL WITH 1
7419
7420 ;NOW THE WRITE HEADER AND DATA COMMAND WILL BE FILLED
7421
7422 024140 004037 036532 JSR RO,#RUN ;SETUP TO RUN FOR DATA COMMAND
7423 024144 000000 0 ;CYLINDER 0
7424 024146 000 .BYTE 0 ;SECTOR 0
7425 024147 000 .BYTE 0 ;TRACK 0
7426 024150 177366 -262.-4 ;WORD COUNT (DATA)=262.+
7427 ;4 HEADER WORDS
7428 024152 002400 WRFROM ;BUS ADDRESS
7429 ;STARTING ADDRESS OF DATA
7430 ;BUFFER = WRFROM
7431 024154 000000 0 ;DO NOT INHIBIT BUS ADDRESS INCREMENT
7432 024156 010000 FMT22 ;16 BITS PER WORD FORMAT
7433 ;DO NOT INHIBIT ECC CORRECTION
7434 ;DO NOT INHIBIT HEADER COMPARE
7435 024160 002356 WRIFOR ;GET READY TO DO A WRIFOR
7436 ;WRITE HEADER AND DATA WITH 62 IN RHCS1
7437
7438
7439
7440 ;NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DATA
7441 024162 004037 034716 JSR RO,#SAVER ;SAVE REGISTERS
7442 024166 002210 RHWC ;RHWC IS THE FIRST REGISTER SAVED
7443 024170 004522 SAVERE ;STARTING ADDRESS OF WHERE
7444 ;THE REGISTERS ARE SAVED
7445 024172 000022 18. ;NUMBER OF REGISTERS
7446 ;SAVED = 18.
7447
7448 024174 004737 034636 JSR PC,#CHECKT ;CHECK DVA,RDY,MOL,DPR,DRY,VV
7449
7450
7451 024200 013777 004516 155776 MOV #RP4VEC,#RPVEC ;SET RPO4 VECTOR ADDRESS
7452 ;TO 'TIME1' IF P-CLOCK IS PRESENT
7453 ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
7454 ;'TIME' WILL ONLY SAVE
7455 ;CURRENT CYLINDER ADDRESS
7456 ;AND LOOK AHEAD REGISTERS

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7457
7458
7459 024206 013746 002356      MOV    Q#WRIFOR,-(SP)  ;GET READY TO MOVE COMMAND
7460 024212 052716 000101      BIS    #GO!IE,(SP)    ;GET READY TO SET GO AND
7461                                     ;ENABLE INTERRUPT
7462 024216 012677 155774      MOV    (SP)+,Q#RHCSI  ;GO WITH
7463                                     ;62 IN RHCSI FOR WRITE HEADER AND DATA
7464                                     ;WITH INTERRUPT ENABLED
7465 024222 011100      MOV    Q#R1,R0        ;SAVE RHCSI DURING ABOVE OPERATION
7466 024224 011305      MOV    Q#R3,R5        ;SAVE RHDSI DURING ABOVE OPERATION
7467                                     ;ONE REVOLUTION = 16670 MICRO SEC, ONE SECTOR = 760 MICRO SEC
7468
7469 024226 104410      WAT                                     ;WAIT FOR RDY BIT TO SET
7470 024230 002216      RHCSI                            ;WAIT FOR RHCSI REGISTER
7471 024232 000200      RDY                               ;WAIT FOR RDY BIT IN RHCSI REGISTER
7472 024234 002001      1025.                            ;ALLOW 10250 MICRO SECONDS
7473 024236 001553      875.                              ;RDY MUST SET BETWEEN
7474                                     ;1500 AND 19000 MICRO SECONDS
7475                                     ;COMPARE CONTENTS OF RHCSI AND RHDSI ALREADY SAVED IN
7476                                     ;R0 AND R5 IMMEDIATELY AFTER GO
7477 024240 013746 002356      MOV    Q#WRIFOR,-(SP)  ;SAVE COMMAND
7478 024244 052716 004101      BIS    #IE!GO!DVA,(SP) ;INCLUDE IE!GO!DVA
7479 024250 011637 001124      MOV    (SP),Q#$GDDAT  ;SAVE FOR PRINTOUT
7480 024254 022600      CMP    (SP)+,R0        ;DURING ABOVE OPERATION ONLY IE!GO!DVA
7481                                     ;AND COMMAND SHOULD BE SET
7482 024256 001405      BEQ    64$             ;BRANCH IF GOOD
7483 024260 010037 001126      MOV    R0,Q#$BDDAT    ;BAD DATA
7484 024264 010137 004510      MOV    R1,Q#REGADR    ;FAILING REGISTER RHCSI
7485 024270 104021      ERROR  21             ;DURING ABOVE OPERATION ONLY
7486                                     ;COMMAND AND IE!GO!DVA SHOULD BE SET
7487 024272 012746 010500      64$: MOV    #MOL!DPR!VV,-(SP) ;SAVE BITS SET DURING OPERATION IN RHDSI
7488 024276 011637 001124      MOV    (SP),Q#$GDDAT  ;SAVE FOR PRINTOUT
7489 024302 022605      CMP    (SP)+,R5       ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
7490                                     ;SHOULD BE SET
7491 024304 001405      BEQ    66$             ;BRANCH IF GOOD
7492 024306 010537 001126      MOV    R5,Q#$BDDAT    ;BAD DATA
7493 024312 010337 004510      MOV    R3,Q#REGADR    ;FAILING REGISTER RHDSI
7494 024316 104063      ERROR  63             ;DURING ABOVE OPERATION ONLY
7495                                     ;MOL!DPR!VV SHOULD BE SET
7496 024320      66$:
7497
7498                                     ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
7499 024320 004037 034460      JSR    R0,Q#FILLRE    ;MOV 0 INTO SAVED RHWC
7500                                     ;RHWC
7501                                     ;SAVED REGISTER TO CHANGE
7502 024326 000000      0                               ;DATA
7503 024330 004037 034460      JSR    R0,Q#FILLRE    ;MOV WRFROM+(266.*2) INTO SAVED RHBA
7504 024334 002212      RHBA                            ;SAVED REGISTER TO CHANGE
7505 024336 003424      WRFROM+(266.*2)                ;DATA
7506 024340 004037 034460      JSR    R0,Q#FILLRE    ;MOV 2 INTO SAVED RHDST
7507 024344 002222      RHDST                          ;SAVED REGISTER TO CHANGE
7508 024346 000002      2                               ;DATA
7509                                     ;NOW COMPARE REGISTERS BEFORE WRITE HEADER AND DATA
7510                                     ;WITH REGISTERS AFTER COMMAND
7511 024350 004037 035546      JSR    R0,Q#COMREG    ;COMPARE SAVED REGISTERS WITH
7512                                     ;PRESENT VALUE

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7513 024354 004522          SAVERE          ;GOOD DATA SAVED IN 'SAVERE'
7514 024356 002266          WC              ;TEST DATA STARTING FROM 'RHWC'
7515 024360 000022          18.            ;18. REGISTERS TO BE COMPARED
7516 024362 024366          1$            ;RETURN TO 1$ ON ERROR
7517 024364 024372          2$            ;RETURN TO 2$ ON NO ERROR
7518
7519 024366 104027          1$:           ERROR 27      ;WRITE HEADER AND DATA
7520 024370 000207          RTS           PC      ;CAUSED IMPROPER REGISTER
7521
7522
7523
7524
7525
7526
7527
7528
7529 024372          2$:           ;NOW WRITE FROM BUFFER WILL BE CHECKED TO SEE THAT
7530
7531 024372 004037 036576      JSR           RO,2#COMPAR ;COMPARE TWO BLOCKS OF MEMORY
7532 024376 003444          REINTO         ;GOOD DATA STARTS FROM REINTO
7533 024400 002400          WRFROM        ;TEST DATA STARTS FROM WRFROM
7534 024402 000412          266.          ;266. WORDS TO BE COMPARED
7535 024404 024410          3$            ;RETURN TO 3$ ON ERROR
7536 024406 024414          4$            ;RETURN TO 4$ ON NO ERROR
7537
7538
7539 024410 104030          3$:           ERROR 30      ;WRITE HEADER AND DATA
7540 024412 000207          RTS           PC      ;CHANGED WRITE FROM BUFFER
7541
7542
7543
7544
7545
7546 024414          4$:           ;NOW A READ HEADER AND DATA COMMAND WILL BE GIVEN
7547
7548 024414 004737 034556      JSR           PC,2#CLDISK ;SET R1-RHCS1, R2-RHCS2
7549
7550
7551
7552 024420 004037 034426      JSR           RO,2#CLAREA ;R3-RHDS1, R4-RHER1
7553 024424 003444          REINTO         ;GIVE RH-11 INITIALIZE
7554 024426 000404          260.          ;SETUP UNIT NUBER
7555 024430 000377          377           ;CLEAR 260. WORDS, FROM REINTO
7556
7557
7558
7559 024432 004037 034402      JSR           RO,2#FLHEAD ;STARTING FROM REINTO
7560 024436 002400          WRFROM        ;260. WORDS
7561 024440 000006          6             ;FILL WITH 377
7562 024442 010000          10000        ;WRITE FROM BUFFER IS FILLED WITH EXPECTED DATA
7563 024444 000001          1
7564 024446 000000          0
7565 024450 000000          0
7566 024452 000001          1
7567 024454 000001          1
7568 024456 004037 034426      JSR           RO,2#CLAREA ;SAVE HEADER DATA IN WRFROM
;LOCATION WHERE SAVED
;NUMBER OF WORDS SAVED
;FIRST DATA WORD
;SECOND DATA WORD
;THIRD DATA WORD
;FOURTH DATA WORD
;FIFTH DATA WORD
;SIXTH DATA WORD
;CLEAR 254 WORDS, FROM WRFROM+(6.*2)

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7569	024462	002414		WRFROM+(6.*2)		;STARTING FROM WRFROM+(6.*2)
7570	024464	000254		254		;254 WORDS
7571	024466	000000		0		;FILL WITH 0
7572						
7573						
7574						;NOW FILL COMMAND
7575	024470	004037	036532	JSR	RO, @#RUN	;SETUP TO RUN FOR DATA COMMAND
7576	024474	000000		0		;CYLINDER 0
7577	024476	001		1		;SECTOR 1
7578	024477	000		0		;TRACK 0
7579	024500	177374		-256.-4		;WORD COUNT (DATA)=256.+
7580						;4 HEADER WORDS
7581	024502	003444		REINTO		;BUS ADDRESS
7582						;STARTING ADDRESS OF DATA
7583						;BUFFER = REINTO
7584	024504	000000		0		;DO NOT INHIBIT BUS ADDRESS INCREMENT
7585	024506	014000		ECI!FMT22		;16 BITS PER WORD FORMAT
7586						;INHIBIT ECC CORRECTION
7587						;DO NOT INHIBIT HEADER COMPARE
7588	024510	002362		REFOR		;GET READY TO DO A REFOR
7589						;READ HEADER AND DATA WITH 72 IN RHCS1
7590						
7591						
7592						;NOW SAVE REGISTERS FOR COMPARISON AFTER READ HEADER AND DATA
7593	024512	004037	034716	JSR	RO, @#SAVER	;SAVE REGISTERS
7594	024516	002210		RHWC		;RHWC IS THE FIRST REGISTER SAVED
7595	024520	004522		SAVERE		;STARTING ADDRESS OF WHERE
7596						;THE REGISTERS ARE SAVED
7597	024522	000022		18.		;NUMBER OF REGISTERS
7598						;SAVED = 18.
7599						
7600	024524	004737	034636	JSR	PC, @#CHECKT	;CHECK DVA, RDY, MOL, DPR, DRY, VV
7601						
7602						
7603	024530	013777	004516 155446	MOV	@#RP4VEC, @RPVEC	;SET RPO4 VECTOR ADDRESS
7604						;TO 'TIME1' IF P-CLOCK IS PRESENT
7605						;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
7606						; 'TIME' WILL ONLY SAVE
7607						;CURRENT CYLINDER ADDRESS
7608						;AND LOOK AHEAD REGISTERS
7609						
7610						
7611	024536	013746	002362	MOV	@#REFOR, -(SP)	;GET READY TO MOVE COMMAND
7612	024542	052716	000101	BIS	#GO!IE, (SP)	;GET READY TO SET GO AND
7613						;ENABLE INTERRUPT
7614	024546	012677	155444	MOV	(SP)+, @RHCS1	;GO WITH
7615						;72 IN RHCS1 FOR READ DATA
7616						;WITH INTERRUPT ENABLED
7617	024552	011100		MOV	@R1, RO	;SAVE RHCS1 DURING ABOVE OPERATION
7618	024554	011305		MOV	@R3, R5	;SAVE RHDS1 DURING ABOVE OPERATION
7619						;ONE REVOLUTION = 16670 MICRO SEC, ONE SECTOR 760 MICRO SECONDS
7620						
7621	024556	104410		WAT		;WAIT FOR RDY BIT TO SET
7622	024560	002216		RHCS1		;WAIT FOR RHCS1 REGISTER
7623	024562	000200		RDY		;WAIT FOR RDY BIT IN RHCS1 REGISTER
7624	024564	001614		908.		;ALLOW 9080 MICRO SECONDS

7625	024566	001507		839.		:RDY MUST SET BETWEEN
7626						:690 AND 17470 MICRO SECONDS
7627						:COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
7628						:R0 AND R5 IMMEDIATELY AFTER GO
7629	024570	013746	002362	MOV	Q#REFOR, -(SP)	:SAVE COMMAND
7630	024574	052716	004101	BIS	#IE!GO!DVA, (SP)	:INCLUDE IE!GO!DVA
7631	024600	011637	001124	MOV	(SP), Q#\$GDDAT	:SAVE FOR PRINTOUT
7632	024604	022600		CMP	(SP)+, R0	:DURING ABOVE OPERATION ONLY IE!GO!DVA
7633						:AND COMMAND SHOULD BE SET
7634	024606	001405		BEQ	67\$:BRANCH IF GOOD
7635	024610	010037	001126	MOV	R0, Q#\$BDDAT	:BAD DATA
7636	024614	010137	004510	MOV	R1, Q#REGADR	:FAILING REGISTER RHCS1
7637	024620	104021		ERROR	21	:DURING ABOVE OPERATION ONLY
7638						:COMMAND AND IE!GO!DVA SHOULD BE SET
7639	024622	012746	010500	67\$: MOV	#MOL!DPR!VV, -(SP)	:SAVE BITS SET DURING OPERATION IN RHDS1
7640	024626	011637	001124	MOV	(SP), Q#\$GDDAT	:SAVE FOR PRINTOUT
7641	024632	022605		CMP	(SP)+, R5	:DURING ABOVE OPERATION ONLY MOL!DPR!VV
7642						:SHOULD BE SET
7643	024634	001405		BEQ	69\$:BRANCH IF GOOD
7644	024636	010537	001126	MOV	R5, Q#\$BDDAT	:BAD DATA
7645	024642	010337	004510	MOV	R3, Q#REGADR	:FAILING REGISTER RHDS1
7646	024646	104063		ERROR	63	:DURING ABOVE OPERATION ONLY
7647						:MOL!DPR!VV SHOULD BE SET
7648	024650			69\$:		
7649						
7650						:CHANGE SAVED REGISTERS TO EXPECTED VALUES
7651	024650	004037	034460	JSR	R0, Q#FILLRE	:MOV 0 INTO SAVED RHWC
7652	024654	002210		RHWC		:SAVED REGISTER TO CHANGE
7653	024656	000000		0		:DATA
7654	024660	004037	034460	JSR	R0, Q#FILLRE	:MOV REINTO+<260.*2> INTO SAVED RHBA
7655	024664	002212		RHBA		:SAVED REGISTER TO CHANGE
7656	024666	004454		REINTO+<260.*2>		:DATA
7657	024670	004037	034460	JSR	R0, Q#FILLRE	:MOV 2 INTO SAVED RHDST
7658	024674	002222		RHDST		:SAVED REGISTER TO CHANGE
7659	024676	000002		2		:DATA
7660						
7661						:COMPARE REGISTERS BEFORE READ HEADER AND DATA
7662						:WITH REGISTERS AFTER COMMAND
7663						
7664						
7665	024700	004037	035546	JSR	R0, Q#COMREG	:COMPARE SAVED REGISTERS WITH
7666						:PRESENT VALUE
7667	024704	004522		SAVERE		:GOOD DATA SAVED IN 'SAVERE'
7668	024706	002266		WC		:TEST DATA STARTING FROM 'RHWC'
7669	024710	000022		18.		:18. REGISTERS TO BE COMPARED
7670	024712	024716		5\$:RETURN TO 5\$ ON ERROR
7671	024714	024722		6\$:RETURN TO 6\$ ON NO ERROR
7672						
7673						
7674	024716	104031		5\$: ERROR	31	:READ HEADER AND DATA CAUSED
7675	024720	000207		RTS	PC	:IMPROPER REGISTER CHANGE
7676						:GOOD DATA GIVES WHAT SHOULD
7677						:BE THERE
7678						:RECEIVED DATA GIVES WHAT WAS
7679						:THERE AFTER COMMAND
7680						

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024722
024722 004037 036576
024722 0022400
024722 0022444
024722 0022404
024722 0022440
024722 0022444

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

66:

JSR RD,3#COMPAR
WRFROM
REINTO
250.
78
108

:COMPARE TWO BLOCKS OF MEMORY
:GOOD DATA STARTS FROM WRFROM
:TEST DATA STARTS FROM REINTO
:250. WORDS TO BE COMPARED
:RETURN TO 78 ON ERROR
:RETURN TO 108 ON NO ERROR

024740 104032
024742 000207

78:

ERROR 32
RTS PC

:WRITE HEADER AND DATA
:FOLLOWED BY A READ HEADER
:AND DATA GAVE A READ ERROR
:ERFOR MAY BE IN READ OR WRITE

024744

108:

: *TEST 31 IMPLIED SEEK

: * ONLY NEW ADDITION IN THIS TEST IS AN IMPLIED SEEK FROM CYLINDER 0
: * TO CYLINDER 1. A WRITE HEADER AND DATA IS GIVEN FOR MORE THAN
: * ONE SECTOR OF WORDS

: * WRITE HEADER AND DATA CYLINDER 0, FORMAT 16 BITS PER WORD
: * TRACK 19, SECTOR 21, KEYS=0, NUMBER OF WORDS 266 WORDS
: * (4 HEADER, 256 DATA=1125, 4 HEADER 2 DATA = 2000
: * THEN READ HEADER AND DATA FOR ABOVE, TRACK 0, SECTOR 0, CYL=1
: * WRITE FROM BUFFER AND READ INTO BUFFER ARE FILLED WITH
: * 10000 0 0 0 AND 256 OF 1125, 10001 0 0 0, AND 2 OF 2000
: * THE WRITE COMMAND IS THEN LOADED INTO THE REGISTERS EXCEPT
: * THE GO BIT, AND ALL THE REGISTERS ARE SAVED
: * THEN GO IS GIVEN FOR WRITE HEADER AND DATA

: * THEN ALL REGISTERS ARE COMPARED TO CHECK FOR IMPROPER CHANGE
: * THEN WRITE FROM BUFFER IS CHECKED TO SEE THAT NOTHING CHANGED

: * NOW FOR READ COMMAND READ INTO BUFFER IS FILLED
: * WITH ALL ONES, WRITE FROM BUFFER IS LOADED WITH
: * 10001 0 0 0 AND 2 OF 2000, 254 OF ZEROS COMMAND IS LOADED
: * INTO REGISTERS EXCEPT GO AND IE ALL REGISTERS ARE SAVED
: * GO IS GIVEN FOR THE READ COMMAND

: * ALL REGISTERS ARE CHECKED FOR IMPROPER CHANGE
: * THEN THE READ DATA IS COMPARED.

024744 000004
024746 012706 001000
024752 012737 000031 004514
024760 004737 034556

†ST31: SCOPE
MOV #STACK,SP ;RESET STACK
MOV #31,3#†STNM ;SAVE TEST NUMBER
JSR PC,3#CLDISK ;SET R1-RHCS1, R2-RHCS2

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7737                                     ;R3-RHDS1, R4-RHER1
7738                                     ;GIVE RH-11 INITIALIZE
7739                                     ;SETUP UNIT NUBER
7740
7741                                     ;FILL WRITE FROM BUFFER WITH HEADER
7742
7743 024764 004037 034402 JSR      RO,3#FLHEAD   ;SAVE HEADER DATA IN WRFROM
7744 024770 002400 WRFROM   ;LOCATION WHERE SAVED
7745 024772 000004 4      ;NUMBER OF WORDS SAVED
7746 024774 010000 10000  ;FIRST DATA WORD
7747 024776 011025 <18.*40>!<21.> ;SECOND DATA WORD
7748 025000 000000 0      ;THIRD DATA WORD
7749 025002 000000 0      ;FOURTH DATA WORD
7750
7751                                     ;FILL WRITE FROM BUFFER WITH DATA
7752 025004 004037 034426 JSR      RO,3#CLAREA   ;CLEAR 256. WORDS, FROM WRFROM+10
7753 025010 002410 WRFROM+10 ;STARTING FROM WRFROM+10
7754 025012 000400 256.   ;256. WORDS
7755 025014 001125 <18.*40>!21.   ;FILL WITH <18.*40>!21.
7756
7757
7758                                     ;FILL WRITE FROM BUFFER WITH NEXT TRACK HEADER
7759
7760 025016 004037 034402 JSR      RO,3#FLHEAD   ;SAVE HEADER DATA IN WRFROM+<260.*2>
7761 025022 003410 WRFROM+<260.*2> ;LOCATION WHERE SAVED
7762 025024 000004 4      ;NUMBER OF WORDS SAVED
7763 025026 010001 10001  ;FIRST DATA WORD
7764 025030 000000 0      ;SECOND DATA WORD
7765 025032 000000 0      ;THIRD DATA WORD
7766 025034 000000 0      ;FOURTH DATA WORD
7767
7768                                     ;FILL WRITE FROM BUFFER WITH NEXT TRACK DATA
7769 025036 004037 034426 JSR      RO,3#CLAREA   ;CLEAR 2 WORDS, FROM WRFROM+<264.*2>
7770 025042 003420 WRFROM+<264.*2> ;STARTING FROM WRFROM+<264.*2>
7771 025044 000002 2      ;2 WORDS
7772 025046 002000 2000   ;FILL WITH 2000
7773
7774
7775                                     ;NOW READ INTO BUFFER WILL BE FILLED WITH SAME DATA
7776                                     ;AS WRITE FROM BUFFER SO THAT AFTER A WRITE COMPARISONS
7777                                     ;CAN BE MADE TO MAKE SURE THAT WRITE DID NOT
7778                                     ;CHANGE WRITE FROM BUFFER.
7779
7780 025050 004037 034402 JSR      RO,3#FLHEAD   ;SAVE HEADER DATA IN REINTO
7781 025054 003444 REINTO   ;LOCATION WHERE SAVED
7782 025056 000004 4      ;NUMBER OF WORDS SAVED
7783 025060 010000 10000  ;FIRST DATA WORD
7784 025062 011025 <18.*40>!<21.> ;SECOND DATA WORD
7785 025064 000000 0      ;THIRD DATA WORD
7786 025066 000000 0      ;FOURTH DATA WORD
7787 025070 004037 034426 JSR      RO,3#CLAREA   ;CLEAR 256. WORDS, FROM REINTO+10
7788 025074 003454 REINTO+10 ;STARTING FROM REINTO+10
7789 025076 000400 256.   ;256. WORDS
7790 025100 001125 <18.*40>!21.   ;FILL WITH <18.*40>!21.
7791
7792

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7849 025216 011100      MOV      @R1,R0      ;SAVE RHCS1 DURING ABOVE OPERATION
7850 025220 011305      MOV      @R3,R5      ;SAVE RHDS1 DURING ABOVE OPERATION
7851                                ;ONE REVOLUTION = 16670 MICRO1 SEC, ONE SECTOR = 760 MICRO1 SEC
7852
7853 025222 104410      WAT                                ;WAIT FOR RDY BIT TO SET
7854 025224 002216      RHCS1                       ;WAIT FOR RHCS1 REGISTER
7855 025226 000200      RDY                                ;WAIT FOR RDY BIT IN RHCS1 REGISTER
7856 025230 003237      1695.                          ;ALLOW 16950 MICRO SECONDS
7857 025232 001515      645.                             ;RDY MUST SET BETWEEN
7858                                ;8500 AND 25400 MICRO SECONDS
7859                                ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
7860                                ;R0 AND R5 IMMEDIATELY AFTER GO
7861 025234 013746 002356  MOV      @#WRIFOR,-(SP) ;SAVE COMMAND
7862 025240 052716 004101  BIS      #IE!GO!DVA,(SP) ;INCLUDE IE!GO!DVA
7863 025244 011637 001124  MOV      (SP),@#$GDDAT ;SAVE FOR PRINTOUT
7864 025250 022600      CMP      (SP)+,R0      ;DURING ABOVE OPERATION ONLY IE!GO!DVA
7865                                ;AND COMMAND SHOULD BE SET
7866 025252 001405      BEQ      64$           ;BRANCH IF GOOD
7867 025254 010037 001126  MOV      R0,@#$BDDAT ;BAD DATA
7868 025260 010137 004510  MOV      R1,@#REGADR ;FAILING REGISTER RHCS1
7869 025264 104021      ERROR   21           ;DURING ABOVE OPERATION ONLY
7870                                ;COMMAND AND IE!GO!DVA SHOULD BE SET
7871 025266 012746 010500  64$:  MOV      #MOL!DPR!VV,-(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
7872 025272 011637 001124  MOV      (SP),@#$GDDAT ;SAVE FOR PRINTOUT
7873 025276 022605      CMP      (SP)+,R5      ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
7874                                ;SHOULD BE SET
7875 025300 001405      BEQ      66$           ;BRANCH IF GOOD
7876 025302 010537 001126  MOV      R5,@#$BDDAT ;BAD DATA
7877 025306 010337 004510  MOV      R3,@#REGADR ;FAILING REGISTER RHDS1
7878 025312 104063      ERROR   63           ;DURING ABOVE OPERATION ONLY
7879                                ;MOL!DPR!VV SHOULD BE SET
7880 025314      66$:
7881
7882                                ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
7883 025314 004037 034460  JSR      R0,@#FILLRE ;MOV 0 INTO SAVED RHWC
7884 025320 002210      RHWC                       ;SAVED REGISTER TO CHANGE
7885 025322 000000      0                            ;DATA
7886 025324 004037 034460  JSR      R0,@#FILLRE ;MOV WRFROM+(266.*2) INTO SAVED RHBA
7887 025330 002212      RHBA                       ;SAVED REGISTER TO CHANGE
7888 025332 003424      WRFROM+(266.*2) ;DATA
7889 025334 004037 034460  JSR      R0,@#FILLRE ;MOV 1 INTO SAVED RHCA
7890 025340 002230      RHCA                       ;SAVED REGISTER TO CHANGE
7891 025342 000001      1                            ;DATA
7892 025344 004037 034460  JSR      R0,@#FILLRE ;MOV 1 INTO SAVED RHCC
7893 025350 002252      RHCC                       ;SAVED REGISTER TO CHANGE
7894 025352 000001      1                            ;DATA
7895 025354 004037 034460  JSR      R0,@#FILLRE ;MOV 1 INTO SAVED RHDST
7896 025360 002222      RHDST                      ;SAVED REGISTER TO CHANGE
7897 025362 000001      1                            ;DATA
7898
7899                                ;NOW COMARE REGISTERS BEFORE WRITE HEADER AND DATA
7900                                ;WITH REGISTERS AFTER COMMAND
7901
7902 025364 004037 035546  JSR      R0,@#COMREG ;COMPARE SAVED REGISTERS WITH
7903                                ;PRESENT VALUE
7904 025370 004522      SAVERE                    ;GOOD DATA SAVED IN 'SAVERE'

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7905 025372 002266          WC          ;TEST DATA STARTING FROM 'RHWC'
7906 025374 000022          18.         ;18. REGISTERS TO BE COMPARED
7907 025376 025402          1$          ;RETURN TO 1$ ON ERROR
7908 025400 025406          2$          ;RETURN TO 2$ ON NO ERROR
7909
7910 025402 104027          1$:         ;WRITE HEADER AND DATA
7911 025404 000207          RTS          ;CAUSED IMPROPER REGISTER
7912                                PC          ;CHANGE
7913                                ;GOOD DATA GIVES WHAT SHOULD
7914                                ;BE THERE
7915                                ;RECEIVED DATA GIVES WHAT
7916                                ;WAS THERE AFTER COMMENT
7917
7918                                ;NOW WRITE FROM BUFFER WILL BE CHECKED TO SEE THAT
7919                                ;NOTHING GOT CHANGED
7920 025406          2$:
7921
7922 025406 004037 036576    JSR          ;COMPARE TWO BLOCKS OF MEMORY
7923 025412 003444          RO,2#COMPAR ;GOOD DATA STARTS FROM REINTO
7924 025414 002400          REINTO        ;TEST DATA STARTS FROM WRFROM
7925 025416 000412          WRFROM        ;266. WORDS TO BE COMPARED
7926 025420 025424          266.         ;RETURN TO 3$ ON ERROR
7927 025422 025430          3$          ;RETURN TO 4$ ON NO ERROR
7928
7929
7930 025424 104030          3$:         ;WRITE HEADER AND DATA
7931 025426 000207          RTS          ;CHANGED WRITE FROM BUFFER
7932
7933                                ;NOW A READ HEADER AND DATA COMMAND WILL BE GIVEN
7934                                ;READ INTO BUFFER IS FILLED WITH ONES
7935 025430          4$:
7936
7937 025430 004737 034556    JSR          ;SET R1-RHCS1, R2-RHCS2
7938                                ;R3-RHDS1, R4-RHER1
7939                                ;GIVE RH-11 INITIALIZE
7940                                ;SETUP UNIT NUMBER
7941 025434 004037 034426    JSR          ;CLEAR 260. WORDS, FROM REINTO
7942 025440 003444          RO,2#CLAREA ;STARTING FROM REINTO
7943 025442 000404          REINTO        ;260. WORDS
7944 025444 177777          260.         ;FILL WITH -1
7945                                ;WRITE FROM BUFFER IS FILLED WITH 10001,0,0,0,2000,2000, AND 254 OF 0
7946
7947
7948 025446 004037 034402    JSR          ;SAVE HEADER DATA IN WRFROM
7949 025452 002400          WRFROM        ;LOCATION WHERE SAVED
7950 025454 000006          6           ;NUMBER OF WORDS SAVED
7951 025456 010001          10001        ;FIRST DATA WORD
7952 025460 000000          0           ;SECOND DATA WORD
7953 025462 000000          0           ;THIRD DATA WORD
7954 025464 000000          0           ;FOURTH DATA WORD
7955 025466 002000          2000         ;FIFTH DATA WORD
7956 025470 002000          2000         ;SIXTH DATA WORD
7957 025472 004037 034426    JSR          ;CLEAR 254. WORDS, FROM WRFROM+(6*2)
7958 025476 002414          WRFROM+(6*2) ;STARTING FROM WRFROM+(6*2)
7959 025500 000376          254.         ;254. WORDS
7960 025502 000000          0           ;FILL WITH 0

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7961
7962
7963
7964
7965 025504 004037 036532 JSR RO, @#RUN ; NOW FILL COMMAND
7966 025510 000001 ; SETUP TO RUN FOR DATA COMMAND
7967 025512 000 ; CYLINDER 1
7968 025513 000 ; SECTOR 0
7969 025514 177374 ; TRACK 0
7970 ; WORD COUNT (DATA)=256.+
7971 025516 003444 REINTO ; 4 HEADER WORDS
7972 ; BUS ADDRESS
7973 ; STARTING ADDRESS OF DATA
7974 025520 000000 0 ; BUFFER = REINTO
7975 025522 014000 ECI!FMT22 ; DO NOT INHIBIT BUS ADDRESS INCREMENT
7976 ; 16 BITS PER WORD FORMAT
7977 ; INHIBIT ECC CORRECTION
7978 025524 002362 REFOR ; DO NOT INHIBIT HEADER COMPARE
7979 ; GET READY TO DO A REFOR
7980 ; READ HEADER AND DATA WITH 72 IN RHCS1
7981
7982 ; NOW SAVE REGISTERS FOR COMPARISON AFTER READ HEADER AND DATA
7983 025526 004037 034716 JSR RO, @#SAVER ; SAVE REGISTERS
7984 025532 002210 RHWC ; RHWC IS THE FIRST REGISTER SAVED
7985 025534 004522 SAVERE ; STARTING ADDRESS OF WHERE
7986 ; THE REGISTERS ARE SAVED
7987 025536 000022 18. ; NUMBER OF REGISTERS
7988 ; SAVED = 18.
7989
7990 025540 004737 034636 JSR PC, @#CHECKT ; CHECK DVA, RDY, MOL, DPR, DRY, VV
7991
7992
7993 025544 013777 004516 154432 MOV @#RP4VEC, @RPVEC ; SET RPO4 VECTOR ADDRESS
7994 ; TO 'TIME1' IF P-CLOCK IS PRESENT
7995 ; OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
7996 ; 'TIME' WILL ONLY SAVE
7997 ; CURRENT CYLINDER ADDRESS
7998 ; AND LOOK AHEAD REGISTERS
7999
8000
8001 025552 013746 002362 MOV @#REFOR, -(SP) ; GET READY TO MOVE COMMAND
8002 025556 052716 000101 BIS #GO!IE, (SP) ; GET READY TO SET GO AND
8003 ; ENABLE INTERRUPT
8004 025562 012677 154430 MOV (SP)+, @RHCS1 ; GO WITH
8005 ; 72 IN RHCS1 FOR READ DATA
8006 ; WITH INTERRUPT ENABLED
8007 025566 011100 MOV @R1, RO ; SAVE RHCS1 DURING ABOVE OPERATION
8008 025570 011305 MOV @R3, R5 ; SAVE RHDS1 DURING ABOVE OPERATION
8009
8010
8011 025572 104410 WAT ; WAIT FOR RDY BIT TO SET
8012 025574 002216 RHCS1 ; WAIT FOR RHCS1 REGISTER
8013 025576 000200 RDY ; WAIT FOR RDY BIT IN RHCS1 REGISTER
8014 025600 001614 908. ; ALLOW 9080 MICRO SECONDS
8015 025602 001507 839. ; RDY MUST SET BETWEEN
8016 ; 690 AND 17470 MICRO SECONDS

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8017 ;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
8018 ;RO AND R5 IMMEDIATELY AFTER GO
8019 025604 013746 002362 MOV J#REFOR,-(SP) ;SAVE COMMAND
8020 025610 052716 004101 BIS #IE!GO!DVA,(SP) ;INCLUDE IE!GO!DVA
8021 025614 011637 001124 MOV (SP),J#SGDDAT ;SAVE FOR PRINTOUT
8022 025620 022600 CMP (SP)+,RO ;DURING ABOVE OPERATION ONLY IE!GO!DVA
8023 ;AND COMMAND SHOULD BE SET
8024 025622 001405 BEQ 67$ ;BRANCH IF GOOD
8025 025624 010037 001126 MOV RO,J#$BDDAT ;BAD DATA
8026 025630 010137 004510 MOV R1,J#REGADR ;FAILING REGISTER RHCS1
8027 025634 104021 ERROR -21 ;DURING ABOVE OPERATION ONLY
8028 ;COMMAND AND IE!GO!DVA SHOULD BE SET
8029 025636 012746 010500 67$: MOV #MOL!DPR!VV,-(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
8030 025642 011637 001124 MOV (SP),J#SGDDAT ;SAVE FOR PRINTOUT
8031 025646 022605 CMP (SP)+,R5 ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
8032 ;SHOULD BE SET
8033 025650 001405 BEQ 69$ ;BRANCH IF GOOD
8034 025652 010537 001126 MOV R5,J#$BDDAT ;BAD DATA
8035 025656 010337 004510 MOV R3,J#REGADR ;FAILING REGISTER RHDS1
8036 025662 104063 ERROR 63 ;DURING ABOVE OPERATION ONLY
8037 ;MOL!DPR!VV SHOULD BE SET
8038 025664 69$:
8039
8040 ;CHNAGE SAVED REGISTERS TO EXPECTED VALUES
8041 025664 004037 034460 JSR RO,J#FILLRE ;MOV 0 INTO SAVED RHWC
8042 025670 002210 RHWC ;SAVED REGISTER TO CHANGE
8043 025672 000000 0 ;DATA
8044 025674 004037 034460 JSR RO,J#FILLRE ;MOV REINTO+<260.*2> INTO SAVED RHBA
8045 025700 002212 RHBA ;SAVED REGISTER TO CHANGE
8046 025702 004454 REINTO+<260.*2> ;DATA
8047 025704 004037 034460 JSR RO,J#FILLRE ;MOV 1 INTO SAVED RHDST
8048 025710 002222 RHDST ;SAVED REGISTER TO CHANGE
8049 025712 000001 1 ;DATA
8050
8051 ;COMPARE REGISTERS BEFORE READ HEADER AND DATA
8052 ;WITH REGISTERS AFTER COMMAND
8053
8054 025714 004037 035546 JSR RO,J#COMREG ;COMPARE SAVED REGISTERS WITH
8055 ;PRESENT VALUE
8056 025720 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
8057 025722 002266 WC ;TEST DATA STARTING FROM 'RHWC'
8058 025724 000022 18. ;18. REGISTERS TO BE COMPARED
8059 025726 025732 5$ ;RETURN TO 5$ ON ERROR
8060 025730 025736 6$ ;RETURN TO 6$ ON NO ERROR
8061
8062
8063 025732 104031 5$: ERROR 31 ;READ HEADER AND DATA CAUSED
8064 025734 000207 RTS PC ;IMPROPER REGISTER CHANGE
8065 ;GOOD DATA GIVES WHAT SHOULD
8066 ;BE THERE
8067 ;RECEIVED DATA GIVES WHAT WAS
8068 ;THERE AFTER COMMAND
8069
8070 ;NOW READ INTO BUFFER WILL BE CHECKED TO SEE
8071 ;THAT READ WAS GOOD
8072 025736 6$:

```

```

8073
8074 025736 004037 036576 JSR RO, @#COMPAR ;COMPARE TWO BLOCKS OF MEMORY
8075 025742 002400 WRFROM ;GOOD DATA STARTS FROM WRFROM
8076 025744 003444 REINTO ;TEST DATA STARTS FROM REINTO
8077 025746 000404 260. ;260. WORDS TO BE COMPARED
8078 025750 025754 7$ ;RETURN TO 7$ ON ERROR
8079 025752 025760 10$ ;RETURN TO 10$ ON NO ERROR

```

```

8083 025754 104032 7$: ERROR 32 ;WRITE HEADER AND DATA
8084 025756 000207 RTS PC ;FOLLOWED BY A READ HEADER
8085 ;AND DATA GAVE A READ ERROR
8086 ;ERROR MAY BE IN READ OR WRITE
8087 025760 10$:

```

```

*****
;TEST 32 SEEK TEST

```

```

; * THIS TEST GETS THE HEADS OUT TO CYLINDER 10 NOT BY ONE
; * SEEK BUT BY TEN IMPLIED SEEKS ONE CYLINDER AT A TIME
; *
; * THIS TEST STARTS WITH A (ALREADY TESTED) RECALIBRATE
; * THAT IS CYLINDER ZERO. THEN ON CYLINDER 0 SECTOR
; * #21 TRACK #18 IT WRITES 266 WORDS THERE BY GETTING
; * THE HEAD TO CYLINDER 1 THEN IT WRITES 266 WORDS ON
; * CYLINDER 1 SECTOR #21 TRACK #18 THERE BY GETTING
; * THE HEADS TO CYLINDER 2
; * THIS IS REPEATED 10 TIMES GETTING THE
; * HEADS TO CYLINDER 10
; * THEN A SEEK COMMAND IS GIVEN TO CYLINDER 0
; * AND DATA ALREADY WRITTEN IS CHECKED

```

```

*****
TST32: SCOPE

```

```

8108 025760 000004 MOV #STACK, SP ;RESET STACK
8109 025762 012706 001000 MOV #32, @#TSTNM ;SAVE TEST NUMBER
8110 025766 012737 000032 004514

```

```

8112 025774 004737 034556 JSR PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
8113 ;R3-RHDS1, R4-RHER1
8114 ;GIVE RH-11 INITIALIZE
8115 ;SETUP UNIT NUBER

```

```

;THE FOLLOWING MOVES ARE TO INITIALIZE TEST FROM
;CYLINDER 0
;THESE LOCATIONS ARE CHANGED DURING TEST TO ENABLE
;GOING TO NEXT CYLINDER

```

```

8120 026000 012737 010000 026156 MOV #10000, @#ST1+10
8121 026006 012737 001125 026176 MOV #<<18.*40>!21.>, @#ST2+10
8122 026014 012737 010001 026210 MOV #10001, @#ST3+10
8123 026022 012737 002000 026230 MOV #2000, @#ST4+10
8124 026030 012737 000000 026236 MOV #0, @#ST5+4
8125 026036 012737 000001 026440 MOV #1, @#ST6+6
8126 026044 012737 000001 026450 MOV #1, @#ST6+16
8127 026052 012737 010001 026532 MOV #10001, @#ST9+10
8128 026060 012737 002000 026552 MOV #2000, @#ST10+10

```

```

8129 026066 012737 000001 026572      MOV      #1, @#ST11+4
8130                                     ; THIS IS TO GET THE HEADS TO CYLINDER 0
8131 026074 013777 004516 154102      MOV      @#RP4VEC, @RPVEC ; SET RPO4 VECTOR ADDRESS
8132                                     ; TO 'TIME1' IF P-CLOCK IS PRESENT
8133                                     ; OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
8134                                     ; 'TIME' WILL ONLY SAVE
8135                                     ; CURRENT CYLINDER ADDRESS
8136                                     ; AND LOOK AHEAD REGISTERS
8137
8138 026102 013746 002340      MOV      @#RECALI, -(SP) ; GET READY TO MOVE COMMAND
8139 026106 052716 000101      BIS      #GO!IE, (SP)   ; GET READY TO SET GO AND
8140                                     ; ENABLE INTERRUPT
8141 026112 012677 154100      MOV      (SP)+, @RHCSI  ; GO WITH
8142                                     ; 6 IN RHCSI FOR RECALIBRATE
8143                                     ; WITH INTERRUPT ENABLED
8144 026116 011100      MOV      @R1, RO       ; SAVE RHCSI DURING ABOVE OPERATION
8145 026120 011305      MOV      @R3, RS       ; SAVE RHDS1 DURING ABOVE OPERATION
8146
8147 026122 104410      WAT                                     ; WAIT FOR DRY BIT TO SET
8148 026124 002240      RHDS1                               ; WAIT FOR RHDS1 REGISTER
8149 026126 000200      DRY                                  ; WAIT FOR DRY BIT IN RHDS1 REGISTER
8150 026130 076377      31999.                               ; ALLOW 319990 MICRO SECONDS
8151 026132 056701      24001.                               ; DRY MUST SET BETWEEN
8152                                     ; 79980 AND 560000 MICRO SECONDS
8153 026134 012737 000012 001176      MOV      #10., @#STMP1 ; TEN COUNT TO GET TO CYLINDER 10
8154
8155 026142 004737 034556      JSR      PC, @#CLDISK ; SET R1-RHCSI, R2-RHCS2
8156                                     ; R3-RHDS1, R4-RHER1
8157                                     ; GIVE RH-11 INITIALIZE
8158                                     ; SETUP UNIT NUBER
8159
8160                                     ; FILL WRITE FROM BUFFER WITH HEADER
8161 026146      ST1:
8162
8163 026146 004037 034402      JSR      RO, @#FLHEAD ; SAVE HEADER DATA IN WRFROM
8164 026152 002400      WRFROM ; LOCATION WHERE SAVED
8165 026154 000004      4 ; NUMBER OF WORDS SAVED
8166 026156 010000      10000 ; FIRST DATA WORD
8167 026160 011025      <18.*400>!21. ; SECOND DATA WORD
8168 026162 000000      0 ; THIRD DATA WORD
8169 026164 000000      0 ; FOURTH DATA WORD
8170
8171                                     ; FILL WRITE FROM BUFFER WITH DATA
8172 026166      ST2:
8173 026166 004037 034426      JSR      RO, @#CLAREA ; CLEAR 256. WORDS, FROM WRFROM+10
8174 026172 002410      WRFROM+10 ; STARTING FROM WRFROM+10
8175 026174 000400      256. ; 256. WORDS
8176 026176 001125      <0.*2000>!<18.*40>!21. ; FILL WITH <0.*2000>!<18.*40>!21.
8177
8178
8179                                     ; FILL WRITE FROM BUFFER WITH NEXT TRACK HEADER
8180 026200      ST3:
8181
8182 026200 004037 034402      JSR      RO, @#FLHEAD ; SAVE HEADER DATA IN WRFROM+<260.*2>
8183 026204 003410      WRFROM+<260.*2> ; LOCATION WHERE SAVED
8184 026206 000004      4 ; NUMBER OF WORDS SAVED

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8185	0262:0	010001		10001	;FIRST DATA WORD
8186	026212	000000		0	;SECOND DATA WORD
8187	026214	000000		0	;THIRD DATA WORD
8188	026216	000000		0	;FOURTH DATA WORD
8189					
8190					;FILL WRITE FROM BUFFER WITH NEXT TRACK DATA
8191	026220				
8192	026220	004037	034426	ST4: JSR RO,@#CLAREA	;CLEAR 2 WORDS FROM WRFROM+<264.*2>
8193	026224	003420		WRFROM+<264.*2>	;STARTING FROM WRFROM+<264.*2>
8194	026226	000002		2	;2 WORDS
8195	026230	002000		1.*2000	;FILL WITH 1.*2000
8196					
8197					;THE WRITE HEADER AND DATA COMMAND WILL BE FILLED
8198	026232			ST5:	
8199					
8200	026232	004037	036532	JSR RO,@#RUN	;SETUP TO RUN FOR DATA COMMAND
8201	026236	000000		0	;CYLINDER 0
8202	026240	025		.BYTE 21.	;SECTOR 21.
8203	026241	022		.BYTE 18.	;TRACK 18.
8204	026242	177366		-262.-4	;WORD COUNT (DATA)=262.+
8205					;4 HEADER WORDS
8206	026244	002400		WRFROM	;BUS ADDRESS
8207					;STARTING ADDRESS OF DATA
8208					;BUFFER = WRFROM
8209	026246	000000		0	;DO NOT INHIBIT BUS ADDRESS INCREMENT
8210	026250	010000		FMT22	;16 BITS PER WORD FORMAT
8211					;DO NOT INHIBIT ECC CORRECTION
8212					;DO NOT INHIBIT HEADER COMPARE
8213	026252	002356		WRIFOR	;GET READY TO DO A WRIFOR
8214					;WRITE HEADER AND DATA WITH 62 IN RHCS1
8215					
8216					
8217					;SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DATA
8218	026254	004037	034716	JSR RO,@#SAVER	;SAVE REGISTERS
8219	026260	002210		RHWC	;RHWC IS THE FIRST REGISTER SAVED
8220	026262	004522		SAVERE	;STARTING ADDRESS OF WHERE
8221					;THE REGISTERS ARE SAVED
8222	026264	000022		18.	;NUMBER OF REGISTERS
8223					;SAVED = 18.
8224					
8225	026266	004737	034636	JSR PC,@#CHECKT	;CHECK DVA,RDY,MOL,DPR,DRY,VV
8226					
8227					
8228	026272	013777	004516 153704	MOV @#RP4VEC,@RPVEC	;SET RP04 VECTOR ADDRESS
8229					;TO 'TIME1' IF P-CLOCK IS PRESENT
8230					;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
8231					; 'TIME' WILL ONLY SAVE
8232					;CURRENT CYLINDER ADDRESS
8233					;AND LOOK AHEAD REGISTERS
8234					
8235					
8236	026300	013746	002356	MOV @#WRIFOR,-(SP)	;GET READY TO MOVE COMMAND
8237	026304	052716	000101	BIS #GO!IE,(SP)	;GET READY TO SET GO AND
8238					;ENABLE INTERRUPT
8239	026310	012677	153702	MOV (SP)+,@RHCS1	;GO WITH
8240					;62 IN RHCS1 FOR WRITE HEADER AND DATA


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8241
8242 026314 011100
8243 026316 011305
8244
8245
8246
8247
8248
8249
8250 026320 104410
8251 026322 002216
8252 026324 000200
8253 026326 003237
8254 026330 001515
8255
8256
8257
8258 026332 013746 002356
8259 026336 052716 004101
8260 026342 011637 001124
8261 026346 022600
8262
8263 026350 001405
8264 026352 010037 001126
8265 026356 010137 004510
8266 026362 104021
8267
8268 026364 012746 010500
8269 026370 011637 001124
8270 026374 022605
8271
8272 026376 001405
8273 026400 010537 001126
8274 026404 010337 004510
8275 026410 104063
8276
8277 026412
8278
8279
8280 026412 004037 034460
8281 026416 002210
8282 026420 000000
8283 026422 004037 034460
8284 026426 002212
8285 026430 003424
8286 026432
8287 026432 004037 034460
8288 026436 002252
8289 026440 000001
8290 026442 004037 034460
8291 026446 002230
8292 026450 000001
8293 026452 004037 034460
8294 026456 002222
8295 026460 000001
8296

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;WITH INTERRUPT ENABLED
;SAVE RHCS1 DURING ABOVE OPERATION
;SAVE RHDS1 DURING ABOVE OPERATION

;ONE REVOLUTION = 16670 MICRO SECONDS, ONE SECTOR = 760 MICRO SEC.
;MAX TIME ALLOWED = ONE REVOLUTION + SEEK + 2 SECTORS
;MIN TIME ALLOWED = 2 SECTORS + SEEK

WAT ;WAIT FOR RDY BIT TO SET
RHCS1 ;WAIT FOR RHCS1 REGISTER
RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
1695. ;ALLOW 16950 MICRO SECONDS
845. ;RDY MUST SET BETWEEN
;8500 AND 25400 MICRO SECONDS

;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
;RO AND RS IMMEDIATELY AFTER GO
MOV @#WRIFOR, -(SP) ;SAVE COMMAND
BIS #IE!GO!DVA, (SP) ;INCLUDE IE!GO!DVA
MOV (SP), @#$GDDAT ;SAVE FOR PRINTOUT
CMP (SP)+, RO ;DURING ABOVE OPERATION ONLY IE!GO!DVA
;AND COMMAND SHOULD BE SET
BEQ 64$ ;BRANCH IF GOOD
MOV RO, @#$BDDAT ;BAD DATA
MOV R1, @#REGADR ;FAILING REGISTER RHCS1
ERROR 21 ;DURING ABOVE OPERATION ONLY
;COMMAND AND IE!GO!DVA SHOULD BE SET
64$: MOV #MOL!DPR!VV, -(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
MOV (SP), @#$GDDAT ;SAVE FOR PRINTOUT
CMP (SP)+, RS ;DURING ABOVE OPERATION ONLY MOL!DPR!VV
;SHOULD BE SET
BEQ 66$ ;BRANCH IF GOOD
MOV RS, @#$BDDAT ;BAD DATA
MOV R3, @#REGADR ;FAILING REGISTER RHDS1
ERROR 63 ;DURING ABOVE OPERATION ONLY
;MOL!DPR!VV SHOULD BE SET

66$:

;NOW CHANGES SAVED REGISTERS TO EXPECTED VALUES
JSR RO, @#FILLRE ;MOV 0 INTO SAVED RHWC
RHWC ;SAVED REGISTER TO CHANGE
0 ;DATA
JSR RO, @#FILLRE ;MOV WRFROM+<266.*2> INTO SAVED RHBA
RHBA ;SAVED REGISTER TO CHANGE
WRFROM+<266.*2> ;DATA

ST6: JSR RO, @#FILLRE ;MOV 1 INTO SAVED RHCC
RHCC ;SAVED REGISTER TO CHANGE
1 ;DATA
JSR RO, @#FILLRE ;MOV 1 INTO SAVED RHCA
RHCA ;SAVED REGISTER TO CHANGE
1 ;DATA
JSR RO, @#FILLRE ;MOV 1 INTO SAVED RHDST
RHDST ;SAVED REGISTER TO CHANGE
1 ;DATA

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8297 ;COMPARE REGISTERS BEFORE WRITE HEADER AND DATA
8298 ;WITH REGISTERS AFTER COMMAND
8299
8300 026462 004037 035546 JSR RO,2#COMREG ;COMPARE SAVED REGISTERS WITH
8301 ;PRESENT VALUE
8302 026466 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
8303 026470 002266 WC ;TEST DATA STARTING FROM 'RHWC'
8304 026472 000022 18. ;18. REGISTERS TO BE COMPARED
8305 026474 026500 ST7 ;RETURN TO ST7 ON ERROR
8306 026476 026504 ST8 ;RETURN TO ST8 ON NO ERROR
8307 026500 104027 ST7: ERROR 27 ;WRITE HEADER AND DATA CAUSED
8308 026502 000207 RTS PC ;IMPROPER REGISTER CHANGE
8309 ;GOOD DATA GIVES WHAT SHOULD BE
8310 ;THERE
8311 ;RECEIVED DATA GIVES WHAT WAS BE
8312 ;THERE AFTER COMMAND
8313
8314 ;SETUP TO READ HEADER AND DATA FOR NEXT TRACK
8315 ;FILL READ INTO BUFFER WITH ALL ONES
8316 026504 ST8:
8317
8318 026504 004737 034556 JSR PC,2#CLDISK ;SET R1-RHCS1, R2-RHCS2
8319 ;R3-RHDS1, R4-RHER1
8320 ;GIVE RH-11 INITIALIZE
8321 ;SETUP UNIT NUMBER
8322 026510 004037 034426 JSR RO,2#CLAREA ;CLEAR 260. WORDS, FROM REINTO
8323 026514 003444 REINTO ;STARTING FROM REINTO
8324 026516 000404 260. ;260. WORDS
8325 026520 177777 -1 ;FILL WITH -1
8326
8327
8328 ;FILL WRITE FROM BUFFER WITH EXPECTED DATA
8329 026522 ST9:
8330
8331 026522 004037 034402 JSR RO,2#FLHEAD ;SAVE HEADER DATA IN WRFROM
8332 026526 002400 WRFROM ;LOCATION WHERE SAVED
8333 026530 000004 4 ;NUMBER OF WORDS SAVED
8334 026532 010001 10001 ;FIRST DATA WORD
8335 026534 000000 0 ;SECOND DATA WORD
8336 026536 000000 0 ;THIRD DATA WORD
8337 026540 000000 0 ;FOURTH DATA WORD
8338
8339 026542 004037 034426 ST10: JSR RO,2#CLAREA ;CLEAR 2 WORDS, FROM WRFROM+(4*2)
8340 026546 002410 WRFROM+(4*2) ;STARTING FROM WRFROM+(4*2)
8341 026550 000002 2 ;2 WORDS
8342 026552 002000 1*2000 ;FILL WITH 1*2000
8343
8344 026554 004037 034426 JSR RO,2#CLAREA ;CLEAR 254. WORDS, FROM WRFROM+(6*2)
8345 026560 002414 WRFROM+(6*2) ;STARTING FROM WRFROM+(6*2)
8346 026562 000376 254. ;254. WORDS
8347 026564 000000 0 ;FILL WITH 0
8348
8349
8350 ;FILL COMMAND INTO REGISTERS
8351 026566 ST11:
8352

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8353	026566	004037	036532	JSR	RO, @#RUN	: SETUP TO RUN FOR DATA COMMAND
8354	026572	000001				: CYLINDER 1
8355	026574	000		.BYTE	0	: SECTOR 0
8356	026575	000		.BYTE	0	: TRACK 0
8357	026576	177374			-256.-4	: WORD COUNT (DATA)=256.+
8358						: 4 HEADER WORDS
8359	026600	003444		REINTO		: BUS ADDRESS
8360						: STARTING ADDRESS OF DATA
8361						: BUFFER = REINTO
8362	026602	000000		0		: DO NOT INHIBIT BUS ADDRESS INCREMENT
8363	026604	014000		ECI!FMT22		: 16 BITS PER WORD FORMAT
8364						: INHIBIT ECC CORRECTION
8365						: DO NOT INHIBIT HEADER COMPARE
8366	026606	002362		REFOR		: GET READY TO DO A REFOR
8367						: READ HEADER AND DATA WITH 72 IN RHCS1
8368						
8369						
8370						: SAVE REGISTERS FOR COMPARISON AFTER READ HEADER
8371						: AND DATA
8372	026610	004037	034716	JSR	RO, @#SAVER	: SAVE REGISTERS
8373	026614	002210		RHWC		: RHWC IS THE FIRST REGISTER SAVED
8374	026616	004522		SAVERE		: STARTING ADDRESS OF WHERE
8375						: THE REGISTERS ARE SAVED
8376	026620	000020		16.		: NUMBER OF REGISTERS
8377						: SAVED = 16.
8378						
8379	026622	004737	034636	JSR	PC, @#CHECKT	: CHECK DVA, RDY, MOL, DFR, DRY, VV
8380						
8381						
8382	026626	013777	004516 153350	MOV	@#RP4VEC, @RPVEC	: SET RPO4 VECTOR ADDRESS
8383						: TO 'TIME1' IF P-CLOCK IS PRESENT
8384						: OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
8385						: 'TIME' WILL ONLY SAVE
8386						: CURRENT CYLINDER ADDRESS
8387						: AND LOOK AHEAD REGISTERS
8388						
8389						
8390	026634	013746	002362	MOV	@#REFOR, -(SP)	: GET READY TO MOVE COMMAND
8391	026640	052716	000101	BIS	#GO!IE, (SP)	: GET READY TO SET GO AND
8392						: ENABLE INTERRUPT
8393	026644	012677	153346	MOV	(SP)+, @RHCS1	: GO WITH
8394						: 72 IN RHCS1 FOR READ DATA
8395						: WITH INTERRUPT ENABLED
8396	026650	011100		MOV	@R1, RO	: SAVE RHCS1 DURING ABOVE OPERATION
8397	026652	011305		MOV	@R3, R5	: SAVE RHDS1 DURING ABOVE OPERATION
8398						
8399						
8400	026654	104410		WAT		: WAIT FOR RDY BIT TO SET
8401	026656	002216		RHCS1		: WAIT FOR RHCS1 REGISTER
8402	026660	000200		RDY		: WAIT FOR RDY BIT IN RHCS1 REGISTER
8403	026662	001614		908.		: ALLOW 9080 MICRO SECONDS
8404	026664	001507		839.		: RDY MUST SET BETWEEN
8405						: 690 AND 17470 MICRO SECONDS
8406						: COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
8407						: RO AND R5 IMMEDIATELY AFTER GO
8408	026666	013746	002362	MOV	@#REFOR, -(SP)	: SAVE COMMAND

2

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00000000 026672 052716 004101 BIS #IE!GO!DVA,(SP) :INCLUDE IE!GO!DVA
00000000 026676 011637 001124 MOV (SP),J#SGDDAT :SAVE FOR PRINTOUT
00000000 026702 022600 CMP (SP)+,R0 :DURING ABOVE OPERATION ONLY IE!GO!DVA
:AND COMMAND SHOULD BE SET
00000000 026704 001405 BEQ 645 :BRANCH IF GOOD
00000000 026706 010037 001126 MOV R0,J#SBDDAT :BAD DATA
00000000 026710 010137 004510 MOV R1,J#REGADR :FAILING REGISTER RHCS1
00000000 026716 104021 ERROR 21 :DURING ABOVE OPERATION ONLY
:COMMAND AND IE!GO!DVA SHOULD BE SET
00000000 026720 012746 010500 645: MOV #MOL!DPR!VV-(SP) :SAVE BITS SET DURING OPERATION IN RHDS1
00000000 026724 011637 001124 MOV (SP),J#SGDDAT :SAVE FOR PRINTOUT
00000000 026730 022605 CMP (SP)+,R5 :DURING ABOVE OPERATION ONLY MOL!DPR!VV
:SHOULD BE SET
00000000 026732 001405 BEQ 665 :BRANCH IF GOOD
00000000 026734 010537 001126 MOV R5,J#SBDDAT :BAD DATA
00000000 026740 010337 004510 MOV R3,J#REGADR :FAILING REGISTER RHCS1
00000000 026744 104063 ERROR 63 :DURING ABOVE OPERATION ONLY
:MOL!DPR!VV SHOULD BE SET
00000000 026746 665:
:CHANGE SAVED REGISTERS TO EXPECTED VALUES
00000000 026746 004037 034460 JSR R0,J#FILLRE :MOV 0 INTO SAVED RHWC
00000000 026752 002210 RHWC :SAVED REGISTER TO CHANGE
00000000 026754 000000 0 :DATA
00000000 026756 004037 034460 JSR R0,J#FILLRE :MOV REINTO+(260.*2) INTO SAVED RHBA
00000000 026762 002212 RHBA :SAVED REGISTER TO CHANGE
00000000 026764 004454 REINTO+(260.*2) :DATA
00000000 026766 004037 034460 JSR R0,J#FILLRE :MOV 1 INTO SAVED RHDST
00000000 026772 002222 RHDST :SAVED REGISTER TO CHANGE
00000000 026774 000001 1 :DATA
:COMPARE REGISTERS BEFORE READ HEADER AND DATA WITH
:REGISTERS AFTER COMMAND
00000000 026776 004037 035546 JSR R0,J#COMREG :COMPARE SAVED REGISTERS WITH
:PRESENT VALUE
00000000 027002 004522 SAVERE :GOOD DATA SAVED IN 'SAVERE'
00000000 027004 002266 WC :TEST DATA STARTING FROM 'RHWC'
00000000 027006 000022 18. :18. REGISTERS TO BE COMPARED
00000000 027010 027014 ST12 :RETURN TO ST12 ON ERROR
00000000 027012 027020 ST13 :RETURN TO ST13 ON NO ERROR
00000000 027014 104031 ST12: ERROR 31 :READ HEADER AND DATA CAUSED
00000000 027016 000207 RTS PC :IMPROPER REGISTER CHANGE
:GOOD DATA GIVES WHAT SHOULD
:BE THERE
:RECEIVED DATA GIVES WHAT
:WAS THERE AFTER COMMAND
:READ INTO BUFFER IS CHECKED FOR PROPER READ
00000000 027020 ST13:
00000000 027020 004037 036576 JSR R0,J#COMPAR :COMPARE TWO BLOCKS OF MEMORY
00000000 027024 002400 WRFROM :GOOD DATA STARTS FROM WRFROM
00000000 027026 003444 REINTO :TEST DATA STARTS FROM REINTO
00000000 027030 000404 260. :260. WORDS TO BE COMPARED
00000000 027032 027036 ST14 :RETURN TO ST14 ON ERROR

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00465 027034 027042 ST15 ;RETURN TO ST15 ON NO ERROR
00466
00467
00468
00469
00470
00471 027036 104032 ST14: ERROR 32 ;WRITE HEADER AND DATA
00472 027040 000207 RTS PC ;WITH AN IMPLIED SEEK
00473 ;FOLLOWED BY A READ
00474 ;HEADER AND DATA ON THE
00475 ;NEXT TRACK GAVE A
00476 ;READ ERROR
00477 ;ERROR MAY BE READ OR WRITE
00478
00479 ;THE HEADS HAVE ADVANCED ONE CYLINDER BY AN IMPLIED
00480 ;SEEK
00481 ;CHANGES WILL BE MADE TO ENABLE GOING TO THE NEXT
00482 ;CYLINDER AND THEN THE ABOVE WILL BE REPEATED
00483 ;TILL CYLINDER 10 IS REACHED
00484
00485 027042 005237 026156 ST15: INC @#ST1+10
00486 027046 062737 002000 026176 ADD #<1.*2000>, @#ST2+10
00487 027054 005237 026210 INC @#ST3+10
00488 027060 062737 002000 026230 ADD #<1.*2000>, @#ST4+10
00489 027066 005237 026236 INC @#ST5+4
00490 027072 005237 026440 INC @#ST6+6
00491 027076 005237 026450 INC @#ST6+16
00492 027102 005237 026532 INC @#ST9+10
00493 027106 062737 002000 026552 ADD #<1.*2000>, @#ST10+10
00494 027114 005237 026572 INC @#ST11+4
00495 027120 005337 001176 DEC @#STMP1 ;COUNT FOR TEN TIMES
00496 027124 001001 BNE ST16 ;BRANCH IF 10 NOT DONE
00497 027126 000402 BR ST17 ;10 COMPLETED SO CONTINUE
00498 027130 000167 177012 ST16: JMP ST1 ;JUMP AS 10 NOT DONE
00499
00500 ;THE HEADS ARE NOW AT CYLINDER 10
00501 ;ALL REGISTERS WILL BE SAVED AND A SEEK WILL BE GIVEN
00502 ;TO CYLINDER 0
00503
00504 ;FILL REGISTERS FOR A SEEK COMMAND
00505
00506 027134 ST17:
00507
00508 027134 004737 034556 JSR PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
00509 ;R3-RHDS1, R4-RHER1
00510 ;GIVE RH-11 INITIALIZE
00511 ;SETUP UNIT NUBER
00512
00513
00514 027140 004037 034526 JSR RO, @#SEEKCY ;SEEK FOR
00515 027144 000000 0 ;CYLINDER 0
00516
00517 ;SAVE REGISTERS FOR COMPARISON AFTER SEEK COMMAND
00518 JSR RO, @#SAVER ;SAVE REGISTERS
00519 RHWC ;RHWC IS THE FIRST REGISTER SAVED
00520 SAVERE ;STARTING ADDRES OF WHERE
00521 ;THE REGISTERS ARE SAVED
00522 18. ;NUMBER OF REGISTERS
00523 ;SAVED = 18.
00524
00525 027160 013777 004516 153016 MOV @#RP4VEC, @#RPVEC ;SET RPO4 VECTOR ADDRESS
00526 ;TO 'TIME1' IF P-CLOCK IS PRESENT

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:OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
: 'TIME' WILL ONLY SAVE
: CURRENT CYLINDER ADDRESS
: AND LOOK AHEAD REGISTERS

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027166 013746 002364 MOV 3#SEECOM, -(SP) ;GET READY TO MOVE COMMAND
027172 052716 000101 BIS #GO!IE, (SP) ;GET READY TO SET GO AND
;ENABLE INTERRUPT
027176 012677 153014 MOV (SP)+, 3RHCS1 ;GO WITH
;4 IN RHCS1 FOR SEEK
;WITH INTERRUPT ENABLED
027202 011100 MOV 3R1, R0 ;SAVE RHCS1 DURING ABOVE OPERATION
027204 011305 MOV 3R3, R5 ;SAVE RHDS1 DURING ABOVE OPERATION
;SEEK FOR ONE CYLINDER=7MILI SEC., FOR TEN=70 MILI SEC
027206 104410 WAT ;WAIT FOR DRY BIT TO SET
027210 002240 RHDS1 ;WAIT FOR RHDS1 REGISTER
027212 000200 DRY ;WAIT FOR DRY BIT IN RHDS1 REGISTER
027214 015530 7000. ;ALLOW 70000 MICRO SECONDS
027216 000043 35. ;DRY MUST SET BETWEEN
;69650 AND 70350 MICRO SECONDS
;COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
;R0 AND R5 IMMEDIATELY AFTER GO
027220 013746 002364 MOV 3#SEECOM, -(SP) ;SAVE COMMAND
027224 052716 004301 BIS #DVA!GO!IE!RDY, (SP) ;INCLUDE DVA!GO!IE!RDY
027230 011637 001124 MOV (SP), 3#SGDDAT ;SAVE FOR PRINTOUT
027234 022600 CMP (SP)+, R0 ;DURING ABOVE OPERATION ONLY DVA!GO!IE!RDY
;AND COMMAND SHOULD BE SET
027236 001405 BEQ 64$ ;BRANCH IF GOOD
027240 010037 001126 MOV R0, 3#SBDDAT ;BAD DATA
027244 010137 004510 MOV R1, 3#REGADR ;FAILING REGISTER RHCS1
027250 104021 ERROR 21 ;DURING ABOVE OPERATION ONLY
;COMMAND AND DVA!GO!IE!RDY SHOULD BE SET
027252 012746 030500 64$: MOV #PIP!MOL!DPR!VV, -(SP) ;SAVE BITS SET DURING OPERATION IN RHDS1
027256 011637 001124 MOV (SP), 3#SGDDAT ;SAVE FOR PRINTOUT
027262 022605 CMP (SP)+, R5 ;DURING ABOVE OPERATION ONLY PIP!MOL!DPR!VV
;SHOULD BE SET
027264 001405 BEQ 66$ ;BRANCH IF GOOD
027266 010537 001126 MOV R5, 3#SBDDAT ;BAD DATA
027272 010337 004510 MOV R3, 3#REGADR ;FAILING REGISTER RHDS1
027276 104063 ERROR 63 ;DURING ABOVE OPERATION ONLY
;PIP!MOL!DPR!VV SHOULD BE SET
027300 66$: ;NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
027300 004037 034460 JSR R0, 3#FILLRE ;MOV 0 INTO SAVED RHCC
027304 002252 RHCC ;SAVED REGISTER TO CHANGE
027306 000000 0 ;DATA
027310 053737 004650 004546 BIS 3#ATTENT, 3#SAVERE+24 ;SET APPROPRIATE ATA BITS
;FOR WORKING DRIVE IN
;SAVED RHAS LOACTION
027316 004037 035440 JSR R0, 3#CHREG ;CHANGE BITS IN SAVED REGISTER
027322 002240 RHDS1 ;CHANGE RHDS1 REGISTER

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8577
8578 027324 000001      1      ;1 BIT/BITS TO BE CHANGED
8579 027326 000001      1      ;NEW VALUE OF ATA IS 1
8580 027330 100000      ATA     ;CHANGE ATA BIT
8581
8582 027332 004037 035440 JSR     RO,2#CHREG ;CHANGE BITS IN SAVED REGISTER
8583 027336 002216      RHCS1  ;CHANGE RHCS1 REGISTER
8584
8585 027340 000001      1      ;1 BIT/BITS TO BE CHANGED
8586 027342 000001      1      ;NEW VALUE OF SC IS 1
8587 027344 100000      SC     ;CHANGE SC BIT
8588
8589      ;COMPARE REGISTERS AFTER A SEEK COMMAND
8590
8591 027346 004037 035546 JSR     RO,2#COMREG ;COMPARE SAVED REGISTERS WITH
8592      ;PRESENT VALUE
8593 027352 004522      SAVERE ;GOOD DATA SAVED IN 'SAVERE'
8594 027354 002266      WC     ;TEST DATA STARTING FROM 'RHWC'
8595 027356 000022      18.  ;18. REGISTERS TO BE COMPARED
8596 027360 027364      ST18  ;RETURN TO ST18 ON ERROR
8597 027362 027370      ST19  ;RETURN TO ST19 ON NO ERROR
8598
8599 027364 104037      ST18:  ERROR 37 ;SEEK COMMAND CAUSED AN
8600 027366 000207      RTS    PC  ;ERROR
8601      ;GOOD DATA GIVES WHAT SHOULD
8602      ;BE THERE
8603      ;RECEIVED DATA GIVES WHAT WAS
8604      ;THERE AFTER A SEEK COMMAND
8605
8606      ;AT THIS POINT THE CURRENT CYLINDER IS GOOD AND THERE ARE
8607      ;NO ERROR BITS
8608      ;A READ HEADER AND DATA WILL BE DONE ON CYLINDER 0
8609      ;SECTOR 21 TRACK 19, EXPECTED DATA IS 1125
8610      ;FOR 10 WORDS
8611      ;CLEAR READ INTO BUFFER WITH ALL ONES
8612 027370      ST19:  JSR     RO,2#CLAREA ;CLEAR 260. WORDS, FROM REINTO
8613 027370 004037 034426 REINTO ;STARTING FROM REINTO
8614 027374 003444      260. ;260. WORDS
8615 027376 000404      -1    ;FILL WITH -1
8616 027400 177777
8617
8618      ;FILL WRITE FROM BUFFER WITH EXPECTED DATA
8619
8620 027402 004037 034402 JSR     RO,2#FLHEAD ;SAVE HEADER DATA IN WRFROM
8621 027406 002400      WRFROM ;LOCATION WHERE SAVED
8622 027410 000004      4      ;NUMBER OF WORDS SAVED
8623 027412 010000      10000 ;FIRST DATA WORD
8624 027414 011025      <18.*400>!<21.> ;SECOND DATA WORD
8625 027416 000000      0      ;THIRD DATA WORD
8626 027420 000000      0      ;FOURTH DATA WORD
8627 027422 004037 034426 JSR     RO,2#CLAREA ;CLEAR 10. WORDS, FROM WRFROM+<4.*2>
8628 027426 002410      WRFROM+<4.*2> ;STARTING FROM WRFROM+<4.*2>
8629 027430 000012      10.  ;10. WORDS
8630 027432 001125      <18.*40>!<21.> ;FILL WITH <18.*40>!<21.>
8631
8632 027434 004037 034426 JSR     RO,2#CLAREA ;CLEAR 246. WORDS, FROM WRFROM+<14.*2>

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8633 027440 002434 WRFROM+<14.*2> ;STARTING FROM WRFROM+<14.*2>
8634 027442 000366 246. ;246. WORDS
8635 027444 177777 -1 ;FILL WITH -1
8636
8637
8638 ;FILL READ HEADER AND DATA COMMAND FOR 10 WORDS
8639
8640 027446 004037 036532 JSR RO, @#RUN ;SETUP TO RUN FOR DATA COMMAND
8641 027452 000000 0 ;CYLINDER 0
8642 027454 025 .BYTE 21. ;SECTOR 21.
8643 027455 022 .BYTE 18. ;TRACK 18.
8644 027456 177762 -10.-4 ;WORD COUNT (DATA)=10.+
8645 ;4 HEADER WORDS
8646 027460 003444 REINTO ;BUS ADDRESS
8647 ;STARTING ADDRESS OF DATA
8648 ;BUFFER = REINTO
8649 027462 000000 0 ;DO NOT INHIBIT BUS ADDRESS INCREMENT
8650 027464 014000 ECI!FMT22 ;16 BITS PER WORD FORMAT
8651 ;INHIBIT ECC CORRECTION
8652 ;DO NOT INHIBIT HEADER COMPARE
8653 027466 002362 REFOR ;GET READY TO DO A REFOR
8654 ;READ HEADER AND DATA WITH 72 IN RHCS1
8655
8656
8657 027470 004737 034636 JSR PC, @#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV
8658
8659
8660 027474 013777 004516 152502 MOV @#RP4VEC, @RPVEC ;SET RPO4 VECTOR ADDRESS
8661 ;TO 'TIME1' IF P-CLOCK IS PRESENT
8662 ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
8663 ;'TIME' WILL ONLY SAVE
8664 ;CURRENT CYLINDER ADDRESS
8665 ;AND LOOK AHEAD REGISTERS
8666
8667
8668 027502 013746 002362 MOV @#REFOR, -(SP) ;GET READY TO MOVE COMMAND
8669 027506 052716 000101 BIS #GO!IE, (SP) ;GET READY TO SET GO AND
8670 ;ENABLE INTERRUPT
8671 027512 012677 152500 MOV (SP)+, @RHCS1 ;GO WITH
8672 ;72 IN RHCS1 FOR READ DATA
8673 ;WITH INTERRUPT ENABLED
8674
8675
8676 027516 104410 WAT ;WAIT FOR RDY BIT TO SET
8677 027520 002216 RHCS1 ;WAIT FOR RHCS1 REGISTER
8678 027522 000200 RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
8679 027524 001614 908. ;ALLOW 9080 MICRO SECONDS
8680 027526 001507 839. ;RDY MUST SET BETWEEN
8681 ;690 AND 17470 MICRO SECONDS
8682
8683 ;CHECK READ WORDS
8684
8685 027530 004037 036576 JSR RO, @#COMPAR ;COMPARE TWO BLOCKS OF MEMORY
8686 027534 002400 WRFROM ;GOOD DATA STARTS FROM WRFROM
8687 027536 003444 REINTO ;TEST DATA STARTS FROM REINTO
8688 027540 000404 260. ;260. WORDS TO BE COMPARED

```


G14

MAINDEC-11-DERPU-8
DERPUB.P11 T32

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SEEK TEST

8689 027542 027546
8690 027544 027552
8691
8692
8693
8694 027546 104032
8695 027550 000207
8696
8697
8698 027552
8699
8700

ST26
ST27

ST26: ERROR 32
RTS PC

ST27:

;RETURN TO ST26 ON ERROR
;RETURN TO ST27 ON NO ERROR

;READ HEADER AND DATA
;FOLLOWING A SEEK TO CYLINDER 0
;FROM CYLINDER 10 GAVE AN
;ERROR

```

8701
8702
8703
8704
8705
8706
8707
8708
8709
8710
8711
8712
8713 027552 000004
8714 027554 012706 001000
8715 027560 012737 000033 004514
8716
8717 027566 004737 034556
8718
8719
8720
8721
8722 027572 013777 004516 152404
8723
8724
8725
8726
8727
8728
8729 027600 013746 002340
8730 027604 052716 000101
8731
8732 027610 012677 152402
8733
8734
8735 027614 011100
8736 027616 011305
8737
8738 027620 104410
8739 027622 002240
8740 027624 000200
8741 027626 076377
8742 027630 056701
8743
8744
8745
8746 027632 004037 034526
8747 027636 000012
8748
8749
8750 027640 004037 034716
8751 027644 002210
8752 027646 004522
8753
8754 027650 000022
8755
8756

```

```

;*****
;*TEST 33      SEEK TEST
;
; THIS TEST DEPENDS ON HEADER AND DATA WRITTEN BY THE
; PREVIOUS TEST.  AT THIS POINT THE HEADS ARE ON
; CYLINDER 0
;
; ALL REGISTERS ARE SAVED
; A SEEK IS GIVEN TO CYLINDER 9
; ALL REGISTERS ARE CHECKED FOR IMPROPER CHANGE
; DATA WRITTEN ON CYLINDER 9 IS CHECKED
;*****
†ST33: SCOPE
      MOV      #STACK,SP      ;RESET STACK
      MOV      #33,‡#†STNM    ;SAVE TEST NUMBER
      JSR      PC,‡#CLDISK    ;SET R1-RHCS1, R2-RHCS2
                                ;R3-RHDS1, R4-RHER1
                                ;GIVE RH-11 INITIALIZE
                                ;SETUP UNIT NUBER
      ;THIS GETS HEADS TO CYLINDER 0
      MOV      ‡#RP4VEC,‡RPVEC ;SET RPO4 VECTOR ADDRESS
                                ;TO 'TIME1' IF P-CLOCK IS PRESENT
                                ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
                                ;'TIME' WILL ONLY SAVE
                                ;CURRENT CYLINDER ADDRESS
                                ;AND LOOK AHEAD REGISTERS
      MOV      ‡#RECALI, -(SP) ;GET READY TO MOVE COMMAND
      BIS      #GO!IE, (SP)    ;GET READY TO SET GO AND
                                ;ENABLE INTERRUPT
      MOV      (SP)+,‡RHCS1    ;GO WITH
                                ;6 IN RHCS1 FOR RECALIBRATE
                                ;WITH INTERRUPT ENABLED
      MOV      ‡R1,R0          ;SAVE RHCS1 DURING ABOVE OPERATION
      MOV      ‡R3,R5          ;SAVE RHDS1 DURING ABOVE OPERATION
      WAT                      ;WAIT FOR DRY BIT TO SET
      RHDS1                    ;WAIT FOR RHDS1 REGISTER
      DRY                      ;WAIT FOR DRY BIT IN RHDS1 REGISTER
      31999.                   ;ALLOW 319990 MICRO SECONDS
      24001.                   ;DRY MUST SET BETWEEN
                                ;79980 AND 560000 MICRO SECONDS
      ;FILL REGISTERS FOR A SEEK COMMAND
      JSR      R0,‡#SEEKCY     ;SEEK FOR
      10.                      ;CYLINDER 10.
      ;SAVE REGISTERS FOR COMPARISON AFTER SEEK COMMAND
      JSR      R0,‡#SAVER     ;SAVE REGISTERS
      RHWC                    ;RHWC IS THE FIRST REGISTER SAVED
      SAVERE                   ;STARTING ADDRES OF WHERE
                                ;THE REGISTERS ARE SAVED
      18.                      ;NUMBER OF REGISTERS
                                ;SAVED = 18.

```

303


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8813
8814 030010 004037 035440 JSR RO,2#CHREG ;CHANGE BITS IN SAVED REGISTER
8815 030014 002240 RHDS1 ;CHANGE RHDS1 REGISTER
8816
8817 030016 000001 1 ;1 BIT/BITS TO BE CHANGED
8818 030020 000001 1 ;NEW VALUE OF ATA IS 1
8819 030022 100000 ATA ;CHANGE ATA BIT
8820
8821 030024 004037 035440 JSR RO,2#CHREG ;CHANGE BITS IN SAVED REGISTER
8822 030030 002216 RHCS1 ;CHANGE RHCS1 REGISTER
8823
8824 030032 000001 1 ;1 BIT/BITS TO BE CHANGED
8825 030034 000001 1 ;NEW VALUE OF SC IS 1
8826 030036 100000 SC ;CHANGE SC BIT
8827
8828 ;COMPARE REGISTERS AFTER A SEEK COMMAND
8829
8830 030040 004037 035546 JSR RO,2#COMREG ;COMPARE SAVED REGISTERS WITH
8831 ;PRESENT VALUE
8832 030044 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
8833 030046 002266 WC ;TEST DATA STARTING FROM 'RHWC'
8834 030050 000022 18. ;18. REGISTERS TO BE COMPARED
8835 030052 030056 1$ ;RETURN TO 1$ ON ERROR
8836 030054 030062 2$ ;RETURN TO 2$ ON NO ERROR
8837
8838 030056 104037 1$: ERROR 37 ;SEEK COMMAND CAUSED
8839 030060 000207 RTS PC ;ERROR
8840 ;GOOD DATA GIVES WHAT SHOULD
8841 ;BE THERE
8842 ;RECEIVED DATA GIVES WHAT WAS
8843 ;THERE AFTER A SEEK COMMAND
8844
8845
8846 ;AT THIS POINT THE CURRENT CYLINDER IS GOOD AND THERE ARE
8847 ;NO ERROR BITS
8848 ;A READ HEADER AND DATA WILL BE DONE ON CYLINDER 9
8849 ;SECTOR 21 TRACK 18, EXPECTED DATA IS 23125
8850 ;FOR 20 WORDS
8851 ;CLEAR READ INTO BUFFER WITH ALL ONES
8852 030062 2$:
8853
8854 030062 004737 034556 JSR PC,2#CLDISK ;SET R1-RHCS1, R2-RHCS2
8855 ;R3-RHDS1, R4-RHER1
8856 ;GIVE RH-11 INITIALIZE
8857 ;SETUP UNIT NUMBER
8858 030066 004037 034426 JSR RO,2#CLAREA ;CLEAR 260. WORDS. FROM REINTO
8859 030072 003444 REINTO ;STARTING FROM REINTO
8860 030074 000404 260. ;260. WORDS
8861 030076 177777 -1 ;FILL WITH -1
8862
8863 ;FILL WRITE FROM BUFFER WITH EXPECTED DATA
8864
8865 030100 004037 034402 JSR RO,2#FLHEAD ;SAVE HEADER DATA IN WRFROM
8866 030104 002400 WRFROM ;LOCATION WHERE SAVED
8867 030106 000004 4 ;NUMBER OF WORDS SAVED
8868 030110 010011 10011 ;FIRST DATA WORD

```

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8869 030112 011025 <18.*400>!<21.> ;SECOND DATA WORD
8870 030114 000000 0 ;THIRD DATA WORD
8871 030116 000000 0 ;FOURTH DATA WORD
8872 030120 004037 034426 JSR RO,@#CLAREA ;CLEAR 20. WORDS, FROM WRFROM+<4.*2>
8873 030124 002410 WRFROM+<4.*2> ;STARTING FROM WRFROM+<4.*2>
8874 030126 000024 20. ;20. WORDS
8875 030130 023125 <9.*2000>!<18.*40>!<21.> ;FILL WITH <9.*2000>!<18.*40>!<2
8876
8877 030132 004037 034426 JSR RO,@#CLAREA ;CLEAR 250. WORDS, FROM WRFROM+<24.*2>
8878 030136 002460 WRFROM+<24.*2> ;STARTING FROM WRFROM+<24.*2>
8879 030140 000372 250. ;250. WORDS
8880 030142 177777 -1 ;FILL WITH -1
8881
8882
8883 ;FILL READ HEADER AND DATA COMMAND FOR 10 WORDS
8884
8885 030144 004037 036532 JSR RO,@#RUN ;SETUP TO RUN FOR DATA COMMAND
8886 030150 000011 9. ;CYLINDER 9.
8887 030152 025 .BYTE 21. ;SECTOR 21.
8888 030153 022 .BYTE 18. ;TRACK 18.
8889 030154 177750 -20.-4 ;WORD COUNT (DATA)=20.+
8890 ;4 HEADER WORDS
8891 030156 003444 REINTO ;BUS ADDRESS
8892 ;STARTING ADDRESS OF DATA
8893 ;BUFFER = REINTO
8894 030160 000000 0 ;DO NOT INHIBIT BUS ADDRESS INCREMENT
8895 030162 014000 ECI!FMT22 ;16 BITS PER WORD FORMAT
8896 ;INHIBIT ECC CORRECTION
8897 ;DO NOT INHIBIT HEADER COMPARE
8898 030164 002362 REFOR ;GET READY TO DO A REFOR
8899 ;READ HEADER AND DATA WITH 72 IN RHCS1
8900
8901
8902 030166 004737 034636 JSR PC,@#CHECKT ;CHECK DVA,RDY,MOL,DPR,DRY,VV
8903
8904
8905 030172 013777 004516 152004 MOV @#RP4VEC,@RPVEC ;SET RPO4 VECTOR ADDRESS
8906 ;TO 'TIME1' IF P-CLOCK IS PRESENT
8907 ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
8908 ;'TIME' WILL ONLY SAVE
8909 ;CURRENT CYLINDER ADDRESS
8910 ;AND LOOK AHEAD REGISTERS
8911
8912
8913 030200 013746 002362 MOV @#REFOR,-(SP) ;GET READY TO MOVE COMMAND
8914 030204 052716 000101 BIS #GO!IE,(SP) ;GET READY TO SET GO AND
8915 ;ENABLE INTERRUPT
8916 030210 012677 152002 MOV (SP)+,@RHCS1 ;GO WITH
8917 ;72 IN RHCS1 FOR READ DATA
8918 ;WITH INTERRUPT ENABLED
8919
8920
8921 030214 104410 WAT ;WAIT FOR RDY BIT TO SET
8922 030216 002216 RHCS1 ;WAIT FOR RHCS1 REGISTER
8923 030220 000200 RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
8924 030222 001614 908. ;ALLOW 9080 MICRO SECONDS

```

8925 030224 001507
8926
8927
8928
8929
8930 030226 004037 036576
8931 030232 002400
8932 030234 003444
8933 030236 000404
8934 030240 030244
8935 030242 030250
8936
8937
8938 030244 104032
8939 030246 000207
8940
8941
8942 030250
8943
8944
8945
8946
8947
8948

839.

;RDY MUST SET BETWEEN
;690 AND 17470 MICRO SECONDS

;CHECK READ WORDS

JSR RO, @#COMPAR
WRFROM
REINTO
260.
3\$
4\$

;COMPARE TWO BLOCKS OF MEMCRY
;GOOD DATA STARTS FROM WRFROM
;TEST DATA STARTS FROM REINTO
;260. WORDS TO BE COMPARED
;RETURN TO 3\$ ON ERROR
;RETURN TO 4\$ ON NO ERROR

3\$: ERROR 32
RTS PC

;READ HEADER AND DATA
;FOLLOWING A SEEK TO CYLINDER 9
;FROM CYLINDER 0 GAVE AN
;ERROR

4\$:

11/18

11/18

8949
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8951
8952
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8954
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8959
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8961
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8964
8965
8966
8967
8968
8969
8970
8971
8972
8973
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8975
8976
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8986
8987
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8989
8990
8991
8992
8993
8994
8995
8996
8997
8998
8999
9000
9001
9002
9003
9004

030250 000004
030252 012706 001000
030256 012737 000034 004514
030264 004737 034556
030270 004037 034526
030274 000005
030276 013777 004516 151700
030304 013746 002364
030310 052716 000101
030314 012677 151676
030320 011100
030322 011305
030324 104410
030326 002240

*TEST 34 WRITE CHECK HEADER AND DATA

* WRITE CHECK HEADER AND DATA CYLINDER 5 FORMAT 16 BITS PER WORD
* TRACK 7, SECTOR 4, KEYS 0, NUMBER OF WORDS 266
* CONSISTING OF
* 10 WORDS OF 12344 (6 BITS FOR CYL, 5 FOR TRACK, 5 FOR SECTOR)
* 10 WORDS OF 177777
* 10 WORDS OF 0
* 10 WORDS OF 052525
* 10 WORDS OF 125252
* 16 WORDS OF LEFT ROTATING ZERO (EG 177776, 177775)
* 16 WORDS OF LEFT ROTATING ONE (EG 1, 2, 4, 10)
* 174 WORDS OF 377
* 4 WORDS OF HEADER
* 2 WORDS OF 12345

* FIRST THE ABOVE DATA IS WRITTEN BY A WRITE HEADER AND
* DATA COMMAND
* CHECK FOR NO ERRORS
* THEN THE ABOVE DATA IS READ BY A READ HEADER AND DATA
* CHECK FOR NO ERRORS
* THEN THE ABOVE WRITE CHECK HEADER AND DATA IS GIVEN

TST34: SCOPE
MOV #STACK, SP ;RESET STACK
MOV #34, @#TSTNM ;SAVE TEST NUMBER
JSR PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUMBER
;GET HEADS TO CYLINDER 5
JSR RO, @#SEEKCY ;SEEK FOR
5 ;CYLINDER 5
MOV @#RP4VEC, @RPVEC ;SET RPO4 VECTOR ADDRESS
;TO 'TIME1' IF P-CLOCK IS PRESENT
;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
;'TIME' WILL ONLY SAVE
;CURRENT CYLINDER ADDRESS
;AND LOOK AHEAD REGISTERS
MOV @#SEECOM, -(SP) ;GET READY TO MOVE COMMAND
BIS #GO!IE, (SP) ;GET READY TO SET GO AND
;ENABLE INTERRUPT
MOV (SP)+, @RHCS1 ;GO WITH
;4 IN RHCS1 FOR SEEK
;WITH INTERRUPT ENABLED
MOV @R1, RO ;SAVE RHCS1 DURING ABOVE OPERATION
MOV @R3, R5 ;SAVE RHDS1 DURING ABOVE OPERATION
WAT ;WAIT FOR DRY BIT TO SET
RHDS1 ;WAIT FOR RHDS1 REGISTER

```

9005 030330 000200          DRY          ;WAIT FOR DRY BIT IN RHDS1 REGISTER
9006 030332 015530          7000.        ;ALLOW 7000 MICRO SECONDS
9007 030334 000043          35.          ;DRY MUST SET BETWEEN
9008                                ;69650 AND 70350 MICRO SECONDS
9009
9010 030336 004737 034556   JSR    PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
9011                                ;R3-RHDS1, R4-RHER1
9012                                ;GIVE RH-11 INITIALIZE
9013                                ;SETUP UNIT NUBER
9014                                ;FILL WRITE FROM BUFFER WITH HEADER
9015
9016 030342 004037 034402   JSR    RO, @#FLHEAD ;SAVE HEADER DATA IN WRFROM
9017 030346 002400          WRFROM        ;LOCATION WHERE SAVED
9018 030350 000004          4            ;NUMBER OF WORDS SAVED
9019 030352 010005          10005        ;FIRST DATA WORD
9020 030354 003404          <7*400>!4    ;SECOND DATA WORD
9021 030356 000000          0            ;THIRD DATA WORD
9022 030360 000000          0            ;FOURTH DATA WORD
9023
9024                                ;10 WORDS OF OF THE FOLLOWING DATA
9025                                ; 12344,17777,0,52525,125252
9026 030362 004037 034426   JSR    RO, @#CLAREA ;CLEAR 10. WORDS, FROM WRFROM+<4*2>
9027 030366 002410          WRFROM+<4*2> ;STARTING FROM WRFROM+<4*2>
9028 030370 000012          10.          ;10. WORDS
9029 030372 012344          <5*2000>!<7*40>!4 ;FILL WITH <5*2000>!<7*40>!4
9030
9031 030374 004037 034426   JSR    RO, @#CLAREA ;CLEAR 10. WORDS, FROM WRFROM+<14.*2>
9032 030400 002434          WRFROM+<14.*2> ;STARTING FROM WRFROM+<14.*2>
9033 030402 000012          10.          ;10. WORDS
9034 030404 177777          -1          ;FILL WITH -1
9035
9036 030406 004037 034426   JSR    RO, @#CLAREA ;CLEAR 10. WORDS, FROM WRFROM+<24.*2>
9037 030412 002460          WRFROM+<24.*2> ;STARTING FROM WRFROM+<24.*2>
9038 030414 000012          10.          ;10. WORDS
9039 030416 000000          0            ;FILL WITH 0
9040
9041 030420 004037 034426   JSR    RO, @#CLAREA ;CLEAR 10. WORDS, FROM WRFROM+<34.*2>
9042 030424 002504          WRFROM+<34.*2> ;STARTING FROM WRFROM+<34.*2>
9043 030426 000012          10.          ;10. WORDS
9044 030430 052525          52525        ;FILL WITH 52525
9045
9046 030432 004037 034426   JSR    RO, @#CLAREA ;CLEAR 10. WORDS, FROM WRFROM+<44.*2>
9047 030436 002530          WRFROM+<44.*2> ;STARTING FROM WRFROM+<44.*2>
9048 030440 000012          10.          ;10. WORDS
9049 030442 125252          125252       ;FILL WITH 125252
9050
9051                                ;FILL LEFT ROTATING ZEROS FROM WRFROM+<54.*2>
9052                                MOV    R1, -(SP) ;: PUSH R1 ON STACK
9053 030444 010146          177776       MOV    #177776, RO ;: DATA
9054 030446 012700          000020       MOV    #16, R5 ;: COUNT
9055 030452 012705          002554       MOV    #WRFROM+<54.*2>, R1 ;: WHERE DATA GOES
9056 030456 012701          15:          SEC
9057 030462 000261          ;: STORE DATA
9058 030464 010021          ;: GET ZERO ONE BIT LEFT
9059 030466 006100          ;: COUNT 16
9060 030470 005305

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9.061 030472 001374          BNE      18          ;BRANCH IF 18 NOT DONE
9.062                                     ;FILL LEFT ROTATING ONE INTO WRFROM+<65.*2>
9.063 030474 000241          CLC
9.064 030476 012700          MOV      #1,R0
9.065 030502 010021          MOV      R0,(R1)+
9.066 030504 005300          ASL      R0
9.067 030506 103375          BCC      28
9.068 030510 012601          MOV      (SP)+,R1          ;;POP STACK INTO R1
9.069
9.070
9.071 030512 004037 034426          ;FILL REST OF DATA
9.072 030514 002654          JSR      R0,3#CLAREA          ;CLEAR 174. WORDS, FROM WRFROM+<86.*2>
9.073 030520 000256          WRFROM+<86.*2>          ;STARTING FROM WRFROM+<86.*2>
9.074 030522 000377          174.          ;174. WORDS
9.075                                     377          ;FILL WITH 377
9.076
9.077
9.078 030524 004037 034402          JSR      R0,3#FLHEAD          ;SAVE HEADER DATA IN WRFROM+<260.*2>
9.079 030526 003410          WRFROM+<260.*2>          ;LOCATION WHERE SAVED
9.080 030528 000004          4          ;NUMBER OF WORDS SAVED
9.081 030530 010005          10005          ;FIRST DATA WORD
9.082 030532 003405          <7*400>!5          ;SECOND DATA WORD
9.083 030534 000000          0          ;THIRD DATA WORD
9.084 030536 000000          0          ;FOURTH DATA WORD
9.085 030538 004037 034426          JSR      R0,3#CLAREA          ;CLEAR 2 WORDS, FROM WRFROM+<264.*2>
9.086 030540 003420          WRFROM+<264.*2>          ;STARTING FROM WRFROM+<264.*2>
9.087 030542 000002          2          ;2 WORDS
9.088 030544 012345          <5*2000>!<7*40>!5          ;FILL WITH <5*2000>!<7*40>!5
9.089
9.090
9.091
9.092
9.093
9.094 030556 004037 034426          ;READ INTO BUFFER WILL BE CLEARED
9.095 030558 003444          JSR      R0,3#CLAREA          ;CLEAR 266. WORDS, FROM REINTO
9.096 030560 000412          REINTO          ;STARTING FROM REINTO
9.097 030562 177400          266.          ;266. WORDS
9.098                                     177400          ;FILL WITH 177400
9.099
9.100
9.101
9.102
9.103 030570 004037 036532          ;THE WRITE HEADER AND DATA COMMAND WILL BE LOADED
9.104 030572 000005          JSR      R0,3#RUN          ;SETUP TO RUN FOR DATA COMMAND
9.105 030574 004          5          ;CYLINDER 5
9.106 030576 007          4          ;SECTOR 4
9.107 030578 177366          7          ;TRACK 7
9.108 030580 002400          -262.-4          ;WORD COUNT (DATA)=262.+
9.109                                     WRFROM          ;4 HEADER WORDS
9.110                                     ;BUS ADDRESS
9.111 030604 000000          0          ;STARTING ADDRESS OF DATA
9.112 030606 010000          FMT22          ;BUFFER = WRFROM
9.113                                     ;DO NOT INHIBIT BUS ADDRESS INCREMENT
9.114                                     ;16 BITS PER WORD FORMAT
9.115 030610 002356          WRIFOR          ;DO NOT INHIBIT ECC CORRECTION
9.116                                     ;DO NOT INHIBIT HEADER COMPARE
9.117                                     ;GET READY TO DO A WRIFOR
9.118                                     ;WRITE HEADER AND DATA WITH 62 IN RHCS1

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0117
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0121 030612 004037 034716 ;NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE HEADER AND DATA
0122 030616 002210 JSR RO,@#SAVER ;SAVE REGISTERS
0123 030620 004522 RHWC ;RHWC IS THE FIRST REGISTER SAVED
0124 030622 000022 SAVERE ;STARTING ADDRESS OF WHERE
18. ;THE REGISTERS ARE SAVED
;NUMBER OF REGISTERS
;SAVED = 18.

0125
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0130 030624 004737 034636 JSR PC,@#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV

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0136 030630 013777 004516 151346 MOV @#RP4VEC,@#RPVEC ;SET RP04 VECTOR ADDRESS
0137 ;TO 'TIME1' IF P-CLOCK IS PRESENT
0138 ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
0139 ;'TIME' WILL ONLY SAVE
0140 ;CURRENT CYLINDER ADDRESS
0141 ;AND LOOK AHEAD REGISTERS

0142
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0145
0146 030636 013746 002356 MOV @#WRIFOR,-(SP) ;GET READY TO MOVE COMMAND
0147 030642 052716 000101 BIS #GO!IE,(SP) ;GET READY TO SET GO AND
0148 ;ENABLE INTERRUPT
0149 030646 012677 151344 MOV (SP)+,@#RHCS1 ;GO WITH
0150 ;62 IN RHCS1 FOR WRITE HEADER AND DATA
0151 ;WITH INTERRUPT ENABLED

0152
0153
0154
0155
0156 030652 104410 WAT ;WAIT FOR RDY BIT TO SET
0157 030654 002216 RHCS1 ;WAIT FOR RHCS1 REGISTER
0158 030656 000200 RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
0159 030660 001732 986. ;ALLOW 9860 MICRO SECONDS
0160 030662 001502 834. ;RDY MUST SET BETWEEN
;1520 AND 19200 MICRO SECONDS

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9173 030730 030736          4$          ;RETURN TO 4$ ON NO ERROR
9174
9175 030732 104027        3$:      ERROR 27      ;WRITE HEADER AND DATA
9176 030734 000207          RTS      PC      ;CAUSED IMPROPER REGISTER
9177
9178
9179
9180
9181
9182
9183
9184 030736          4$:          ;NOW FILL COMMAND FOR READ
9185
9186 030736 004737 034556    JSR      PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
9187
9188
9189
9190
9191 030742 004037 036532    JSR      RO, @#RUN    ;SETUP TO RUN FOR DATA COMMAND
9192 030746 000005          S          ;CYLINDER 5.
9193 030750          .BYTE 4          ;SECTOR 4
9194 030751          .BYTE 7          ;TRACK 7
9195 030752 177366          -262.-4 ;WORD COUNT (DATA)=262.+
9196
9197 030754 003444          REINTO   ;4 HEADER WORDS
9198
9199
9200 030756 000000          0          ;BUS ADDRESS
9201 030760 014000          ECI!FMT22 ;STARTING ADDRESS OF DATA
9202
9203
9204 030762 002362          REFOR    ;BUFFER = REINTO
9205
9206
9207
9208
9209 030764 004037 034716    JSR      RO, @#SAVER ;DO NOT INHIBIT BUS ADDRESS INCREMENT
9210 030770 002210          RHWC      ;16 BITS PER WORD FORMAT
9211 030772 004522          SAVERE   ;INHIBIT ECC CORRECTION
9212
9213 030774 000022          18.     ;DO NOT INHIBIT HEADER COMPARE
9214
9215
9216 030776 004737 034636    JSR      PC, @#CHECKT ;GET READY TO DO A REFOR
9217
9218
9219 031002 013777 004516 151174 MOV      @#RP4VEC, @#RPVEC ;READ HEADER AND DATA WITH 72 IN RHCS1
9220
9221
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9226
9227 031010 013746 002362    MOV      @#REFOR, -(SP) ;NOW SAVE REGISTERS FOR COMPARISON AFTER READ HEADER AND DATA
9228 031014 052716 000101    BIS      @#GO!IE, (SP) ;SAVE REGISTERS

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;RHWC IS THE FIRST REGISTER SAVED
;STARTING ADDRESS OF WHERE
;THE REGISTERS ARE SAVED
;NUMBER OF REGISTERS
;SAVED = 18.
;CHECK DVA, RDY, MOL, DPR, DRY, VV
;SET RPD4 VECTOR ADDRESS
;TO 'TIME1' IF P-CLOCK IS PRESENT
;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
;'TIME' WILL ONLY SAVE
;CURRENT CYLINDER ADDRESS
;AND LOOK AHEAD REGISTERS
;GET READY TO MOVE COMMAND
;GET READY TO SET GO AND

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92329 031020 012677 151172 MOV (SP)+, @RHCS1 ;ENABLE INTERRUPT
92330 ;GO WITH
92331 ;72 IN RHCS1 FOR READ DATA
92332 ;WITH INTERRUPT ENABLED
92333
92334
92335 031024 104410 WAT ;WAIT FOR RDY BIT TO SET
92336 031026 002216 RHCS1 ;WAIT FOR RHCS1 REGISTER
92337 031030 000200 RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
92338 031032 001732 986. ;ALLOW 9860 MICRO SECONDS
92339 031034 001502 834. ;RDY MUST SET BETWEEN
92340 ;1520 AND 18200 MICRO SECONDS
92341
92342 ;CHANGE SAVED REGISTERS TO EXPECTED VALUES
92343 031036 004037 034460 JSR RO, @#FILLRE ;MOV 0 INTO SAVED RHWC
92344 031042 002210 RHWC ;SAVED REGISTER TO CHANGE
92345 031044 000000 0 ;DATA
92346 031046 004037 034460 JSR RO, @#FILLRE ;MOV REINTO+<266.*2> INTO SAVED RHBA
92347 031052 002212 RHBA ;SAVED REGISTER TO CHANGE
92348 031054 004470 REINTO+<266.*2> ;DATA
92349 031056 004037 034460 JSR RO, @#FILLRE ;MOV 3406 INTO SAVED RHDST
92350 031062 002222 RHDST ;SAVED REGISTER TO CHANGE
92351 031064 003406 3406 ;DATA
92352
92353 ;COMPARE REGISTERS BEFORE READ HEADER AND DATA
92354 ;WITH REGISTERS AFTER COMMAND
92355
92356 031066 004037 035546 JSR RO, @#COMREG ;COMPARE SAVED REGISTERS WITH
92357 ;PRESENT VALUE
92358 031072 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
92359 031074 002266 WC ;TEST DATA STARTING FROM 'RHWC'
92360 031076 000022 18. ;18. REGISTERS TO BE COMPARED
92361 031100 031104 5$ ;RETURN TO 5$ ON ERROR
92362 031102 031110 6$ ;RETURN TO 6$ ON NO ERROR
92363
92364
92365 031104 104031 5$: ERROR 31 ;READ HEADER AND DATA CAUSED
92366 031106 000207 RTS PC ;IMPROPER REGISTER CHANGE
92367 ;GOOD DATA GIVES WHAT SHOULD
92368 ;BE THERE RECEIVED DATA GIVES WHAT WAS
92369 ;RECEIVED DATA GIVES WHAT WAS
92370 ;THERE AFTER COMMAND
92371
92372 ;NOW READ INTO BUFFER WILL BE CHECKED TO SEE
92373 ;THAT READ WAS GOOD
92374 031110 6$:
92375
92376 031110 004037 036576 JSR RO, @#COMPAR ;COMPARE TWO BLOCKS OF MEMORY
92377 031114 002400 WRFROM ;GOOD DATA STARTS FROM WRFROM
92378 031116 003444 REINTO ;TEST DATA STARTS FROM REINTO
92379 031120 000412 266. ;266. WORDS TO BE COMPARED
92380 031122 031126 7$ ;RETURN TO 7$ ON ERROR
92381 031124 031132 10$ ;RETURN TO 10$ ON NO ERROR
92382
92383
92384

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9285 031126 104032      7$:  ERROR 32      ;WRITE HEADER AND DATA
9286 031130 000207      RTS    PC      ;FOLLOWED BY A READ HEADER
9287                                     ;AND DATA GAVE A READ ERROR
9288                                     ;ERROR MAY BE IN READ OR WRITE
9289
9290                                     ;A WRITE, READ HAS BEEN SUCCESSFULLY COMPLETED
9291                                     ;NOW A WRITE CHECK HEADER AND DATA WILL BE GIVEN
9292                                     ;FILL THE WRITE CHECK HEADER AND DATA
9293 031132      10$:
9294
9295 031132 004737 034556  JSR    PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
9296                                     ;R3-RHDS1, R4-RHER1
9297                                     ;GIVE RH-11 INITIALIZE
9298                                     ;SETUP UNIT NUBER
9299
9300 031136 004037 036532  JSR    RD, @#RUN    ;SETUP TO RUN FOR DATA COMMAND
9301 031142 000005      5      ;CYLINDER 5
9302 031144      004      4      ;SECTOR 4
9303 031145      007      7      ;TRACK 7
9304 031146 177366      -262.-4 ;WORD COUNT (DATA)=262. +
9305                                     ;4 HEADER WORDS
9306 031150 002400      WRFROM ;BUS ADDRESS
9307                                     ;STARTING ADDRESS OF DATA
9308                                     ;BUFFER = WRFROM
9309 031152 000000      0      ;DO NOT INHIBIT BUS ADDRESS INCREMENT
9310 031154 014000      ECI!FMT2 ;16 BITS PER WORD FORMAT
9311                                     ;INHIBIT ECC CORRECTION
9312                                     ;DO NOT INHIBIT HEADER COMPARE
9313 031156 002352      WRCHDT ;GET READY TO DO A WRCHDT
9314                                     ;WRITE CHECK HEADER AND DATA WITH 52 IN RHCS1
9315
9316
9317                                     ;SAVE REGISTERS FOR COMPARISON AFTER WRITE CHECK
9318 031160      ST25:
9319 031160 004037 034716  JSR    RD, @#SAVER ;SAVE REGISTERS
9320 031164 002210      RHWC   ;RHWC IS THE FIRST REGISTER SAVED
9321 031166 004522      SAVERE ;STARTING ADDRESS OF WHERE
9322                                     ;THE REGISTERS ARE SAVED
9323 031170 000022      18.    ;NUMBER OF REGISTERS
9324                                     ;SAVED = 18.
9325
9326 031172 004737 034636  JSR    PC, @#CHECKT ;CHECK DVA, RDY, MOL, DPR, DRY, VV
9327
9328
9329 031176 013777 004516 151000 MOV    @#RP4VEC, @RPVEC ;SET RP04 VECTOR ADDRESS
9330                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
9331                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
9332                                     ;'TIME' WILL ONLY SAVE
9333                                     ;CURRENT CYLINDER ADDRESS
9334                                     ;AND LOOK AHEAD REGISTERS.
9335
9336
9337 031204 013746 002352  MOV    @#WRCHDT, -(SP) ;GET READY TO MOVE COMMAND
9338 031210 052716 000101  BIS    #GO!IE, (SP)  ;GET READY TO SET GO AND
9339                                     ;ENABLE INTERRUPT
9340 031214 012677 150776  MOV    (SP)+, @RHCS1 ;GO WITH

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Handwritten notes and scribbles on the right side of the page, including a large 'S' and some illegible marks.

9397
9398 031364 104040
9399 031366 000207

8\$: ERROR 40
RTS PC

:WRITE CHECK CAUSED
:AN IMPROPER REGISTER
:CHANGE
:GOOD DATA GIVES WHAT
:SHOULD BE THERE
:RECEIVED DATA GIVES WHAT
:WAS THERE AFTER COMMAND

9400
9401
9402
9403
9404
9405
9406
9407 031370

9\$:

:TEST 35 WRITE CHECK DATA
: THE DATA FOR THIS TEST IS WRITTEN ON DISK BY PREVIOUS TEST
: WRITE CHECK DATA CYLINDER 5, FORMAT 16 BITS PER WORDS
: TRACK 7, SECTOR 4, KEYS 0, NUMBER OF WORDS 258
: CONSISTING OF
: 10 WORDS OF 12344 (6 BITS FOR CYL, 5 FOR TRACK, 5 FOR SECTOR)
: 10 WORDS OF 177777
: 10 WORDS OF 0
: 10 WORDS OF 052525
: 10 WORD OF 125252
: 16 WORDS OF LEFT ROTATING ZERO (EG177776,177775)
: 16 WORDS OF LEFT ROTATING ONE (EG 1,2,4,10)
: 174 WORDS OF 377
: 2 WORDS OF 12345

FIRST THE ABOVE DATA IS FILLED INTO WRITE FROM BUFFER
THEN THE ABOVE WRITE CHECK DATA IS GIVEN

9429 031370 000004
9430 031372 012706 001000
9431 031376 012737 000035 004514

:ST35: SCOPE

MOV #STACK, SP ;RESET STACK
MOV #35, @#STNM ;SAVE TEST NUMBER

9433 031404 004737 034556

JSR PC, @#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUMBER

9434
9435
9436
9437

;GET HEADS TO CYLINDER 5

9440 031410 004037 034526
9441 031414 000005
9442 031416 013777 004516 150560

JSR R0, @#SEEKCY ;SEEK FOR
5 ;CYLINDER 5
MOV @#RP4VEC, @RPVEC ;SET RPO4 VECTOR ADDRESS
;TO 'TIME1' IF P-CLOCK IS PRESENT
;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
;'TIME' WILL ONLY SAVE
;CURRENT CYLINDER ADDRESS
;AND LOOK AHEAD REGISTERS

9448
9449 031424 013746 002364
9450 031430 052716 000101
9451
9452 031434 012677 150556

MOV @#SEECOM, -(SP) ;GET READY TO MOVE COMMAND
BIS #GO!IE, (SP) ;GET READY TO SET GO AND
;ENABLE INTERRUPT
MOV (SP)+, @RHCS1 ;GO WITH

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9453                                     ;4 IN RHCS1 FOR SEEK
9454                                     ;WITH INTERRUPT ENABLED
9455
9456 031440 104410                       WAT
9457 031442 002240                       RHDS1
9458 031444 000200                       DRY
9459 031446 004704                       2500.
9460 031450 004704                       2500.
9461
9462
9463 031452 004737 034556               JSR    PC,2#CLDISK
9464
9465                                     ;SET R1-RHCS1, R2-RHCS2
9466                                     ;R3-RHDS1, R4-RHER1
9467                                     ;GIVE RH-11 INITIALIZE
9468                                     ;SETUP UNIT NUBER
9469 031456 004037 034426               JSR    RO,2#CLAREA
9470 031462 002400                       WRFROM
9471 031464 000012                       10.
9472 031466 012344                       <5*2000>!<7*40>!4
9473 031470 004037 034426               JSR    RO,2#CLAREA
9474 031474 002424                       WRFROM+<10.*2>
9475 031476 000012                       10.
9476 031500 177777                       -1
9477
9478 031502 004037 034426               JSR    RO,2#CLAREA
9479 031506 002450                       WRFROM+<20.*2>
9480 031510 000012                       10.
9481 031512 000000                       0
9482
9483 031514 004037 034426               JSR    RO,2#CLAREA
9484 031520 002474                       WRFROM+<30.*2>
9485 031522 000012                       10.
9486 031524 052525                       52525
9487
9488 031526 004037 034426               JSR    RO,2#CLAREA
9489 031532 002520                       WRFROM+<40.*2>
9490 031534 000012                       10.
9491 031536 125252                       125252
9492
9493
9494                                     ;FILL LEFT ROTATING ZEROS FROM WRFROM+<50.*2>
9495 031540 010146                       MOV    R1,-(SP)
9496 031542 012700 177776               MOV    #177776,R0
9497 031546 012705 000020               MOV    #16,R5
9498 031552 012701 002544               MOV    #WRFROM+<50.*2>,R1 ;WHERE DATA GOES
9499 031556 000261
9500 031560 010021                       1$: MOV    RO,(R1)+
9501 031562 006100                       ROL    RO
9502 031564 005305                       DEC    R5
9503 031566 001374                       BNE    1$
9504
9505                                     ;FILL LEFT ROTATING ONE INTO WRFROM+<65.*2>
9506 031570 000241                       CLC
9507 031572 012700 000001               MOV    #1,R0
9508 031576 010021                       2$: MOV    RO,(R1)+

```

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9509	031600	006300		ASL	RO		
9510	031602	103375		BCC	2\$		
9511	031604	012601		MOV	(SP)+,R1	::POP STACK INTO R1	
9512				;FILL REST OF DATA			
9513	031606	004037	034426	JSR	RO,@#CLAREA	;CLEAR 174. WORDS, FROM WRFROM+<82.*2>	
9514	031612	002644				;STARTING FROM WRFROM+<82.*2>	
9515	031614	000256				;174. WORDS	
9516	031616	000377				;FILL WITH 377	
9517							
9518	031620	004037	034426	JSR	RO,@#CLAREA	;CLEAR 2 WORDS, FROM WRFROM+<256.*2>	
9519	031624	003400				;STARTING FROM WRFROM+<256.*2>	
9520	031626	000002				;2 WORDS	
9521	031630	012345				;FILL WITH <5*2000>!<7*40>!5	
9522							
9523							
9524							
9525							
9526	031632	004037	036532	JSR	RO,@#RUN	;SETUP TO RUN FOR DATA COMMAND	
9527	031636	000005				;CYLINDER 5	
9528	031640	004				;SECTOR 4	
9529	031641	007				;TRACK 7	
9530	031642	177400				;WORD COUNT = 256.	
9531	031644	002400				;BUS ADDRESS	
9532						;STARTING ADDRESS OF DATA	
9533						;BUFFER = WRFROM	
9534	031646	000000				;DO NOT INHIBIT BUS ADDRESS INCREMENT	
9535	031650	014000				;16 BITS PER WORD FORMAT	
9536						;INHIBIT ECC CORRECTION	
9537						;DO NOT INHIBIT HEADER COMPARE	
9538	031652	002350				;GET READY TO DO A WRCHK	
9539						;WRITE CHECK DATA WITH 50 IN RHCS1	
9540							
9541							
9542							
9543	031654	004037	034716				
9544	031660	002210					
9545	031662	004522					
9546							
9547	031664	000022					
9548							
9549							
9550	031666	004737	034636	JSR	PC,@#CHECKT	;CHECK DVA,RDY,MOL,DPR,DRY,VV	
9551							
9552							
9553	031672	013777	004516 150304	MOV	@#RP4VEC,@RPVEC	;SET RPO4 VECTOR ADDRESS	
9554						;TO 'TIME1' IF P-CLOCK IS PRESENT	
9555						;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT	
9556						; 'TIME' WILL ONLY SAVE	
9557						;CURRENT CYLINDER ADDRESS	
9558						;AND LOOK AHEAD REGISTERS	
9559							
9560							
9561	031700	013746	002350	MOV	@#WRCHK,-(SP)	;GET READY TO MOVE COMMAND	
9562	031704	052716	000101	BIS	#GO!IE,(SP)	;GET READY TO SET GO AND	
9563						;ENABLE INTERRUPT	
9564	031710	012677	150302	MOV	(SP)+,@RHCS1	;GO WITH	

.BYTE
.BYTE

9621
9622 032060 104040
9623 032062 000207
9624
9625
9626
9627
9628
9629
9630 032064

8\$: ERROR 40
RTS PC

;WRITE CHECK CAUSED
;AN IMPROPER REGISTER
;CHANGE
;GOOD DATA GIVES WHAT
;SHOULD BE THERE
;RECEIVED DATA GIVES WHAT
;WAS THERE AFTER COMMANDS

9\$:

9631
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```
*****
*TEST 36 WRITE CHECK DATA USING UNIBUS B
* THIS TEST USES UNIBUS B IF CONNECTED TO THE RH
* IF UNIBUS B IS NOT CONNECTED THEN THIS TEST IS NOT PERFORMED
* THE DATA FOR THIS TEST IS WRITTEN ON DISK BY PREVIOUS TEST
* WRITE CHECK DATA CYLINDER 5, FORMAT 16 BITS PER WORDS
* TRACK 7, SECTOR 4, KEYS 0, NUMBER OF WORDS 258
* CONSISTING OF
* 10 WORDS OF 12344 (6 BITS FOR CYL, 5 FOR TRACK, 5 FOR SECTOR)
* 10 WORDS OF 177777
* 10 WORDS OF 0
* 10 WORDS OF 052525
* 10 WORD OF 125252
* 16 WORDS OF LEFT ROTATING ZERO (EG177776,177775)
* 16 WORDS OF LEFT ROTATING ONE (EG 1,2,4,10)
* 174 WORDS OF 377
* 2 WORDS OF 12345
*
* FIRST THE ABOVE DATA IS FILLED INTO WRITE FROM BUFFER
* THEN THE ABOVE WRITE CHECK DATA IS GIVEN
*****
```

9655
9656 032064 000004
9657 032066 012706 001000
9658 032072 012737 000036 004514
9659
9660 032100 004737 034556
9661
9662
9663
9664
9665
9666 032104 000167 000474
9667 032110 005737 004642
9668 032114 001402
9669 032116 000137 032604
9670

```
TST36: SCOPE
MOV #STACK,SP ;RESET STACK
MOV #36,#TSTNM ;SAVE TEST NUMBER
JSR PC,#CLDISK ;SET R1-RHCS1, R2-RHCS2
;R3-RHDS1, R4-RHER1
;GIVE RH-11 INITIALIZE
;SETUP UNIT NUBER

JMP TST37 ;JUMP TO NEXT TEST FOR RH70
TST #UBUSB ;IS UNIBUS B THERE
BEQ 11$ ;UNIBUS B THERE SO CONTINUE
JMP #9$ ;NO UNIBUS B JUMP OUT
```

11\$: ;GET HEADS TO CYLINDER 5

9671
9672 032122
9673
9674 032122 004037 034526
9675 032126 000005
9676 032130 013777 004516 150046

```
JSR R0,#SEEKCY ;SEEK FOR
5 ;CYLINDER 5
MOV #RP4VEC,#RPVEC ;SET RPO4 VECTOR ADDRESS
```

```

9677                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
9678                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
9679                                     ;'TIME' WILL ONLY SAVE
9680                                     ;CURRENT CYLINDER ADDRESS
9681                                     ;AND LOOK AHEAD REGISTERS
9682
9683 032136 013746 002364                 MOV    @#SEECOM, -(SP) ;GET READY TO MOVE COMMAND
9684 032142 052716 000101                 BIS    #GO!IE, (SP)   ;GET READY TO SET GO AND
9685                                     ;ENABLE INTERRUPT
9686 032146 012677 150044                 MOV    (SP)+, @RHCS1 ;GO WITH
9687                                     ;4 IN RHCS1 FOR SEEK
9688                                     ;WITH INTERRUPT ENABLED
9689
9690 032152 104410                         WAT                                     ;WAIT FOR DRY BIT TO SET
9691 032154 002240                         RHDS1                                ;WAIT FOR RHDS1 REGISTER
9692 032156 000200                         DRY                                  ;WAIT FOR DRY BIT IN RHDS1 REGISTER
9693 032160 004704                         2500.                               ;ALLOW 2500 MICRO SECONDS
9694 032162 004704                         2500.                               ;DRY MUST SET BETWEEN
9695                                     ;00 AND 50000 MICRO SECONDS
9696
9697 032164 004737 034556                 JSR    PC, @#CLDISK   ;SET R1-RHCS1, R2-RHCS2
9698                                     ;R3-RHDS1, R4-RHER1
9699                                     ;GIVE RH-11 INITIALIZE
9700                                     ;SETUP UNIT NUBER
9701                                     ;10 WORDS OF EACH 12344, 17777, 0, 52525, 125252
9702 032170 004037 034426                 JSR    RO, @#CLAREA  ;CLEAR 10. WORDS FROM WRFROM
9703 032174 002400                         WRFROM                               ;STARTING FROM WRFROM
9704 032176 000012                         10.                                  ;10. WORDS
9705 032200 012344                         <5*2000>!<7*40>!4                 ;FILL WITH <5*2000>!<7*40>!4
9706
9707 032202 004037 034426                 JSR    RO, @#CLAREA  ;CLEAR 10. WORDS FROM WRFROM+<10.*2>
9708 032206 002424                         WRFROM+<10.*2>                     ;STARTING FROM WRFROM+<10.*2>
9709 032210 000012                         10.                                  ;10. WORDS
9710 032212 177777                         -1                                   ;FILL WITH -1
9711
9712 032214 004037 034426                 JSR    RO, @#CLAREA  ;CLEAR 10. WORDS FROM WRFROM+<20.*2>
9713 032220 002450                         WRFROM+<20.*2>                     ;STARTING FROM WRFROM+<20.*2>
9714 032222 000012                         10.                                  ;10. WORDS
9715 032224 000000                         0                                   ;FILL WITH 0
9716
9717 032226 004037 034426                 JSR    RO, @#CLAREA  ;CLEAR 10. WORDS FROM WRFROM+<30.*2>
9718 032232 002474                         WRFROM+<30.*2>                     ;STARTING FROM WRFROM+<30.*2>
9719 032234 000012                         10.                                  ;10. WORDS
9720 032236 052525                         52525                              ;FILL WITH 52525
9721
9722 032240 004037 034426                 JSR    RO, @#CLAREA  ;CLEAR 10. WORDS FROM WRFROM+<40.*2>
9723 032244 002520                         WRFROM+<40.*2>                     ;STARTING FROM WRFROM+<40.*2>
9724 032246 000012                         10.                                  ;10. WORDS
9725 032250 125252                         125252                             ;FILL WITH 125252
9726
9727
9728                                     ;FILL LEFT ROTATING ZEROS FROM WRFROM+<50.*2>
9729 032252 010146                         MOV    R1, -(SP)                   ;PUSH R1 ON STACK
9730 032254 012700 177776                 MOV    #177776, RO                 ;DATA
9731 032260 012705 000020                 MOV    #16, R5                     ;COUNT
9732 032264 012701 002544                 MOV    #WRFROM+<50.*2>, R1 ;WHERE DATA GOES

```

```

9733 032270 000261
9734 032272 010021
9735 032274 006100
9736 032276 005305
9737 032300 001374
9738
9739
9740 032302 000241
9741 032304 012700 000001
9742 032310 010021
9743 032312 006300
9744 032314 103375
9745 032316 012601
9746
9747 032320 004037 034426
9748 032324 002644
9749 032326 000256
9750 032330 000377
9751
9752 032332 004037 034426
9753 032336 003400
9754 032340 000002
9755 032342 012345
9756
9757
9758
9759
9760 032344 004037 036532
9761 032350 000005
9762 032352 004
9763 032353 007
9764 032354 177400
9765 032356 002400
9766
9767
9768 032360 000000
9769 032362 014000
9770
9771
9772 032364 002350
9773
9774
9775
9776
9777 032366 052777 000000 147622
9778
9779
9780
9781 032374 004037 034716
9782 032400 002210
9783 032402 004522
9784
9785 032404 000022
9786
9787
9788 032406 004737 034636

```

```

SEC
MOV RO,(R1)+ ;STORE DATA
ROL RO ;GET ZERO ONE BIT LEFT
DEC R5 ;COUNT 16
BNE 1$ ;BRANCH IF 16 NOT DONE

;FILL LEFT ROTATING ONE INTO WRFROM+<65.*2>
CLC
MOV #1,RO
MOV RO,(R1)+
ASL RO
BCC 2$
MOV (SP)+,R1 ;;POP STACK INTO R1
;FILL REST OF DATA
JSR RO,#CLAREA ;CLEAR 174. WORDS, FROM WRFROM+<82.*2>
WRFROM+<82.*2> ;STARTING FROM WRFROM+<82.*2>
174. ;174. WORDS
377 ;FILL WITH 377

JSR RO,#CLAREA ;CLEAR 2 WORDS, FROM WRFROM+<256.*2>
WRFROM+<256.*2> ;STARTING FROM WRFROM+<256.*2>
2 ;2 WORDS
<5*2000>!<7*40>!5 ;FILL WITH <5*2000>!<7*40>!5

;FILL THE WRITE CHECK HEADER AND DATA
JSR RO,#RUN ;SETUP TO RUN FOR DATA COMMAND
5 ;CYLINDER 5
4 ;SECTOR 4
7 ;TRACK 7
-256. ;WORD COUNT = 256.
WRFROM ;BUS ADDRESS
;STARTING ADDRESS OF DATA
;BUFFER = WRFROM
0 ;DO NOT INHIBIT BUS ADDRESS INCREMENT
ECI!FMT22 ;16 BITS PER WORD FORMAT
;INHIBIT ECC CORRECTION
;DO NOT INHIBIT HEADER COMPARE
WRCHK ;GET READY TO DO A WRCHK
;WRITE CHECK DATA WITH 50 IN RHCS1

BIS #PSEL,#RHCS1 ;SET PORT B
;THAT IS UNIBUS B

;SAVE REGISTERS FOR COMPARISON AFTER WRITE CHECK
JSR RO,#SAVER ;SAVE REGISTERS
RHWC ;RHWC IS THE FIRST REGISTER SAVED
SAVERE ;STARTING ADDRESS OF WHERE
18. ;THE REGISTERS ARE SAVED
;NUMBER OF REGISTERS
;SAVED = 18.

JSR PC,#CHECKT ;CHECK DVA,RDY,MOL,DPR,DRY,VV

```

```

032412 013777 004516 147564   MOV   2#RP4VEC,2#RPVEC   :SET RP04 VECTOR ADDRESS
                               :TO 'TIME1' IF P-CLOCK IS PRESENT
                               :OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
                               : 'TIME' WILL ONLY SAVE
                               :CURRENT CYLINDER ADDRESS
                               :AND LOOK AHEAD REGISTERS
                               :SET PORT SELECT

032420 013746 002350   MOV   2#WRCHK, -(SP)   :GET READY TO MOVE COMMAND
032424 052716 000101   BIS   #GO!IE!PSEL, (SP) :GET READY TO SET GO AND
                               :ENABLE INTERRUPT

032430 012677 147562   MOV   (SP)+,2#RHCS1   :GO WITH
                               :50 IN RHCS1 FOR WRITE CHECK DATA
                               :WITH INTERRUPT ENABLED

032424 011100   MOV   2#R1,R0          :SAVE RHCS1 DURING ABOVE OPERATION
032426 011305   MOV   2#R3,R5          :SAVE RHDS1 DURING ABOVE OPERATION

032440 104410   WAIT                               :WAIT FOR RDY BIT TO SET
032442 002216   RHCS1                          :WAIT FOR RHCS1 REGISTER
032444 000200   RDY                             :WAIT FOR RDY BIT IN RHCS1 REGISTER
032446 001732   986.                            :ALLOW 9860 MICRO SECONDS
032450 001502   834.                            :RDY MUST SET BETWEEN
                               :1520 AND 18200 MICRO SECONDS

                               :COMPARE CONTENTS OF RHCS1 AND RHDS1 ALREADY SAVED IN
                               :R0 AND R5 IMMEDIATELY AFTER GO
032452 013746 002350   MOV   2#WRCHK, -(SP)   :SAVE COMMAND
032456 052716 004101   BIS   #IE!DVA!PSEL!GO, (SP) :INCLUDE IE!DVA!PSEL!GO
032462 011637 001124   MOV   (SP),2#$GDDAT   :SAVE FOR PRINTOUT
032466 022600   CMP   (SP)+,R0        :DURING ABOVE OPERATION ONLY IE!DVA!PSEL!GO
                               :AND COMMAND SHOULD BE SET

032470 001405   BEQ   67$             :BRANCH IF GOOD
032472 010037 001126   MOV   R0,2#$BDDAT     :BAD DATA
032476 010137 004510   MOV   R1,2#REGADR     :FAILING REGISTER RHCS1
032502 104021   ERROR 21              :DURING ABOVE OPERATION ONLY
                               :COMMAND AND IE!DVA!PSEL!GO SHOULD BE SET

67$: 032504 012746 010500   MOV   #MOL!DPR!VV, -(SP) :SAVE BITS SET DURING OPERATION IN RHDS1
032510 011637 001124   MOV   (SP),2#$GDDAT   :SAVE FOR PRINTOUT
032514 022605   CMP   (SP)+,R5        :DURING ABOVE OPERATION ONLY MOL!DPR!VV
                               :SHOULD BE SET

032516 001405   BEQ   69$             :BRANCH IF GOOD
032520 010537 001126   MOV   R5,2#$BDDAT     :BAD DATA
032524 010337 004510   MOV   R3,2#REGADR     :FAILING REGISTER RHDS1
032530 104063   ERROR 63              :DURING ABOVE OPERATION ONLY
                               :MOL!DPR!VV SHOULD BE SET

69$: 032532

                               :CHANGE SAVED REGISTERS TO EXPECTED VALUES
032532 004037 034460   JSR   R0,2#FILLRE     :MOV 0 INTO SAVED RHWC
032534 002210   RHWC                    :SAVED REGISTER TO CHANGE
032536 000000   0                       :DATA
032540 004037 034460   JSR   R0,2#FILLRE     :MOV WRFROM+(256.*2) INTO SAVED RHBA
032546 002212   RHBA                    :SAVED REGISTER TO CHANGE

```

00000004 032550 003400
00000005 032552 004037 034460
00000006 032556 002222
00000007 032560 003405
00000008
00000009
00000010
00000011
00000012
00000013
00000014
00000015
00000016
00000017
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00000021
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00000097
00000098
00000099
00000100

WAFROM+(256.*2) :DATA
JSR RO,0#FILLRE :NOV 3405 INTO SAVED RHDST
RHDST :SAVED REGISTER TO CHANGE
3405 :DATA

:COMPARE REGISTERS BEFORE WRITE CHECK HEADER AND DATA
:WITH REGISTER AFTER COMMAND

JSR RO,0#COMREG :COMPARE SAVED REGISTERS WITH
:PRESENT VALUE
SAVERE :GOOD DATA SAVED IN 'SAVERE'
WC :TEST DATA STARTING FROM 'RHWC'
18. :18. REGISTERS TO BE COMPARED
99. :RETURN TO 99 ON ERROR
99. :RETURN TO 99 ON NO ERROR

99: ERROR 76 :WHILE USING UNIBUS B
RTS PC :WRITE CHECK CAUSED
:AN IMPROPER REGISTER
:CHANGE
:GOOD DATA GIVES WHAT
:SHOULD BE THERE
:RECEIVED DATA GIVES WHAT
:WAS THERE AFTER COMMANDS

99:

*TEST 37 WRITE PROTECT BUTTON
* IF STARTING ADDRESS 220 IS USED THIS TEST WILL NOT BE PERFORMED
*
* IF THE PROGRAM WORKS UNDER ACT-11 MONITOR
* THEN THIS TEST IS NOT PERFORMED
*
* IF NO ACT-11 MONITOR IS PRESENT
* THEN THIS TEST IS PERFORMED ONLY ON THE FIRST PASS
* ON SUBSEQUENT PASSES THIS TEST IS NOT DONE
*
* WRITE FROM BUFFER IS FILLED WITH ALL ONES AND
* SECTOR 0, TRACK 0, CYLINDER 0 IS FILLED WITH
* ALL ONES
* ALL REGISTERS ARE SAVED THEN WRITE LOCK BUTTON IS
* PRESSED AND ALL REGISTERS ARE CHECKED.
* WRITE FROM BUFFER IS FILLED WITH 377 AND A WRITE IS
* ATTEMPTED TO SECTOR 0, TRACK 0, CYLINDER 0 70. WORDS
* ALL REGISTERS ARE CHECKED
* THE SAME SECTOR IS READ AND DATA COMPARED TO SEE
* THAT NOTHING GOT DESTROYED (READ DATA SHOULD BE ALL
* ONES AND NOT 377)
* THEN WRITE LOCK BUTTON IS PRESSED TO UNLOCK
* WRITE LOCKS AND ALL REGISTERS ARE COMPARED
*

```

*****
9901          032604 000004          TST37: SCOPE
9902          032606 012706 001000      MOV    #STACK,SP      ;RESET STACK
9903          032612 012737 000037 004514  MOV    #37,2#TSTNM    ;SAVE TEST NUMBER
9904          032620 004737 034556          JSR    PC,2#CLDISK    ;SET R1-RHCS1, R2-RHCS2
9905          032620 004737 034556          ;R3-RHDS1, R4-RHER1
9906          032620 004737 034556          ;GIVE RH-11 INITIALIZE
9907          032620 004737 034556          ;SETUP UNIT NUBER
9908          032624 005737 004634          TST    2#NOPUSH      ;IS THIS 220 START
9909          032630 001402          BEQ    9$            ;BRANCH IF NO
9910          032632 000167 001170          JMP    TST40        ;JUMP TO NEXT TEST
9911          032636 005737 000042          9$:  TST    2#42      ;MONITOR (ACT-11) RETURN ADDRESS
9912          032642 001004          BNE    1$            ;BRANCH IF MONITOR PRESENT
9913          032644 005737 001100          TST    2#$PASS      ;IS THIS FIRST PASS
9914          032650 001001          BNE    1$            ;BRANCH IF NOT FIRST PASS
9915          032652 000402          BR     2$            ;BRANCH TO CONTINUE TEST
9916          032654          1$:  JMP    TST40        ;JUMP TO NEXT TEST
9917          032654 000167 001146          ;FILL SECTOR 0, TRACK 0, CYL 0 WITH ONES
9918          032654          2$:  ;FILL WRITE FROM BUFFER
9919          032660          2$:  JSR    RD,2#CLAREA   ;CLEAR 256. WORDS FROM WRFROM
9920          032660 004037 034426          WRFROM ;STARTING FROM WRFROM
9921          032664 002400          256.  ;256. WORDS
9922          032666 000400          -1     ;FILL WITH -1
9923          032670 177777          ;FILL WRITE DATA COMMAND
9924          032672 004037 036532          JSR    RD,2#RUN     ;SETUP TO RUN FOR DATA COMMAND
9925          032676 000000          0      ;CYLINDER 0
9926          032700          0      ;SECTOR 0
9927          032701          0      ;TRACK 0
9928          032702 177400          -256.  ;WORD COUNT = 256.
9929          032704 002400          WRFROM ;BUS ADDRESS
9930          032706 000000          0      ;STARTING ADDRESS OF DATA
9931          032710 010000          FMT22  ;BUFFER = WRFROM
9932          032712 002354          WRIDAT ;DO NOT INHIBIT BUS ADDRESS INCREMENT
9933          032712 002354          WRIDAT ;16 BITS PER WORD FORMAT
9934          032712 002354          WRIDAT ;DO NOT INHIBIT ECC CORRECTION
9935          032712 002354          WRIDAT ;DO NOT INHIBIT HEADER COMPARE
9936          032712 002354          WRIDAT ;GET READY TO DO A WRIDAT
9937          032712 002354          WRIDAT ;WRITE DATA WITH 50 IN RHCS1
9938          032714 004737 034636          JSR    PC,2#CHECKT  ;CHECK DVA, RDY, MOL, DPR, DRY, VV
9939          032720 013777 004516 147256  MOV    2#RP4VEC,2#RPVEC ;SET RPN VECTOR ADDRESS
9940          032720 013777 004516 147256  ;TO 'TIME1' IF P-CLOCK IS PRESENT
9941          032720 013777 004516 147256  ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
9942          032720 013777 004516 147256  ;'TIME' WILL ONLY SAVE
9943          032720 013777 004516 147256  ;CURRENT CYLINDER ADDRESS
9944
9945
9946
9947
9948
9949
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9951
9952
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9955
9956

```



```

00057 ;AND LOOK AHEAD REGISTERS
00058
00059
00060 032726 013746 002354 MOV @#WRIDAT,-(SP) ;GET READY TO MOVE COMMAND
00061 032732 052716 000101 BIS #GO!IE,(SP) ;GET READY TO SET GO AND
00062 ;ENABLE INTERRUPT
00063 032736 012677 147254 MOV (SP)+,@RHCS1 ;GO WITH
00064 ;60 IN RHCS1 FOR WRITE DATA
00065 ;WITH INTERRUPT ENABLED
00066 ;TIME IS NOT CRITICAL
00067
00068 032742 104410 WAT ;WAIT FOR RDY BIT TO SET
00069 032744 002216 RHCS1 ;WAIT FOR RHCS1 REGISTER
00070 032746 000200 RDY ;WAIT FOR RDY BIT IN RHCS1 REGISTER
00071 032750 004704 2500. ;ALLOW 25000 MICRO SECONDS
00072 032752 004704 2500. ;RDY MUST SET BETWEEN
00073 ;00 AND 50000 MICRO SECONDS
00074
00075 ;SAVE REGISTERS FOR COMPARISON AFTER WRITE PROTECT
00076 ;BUTTON HAS BEEN HIT
00077 032754 004037 034716 JSR RO,@#SAVER ;SAVE REGISTERS
00078 032760 002210 RHWC ;RHWC IS THE FIRST REGISTER SAVED
00079 032762 004522 SAVERE ;STARTING ADDRES OF WHERE
00080 ;THE REGISTERS ARE SAVED
00081 032764 000022 18. ;NUMBER OF REGISTERS
00082 ;SAVED = 18.
00083
00084 032766 104400 032774 TYPE ;TYPE ASCIZ STRING
00085 032772 000407 BR 67$ ;GET OVER THE ASCIZ
00086 ;:.ASCIZ <15><12>/ON DRIVE /
00087 57$: 033012 MOV @#UNIT,-(SP) ;GET UNIT UNDER TEST
00088 033012 013746 004626 TYPDS
00089 033016 104404 TYPE ;TYPE ASCIZ STRING
00090 033020 104400 033026 BR 68$ ;GET OVER THE ASCIZ
00091 033024 000442 ;:.ASCIZ <15><12>/PUSH WRITE PROTECT BUTTON TO LOCK OUT WRITES THEN HIT CON
00092 68$: 033132 HALT
00093 033132 000000 ;THE ONLY REGISTER THAT SHOULD CHANGE IS RHDS1 - BIT #11
00094 ;:-WRL
00095
00096 033134 004037 035440 JSR RO,@#CHREG ;CHANGE BITS IN SAVED REGISTER
00097 033140 002240 RHDS1 ;CHANGE RHDS1 REGISTER
00098
00099 1 1 ;1 BIT/BITS TO BE CHANGED
00100 1 ;NEW VALUE OF WRL IS 1
00101 1 WRL ;CHANGE WRL BIT
00102
00103 ;COMPARE ALL REGISTERS BEFORE WRITE WAS LOCKED
00104 ;OUT WITH REGISTER VALUES AFTER WRITE WAS LOCKED OUT
00105
00106 033150 004037 035546 JSR RO,@#COMREG ;COMPARE SAVED REGISTERS WITH
00107 ;PRESENT VALUE
00108 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
00109 WC ;TEST DATA STARTING FROM 'RHWC'
00110 033154 004522 18. ;18. REGISTERS TO BE COMPARED
00111 033156 002266
00112 033160 000022

```



Handwritten mark resembling a stylized 'S' or 'J'.

Handwritten mark resembling a stylized '8' or '0'.

```

10013 033162 033166          3%          ;RETURN TO 3% ON ERROR
10014 033164 033172          4%          ;RETURN TO 4% ON NO ERROR
10015
10016 033166 104041          3%:      ERROR  41          ;LOCKING OUT WRITE BY
10017 033170 000207          RTS      PC          ;WRITE LOCK BUTTON CAUSED
10018                                     ;IMPROPER REGISTER CHANGE
10019                                     ;GOOD DATA GIVES WHAT SHOULD
10020                                     ;BE THERE
10021                                     ;RECEIVED DATA GIVES WHAT
10022                                     ;WAS THERE AFTER WRITE
10023                                     ;WAS LOCKED OUT BY BUTTON
10024
10025                                     ;NOW A WRITE WILL BE ATTEMPTED WITH WRITE LOCKED
10026                                     ;OUT BY BUTTON
10027                                     ;FILL WRITE FROM BUFFER WITH 377
10028 033172 013737 033172 001110 4%:      MOV      @#4$,@#SLPERR ;SCOPE LOOP STARTS FROM HERE
10029
10030
10031 033200 004737 034556          JSR      PC,@#CLDISK   ;SET R1-RHCS1, R2-RHCS2
10032                                     ;R3-RHDS1, R4-RHER1
10033                                     ;GIVE RH-11 INITIALIZE
10034                                     ;SETUP UNIT NUMBER
10035 033204 000737 034426          JSR      RD,@#CLAREA   ;CLEAR 256. WORDS FROM WRFROM
10036 033210 000000          WRFROM   ;STARTING FROM WRFROM
10037 033212 000400          256.    ;256. WORDS
10038 033214 000377          377      ;FILL WITH 377
10039
10040
10041                                     ;TRY A ONE WORD WRITE
10042
10043 033216 004037 036532          JSR      RD,@#RUN      ;SETUP TO RUN FOR DATA COMMAND
10044 033222 000000          0          ;CYLINDER 0
10045 033224 000000          .BYTE 0 ;SECTOR 0
10046 033225 000000          .BYTE 0 ;TRACK 0
10047 033226 177777          -1        ;WORD COUNT = 1.
10048 033230 002400          WRFROM   ;BUS ADDRESS
10049                                     ;STARTING ADDRESS OF DATA
10050                                     ;BUFFER = WRFROM
10051 033232 000000          0          ;DO NOT INHIBIT BUS ADDRESS INCREMENT
10052 033234 010000          FMT22    ;16 BITS PER WORD FORMAT
10053                                     ;DO NOT INHIBIT ECC CORRECTION
10054                                     ;DO NOT INHIBIT HEADER COMPARE
10055 033236 002354          WRIDAT   ;GET READY TO DO A WRIDAT
10056                                     ;WRITE DATA WITH 60 IN RHCS1
10057
10058                                     ;SAVE REGISTERS
10059 033240 004037 034716          JSR      RD,@#SAVER   ;SAVE REGISTERS
10060 033244 002210          RHWC     ;RHWC IS THE FIRST REGISTER SAVED
10061 033246 004522          SAVERE   ;STARTING ADDRESS OF WHERE
10062                                     ;THE REGISTERS ARE SAVED
10063 033250 000022          18.     ;NUMBER OF REGISTERS
10064                                     ;SAVED = 18.
10065
10066 033252 013777 004516 146724      MOV      @#RP4VEC,@RPVEC ;SET RP04 VECTOR ADDRESS
10067                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
10068                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT

```



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10125 033430 053737 004650 004546 BIS 2#ATTENT,2#SAVERE+24 ;SET APPROPRIATE ATA BITS
10126 ;FOR WORKING DRIVE IN
10127 ;SAVED RHAS LOACTION
10128
10129 ;COMPARE REGISTERS BEFORE WRITE WAS ATTEMPTED
10130 ;WITH REGISTERS AFTER ATTEMPT
10131
10132 033436 004037 035546 JSR RO,2#COMREG ;COMPARE SAVED REGISTERS WITH
10133 ;PRESENT VALUE
10134 033442 004522 SAVERE ;GOOD DATA SAVED IN 'SAVERE'
10135 033444 002266 WC ;TEST DATA STARTING FROM 'RHWC'
10136 033446 000022 18. ;18. REGISTERS TO BE COMPARED
10137 033450 033454 5$ ;RETURN TO 5$ ON ERROR
10138 033452 033460 6$ ;RETURN TO 6$ ON NO ERROR
10139
10140 033454 104042 5$: ERROR 42 ;ATTEMPTING TO WRITE WITH
10141 033456 000207 RTS PC ;WRITE LOCKED OUT
10142 ;CAUSED IMPROPER REGISTER
10143 ;CHANGE
10144 ;GOOD DATA GIVES WHAT SHOULD
10145 ;BE THERE
10146 ;RECEIVED DATA GIVES WHAT WAS
10147 ;THERE AFTER ATTEMPT
10148
10149 ;NOW A READ WILL BE DONE TO DETERMIN THAT
10150 ;READS CAN BE DONE WITH WRITE LOCKED OUT AND
10151 ;THAT NO DATA ON DISK GOT CHANGED, BUT FIRST CLEAR ERROR
10152 033460 6$:
10153
10154 033460 004737 034556 JSR PC,2#CLDISK ;SET R1-RHCS1, R2-RHCS2
10155 ;R3-RHDS1, R4-RHER1
10156 ;GIVE RH-11 INITIALIZE
10157 ;SETUP UNIT NUBER
10158 ;FILL READ INTO BUFFER WITH 0
10159 033464 004037 034426 JSR RO,2#CLAREA ;CLEAR 256. WORDS, FROM REINTO
10160 033470 003444 REINTO ;STARTING FROM REINTO
10161 033472 000400 256. ;256. WORDS
10162 033474 000000 0 ;FILL WITH 0
10163
10164 ;FILL WRITE FROM BUFFER WITH EXPECTED DATA FROM READ
10165 JSR RO,2#CLAREA ;CLEAR 256. WORDS, FROM WRFROM
10166 033476 004037 034426 WRFROM ;STARTING FROM WRFROM
10167 033502 002400 256. ;256. WORDS
10168 033504 000400 -1 ;FILL WITH -1
10169 033506 177777
10170
10171 ;FILL COMMAND
10172
10173
10174 033510 004037 036532 JSR RO,2#RUN ;SETUP TO RUN FOR DATA COMMAND
10175 033514 000000 0 ;CYLINDER 0
10176 033516 000 ;SECTOR 0
10177 033517 000 ;TRACK 0
10178 033520 177400 -256. ;WORD COUNT = 256.
10179 033522 003444 REINTO ;BUS ADDRESS
10180 ;STARTING ADDRESS OF DATA

```

MAINDEC-11-DERPU-B
DERPUB.P11 T37MACY11 27(732) 17-SEP-76 13:23 PAGE 203
WRITE PROTECT BUTTON

```

10181                                     ;BUFFER = REINTO
10182 033524 000000                       0       ;DO NOT INHIBIT BUS ADDRESS INCREMENT
10183 033526 014000                       ECI:FMT22 ;16 BITS PER WORD FORMAT
10184                                     ;INHIBIT ECC CORRECTION
10185                                     ;DO NOT INHIBIT HEADER COMPARE
10186 033530 002360                       READAT   ;GET READY TO DO A READAT
10187                                     ;READ DATA WITH 70 IN RHCS1
10188
10189
10190 033532 013777 004516 146444         MOV      @#RP4VEC,@RPVEC ;SET RPO4 VECTOR ADDRESS
10191                                     ;TO 'TIME1' IF P-CLOCK IS PRESENT
10192                                     ;OR TO 'TIME2' IF P-CLOCK IS NOT PRESENT
10193                                     ;'TIME' WILL ONLY SAVE
10194                                     ;CURRENT CYLINDER ADDRESS
10195                                     ;AND LOOK AHEAD REGISTERS
10196
10197
10198 033540 013746 002360                 MOV      @#READAT,-(SP) ;GET READY TO MOVE COMMAND
10199 033544 052716 000101                 BIS      #GO!IE,(SP)   ;GET READY TO SET GO AND
10200                                     ;ENABLE INTERRUPT
10201 033550 012677 146442                 MOV      (SP)+,@RHCS1  ;GO WITH
10202                                     ;70 IN RHCS1 FOR READ DATA
10203                                     ;WITH INTERRUPT ENABLED
10204
10205
10206 033554 104410                           WAT      ;WAIT FOR RDY BIT TO SET
10207 033556 002216                           RHCS1    ;WAIT FOR RHCS1 REGISTER
10208 033560 000200                           RDY      ;WAIT FOR RDY BIT IN RHCS1 REGISTER
10209 033562 001614                           908.    ;ALLOW 9080 MICRO SECONDS
10210 033564 001507                           839.    ;RDY MUST SET BETWEEN
10211                                     ;690 AND 17470 MICRO SECONDS
10212
10213                                     ;COMPARE READ DATA
10214
10215 033566 004037 036576                   JSR      RD,@#COMPAR   ;COMPARE TWO BLOCKS OF MEMORY
10216 033572 002400                           WRFROM   ;GOOD DATA STARTS FROM WRFROM
10217 033574 003444                           REINTO   ;TEST DATA STARTS FROM REINTO
10218 033576 000400                           256.    ;256. WORDS TO BE COMPARED
10219 033600 033604                           7$      ;RETURN TO 7$ ON ERROR
10220 033602 033606                           8$      ;RETURN TO 8$ ON NO ERROR
10221
10222
10223 033604 104043                           7$:     ERROR 43      ;WRITING WITH WRITE
10224                                     ;LOCKED CHANGED DISK
10225                                     ;GOOD DATA GIVES WHAT WAS
10226                                     ;ON DISK BEFORE WRITE WITH
10227                                     ;WRITE LOCK WAS ATTEMPTED
10228
10229                                     ;RECEIVED DATA GIVES WHAT
10230                                     ;WAS READ BACK AFTER WRITE
10231                                     ;WITH WRITE LOCKED WAS ATTEMPTED
10232
10233                                     ;SAVE REGISTERS FOR COMPARISON AFTER WRITE LOCK HAS BEEN
10234                                     ;UNLOCKED
10235 033606 004037 034716                   8$:     JSR      RD,@#SAVER ;SAVE REGISTERS
10236 033606

```

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10237 033612 002210          RHWC          ;RHWC IS THE FIRST REGISTER SAVED
10238 033614 004522          SAVERE       ;STARTING ADDRESS OF WHERE
10239                                ;THE REGISTERS ARE SAVED
10240 033616 000022          18.          ;NUMBER OF REGISTERS
10241                                ;SAVED = 18.
10242
10243 033620          ST20:
10244 033620 104400 033626    TYPE          ;:TYPE ASCIZ STRING
10245 033624 000407          BR 64$        ;:GET OVER THE ASCIZ
10246                                ;:ASCIZ <15><12>/ON DRIVE /
10247 033644          64$:
10248 033644 013746 004626    MOV 2#UNIT,-(SP) ;GET UNIT UNDER TEST
10249 033650 104404          TYPDS
10250 033652 104400 033660    TYPE          ;:TYPE ASCIZ STRING
10251 033655 000440          BR 65$        ;:GET OVER THE ASCIZ
10252                                ;:ASCIZ <15><12>/PUSH WRITE PROTCT BUTTON TO UNLOCK WRITES THEN HIT CONTIN
10253 033760          65$:
10254 033760 000000          HALT
10255                                ;THE ONLY BIT THAT SHOULD CHANGE IS WRL-BIT #11 IN RHDS1
10256
10257 033762 004037 035440    JSR RO,2#CHREG ;CHANGE BITS IN SAVED REGISTER
10258 033766 002240          RHDS1        ;CHANGE RHDS1 REGISTER
10259
10260 033770 000001          1
10261 033772 000000          0
10262 033774 004000          WRL          ;1 BIT/BITS TO BE CHANGED
10263                                ;NEW VALUE OF WRL IS 0
10264                                ;CHANGE WRL BIT
10265                                ;COMPARE ALL REGISTERS BEFORE WRITE LOCK WAS UNLOCKED
10266                                ;WITH REGISTERS AFTER WRITE WAS UNLOCKED
10267 033776 004037 035546    JSR RO,2#COMREG ;COMPARE SAVED REGISTERS WITH
10268                                ;PRESENT VALUE
10269 034002 004522          SAVERE       ;GOOD DATA SAVED IN 'SAVERE'
10270 034004 002266          WC          ;TEST DATA STARTING FROM 'RHWC'
10271 034006 000022          18.        ;18. REGISTERS TO BE COMPARED
10272 034010 034014          9$         ;RETURN TO 9$ ON ERROR
10273 034012 034020          10$        ;RETURN TO 10$ ON NO ERROR
10274
10275 034014 104044          9$:         ;UNLOCKING WRITES BY WRITE
10276 034016 000207          RTS PC      ;LOCK BUTTON CAUSED AN ERROR
10277                                ;GOOD DATA GIVES WHAT SHOULD
10278                                ;BE THERE
10279                                ;RECEIVED DATA GIVES WHAT WAS
10280                                ;THERE AFTER WRITES WERE
10281                                ;UNLOCKED
10282                                ;ON THIS ERROR NO LOOPING IS RECOMMENDED
10283                                ;JUST A HALT ON ERROR WILL DO THE SAME
10284                                ;THING AS ONLY THE REGISTERS ARE READ
10285 034020 012737 177777 041404 10$: MOV #-1,2#PRITEM ;CLEAR PREVIOUS ITEM NUMBER
10286
10287
10288
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10290
10291
10292

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103 994

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10293
10294
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10299
10300
10301 034026 000004
10302 034030 012767 000001 145152
10303 034036 012767 000000 143732
10304 034044 104400 034052
10305 034050 000425
10306
10307 034124
10308 034124 013746 004626
10309 034130 104404
10310 034132 104400 034140
10311 034136 000402
10312
10313 034144
10314 034144 013746 001112
10315 034150 104404
10316 034152 005037 001112
10317 034156 005737 004636
10318 034162 001415
10319 034164 005067 144712
10320 034170 005237 001100
10321 034174 104400 034362
10322 034200 013746 001100
10323 034204 104404
10324 034206 104400 034377
10325 034212 000137 007572
10326 034216 012737 177777 041404 3$
10327 034224 005337 004630
10328 034230 001413
10329 034232 013700 004626
10330 034236 012701 004606
10331 034242 022100 1$
10332 034244 001401
10333 034246 000775
10334 034250 011137 004626 2$
10335 034254 000137 007572

```

```

;*TEST 40      END OF DRIVE

;*      THIS IS THE END OF TEST FOR ONE DRIVE
;*      IF THERE ARE MORE DRIVES THEN THE PROGRAM
;*      JUMPS TO TEST 5 FOR NEXT DRIVE TEST
;*      END PASS IS REACHED ONLY AFTER ALL DRIVES ARE COMPLETE

*****
TST40: SCOPE
MOV      #1,$TIMES      ;;DO 1 ITERATION
MOV      #0,PS          ;;REINSTATE PS TO 0
TYPE     +4             ;;TYPE ASCIZ STRING
BR       64$           ;;GET OVER THE ASCIZ
;;.ASCIZ <15><12>/TOTAL ERRORS ON THIS PASS ON UNIT NO. /

64$: MOV      @#UNIT,-(SP)  ;GET READY TO TYPE UNIT NUMBER
TYPDS
TYPE     +4             ;;TYPE ASCIZ STRING
BR       65$           ;;GET OVER THE ASCIZ
;;.ASCIZ /= /

65$: MOV      @#$ERTTL,-(SP) ;GET READY TO TYPE NUMBER OF ERRORS
TYPDS
CLR      @#$ERTTL      ;CLEAR TOTAL NUMBER OF ERRORS
TST      @#$SELECT     ;STARTING FROM 200 ?
BEQ      3$           ;BRANCH IF YES
CLR      $TSTNM        ;CLEAR TEST NUMBER
INC      @#$PASS       ;INCREASE PASS COUNT
TYPE     $ENDMG        ;TYPE END PASS #
MOV      @#$PASS,-(SP)

JMP      @#TST4
MOV      #-1,@#PRITEM  ;CLEAR PREVIOUS ITEM NUMBER
DEC      @#NOUNITS     ;NO. OF UNITS PRESENT DECREMENT
BEQ      $EOP         ;BRANCH IF ALL DRIVES COMPLETE
MOV      @#UNIT,R0     ;UNIT UNDER TEST
MOV      #UNITS,R1    ;TABLE
CMP      (R1)+,R0      ;IS THIS UNIT JUST TESTED
BEQ      2$           ;BRANCH IF YES
BR       1$           ;BRANCH IF NO
MOV      (R1),@#UNIT   ;THIS IS NEXT UNIT
JMP      @#TST4       ;GO FOR NEXT TESTS.

```

```

10336
10337
10338
10339
10340
10341
10342
10343
10344
10345 034260
10346 034260 000634
10347 034262 005067 144614
10348 034266 005067 144716
10349 034272 005267 144602
10350 034276 042767 100000 144574
10351 034304 005327
10352 034306 000001
10353 034310 003022
10354 034312 012737
10355 034314 000001
10356 034316 034306
10357 034320 104400 034362
10358 034324 016746 144550
10359 034330 104404
10360 034332 104400 034377
10361 034336
10362
10363 034336 013700 000042
10364 034342 001405
10365 034344 000005
10366 034346 004710
10367 034350 000240
10368 034352 000240
10369 034354 000240
10370 034356
10371 034356 000137 006170
10372 034362 005015 047105 020104
10373 034370 040520 051523 021440
10374 034376 000
10375 034377 377 377 000
10376
10377
10378
10379
10380
10381
10382
10383
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10390
10391

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;*****
.SBTTL END OF PASS ROUTINE

;*INCREMENT THE PASS NUMBER ($PASS)
;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
;*IF THERES A MONITOR GO TO IT
;*IF THERE ISN'T JUMP TO TST1

$EOP:
      SCOPE
      CLR $TSTNM ;;ZERO THE TEST NUMBER
      CLR $TIMES ;;ZERO THE NUMBER OF ITERATIONS
      INC $PASS ;;INCREMENT THE PASS NUMBER
      BIC #100000,$PASS ;;DON'T ALLOW A NEG. NUMBER
      DEC (PC)+ ;;LOOP?
$EOPCT: .WORD 1
      BGT $DOAGN ;;YES
      MOV (PC)+,2(PC)+ ;;RESTORE COUNTER
$ENDCT: .WORD 1
      $EOPCT
      TYPE $SENDMG ;;TYPE "END PASS #"
      MOV $PASS,-(SP) ;;SAVE $PASS FOR TYPEOUT
      TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
      TYPE , $ENULL ;;TYPE A NULL CHARACTER

$GET42:
      MOV 2#42,RO ;;GET MONITOR ADDRESS
      BEQ $DOAGN ;;BRANCH IF NO MONITOR
      RESET ;;CLEAR THE WORLD
      JSR PC,(RO) ;;GO TO MONITOR
      NOP ;;SAVE ROOM
      NOP ;;FOR
      NOP ;;ACT11
$DOAGN:
      JMP 2#TST1 ;;RETURN
$SENDMG: .ASCIZ <15><12>/END PASS #/
$ENULL: .BYTE -1,-1,0 ;;NULL CHARACTER STRING

.SBTTL SUBROUTINES

; THIS FILLS MEMORY WITH GIVEN DATA
; USED CHIEFLY FOR HEADER INFORMATION
; CALL IS
; JSR RO,2#FLHEAD ;FILL HEADER
; LOC ;LOCATION WHERE SAVED

```



```

10392      :          XN          ;NUMBER OF WORDS
10393      :          XD1        ;DATA REPEATED XN TIMES
10394      :          XD2        ;DATA REPEATED XN TIMES
10395      :
10396      :
10397      :
10398      :
10399      034402      FLHEAD:
10400      034402      010146      MOV      R1,-(SP)      ;;PUSH R1 ON STACK
10401      034404      010246      MOV      R2,-(SP)      ;;PUSH R2 ON STACK
10402      034406      012001      MOV      (R0)+,R1      ;R1 HAS ADDRESS OF WHERE TO SAVE
10403      034410      012002      MOV      (R0)+,R2      ;R2 HAS NUMBER OF WORDS
10404
10405      ;NOW FILL DATA
10406
10407      034412      012021      1$:      MOV      (R0)+,(R1)+      ;SAVE DATA
10408      034414      005302      DEC      R2              ;DECREMENT COUNT
10409      034416      001375      BNE     1$              ;BRANCH IF INCOMPLETE
10410      034420      012602      MOV      (SP)+,R2      ;POP STACK INTO R2
10411      034422      012601      MOV      (SP)+,R1      ;POP STACK INTO R1
10412      034424      000200      RTS      R0
10413
10414
10415
10416      ;THIS CLEARS ANY BLOCK OF MEMORY.
10417      ;FILLING IT WITH ANY DATA
10418      ;CALL IS
10419      ;          JSR      R0,2#CLAREA
10420      ;          F          ;FROM
10421      ;          N          ;NUMBER OF WORDS
10422      ;          D          ;DATA TO BE FILLED
10423
10424      ;R1 WILL HAVE STARTING ADDRESS OF BLOCK TO BE FILLED
10425      ;R2 WILL HAVE NUMBER OF WORDS
10426      ;R3 WILL HAVE DATA
10427
10428      034426      CLAREA:
10429      034426      010146      MOV      R1,-(SP)      ;;PUSH R1 ON STACK
10430      034430      010246      MOV      R2,-(SP)      ;;PUSH R2 ON STACK
10431      034432      010346      MOV      R3,-(SP)      ;;PUSH R3 ON STACK
10432      034434      012001      MOV      (R0)+,R1      ;FROM
10433      034436      012002      MOV      (R0)+,R2      ;NUMBER
10434      034440      012003      MOV      (R0)+,R3      ;DATA
10435      034442      010321      1$:      MOV      R3,(R1)+      ;MOVE DATA
10436      034444      005302      DEC      R2              ;COUNT
10437      034446      001375      BNE     1$              ;BRANCH IF NOT COMPLETE
10438      034450      012603      MOV      (SP)+,R3      ;POP STACK INTO R3
10439      034452      012602      MOV      (SP)+,R2      ;POP STACK INTO R2
10440      034454      012601      MOV      (SP)+,R1      ;POP STACK INTO R1
10441      034456      000200      RTS      R0          ;RETURN TO MAIN PROGRAM
10442
10443
10444
10445
10446
10447

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9265 035544 000200          RTS      RO          ;RETURN TO MAIN PROGRAM
9266
9267
9268
9269
9270
9271
9272          ; THIS IS A SUBROUTINE TO COMPARE REGISTERS
9273          ; GOOD DATA IS ALREADY SAVED IN 'SAVERE'
9274          ; TEST DATA IS IN THE REGISTERS
9275          ; CALL IS
9276          JSR      RO, @COMREG
9277          SAVERE          ; GOOD DATA
9278          RHCSI          ; ADDRESS OF ADDRESS TEST DATA
9279          N.              ; RETURN FOR ERROR
9280          RG              ; RETURN FOR GOOD COMPARISON
9281          ; ON RETURN WITH ERROR 'SGDDAT' HAS GOOD DATA, 'SBDDAT' HAS BAD DATA
9282          ; 'REGADR' HAS REGISTER ADDRESS
9283
9284          COMREG:
9285          MOV      R1, -(SP)          ; PUSH R1 ON STACK
9286          MOV      R2, -(SP)          ; PUSH R2 ON STACK
9287          MOV      R3, -(SP)          ; PUSH R3 ON STACK
9288          MOV      R4, -(SP)          ; PUSH R4 ON STACK
9289          MOV      R5, -(SP)          ; PUSH R5 ON STACK
9290          MOV      (RO)+, R1          ; R1 HAS ADDRESS OF GOOD DATA
9291          MOV      (RO)+, R2          ; R2 HAS ADDRESS OF ADDRESS OF TEST DATA
9292          MOV      (RO)+, R3          ; R3 HAS NUMBER OF WORDS
9293          MOV      (RO)+, R4          ; R4 HAS RETURN FOR ERROR
9294          MOV      (RO), RO          ; RO HAS RETURN ON NO ERROR
9295          ; NOW SAVE REGISTERS
9296          JSR      PC, @PUTREG          ; SAVE REGISTERS
9297          MOV      @SAVERE+25, @R5+1 ; MAKE UPPER BYTE OF R HAS SAME
9298          MOV      @-2, R5           ; PRESET R5 TO -2
9299          ; NOW COMPARES WILL MADE
9300          ADD      @2, R5             ; INCREMENT TO INDEX
9301          CMP      (R1)+, (R2)+       ; COMPARE REGISTER CONTENTS
9302          BEQ      @25                ; BRANCH IF GOOD
9303          MOV      -(R1), @SGDDAT     ; SAVE GOOD DATA
9304          MOV      -(R2), @SBDDAT     ; SAVE BAD DATA
9305          MOV      RHWC(R5), @REGADR  ; SAVE ADDRESS OF FAILING REGISTER
9306          JSR      PC, @R4           ; RETURN TO MAIN PROGRAM
9307          ; TO PRINT ERROR
9308          CMP      (R1)+, (R2)+       ; UNDO -(R1) AND -(R2) FOR ERRORS
9309          MOV      @SWR, -(SP)        ; GET SWITCH SETTING
9310          BIC      @C600, (SP)       ; KEEP ONLY SWITCH 7 AND 8
9311          CMP      @SW07, (SP)+     ; IS 7 SET AND 8 DOWN
9312          BEQ      @35                ; BRANCH OUT IF YES
9313          DEC      R3                 ; ARE ALL COMPARES DONE
9314          BNE      @15                ; BRANCH IF NOT COMPLETE
9315
9316          35:
9317          MOV      (SP)+, R5          ; POP STACK INTO R5
9318          MOV      (SP)+, R4          ; POP STACK INTO R4
9319          MOV      (SP)+, R3          ; POP STACK INTO R3
9320          MOV      (SP)+, R2          ; POP STACK INTO R2

```

9321 035674 012601
9322 035676 000200
9323 035700 000000

MOV (SP)+,R1
RTS R0
4S: .WORD 0

:::POP STACK INTO R1
:::RETURN TO MAIN PROGRAM
;TEMP STORAGE

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9346 035702 000000
9347 035704
9348 035704 005067 142066
9349 035710 012737 177777 041404
9350 035716 104400 035724
9351 035722 000421
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9353 035766
9354 035766 013746 004514
9355 035772 104401
9356 035774 104400 036002
9357 036000 000414
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9359 036032
9360 036032 013746 001110
9361 036036 104401
9362 036040 104400 001221
9363 036044 104400 036052
9364 036050 000430
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9366 036132
9367 036132 104400 036140
9368 036136 000430
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9370 036220
9371 036220 104400 036226
9372 036224 000422
9373
9374 036272
9375 036272 104407
9376 036274 062716 000002
9377 036300 012637 001106
9378 036304 104400 036312
9379 036310 000417

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```

;HERE IS A DETAILED EXPLANATION OF HOW THE LOOP ON ERROR WORKS.
;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.

```

```

TESTAD: 0 ;FIRST ADDRESS OF TEST
OPERSEL:
CLR PS ;MAKE PROCESSOR STATUS ZERO
MOV #1, @PRITEM ;CLEAR PREVIOUS ITEM NUMBER
TYPE +4 ;TYPE ASCIZ STRING
BR 64$ ;GET OVER THE ASCIZ
;;.ASCIZ <15><12>/THE PROGRAM WAS IN TEST NUMBER /
64$:
MOV @TSTNM, -(SP) ;GET READY TO TYPE TEST
TYPC ;NUMBER
TYPE +4 ;TYPE ASCIZ STRING
BR 65$ ;GET OVER THE ASCIZ
;;.ASCIZ <15><12>/THE LOOP BACK PC WAS /
65$:
MOV @SLPERR, -(SP) ;GET READY TO TYPE LOOP BACK PC
TYPC
TYPE ,SCLF
TYPE +4 ;TYPE ASCIZ STRING
BR 66$ ;GET OVER THE ASCIZ
;;.ASCIZ <15><12>/SET SWITCH FOR LOOP ON ERROR OR LOOP ON TEST/
66$:
TYPE +4 ;TYPE ASCIZ STRING
BR 67$ ;GET OVER THE ASCIZ
;;.ASCIZ <15><12>/TYPE THE FIRST PC OF THE TEST TO BE LOOPED ON/
67$:
TYPE +4 ;TYPE ASCIZ STRING
BR 68$ ;GET OVER THE ASCIZ
;;.ASCIZ <15><12>/ FOLLOWED BY A CARRIAGE RETURN /<15><12>
68$:
RDOCT
ADD #2, (SP) ;GET LPADR
MOV (SP)+, @SLPADR
TYPE +4 ;TYPE ASCIZ STRING
BR 69$ ;GET OVER THE ASCIZ

```

```

9380          ;;.ASCIZ      <15><12>/TYPE THE PC WHERE YOU WANT/
9381 036350    69$:      TYPE          ;;TYPE ASCIZ STRING
9382 036350 104400 036356 BR          70$          ;;GET OVER THE ASCIZ
9383 036354 000440          ;;.ASCIZ      <15><12>/ THE PROGRAM TO LOOP BACK TO FOLLOWED BY A CARRIAGE RETUR
9384
9385 036456    70$:      RDOCT
9386 036456 104407      MOV      (SP)+,2*SLPERR ;GET LPERR
9387 036460 012637 001110 MOV      2*SLPADR,-(SP)
9388 036464 013746 001106 RTI
9389 036470 000002
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```

```

;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
  
```

```

9403 036472    PUTREG:  MOV      RO,-(SP)          ;;PUSH RO ON STACK
9404 036472 010046      MOV      R1,-(SP)          ;;PUSH R1 ON STACK
9405 036474 010146      MOV      R2,-(SP)          ;;PUSH R2 ON STACK
9406 036476 010246      MOV      #RHW,RO          ;;STARTING ADDRESS OF REG
9407 036500 012700 002210 MOV      #WC,R1          ;;STARTING ADDRESS OF WERE SAVED
9408 036504 012701 002266 MOV      #RHC-RHW+2/2,R2 ;NUMBER OF REG. INTO R2
9409 036510 012702 000022 10$:  MOV      2(RO)+,(R1)+ ;SAVE HARDWARE REG.
9410 036514 013021      DEC      R2
9411 036516 005302      BNE     10$
9412 036520 001375      MOV      (SP)+,R2          ;;POP STACK INTO R2
9413 036522 012602      MOV      (SP)+,R1          ;;POP STACK INTO R1
9414 036524 012601      MOV      (SP)+,RO          ;;POP STACK INTO RO
9415 036526 012600      RTS     PC
9416 036530 000207
  
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9430 036532 012077 143472
9431 036536 012077 143460
9432 036542 012077 143442
9433 036546 012077 143440
9434 036552 013746 004626
9435 036556 052016
9436 036560 012677 143430
9437 036564 012077 143436
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9439 036570 013077 143422
9440 036574 000200
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9461 036576
9462 036576 010146
9463 036600 010246
9464 036602 010346
9465 036604 010446
9466 036606 010546
9467 036610 012001
9468 036612 012002
9469 036614 012003
9470 036616 012005
9471 036620 011000
9472 036622 010304
  
```

```

: THIS IS A DATA COMMAND SETUP SUBROUTINE
: THE CALL IS
: JSR      RO, @#RUN
:
: .BYTE    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
RUN:    MOV      (RO)+, @RHCA   : CYLINDER
        MOV      (RO)+, @RHDS  : DESIRED SECTOR/TRACK
        MOV      (RO)+, @RHWC  : WORD COUNT
        MOV      (RO)+, @RHBA  : BUS ADDRESS
        MOV      @#UNIT, -(SP) : GET UNIT NO
        BIS      (RO)+, (SP)   : SET BUS ADDRESS INHIBIT
        MOV      (SP)+, @RHCS2 : UNIT NO AND BAI TO RHCS2
        MOV      (RO)+, @RHOF  : FORMAT, ECC INHIBIT, HEADER
:                               COMPARE, IF THERE
:                               COMMAND IN RHCS1
:                               RETURN TO MAIN PROGRAM
        MOV      @#(RO)+, @RHCS1
        RTS      RO
  
```

```

: 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      RO, @#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
  
```

```

COMPAR:
        MOV      R1, -(SP)    : PUSH R1 ON STACK
        MOV      R2, -(SP)    : PUSH R2 ON STACK
        MOV      R3, -(SP)    : PUSH R3 ON STACK
        MOV      R4, -(SP)    : PUSH R4 ON STACK
        MOV      R5, -(SP)    : PUSH R5 ON STACK
        MOV      (RO)+, R1    : ADDRESS OF GOOD DATA BUFFER
        MOV      (RO)+, R2    : ADDRESS OF TEST DATA BUFFER
        MOV      (RO)+, R3    : NO OF WORDS TO BE COMPARED
        MOV      (RO)+, R5    : RETURN ON ERROR
        MOV      (RO), RO     : RETURN ON NO ERROR
        MOV      R3, R4      : NO OF WORDS TO BE COMPARED
  
```

```

9473 036624 005204      INC      R4
9474 036626 010437 004512 1$:      MOV      R4, @#ERWORD ;FOR ERROR WORD NO
9475 036632 022122      CMP      (R1)+, (R2)+ ;COMPARE GOOD WITH TEST DATA
9476 036634 001417      BEQ      2$ ;BRANCH IF GOOD
9477
9478 036636 014137 001124      MOV      -(R1), @#SGDDAT ;GOOD DATA
9479 036642 014237 001126      MOV      -(R2), @#SBDDAT ;BAD DATA
9480 036646 160337 004512      SUB      R3, @#ERWORD ;ERROR WORD NO.
9481 036652 004715      JSR      PC, @R5 :RETURN TO PRINT ERROR
9482 036654 022122      CMP      (R1)+, (R2)+ ;UNDO -(R1) AND -(R2) FOR ERRORS
9483 036656 013746 001136      MOV      @#SWR, -(SP) ;GET SWITCH SETTING
9484 036662 042716 177177      BIC      #1C600, (SP) ;KEEP ONLY SWITCH 7 AND 8
9485 036666 022726 000200      CMP      @SW07, (SP)+ ;IS 7 SET AND 8 RESET
9486 036672 001402      BEQ      3$ ;BRANCH OUT IF YES
9487 036674 005303      2$:      DEC      R3 ;COUNT
9488 036676 001353      BNE      1$ ;BRANCH IF ALL NOT DEVICE
9489
9490 036700 012605      3$:      MOV      (SP)+, R5 ;POP STACK INTO R5
9491 036702 012604      MOV      (SP)+, R4 ;POP STACK INTO R4
9492 036704 012603      MOV      (SP)+, R3 ;POP STACK INTO R3
9493 036706 012602      MOV      (SP)+, R2 ;POP STACK INTO R2
9494 036710 012601      MOV      (SP)+, R1 ;POP STACK INTO R1
9495 036712 000200      RTS      R0 ;RETURN TO MAIN PROGRAM
9496
9497 ;*      THIS ROUTINE WILL ALLOW THE CHANGE OF THE BASE
9498 ;*      ADDRESS FROM 176700 TO ANY TYPED VALUE
9499
9500 036714 104400 036722      BASECH: TYPE      +4 ;TYPE ASCIZ STRING
9501 036720 000424      BR      64$ ;GET OVER THE ASCIZ
9502 ;;.ASCIZ <15><12>/PRESENT BASE ADDRESS OF REGISTERS IS /
9503 036772 013746 002216      64$:      MOV      @#RHCS1, -(SP) ;GET READY TO TYPE OLD BASE
9504 036776 104401      TYPOC
9505 037000 104400 037006      TYPE      +4 ;TYPE ASCIZ STRING
9506 037004 000425      BR      65$ ;GET OVER THE ASCIZ
9507 ;;.ASCIZ <15><12>/TYPE NEW BASE ADDRESS FOLLOWED BY 'CR'/
9508
9509 037060 104407      65$:      RDOCT
9510 037062 012700 002206      MOV      @#RHDB, R0 ;GET STARTING ADDRESS OF RGISTERS
9511 037066 012701 000024      MOV      #20, R1 ;NUMBER OF REGISTERS
9512 037072 042710 177700      1$:      BIC      #1C77, (R0) ;CLEAR OLD BASE
9513 037076 051620      BIS      (SP), (R0)+ ;SET NEW BASE
9514 037100 005301      DEC      R1 ;COUNT
9515 037102 001373      BNE      1$ ;BRANCH IF 20 NOT DONE
9516 037104 104400 037112      TYPE      +4 ;TYPE ASCIZ STRING
9517 037110 000417      BR      66$ ;GET OVER THE ASCIZ
9518 ;;.ASCIZ <15><12>/PRESENT VECTOR ADDRESS IS /
9519
9520 037150 013746 002204      66$:      MOV      @#RPVEC, -(SP) ;GET READY TO TYPE OLD VECTOR ADDRESS
9521 037154 104401      TYPOC
9522 037156 104400 037164      TYPE      +4 ;TYPE ASCIZ STRING
9523 037162 000437      BR      67$ ;GET OVER THE ASCIZ
9524 ;;.ASCIZ <15><12>/TYPE NEW VECTOR ADDRESS OR RETYPE OLD ONE FOLLOWED BY "CR
9525
9526 037262 104407      67$:      RDOCT
9527 037262 012637 002204      MOV      (SP)+, @#RPVEC ;SETUP VECTOR ADDRESS
9528

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9529	037270	104400	037276		TYPE		;;TYPE ASCIZ STRING
9530	037274	000421			BR	68\$;;GET OVER THE ASCIZ
9531					;;.ASCIZ		<15><12>/RESTART PROGRAM FROM 200 OR 210/
9532	037340			68\$:			
9533	037340	104400	037346		TYPE		;;TYPE ASCIZ STRING
9534	037344	000414			BR	69\$;;GET OVER THE ASCIZ
9535					;;.ASCIZ		<15><12>/NEW BASE WILL REMAIN/
9536	037376			69\$:			
9537	037376	013746	002216		MOV	2#RHCS1,-(SP)	
9538	037402	104401			TYPOC		
9539	037404	104400	037412		TYPE		;;TYPE ASCIZ STRING
9540	037410	000415			BR	70\$;;GET OVER THE ASCIZ
9541					;;.ASCIZ		<15><12>/NEW VECTOR WILL REMAIN /
9542	037444			70\$:			
9543	037444	013746	002204		MOV	2#RPVEC,-(SP)	
9544	037450	104401			TYPOC		
9545	037452	104400	037460		TYPE		;;TYPE ASCIZ STRING
9546	037456	000416			BR	71\$;;GET OVER THE ASCIZ
9547					;;.ASCIZ		<15><12>/UNTIL PROGRAM IS RELOADED/
9548	037514			71\$:			
9549	037514	000000			HALT		
9550							

9551	037516				RPVECT:			
9552	037516	104400	037524			TYPE	+4	::TYPE ASCIZ STRING
9553	037522	000411				BR	64\$::GET OVER THE ASCIZ
9554						::ASCIZ		/TRAPED FROM PC = /
9555	037546				64\$:			
9556	037546	104401				TYPOC		:TYPE FROM PC
9557	037550	012777	037516	142426		MOV	#RPVECT,@RPVEC	:RESTORE TRAP RPO4 VECTOR
9558	037556	000000				HALT		:CHANGE TO CONTINUE
9559								
9560								
9561								
9562								

```

9563 ;*****
9564 ;*****
9565 ;*****
9566 .SBTTL SCOPE HANDLER ROUTINE
9567
9568 ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
9569 ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
9570 ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
9571 ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
9572 ;*SW14=1 LOOP ON TEST
9573 ;*SW11=1 INHIBIT ITERATIONS
9574 ;*SW09=1 LOOP ON ERROR
9575 ;*SW08=1 LOOP ON TEST IN SWR<7:0>
9576 ;*CALL
9577 ;* SCOPE ;;SCOPE=IOT
9578
9579 037560 $SCOPE:
9580 037560 032777 040000 141350 1$: BIT #BIT14,$SWR ;;LOOP ON PRESENT TEST?
9581 037566 001111 BNE $OVER ;;YES IF SW14=1
9582 ;*****START OF CODE FOR THE XOR TESTER*****
9583 037570 000416 $XTSTR: BR 6$ ;;IF RUNNING ON THE "XOR" TESTER CHANGE
9584 ; THIS INSTRUCTION TO A "NOP" (NOP=240)
9585 037572 013746 000004 MOV $ERRVEC,-($P) ;;SAVE THE CONTENTS OF THE ERROR VECTOR
9586 037576 012737 037616 000004 MOV $S,$ERRVEC ;;SET FOR TIMEOUT
9587 037604 005737 177060 TST $177060 ;;TIME OUT ON XOR?
9588 037610 012637 000004 MOV ($P)+,$ERRVEC ;;RESTORE THE ERROR VECTOR
9589 037614 000463 BR $SVLAD ;;GO TO THE NEXT TEST
9590 037616 022626 5$: CMP ($P)+,$($P)+ ;;CLEAR THE STACK AFTER A TIME OUT
9591 037620 012637 000004 MOV ($P)+,$ERRVEC ;;RESTORE THE ERROR VECTOR
9592 037624 000423 BR 7$ ;;LOOP ON THE PRESENT TEST
9593 037626 6$: ;*****END OF CODE FOR THE XOR TESTER*****
9594 037626 032777 000400 141302 BIT #BIT08,$SWR ;;LOOP ON SPEC. TEST?
9595 037634 001404 BEQ 2$ ;;BR IF NO
9596 037636 127767 141274 141236 CMPB $SWR,$TSTNM ;;ON THE RIGHT TEST? SWR<7:0>
9597 037644 001462 BEQ $OVER ;;BR IF YES
9598 037646 105767 141231 2$: TSTB $ERFLG ;;HAS AN ERROR OCCURRED?
9599 037652 001421 BEQ 3$ ;;BR IF NO
9600 037654 126767 141235 141221 CMPB $ERMAX,$ERFLG ;;MAX. ERRORS FOR THIS TEST OCCURRED?
9601 037662 101015 BHI 3$ ;;BR IF NO
9602 037664 032777 001000 141244 BIT #BIT09,$SWR ;;LOOP ON ERROR?
9603 037672 001404 BEQ 4$ ;;BR IF NO
9604 037674 016767 141210 141204 7$: MOV $LPERR,$LPADR ;;SET LOOP ADDRESS TO LAST SCOPE
9605 037702 000443 BR $OVER
9606 037704 105067 141173 4$: CLRB $ERFLG ;;ZERO THE ERROR FLAG
9607 037710 005067 141274 CLR $TIMES ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
9608 037714 000415 BR 1$ ;;ESCAPE TO THE NEXT TEST
9609 037716 032777 004000 141212 3$: BIT #BIT11,$SWR ;;INHIBIT ITERATIONS?
9610 037724 001011 BNE 1$ ;;BR IF YES
9611 037726 005767 141146 TST $PASS ;;IF FIRST PASS OF PROGRAM
9612 037732 001406 BEQ 1$ ;; INHIBIT ITERATIONS
9613 037734 005267 141144 INC $ICNT ;;INCREMENT ITERATION COUNT
9614 037740 026767 141244 141136 CMP $TIMES,$ICNT ;;CHECK THE NUMBER OF ITERATIONS MADE
9615 037746 002021 BGE $OVER ;;BR IF MORE ITERATION REQUIRED
9616 037750 012767 000001 141126 1$: MOV #1,$ICNT ;;REINITIALIZE THE ITERATION COUNTER
9617 037756 016767 000044 141224 MOV $MXCNT,$TIMES ;;SET NUMBER OF ITERATIONS TO DO
9618 037764 105267 141112 $SVLAD: INCB $TSTNM ;;COUNT TEST NUMBERS

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K01

9619	037770	011667	141112		MOV	(SP), \$LPADR	:: SAVE SCOPE LOOP ADDRESS
9620	037774	011667	141110		MOV	(SP), \$LPERR	:: SAVE ERROR LOOP ADDRESS
9621	040000	005067	141206		CLR	\$ESCAPE	:: CLEAR THE ESCAPE FROM ERROR ADDRESS
9622	040004	112767	000001	141103	MOVB	#1, \$ERMAX	:: ONLY ALLOW ONE(I) ERROR ON NEXT TEST
9623	040012	016777	141064	141120	\$OVER: MOV	\$TSTNM, @DISPLAY	:: DISPLAY TEST NUMBER
9624	040020	016716	141062		MOV	\$LPADR, (SP)	:: FUDGE RETURN ADDRESS
9625	040024	000002			RTI		:: FIXES PS
9626	040026	000004			\$MXCNT: 4		:: MAX. NUMBER OF ITERATIONS

```

9627 ;*****
9628
9629 .SBTTL CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
9630
9631 ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
9632 ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
9633 ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
9634 ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
9635 ;*REPLACED WITH SPACES.
9636 ;*CALL:
9637 ;*      MOV      NUM,-(SP)      ;;PUT THE BINARY NUMBER ON THE STACK
9638 ;*      TYPDS                    ;;GO TO THE ROUTINE
9639
9640 040030 STYPDS:
9641 040030 010046      MOV      R0,-(SP)      ;;PUSH R0 ON STACK
9642 040032 010146      MOV      R1,-(SP)      ;;PUSH R1 ON STACK
9643 040034 010246      MOV      R2,-(SP)      ;;PUSH R2 ON STACK
9644 040036 010346      MOV      R3,-(SP)      ;;PUSH R3 ON STACK
9645 040040 010546      MOV      R5,-(SP)      ;;PUSH R5 ON STACK
9646 040042 012746 02020C      MOV      #20200,-(SP)  ;;SET BLANK SWITCH AND SIGN
9647 040046 016605 000020      MOV      20(SP),R5    ;;GET THE INPUT NUMBER
9648 040052 100004      BPL      1$           ;;BR IF INPUT IS POS.
9649 040054 005405      NEG      R5           ;;MAKE THE BINARY NUMBER POS.
9650 040056 112766 000055 000001      MOVVB   #'-,1(SP)    ;;MAKE THE ASCII NUMBER NEG.
9651 040064 005000      CLR      R0           ;;ZERO THE CONSTANTS INDEX
9652 040066 012703 040244      MOV      #SDBLK,R3    ;;SETUP THE OUTPUT POINTER
9653 040072 112723 000040      MOVVB   #' ,(R3)+    ;;SET THE FIRST CHARACTER TO A BLANK
9654 040076 005002      CLR      R2           ;;CLEAR THE BCD NUMBER
9655 040100 016001 040234      MOV      $DTBL(R0),R1 ;;GET THE CONSTANT
9656 040104 160105      SJB     R1,R5         ;;FORM THIS BCD DIGIT
9657 040106 002402      BLT     4$           ;;BR IF DONE
9658 040110 005202      INC     R2           ;;INCREASE THE BCD DIGIT BY 1
9659 040112 000774      BR      3$
9660 040114 060105      4$:      ADD     R1,R5         ;;ADD BACK THE CONSTANT
9661 040116 005702      TST     R2           ;;CHECK IF BCD DIGIT=0
9662 040120 001002      BNE     5$           ;;FALL THROUGH IF 0
9663 040122 105716      TSTB   (SP)         ;;STILL DOING LEADING 0'S?
9664 040124 100407      BMI     7$           ;;BR IF YES
9665 040126 106316      5$:      ASLB   (SP)         ;;MSD?
9666 040130 103003      BCC     6$           ;;BR IF NO
9667 040132 116663 000001 177777      MOVVB   1(SP),-1(R3)  ;;YES--SET THE SIGN
9668 040140 052702 000060      BIS     #'0,R2       ;;MAKE THE BCD DIGIT ASCII
9669 040144 052702 000040      6$:      BIS     #' ,R2       ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
9670 040150 110223      MOVVB   R2,(R3)+    ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
9671 040152 005720      TST    (R0)+        ;;JUST INCREMENTING
9672 040154 020027 000010      CMP     R0,#10      ;;CHECK THE TABLE INDEX
9673 040160 002746      BLT     2$           ;;GO DO THE NEXT DIGIT
9674 040162 003002      BGT     8$           ;;GO TO EXIT
9675 040164 010502      MOV     R5,R2       ;;GET THE LSD
9676 040166 000764      BR      6$         ;;GO CHANGE TO ASCII
9677 040170 105726      8$:      TSTB   (SP)+        ;;WAS THE LSD THE FIRST NON-ZERO?
9678 040172 100003      BPL     9$           ;;BR IF NO
9679 040174 116663 177777 177776      MOVVB   -1(SP),-2(R3) ;;YES--SET THE SIGN FOR TYPING
9680 040202 105013      9$:      CLRB   (R3)         ;;SET THE TERMINATOR
9681 040204 012605      MOV     (SP)+,R5    ;;POP STACK INTO R5
9682 040206 012603      MOV     (SP)+,R3    ;;POP STACK INTO R3

```

```

9683 040210 012602          MOV      (SP)+,R2          ;;POP STACK INTO R2
9684 040212 012601          MOV      (SP)+,R1          ;;POP STACK INTO R1
9685 040214 012600          MOV      (SP)+,R0          ;;POP STACK INTO R0
9686 040216 104400 040244  TYPE      $DBLK          ;;NOW TYPE THE NUMBER
9687 040222 016666 000002 000004  MOV      2(SP),4(SP)      ;;ADJUST THE STACK
9688 040230 012616          MOV      (SP)+,(SP)
9689 040232 000002          RTI                          ;;RETURN TO USER
9690 040234 023420          $DTBL: 10000.
9691 040236 001750          1000.
9692 040240 000144          100.
9693 040242 000012          10.
9694 040244 000004          $DBLK: .BLKW 4
9695                                     ;*****
9696                                     ;
9697                                     ;.SBTTL TYPE ROUTINE
9698                                     ;
9699                                     ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
9700                                     ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
9701                                     ;*NOTE1:          $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
9702                                     ;*NOTE2:          $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
9703                                     ;*NOTE3:          $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
9704                                     ;*
9705                                     ;*CALL:
9706                                     ;*1) USING A TRAP INSTRUCTION
9707                                     ;*      TYPE      ,MESADR          ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
9708                                     ;*OR
9709                                     ;*      TYPE
9710                                     ;*      MESADR
9711                                     ;*
9712                                     ;*
9713 040254 105767 140675          $TYPE: TSTB      $TFPLG          ;; IS THERE A TERMINAL?
9714 040260 100002          BPL      1$                  ;; BR IF YES
9715 040262 000000          HALT                    ;; HALT HERE IF NO TERMINAL
9716 040264 000407          BR      3$                  ;; LEAVE
9717 040266 010046          1$:  MOV      RO,-(SP)          ;; SAVE RO
9718 040270 017600 000002          MOV      2(SP),RO          ;; GET ADDRESS OF ASCIZ STRING
9719 040274 112046          2$:  MOV      (RO)+,-(SP)      ;; PUSH CHARACTER TO BE TYPED ONTO STACK
9720 040276 001005          BNE      4$                  ;; BR IF IT ISN'T THE TERMINATOR
9721 040300 005726          TST      (SP)+              ;; IF TERMINATOR POP IT OFF THE STACK
9722 040302 012600          60$: MOV      (SP)+,RO          ;; RESTORE RO
9723 040304 062716 000002          3$:  ADD      #2,(SP)          ;; ADJUST RETURN PC
9724 040310 000002          RTI                          ;; RETURN
9725 040312 122716 000011          4$:  CMP      #THT,(SP)          ;; BRANCH IF <HT>
9726 040316 001426          BEQ      8$                  ;;
9727 040320 122716 000200          CMP      #TCRLF,(SP)        ;; BRANCH IF NOT <CRLF>
9728 040324 001004          BNE      5$                  ;;
9729 040326 005726          TST      (SP)+              ;; POP <CR><LF> EQUIV
9730 040330 104400          TYPE      $CRLF            ;; TYPE A CR AND LF
9731 040332 001221          $CRLF
9732 040334 000757          BR      2$                  ;; GET NEXT CHARACTER
9733 040336 004767 000056          5$:  JSR      PC,$TYPEC          ;; GO TYPE THIS CHARACTER
9734 040342 126726 140606          6$:  CMP      $FILLC,(SP)+      ;; IS IT TIME FOR FILLER CHARS.?
9735 040346 001352          BNE      2$                  ;; IF NO GO GET NEXT CHAR.
9736 040350 016746 140576          MOV      $NULL,-(SP)        ;; GET # OF FILLER CHARS. NEEDED
9737                                     ;; AND THE NULL CHAR.
9738 040354 105366 000001          7$:  DECB      1(SP)          ;; DOES A NULL NEED TO BE TYPED?

```

```

9739 040360 002770          BLT      6$          ;; BR IF NO--GO POP THE NULL OFF OF STACK
9740 040362 004767- 000032  JSR      PC,$TYPEC  ;; GO TYPE A NULL
9741 040366 105367 000072  DECB    $CHARCNT    ;; DO NOT COUNT AS A COUNT
9742 040372 000770          BR       7$          ;; LOOP

```

;HORIZONTAL TAB PROCESSOR

```

9746 040374 112716 000040  8$:     MOVB    #40,(SP)  ;; REPLACE TAB WITH SPACE
9747 040400 004767 000014  9$:     JSR      PC,$TYPEC  ;; TYPE A SPACE
9748 040404 132767 000007 000052  BITB    #7,$CHARCNT    ;; BRANCH IF NOT AT
9749 040412 001372          BNE     9$            ;; TAB STOP
9750 040414 005726          TST     (SP)+         ;; POP SPACE OFF STACK
9751 040416 000726          BR      2$            ;; GET NEXT CHARACTER
9752 040420 105777 140522  $TYPEC: TSTB    @STPS    ;; WAIT UNTIL PRINTER IS READY
9753 040424 100375          BPL     $TYPEC
9754 040426 116677 000002 140514  MOVB    2(SP),@STPB    ;; LOAD CHAR TO BE TYPED INTO DATA REG.
9755 040434 122766 000015 000002  CMPB    #15,2(SP)     ;; BRANCH IF
9756 040442 001003          BNE     1$            ;; NOT <CR>
9757 040444 105067 000014          CLRB   $CHARCNT
9758 040450 000406          BR     $TYPEX
9759 040452 122766 000012 000002  1$:     CMPB    #12,2(SP)  ;; BRANCH IF
9760 040460 002002          BGE     $TYPEX       ;; <LF>
9761 040462 105227          INCB   (PC)+         ;; INC SPACE
9762 040464 000000          SCHARCNT: .WORD 0    ;; COUNT
9763 040466 000207          $TYPEX: RTS      PC

```

```

;: EQUATES
THT=11
TCRLF=200

```

;*****

.SBTTL TTY INPUT ROUTINE

```

9772 040470 000000  $TKCNT: .WORD 0    ;; NUMBER OF ITEMS IN QUEUE
9773 040472 000000  $TKQIN: .WORD 0    ;; INPUT POINTER
9774 040474 000000  $TKQOUT: .WORD 0   ;; OUTPUT POINTER
9775 040476 000011  $TKQSRT: .BLKB 9.  ;; TTY KEYBOARD QUEUE
9776          040507  $TKQEND=.
9777          040510  .EVEN

```

```

; *TK INITIALIZE ROUTINE
; *THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
; *SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT

```

```

; *CALL
; * JSR      PC,$TKINT
; * RETURN

```

```

9787 040510 005067 177754  $TKINT: CLR     $TKCNT    ;; CLEAR COUNT OF ITEMS IN QUEUE
9788 040514 012767 040476 177750  MOV     #TKQSRT,$TKQIN  ;; MOVE THE STARTING ADDRESS OF THE
9789 040522 016767 177744 177744  MOV     $TKQIN,$TKQOUT  ;; QUEUE INTO THE INPUT & OUTPUT POINTERS.
9790 040530 012737 040560 000060  MOV     #TKQSRT,@TKVEC  ;; INITIALIZE THE KEYBOARD VECTOR
5791 040536 012737 000200 000062  MOV     #200,@TKVEC+2  ;; "BR" LEVEL 4
9792 040544 005777 140374          TST     @TKB           ;; CLEAR DONE FLAG
9793 040550 012777 000100 140364  MOV     #BIT06,@STKS   ;; ENABLE INTERRUPT
9794 040556 000207          RTS      PC          ;; RETURN TO CALLER

```

```

9795
9796
9797
9798
9799 040560 117746 140360
9800 040564 042716 177600
9801 040570 021627 000003
9802 040574 001006
9803 040576 104400 041075
9804 040602 004767 177702
9805 040606 000167 175072
9806 040612 022767 000011 177650 1S:
9807 040620 001004
9808 040622 104400 001214
9809 040626 005726
9810 040630 000002
9811 040632 005267 177632 2S:
9812 040636 112677 177630
9813 040642 005267 177624
9814 040646 026727 177620 040507
9815 040654 001003
9816 040656 012767 040476 177606
9817 040664 000002 3S:
9818
9819
9820
9821
9822
9823
9824
9825 040666 011646
9826 040670 016666 000004 000002
9827 040676 005066 000004
9828 040702 005046
9829 040704 012746 040712
9830 040710 000002
9831 040712 005767 177552 1S:
9832 040716 001775
9833 040720 005367 177544
9834 040724 117766 177544 000004
9835 040732 005267 177536
9836 040736 026727 177532 040507
9837 040744 001003
9838 040746 012767 040476 177520
9839 040754 000002 2S:
9840
9841
9842
9843
9844
9845
9846
9847 040756 010346
9848 040760 012703 041064
9849 040764 022703 041075
9850 040770 101405

; *TK SERVICE ROUTINE
; *THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
$TKSRV: MOVB 2$TKB, -(SP) ; PICKUP THE CHARACTER
        BIC  #1C177, (SP) ; STRIP THE JUNK
        CMP  (SP), #3 ; IS IT A CONTROL C?
        BNE  1$ ; BRANCH IF NO
        TYPE $CNTLC ; TYPE A CONTROL-C (1C)
        JSR  PC, $TKINT ; INIT THE KEYBOARD
        JMP  OPSEL ; CONTROL C RESTART
        CMP  #9., $STKCNT ; IS THE QUEUE FULL?
        BNE  2$ ; BRANCH IF NO
        TYPE $BELL ; RING THE TTY BELL
        TST  (SP)+ ; CLEAN CHARACTER OFF OF STACK
        RTI ; RETURN
        INC  $STKCNT ; COUNT THIS CHARACTER
        MOVB (SP)+, 2$TKQIN ; AND PUT IT IN QUEUE
        INC  $TKQIN ; UPDATE THE POINTER
        CMP  $TKQIN, #2$TKQEND ; GO OFF THE END?
        BNE  3$ ; BRANCH IF NO
        MOV  #2$TKQSR, $TKQIN ; RESET THE POINTER
        RTI ; RETURN
; *****
; *THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
; *CALL:
; * RDCHR ; INPUT A SINGLE CHARACTER FROM THE TTY
; * RETURN HERE ; CHARACTER IS ON THE STACK
;
$RDCHR: MOV (SP), -(SP) ; PUSH DOWN THE PC AND
        MOV  4(SP), 2(SP) ; THE PS
        CLR  4(SP) ; GET READY FOR A CHARACTER
        CLR  -(SP) ; SETUP TO LOAD A NEW
        MOV  #1$, -(SP) ; PS WORD THAT
        RTI ; WILL ALLOW INTERRUPTS
        TST  $STKCNT ; WAIT ON A CHARACTER
        BEQ  1$
        DEC  $STKCNT ; DECREMENT THE COUNTER
        MOVB 2$TKQOUT, 4(SP) ; GET ONE CHARACTER
        INC  $TKQOUT ; UPDATE THE POINTER
        CMP  $TKQOUT, #2$TKQEND ; DID IT GO OFF OF THE END?
        BNE  2$ ; BRANCH IF NO
        MOV  #2$TKQSR, $TKQOUT ; RESET THE POINTER
        RTI ; RETURN
; *****
; *THIS ROUTINE WILL INPUT A STRING FROM THE TTY
; *CALL:
; * RDLIN ; INPUT A STRING FROM THE TTY
; * RETURN HERE ; ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
; * ; TERMINATOR WILL BE A BYTE OF ALL 0'S
;
$RDLIN: MOV R3, -(SP) ; SAVE R3
        MOV  #2$TTYIN, R3 ; GET ADDRESS
        CMP  #2$TTYIN+9., R3 ; BUFFER FULL?
        BLOS 4$ ; BR IF YES

```

```

9851 040772 104405          RDCHR          ;; GO READ ONE CHARACTER FROM THE TTY
9852 040774 112613          MOVB          (SP)+,(R3)      ;; GET CHARACTER
9853 040776 122713 000177  CMPB          #'177,(R3)     ;; IS IT A RUBOUT
9854 041002 001003          BNE          3$            ;; SKIP IF NOT
9855 041004 104400 001220 4$:  TYPE          $QUES      ;; TYPE A '?'
9856 041010 000763          BR           1$            ;; CLEAR THE BUFFER AND LOOP
9857 041012 111367 000044 3$:  MOVB          (R3),9$      ;; ECHO THE CHARACTER
9858 041016 104400 041062  TYPE          ,9$
9859 041022 122723 000015  CMPB          #'15,(R3)+    ;; CHECK FOR RETURN
9860 041026 001356          BNE          2$            ;; LOOP IF NOT RETURN
9861 041030 105063 177777  CLR          -1(R3)         ;; CLEAR RETURN (THE 15)
9862 041034 104400 001222  TYPE          $LF          ;; TYPE A LINE FEED
9863 041040 012603          MOV          (SP)+,R3      ;; RESTORE R3
9864 041042 011646          MOV          (SP),-(SP)    ;; ADJUST THE STACK AND PUT ADDRESS OF THE
9865 041044 016666 000004 000002  MOV          4(SP),2(SP)    ;; FIRST ASCII CHARACTER ON IT
9866 041052 012766 041064 000004  MOV          #STTYIN,4(SP)
9867 041060 000002          RTI
9868 041062 000          9$:  .BYTE          0          ;; RETURN
9869 041063 000          .BYTE          0          ;; STORAGE FOR ASCII CHAR. TO TYPE
9870 041064 000011 006503 000012 STTYIN: .BLKB          9.    ;; TERMINATOR
9871 041075 136          SCNTLC: .ASCIZ      /?C/<15><12>  ;; RESERVE 9 BYTES FOR TTY INPUT
9872                                     ;; CONTROL "C"
9873                                     ;; FROM THE TTY
9874
9875
9876                                     ;*****
9877                                     .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
9878
9879                                     ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
9880                                     ;*CHANGE IT TO BINARY.
9881                                     ;*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
9882                                     ;*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A "?" WILL BE TYPED
9883                                     ;*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
9884                                     ;*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
9885                                     ;*CALL:
9886                                     ;*
9887                                     ;*   RDOCT          ;; READ AN OCTAL NUMBER
9888                                     ;*   RETURN HERE    ;; LOW ORDER BITS ARE ON TOP OF THE STACK
9889                                     ;*
9890                                     ;; HIGH ORDER BITS ARE IN SHIOCT
9891 041102 011646          SRDOCT: MOV          (SP),-(SP)    ;; PROVIDE SPACE FOR THE
9892 041104 016666 000004 000002  MOV          4(SP),2(SP)    ;; INPUT NUMBER
9893 041112 010046          MOV          R0,-(SP)     ;; PUSH R0 ON STACK
9894 041114 010146          MOV          R1,-(SP)     ;; PUSH R1 ON STACK
9895 041116 010246          MOV          R2,-(SP)     ;; PUSH R2 ON STACK
9896 041120 104406          1$:  RDLIN          ;; READ AN ASCIZ LINE
9897 041122 012600          MOV          (SP)+,R0     ;; GET ADDRESS OF 1ST CHARACTER
9898 041124 010067 000100  MOV          R0,5$        ;; AND SAVE IT
9899 041130 005001          CLR          R1          ;; CLEAR DATA WORD
9900 041132 005002          CLR          R2
9901 041134 112046          2$:  MOVB          (R0)+,-(SP)  ;; PICKUP THIS CHARACTER
9902 041136 001420          BEQ          3$          ;; IF ZERO GET OUT
9903 041140 122716 000060  CMPB          #'0,(SP)    ;; MAKE SURE THIS CHARACTER
9904 041144 003026          BGT          4$          ;; IS AN OCTAL DIGIT
9905 041146 122716 000067  CMPB          #'7,(SP)
9906 041152 002423          BLT          4$

```


9907	041154	006301		ASL	R1	::*2
9908	041156	006102		ROL	R2	
9909	041160	006301		ASL	R1	::*4
9910	041162	006102		ROL	R2	
9911	041164	006301		ASL	R1	::*8
9912	041166	006102		ROL	R2	
9913	041170	042716	177770	BIC	#1C7,(SP)	::STRIP THE ASCII JUNK
9914	041174	062601		ADD	(SP)+,R1	::ADD IN THIS DIGIT
9915	041176	000756		BR	2\$::LOOP
9916	041200	005726		3\$: TST	(SP)+	::CLEAN TERMINATOR FROM STACK
9917	041202	010166	000012	MOV	R1,12(SP)	::SAVE THE RESULT
9918	041206	010267	000026	MOV	R2,\$SHIOCT	
9919	041212	012602		MOV	(SP)+,R2	::POP STACK INTO R2
9920	041214	012601		MOV	(SP)+,R1	::POP STACK INTO R1
9921	041216	012600		MOV	(SP)+,R0	::POP STACK INTO R0
9922	041220	000002		RTI		::RETURN
9923	041222	005726		4\$: TST	(SP)+	::CLEAN PARTIAL FROM STACK
9924	041224	105010		CLRB	(R0)	::SET A TERMINATOR
9925	041226	104400		TYPE		::TYPE UP THRU THE BAD CHAR.
9926	041230	000000		5\$: .WORD	0	
9927	041232	104400	001220	TYPE	\$QUES	::"? "CR" & "LF"
9928	041236	000730		BR	1\$::TRY AGAIN
9929	041240	000000		\$SHIOCT: .WORD	0	::HIGH ORDER BITS GO HERE

```

9930 ;*****
9931
9932 .SBTTL ERROR HANDLER ROUTINE
9933
9934 ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
9935 ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
9936 ;*AND GO TO SERRTYP ON ERROR
9937 ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
9938 ;*SW15=1 HALT ON ERROR
9939 ;*SW13=1 INHIBIT ERROR TYPEOUTS
9940 ;*SW10=1 BELL ON ERROR
9941 ;*SW09=1 LOOP ON ERROR
9942 ;*CALL
9943 ;* ERROR N ;;ERROR=EMT AND N=ERROR ITEM NUMBER
9944
9945 041242 SERROR:
9946
9947
9948 041242 REGSAV:
9949 041242 012737 177777 004644 MOV #-1,2#ERFLGS ;SET ERROR FLAG
9950 041250 REGSA1:
9951
9952
9953 041250 105267 137627 7S: INCB SERFLG ;;SET THE ERROR FLAG
9954 041254 001775 BEQ 7S ;;DON'T LET THE FLAG GO TO ZERO
9955 041256 016777 137620 137654 MOV $TSTNM,2DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
9956 041264 032777 002000 137644 BIT #BIT10,2SWR ;;BELL ON ERROR?
9957 041272 001402 BEQ 1S ;;NO - SKIP
9958 041274 104400 001214 TYPE $BELL ;;RING BELL
9959 041300 005267 137606 1S: INC $ERTTL ;;COUNT THE NUMBER OF ERRORS
9960 041304 011667 137606 MOV (SP), $ERRPC ;;GET ADDRESS OF ERROR INSTRUCTION
9961 041310 162767 000002 137600 SUB #2,$ERRPC
9962 041316 117767 137574 137570 MOVB 2$ERRPC,$ITEMB ;;STRIP AND SAVE THE ERROR ITEM CODE
9963 041324 032777 020000 137604 BIT #BIT13,2SWR ;;SKIP TYPEOUT IF SET
9964 041332 001004 BNE 20S ;;SKIP TYPEOUTS
9965 041334 004767 000046 JSR PC,SERRTYP ;;GO TO USER ERROR ROUTINE
9966 041340 104400 001221 TYPE ,SCLF
9967 041344 20S:
9968 041344 005777 137566 2S: TST 2SWR ;;HALT ON ERROR
9969 041350 100001 BPL 3S ;;SKIP IF CONTINUE
9970 041352 000000 HALT ;;HALT ON ERROR!
9971 041354 032777 001000 137554 3S: BIT #BIT09,2SWR ;;LOOP ON ERROR SWITCH SET?
9972 041362 001402 BEQ 4S ;;BR IF NO
9973 041364 016716 137520 MOV $LPERR,(SP) ;;FUDGE RETURN FOR LOOPING
9974 041370 005767 137616 4S: TST $ESCAPE ;;CHECK FOR AN ESCAPE ADDRESS
9975 041374 001402 BEQ 5S ;;BR IF NONE
9976 041376 016716 137610 MOV $ESCAPE,(SP) ;;FUDGE RETURN ADDRESS FOR ESCAPE
9977 041402 5S:
9978 041402 000002 RTI ;;RETURN
9979 ;*****
9980 .SBTTL ERROR MESSAGE TYPEOUT ROUTINE
9981 ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
9982 ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
9983 ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
9984 ;*IT IS A COPY OF THE SERRTYP SUBROUTINE FROM SYSMAC.
9985 ;*WITH ONLY MINOR CHANGES

```

```

9986 ;*FIRST IF SWITCH 6 IS SET AND SWITCH 8 RESET THEN
9987 ;*ALL REGISTER CONTENTS WILL BE TYPED BEFOR REPORTING THE ERROR
9988 ;*SECOND IF THE CURRENT ERROR HAS THE SAME ITEM NUMBER
9989 ;*AS THE PREVIOUS ERROR THEN ONLY THE DATA WILL BE TYPED
9990 ;*AND NOT THE ERROR MESSAGE AND HEADER.
9991 041404 000000 PRITEM: 0 ;PREVIOUS ITEM NO. LOCATION
9992 041406 013746 001136 SERRTYP: MOV 2#SWR, -(SP) ;GET SWITCH SETTING
9993 041412 042716 177277 BIC #1C500, (SP) ;KEEP ONLY SWITCH 8 AND 6
9994 041416 022726 000100 CMP #SW06, (SP)+ ;IS 6 SET AND 8 RESET
9995 041422 001001 BNE 1$ ;IF NOT BRANCH
9996 041424 000402 BR 2$ ;BRANCH IF SW 6 IS SET AND 8 RESET
9997 041426 000137 042346 1$: JMP 2#TYPERR ;JUMP IF SW 8 IS SET
9998 ;OR IF SW 8 IS RESET AND SW 6 IS RESET
9999 041432 2$:
10000
10001 041432 104400 041440 TYPE ,.+4 ;;TYPE ASCIZ STRING
10002 041436 000406 BR 64$ ;;GET OVER THE ASCIZ
10003 ;;.ASCIZ <15><12>/RHWC = /
10004 041454 64$:
10005 041454 013746 002266 MOV 2#WC, -(SP) ;GET READY TO TYPE RHWC CONTENTS
10006 041460 104401 TYPOC
10007
10008
10009 041462 104400 041470 TYPE ,.+4 ;;TYPE ASCIZ STRING
10010 041466 000406 BR 65$ ;;GET OVER THE ASCIZ
10011 ;;.ASCIZ <15><12>/RHBA = /
10012 041504 65$:
10013 041504 013746 002270 MOV 2#BA, -(SP) ;GET READY TO TYPE RHBA CONTENTS
10014 041510 104401 TYPOC
10015
10016
10017 041512 104400 041520 TYPE ,.+4 ;;TYPE ASCIZ STRING
10018 041516 000406 BR 66$ ;;GET OVER THE ASCIZ
10019 ;;.ASCIZ <15><12>/RHCS2 = /
10020 041534 66$:
10021 041534 013746 002272 MOV 2#CS2, -(SP) ;GET READY TO TYPE RHCS2 CONTENTS
10022 041540 104401 TYPOC
10023
10024
10025 041542 104400 041550 TYPE ,.+4 ;;TYPE ASCIZ STRING
10026 041546 000406 BR 67$ ;;GET OVER THE ASCIZ
10027 ;;.ASCIZ <15><12>/RHCS1 = /
10028 041564 67$:
10029 041564 013746 002274 MOV 2#CS1, -(SP) ;GET READY TO TYPE RHCS1 CONTENTS
10030 041570 104401 TYPOC
10031
10032
10033 041572 104400 041600 TYPE ,.+4 ;;TYPE ASCIZ STRING
10034 041576 000406 BR 68$ ;;GET OVER THE ASCIZ
10035 ;;.ASCIZ <15><12>/RHDS1 = /
10036 041614 68$:
10037 041614 013746 002316 MOV 2#DS1, -(SP) ;GET READY TO TYPE RHDS1 CONTENTS
10038 041620 104401 TYPOC
10039
10040
10041 041622 104400 041630 TYPE ,.+4 ;;TYPE ASCIZ STRING
  
```

10042	041626	000406		BR	69\$::GET OVER THE ASCIZ
10043				::.ASCIZ	<15><12>/RHER1 = /	
10044	041644		69\$:			
10045	041644	013746	002276	MOV	2#ER1,-(SP)	;GET READY TO TYPE RHER1 CONTENTS
10046	041650	104401		TYPOC		
10047						
10048						
10049	041652	104400	041660	TYPE	70\$ +4	::TYPE ASCIZ STRING
10050	041656	000406		BR	70\$::GET OVER THE ASCIZ
10051				::.ASCIZ	<15><12>/RHER2 = /	
10052	041674		70\$:			
10053	041674	013746	002302	MOV	2#ER2,-(SP)	;GET READY TO TYPE RHER2 CONTENTS
10054	041700	104401		TYPOC		
10055						
10056						
10057	041702	104400	041710	TYPE	71\$ +4	::TYPE ASCIZ STRING
10058	041706	000406		BR	71\$::GET OVER THE ASCIZ
10059				::.ASCIZ	<15><12>/RHER3 = /	
10060	041724		71\$:			
10061	041724	013746	002310	MOV	2#ER3,-(SP)	;GET READY TO TYPE RHER3 CONTENTS
10062	041730	104401		TYPOC		
10063						
10064						
10065	041732	104400	041740	TYPE	72\$ +4	::TYPE ASCIZ STRING
10066	041736	000406		BR	72\$::GET OVER THE ASCIZ
10067				::.ASCIZ	<15><12>/RHDST = /	
10068	041754		72\$:			
10069	041754	013746	002300	MOV	2#DST,-(SP)	;GET READY TO TYPE RHDST CONTENTS
10070	041760	104401		TYPOC		
10071						
10072						
10073	041762	104400	041770	TYPE	73\$ +4	::TYPE ASCIZ STRING
10074	041766	000406		BR	73\$::GET OVER THE ASCIZ
10075				::.ASCIZ	<15><12>/RHCA = /	
10076	042004		73\$:			
10077	042004	013746	002306	MOV	2#CA,-(SP)	;GET READY TO TYPE RHCA CONTENTS
10078	042010	104401		TYPOC		
10079						
10080						
10081	042012	104400	042020	TYPE	74\$ +4	::TYPE ASCIZ STRING
10082	042016	000406		BR	74\$::GET OVER THE ASCIZ
10083				::.ASCIZ	<15><12>/RHAS = /	
10084	042034		74\$:			
10085	042034	013746	002312	MOV	2#AS,-(SP)	;GET READY TO TYPE RHAS CONTENTS
10086	042040	104401		TYPOC		
10087						
10088						
10089	042042	104400	042050	TYPE	75\$ +4	::TYPE ASCIZ STRING
10090	042046	000406		BR	75\$::GET OVER THE ASCIZ
10091				::.ASCIZ	<15><12>/RHOF = /	
10092	042064		75\$:			
10093	042064	013746	002304	MOV	2#OF,-(SP)	;GET READY TO TYPE RHOF CONTENTS
10094	042070	104401		TYPOC		
10095						
10096						
10097	042072	104400	042100	TYPE	..+4	::TYPE ASCIZ STRING

10098	042076	000406			BR 76\$::GET OVER THE ASCIZ
10099					::.ASCIZ	<15><12>/RHMR = /
10100	042114			76\$:		
10101	042114	013746	002314		MOV @MR,-(SP)	;GET READY TO TYPE RHMR CONTENTS
10102	042120	104401			TYPOC	
10103						
10104						
10105	042122	104400	042130		TYPE +4	::TYPE ASCIZ STRING
10106	042126	000406			BR 77\$::GET OVER THE ASCIZ
10107					::.ASCIZ	<15><12>/RHLA = /
10108	042144			77\$:		
10109	042144	013746	002332		MOV @LA,-(SP)	;GET READY TO TYPE RHLA CONTENTS
10110	042150	104401			TYPOC	
10111						
10112						
10113	042152	104400	042160		TYPE +4	::TYPE ASCIZ STRING
10114	042156	000406			BR 78\$::GET OVER THE ASCIZ
10115					::.ASCIZ	<15><12>/RHCC = /
10116	042174			78\$:		
10117	042174	013746	002330		MOV @CC,-(SP)	;GET READY TO TYPE RHCC CONTENTS
10118	042200	104401			TYPOC	
10119						
10120						
10121	042202	104400	042210		TYPE +4	::TYPE ASCIZ STRING
10122	042206	000406			BR 79\$::GET OVER THE ASCIZ
10123					::.ASCIZ	<15><12>/RHEC1 = /
10124	042224			79\$:		
10125	042224	013746	002324		MOV @EC1,-(SP)	;GET READY TO TYPE RHEC1 CONTENTS
10126	042230	104401			TYPOC	
10127						
10128						
10129	042232	104400	042240		TYPE +4	::TYPE ASCIZ STRING
10130	042236	000406			BR 80\$::GET OVER THE ASCIZ
10131					::.ASCIZ	<15><12>/RHEC2 = /
10132	042254			80\$:		
10133	042254	013746	002326		MOV @EC2,-(SP)	;GET READY TO TYPE RHEC2 CONTENTS
10134	042260	104401			TYPOC	
10135						
10136						
10137	042262	104400	042270		TYPE +4	::TYPE ASCIZ STRING
10138	042266	000406			BR 81\$::GET OVER THE ASCIZ
10139					::.ASCIZ	<15><12>/RHDT = /
10140	042304			81\$:		
10141	042304	013746	002320		MOV @DT,-(SP)	;GET READY TO TYPE RHDT CONTENTS
10142	042310	104401			TYPOC	
10143						
10144						
10145	042312	104400	042320		TYPE +4	::TYPE ASCIZ STRING
10146	042316	000406			BR 82\$::GET OVER THE ASCIZ
10147					::.ASCIZ	<15><12>/RHSN = /
10148	042334			82\$:		
10149	042334	013746	002322		MOV @SN,-(SP)	;GET READY TO TYPE RHSN CONTENTS
10150	042340	104401			TYPOC	
10151						
10152	042342	005037	041404		CLR @PRITEM	;CLEAR PREVIOUS ERROR ITEM
10153	042346			TYPERR:		

```

10154 042346 104400 001221      TYPE      $CRLF      ;"CARRIAGE RETURN" & "LINE FEED"
10155 042352 010046      MOV      RO,-(SP)   ;SAVE RO
10156 042354 005000      CLR      RO        ;PICKUP THE ITEM INDEX
10157 042356 153700 001114      B1SB     @#$ITEMB,RO
10158 042362 001004      BNE     1$        ; IF ITEM NUMBER IS ZERO, JUST
10159                                ; TYPE THE PC OF THE ERROR
10160 042364 016746 136526      MOV      $ERRPC,-(SP) ;SAVE $ERRPC FOR TYPEOUT
10161                                ;ERROR ADDRESS
10162 042370 104401      TYP0C    ;GO TYPE--OCTAL ASCII(ALL DIGITS)
10163 042372 000454      BR      10$      ;GET OUT
10164 042374 005300      1$:     DEC     RO  ;ADJUST THE INDEX SO THAT IT WILL
10165 042376 006300      ASL     RO        ; WORK FOR THE ERROR TABLE
10166 042400 006300      ASL     RO
10167 042402 006300      ASL     RO
10168 042404 062700 001224      ADD     $ERRTB,RO  ;FORM TABLE POINTER
10169 042410 020037 041404      CMP     RO,@PRITEM ;WAS PREVIOUS ERROR SAME
10170 042414 001002      BNE     13$      ;BRANCH IF NOT
10171 042416 022020      CMP     (RO)+,(RO)+ ;POP RO OVER EM AND DH
10172 042420 000420      BR      5$
10173 042422 010037 041404      13$:    MOV     RO,@PRITEM ;SAVE NEW ERROR ITEM
10174 042426 012067 000004      MOV     (RO)+,2$  ;PICKUP "ERROR MESSAGE" POINTER
10175 042432 001404      BEQ     3$        ;SKIP TYPEOUT IF NO POINTER
10176 042434 104400      TYPE    ;TYPE THE "ERROR MESSAGE"
10177 042436 000000      2$:     .WORD 0     ;"ERROR MESSAGE" POINTER GOES HERE
10178 042440 104400 001221      TYPE    $CRLF     ;"CARRIAGE RETURN" & "LINE FEED"
10179 042444 012067 000004      3$:     MOV     (RO)+,4$ ;PICKUP "DATA HEADER" POINTER
10180 042450 001404      BEQ     5$        ;SKIP TYPEOUT IF 0
10181 042452 104400      TYPE    ;TYPE THE "DATA HEADER"
10182 042454 000000      4$:     .WORD 0     ;"DATA HEADER" POINTER GOES HERE
10183 042456 104400 001221      TYPE    $CRLF     ;"CARRIAGE RETURN" & "LINE FEED"
10184 042462 010146      5$:     MOV     R1,-(SP) ;SAVE R1
10185 042464 012001      MOV     (RO)+,R1  ;PICKUP "DATA TABLE" POINTER
10186 042466 001415      BEQ     9$        ;BR IF NO DATA TO BE TYPED
10187 042470 012000      MOV     (RO)+,RO  ;PICKUP "DATA FORMAT" POINTER
10188 042472 105720      6$:     TSTB   (RO)+   ;"OCTAL" OR "DECIMAL"
10189 042474 001003      BNE     7$        ;BR IF DECIMAL
10190 042476 013146      MOV     @R1+,-(SP) ;SAVE @R1+ FOR TYPEOUT
10191 042500 104401      TYP0C    ;GO TYPE--OCTAL ASCII(ALL DIGITS)
10192 042502 000402      BR      8$
10193 042504      7$:     BR      8$
10194 042504 013146      MOV     @R1+,-(SP) ;SAVE @R1+ FOR TYPEOUT
10195 042506 104404      TYPDS    ;GO TYPE--DECIMAL ASCII WITH SIGN
10196 042510 005711      8$:     TST   (R1)   ;IS THERE ANOTHER NUMBER?
10197 042512 001403      BEQ     9$        ;BR IF NO
10198 042514 104400 042530      TYPE    ,11$     ;TYPE TWO(2) SPACES
10199 042520 000764      BR      6$        ;LOOP
10200
10201 042522 012601      9$:     MOV     (SP)+,R1 ;RESTORE R1
10202 042524 012600      10$:    MOV     (SP)+,RO  ;"CARRIAGE RETURN" & "LINE FEED"
10203 042526 000207      RTS     PC        ;RETURN
10204 042530 020040 000      11$:    .ASCIZ  / /   ;TWO(2) SPACES
10205 042534      .EVEN
10206
10207
10208
10209
;*****
;*****
;*****

```

```

10210 .SBTTL BINARY TO OCTAL (ASCII) AND TYPE
10211
10212 ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
10213 ;*OCTAL (ASCII) NUMBER AND TYPE IT.
10214 ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
10215 ;*CALL:
10216 ;*      MOV      NUM,-(SP)      ;;NUMBER TO BE TYPED
10217 ;*      TYPOS    ;;CALL FOR TYPEOUT
10218 ;*      .BYTE   N              ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
10219 ;*      .BYTE   M              ;;M=1 OR 0
10220 ;*                               ;;1=TYPE LEADING ZEROS
10221 ;*                               ;;0=SUPPRESS LEADING ZEROS
10222
10223 ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
10224 ;*$TYPOS OR $TYPOC
10225 ;*CALL:
10226 ;*      MOV      NUM,-(SP)      ;;NUMBER TO BE TYPED
10227 ;*      TYPON    ;;CALL FOR TYPEOUT
10228
10229 ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
10230 ;*CALL:
10231 ;*      MOV      NUM,-(SP)      ;;NUMBER TO BE TYPED
10232 ;*      TYPOC    ;;CALL FOR TYPEOUT
10233
10234 042534 017646 000000      STYPOS: MOV      2(SP),-(SP)      ;;PICKUP THE MODE
10235 042540 116667 000001 000211  MOVB     1(SP),SOFILL    ;;LOAD ZERO FILL SWITCH
10236 042546 112667 000207      MOVB     (SP)+,SOMODE+1  ;;NUMBER OF DIGITS TO TYPE
10237 042552 062716 000002      ADD      #2,(SP)        ;;ADJUST RETURN ADDRESS
10238 042556 000406      BR      $TYPON
10239 042560 112767 000001 000171  STYPOC: MOVB     #1,SOFILL    ;;SET THE ZERO FILL SWITCH
10240 042566 112767 000006 000165  MOVB     #6,SOMODE+1    ;;SET FOR SIX(6) DIGITS
10241 042574 112767 000005 000154  STYPON: MOVB     #5,SOCNT    ;;SET THE ITERATION COUNT
10242 042602 010346      MOV      R3,-(SP)      ;;SAVE R3
10243 042604 010446      MOV      R4,-(SP)      ;;SAVE R4
10244 042606 010546      MOV      R5,-(SP)      ;;SAVE R5
10245 042610 116704 000145      MOVB     SOMODE+1,R4    ;;GET THE NUMBER OF DIGITS TO TYPE
10246 042614 005404      NEG      R4
10247 042616 062704 000006      ADD      #6,R4         ;;SUBTRACT IT FOR MAX. ALLOWED
10248 042622 110467 000132      MOVB     R4,SOMODE     ;;SAVE IT FOR USE
10249 042626 116704 000125      MOVB     SOFILL,R4     ;;GET THE ZERO FILL SWITCH
10250 042632 016605 000012      MOV      12(SP),R5    ;;PICKUP THE INPUT NUMBER
10251 042636 005003      CLR      R3           ;;CLEAR THE OUTPUT WORD
10252 042640 006105      1$:     ROL      R5     ;;ROTATE MSB INTO "C"
10253 042642 000404      BR      3$           ;;GO DO MSB
10254 042644 006105      2$:     ROL      R5     ;;FORM THIS DIGIT
10255 042646 006105      ROL      R5
10256 042650 006105      ROL      R5
10257 042652 010503      MOV      R5,R3
10258 042654 006103      3$:     ROL      R3     ;;GET LSB OF THIS DIGIT
10259 042656 105367 000076      DECB     SOMODE       ;;TYPE THIS DIGIT?
10260 042662 100016      BPL     7$           ;;BR IF NO
10261 042664 042703 177770      BIC     #177770,R3    ;;GET RID OF JUNK
10262 042670 001002      BNE     4$           ;;TEST FOR 0
10263 042672 005704      TST     R4           ;;SUPPRESS THIS 0?
10264 042674 001403      BEQ     5$           ;;BR IF YES
10265 042676 005204      4$:     INC      R4     ;;DON'T SUPPRESS ANYMORE 0'S
  
```

10266	042700	052703	000060		BIS	#'0,R3	:: MAKE THIS DIGIT ASCII
10267	042704	052703	000040	5\$:	BIS	#',R3	:: MAKE ASCII IF NOT ALREADY
10268	042710	110367	000040		MOVB	R3,B\$:: SAVE FOR TYPING
10269	042714	104400	042754		TYPE	B\$:: GO TYPE THIS DIGIT
10270	042720	105367	000032	7\$:	DECB	\$OCNT	:: COUNT BY 1
10271	042724	003347			BGT	2\$:: BR IF MORE TO DO
10272	042726	002402			BLT	6\$:: BR IF DONE
10273	042730	005204			INC	R4	:: INSURE LAST DIGIT ISN'T A BLANK
10274	042732	000744			BR	2\$:: GO DO THE LAST DIGIT
10275	042734	012605		6\$:	MOV	(SP)+,R5	:: RESTORE R5
10276	042736	012604			MOV	(SP)+,R4	:: RESTORE R4
10277	042740	012603			MOV	(SP)+,R3	:: RESTORE R3
10278	042742	016666	000002 000004		MOV	2(SP),4(SP)	:: SET THE STACK FOR RETURNING
10279	042750	012616			MOV	(SP)+,(SP)	
10280	042752	000002			RTI		:: RETURN
10281	042754	000		8\$:	.BYTE	0	:: STORAGE FOR ASCII DIGIT
10282	042755	000			.BYTE	0	:: TERMINATOR FOR TYPE ROUTINE
10283	042756	000		\$OCNT:	.BYTE	0	:: OCTAL DIGIT COUNTER
10284	042757	000		\$OFILL:	.BYTE	0	:: ZERO FILL SWITCH
10285	042760	000000		\$OMODE:	.WORD	0	:: NUMBER OF DIGITS TO TYPE


```

10286 ;*****
10287
10288 .SBTTL TRAP DECODER
10289
10290 ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
10291 ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
10292 ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
10293 ;*GO TO THAT ROUTINE.
10294

```

```

10295 042762 010046 STRAP: MOV RO, -(SP) ;: SAVE RO
10296 042764 016600 000002 MOV 2(SP), RO ;: GET TRAP ADDRESS
10297 042770 005740 TST -(RO) ;: BACKUP BY 2
10298 042772 111000 MOVB (RO), RO ;: GET RIGHT BYTE OF TRAP
10299 042774 006300 ASL RO ;: POSITION FOR INDEXING
10300 042776 016000 043004 MOV STRPAD(RO), RO ;: INDEX TO TABLE
10301 043002 000200 RTS RO ;: GO TO ROUTINE
10302

```

```

10303 .SBTTL TRAP TABLE
10304
10305 ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
10306 ;*BY THE "TRAP" INSTRUCTION.
10307

```

```

10308 ; ROUTINE
10309 ; -----
10310 $TRPAD:
10311 043004 $TYPE ;: CALL=TYPE TRAP+0(104400) TTY TYPEOUT ROUTINE
10312 043004 040254 $TYPOC ;: CALL=TYPOC TRAP+1(104401) TYPE OCTAL NUMBER (WITH LEADING ZEROS)
10313 043006 042560 $TYPOS ;: CALL=TYPOS TRAP+2(104402) TYPE OCTAL NUMBER (NO LEADING ZEROS)
10314 043010 042534 $TYPON ;: CALL=TYPON TRAP+3(104403) TYPE OCTAL NUMBER (AS PER LAST CALL)
10315 043012 042574 $TYPDS ;: CALL=TYPDS TRAP+4(104404) TYPE DECIMAL NUMBER (WITH SIGN)
10316 043014 040030 $RDCHR ;: CALL=RDCHR TRAP+5(104405) TTY TYPEIN CHARACTER ROUTINE
10317 043016 040666 $RDLIN ;: CALL=RDLIN TRAP+6(104406) TTY TYPEIN STRING ROUTINE
10318 043020 040756 $RDOCT ;: CALL=RDOCT TRAP+7(104407) READ AN OCTAL NUMBER FROM TTY
10319 043022 041102 WAIT.T ;: CALL=WAT TRAP+10(104410) DONT ADD ABOVE THIS TRAP
10320 043024 035250
10321
10322
10323

```

.SBTTL POWER DOWN AND UP ROUTINES

:POWER DOWN ROUTINE

```

$PWRDN: MOV $SILLUP, @#PWRVEC ;;SET FOR FAST UP
        MOV #340, @#PWRVEC+2 ;;PRIO:7
        MOV RO, -(SP) ;;PUSH RO ON STACK
        MOV R1, -(SP) ;;PUSH R1 ON STACK
        MOV R2, -(SP) ;;PUSH R2 ON STACK
        MOV R3, -(SP) ;;PUSH R3 ON STACK
        MOV R4, -(SP) ;;PUSH R4 ON STACK
        MOV R5, -(SP) ;;PUSH R5 ON STACK
        MOV SP, $SAVR6 ;;SAVE SP
        MOV #PWRUP, @#PWRVEC ;;SET UP VECTOR
        BR .-2 ;;HANG UP

```

:POWER UP ROUTINE

```

$PWRUP: MOV $SAVR6, SP ;;GET SP
        CLR $SAVR6 ;;WAIT LOOP FOR THE TTY
1$: INC $SAVR6 ;;WAIT FOR THE INC
    BNE 1$ ;;OF WORD
    MOV (SP)+, R5 ;;POP STACK INTO R5
    MOV (SP)+, R4 ;;POP STACK INTO R4
    MOV (SP)+, R3 ;;POP STACK INTO R3
    MOV (SP)+, R2 ;;POP STACK INTO R2
    MOV (SP)+, R1 ;;POP STACK INTO R1
    MOV (SP)+, R0 ;;POP STACK INTO R0
    MOV #PWRDN, @#PWRVEC ;;SET UP THE POWER DOWN VECTOR
    MOV #340, @#PWRVEC+2 ;;PRIO:7
    TYPE $POWER ;;REPORT THE POWER FAILURE
    MOV (PC)+, (SP) ;;POWER FAIL MESSAGE POINTER
$PWRMG: .WORD BEGIN ;;RESTART AT BEGIN
$PWRAD: .WORD BEGIN ;;RESTART ADDRESS
$SILLUP: HALT
        BR .-2 ;;THE POWER UP SEQUENCE WAS STARTED
        ;;BEFORE THE POWER DOWN WAS COMPLETE
        ;;PUT THE SP HERE
$SAVR6: 0
$POWER: .ASCIZ <15><12>"POWER"

```

.EVEN

10324					
10325					
10326					
10327					
10328					
10329	043026	012737	043154	000024	
10330	043034	012737	000340	000026	
10331	043042	010046			
10332	043044	010146			
10333	043046	010246			
10334	043050	010346			
10335	043052	010446			
10336	043054	010546			
10337	043056	010667	000076		
10338	043062	012737	043074	000024	
10339	043070	000000			
10340	043072	000776			
10341					
10342					
10343	043074	016706	00006C		
10344	043100	005067	000054		
10345	043104	005267	000050		
10346	043110	001375			
10347	043112	012605			
10348	043114	012604			
10349	043116	012603			
10350	043120	012602			
10351	043122	012601			
10352	043124	012600			
10353	043126	012737	043026	000024	
10354	043134	012737	000340	000026	
10355	043142	104400			
10356	043144	043162			
10357	043146	012716			
10358	043150	004712			
10359	043152	000002			
10360	043154	000000			
10361	043156	000776			
10362	043160	000000			
10363	043162	005015	047520	042527	
10364	043170	000122			
10365					

10366 ;*****
10367 ;
10368 ;ERROR AND MESSAGE TABLE CONDIMENTS
10369 ;
10370 ;*****
10371 ;

10374
10375 043172 050122 032060 042040 EM1: .ASCIZ /RPO4 DID NOT INTERRUPT/
10376 043200 042111 047040 052117
10377 043206 044440 052116 051105
10378 043214 052522 052120 000

10379 043221 111 052116 051105 EM2: .ASCIZ /INTERRUPT ENABLE BIT DOWN BUT EXPECTED BIT DID NOT SET/
10380 043226 052522 052120 042440
10381 043234 040516 046102 020105
10382 043242 044502 020124 047504
10383 043250 047127 041040 052125
10384 043256 042440 050130 041505
10385 043264 042524 020104 044502
10386 043272 020124 044504 020104
10387 043300 047516 020124 042523
10388 043306 000124

10389 043310 050122 032060 042040 EM3: .ASCIZ /RPO4 DID NOT INTERRUPT WHEN EXPECTED BIT DID SET/
10390 043316 042111 047040 052117
10391 043324 044440 052116 051105
10392 043332 052522 052120 053440
10393 043340 042510 020116 054105
10394 043346 042520 052103 042105
10395 043354 041040 052111 042040
10396 043362 042111 051440 052105
10397 043370 000

10398 043371 105 050130 041505 EM4: .ASCIZ /EXPECTED BIT DID SET BUT TIME IS IN ERROR TIME IN 10 MICROSEC. DECIMAL/
10399 043376 042524 020104 044502
10400 043404 020124 044504 020104
10401 043412 042523 020124 052502
10402 043420 020124 044524 042515
10403 043426 044440 020123 047111
10404 043434 042440 051122 051117
10405 043442 052040 046511 020105
10406 043450 047111 030440 020060
10407 043456 044515 051103 051517
10408 043464 041505 020056 042504
10409 043472 044503 040515 000114
10410 043500 044122 051501 042040 EM5: .ASCIZ /RHAS DOES NOT CLEAR BY MOVING IN ALL ONES/
10411 043506 042517 020123 047516
10412 043514 020124 046103 040505
10413 043522 020122 054502 046440
10414 043530 053117 047111 020107
10415 043536 047111 040440 046114
10416 043544 047440 042516 000123
10417 043552 047514 042101 047111 EM6: .ASCIZ /LOADING RHER1 FOR ALL UNITS DID NOT SET ANY RHAS BITS/
10418 043560 020107 044122 051105
10419 043566 020061 047506 020122
10420 043574 046101 020114 047125
10421 043602 052111 020123 044504

10422	043610	020104	047516	020124
10423	043616	042523	020124	047101
10424	043624	020131	044122	051501
10425	043632	041040	052111	030123
10426	043640	050123	041505	043111
10427	043646	042511	020104	042522
10428	043654	044507	052123	051105
10429	043662	047040	047117	042440
10430	043670	044530	052123	047101
10431	043676	026124	051440	020117
10432	043704	041101	051117	020124
10433	043712	051120	043517	040522
10434	043720	000115		
10435	043722	052123	050117	042520
10436	043730	020104	051104	053111
10437	043736	020105	040510	020123
10438	043744	047515	020114	044502
10439	043752	020124	047111	051040
10440	043760	042110	030523	051440
10441	043766	052105	000	
10442	043771	127	052111	020110
10443	043776	050123	047111	046104
10444	044004	020105	047520	042527
10445	044012	042522	020104	047504
10446	044020	047127	051040	041510
10447	044026	031123	051440	047510
10448	044034	046125	020104	047117
10449	044042	054514	044040	053101
10450	044050	020105	047125	052111
10451	044056	047040	035117	040440
10452	044064	042116	044440	020122
10453	044072	042523	000124	
10454	044076	043101	042524	020122
10455	044104	050123	047111	046104
10456	044112	020105	047520	042527
10457	044120	042522	020104	050125
10458	044126	020054	047516	050040
10459	044134	041501	020113	041501
10460	044142	047113	020056	044122
10461	044150	051504	020061	044123
10462	044156	052517	042114	044040
10463	044164	053101	020105	047515
10464	044172	036514	026061	053040
10465	044200	036526	000060	
10466	044204	044527	044124	051440
10467	044212	044520	042116	042514
10468	044220	050040	053517	051105
10469	044226	042105	020054	047516
10470	044234	044440	052116	040511
10471	044242	044514	042532	020054
10472	044250	044122	051503	020061
10473	044256	044123	052517	042114
10474	044264	044040	053101	020105
10475	044272	047507	030075	020054
10476	044300	053104	036501	026061
10477	044306	051040	054504	030475

EM7: .ASCIZ /SPECIFIED REGISTER NON EXISTANT, SO ABORT PROGRAM/

EM10: .ASCIZ /STOPPED DRIVE HAS MOL BIT IN RHDS1 SET/

EM11: .ASCIZ /WITH SPINDLE POWERED DOWN RHCS2 SHOULD ONLY HAVE UNIT NO: AND IR SET/

EM12: .ASCIZ /AFTER SPINDLE POWERED UP, NO PACK ACKN. RHDS1 SHOULD HAVE MOL=1, VV=0/

EM13: .ASCIZ /WITH SPINDLE POWERED, NO INTIALIZE, RHCS1 SHOULD HAVE GO=0, DVA=1, RDY=

10478	044314	020054	042511	030075	
10479	044322	000			
10480	044323	101	052106	051105	EM14: .ASCIZ /AFTER SPINDLE POWERED UP RHCC SHOULD BE=0/
10481	044330	051440	044520	042116	
10482	044336	042514	050040	053517	
10483	044344	051105	042105	052440	
10484	044352	020120	044122	041503	
10485	044360	051440	047510	046125	
10486	044366	020104	042502	030075	
10487	044374	000			
10488	044375	120	041501	020113	EM15: .ASCII /PACK ACKNOWLEDGE COMMAND CAUSED AN ERROR/<15><12>
10489	044402	041501	047113	053517	
10490	044410	042514	043504	020105	
10491	044416	047503	046515	047101	
10492	044424	020104	040503	051525	
10493	044432	042105	040440	020116	
10494	044440	051105	047522	006522	
10495	044446	012			
10496	044447	107	047517	020104	.ASCIZ /GOOD DATA IS BEFORE COMMAND, REC DATA IS AFTER COMMAND/
10497	044454	040504	040524	044440	
10498	044462	020123	042502	047506	
10499	044470	042522	041440	046517	
10500	044476	040515	042116	020054	
10501	044504	042522	020103	040504	
10502	044512	040524	044440	020123	
10503	044520	043101	042524	020122	
10504	044526	047503	046515	047101	
10505	044534	000104			
10506	044536	047516	047455	020120	EM16: .ASCII /NO-OP COMMAND CAUSED AN ERROR/<15><12>
10507	044544	047503	046515	047101	
10508	044552	020104	040503	051525	
10509	044560	042105	040440	020116	
10510	044566	051105	047522	006522	
10511	044574	012			
10512	044575	107	047517	020104	.ASCIZ /GOOD DATA IS BEFORE COMMAND, REC DATA IS AFTER COMMAND/
10513	044602	040504	040524	044440	
10514	044610	020123	042502	047506	
10515	044616	042522	041440	046517	
10516	044624	040515	042116	020054	
10517	044632	042522	020103	040504	
10518	044640	040524	044440	020123	
10519	044646	043101	042524	020122	
10520	044654	047503	046515	047101	
10521	044662	000104			
10522	044664	051104	053111	020105	EM17: .ASCII /DRIVE CLEAR COMMAND CAUSED AN ERROR/<15><12>
10523	044672	046103	040505	020122	
10524	044700	047503	046515	047101	
10525	044706	020104	040503	051525	
10526	044714	042105	040440	020116	
10527	044722	051105	047522	006522	
10528	044730	012			
10529	044731	107	047517	020104	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES AFTER COMMAND/
10530	044736	040504	040524	043440	
10531	044744	053111	051505	051440	
10532	044752	047510	046125	020104	
10533	044760	042502	020054	042522	

10534	044766	020103	040504	040524	
10535	044774	043440	053111	051505	
10536	045002	040440	052106	051105	
10537	045010	041440	046517	040515	
10538	045016	042116	000		
10539	045021	122	040505	026504	EM20: .ASCII /READ-IN COMMAND CAUSED AN ERROR/<15><12>
10540	045026	047111	041440	046517	
10541	045034	040515	042116	041440	
10542	045042	052501	042523	020104	
10543	045050	047101	042440	051122	
10544	045056	051117	005015		
10545	045062	047507	042117	042040	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONTENTS AFTER COMMAND/
10546	045070	052101	020101	044507	
10547	045076	042526	020123	044123	
10548	045104	052517	042114	041040	
10549	045112	026105	051040	041505	
10550	045120	042040	052101	020101	
10551	045126	044507	042526	020123	
10552	045134	042522	027107	041440	
10553	045142	047117	042524	052116	
10554	045150	020123	043101	042524	
10555	045156	020122	047503	046515	
10556	045164	047101	000104		
10557	045170	044122	051503	020061	EM21: .ASCIZ /RHCSI CONTENTS DURING COMMAND WAS IN ERROR/
10558	045176	047503	052116	047105	
10559	045204	051524	042040	051125	
10560	045212	047111	020107	047503	
10561	045220	046515	047101	020104	
10562	045226	040527	020123	047111	
10563	045234	042440	051122	051117	
10564	045242	000			
10565	045243	122	042110	030523	EM22: .ASCIZ /RHDS1 CONTENTS DURING COMMAND WAS IN ERROR/
10566	045250	041440	047117	042524	
10567	045256	052116	020123	052504	
10568	045264	044522	043516	041440	
10569	045272	046517	040515	042116	
10570	045300	053440	051501	044440	
10571	045306	020116	051105	047522	
10572	045314	000122			
10573	045316	047125	047514	042101	EM23: .ASCII /UNLOAD COMMAND CAUSED AN ERROR/<15><12>
10574	045324	041440	046517	040515	
10575	045332	042116	041440	052501	
10576	045340	042523	020104	047101	
10577	045346	042440	051122	051117	
10578	045354	005015			
10579	045356	047507	042117	042040	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REGISTER CONT. AFTER COMMAND/
10580	045364	052101	020101	044507	
10581	045372	042526	020123	044123	
10582	045400	052517	042114	041040	
10583	045406	026105	051040	041505	
10584	045414	042040	052101	020101	
10585	045422	044507	042526	020123	
10586	045430	042522	044507	052123	
10587	045436	051105	041440	047117	
10588	045444	027124	040440	052106	
10589	045452	051105	041440	046517	

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10590	045460	040515	042116	000	
10591	045465	117	043106	042523	EM24: .ASCII /OFFSET COMMAND CAUSED AN ERROR/<15><12>
10592	045472	020124	047503	046515	
10593	045500	047101	020104	040503	
10594	045506	051525	042105	040440	
10595	045514	020116	051105	047522	
10596	045522	006522	012		
10597	045525	107	047517	020104	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONT. AFTER COMMAND/
10598	045532	040504	040524	043440	
10599	045540	053111	051505	051440	
10600	045546	047510	046125	020104	
10601	045554	042502	020054	042522	
10602	045562	020103	040504	040524	
10603	045570	043440	053111	051505	
10604	045576	051040	043505	020056	
10605	045604	047503	052116	020056	
10606	045612	043101	042524	020122	
10607	045620	047503	046515	047101	
10608	045626	000104			
10609	045630	042522	052524	047122	EM25: .ASCII /RETURN TO CENTER LINE COMMAND CAUSED AN ERROR/<15><12>
10610	045636	052040	020117	042503	
10611	045644	052116	051105	046040	
10612	045652	047111	020105	047503	
10613	045660	046515	047101	020104	
10614	045666	040503	051525	042105	
10615	045674	040440	020116	051105	
10616	045702	047522	006522	012	
10617	045707	107	047517	020104	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONT. AFTER COMMAND/
10618	045714	040504	040524	043440	
10619	045722	053111	051505	051440	
10620	045730	047510	046125	020104	
10621	045736	042502	020054	042522	
10622	045744	020103	040504	040524	
10623	045752	043440	053111	051505	
10624	045760	051040	043505	020056	
10625	045766	047503	052116	020056	
10626	045774	043101	042524	020122	
10627	046002	047503	046515	047101	
10628	046010	000104			
10629	046012	030065	020060	043117	EM26: .ASCIZ /500 OFFSET COMMANDS ONE AFTER THE OTHER CAUSED AN ERROR/
10630	046020	051506	052105	041440	
10631	046026	046517	040515	042116	
10632	046034	020123	047117	020105	
10633	046042	043101	042524	020122	
10634	046050	044124	020105	052117	
10635	046056	042510	020122	040503	
10636	046064	051525	042105	040440	
10637	046072	020116	051105	047522	
10638	046100	000122			
10639	046102	051127	052111	020105	EM27: .ASCII /WRITE HEADER AND DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
10640	046110	042510	042101	051105	
10641	046116	040440	042116	042040	
10642	046124	052101	020101	040503	
10643	046132	051525	042105	044440	
10644	046140	050115	047522	042520	
10645	046146	020122	042522	044507	

10646	046154	052123	051105	041440	
10647	046162	040510	043516	006505	
10648	046170	012			
10649	046171	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
10650	046176	040504	040524	043440	
10651	046204	053111	051505	053440	
10652	046212	040510	020124	044123	
10653	046220	052517	042114	041040	
10654	046226	020105	044124	051105	
10655	046234	006505	012		
10656	046237	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
10657	046244	042526	020104	040504	
10658	046252	040524	043440	053111	
10659	046260	051505	053440	040510	
10660	046266	020124	040527	020123	
10661	046274	044124	051105	020105	
10662	046302	043101	042524	020122	
10663	046310	047503	046515	047101	
10664	046316	000104			
10665	046320	051127	052111	020105	EM30: .ASCIZ /WRITE HEADER AND DATA CHANGED WRITE FROM BUFFER/
10666	046326	042510	042101	051105	
10667	046334	040440	042116	042040	
10668	046342	052101	020101	044103	
10669	046350	047101	042507	020104	
10670	046356	051127	052111	020105	
10671	046364	051106	046517	041040	
10672	046372	043125	042506	000122	
10673	046400	042522	042101	044040	EM31: .ASCII /READ HEADER AND DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
10674	046406	040505	042504	020122	
10675	046414	047101	020104	040504	
10676	046422	040524	041440	052501	
10677	046430	042523	020104	046511	
10678	046436	051120	050117	051105	
10679	046444	051040	043505	051511	
10680	046452	042524	020122	044103	
10681	046460	047101	042507	005015	
10682	046466	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
10683	046474	052101	020101	044507	
10684	046502	042526	020123	044127	
10685	046510	052101	051440	047510	
10686	046516	046125	020104	042502	
10687	046524	052040	042510	042522	
10688	046532	005015			
10689	046534	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
10690	046542	042105	042040	052101	
10691	046550	020101	044507	042526	
10692	046556	020123	044127	052101	
10693	046564	053440	051501	052040	
10694	046572	042510	042522	040440	
10695	046600	052106	051105	041440	
10696	046606	046517	040515	042116	
10697	046614	000			
10698	046615	127	044522	042524	EM32: .ASCIZ /WRITE HEADER DATA FOLLOWED BY READ HEADER AND DATA CAUSED DATA ERROR/
10699	046622	044040	040505	042504	
10700	046630	020122	040504	040524	
10701	046636	043040	046117	047514	

10702	046644	042527	020104	054502	
10703	046652	051040	040505	020104	
10704	046660	042510	042101	051105	
10705	046666	040440	042116	042040	
10706	046674	052101	020101	040503	
10707	046702	051525	042105	042040	
10708	046710	052101	020101	051105	
10709	046716	047522	000122		
10710	046722	042522	042101	042040	EM33: .ASCII /READ DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
10711	046730	052101	020101	040503	
10712	046736	051525	042105	044440	
10713	046744	050115	047522	042520	
10714	046752	020122	042522	044507	
10715	046760	052123	051105	041440	
10716	046766	040510	043516	006505	
10717	046774	012			
10718	046775	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
10719	047002	040504	040524	043440	
10720	047010	053111	051505	053440	
10721	047016	040510	020124	044123	
10722	047024	052517	042114	041040	
10723	047032	020105	044124	051105	
10724	047040	006505	012		
10725	047043	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
10726	047050	042526	020104	040504	
10727	047056	040524	043440	053111	
10728	047064	051505	053440	040510	
10729	047072	020124	040527	020123	
10730	047100	044124	051105	020105	
10731	047106	043101	042524	020122	
10732	047114	047503	046515	047101	
10733	047122	000104			
10734	047124	042522	042101	042040	EM34: .ASCIZ /READ DATA INCORRECT/
10735	047132	052101	020101	047111	
10736	047140	047503	051122	041505	
10737	047146	000124			
10738	047150	051127	052111	020105	EM35: .ASCII /WRITE DATA COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>
10739	047156	040504	040524	041440	
10740	047164	046517	040515	042116	
10741	047172	041440	052501	042523	
10742	047200	020104	046511	051120	
10743	047206	050117	051105	051040	
10744	047214	043505	051511	042524	
10745	047222	020122	044103	047101	
10746	047230	042507	005015		
10747	047234	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
10748	047242	052101	020101	044507	
10749	047250	042526	020123	044127	
10750	047256	052101	051440	047510	
10751	047264	046125	020104	042502	
10752	047272	052040	042510	042522	
10753	047300	005015			
10754	047302	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
10755	047310	042105	042040	052101	
10756	047316	020101	044507	042526	
10757	047324	020123	042522	044507	

10758	047332	052123	051105	041440
10759	047340	047117	042524	052116
10760	047346	020123	043101	042524
10761	047354	020122	047503	046515
10762	047362	047101	000104	
10763	047366	051127	052111	020105
10764	047374	040504	040524	041440
10765	047402	046517	040515	042116
10766	047410	041440	040510	043516
10767	047416	042105	053440	044522
10768	047424	042524	043040	047522
10769	047432	020115	052502	043106
10770	047440	051105	000	
10771	047443	123	042505	020113
10772	047450	047503	046515	047101
10773	047456	020104	040503	051525
10774	047464	042105	044440	050115
10775	047472	047522	042520	020122
10776	047500	042522	044507	052123
10777	047506	051105	041440	040510
10778	047514	043516	006505	012
10779	047521	107	047517	020104
10780	047526	040504	040524	043440
10781	047534	053111	051505	053440
10782	047542	040510	020124	044123
10783	047550	052517	042114	041040
10784	047556	020105	044124	051105
10785	047564	006505	012	
10786	047567	122	041505	044505
10787	047574	042526	020104	040504
10788	047602	040524	043440	053111
10789	047610	051505	051040	043505
10790	047616	051511	042524	020122
10791	047624	047503	052116	047105
10792	047632	051524	040440	052106
10793	047640	051105	051440	042505
10794	047646	020113	047503	046515
10795	047654	047101	000104	
10796	047660	051127	052111	020105
10797	047666	044103	041505	020113
10798	047674	040503	051525	042105
10799	047702	044440	050115	047522
10800	047710	042520	020122	042522
10801	047716	044507	052123	051105
10802	047724	041440	040510	043516
10803	047732	006505	012	
10804	047735	107	047517	020104
10805	047742	040504	040524	043440
10806	047750	053111	051505	053440
10807	047756	040510	020124	044123
10808	047764	052517	042114	041040
10809	047772	020105	044124	051105
10810	050000	006505	012	
10811	050003	122	041505	044505
10812	050010	042526	020104	040504
10813	050016	040524	043440	053111

EM36: .ASCIZ /WRITE DATA COMMAND CHANGED WRITE FROM BUFFER/

EM37: .ASCII /SEEK COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>

.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>

.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER SEEK COMMAND/

EM40: .ASCII /WRITE CHECK CAUSED IMPROPER REGISTER CHANGE/<15><12>

.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>

.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/

10814	050024	051505	051040	043505
10815	050032	051511	042524	020122
10816	050040	047503	052116	047105
10817	050046	051524	040440	052106
10818	050054	051105	041440	046517
10819	050062	040515	042116	000
10820	050067	114	041517	044513
10821	050074	043516	047440	052125
10822	050102	053440	044522	042524
10823	050110	041040	020131	051127
10824	050116	052111	020105	047514
10825	050124	045503	041040	052125
10826	050132	047524	020116	040503
10827	050140	051525	042105	044440
10828	050146	050115	047522	042520
10829	050154	020122	042522	044507
10830	050162	052123	051105	041440
10831	050170	040510	043516	006505
10832	050176	012		
10833	050177	107	047517	020104
10834	050204	040504	040524	043440
10835	050212	053111	051505	053440
10836	050220	040510	020124	044123
10837	050226	052517	042114	041040
10838	050234	020105	044124	051105
10839	050242	006505	012	
10840	050245	122	041505	044505
10841	050252	042526	020104	040504
10842	050260	040524	043440	053111
10843	050266	051505	051040	043505
10844	050274	051511	042524	020122
10845	050302	047503	052116	047105
10846	050310	051524	040440	052106
10847	050316	051105	053440	044522
10848	050324	042524	020123	042527
10849	050332	042522	046040	041517
10850	050340	042513	020104	052517
10851	050346	000124		
10852	050350	052101	042524	050115
10853	050356	044524	043516	052040
10854	050364	020117	051127	052111
10855	050372	020105	044527	044124
10856	050400	053440	044522	042524
10857	050406	020123	047514	045503
10858	050414	042105	047440	052125
10859	050422	041440	052501	042523
10860	050430	020104	046511	051120
10861	050436	050117	051105	051040
10862	050444	043505	051511	042524
10863	050452	020122	044103	047101
10864	050460	042507	005015	
10865	050464	047507	042117	042040
10866	050472	052101	020101	044507
10867	050500	042526	020123	044127
10868	050506	052101	051440	047510
10869	050514	046125	020104	042502

EM41: .ASCII /LOCKING OUT WRITE BY WRITE LOCK BUTTON CAUSED IMPROPER REGISTER CHANGE/

.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>

.ASCIIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER WRITES WERE LOCKED OUT/

EM42: .ASCII /ATTEMPTING TO WRITE WITH WRITES LOCKED OUT CAUSED IMPROPER REGISTER CHA

.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>

10870	050522	052040	042510	042522	
10871	050530	005015			
10872	050532	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED WRITE/
10873	050540	042105	042040	052101	
10874	050546	020101	044507	042526	
10875	050554	020123	042522	044507	
10876	050562	052123	051105	041440	
10877	050570	047117	042524	052116	
10878	050576	020123	043101	042524	
10879	050604	020122	052101	042524	
10880	050612	050115	042524	020104	
10881	050620	051127	052111	000105	
10882	050626	051127	052111	047111	EM43: .ASCII /WRITING WITH WRITES LOCKED OUT CHANGED DISK DATA/<15><12>
10883	050634	020107	044527	044124	
10884	050642	053440	044522	042524	
10885	050650	020123	047514	045503	
10886	050656	042105	047440	052125	
10887	050664	041440	040510	043516	
10888	050672	042105	042040	051511	
10889	050700	020113	040504	040524	
10890	050706	005015			
10891	050710	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT WAS ON DISK BEFORE WRITE WITH WRITE LOCKED OUT/<15>
10892	050716	052101	020101	044507	
10893	050724	042526	020123	044127	
10894	050732	052101	053440	051501	
10895	050740	047440	020116	044504	
10896	050746	045523	041040	043105	
10897	050754	051117	020105	051127	
10898	050762	052111	020105	044527	
10899	050770	044124	053440	044522	
10900	050776	042524	046040	041517	
10901	051004	042513	020104	052517	
10902	051012	006524	012		
10903	051015	127	051501	040440	.ASCII /WAS ATTEMPTED/<15><12>
10904	051022	052124	046505	052120	
10905	051030	042105	005015		
10906	051034	042522	042503	053111	.ASCII /RECEIVED DATA GIVES WHAT WAS READ BACK AFTER WRITE/<15><12>
10907	051042	042105	042040	052101	
10908	051050	020101	044507	042526	
10909	051056	020123	044127	052101	
10910	051064	053440	051501	051040	
10911	051072	040505	020104	040502	
10912	051100	045503	040440	052106	
10913	051106	051105	053440	044522	
10914	051114	042524	005015		
10915	051120	044527	044124	053440	.ASCIZ /WITH WRITE LOCKED OUT WAS ATTEMPTED/
10916	051126	044522	042524	046040	
10917	051134	041517	042513	020104	
10918	051142	052517	020124	040527	
10919	051150	020123	052101	042524	
10920	051156	050115	042524	000104	
10921	051164	047105	041101	044514	EM44: .ASCII /ENABLING WRITES BY WRITE LOCK BUTTON CAUSED IMPROPER REGISTER CHANGE/<1
10922	051172	043516	053440	044522	
10923	051200	042524	020123	054502	
10924	051206	053440	044522	042524	
10925	051214	046040	041517	020113	

10926	051222	052502	052124	047117	
10927	051230	041440	052501	042523	
10928	051236	020104	046511	051120	
10929	051244	050117	051105	051040	
10930	051252	043505	051511	042524	
10931	051260	020122	044103	047101	
10932	051266	042507	005015		
10933	051272	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
10934	051300	052101	020101	044507	
10935	051306	042526	020123	044127	
10936	051314	052101	051440	047510	
10937	051322	046125	020104	042502	
10938	051330	052040	042510	042522	
10939	051336	005015			
10940	051340	042522	042503	053111	.ASCII /RECEIVED DATA GIVES REGISTER CONTENTS AFTER WRITE LOCK BUTTON/<15><12>
10941	051346	042105	042040	052101	
10942	051354	020101	044507	042526	
10943	051362	020123	042522	044507	
10944	051370	052123	051105	041440	
10945	051376	047117	042524	052116	
10946	051404	020123	043101	042524	
10947	051412	020122	051127	052111	
10948	051420	020105	047514	045503	
10949	051426	041040	052125	047524	
10950	051434	006516	012		
10951	051437	105	040516	046102	.ASCIZ /ENABLED WRITES/
10952	051444	042105	053440	044522	
10953	051452	042524	000123		
10954	051456	051124	047101	043123	EM45: .ASCII /TRANSFERRING ON LAST BLOCK - CYLINDER 410, SECTOR 21, TRACK 18/<15><12>
10955	051464	051105	044522	043516	
10956	051472	047440	020116	040514	
10957	051500	052123	041040	047514	
10958	051506	045503	026440	041440	
10959	051514	046131	047111	042504	
10960	051522	020122	030464	026060	
10961	051530	051440	041505	047524	
10962	051536	020122	030462	020054	
10963	051544	051124	041501	020113	
10964	051552	034061	005015		
10965	051556	040503	051525	042105	.ASCII /CAUSED IMPROPER REGISTER CHANGE/<15><12>
10966	051564	044440	050115	047522	
10967	051572	042520	020122	042522	
10968	051600	044507	052123	051105	
10969	051606	041440	040510	043516	
10970	051614	006505	012		
10971	051617	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
10972	051624	040504	040524	043440	
10973	051632	053111	051505	053440	
10974	051640	040510	020124	044123	
10975	051646	052517	042114	041040	
10976	051654	020105	044124	051105	
10977	051662	006505	012		
10978	051665	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER TRANSFER/
10979	051672	042526	020104	040504	
10980	051700	040524	043440	053111	
10981	051706	051505	051040	043505	

10982	051714	051511	042524	020122	
10983	051722	047503	052116	047105	
10984	051730	051524	040440	052106	
10985	051736	051105	052040	040522	
10986	051744	051516	042506	000122	
10987	051752	040504	040524	051040	EM46: .ASCII /DATA READ FROM LAST BLOCK - CYLINDER 410, SECTOR 21, TRACK 18/<15><12>
10988	051760	040505	020104	051106	
10989	051766	046517	046040	051501	
10990	051774	020124	046102	041517	
10991	052002	020113	020055	054503	
10992	052010	044514	042116	051105	
10993	052016	032040	030061	020054	
10994	052024	042523	052103	051117	
10995	052032	031040	026061	052040	
10996	052040	040522	045503	030440	
10997	052046	006470	012		
10998	052051	111	020123	047111	.ASCIZ /IS IN ERROR/
10999	052056	042440	051122	051117	
11000	052064	000			
11001	052065	124	040522	051516	EM47: .ASCII /TRANSFERRING DATA FROM NONEXISTANT SECTOR CAUSED IMPROPER /<15><12>
11002	052072	042506	051122	047111	
11003	052100	020107	040504	040524	
11004	052106	043040	047522	020115	
11005	052114	047516	042516	044530	
11006	052122	052123	047101	020124	
11007	052130	042523	052103	051117	
11008	052136	041440	052501	042523	
11009	052144	020104	046511	051120	
11010	052152	050117	051105	006440	
11011	052160	012			
11012	052161	122	043505	051511	.ASCII /REGISTER CHANGE, GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11013	052166	042524	020122	044103	
11014	052174	047101	042507	020054	
11015	052202	047507	042117	042040	
11016	052210	052101	020101	044507	
11017	052216	042526	020123	044127	
11018	052224	052101	051440	047510	
11019	052232	046125	020104	042502	
11020	052240	052040	042510	042522	
11021	052246	005015			
11022	052250	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED TRANSFER/
11023	052256	042105	042040	052101	
11024	052264	020101	044507	042526	
11025	052272	020123	042522	044507	
11026	052300	052123	051105	041440	
11027	052306	047117	042524	052116	
11028	052314	020123	043101	042524	
11029	052322	020122	052101	042524	
11030	052330	050115	042524	020104	
11031	052336	051124	047101	043123	
11032	052344	051105	000		
11033	052347	124	040522	051516	EM50: .ASCII /TRANSFERRING FROM NONEXISTANT SECTOR CAUSED DATA ERROR/<15><12>
11034	052354	042506	051122	047111	
11035	052362	020107	051106	046517	
11036	052370	047040	047117	054105	
11037	052376	051511	040524	052116	

11038	052404	051440	041505	047524	
11039	052412	020122	040503	051525	
11040	052420	042105	042040	052101	
11041	052426	020101	051105	047522	
11042	052434	006522	012		
11043	052437	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11044	052444	040504	040524	043440	
11045	052452	053111	051505	053440	
11046	052460	040510	020124	044123	
11047	052466	052517	042114	041040	
11048	052474	020105	044124	051105	
11049	052502	006505	012		
11050	052505	102	042101	042040	.ASCIZ /BAD DATA GIVES WHAT WAS IN BUFFER AFTER TRANSFER/
11051	052512	052101	020101	044507	
11052	052520	042526	020123	044127	
11053	052526	052101	053440	051501	
11054	052534	044440	020116	052502	
11055	052542	043106	051105	040440	
11056	052550	052106	051105	052040	
11057	052556	040522	051516	042506	
11058	052564	000122			
11059	052566	044507	044526	043516	EM51: .ASCII /GIVING ILLEGAL FUNCTION CAUSED IMPROPER REGISTER CHANGE/<15><12>
11060	052574	044440	046114	043505	
11061	052602	046101	043040	047125	
11062	052610	052103	047511	020116	
11063	052616	040503	051525	042105	
11064	052624	044440	050115	047522	
11065	052632	042520	020122	042522	
11066	052640	044507	052123	051105	
11067	052646	041440	040510	043516	
11068	052654	006505	012		
11069	052657	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11070	052664	040504	040524	043440	
11071	052672	053111	051505	053440	
11072	052700	040510	020124	044123	
11073	052706	052517	042114	041040	
11074	052714	020105	044124	051105	
11075	052722	006505	012		
11076	052725	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ILLEGAL FUNCTION IS GIVEN/
11077	052732	042526	020104	040504	
11078	052740	040524	043440	053111	
11079	052746	051505	051040	043505	
11080	052754	051511	042524	020122	
11081	052762	047503	052116	047105	
11082	052770	051524	040440	052106	
11083	052776	051105	044440	046114	
11084	053004	043505	046101	043040	
11085	053012	047125	052103	047511	
11086	053020	020116	051511	043440	
11087	053026	053111	047105	000	
11088	053033	127	044522	042524	EM52: .ASCII /WRITE DATA ON NONEXISTANT SECTOR CAUSED IMPROPER REGISTER CHANGE/<15><1
11089	053040	042040	052101	020101	
11090	053046	047117	047040	047117	
11091	053054	054105	051511	040524	
11092	053062	052116	051440	041505	
11093	053070	047524	020122	040503	

11094	053076	051525	042105	044440	
11095	053104	050115	047522	042520	
11096	053112	020122	042522	044507	
11097	053120	052123	051105	041440	
11098	053126	040510	043516	006505	
11099	053134	012			
11100	053135	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11101	053142	040504	040524	043440	
11102	053150	053111	051505	053440	
11103	053156	040510	020124	044123	
11104	053164	052517	042114	041040	
11105	053172	020105	044124	051105	
11106	053200	006505	012		
11107	053203	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED WRITE DATA/
11108	053210	042526	020104	040504	
11109	053216	040524	043440	053111	
11110	053224	051505	051040	043505	
11111	053232	051511	042524	020122	
11112	053240	047503	052116	047105	
11113	053246	051524	040440	052106	
11114	053254	051105	040440	052124	
11115	053262	046505	052120	042105	
11116	053270	053440	044522	042524	
11117	053276	042040	052101	000101	
11118	053304	042522	042101	044040	EM53: .ASCIZ /READ HEADER AND DATA AFTER A SEARCH CAUSED DATA ERROR/
11119	053312	040505	042504	020122	
11120	053320	047101	020104	040504	
11121	053326	040524	040440	052106	
11122	053334	051105	040440	051440	
11123	053342	040505	041522	020110	
11124	053350	040503	051525	042105	
11125	053356	042040	052101	020101	
11126	053364	051105	047522	000122	
11127	053372	052101	042524	050115	EM54: .ASCII /ATTEMPTING COMMAND WITH INVALID ADDRESS CAUSED IMPROPER REGISTER CHANGE
11128	053400	044524	043516	041440	
11129	053406	046517	040515	042116	
11130	053414	053440	052111	020110	
11131	053422	047111	040526	044514	
11132	053430	020104	042101	051104	
11133	053436	051505	020123	040503	
11134	053444	051525	042105	044440	
11135	053452	050115	047522	042520	
11136	053460	020122	042522	044507	
11137	053466	052123	051105	041440	
11138	053474	040510	043516	006505	
11139	053502	012			
11140	053503	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11141	053510	040504	040524	043440	
11142	053516	053111	051505	053440	
11143	053524	040510	020124	044123	
11144	053532	052517	042114	041040	
11145	053540	020105	044124	051105	
11146	053546	006505	012		
11147	053551	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER OPERATION/
11148	053556	042526	020104	040504	
11149	053564	040524	043440	053111	

11150	053572	051505	051040	043505
11151	053600	051511	042524	020122
11152	053606	047503	052116	047105
11153	053614	051524	040440	052106
11154	053622	051105	047440	042520
11155	053630	040522	044524	047117
11156	053636	000		
11157	053637	127	044522	044524
11158	053644	043516	047440	020122
11159	053652	042522	042101	047111
11160	053660	020107	044527	044124
11161	053666	042440	050130	041505
11162	053674	042524	020104	042101
11163	053702	051104	051505	020123
11164	053710	053117	051105	046106
11165	053716	053517	042440	051122
11166	053724	051117	005015	
11167	053730	040503	051525	042105
11168	053736	044440	050115	047522
11169	053744	042520	020122	042522
11170	053752	044507	052123	051105
11171	053760	041440	040510	043516
11172	053766	006505	012	
11173	053771	107	047517	020104
11174	053776	040504	040524	043440
11175	054004	053111	051505	053440
11176	054012	040510	020124	044123
11177	054020	052517	042114	041040
11178	054026	020105	044124	051105
11179	054034	006505	012	
11180	054037	122	041505	044505
11181	054044	042526	020104	040504
11182	054052	040524	043440	053111
11183	054060	051505	051040	043505
11184	054066	051511	042524	020122
11185	054074	047503	052116	047105
11186	054102	051524	040440	052106
11187	054110	051105	047440	042520
11188	054116	040522	044524	047117
11189	054124	000		
11190	054125	104	052101	020101
11191	054132	042522	042101	053440
11192	054140	052111	020110	047101
11193	054146	042440	050130	041505
11194	054154	042524	020104	042101
11195	054162	051104	051505	020123
11196	054170	053117	051105	046106
11197	054176	053517	042440	051122
11198	054204	051117	044440	020123
11199	054212	047111	047503	051122
11200	054220	041505	006524	012
11201	054225	127	051117	020104
11202	054232	047516	020056	020061
11203	054240	047524	031040	030066
11204	054246	051440	047510	046125
11205	054254	020104	042502	051040

EM55: .ASCII /WRITING OR READING WITH EXPECTED ADDRESS OVERFLOW ERROR/<15><12>

.ASCII /CAUSED IMPROPER REGISTER CHANGE/<15><12>

.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>

.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER OPERATION/

EM56: .ASCII /DATA READ WITH AN EXPECTED ADDRESS OVERFLOW ERROR IS INCORRECT/<15><12>

.ASCII /WORD NO. 1 TO 260 SHOULD BE READ, WORD NO 261 TO 266 SHOULD/<15><12>

11206	054262	040505	026104	053440	
11207	054270	051117	020104	047516	
11208	054276	031040	030466	052040	
11209	054304	020117	033062	020066	
11210	054312	044123	052517	042114	
11211	054320	005015			
11212	054322	042502	041440	040510	.ASCIZ /BE CHANGED/
11213	054330	043516	042105	000	
11214	054335	101	052124	046505	EM57: .ASCII /ATTEMPTING DATA COMMAND WITH WRONG FORMAT BIT CAUSED/<15><12>
11215	054342	052120	047111	020107	
11216	054350	040504	040524	041440	
11217	054356	046517	040515	042116	
11218	054364	053440	052111	020110	
11219	054372	051127	047117	020107	
11220	054400	047506	046522	052101	
11221	054406	041040	052111	041440	
11222	054414	052501	042523	006504	
11223	054422	012			
11224	054423	111	050115	047522	.ASCII /IMPROPER REGISTER CHANGE/<15><12>
11225	054430	042520	020122	042522	
11226	054436	044507	052123	051105	
11227	054444	041440	040510	043516	
11228	054452	006505	012		
11229	054459	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11230	054462	040504	040524	043440	
11231	054470	053111	051505	053440	
11232	054476	040510	020124	044123	
11233	054504	052517	042114	041040	
11234	054512	020105	044124	051105	
11235	054520	006505	012		
11236	054523	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED DATA TRANSFER/
11237	054530	042526	020104	040504	
11238	054536	040524	043440	053111	
11239	054544	051505	051040	043505	
11240	054552	051511	042524	020122	
11241	054560	047503	052116	047105	
11242	054566	051524	040440	052106	
11243	054574	051105	040440	052124	
11244	054602	046505	052120	042105	
11245	054610	042040	052101	020101	
11246	054616	051124	047101	043123	
11247	054624	051105	000		
11248	054627	101	052124	046505	EM60: .ASCII /ATTEMPTING TO MODIFY REGISTER DURING AN OPERATION CAUSED IMPROPER/<15><
11249	054634	052120	047111	020107	
11250	054642	047524	046440	042117	
11251	054650	043111	020131	042522	
11252	054656	044507	052123	051105	
11253	054664	042040	051125	047111	
11254	054672	020107	047101	047440	
11255	054700	042520	040522	044524	
11256	054706	047117	041440	052501	
11257	054714	042523	020104	046511	
11258	054722	051120	050117	051105	
11259	054730	005015			
11260	054732	042522	044507	052123	.ASCII /REGISTER CHANGE. GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11261	054740	051105	041440	040510	

11262	054746	043516	027105	043440
11263	054754	047517	020104	040504
11264	054762	040524	043440	053111
11265	054770	051505	053440	040510
11266	054776	020124	044123	052517
11267	055004	042114	041040	020105
11268	055012	044124	051105	006505
11269	055020	012		
11270	055021	122	041505	044505
11271	055026	042526	020104	040504
11272	055034	040524	043440	053111
11273	055042	051505	051040	043505
11274	055050	051511	042524	020122
11275	055056	047503	052116	047105
11276	055064	051524	040440	052106
11277	055072	051105	047440	042520
11278	055100	040522	044524	047117
11279	055106	053440	051501	040440
11280	055114	052124	046505	052120
11281	055122	042105	005015	
11282	055126	047515	043104	047111
11283	055134	020107	042522	020107
11284	055142	044507	042526	020123
11285	055150	042101	051104	051505
11286	055156	020123	043117	051040
11287	055164	043505	051511	042524
11288	055172	020122	042502	047111
11289	055200	020107	047515	044504
11290	055206	054506	042105	053440
11291	055214	044510	044103	041440
11292	055222	052501	042523	020104
11293	055230	051105	047522	000122
11294	055236	042504	044526	042503
11295	055244	047040	052117	040440
11296	055252	040526	040514	046102
11297	055260	020105	042502	047506
11298	055266	042522	041440	046517
11299	055274	040515	042116	053440
11300	055302	051501	052040	020117
11301	055310	042502	043440	053111
11302	055316	042511	000116	
11303	055322	044122	051504	020061
11304	055330	047503	052116	047105
11305	055336	051524	042040	051125
11306	055344	047111	020107	047503
11307	055352	046515	047101	020104
11308	055360	040527	020123	047111
11309	055366	042440	051122	051117
11310	055374	000		
11311	055375	122	041505	046101
11312	055402	041111	040522	042524
11313	055410	041440	046517	040515
11314	055416	042116	041440	052501
11315	055424	042523	020104	046511
11316	055432	051120	050117	051105
11317	055440	051040	043505	051511

.ASCII /RECEIVED DATA GIVES REGISTER CONTENTS AFTER OPERATION WAS ATTEMPTED/<15

.ASCIZ /MODFING REG GIVES ADDRESS OF REGISTER BEING MODIFIED WHICH CAUSED ERROR

EM61: .ASCIZ /DEVICE NOT AVAILABLE BEFORE COMMAND WAS TO BE GIVIEN/

EM63: .ASCIZ /RHDS1 CONTENTS DURING COMMAND WAS IN ERROR/

EM64: .ASCII /RECALIBRATE COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>

11318	055446	042524	020122	044103	
11319	055454	047101	042507	005015	
11320	055462	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11321	055470	052101	020101	044507	
11322	055476	042526	020123	044127	
11323	055504	052101	051440	047510	
11324	055512	046125	020104	042502	
11325	055520	052040	042510	042522	
11326	055526	005015			
11327	055530	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
11328	055536	042105	042040	052101	
11329	055544	020101	044507	042526	
11330	055552	020123	042522	044507	
11331	055560	052123	051105	041440	
11332	055566	047117	042524	052116	
11333	055574	020123	043101	042524	
11334	055602	020122	047503	046515	
11335	055610	047101	000104		
11336	055614	047111	042524	051122	EM65: .ASCIZ /INTERRUPT FAILING/
11337	055622	050125	020124	040506	
11338	055630	046111	047111	000107	
11339					
11340					
11341					
11342	055636	042510	042101	051105	EM66: .ASCII /HEADER AND DATA COMMAND FOR HEAD SELECTION TEST/<15><12>
11343	055644	040440	042116	042040	
11344	055652	052101	020101	047503	
11345	055660	046515	047101	020104	
11346	055666	047506	020122	042510	
11347	055674	042101	051440	046105	
11348	055702	041505	044524	047117	
11349	055710	052040	051505	006524	
11350	055716	012			
11351	055717	103	052501	042523	.ASCII /CAUSED ERROR/<15><12>
11352	055724	020104	051105	047522	
11353	055732	006522	012		
11354	055735	122	042110	052123	.ASCII /RHDST GIVES WHAT TRACK WAS BEING WRITTEN OR READ/<15><12>
11355	055742	043440	053111	051505	
11356	055750	053440	040510	020124	
11357	055756	051124	041501	020113	
11358	055764	040527	020123	042502	
11359	055772	047111	020107	051127	
11360	056000	052111	042524	020116	
11361	056006	051117	051040	040505	
11362	056014	006504	012		
11363	056017	117	020116	054503	.ASCIZ /ON CYLINDER 0, SECTOR 0/
11364	056024	044514	042116	051105	
11365	056032	030040	020054	042523	
11366	056040	052103	051117	030040	
11367	056046	000			
11368	056047	122	040505	020104	EM67: .ASCII /READ HEADER AND DATA ERROR IN HEAD SELECTION TEST/<12><15>
11369	056054	042510	042101	051105	
11370	056062	040440	042116	042040	
11371	056070	052101	020101	051105	
11372	056076	047522	020122	047111	
11373	056104	044040	040505	020104	

11374	056112	042523	042514	052103	
11375	056120	047511	020116	042524	
11376	056126	052123	006412		
11377	056132	044506	051522	020124	.ASCII /FIRST FOUR WORD NUMBERS ARE HEADER/<12><15>
11378	056140	047506	051125	053440	
11379	056146	051117	020104	052516	
11380	056154	041115	051105	020123	
11381	056162	051101	020105	042510	
11382	056170	042101	051105	006412	
11383	056176	047527	042122	047040	.ASCII /WORD NUMBERS 5 TO 260 ARE DATA WORDS/<12><15>
11384	056204	046525	042502	051522	
11385	056212	032440	052040	020117	
11386	056220	033062	020060	051101	
11387	056226	020105	040504	040524	
11388	056234	053440	051117	051504	
11389	056242	006412			
11390	056244	047111	042040	052101	.ASCIZ /IN DATA WORDS BITS 4,5,6,7,8 GIVE TRACK NUMBER/
11391	056252	020101	047527	042122	
11392	056260	020123	044502	051524	
11393	056266	032040	032454	033054	
11394	056274	033454	034054	043440	
11395	056302	053111	020105	051124	
11396	056310	041501	020113	052516	
11397	056316	041115	051105	000	
11398	056323	122	040505	020104	EM70: .ASCII /READ HEADER AND DATA ERROR IN/<15><12>
11399	056330	042510	042101	051105	
11400	056336	040440	042116	042040	
11401	056344	052101	020101	051105	
11402	056352	047522	020122	047111	
11403	056360	005015			
11404	056362	044504	043106	051105	.ASCII /DIFFERENCE LINE TEST/<15><12>
11405	056370	047105	042503	046040	
11406	056376	047111	020105	042524	
11407	056404	052123	005015		
11408	056410	047527	042122	047040	.ASCII /WORD NOS 1-4 GIVE HEADER/<15><12>
11409	056416	051517	030440	032055	
11410	056424	043440	053111	020105	
11411	056432	042510	042101	051105	
11412	056440	005015			
11413					.ASCII
11414	056442	047527	042122	047040	.ASCIZ /WORD NOS 5-260 GIVE DATA WHICH IS THE CYLINDER ADDRESS/
11415	056450	051517	032440	031055	
11416	056456	030066	043440	053111	
11417	056464	020105	040504	040524	
11418	056472	053440	044510	044103	
11419	056500	044440	020123	044124	
11420	056506	020105	054503	044514	
11421	056514	042116	051105	040440	
11422	056522	042104	042522	051523	
11423	056530	000			
11424	056531	106	051117	044503	EM71: .ASCII /FORCING OPI BY 3 INDEX PULSES/<15><12>
11425	056536	043516	047440	044520	
11426	056544	041040	020131	020063	
11427	056552	047111	042504	020130	
11428	056560	052520	051514	051505	
11429	056566	005015			

11430	056570	040503	051525	042105	.ASCII /CAUSED IMPROPER REGISTER CHANGE/<15><12>
11431	056576	044440	050115	047522	
11432	056604	042520	020122	042522	
11433	056612	044507	052123	051105	
11434	056620	041440	040510	043516	
11435	056626	006505	012		
11436	056631	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11437	056636	040504	040524	043440	
11438	056644	053111	051505	053440	
11439	056652	040510	020124	044123	
11440	056660	052517	042114	041040	
11441	056666	020105	044124	051105	
11442	056674	006505	C12		
11443	056677	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER 3 INDEX PULSES/
11444	056704	042526	020104	040504	
11445	056712	040524	043440	053111	
11446	056720	051505	051040	043505	
11447	056726	051511	042524	020122	
11448	056734	047503	052116	047105	
11449	056742	051524	040440	052106	
11450	056750	051105	031440	044440	
11451	056756	042116	054105	050040	
11452	056764	046125	042523	000123	
11453	056772	044127	046111	020105	EM72: .ASCII /WHILE USING UNIBUS B/<15><12>
11454	057000	051525	047111	020107	
11455	057006	047125	041111	051525	
11456	057014	041040	005015		
11457	057020	042522	042101	042040	.ASCII /READ DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
11458	057026	052101	020101	040503	
11459	057034	051525	042105	044440	
11460	057042	050115	047522	042520	
11461	057050	020122	042522	044507	
11462	057056	052123	051105	041440	
11463	057064	040510	043516	006505	
11464	057072	012			
11465	057073	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11466	057100	040504	040524	043440	
11467	057106	053111	051505	053440	
11468	057114	040510	020124	044123	
11469	057122	052517	042114	041040	
11470	057130	020105	044124	051105	
11471	057136	006505	012		
11472	057141	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
11473	057146	042526	020104	040504	
11474	057154	040524	043440	053111	
11475	057162	051505	053440	040510	
11476	057170	020124	040527	020123	
11477	057176	044124	051105	020105	
11478	057204	043101	042524	020122	
11479	057212	047503	046515	047101	
11480	057220	000104			
11481	057222	044127	046111	020105	EM73: .ASCII /WHILE USING UNIBUS B/<15><12>
11482	057230	051525	047111	020107	
11483	057236	047125	041111	051525	
11484	057244	041040	005015		
11485	057250	042522	042101	042040	.ASCIZ /READ DATA INCORRECT/

11486	057256	052101	020101	047111	
11487	057264	047503	051122	041505	
11488	057272	000124			
11489	057274	044127	046111	020105	EM74: .ASCII /WHILE USING UNIBUS B/<15><12>
11490	057302	051525	047111	020107	
11491	057310	047125	041111	051525	
11492	057316	041040	005015		
11493	057322	051127	052111	020105	.ASCII /WRITE DATA COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>
11494	057330	040504	040524	041440	
11495	057336	046517	040515	042116	
11496	057344	041440	052501	042523	
11497	057352	020104	046511	051120	
11498	057360	050117	051105	051040	
11499	057366	043505	051511	042524	
11500	057374	020122	044103	047101	
11501	057402	042507	005015		
11502	057406	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
11503	057414	052101	020101	044507	
11504	057422	042526	020123	044127	
11505	057430	052101	051440	047510	
11506	057436	046125	020104	042502	
11507	057444	052040	042510	042522	
11508	057452	005015			
11509	057454	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
11510	057462	042105	042040	052101	
11511	057470	020101	044507	042526	
11512	057476	020123	042522	044507	
11513	057504	052123	051105	041440	
11514	057512	047117	042524	052116	
11515	057520	020123	043101	042524	
11516	057526	020122	047503	046515	
11517	057534	047101	000104		
11518	057540	044127	046111	020105	EM75: .ASCII /WHILE USING UNIBUS B/<15><12>
11519	057546	051525	047111	020107	
11520	057554	047125	041111	051525	
11521	057562	041040	005015		
11522	057566	051127	052111	020105	.ASCIZ /WRITE DATA COMMAND CHANGED WRITE FROM BUFFER/
11523	057574	040504	040524	041440	
11524	057602	046517	040515	042116	
11525	057610	041440	040510	043516	
11526	057616	042105	053440	044522	
11527	057624	042524	043040	047522	
11528	057632	020115	052502	043106	
11529	057640	051105	000		
11530	057643	127	044510	042514	EM76: .ASCII /WHILE USING UNIBUS B/<15><12>
11531	057650	052440	044523	043516	
11532	057656	052440	044516	052502	
11533	057664	020123	006502	012	
11534	057671	127	044522	042524	.ASCII /WRITE CHECK CAUSED IMPROPER REGISTER CHANGE/<15><12>
11535	057676	041440	042510	045503	
11536	057704	041440	052501	042523	
11537	057712	020104	046511	051120	
11538	057720	050117	051105	051040	
11539	057726	043505	051511	042524	
11540	057734	020122	044103	047101	
11541	057742	042507	005015		

11598	060446	052101	020101	020040															
11599	060454	042040	052101	000101															
11600	060462	041520	020040	020040	DH6:	.ASCII	/PC	REG	RECEIVED/	<15>	<12>								
11601	060470	020040	042522	020107															
11602	060476	020040	020040	042522															
11603	060504	042503	053111	042105															
11604	060512	005015																	
11605	060514	020040	020040	020040		.ASCIZ	/		ADDRESS DATA/										
11606	060522	020040	042101	051104															
11607	060530	051505	020123	040504															
11608	060536	040524	000																
11609	060541	120	020103	020040	DH7:	.ASCIZ	/PC	REG	ADDRESS/										
11610	060546	020040	051040	043505															
11611	060554	020040	020040	040440															
11612	060562	042104	042522	051523															
11613	060570	000																	
11614	060571	120	020103	020040	DH10:	.ASCII	/PC	TEST	FAILING CONTENT	CONTENT	CONTENT	CONTENT	CONTENT	CONTENT	CONTENT	CONTENT	CONTENT	CONTENT	CONTENT
11615	060576	020040	052040	051505															
11616	060604	020124	020040	043040															
11617	060612	044501	044514	043516															
11618	060620	041440	047117	042524															
11619	060626	052116	041440	047117															
11620	060634	042524	052116	041440															
11621	060642	047117	042524	052116															
11622	060650	041440	047117	042524															
11623	060656	052116	005015																
11624	060662	020040	020040	020040		.ASCIZ	/	NO	REG.	RHCS1	RHCS2	RHDS1	RHER1/						
11625	060670	020040	047516	020040															
11626	060676	020040	020040	042522															
11627	060704	027107	020040	020040															
11628	060712	044122	051503	020061															
11629	060720	020040	044122	051503															
11630	060726	020062	020040	044122															
11631	060734	051504	020061	020040															
11632	060742	044122	051105	000061															
11633	060750	041520	020040	020040	DH26:	.ASCII	/PC		CONT OF CONT	OF CONT	OF CONT	OF CONT	OF CONT	OF CONT	OF CONT	OF CONT	OF CONT	OF CONT	OF CONT
11634	060756	020040	047503	052116															
11635	060764	047440	020106	047503															
11636	060772	052116	047440	020106															
11637	061000	047503	052116	047440															
11638	061006	020106	047503	052116															
11639	061014	047440	020106	047503															
11640	061022	052116	047440	020106															
11641	061030	047503	052116	047440															
11642	061036	006506	012																
11643	061041	040	020040	020040		.ASCIZ	/		RHCS1	RHCS2	RHDS1	RHER1	RHER2	RHER3/					
11644	061046	020040	051040	041510															
11645	061054	030523	020040	051040															
11646	061062	041510	031123	020040															
11647	061070	051040	042110	030523															
11648	061076	020040	051040	042510															
11649	061104	030522	020040	051040															
11650	061112	042510	031122	020040															
11651	061120	051040	042510	031522															
11652	061126	000																	
11653	061127	120	020103	020040	DH30:	.ASCII	/PC	WORD	GOOD	BAD/	<15>	<12>							

11654	061134	020040	053440	051117						
11655	061142	020104	020040	043440						
11656	061150	047517	020104	020040						
11657	061156	041040	042101	005015						
11658	061164	020040	020040	020040		.ASCIZ /	NO	DATA	DATA/	
11659	061172	020040	047040	020117						
11660	061200	020040	020040	040504						
11661	061206	040524	020040	020040						
11662	061214	040504	040524	000						
11663	061221	120	020103	020040	DH51:	.ASCII /PC	REG	GOOD	RECVD	ILLEGL/<15><12>
11664	061226	020040	051040	043505						
11665	061234	020040	020040	043440						
11666	061242	047517	020104	020040						
11667	061250	051040	041505	042126						
11668	061256	020040	044440	046114						
11669	061264	043505	006514	012						
11670	061271	040	020040	020040		.ASCIZ /	ADDRESS DATA	DATA	FUNCTN/	
11671	061276	020040	040440	042104						
11672	061304	042522	051523	042040						
11673	061312	052101	020101	020040						
11674	061320	042040	052101	020101						
11675	061326	020040	043040	047125						
11676	061334	052103	000116							
11677	061340	041520	020040	020040	DH60:	.ASCII /PC	REG	GOOD	RECVD	MODFING/<15><12>
11678	061346	020040	042522	020107						
11679	061354	020040	020040	047507						
11680	061362	042117	020040	020040						
11681	061370	042522	053103	020104						
11682	061376	020040	047515	043104						
11683	061404	047111	006507	012						
11684	061411	040	020040	020040		.ASCIZ /	ADDRESS DATA	DATA	REG/	
11685	061416	020040	040440	042104						
11686	061424	042522	051523	042040						
11687	061432	052101	020101	020040						
11688	061440	042040	052101	020101						
11689	061446	020040	051040	043505						
11690	061454	000								
11691	061455	120	020103	020040	DH61:	.ASCII /PC	PC OF	RHDS1	/<15><12>	
11692	061462	020040	050040	020103						
11693	061470	043117	020040	051040						
11694	061476	042110	030523	020040						
11695	061504	006440	012							
11696	061507	040	020040	020040		.ASCIZ /	JSR	WAS	/	
11697	061514	020040	045040	051123						
11698	061522	020040	020040	053440						
11699	061530	051501	020040	020040						
11700	061536	000040								
11701	061540	041520	020040	020040	DH62:	.ASCII /PC	PC OF	RHCS1/	<15><12>	
11702	061546	020040	041520	047440						
11703	061554	020106	020040	044122						
11704	061562	051503	006461	012						
11705	061567	040	020040	020040		.ASCIZ /	JSR	WAS/		
11706	061574	020040	045040	051123						
11707	061602	020040	020040	053440						
11708	061610	051501	000							
11709	061613	040	020040	041520	DH65:	.ASCII / PC	TEST	CONT	CONT	CONT /<15><12>


```

11766 062260 000000
11767 062262 000 000 000 DF1: .BYTE 0,0,0,0,0,0
11768 062265 000 000 000
11769 062270 000 000 000 DF4: .BYTE 0,0,0,0,0,1
11770 062273 000 000 001
11771 062276 000 000 000 DF5: .BYTE 0,0,0,0
11772 062301 000
11773 062302 000 000 000 DF6: .BYTE 0,0,0
11774 062305 000 000 000 DF7: .BYTE 0,0
11775 062307 000 000 000 DF10: .BYTE 0,0,0,0,0,0,0
11776 062312 000 000 000
11777 062315 000
11778 062316 000 000 000 DF26: .BYTE 0,0,0,0,0,0,0
11779 062321 000 000 000
11780 062324 000
11781 062325 000 000 000 DF30: .BYTE 0,0,0,0
11782 062330 000
11783 062331 000 000 000 DF51: .BYTE 0,0,0,0,0
11784 062334 000 000
11785 062336 000 000 000 DF60: .BYTE 0,0,0,0,0
11786 062341 000 000
11787 062343 000 000 000 DF61: .BYTE 0,0,0
11788 062346 000 000 000 DF62: .BYTE 0,0,0
11789 062351 000 000 000 DF65: .BYTE 0,0,0,0,0
11790 062354 000 000
11791 062356 000 000 000 DF66: .BYTE 0,0,0,0,0,0,0
11792 062361 000 000
11793 062364 000
11794 062366 .EVEN
11795 .EVEN
11796
11797 000001 .END

```

ACL = 000040	1178#																
ACU = 100000	1138#																
AOE = 001000	1070#																
AS 002312	1269#	9297*	10085	11762													
ATA = 100000	1058#	2316	3200	3452	3701	3808	7030	7269	8571	8995							
ATABLE 004576	1331#	1693															
ATTENT 004650	1359#	1691*	1693*	2308	2470	2644	2794	3026	3191	3473	3703	3721	3810				
	7021	7260	8575														
ATO = 000001	1090#																
AT1 = 000002	1091#																
AT2 = 000004	1092#																
AT3 = 000010	1093#																
AT4 = 000020	1094#																
AT5 = 000040	1095#																
AT6 = 000100	1096#																
AT7 = 000200	1097#																
A16 = 000400	1033#																
A17 = 001000	1034#																
BA 002270	1258#	10013															
BAI = 000010	1004#	2449															
BASECH 036714	1523	9499#															
BEGIN 004712	153	1372#	10358														
BEGIN1 004662	161	1366#															
BEGIN2 004676	159	1369#															
BIT0 = 000001	125#																
BIT00 = 000001	115#	125															
BIT01 = 000002	114#	124															
BIT02 = 000004	113#	123															
BIT03 = 000010	112#	122															
BIT04 = 000020	111#	121															
BIT05 = 000040	110#	120															
BIT06 = 000100	109#	119	9793														
BIT07 = 000200	108#	118															
BIT08 = 000400	107#	117	9594														
BIT09 = 001000	106#	116	9602	9971													
BIT1 = 000002	124#																
BIT10 = 002000	105#	9956															
BIT11 = 004000	104#	9609															
BIT12 = 010000	103#																
BIT13 = 020000	102#	9963															
BIT14 = 040000	101#	9580															
BIT15 = 100000	100#	3815															
BIT2 = 000004	123#																
BIT3 = 000010	122#																
BIT4 = 000020	121#	9077															
BIT5 = 000040	120#																
BIT6 = 000100	119#																
BIT7 = 000200	118#																
BIT8 = 000400	117#																
BIT9 = 001000	116#																
BPTVEC= 000014	132#																
CA 002306	1267#	10077															
CC 002330	1276#	10117															
CHECK 034614	1932	2033	2596	2767	3284	3509	8978#										
CHECKC 034652	8982	8986#															
CHECKT 034636	2151	2264	2357	2903	3077	3305	3567	3725	3867	4013	4148	4300	4482				

DH30	061127	552	574	590	607	668	702	726	762	798	905	916	947	966
		11653#												
DH4	060240	326	11575#											
DH5	060363	337	422	434	448	462	474	485	492	502	511	522	545	566
		584	600	618	629	643	655	680	693	715	755	774	786	811
		852	864	927	940	958	978	11589#						
DH51	061221	737	11663#											
DH6	060462	348	11600#											
DH60	061340	824	11677#											
DH61	061455	834	11691#											
DH62	061540	842	11701#											
DH65	061613	872	11709#											
DH66	061734	888	11723#											
DH7	060541	357	11609#											
DIG8	= 000004	1045#												
DISPLA	001140	234#	1401*	9623*	9955*									
DISPRE	000174	149#	1401											
DLT	= 100000	1016#												
DL64	= 000020	1047#												
DND	= 000001	1080#												
DPR	= 000400	1051#	1896	2085	3007	3175	3434	3676	3783	4052	4187	4339	4522	4673
		4850	4991	5175	5326	5523	5704	5937	6089	6321	6479	6718	6868	7005
		7244	7815	8039	8278	8996								
DRY	= 000200	1050#	1898	2085	2983	3159	3452	3652	3759	3883	3906	6599	6989	7190
		7228	7455	7908	8142	8996								
DST	002300	1264#	10069											
DSMR	= 177570	46#	233											
DS1	002316	1271#	10037	11746	11749	11762								
DT	002320	1272#	1718*	2483	10141									
DTE	= 010000	1073#												
DTSY	= 001000	1086#												
DT1	062022	295	307	318	11735#									
DT10	062106	372	386	400	416	11746#								
DT26	062126	535	11749#											
DT30	062146	556	575	591	608	669	703	727	763	799	906	917	948	967
		11752#												
DT4	062040	331	11738#											
DT5	062056	341	426	438	452	466	478	486	493	503	512	523	546	567
		585	601	619	630	644	656	681	694	716	756	775	787	812
		853	865	931	941	959	979	11741#						
DT51	062160	742	11754#											
DT6	062070	351	11743#											
DT60	062174	829	11756#											
DT61	062210	837	11758#											
DT62	062220	845	11760#											
DT65	062230	877	11762#											
DT66	062244	895	11764#											
DT7	062100	359	11745#											
DVA	= 004000	1036#	1757	1909	2076	2990	3166	3417	3659	3766	4043	4178	4330	4513
		4664	4841	4982	5166	5317	5514	5695	5928	6080	6312	6470	6709	6859
		6996	7235	7806	8030	8269	8988							
ECH	= 000100	1067#												
ECI	= 004000	1151#	2697	2846	3815	3999	4133	4134	4135	4285	4286	4287	4468	4619
		4620	4621	4796	4937	4938	4939	5121	5272	5273	5274	5465	5645	5646
		5647	5883	6035	6036	6037	6268	6425	6426	6427	6661	6813	6814	6815
		7100	7101	7102	7345	7346	7347	7563	7651	7652	7653	7760	7761	7762

EM67	056047	898	11368#											
EM7	043640	355	10426#											
EM70	056323	909	11398#											
EM71	056531	921	11424#											
EM72	056772	11453#												
EM73	057222	945	11481#											
EM74	057274	934	952	11489#										
EM75	057540	963	11518#											
EM76	057643	971	11530#											
ERFLGS	004644	1353#	9949#											
ERR =	040000	1057#	3887	8573										
ERRVEC =	000004	128#	1502*	1509*	1529*	9585	9586*	9588*	9591*					
ERWORD	004512	1314#	9474*	9480*	11752									
ER1	002276	1263#	10045	11746	11749	11764								
ER2	002302	1265#	10053	11749	11764									
ER3	002310	1268#	10061	11749	11764									
EXT1 =	000001	1105#												
EXT10 =	000010	1108#												
EXT2 =	000002	1106#												
EXT20 =	000020	1109#												
EXT4 =	000004	1107#												
EXT40 =	000040	1110#												
FEN =	000200	1131#												
FER =	000020	1065#												
FILL	035504	9247#												
FILLRE	034460	2433	2436	2450	2453	2456	2459	2462	2465	2474	2479	2488	2491	2683
		2686	2832	2835	3019	3022	3029	3032	3187	3813	4064	4067	4070	4199
		4202	4205	4351	4354	4357	4534	4537	4540	4685	4688	4691	4862	4865
		4868	5003	5006	5009	5187	5190	5193	5338	5341	5344	5558	5561	5564
		5716	5719	5722	5949	5952	5955	6101	6104	6107	6333	6336	6339	6342
		6345	6491	6494	6497	6730	6733	6737	6740	6743	6880	6883	6886	7017
		7256	7604	7607	7610	7693	7696	7699	7827	7830	7833	8051	8054	8057
		8290	8293	8296	8555	8906#								
FINACC	004574	1326#	9052*											
FINALA	004572	1325#	9053*											
FIRST	004646	1354#	1414	1447*										
FLHEAD	034402	3953	3973	5808	5825	5845	5858	6009	6193	6210	6230	6243	6398	6613
		6632	6781	7070	7315	7466	7529	8849#						
FMT22 =	010000	1152#	2695	2844	3815	3998	3999	4000	4133	4134	4135	4285	4286	4287
		4467	4468	4469	4619	4620	4621	4795	4796	4797	4937	4938	4939	5120
		5121	5122	5272	5273	5274	5464	5465	5466	5645	5646	5647	5882	5883
		5884	6035	6036	6037	6267	6268	6269	6425	6426	6427	6660	6661	6662
		6813	6814	6815	7100	7101	7102	7345	7346	7347	7562	7563	7564	7651
		7652	7653	7760	7761	7762	7985	7986	7987	8219	8220	8221	8392	8393
		8394	8502	8503	8504	8633	8634	8635						
FUTABL	002334	1286#												
GNS =	***** U	148	1421	1425	1429	1433	1437	1441	1445	1479	1517	1521	1569	1592
		1596	1600	1604	1632	1638	1644	1696	1703	1710	1851	1857	1884	1890
		2575	2584	3272	3276	3495	3501	3505	5544	5552	8436	8442	8696	8702
		8756	8762	9352	9358	9365	9369	9373	9380	9384	9502	9508	9519	9525
		9531	9535	9541	9547	9554	10003	10011	10019	10027	10035	10043	10051	10059
		10067	10075	10083	10091	10099	10107	10115	10123	10131	10139	10147	10312	10313
		10314	10315	10316	10317	10318	10319	10320						
GO =	000001	1030#	1955	2057	2176	2288	2414	2667	2817	2972	2990	3148	3166	3290
		3398	3417	3461	3516	3641	3659	3748	3766	3875	3898	4025	4043	4160
		4178	4312	4330	4494	4513	4646	4664	4822	4841	4964	4982	5147	5166

		5299	5317	5495	5514	5677	5695	5910	5928	6062	6080	6294	6312	6452
		6470	6589	6687	6709	6841	6859	6978	6996	7119	7180	7216	7235	7364
		7444	7589	7678	7788	7806	7900	8012	8030	8134	8251	8269	8411	8525
		8649	9077											
GRV	= 000010	1046#												
HCE	= 000200	1068#												
HCI	= 002000	1150#	2699	2848	3815	4000	4135	4287	4469	4621	4797	4939	5122	5274
		5466	5647	5884	6037	6269	6427	6662	6815	7102	7347	7564	7653	7762
		7987	8221	8394	8504	8635								
HCRC	= 000400	1069#												
HT.	= 003323	1963#	1968	2067#	2072	2184#	2189	2296#	2301	2422#	2427	2675#	2680	2824#
		2829	2981#	2986	3157#	3162	3298#	3303	3408#	3413	3525#	3530	3650#	3655
		3757#	3762	3881#	3886	3904#	3909	4034#	4039	4169#	4174	4321#	4326	4504#
		4509	4655#	4660	4832#	4837	4973#	4978	5157#	5162	5308#	5313	5505#	5510
		5686#	5691	5919#	5924	6071#	6076	6303#	6308	6461#	6466	6597#	6602	6700#
		6705	6850#	6855	6987#	6992	7126#	7131	7188#	7193	7226#	7231	7371#	7376
		7453#	7458	7596#	7601	7685#	7690	7797#	7802	7906#	7911	8021#	8026	8140#
		8145	8260#	8265	8418#	8423	8532#	8537	8656#	8661				
IAE	= 002000	1071#												
IE	= 000100	1031#	1744	1784	2972	2990	2994	2995	3148	3166	3421	3422	3641	3659
		3663	3664	3748	3766	3770	3771	3875	3898	4025	4043	4160	4178	4312
		4330	4494	4513	4646	4664	4822	4841	4964	4982	5147	5166	5299	5317
		5495	5514	5677	5695	5910	5928	6062	6080	6294	6312	6452	6470	6589
		6687	6709	6841	6859	6978	6996	7119	7180	7216	7235	7364	7444	7589
		7678	7788	7806	7900	8012	8030	8134	8251	8269	8411	8525	8649	9103
		9115	9184	9198										
ILF	= 000001	1061#												
ILLEGL	002376	1304#	11754											
ILR	= 000002	1062#												
IOTVEC	= 000020	133#	1382#	1383#										
IR	= 000100	1007#	1867	2447	8543	8544								
IXE	= 004000	1135#												
KIPAR0	= 172340	196#												
KIPAR1	= 172342	197#												
KIPAR2	= 172344	198#												
KIPAR3	= 172346	199#												
KIPAR4	= 172350	200#												
KIPAR5	= 172352	201#												
KIPAR6	= 172354	202#												
KIPAR7	= 172356	203#												
KIPDR0	= 172300	185#												
KIPDR1	= 172302	186#												
KIPDR2	= 172304	187#												
KIPDR3	= 172306	188#												
KIPDR4	= 172310	189#												
KIPDR5	= 172312	190#												
KIPDR6	= 172314	191#												
KIPDR7	= 172316	192#												
LA	002332	1277#	10109											
LBT	= 002000	1053#	8995											
LT.	= 000105	1963#	1968	2067#	2072	2184#	2189	2296#	2301	2422#	2427	2675#	2680	2824#
		2829	2981#	2986	3157#	3162	3298#	3303	3408#	3413	3525#	3530	3650#	3655
		3757#	3762	3881#	3886	3904#	3909	4034#	4039	4169#	4174	4321#	4326	4504#
		4509	4655#	4660	4832#	4837	4973#	4978	5157#	5162	5308#	5313	5505#	5510
		5686#	5691	5919#	5924	6071#	6076	6303#	6308	6461#	6466	6597#	6602	6700#
		6705	6850#	6855	6987#	6992	7126#	7131	7188#	7193	7226#	7231	7371#	7376

PCLCSR	002256	1246#	1461	9050*	9077*									
PCLCTR	002262	1248#	9051											
PGE	= 002000	1011#												
PIP	= 020000	1056#	3007	3175	3434	3454	3676	3783	7005	7244				
PIRQ	= 177772	45#												
PIRQVE	= 000240	139#												
PKACK	002372	1302#	1934	1954	2035	2056	2075	3289	3515					
PLU	= 020000	1137#												
PRE	= 000020	1177#												
PRITEM	041404	1469#	2004*	2736*	3507*	8735*	8776*	9349*	9991#	10152*	10169	10173*		
PROG	= 001000	1052#												
PRO	= 000000	62#												
PR1	= 000040	63#												
PR2	= 000100	64#												
PR3	= 000140	65#												
PR4	= 000200	66#												
PR5	= 000240	67#												
PR6	= 000300	68#												
PR7	= 000340	69#												
PS	= 177776	42#	43	1407*	1743*	1783*	1838*	8753*	9348*					
PSEL	= 000000	1035#	5471	5495	5514	5653	5677	5695	8227	8251	8269			
PSU	= 000001	1174#												
PSW	= 177776	43#												
PUTREG	036472	1860	1893	9182	9197	9296	9403#							
PWRVEC	= 000024	134#	1388#	1389*	10329*	10330*	10338*	10353*	10354*					
RDCHR	= 104405	9851	10317#											
RDLIN	= 104406	9896	10318#											
RDOCT	= 104407	1481	9375	9386	9510	9527	10319#							
RDY	= 000200	1032#	1744	1757	1784	1909	2076	2186	2298	2424	2826	2990	3166	3410
		3417	3659	3766	4036	4171	4323	4506	4657	4834	4975	5159	5310	5507
		5688	5921	6073	6305	6463	6702	6852	6996	7128	7235	7373	7598	7687
		7799	8023	8262	8420	8534	8658	8988						
READAT	002360	1297#	4288	4311	4329	4622	4645	4663	4940	4963	4981	5275	5298	5316
		5648	5676	5694	8636	8648								
READIN	002374	1303#	2647	2666	2797	2816								
RECALI	002340	1289#	2952	2971	2989	3127	3147	3165	3897	6588	7179			
REFOR	002362	1298#	4136	4159	4177	6038	6061	6079	6428	6451	6469	6816	6840	6858
		7103	7118	7348	7363	7654	7677							
REGADR	004510	1313#	1546*	1920*	2082*	2091*	3004*	3013*	3172*	3181*	3431*	3440*	3673*	3682*
		3780#	3789*	4049*	4058*	4184*	4193*	4336*	4345*	4519*	4528*	4670*	4679*	4847*
		4856*	4988*	4997*	5172*	5181*	5323*	5332*	5520*	5529*	5701*	5710*	5934*	5943*
		6086*	6095*	6318*	6327*	6476*	6485*	6715*	6724*	6865*	6874*	7002*	7011*	7241*
		7250*	7812*	7821*	8036*	8045*	8275*	8284*	9305*	11741	11743	11754	11756	
REGSAV	041242	9948#												
REGSA1	041250	1500	9950#											
REINTO	003444	1308#	3974	3981	4097	4116	4129	4204	4234	4281	4356	4382	4446	4451
		4566	4586	4591	4615	4690	4717	4779	4894	4914	4933	5008	5035	5099
		5104	5219	5239	5244	5268	5343	5370	5443	5448	5591	5612	5617	5641
		5721	5749	5846	5853	5859	5866	5982	6003	6031	6106	6137	6231	6238
		6244	6251	6373	6392	6421	6496	6526	6773	6809	6885	6912	7064	7096
		7137	7309	7341	7382	7545	7647	7698	7728	8610	8629	8667		
RELEAS	002344	1291#												
RESVEC	= 000010	129#												
RETCL	002370	1301#	3727	3747	3765									
RHAS	002234	1230#	1538	1571	2644*	2794*	3721*							
RHBA	002212	1218#	2437	4068	4203	4355	4538	4689	4866	5007	5191	5342	5562	5720

RHCA	002230	5953	6105	6337	6495	6734	6884	7608	7697	7831	8055	8294	8541	9433*
RHCC	002252	1228#	2463	2684	2833	6340	6741	8926*	8944*	9430*				
RHCS1	002216	1237#	1918	1920	1922	2404	3020	3188	6343	6738	7018	7257	9052	9409
		1223#	1934*	1957*	2035*	2059*	2154*	2178*	2185	2266*	2290*	2297	2416*	2423
		2496	2647*	2669*	2797*	2819*	2825	2952*	2974*	3030	3127*	3150*	3203	3292*
		3378*	3400*	3409	3457	3466	3518*	3621*	3643*	3690	3727*	3750*	3797	3877*
		3900*	4027*	4035	4162*	4170	4314*	4322	4496*	4505	4648*	4656	4824*	4833
		4966*	4974	5149*	5158	5301*	5309	5471*	5497*	5506	5653*	5679*	5687	5912*
		5920	6064*	6072	6296*	6304	6454*	6462	6591*	6689*	6701	6843*	6851	6980*
		7033	7121*	7127	7182*	7218*	7272	7366*	7372	7446*	7591*	7597	7680*	7686
		7790*	7798	7902*	8014*	8022	8136*	8227*	8253*	8261	8413*	8419	8527*	8533
		8548	8651*	8657	8928*	8945*	8954*	8958	9103	9115	9184	9198	9439*	9504
		9537												
RHCS2	002214	1219#	1572	1625*	2443	5539	8542	8959	9436*					
RHDB	002206	1216#	1504	9511										
RHDST	002222	1225#	2454	2687	2836	4071	4206	4358	4541	4692	4869	5010	5194	5345
		5565	5723	5956	6108	6346	6498	6744	6887	7611	7700	7834	8058	8297
		8556	8927*	9431*										
RHDS1	002240	1232#	1964	1972	2068	2097	2312	2480	2676	2702	2851	2982	3033	3158
		3196	3266	3299	3448	3526	3651	3697	3758	3804	3882	3887	3905	6598
		6988	7026	7189	7227	7265	7454	7907	8141	8449	8567	8708	8960	
RHDT	002242	1233#	1626	1628	1640	1712	1716	1718						
RHEC1	002246	1235#	2489											
RHEC2	002250	1236#	2492											
RHER1	002220	1224#	1575	2451	8560	8961								
RHER2	002224	1226#	2457											
RHER3	002232	1229#	2466											
RHLA	002254	1238#	9053											
RHMR	002236	1231#	2475											
RHOF	002226	1227#	2460	2691	2840	3023	3814	8953*	9437*					
RHSN	002244	1234#	1705	1715	1717									
RHWC	002210	1217#	1940	2042	2161	2217	2273	2359	2434	2598	2653	2769	2803	2905
		2957	3079	3133	3308	3383	3569	3626	3733	4007	4065	4142	4200	4294
		4352	4476	4535	4628	4686	4804	4863	4946	5004	5129	5188	5281	5339
		5476	5559	5658	5717	5892	5950	6044	6102	6276	6334	6434	6492	6669
		6731	6823	6881	6963	7201	7571	7605	7660	7694	7770	7828	7994	8052
		8232	8291	8428	8510	8540	8687	8911	9222	9305	9407	9409	9432*	
		1063#												
RMR =	000004	1739	1756#											
RPTRP1	010130	1779	1794#											
RPTRP2	010226	987#	1409	1738	1778	1946*	2048*	2167*	2279*	2405*	2659*	2809*	2963*	3139*
RPVEC	002204	3389*	3632*	3739*	4016*	4151*	4303*	4485*	4637*	4813*	4955*	5138*	5290*	5485*
		5667*	5901*	6053*	6285*	6443*	6581*	6678*	6832*	6969*	7110*	7172*	7207*	7355*
		7436*	7580*	7669*	7779*	7892*	8003*	8126*	8241*	8402*	8516*	8640*	9521	9528*
		9543	9557*											
		1410	9551#	9557										
RPVECT	037516	1316#	1464*	1468*	1946	2048	2167	2279	2405	2659	2809	2963	3139	3389
RP4VEC	004516	3632	3739	4016	4151	4303	4485	4637	4813	4955	5138	5290	5485	5667
		5901	6053	6285	6443	6581	6678	6832	6969	7110	7172	7207	7355	7436
		7580	7669	7779	7892	8003	8126	8241	8402	8516	8640			
		3988	4123	4276	4458	4610	4786	4928	5111	5263	5455	5636	5872	6025
RUN	036532	6257	6415	6650	6803	7090	7335	7552	7641	7750	7976	8210	8383	8493
		8624	9430#											
		50#	1409*	1410*	1411*	1503*	1506*	1574*	1578*	1612*	1615*	1620*	1653*	1692*
RO =	%000000	1693	1738*	1739*	1740*	1778*	1779*	1780*	1906*	1907*	1909	1939*	1971*	1982*
		2041*	2063*	2078	2081	2096*	2108*	2160*	2194*	2217*	2218*	2220*	2222*	2223*

2225*	2227*	2229*	2231*	2233*	2235*	2239	2243*	2246*	2255*	2256	2259*	2272*
2311*	2323*	2359*	2360*	2362*	2364*	2365*	2367*	2369*	2371*	2373*	2375*	2377*
2381	2385*	2388*	2397*	2398	2401*	2433*	2436*	2442*	2450*	2453*	2456*	2459*
2462*	2465*	2474*	2479*	2488*	2491*	2495*	2507*	2598*	2600*	2602*	2604*	2605*
2607*	2609*	2611*	2613*	2615*	2617*	2621	2625*	2628*	2637*	2638	2641*	2652*
2683*	2686*	2690*	2701*	2713*	2769*	2771*	2773*	2775*	2776*	2778*	2780*	2782*
2784*	2786*	2788*	2790*	2791*	2802*	2832*	2835*	2839*	2850*	2862*	2905*	2907*
2909*	2911*	2912*	2914*	2916*	2918*	2920*	2922*	2924*	2928	2932*	2935*	2944*
2945	2948*	2956*	2977*	2993	3000	3003	3019*	3022*	3029*	3032*	3040*	3079*
3082*	3086*	3090*	3093*	3097*	3101*	3105*	3109*	3113*	3117*	3121*	3124*	3132*
3153*	3168	3171	3187*	3195*	3202*	3210*	3308*	3312*	3316*	3320*	3323*	3327*
3331*	3335*	3339*	3343*	3347*	3353	3357*	3360*	3369*	3370	3375*	3382*	3404*
3420	3427	3430	3447*	3456*	3465*	3478*	3522*	3569*	3571*	3574*	3577*	3579*
3582*	3585*	3588*	3591*	3593*	3595*	3599	3603*	3606*	3615*	3616	3619*	3625*
3646*	3662	3669	3672	3689*	3696*	3709*	3732*	3753*	3769	3776	3779	3796*
3803*	3813*	3819*	3869*	3953*	3962*	3973*	3980*	3988*	4006*	4030*	4045	4048
4064*	4067*	4070*	4076*	4096*	4115*	4123*	4141*	4165*	4180	4183	4199*	4202*
4205*	4213*	4232*	4268*	4276*	4293*	4317*	4332	4335	4351*	4354*	4357*	4364*
4380*	4431*	4436*	4445*	4450*	4458*	4475*	4499*	4515	4518	4534*	4537*	4540*
4547*	4565*	4585*	4590*	4597*	4602*	4610*	4627*	4651*	4666	4669	4685*	4688*
4691*	4698*	4715*	4769*	4778*	4786*	4803*	4827*	4843	4846	4862*	4865*	4868*
4875*	4893*	4913*	4920*	4928*	4945*	4969*	4984	4987	5003*	5006*	5009*	5016*
5033*	5084*	5089*	5098*	5103*	5111*	5128*	5152*	5168	5171	5187*	5190*	5193*
5200*	5218*	5238*	5243*	5250*	5255*	5263*	5280*	5304*	5319	5322	5338*	5341*
5344*	5351*	5368*	5428*	5433*	5442*	5447*	5455*	5475*	5500*	5516	5519	5558*
5561*	5564*	5571*	5590*	5611*	5616*	5623*	5628*	5636*	5657*	5682*	5697	5700
5716*	5719*	5722*	5729*	5747*	5808*	5817*	5825*	5834*	5845*	5852*	5858*	5865*
5872*	5891*	5915*	5930	5933	5949*	5952*	5955*	5961*	5981*	6002*	6009*	6018*
6025*	6043*	6067*	6082	6085	6101*	6104*	6107*	6115*	6135*	6193*	6202*	6210*
6219*	6230*	6237*	6243*	6250*	6257*	6275*	6299*	6314	6317	6333*	6336*	6339*
6342*	6345*	6352*	6372*	6391*	6398*	6407*	6415*	6433*	6457*	6472	6475	6491*
6494*	6497*	6504*	6524*	6594*	6613*	6623*	6632*	6642*	6650*	6668*	6692*	6711
6714	6730*	6733*	6737*	6740*	6743*	6750*	6772*	6781*	6789*	6794*	6803*	6822*
6846*	6861	6864	6880*	6883*	6886*	6893*	6910*	6958*	6962*	6983*	6998	7001
7017*	7025*	7032*	7041*	7063*	7070*	7077*	7082*	7090*	7135*	7185*	7196*	7200*
7221*	7237	7240	7256*	7264*	7271*	7280*	7308*	7315*	7322*	7327*	7335*	7380*
7434*	7449*	7466*	7476*	7481*	7486*	7491*	7496*	7504*	7508	7509*	7515*	7516
7517*	7523*	7529*	7536*	7544*	7552*	7570*	7604*	7607*	7610*	7617*	7641*	7659*
7693*	7696*	7699*	7706*	7726*	7750*	7769*	7793*	7808	7811	7827*	7830*	7833*
7840*	7890*	7918*	7923*	7928*	7933*	7938*	7946*	7950	7951*	7957*	7958	7959*
7963*	7968*	7976*	7993*	8017*	8032	8035	8051*	8054*	8057*	8064*	8124*	8152*
8157*	8162*	8167*	8172*	8180*	8184	8185*	8191*	8192	8193*	8197*	8202*	8210*
8231*	8256*	8271	8274	8290*	8293*	8296*	8303*	8375*	8383*	8427*	8448*	8458*
8485*	8493*	8509*	8547*	8555*	8559*	8566*	8582*	8609*	8616*	8624*	8665*	8686*
8707*	8717*	8779*	8781	8813*	8816	8852	8853	8857	8862*	8882	8883	8884
8891*	8909	8910	8915*	8926	8927	8930*	8944	8946*	8953	8955*	9019	9020
9021	9028*	9078	9082*	9083	9085	9086	9087	9088	9089	9141*	9161	9163*
9164	9166	9167	9168	9169	9207*	9220	9221	9223	9225	9227	9232*	9252
9253	9254	9255	9265*	9290	9291	9292	9293	9294*	9322*	9404	9407*	9410
9415*	9430	9431	9432	9433	9435	9437	9439	9440*	9467	9468	9469	9470
9471*	9495*	9511*	9513*	9514*	9641	9651*	9655	9671	9672	9685*	9717	9718*
9719	9722*	9893	9897*	9898	9901	9921*	9924*	10155	10156*	10157*	10164*	10165*
10166*	10167*	10168*	10169	10171	10173	10174	10179	10185	10187*	10188	10202*	10295
10296*	10297	10298*	10299*	10300*	10301*	10331	10352*					
51*	1504*	1505	1511	1538*	1539*	1540	1544	1546	1571*	1580	1583	1621
1744*	1757	1784*	1906	1912	2063	2082	2977	3004	3153	3172	3404	3431

		3522	3646	3673	3753	3780	4030	4049	4165	4184	4317	4336	4499	4519
		4651	4670	4827	4847	4969	4988	5152	5172	5304	5323	5500	5520	5682
		5701	5915	5934	6067	6086	6299	6318	6457	6476	6594	6692	6715	6846
		6865	6983	7002	7185	7221	7241	7449	7503	7506*	7508*	7516*	7519*	7793
		7812	7945	7948*	7950*	7958*	7961*	8017	8036	8179	8182*	8184*	8192*	8195*
		8256	8275	8780*	8781	8784	8850	8852*	8857*	8861*	8879	8882*	8885*	8890*
		8907	8909*	8911*	8912*	8914*	8958*	8965*	8986	8991	9016	9019*	9022	9027*
		9079	9087*	9121*	9122	9131*	9132	9140*	9218	9220*	9222*	9225*	9227*	9231*
		9248	9252*	9257*	9264*	9285	9290*	9301	9303	9308	9321*	9405	9408*	9410*
		9414*	9462	9467*	9475	9478	9482	9494*	9512*	9515*	9642	9655*	9656	9660
		9684*	9894	9899*	9907*	9909*	9911*	9914*	9917	9920*	10184	10185*	10190	10194
R2	=%000002	10196	10201*	10332	10351*									
		52*	1505*	1572*	1573*	1577*	1868	1871	2241	2244*	2250*	2253*	2383	2386*
		2392*	2395*	2623	2626*	2632*	2635*	2930	2933*	2939*	2942*	3355	3358*	3364*
		3367*	3601	3604*	3610*	3613*	8851	8853*	8858*	8860*	8880	8883*	8886*	8889*
		8908	8910*	8912	8913*	8959*	8963*	8964*	9017	9020*	9022*	9026*	9080	9088*
		9121	9130*	9131	9139*	9219	9221*	9228*	9230*	9249	9253*	9259*	9263*	9286
		9291*	9301	9304	9308	9320*	9406	9409*	9411*	9413*	9463	9468*	9475	9479
		9482	9493*	9643	9654*	9658*	9661	9668*	9669*	9670	9675*	9683*	9895	9900*
R3	=%000003	9908*	9910*	9912*	9918	9919*	10333	10350*						
		53*	1613*	1614*	1617*	1647*	1861	1863	1894	1896	1898	1900	1902	2064
		2091	2580	2589	2978	3013	3154	3181	3405	3440	3523	3647	3682	3754
		3789	4031	4058	4166	4193	4318	4345	4500	4528	4652	4679	4828	4856
		4970	4997	5153	5181	5305	5332	5501	5529	5683	5710	5916	5943	6068
		6095	6300	6327	6458	6485	6595	6693	6724	6847	6874	6984	7011	7186
		7222	7250	7450	7794	7821	8018	8045	8257	8284	8881	8884*	8885	8888*
		8960*	8980	8985	8998	9018	9021*	9023*	9025*	9081	9092*	9095*	9097*	9100*
		9138*	9162	9172*	9175*	9177*	9180*	9206*	9250	9254*	9257	9258*	9262*	9287
		9292*	9313*	9319*	9464	9469*	9472	9480	9487*	9492*	9644	9652*	9653*	9667*
		9670*	9679*	9680*	9682*	9847	9848*	9849	9852*	9853	9857	9859	9861*	9863*
R4	=%000004	10242	10251*	10257*	10258*	10261*	10266*	10267*	10268	10277*	10334	10349*		
		54*	1575*	1576*	2240	2248*	2254*	2382	2390*	2396*	2622	2630*	2636*	2929
		2937*	2943*	3354	3362*	3368*	3600	3608*	3614*	8961*	9251	9255*	9258	9261*
		9288	9293*	9306	9318*	9465	9472*	9473*	9474	9491*	10243	10245*	10246*	10247*
R5	=%000005	10248	10249*	10263	10265*	10273*	10276*	10335	10348*					
		55*	1618*	1625	1634	1647	1649	1652*	2064*	2087	2090	2245*	2251*	2387*
		2393*	2627*	2633*	2934*	2940*	2978*	3009	3012	3154*	3177	3180	3359*	3365*
		3405*	3436	3439	3523*	3605*	3611*	3647*	3678	3681	3754*	3785	3788	4031*
		4054	4057	4166*	4189	4192	4318*	4341	4344	4500*	4524	4527	4652*	4675
		4678	4828*	4852	4855	4970*	4993	4996	5153*	5177	5180	5305*	5328	5331
		5501*	5525	5528	5683*	5706	5709	5916*	5939	5942	6068*	6091	6094	6300*
		6323	6326	6458*	6481	6484	6595*	6693*	6720	6723	6847*	6870	6873	6984*
		7007	7010	7186*	7222*	7246	7249	7450*	7505*	7510*	7794*	7817	7820	7947*
		7952*	8018*	8041	8044	8181*	8186*	8257*	8280	8283	9289	9298*	9300*	9305
		9317*	9466	9470*	9481	9490*	9645	9647*	9649*	9656*	9660*	9675	9681*	10244
R6	=%000006	10250*	10252*	10254*	10255*	10256*	10257	10275*	10336	10347*				
R7	=%000007	56*	58	1377*	1378*	1379								
SAVER	034716	57*	59											
		1939	2041	2160	2272	2652	2802	2956	3132	3382	3625	3732	4006	4141
		4293	4475	4627	4803	4945	5128	5280	5475	5657	5891	6043	6275	6433
		6668	6822	6962	7200	7570	7659	7769	7993	8231	8427	8509	8686	9015*
SAVERE	004522	1324*	1941	1984	2043	2110	2162	2196	2274	2305*	2308*	2325	2404*	2430*
		2439*	2440*	2471*	2483*	2485*	2509	2654	2715	2804	2864	2958	3026*	3042
		3134	3191*	3212	3384	3473*	3480	3627	3703*	3711	3734	3810*	3821	4008
		4078	4143	4215	4295	4366	4477	4549	4629	4700	4805	4877	4947	5018
		5130	5202	5282	5353	5477	5573	5659	5731	5893	5963	6045	6117	6277

SC	=	100000	6354	6435	6506	6670	6752	6824	6895	6964	7021*	7043	7202	7260*	7282
SC1	=	000100	7572	7619	7661	7708	7771	7842	7995	8066	8233	8305	8429	8460	8511
SC10	=	001000	8540*	8541*	8544*	8545*	8575*	8584	8688	8719	8912*	9225*	9227*	9297	
SC2	=	000200	1039#	1907	2997	3207	3424	3470	3666	3694	3773	3801	7037	7276	8552
SC20	=	002000	1111#												
SC4	=	000400	1114#												
SEECOM		002364	1112#												
SEEKCY		034526	1115#												
SELECT		004636	1113#												
SERCH		002346	1299#	6977	6995	7215	7234	7443	7899	8133	8945				
SKI	=	040000	6958	7196	7434	7890	8124	8944#							
SN		002322	1346#	1367*	1369*	1372*	1473	1659	8767						
SND1		005776	1292#	8928											
SP	=	%000006	1180#												
			1273#	1717*	2485	10149									
			1417	1447#											
			58#	1381*	1395*	1396*	1402	1403	1404	1482*	1483	1484	1499*	1510	1523*
			1537*	1634*	1640*	1649*	1684*	1698*	1705*	1712*	1736*	1756	1776*	1794	1831*
			1853*	1866*	1867*	1868	1886*	1954*	1955*	1957	2026*	2056*	2057*	2059	2075*
			2076*	2077	2078	2085*	2086	2087	2144*	2175*	2176*	2178	2239*	2240*	2241*
			2253	2254	2255	2287*	2288*	2290	2350*	2381*	2382*	2383*	2395	2396	2397
			2413*	2414*	2416	2468*	2470*	2471	2555*	2577*	2586*	2621*	2622*	2623*	2635
			2636	2637	2666*	2667*	2669	2760*	2816*	2817*	2819	2896*	2928*	2929*	2930*
			2942	2943	2944	2971*	2972*	2974	2989*	2990*	2995*	2996*	2997*	2999	3000
			3007*	3008	3009	3070*	3147*	3148*	3150	3165*	3166*	3167	3168	3175*	3176
			3177	3247*	3266*	3267*	3268	3289*	3290*	3292	3353*	3354*	3355*	3367	3368
			3369	3397*	3398*	3400	3416*	3417*	3422*	3423*	3424*	3426	3427	3434*	3435
			3436	3497*	3515*	3516*	3518	3550*	3599*	3600*	3601*	3613	3614	3615	3640*
			3641*	3643	3658*	3659*	3664*	3665*	3666*	3668	3669	3676*	3677	3678	3747*
			3748*	3750	3765*	3766*	3771*	3772*	3773*	3775	3776	3783*	3784	3785	3860*
			3874*	3875#	3877	3897*	3898*	3900	3943*	4024*	4025*	4027	4042*	4043*	4044
			4045	4052#	4053	4054	4159*	4160*	4162	4177*	4178*	4179	4180	4187*	4188
			4189	4259*	4311*	4312*	4314	4329*	4330*	4331	4332	4339*	4340	4341	4422*
			4493*	4494*	4496	4512*	4513*	4514	4515	4522*	4523	4524	4645*	4646*	4648
			4663*	4664*	4665	4666	4673*	4674	4675	4760*	4821*	4822*	4824	4840*	4841*
			4842	4843	4850*	4851	4852	4963*	4964*	4966	4981*	4982*	4983	4984	4991*
			4992	4993	5075*	5146*	5147*	5149	5165*	5166*	5167	5168	5175*	5176	5177
			5298*	5299*	5301	5316*	5317*	5318	5319	5326*	5327	5328	5417*	5494*	5495*
			5497	5513*	5514*	5515	5516	5523*	5524	5525	5676*	5677*	5679	5694*	5695*
			5696	5697	5704*	5705	5706	5798*	5909*	5910*	5912	5927*	5928*	5929	5930
			5937*	5938	5939	6061*	6062*	6064	6079*	6080*	6081	6082	6089*	6090	6091
			6183*	6293*	6294*	6296	6311*	6312*	6313	6314	6321*	6322	6323	6451*	6452*
			6454	6469*	6470*	6471	6472	6479*	6480	6481	6559*	6588*	6589*	6591	6686*
			6687*	6689	6708*	6709*	6710	6711	6718*	6719	6720	6840*	6841*	6843	6858*
			6859*	6860	6861	6868*	6869	6870	6977*	6978*	6980	6995*	6996*	6997	6998
			7005*	7006	7007	7118*	7119*	7121	7164*	7179*	7180*	7182	7215*	7216*	7218
			7234*	7235*	7236	7237	7244*	7245	7246	7363*	7364*	7366	7425*	7443*	7444*
			7446	7503*	7519	7588*	7589*	7591	7677*	7678*	7680	7787*	7788*	7790	7805*
			7806*	7807	7808	7815*	7816	7817	7880*	7899*	7900*	7902	7945*	7961	8011*
			8012*	8014	8029*	8030*	8031	8032	8039*	8040	8041	8107*	8133*	8134*	8136
			8179*	8195	8250*	8251*	8253	8268*	8269*	8270	8271	8278*	8279	8280	8354*
			8410*	8411*	8413	8438*	8524*	8525*	8527	8542*	8543*	8545	8648*	8649*	8651
			8698*	8758*	8764*	8772*	8808*	8850*	8851*	8860	8861	8879*	8880*	8881*	8888
			8889	8890	8907*	8908*	8913	8914	8978	8980*	8981*	8983	8985*	8986*	8987*
			8988	8995*	8996	9016*	9017*	9018*	9025	9026	9027	9078*	9079*	9080*	9081*
			9082	9089*	9138	9139	9140	9141	9161*	9162*	9163	9169*	9206	9207	9218*

SCM1 = 000006	245#	246#	247#	248#	249#	250#	251#							
SCM2 = 000014	245#	246#	247#	248#	249#	250#	251#							
SCM3 = 000006	243#	245#												
SCM4 = 000006	251#	252#	253#	254#	255#	256#	257#							
SCNTLC 041075	9803	9871#												
SCRFLF 001221	261#	1648	1700	1707	1714	2579	2588	5546	5547	5554	5555	9362	9731	
	9768	9871	9930	9966	9979	10154	10178	10183						
SDBLK 040244	9652	9686	9694#											
SDOAGN 034356	8803	8814	8820#											
SDTBL 040234	9655	9690#												
SENDAD 034346	155	8816#												
SENDCT 034314	8805#													
SENDNG 034362	8771	8807	8822#											
SENULL 034377	8774	8810	8825#											
SEOP 034260	1526	1606	1610	8778	8795#									
SEOPCT 034306	8802#	8806												
SERFLG 001103	218#	9570	9598	9600	9606*	9627	9953*	9979						
SERMAX 001115	224#	1392*	9600	9622*	9627									
SERROR 041242	1384	1527	9945#											
SERRPC 001116	225#	9960*	9961*	9962	9979	10160	11735	11738	11741	11743	11745	11746	11749	
	11752	11754	11756	11758	11760	11762	11764							
SERRTB 001224	279#	10168												
SERTY 041406	9965	9992#												
SERTTL 001112	222#	8764	8766*	9959*	9979									
SESCAP 001212	258#	1391*	9621*	9974	9976	9979								
SFILLC 001154	241#	9734	9768											
SFILLS 001153	240#	9768												
SGADR 001120	226#													
SGDAT 001124	228#	1545*	1921*	2077*	2086*	2999*	3008*	3167*	3176*	3426*	3435*	3668*	3677*	
	3775#	3784#	4044#	4053#	4179#	4188#	4331#	4340#	4514#	4523#	4665#	4674#	4842#	
	4851#	4983#	4992#	5167#	5176#	5318#	5327#	5515#	5524#	5696#	5705#	5929#	5938#	
	6081#	6090#	6313#	6322#	6471#	6480#	6710#	6719#	6860#	6869#	6997#	7006#	7236#	
	7245#	7807#	7816#	8031#	8040#	8270#	8279#	9303#	9478#	11741	11752	11754	11756	
	8811#													
SGET42 034336	11													
SHD = 000000	9918#	9929#												
SHIOCT 041240	219#	9613#	9614	9616*	9626									
SICNT 001104	10329	10360#												
SILLUP 043154	223#	9962#	9979	10157										
SITEMB 001114	262#	9768	9862	9871	9930	9979								
SLF 001222	220#	1393#	1683#	3549#	9377#	9388	9604*	9619*	9624	9626				
SLPADR 001106	221#	1394#	8478#	9360	9387#	9604	9620#	9626	9973					
SLPERR 001110	1405	1499	1537	1563	1684	1732	1772	1831	2019	2144	2350	2555	2760	
SMAIL = ***** U	2896	3070	3247	3550	3858	3943	4259	4422	4760	5075	5417	5798	6183	
	6559	7164	7425	7880	8107	8354	8753	9619	9719	9968				
SMXCNT 040026	9617	9626#												
SNULL 001152	239#	9736	9768											
SNWTST= 000001	1493#	1495	1531#	1533	1551#	1553	1671#	1673	1723#	1725	1765#	1767	1803#	
	1805	2009#	2011	2135#	2137	2342#	2344	2526#	2528	2738#	2740	2887#	2889	
	3062#	3064	3225#	3227	3532#	3534	3851#	3853	3916#	3918	4247#	4249	4393#	
	4395	4731#	4733	5046#	5048	5384#	5386	5767#	5769	6150#	6152	6540#	6542	
	7151#	7153	7399#	7401	7859#	7861	8084#	8086	8327#	8329	8742#	8744		
SOCNT 042756	10241#	10270#	10283#											
SOMODE 042760	10236#	10240#	10245	10248#	10259#	10285#								
SOVER 040012	9581	9597	9605	9615	9623#									
SPASS 001100	216#	1843	2567	3259	8366	8770*	8772	8799*	8800*	8808	8822	9611	9627	

\$POWER	043162	10356	10363#															
\$PWAD	043150	10358#																
\$PWADN	043026	1388	10329#	10353														
\$PWAMG	043144	10356#																
\$PWAP	043074	10338	10343#															
\$QUES	001220	260#	9768	9855	9871	9927	9930	9979										
\$RDCHR	040666	9825#	10317															
\$RDEC=	***** U	10320																
\$ROLIN	040756	9847#	10318															
\$ROCT	041102	9891#	10319															
\$RDSZ =	000011	9840#																
\$REGAD	001156	243#																
\$REG0	001160	245#																
\$REG1	001162	246#																
\$REG2	001164	247#																
\$REG3	001166	248#																
\$REG4	001170	249#																
\$REG5	001172	250#																
\$R2A =	***** U	10320																
\$SAVRE=	***** U	10320																
\$SAVR6	043160	10337#	10343	10344#	10345#	10362#												
\$SCOPE	037560	1382	9579#															
\$SETUP=	000017	1377#	1382	1384	1386	1388	1390	1391	1393	8797	9971							
\$SS1 =	000000	1405#																
\$STUP =	177777	1377#																
\$SVLAD	037764	9589	9618#															
\$SWR =	167700	1#	11	26	27	28	29	30	31	32	257	258	259	1390				
		1391	1393	1394	1498	1536	1562	1682	1732	1772	1831	2019	2144	2350				
		2555	2760	2896	3070	3247	3549	3858	3943	4259	4422	4760	5075	5416				
		5798	6183	6559	7164	7425	7880	8107	8354	8752	8792	8798	8812	8821				
		8822	9571	9572	9573	9574	9575	9580	9592	9594	9595	9598	9599	9600				
		9607	9608	9609	9620	9623	9626	9937	9938	9939	9940	9941	9956	9963				
		9968	9971	9979	10359													
		32	33	9575	9576	9596												
\$SWRMK=	000000	257#	1390#	1498#	1536#	1562#	1682#	5416#	8752#	8798#	9607#	9614	9617#	9626				
\$TIMES	001210	236#	9772	9792	9799													
\$TKB	001144	9772#	9787#	9806	9811#	9831	9833#											
\$TKCNT	040470	1413	1564	2023	9787#	9804												
\$TKINT	040510	9776#	9814	9836														
\$TKQEN=	040507	9773#	9788#	9789	9812#	9813#	9814	9816#										
\$TKQIN	040472	9774#	9789#	9834	9835#	9836	9838#											
\$TKQOU	040474	9775#	9788	9816	9838													
\$TKGSR	040476	235#	9772	9793#														
\$TKS	001142	9790	9799#															
\$TKSRV	040560	251#	1621#	1622#														
\$TMP0	001174	252#	1511#	1745#	1746#	1785#	1786#	6603#	6941#	11745								
\$TMP1	001176	253#																
\$TMP2	001200	254#																
\$TMP3	001202	255#																
\$TMP4	001204	256#																
\$TMP5	001206	1#																
\$STN =	000041	11	1474	1488	1493	1498#	1531	1536#	1541	1551	1562#	1588	1660					
		1671	1682#	1684	1723	1732#	1733	1752	1758	1765	1772#	1790	1803					
		1831#	1846	2009	2019#	2026	2135	2144#	2342	2350#	2526	2555#	2564	2570				
		2738	2760#	2887	2896#	3062	3070#	3225	3247#	3256	3262	3532	3549#	3550				
		3846	3851	3858#	3860	3911	3916	3943#	4247	4259#	4393	4422#	4731	4760#				
		5046	5075#	5384	5416#	5417	5424	5767	5798#	6150	6183#	6540	6559#	7151				

ALLREG	21#	9999	10008	10016	10024	10032	10040	10048	10056	10064	10072	10080	10088	10096	10104
	10112	10120	10128	10136	10144										
CHANGR	21#	1970	2095	2307	2310	2441	2494	2689	2700	2838	2849	3025	3190	3194	3201
	3446	3455	3464	3471	3688	3695	3702	3795	3802	3809	7020	7024	7031	7259	7263
	7270	8447	8546	8558	8565	8574	8706								
CHECKD	21#	2151	2264	2357	2903	3077	3304	3567	3725	3867	4013	4148	4300	4482	4634
	4810	4952	5135	5287	5482	5664	5898	6050	6282	6440	6675	6829	7107	7352	7577
	7666	7776	8000	8238	8399										
CHECKV	21#	1932	2033	2596	2767	3284	3509								
CLEARA	21#	3962	3980	4115	4268	4431	4436	4445	4450	4585	4590	4597	4602	4769	4778
	4913	4920	5084	5089	5098	5103	5238	5243	5250	5255	5428	5433	5442	5447	5611
	5616	5623	5628	5817	5834	5852	5865	6002	6018	6202	6219	6237	6250	6391	6407
	6622	6641	6772	6788	6794	7062	7077	7082	7308	7322	7327	7476	7481	7486	7491
	7496	7523	7536	7544	7918	7923	7928	7933	7938	7963	7968	8152	8157	8162	8167
	8172	8197	8202	8374	8485	8609	8616								
CMPBLK	21#	4094	4230	4378	4563	4713	4891	5031	5216	5366	5588	5745	5979	6133	6370
	6522	6908	7134	7379	7724	8664									
CMREGI	21#	1981	2107	2193	2322	2506	2712	2861	3039	3209	3477	3708	3818	4075	4212
	4363	4546	4697	4874	5015	5199	5350	5570	5728	5960	6114	6351	6503	6749	6892
	7040	7279	7616	7705	7839	8063	8302	8457	8581	8716					
COMMEN	1#	11	140#												
DATAO	21#	3987	4122	4275	4457	4609	4785	4927	5110	5262	5454	5635	5871	6024	6256
	6414	6648	6801	7089	7334	7551	7640	7749	7975	8209	8382	8492	8623		
DISREG	21#	1934	2035	2154	2266	2647	2797	2952	3127	3378	3621	3727			
DUM	21#	16	140#												
ENDCOM	1#														
ERROR	40#	1512	1547	1750	1761	1795	1864	1872	1903	1913	1923	1990	2083	2092	2116
	2202	2331	2515	2721	2870	3005	3014	3048	3173	3182	3218	3432	3441	3486	3674
	3683	3717	3781	3790	3826	3889	4050	4059	4084	4104	4185	4194	4221	4240	4337
	4346	4372	4388	4520	4529	4555	4573	4671	4680	4706	4723	4848	4857	4883	4901
	4989	4998	5024	5041	5173	5182	5208	5226	5324	5333	5359	5376	5521	5530	5579
	5598	5702	5711	5737	5755	5935	5944	5969	5989	6087	6096	6124	6144	6319	6328
	6360	6380	6477	6486	6513	6533	6716	6725	6757	6866	6875	6901	6918	7003	7012
	7049	7143	7242	7251	7288	7388	7625	7715	7735	7813	7822	7848	8037	8046	8072
	8276	8285	8311	8466	8590	8673	8725	8992	8999	9105	9107	9117	9126	9135	9186
	9189	9201													
ESCAPE	1#	140#													
FIHEAD	21#	3952	3972	5807	5824	5844	5857	6008	6192	6209	6229	6242	6397	6611	6630
	6779	7069	7314	7465	7528										
FILLBL	21#	2433	2436	2450	2453	2456	2459	2462	2465	2474	2478	2488	2491	2683	2686
FLSVRE	21#	2832	2835	3019	3022	3029	3032	3187	3813	4064	4067	4070	4199	4202	4351
	4354	4357	4534	4537	4540	4685	4688	4691	4862	4865	4868	5003	5006	5009	5187
	5190	5193	5338	5341	5344	5558	5561	5564	5716	5719	5722	5949	5952	5955	6101
	6104	6107	6333	6336	6339	6342	6345	6491	6494	6497	6730	6733	6736	6740	6743
	6880	6883	6886	7017	7256	7604	7607	7610	7693	7696	7699	7827	7830	7833	8051
	8054	8057	8290	8293	8296	8555									
GETPRI	1#														
GOO	21#	1953	2055	2174	2286	2412	2665	2815	2970	3146	3288	3396	3514	3639	3746
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BGT	8803	9674	9904	10271											
BHI	9601														
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ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

*, DERPUB/NL: TOC/SOL/CRF=DERPUB.SML, DERPUB.P11
 RUN-TIME: 95 137 18 SECONDS
 RUN-TIME RATIO: 348/250=1.3
 CORE USED: 33K (65 PAGES)

