

RP04/5/6

FUNCTIONAL CONTROL 2  
CZRJJBO

AH-9225B-MC

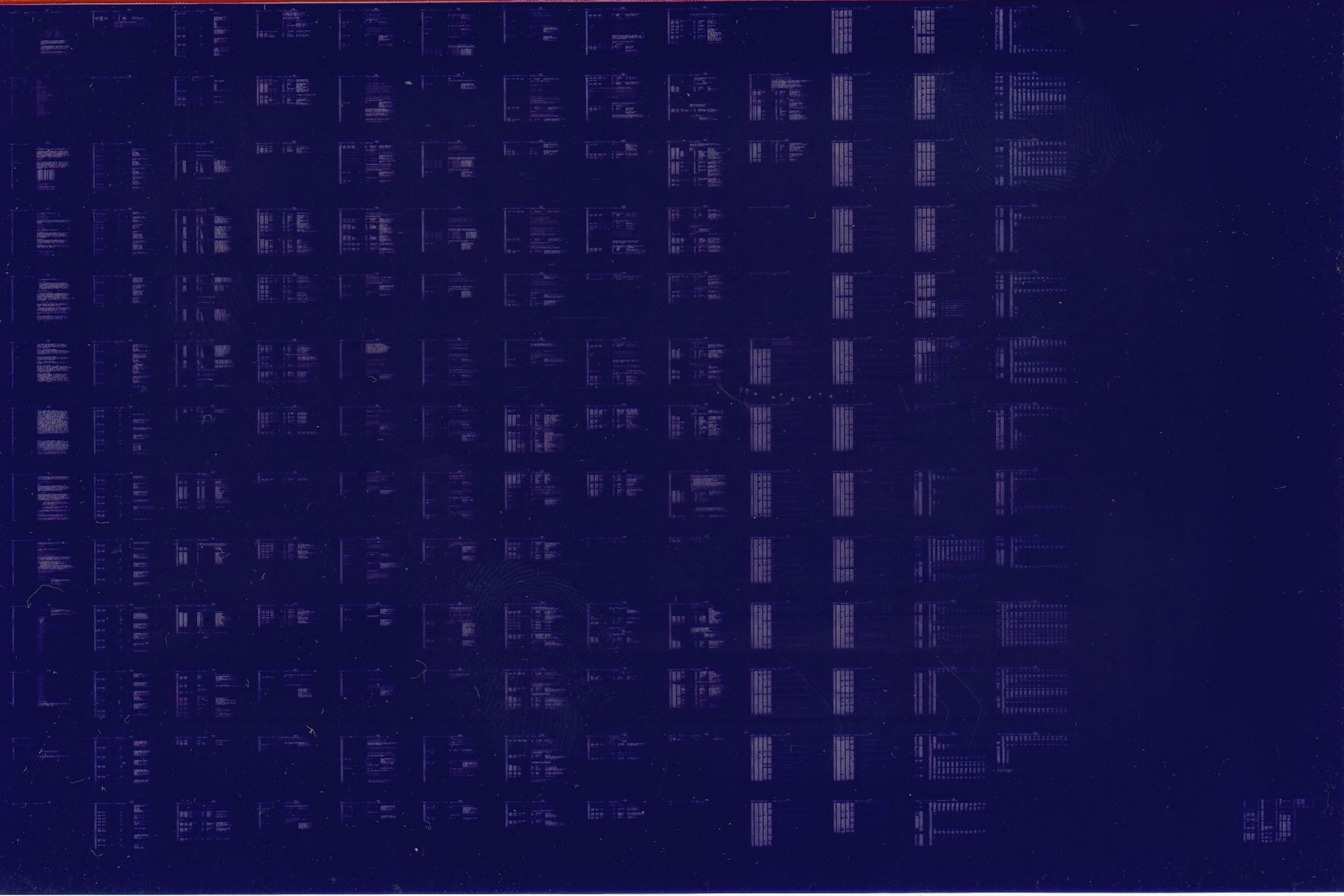
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IDENTIFICATION

PRODUCT CODE: AC-92238-MC  
 PRODUCT NAME: CZRJJ80 RPO4/5/6 FUNCTIONAL CONTROLLER TEST PART II  
 DATE CREATED: DECEMBER 1977  
 MAINTAINER: DIAGNOSTIC ENGINEERING  
 AUTHOR: PETE BLACKSTONE

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1.0 ABSTRACT

THIS DIAGNOSTIC TESTS THE DCL OF THE RPO4/5/6 DISK SUBSYSTEM WHEN CONNECTED TO EITHER AN RH11 OR RH70 CONTROLLER.

IT USES THE DISK SURFACE AND THE DRIVE MECHANICS TO PROVE THE PROPER WORKING OF THE SUBSYSTEM. IT DOES NOT NEED A FORMATTED DISK PACK. A DISK PACK WITH NO VITAL INFORMATION WRITTEN ON IT IS ESSENTIAL. AFTER A SUCCESSFUL RUN (WITH NO ERRORS) OF THIS DIAGNOSTIC IT CAN BE ASSERTED THAT THE DCL IN THE RPO4/5/6 SUBSYSTEM WORKS SUCCESSFULLY WHILE STANDING ALONE. SYSTEMS INTERACTION AND DRIVE TIMING IS LEFT TO OTHER DIAGNOSTICS. THIS IS WITH THE ASSUMPTION THAT STATIC 1 (DZRPS AND DZRPT ) HAS BEEN RUN SUCCESSFULLY.

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11 COMPUTER WITH CONSOLE TELETYPE, AND A RPO4/5/6 DISK SYSTEM. THE RPO4/5/6 DISK SYSTEM WILL CONSIST OF AN RH11 CONTROLLER, A DISK CONTROL LOGIC (DCL), A DEC 733 DISK DRIVE, AND ITS APPROPRIATE DISK PACK. THE DISK PACK NEED NOT BE FORMATTED. USED SECTION OF THE DISK SURFACE SHALL BE GOOD (HOLE FREE). THE SURFACE FOR THE FOLLOWING SECTORS MUST BE GOOD, THAT IS, FREE OF ANY HOLES OR SURFACE IRREGULARITY BEFORE ANY DATA ERROR CAN BE ATTRIBUTED TO THE LOGIC.

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

2.2 STORAGE

THIS PROGRAM REQUIRES 16K WORDS OF MEMORY

2.3 PRELIMINARY PROGRAMS

THIS PROGRAM ASSUMES THAT MAINDEC-11-DZRJG-(LATEST REV) HAS BEEN RUN WITHOUT ERRORS.

IT ASSUMES THAT MAINDEC-11-DZRJH-(LATEST REV) HAS BEEN RUN WITHOUT ERRORS.

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- AND IT ASSUMES THAT MAINDEC-11-DZRJI-(LATEST REV) HAS BEEN RUN WITHOUT ERRORS.
- 3.0 LOADING PROCEDURE
- USE STANDARD PROCEDURE FOR LOADING .ABS TAPES
- 4.0 STARTING PROCEDURE
- SWITCH 12 MUST BE SET WHEN THIS PROGRAM IS TO BE RUN USING AN RH70 CONTROLLER. IT CAN BE SET AT THE FRONT PANEL OR IN THE SOFTWARE SWITCH REGISTER IF THE OPERATOR SO DESIRES. SEE PARAGRAPH 5.1 FOR A DESCRIPTION OF SOFTWARE SWITCH REGISTER OPERATION.
- 4.1 CONTROL SWITCH SETTINGS
- SEE SECTION 5.1
- 4.2 STARTING ADDRESS
- START AT ADDRESS 200---FOR NORMAL RUN  
START AT ADDRESS 210---FOR UNIT SELECTION
- 200 START  
ALL SWITCHES MUST BE DOWN FOR WORST CASE RUN. WITH THIS STARTING ADDRESS ALL THE RPO4/5/6S ON THE SYSTEM WILL BE TESTED ONE AT A TIME BEFORE "END PASS" IS PRINTED OUT. TESTING WILL START WITH THE LOWEST UNIT NUMBER DRIVE THAT IS POWERED UP (THAT IS THE LOWEST UNIT NUMBER RHAS REGISTER THAT RESPONDS) THEN GO ON TO THE NEXT HIGHER UNIT NUMBER THAT IS POWERED UP.
- 204 RESTART  
SAME AS 200 START, WITH THE FOLLOWING EXCEPTIONS: THE PROGRAM WILL INTERROGATE THE OPERATOR FOR THE NON-DEFAULT C.S.R. AND VECTOR ADDRESS FOR THE RHXX CONTROLLER. WHEN THESE QUESTIONS HAVE CORRECTLY BEEN ANSWERED, THE PROGRAM WILL AUTOMATICALLY RESTART FROM ADDRESS 200.
- 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.
- 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".

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

5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR (I. E. AN 11/34) IT WILL DETERMINE THAT A HARDWARE SWITCH REGISTER IS NOT PRESENT, AND WILL USE A "SOFTWARE" SWITCH REGISTER. THE SETTINGS OF THE "SOFTWARE" SWITCHES ARE CONTROLLED THROUGH A KEYBOARD ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'. THE PROGRAM WILL RECOGNIZE A 'CONTROL G' AT ANY TIME EXCEPT WHEN IT IS AT A HIGHER PRIORITY PROCESSING AN RPO4/5/6 INTERRUPT. THE "SOFTWARE" SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE TO PROMPTING FROM THE SWITCH ENTRY ROUTINE:

'SWR = NNNNNN NEW ='

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

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

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

SWITCH 15 - HALT ON ERROR  
WHEN THIS SWITCH IS SET, IF THE PROGRAM FINDS AN ERROR THEN THE 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.

SWITCH 14 - LOOP ON TEST  
WHEN THIS SWITCH IS SET THE PROGRAM WILL BEGIN TO LOOP



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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 SWOP IS LOW.  
IF SWITCH 8 IS SET AND THIS SWITCH IS ALSO SET THEN THIS  
SWITCH GIVES THE TEST NUMBER TO BE LOOPED ON AS INDICATED  
IN THE DESCRIPTION OF SWITCH 8. IF SWITCH 8 IS NOT SET  
AND THIS SWITCH IS SET THEN THE PROGRAM WILL DO AS THE  
NAME INDICATES. FOR EXAMPLE IN A 256 WORD BUFFER IF ALL  
THE WORDS ARE IN ERROR THEN AFTER SEEING THE ERROR PRINTOUTS  
FOR THE FIRST FEW WORDS THEN SETTING SWITCH 7 WITH SWITCH 8  
NOT SET WILL STOP THE PRINTOUT OF ALL 256 WORDS BUT WILL  
NOT STOP THE PRINTOUT OF ANOTHER ERROR IN ANY SUBSEQUENT  
TEST. IT IS EXPECTED THAT SWITCH 7 AFTER BEING SET FOR  
A WHILE TO STOP PRINTING ALL THE 256 WORDS WILL BE RESET  
AGAIN TO ENABLE THE PRINTING OF OTHER DATA ERRORS.

SWITCH 6 - TYPE ALL REGISTERS WITH ERROR IF SWOB 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



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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" RH0B).

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 RPO4/5/6 REGISTERS OR GOOD/RECEIVED DATA. IF THE ERROR OCCURRED IN A SUBROUTINE, THE ADDRESS OF THE SUBROUTINE CALL IS ALSO GIVEN. REFER TO THE PROGRAM LISTING AT THE STATED ADDRESS TO DETERMINE THE CAUSE OF THE ERROR.

6.1 'FATAL' ERRORS

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

1. LOOK IN THE TEST LISTING FOR THE 'HALT' INSTRUCTION AND REPLACE IT, PLUS THE TWO WORDS ("TYPE CPHALT") ABOVE WITH 'NOP'S. WITH TTY ERROR PRINTOUTS INHIBITED, A SCOPE LOOP CAN BE INITIATED FOR THE TEST IN QUESTION.
2. GO BACK AND RERUN THE DZRPS DIAGNOSTIC AS IT IS QUITE POSSIBLE THAT A HARD FAILURE HAS OCCURRED IN ONE OF THE HARDWARE REGISTERS.

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

7.0 RESTRICTIONS

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

SWITCH 12 MUST BE SET WHEN RUNNING ON AN RH70 CONTROLLER AND IT MUST NOT BE SET WHEN RUNNING ON AN RH11 CONTROLLER. BECAUSE OF THE REQUIREMENT FOR IT TO BE SET WHEN USING AN RH70, THE PROGRAM CANNOT BE RUN IN CHAIN MODE WHEN USING THE

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SOFTWARE REGISTER FEATURE WHILE RUNNING ON AN RH70. THIS IS BECAUSE THE ROUTINE WHICH GETS SOFTWARE SWITCH SETTINGS IS NOT OPERABLE WHEN IN CHAIN MODE.

8. MISCELLANEOUS

8.1 EXECUTION TIME

THE FIRST PASS OF THE PROGRAM WILL TAKE APPROXIMATELY 20 SECONDS. SUBSEQUENT PASSES WILL TAKE 60 SECONDS .

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.

WHEN THIS OPERATOR SELECTABLE SCOPE LOOP IS USED THEN THE POINT THE PROGRAM GOES BACK TO CAN BE CHANGED.

THE RESTRICTIONS TO THE POINT WHERE THE PROGRAM CAN GO ARE: -

1. IT MUST BE WITHIN THE TEST UNDER CONSIDERATION
2. LOOP ON ERROR SWITCH MUST BE SET
3. THE ERROR MUST OCCUR WITHIN THE TEST UNDER CONSIDERATION

IF THE ERROR DOES NOT OCCUR WITHIN THE TEST UNDER CONSIDERATION THE PROGRAM WILL REVERT TO NORMAL OPERATION. HOWEVER, IF LOOP ON TEST SWITCH IS SET AND THIS OPERATOR SELECTABLE SCOPE LOOP IS USED THEN THE PROGRAM WILL LOOP BACK TO THE SELECTED POINT WHEN IT COMES TO THE END OF THE TEST UNDER CONSIDERATION.

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

8.4 PROGRAM REVISION HISTORY

9.0 PROGRAM DESCRIPTION

9.1 LOGIC DIVISION IN HARDWARE MODULES

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

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

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

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HANDLING.

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

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

9.2 DISK SURFACE USAGE

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

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

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

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

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

C1, T18, S21  
TT31-W

C2, T0, S0  
TT31-W,R

C2, T18, S21  
TT31-W

C3, T0, S0  
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

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

C5, T18, S21  
TT31-W

C6, T0, S0  
TT31-W,R

C6, T18, S21  
TT31-W

C7, T0, S0  
TT31-W,R

C7, T18, S18  
TT31-W

C8, T0, S0  
TT31-W,R

C8, T18, S21  
TT31-W

C9, T0, S0  
TT31-W

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

C10, T0, S0  
TT31-W,R

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

9.3

THE FOLLOWING SECTION DESCRIBES EACH TEST AND SUBROUTINES  
IN DETAIL AND CAN BE USED AS AN INDEX TO THE LISTING.  
THE LEFT MOST COLUMN IS THE LINE NUMBER WITHIN THE LISTING  
WHERE THAT ITEM WILL BE FOUND.  
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:DRIVE MUST BE LOCKED ON PORT A OR PORT B

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:\*INTERNAL PROGRAM MACROS BEGIN HERE  
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:\*NOTE: ALL MACRO CALLS BEGINNING WITH ".S" ARE SUPPLIED FROM AN  
:\*EXTERNAL SYSMAC.SML PACKAGE WHICH MUST BE MADE AVAILABLE  
:\*TO THE SOURCE PROGRAM AT ASSEMBLY TIME.  
:\*

CZRJJBO RPO4/5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 13  
CZRJJ8.P11 10-NOV-77 11:20 BASIC DEFINITIONS

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SEQ 0013

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000204 000137 035232  
000210 000137 004674  
000220 000137 004660

.SBTTL STARTING ADDRESS

RA:        JMP        =200                    ;NORMAL START  
ADDMOD:    JMP        @#BEGIN            ;GET DEVICE PARAMETERS  
            JMP        @#BASECH         ;JUMP TO SELECT DRIVE START  
            JMP        @#BEGIN2  
            JMP        =220               ;JUMP TO NO OPERATOR TESTS START  
            JMP        @#BEGIN1

;\*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  
;\*AT THE DRIVE





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646	001226	042566		EM1	: RPO4 DID NOT INTERRUPT
647					: WAITED ON BIT DID NOT OCCUR
648	001230	057444		DH1	: PC
649					: WAT PC
650					: BIT WAITED
651					: REG ADDRESS
652					: REG CONTENTS
653					: RHCSI CONTENTS
654	001232	061714		DT1	: \$ERRPC, WAITPC, WAITBT, WAITRE, \$BDDAT, CS1
655	001234	062234		DF1	: 0,0,0,0,0,0
656					
657					
658	001236	042615		EM2	: INTERRUPT ENABLE BIT DOWN BUT
659					: WAITED ON BIT DID NOT OCCUR
660	001240	057444		DH1	: PC
661					: WAT PC
662					: BIT WAITED
663					: REG ADDRESS
664					: REG CONTENTS
665					: RHCSI CONTENTS
666	001242	061714		DT1	: \$ERRPC, WAITPC, WAITBT, WAITRE, \$BDDAT, CS1
667	001244	062234		DF1	: 0,0,0,0,0,0
668					
669					
670	001246	042704		EM3	: RPO4 DID NOT INTERRUPT WHEN
671					: WAITED ON BIT DID SET
672	001250	057444		DH1	: PC
673					: WAT PC
674					: BIT WAITED
675					: REG ADDRESS
676					: RHCSI CONTENTS
677	001252	061714		DT1	: \$ERRPC, WAITPC, WAITBT, WAITRE, \$BDDAT, CS1
678	001254	062234		DF1	: 0,0,0,0,0,0
679					
680					
681	001256	042765		EM4	: WAITED ON BIT DID SET BUT
682					: TIME IS IN ERROR
683					: TIME IS GIVEN IN 10 MICRO SEC.
684					: (DECIMAL)
685	001260	057624		DH4	: PC
686					: WAT PC
687					: BIT WAITED
688					: REG ADDRESS
689					: TIME IN 10 MSEC
690	001262	061734		DT4	: \$ERRPC, WAITPC, WAITBT, WAITRE, \$BDDAT, WAITIM
691	001264	062243		DF4	: 0,0,0,0,0,1
692					
693					
694	001266	043076		EM5	: RHAS DOES NOT CLEAR BY
695					: MOVING IN ALL ONES
696	001270	057765		DH5	: PC
697					: REG. ADDR.

698				: GOOD DATA
699				: RECEIVED DATA
700	001272	061756	DT5	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT
701	001274	062252	DF5	: 0,0,0,0
702				
703			: ITEM6	
704	001276	043150	EM6	: LOADING RHER1 FOR ALL
705				: UNITS DID NOT SET ANY BITS
706				: IN RHAS-NO UNITS PRESENT
707	001300	060104	DH6	: PC
708				: REG ADDR
709				: RECEIVED DATA
710	001302	061772	DT6	: \$ERRPC, REGADR, \$BDDAT
711	001304	062257	DF6	: 0,0,0
712				
713			: ITEM7	
714	001306	043236	EM7	: SPECIFIED REGISTER NONEXISTANT
715				: SO ABORT PROGRAM
716	001310	060203	DH7	: PC
717				: ADDR. OF REG.
718	001312	062004	DT7	: \$ERRPC, TEMP1
719	001314	062263	DF7	: 0,0
720				
721			: ITEM10	
722	001316	043306	EM10	: STOPED DRIVE HAS MOL BIT
723				: IN RHDS1 = 1
724	001320	060243	DH10	: PC
725				: TEST NO
726				: FAILING REG ADDR
727				: CONTENTS OF RHCS1
728				: CONTENTS OF RHCS2
729				: CONTENTS OF RHDS1
730				: CONTENTS OF RHER1
731	001322	062014	DT10	: \$ERRPC, \$STNM, \$BDADR, CS1, CS2, DS1, ER1
732	001324	062266	DF10	: 0,0,0,0,0,0,0
733				
734			: ITEM11	
735	001326	043355	EM11	: WITH SPINDLE POWERED DOWN
736				: RHCS2 SHOULD HAVE ONLY
737				: UNIT NUMBER AND IR HIGH
738	001330	060243	DH10	: PC
739				: TEST NO
740				: FAILING REG. ADR
741				: CONTENTS OF RHCS1
742				: CONTENTS OF RHCS2
743				: CONTENTS OF RHDS1
744				: CONTENTS OF RHER1
745	001332	062014	DT10	: \$ERRPC, \$STNM, \$BDADR, CS1, CS2, DS1, ER1
746	001334	062266	DF10	: 0,0,0,0,0,0,0
747				
748			: ITEM12	
749	001336	043462	EM12	: AFTER A POWER UP WITH
750				: NO PACK ACKNOWLEDGE COMMAND
751				: RHDS1 SHOULD HAVE MOL=1, VV=0
752	001340	060243	DH10	: PC
753				: TEST NO

754				: FAILING REGISTER ADDR.
755				: CONTENTS OF RHCS1
756				: CONTENTS OF RHCS2
757				: CONTENTS OF RHDS1
758				: CONTENTS OF RHER1
759	001342	062014	DT10	: \$ERRPC, \$STSNM, \$BDADR, CS1, CS2, DS1, ER1
760	001344	062266	DF10	: 0,0,0,0,0,0,0
761				
762			: ITEM13	
763	001346	043570	EM13	: AFTER A POWER UP WITHOUT
764				: ANY INIT RHCS1 SHOULD
765				: HAVE GO=0, DVA=1, RDY=1
766				: IE=0, DISREGARD
767				: ALL OTHER BITS
768	001350	060243	DH10	: PC
769				: TEST NO
770				: FAILING REGISTER ADDR.
771				: CONTENTS OF RHCS1
772				: CONTENTS OF RHCS2
773				: CONTENTS OF RHDS1
774				: CONTENTS OF RHER1
775	001352	062014	DT10	: \$ERRPC, \$STSNM, \$BDADR, CS1, CS2, DS1, ER1
776	001354	062266	DF10	: 0,0,0,0,0,0,0
777				
778			: ITEM14	
779	001356	043707	EM14	: AFTER POWER UP RHCC
780				: SHOULD BE=0
781	001360	057765	DH5	: PC
782				: REG. ADDR.
783				: GOOD DATA
784				: RECEIVED DATA
785	001362	061756	DTS	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT
786	001364	062252	DFS	: 0,0,0,0
787				

788			:ITEM15			
789	001366	043761		EM15		:PACK ACKNOWLEDGE CAUSED
790						:AN ERROR
791						:GOOD DATA IS BEFORE COMMAND
792						:RECEIVED DATA IS AFTER COMMAND
793	001370	057765		DH5		:PC
794						:REG. ADDR.
795						:GOOD DATA
796						:RECEIVED DATA
797	001372	061756		DT5		:SERRPC,REGADR,\$GDDAT,\$BDDAT
798	001374	062252		DFS		:0,0,0,0
799						
800			:ITEM16			
801	001376	044122		EM16		:GIVING A NO-OP COMMAND CAUSED
802						:AN ERROR
803						:GOOD DATA GIVES REGISTER
804						:CONTENTS BEFORE COMMAND
805						:RECEIVED DATA GIVES REGISTER
806						:CONTENTS AFTER COMMAND
807	001400	057765		DH5		:PC
808						:REG. ADDR.
809						:GOOD DATA
810						:RECEIVED DATA
811	001402	061756		DT5		:SERRPC,REGADR,\$GDDAT,\$BDDAT
812	001404	062252		DFS		:0,0,0,0
813						
814			:ITEM17			
815	001406	044250		EM17		:DRIVE CLEAR COMMAND
816						:CAUSED AN ERROR
817						:GOOD DATA GIVES WHAT SHOULD
818						:BE THERE
819						:RECEIVED DATA GIVES WHAT WAS
820						:THERE AFTER COMMAND
821	001410	057765		DH5		:PC
822						:REG. ADDR.
823						:GOOD DATA
824						:RECEIVED DATA
825	001412	061756		DT5		:SERRPC,REGADR,\$GDDAT,\$BDDAT
826	001414	062252		DFS		:0,0,0,0
827						
828			:ITEM20			
829	001416	044405		EM20		:READ-IN COMMAND GAVE AN ERROR
830						:GOOD DATA HAS WHAT SHOULD BE THERE
831						:RECEIVED DATA HAS WHAT WAS
832						:AFTER COMMAND
833	001420	057765		DH5		:PC
834						:REG. ADDR.
835						:GOOD DATA
836						:RECEIVED DATA
837	001422	061756		DT5		:SERRPC,REGADR,\$GDDAT,\$BDDAT
838	001424	062252		DFS		:0,0,0,0
839						
840						
841			:ITEM 21			
842	001426	044554		EM21		:RHCSI CONTENTS DURING
843						:COMMAND WAS IN ERROR

844	001430	057765	DH5		
845	001432	061756	DT5		
846	001434	062252	DF5		
847					
848				: ITEM 22	
849	001436	044627	EM22		: RHDS1 CONTENTS DURING
850					: COMM ANS WAS IN ERROR
851	001440	057765	DH5		
852	001442	061756	DT5		
853	001444	062252	DF5		
854					
855				: ITEM 23	
856	001446	044702	EM23		: UNLOAD COMMAND GAVE AN ERROR
857					: GOOD DATA GIVES WHAT SHOULD
858					: BE THERE
859					: RECEIVED DATA GIVES WHAT WAS
860					: THERE AFTER COMMAND
861	001450	057765	DH5		
862	001452	061756	DT5		
863	001454	062252	DF5		
864					
865				: ITEM 24	
866	001456	045051	EM24		: OFFSET COMMAND CAUSED AN ERROR
867					: GOOD DATA IS WHAT SHOULD BE THERE
868					: RECEIVED DATA GIVES WHAT WAS THERE
869					: AFTER AN OFFSET COMMAND
870	001460	057765	DH5		
871	001462	061756	DT5		
872	001464	062252	DF5		
873					
874				: ITEM 25	
875	001466	045214	EM25		: RETURN TO CENTER LINE COMMAND
876					: CAUSED AN ERROR
877					: GOOD DATA GIVES WHAT SHOULD BE
878					: THERE
879					: RECEIVED DATA GIVES WHAT WAS
880					: THERE AFTER COMMAND
881	001470	057765	DH5		
882	001472	061756	DT5		
883	001474	062252	DF5		
884					
885				: ITEM 26	
886	001476	045376	EM26		: 500 OFFSETS CAUSED AN ERROR
887	001500	060422	DH26		: PC
888					: CONT. OF RHCS1
889					: CONT. OF RHCS2
890					: CONT. OF RHDS1
891					: CONT. OF RHER1
892					: CONT. OF RHER2
893					: CONT. OF RHER3
894	001502	062034	DT26		: \$ERRPC, CS1, CS2, DS1, ER1, ER2, ER3
895	001504	062275	DF26		: 0, 0, 0, 0, 0, 0, 0
896					
897				: ITEM 27	
898	001506	045466	EM27		: WRITE HEADER AND DATA
899					: CAUSED IMPROPER REGISTER CHANGE

900					:GOOD DATA GIVES WHAT
901					:SHOULD BE THERE
902					:RECEIVED DATA GIVES WHAT
903					:WAS THERE AFTER COMMAND
904	001510	057765		DH5	
905	001512	061756		DT5	
906	001514	062252		DF5	
907					
908					
909	001516	045704		EM30	:WRITE HEADER AND DATA
910					:CHANGED WRITE FROM BUFFER
911	001520	060622		DH30	:PC
912					:WORD NO
913					:GOOD DATA
914					:BAD DATA
915	001522	062056		DT30	:SERRPC, ERWORD, \$GDDAT, \$BDDAT
916	001524	062305		DF30	:0,0,0,0
917					
918					
919	001526	045764		EM31	:READ HEADER AND DATA CAUSED
920					:IMPROPER REGISTER CHANGE
921					:GOOD DATA HAS WHAT SHOULD
922					:BE THERE
923					:RECEIVED DATA GIVES WHAT
924					:WAS THERE AFTER COMMAND
925	001530	057765		DH5	
926	001532	061756		DT5	
927	001534	062252		DF5	
928					
929					
930	001536	046201		EM32	:WRITE HEADER AND DATA FOLLOWED
931					:BY A READ HEADER AND DATA
932					:CAUSED A READ/WRITE ERROR
933	001540	060622		DH30	
934	001542	062056		DT30	
935	001544	062305		DF30	
936					
937					
938	001546	046306		EM33	:READ DATA CAUSED IMPROPER REGISTER
939					:CHANGE
940					:GOOD DATA GIVES WHAT SHOULD BE THERE
941					:RECEIVED DATA GIVES WHAT WAS THERE AFTER
942					:COMMAND
943	001550	057765		DH5	
944	001552	061756		DT5	
945	001554	062252		DF5	
946					
947					
948	001556	046510		EM34	:READ DATA INCORRECT
949	001560	060622		DH30	
950	001562	062056		DT30	
951	001564	062305		DF30	
952					
953					
954	001566	046534		EM35	:WRITE DATA COMMAND CAUSED
955					:IMPROPER REGISTER CHANGE

956					; GOOD DATA GIVES WHAT SHOULD BE THERE
957					; RECEIVED DATA GIVES REGISTER
958					; CONTENTS AFTER WRITE DATA
959	001570	057765	DH5		
960	001572	061756	DT5		
961	001574	062252	DF5		
962					
963				; ITEM 36	
964	001576	046752	EM36		; WRITE DATA COMMAND CHANGED
965					; WRITE FROM BUFFER
966	001600	060622	DH30		
967	001602	062056	DT30		
968	001604	062305	DF30		
969					
970				; ITEM 37	
971	001606	047027	EM37		; SEEK COMMAND CAUSED AN
972					; ERROR
973					; GOOD DATA GIVES WHAT SHOULD
974					; BE THERE
975					; RECEIVED DATA GIVES WHAT
976					; WAS THERE AFTER SEEK COMMAND
977	001610	057765	DH5		
978	001612	061756	DT5		
979	001614	062252	DF5		
980					
981				; ITEM 40	
982	001616	047244	EM40		; WRITE CHECK CAUSED AN
983					; IMPROPER REGISTER CHANGE
984					; GOOD DATA GIVES WHAT SHOULD
985					; BE THERE
986					; RECEIVED DATA GIVES WHAT WAS
987					; THERE AFTER COMMAND
988	001620	057765	DH5		
989	001622	061756	DT5		
990	001624	062252	DF5		
991					
992				; ITEM 41	
993	001626	047453	EM41		; LOCKING OUT WRITES BY WRITE
994					; LOCK BUTTON CAUSED IMPROPER
995					; REGISTER CHANGE
996					; GOOD DATA GIVES WHAT SHOULD
997					; BE THERE
998					; RECEIVED DATA GIVES WHAT
999					; WAS THERE AFTER WRITES
1000					; WERE LOCKED OUT BY
1001					; BUTTON
1002	001630	057765	DH5		
1003	001632	061756	DT5		
1004	001634	062252	DF5		
1005					
1006				; ITEM 42	
1007	001636	047734	EM42		; ATTEMPTING TO WRITE WITH WRITE
1008					; LOCKED OUT CAUSED IMPROPER
1009					; REGISTER CHANGE
1010					; GOOD DATA GIVES WHAT SHOULD
1011					; BE THERE

1012					; RECEIVED DATA GIVES WHAT WAS
1013					; THERE AFTER ATTEMPT
1014	001640	057765		DH5	
1015	001642	061756		DT5	
1016	001644	062252		DF5	
1017					
1018			; ITEM 43		
1019	001646	050212		EM43	; WRITING WITH WRITE LOCKED
1020					; OUT CHANGED DISK DATA
1021					; GOOD DATA GIVES WHAT WAS
1022					; ON DISK BEFORE WRITE WITH
1023					; WRITE LOCK WAS ATTEMPTED
1024					; RECEIVED DATA GIVES WHAT WAS
1025					; READ BACK AFTER WRITE WITH
1026					; WRITE LOCK WAS ATTEMPTED
1027	001650	060622		DH30	
1028	001652	062056		DT30	
1029	001654	062305		DF30	
1030					
1031			; ITEM 44		
1032	001656	050550		EM44	; ENABLING WRITES BY WRITE LOCK
1033					; BUTTON CAUSED AN ERROR
1034					; GOOD DATA GIVES WHAT SHOULD
1035					; BE THERE
1036					; RECEIVED DATA GIVES WHAT WAS
1037					; THERE AFTER WRITE LOCK
1038					; BUTTON ENABLED WRITES
1039	001660	057765		DH5	
1040	001662	061756		DT5	
1041	001664	062252		DF5	
1042					
1043			; ITEM 45		
1044	001666	051042		EM45	; TRANSFERRING ON LAST BLOCK IE. CYLINDER
1045					; 410 SECTOR 21 TRACK 18
1046					; CAUSED IMPROPER REGISTER
1047					; CHANGE
1048					; GOOD DATA GIVES WHAT SHOULD
1049					; BE THERE
1050					; RECEIVED DATA GIVES WHAT WAS
1051					; THERE AFTER TRANSFER
1052	001670	057765		DH5	
1053	001672	061756		DT5	
1054	001674	062252		DF5	
1055					
1056			; ITEM 46		
1057	001676	051350		EM46	; DATA READ FROM LAST
1058					; BLOCK IE. CYLINDER 410
1059					; SECTOR 21, TRACK 18 IS IN
1060					; ERROR
1061	001700	060622		DH30	
1062	001702	062056		DT30	
1063	001704	062305		DF30	
1064					
1065			; ITEM 47		
1066	001706	051474		EM47	; TRANSFERRING FROM NONEXISTANT
1067					; SECTOR CAUSED IMPROPER



1068					: REGISTER CHANGE
1069					: GOOD DATA GIVES WHAT SHOULD
1070					: BE THERE
1071					: RECEIVED DATA GIVES WHAT WAS
1072					: THERE AFTER ATTEMPTED
1073					: TRANSFER
1074	001710	057765		DH5	
1075	001712	061756		DT5	
1076	001714	062252		DF5	
1077					
1078					: ITEM 50
1079	001716	051756		EM50	
1080					: TRANSFERRING FROM NONEXISTANT
1081					: SECTOR CAUSED DATA ERROR
1082					: GOOD DATA GIVES WHAT
1083					: SHOULD BE IN BUFFER
1084					: RECEIVED DATA GIVES WHAT WAS
1085	001720	060622		DH30	: IN BUFFER AFTER TRANSFER
1086	001722	062056		DT30	
1087	001724	062305		DF30	
1088					
1089					: ITEM 51
1090	001726	052175		EM51	
1091					: GIVING ILLEGAL FUNCTION CAUSED
1092					: IMPROPER REGISTER CHANGE
1093					: GOOD DATA GIVES WHAT SHOULD BE
1094					: THERE
1095					: RECEIVED DATA GIVES REGISTER
1096	001730	060734		DH51	: CONTENTS AFTER ILLEGAL FUNCTION
1097					: PC
1098					: REG. ADDR.
1099					: GOOD DATA
1100					: RECEIVED DATA
1101	001732	062072		DT51	: ILLEGAL FUNCTION
1102	001734	062312		DF51	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT, ILLEGL
1103					: 0,0,0,0
1104					
1105					: ITEM 52
1106	001736	052442		EM52	
1107					: WRITE DATA ON NONEXISTANT
1108					: SECTOR CAUSED IMPROPER
1109					: REGISTER CHANGE
1110					: GOOD DATA GIVES WHAT SHOULD
1111					: BE THERE
1112					: RECEIVED DATA GIVES WHAT
1113					: WAS THERE AFTER ATTEMPTED
1114	001740	057765		DH5	: WRITE DATA
1115	001742	061756		DT5	
1116	001744	062252		DF5	
1117					
1118					: ITEM 53
1119	001746	052713		EM53	
1120					: READ HEADER AND DATA AFTER
1121	001750	060622		DH30	: A SEARCH CAUSED AN ERROR
1122	001752	062056		DT30	
1123	001754	062305		DF30	

1124					
1125			; ITEM 54		
1126	001756	053001	EM54		: ATTEMPTED OPERATION WITH
1127					: INVALID ADDRESS CAUSED
1128					: IMPROPER REGISTER CHANGE
1129					: GOOD DATA GIVES WHAT SHOULD
1130					: BE THERE
1131					: RECEIVED DATA GIVES WHAT WAS
1132					: THERE AFTER OPERATION
1133	001760	057765	DH5		
1134	001762	061756	DT5		
1135	001764	062252	DF5		
1136					
1137			; ITEM 55		
1138	001766	053246	EM55		: WRITING/READING WITH EXPECTED
1139					: ADDRESS OVERFLOW ERROR CAUSED
1140					: IMPROPER REGISTER CHANGE
1141					: GOOD DATA GIVES WHAT SHOULD
1142					: BE THERE
1143					: RECEIVED DATA GIVES WHAT
1144					: WAS THERE AFTER OPERATION
1145	001770	057765	DH5		
1146	001772	061756	DT5		
1147	001774	062252	DF5		
1148					
1149			; ITEM 56		
1150	001776	053534	EM56		: DATA READ WITH AN EXPECTED
1151					: ADDRESS OVERFLOW ERROR IS
1152					: INCORRECT
1153					: WORD NO 1 TO 260 SHOULD
1154					: BE READ
1155					: WORD NOS 261 TO 266 SHOULD
1156					: NOT CHANGE DUE TO READ
1157	002000	060622	DH30		
1158	002002	062056	DT30		
1159	002004	062305	DF30		
1160					
1161			; ITEM 57		
1162	002006	053744	EM57		: ATTEMPTING DATA COMMAND
1163					: WITH WRONG FORMAT BIT CAUSED
1164					: IMPROPER REGISTER CHANGE
1165					: GOOD DATA GIVES WHAT SHOULD BE
1166					: THERE
1167					: RECEIVED DATA GIVES WHAT WAS
1168					: THERE AFTER ATTEMPTED DATA
1169					: TRANSFER
1170	002010	057765	DH5		
1171	002012	061756	DT5		
1172	002014	062252	DF5		
1173					
1174			; ITEM 60		
1175	002016	054236	EM60		: ATTEMPTING TO MODIFY REGISTER
1176					: DURING AN OPERATION CAUSED
1177					: IMPROPER REGISTER CHANGE
1178					: GOOD DATA GIVES WHAT SHOULD
1179					: BE THERE

1180				: RECEIVED DATA GIVES WHAT WAS
1181				: THERE AFTER OPERATION
1182				: WAS COMPLETE
1183	002020	061073	DH60	: PC
1184				: REG. ADDR.
1185				: GOOD DATA
1186				: RECEIVED DATA
1187				: MODIFYING REGISTER
1188	002022	062110	DT60	: \$ERRPC, REGADR, \$GDDAT, \$BDDAT, \$BDADR
1189	002024	062320	DF60	: 0,0,0,0
1190				
1191				: ITEM 61
1192	002026	054645	EM61	: DEVICE NOT AVAILBE BEFOR COMMAND WAS TO BE GIVEN
1193	002030	061230	DH61	: PC
1194				: PC OF JSR
1195				: RHDS1
1196	002032	062126	DT61	: \$ERRPC, PCJSR, \$BDADR
1197	002034	062326	DF61	: 0,0,0
1198				
1199				: ITEM 62
1200	002036	054645	EM61	: DEVICE NOT AVAILBE BEFOR COMMAND WAS TO BE GIVEN
1201	002040	061322	DH62	: PC
1202				: PC OF JSR
1203				: RHCS1 WAS
1204	002042	062140	DT62	: \$ERRPC, PCJSR, \$BDADR
1205	002044	062332	DF62	: 0,0,0
1206				
1207				
1208				: ITEM 63
1209	002046	054731	EM63	: RHDS1 CONTENTS DURING
1210				: COMMAND WAS IN ERROR
1211	002050	057765	DH5	
1212	002052	061756	DT5	
1213	002054	062252	DF5	
1214				
1215				: ITEM 64
1216	002056	055004	EM64	: RECALIBRATE COMMAND CAUSED
1217				: IMPROPER REGISTER CHANGE.
1218				: GOOD DATA GIVES WHAT SHOULD BE
1219				: THERE.
1220				: RECEIVED DATA GIVES WHAT WAS THERE
1221				: AFTER COMMAND
1222				
1223	002060	057765	DH5	
1224	002062	061756	DT5	
1225	002064	062252	DF5	
1226				
1227				
1228				: ITEM 65
1229				
1230	002066	055223	EM65	: INTERRUPT FAILING
1231	002070	061375	DH65	: PC
1232				: TEST NO
1233				: CONTENTS OF RHCS1
1234				: CONTENTS OF RHAS
1235				: CONTENTS OF RHDS1

1236	002072	062152	DT65		:\$ERRPC,TSTNM,CS1,AS,DS1
1237	002074	062336	DF65		:0,0,0,0,0
1238					
1239					
1240				; ITEM66	
1241	002076	055245	EM66		:HEADER AND DATA COMMAND
1242					:FOR HEAD SELECTION TEST
1243					:CAUSED AN ERROR
1244					:RHOST GIVES WHAT TRACK
1245					:WAS BEING WRITTEN ON CYLINDER 0
1246					:SECTOR 0
1247	002100	061511	DH66		:PC
1248					:RHOST
1249					:RHER1
1250					:RHER2
1251					:RHER3
1252					:RHCS1
1253					:RHCS2
1254	002102	062166	DT66		:\$ERRPC,DST,ER1,ER2,ER3,CS1,CS2
1255	002104	062343	DF66		:0,0,0,0,0,0,0
1256				; ITEM67	
1257	002106	055456	EM67		:READ HEADER AND DATA ERROR
1258					:IN HEAD SELECTION TEST
1259					:FIRST FOUR WORDS GIVE HEADER
1260					:NEXT WORDS ARE DATA
1261					:GOOD DATA WORDS GIVE
1262					:THE TRACK NUMBER IN
1263					:BITS 4,5,6,7,8
1264	002110	060622	DH30		
1265	002112	062056	DT30		
1266	002114	062305	DF30		
1267				; ITEM70	
1268	002116	055732	EM70		:READ HEADER AND DATA ERROR
1269					:IN DIFFERENCE LINE TEST
1270					:WORD NOS. 1-4 GIVE
1271					:HEADER
1272					:WORD NOS. 5-260 GIVE DATA
1273					:WHICH IS THE CYLINDER
1274					:ADDRESS
1275	002120	060622	DH30		
1276	002122	062056	DT30		
1277	002124	062305	DF30		
1278					
1279				; ITEM 71	
1280	002126	056140	EM71		:FORCING OPI CAUSED IMPROPER REGISTER
1281					:CHANGE
1282					:GOOD DATA GIVES WHAT SHOULD
1283					:BE THERE
1284					:RECEIVED DATA GIVES WHAT WAS
1285					:THERE AFTER 3 INDEX PULSES
1286	002130	057765	DH5		:PC
1287					:REG. ADDR.
1288					:GOOD DATA
1289					:RECEIVED DATA
1290	002132	061756	DT5		:\$ERRPC,REGADR,\$GDDAT,\$BDDAT
1291	002134	062252	DF5		:0,0,0,0

1292					
1293					
1294	002136	056401		EM72	: THERE WAS AN ERROR
1295					: AFTER A WRITE HEADER
1296					: AND DATA COMMAND
1297					
1298	002140	061607		DH72	: PC
1299					: RHCS1
1300					: RHCS2
1301					: RHDS1
1302					: RHDS2
1303					: RHCA
1304					: RHER1
1305					: RHC
1306	002142	062210		DT72	: \$ERRPC,CS1,CS2,DS1,DST,CA,ER1,WC
1307	002144	062354		DF72	: 0,0,0,0,0,0,0,0
1308					
1309					
1310					
1311					
1312					
1313					
1314	002146	056647		EM73	: READING OVER 3 INDEX
1315					: PULSES CAUSED SC
1316	002150	061607		DH72	
1317	002152	062210		DT72	
1318	002154	062354		DF72	
1319					
1320					
1321	002156	057017		EM74	: READING OVER 3 INDEX
1322					: PULSES CAUSED OPI
1323	002160	061607		DH72	
1324	002162	062210		DT72	
1325	002164	062354		DF72	
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040000  
100000

;RH11 REGISTER BITS

RPVEC: 254 ;RP04 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

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1372 ;RPO4 REGISTER BITS
1373
1374
1375
1376 ;CONTROL AND STATUS 1 REGISTER. (#00)
1377
1378 000001 GO= 1 ;GO (BIT #0)
1379 000100 IE= 100 ;INTERRUPT ENABLE (BIT #6)
1380 000200 RDY= 200 ;READY (BIT #7)
1381 000400 A16= 400 ;HIGH ORDER UNIBUS BITS (BIT #8)
1382 001000 A17= 1000 ;HIGH ORDER UNIBUS BITS (BIT #9)
1383 002000 PSEL= 2000 ;PORT SELECT (BIT #10)
1384 004000 DVA= 4000 ;DEVICE AVAILABLE (BIT #11)
1385 020000 MCPE= 20000 ;MASSBUSS PARITY ERROR (BIT #13)
1386 040000 TRE= 40000 ;TRANSFER ERROR (BIT #14)
1387 100000 SC= 100000 ;SPECIAL CONDITION (BIT #15)
1388
1389 ;STATUS REGISTER (RHDS1) (#01)
1390
1391 000001 DFF5= 1 ;DRIVE FORWARD 5"/SEC. (BIT #0)
1392 000002 DFF20= 2 ;DRIVE FORWARD 20"/SEC. (BIT #1)
1393 000004 DIGB= 4 ;DRIVE TO INNER GAVRD BAND (BIT #2)
1394 000010 GRV= 10 ;GO REVERSE (BIT #3)
1395 000020 DL64= 20 ;DIFFERENCE LESS THAN 64 (BIT #4)
1396 000040 DE1= 40 ;DIFFERENCE EQUALS 1 (BIT #5)
1397 000100 VV= 100 ;VOLUME VALID (BIT #6)
1398 000200 DRY= 200 ;DRIVE READY (BIT #7)
1399 000400 DPR= 400 ;DRIVE PRESENT (BIT #8)
1400 001000 PROG= 1000 ;PROGRAMABLE (BIT #9)
1401 002000 LBT= 2000 ;LAST SECTOR TRANSFERRED (BIT #10)
1402 004000 WRL= 4000 ;WRITE LOCK (BIT #11)
1403 010000 MOL= 10000 ;MEDIUM ON-LINE (BIT #12)
1404 020000 PIP= 20000 ;POSITIONING OPERATION IN PROGRESS (BIT #13)
1405 040000 ERR= 40000 ;COMPOSIT ERROR. (BIT #14)
1406 100000 ATA= 100000 ;ATTENTION ACTIVE (BIT #15)
1407
1408 ;ERROR REGISTER #01 (RHER1) (#02)
1409 000001 ILF= 1 ;ILLEGAL FUNCTION (BIT #0)
1410 000002 ILR= 2 ;ILLEGAL REGISTER (BIT #1)
1411 000004 RMR= 4 ;REGISTER MODIFICATION REFUSED (BIT #2)
1412 000010 PAR= 10 ;PARITY ERROR (BIT #3)
1413 000020 FER= 20 ;FORMAT ERROR (BIT #4)
1414 000040 WCF= 40 ;WRITE CLOCK FAIL (BIT #5)
1415 000100 ECH= 100 ;ECC HARD ERROR (BIT #6)
1416 000200 HCE= 200 ;HEADER COMPARE ERROR (BIT #7)
1417 000400 HCRC= 400 ;HEADER CRC ERROR (BIT #8)
1418 001000 AOE= 1000 ;ADDRESS OVERFLOW ERROR (BIT #9)
1419 002000 IAE= 2000 ;INVALID ADDRESS ERROR (BIT #10)
1420 004000 WLE= 4000 ;WRITE LOCK ERROR (BIT #11)
1421 010000 DTE= 10000 ;DRIVE TIMING ERROR (BIT #12)
1422 020000 OPI= 20000 ;OPERATION INCOMPLETE (BIT #13)
1423 040000 UNS= 40000 ;DRIVE UNSAFE (BIT #14)
1424 100000 DCK= 100000 ;DATA CHECK ERROR (BIT 15)
1425
1426 ;MAINTAINABILITY REGISTER (RHMR) (#03)
1427

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1428	000001	DMD=	1	;DIAGINOSTIC MODE (BIT #0)
1429	000002	MCLK=	2	;MAINTAINABILITY CLOCK (BIT #1)
1430	000004	MINX=	4	;MAINTAINABILITY INDEX (BIT #2)
1431	000010	MSTCK=	10	;MAINTAINABILITY SECTOR CLOCK (BIT #3)
1432	000020	MRD=	20	;MAINTAINABILITY READ (BIT #4)
1433	000040	MWR=	40	;MAINTAINABILITY WRITE (BIT #5)
1434	001000	DTSY=	1000	;MAINTAINABILITY SYNC DETECTED (BIT #9)

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

1437				
1438	000001	AT0=	1	;DEVICE 0 (BIT #0)
1439	000002	AT1=	2	;DEVICE 1 (BIT #1)
1440	000004	AT2=	4	;DEVICE 2 (BIT #2)
1441	000010	AT3=	10	;DEVICE 3 (BIT #3)
1442	000020	AT4=	20	;DEVICE 4 (BIT #4)
1443	000040	AT5=	40	;DEVICE 5 (BIT #5)
1444	000100	AT6=	100	;DEVICE 6 (BIT #6)
1445	000200	AT7=	200	;DEVICE 7 (BIT #7)

;DESIRED SECTOR/TRACK ADDRESS REGISTER (RHDST) (#1)  
;EACH BIT IS CALLED BY BIT NUMBER

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;DRIVE TYPE REGISTER (RHDT) (#06)  
;EACH BIT IS CALLED BY BIT NUMBER

;LOOK-AHEAD REGISTER (RHLA) (#07)

1468	000001	EXT1=	1	;EXTENSION 1 (BIT #0)
1469	000002	EXT2=	2	;EXTENSION 2 (BIT #1)
1470	000004	EXT4=	4	;EXTENSION 3 (BIT #2)
1471	000010	EXT10=	10	;EXTENSION 4 (BIT #3)
1472	000020	EXT20=	20	;EXTENSION 5 (BIT #4)
1473	000040	EXT40=	40	;EXTENSION 6 (BIT #5)
1474	000100	SC1=	100	;SECTOR COUNT FIELD 0 (BIT #6)
1475	000200	SC2=	200	;SECTOR COUNT FIELD 1 (BIT #7)
1476	000400	SC4=	400	;SECTOR COUNT FIELD 2 (BIT #8)
1477	001000	SC10=	1000	;SECTOR COUNT FIELD 3 (BIT #9)
1478	002000	SC20=	2000	;SECTOR COUNT FIELD 4 (BIT #10)
1479	004000	TRK1=	4000	;TRACK FIELD 1 (BIT #11)
1480	010000	TRK2=	10000	;TRACK FIELD 2 (BIT #12)
1481	020000	TRK4=	20000	;TRACK FIELD 3 (BIT #13)
1482	040000	TRK10=	40000	;TRACK FIELD 4 (BIT #14)
1483	100000	TRK20=	100000	;TRACK FIELD 5 (BIT #15)



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1484
1485 ;ERROR REGISTER #2 (RHER2) (#10)
1486
1487 000001 WCU= 1 ;WRITE CURRENT UNSAFE (BIT #0)
1488 000002 CSF= 2 ;CURRENT SINK FAILURE (BIT #1)
1489 000004 WSU= 4 ;WRITE SELECT UNSAFE (BIT #2)
1490 000010 CSU= 10 ;CURRENT SWITCH UNSAFE (BIT #3)
1491 000020 MSE= 20 ;MOTOR SEQUENCE ERROR (BIT #4)
1492 000040 TDF= 40 ;TRANSITIONS DETECTOR FAILURE (BIT #5)
1493 000100 TUF= 100 ;TRANSITIONS UNSAFE (BIT #6)
1494 000200 FEN= 200 ;FAILSAFE ENABLED (BIT #7)
1495 000400 WRU= 400 ;WRITE READY UNSAFE (BIT #8)
1496 001000 MHS= 1000 ;MULTIPLE HEAD SELECT (BIT #9)
1497 002000 NHS= 2000 ;NO HEAD SELECTION (BIT #10)
1498 004000 IXE= 4000 ;INDEX ERROR (BIT #11)
1499 010000 VU30= 10000 ;30VOLT UNSAFE (BIT #12)
1500 020000 PLU= 20000 ;PLO UNSAFE (BIT #13)
1501 100000 ACU= 100000 ;ACUNSAFE (BIT #15)
1502
1503 ;OFFSET REGISTER (RHOF) (#11)
1504
1505 000001 OF25= 1 ;OFFSET 25 MICRO INCHES (BIT #0)
1506 000002 OF50= 2 ;OFFSET 50 MICRO INCHES (BIT #1)
1507 000004 OF100= 4 ;OFFSET 100 MICRO INCHES (BIT #2)
1508 000010 OF200= 10 ;OFFSET 200 MICRO INCHES (BIT #3)
1509 000020 OF400= 20 ;OFFSET 400 MICRO INCHES (BIT #4)
1510 000040 OF800= 40 ;OFFSET 800 MICRO INCHES (BIT #5)
1511
1512 000200 OFREV= 200 ;OFFSET NEGATIVE (REVERSE) (BIT #5)
1513 002000 HCI= 2000 ;HEADER COMPARE INHIBIT (BIT #10)
1514 004000 ECI= 4000 ;ERROR CORRECTION CODE INHIBIT (BIT #11)
1515 010000 FMT22= 10000 ;FORMAT BIT (BIT #12)
1516
1517 ;DESIRED CYLINDER ADDRESS (RHCA) (#12)
1518 ;EACH BIT IS CALLED BY BIT NUMBER.
1519
1520
1521
1522
1523 ;CURRENT CYLINDER ADDRESS (RHCC) (#13)
1524 ;EACH BIT IS CALLED BY BIT NUMBER
1525
1526
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1528
1529 ;SERIAL NUMBER REGISTER (RHSN) (#14)
1530 ;EACH IS CALLED BY BIT NUMBER
1531
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1534
1535 ;ERROR REGISTER #03 (RHER3) (#15)
1536
1537 000001 PSU= 1 ;PACK SPEED UNSAFE (BIT #0)
1538 000002 VUF= 2 ;VELOCITY UNSAFE (BIT #1)
1539 000010 UWR= 10 ;ANY UNSAFE EXCEPT READ WRITE (BIT #3)

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1540	000020	PRE= 20	;DISK PACK ROTATION ERROR (BIT #4)
1541	000040	ACL= 40	;AC LOW (BIT #5)
1542	000100	DCL= 100	;DC LOW (BIT #6)
1543	040000	SKY= 40000	;SEEK INCOMPLETE (BIT #14)
1544	100000	OCYL= 100000	;OFF CYLINDER (BIT #15)

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;ECC POSITION REGISTER (RHEC1) (#16)  
;EACH BIT IS CALLED BY BIT NUMBER

;ECC PATTERN REGISTER (RHEC2) (#17)  
;EACH BIT IS CALLED BY BIT NUMBER

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1557 .SBTTL REGISTER ADDRESSES
1558
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1561
1562 ;RPO4/5/6 DISK I/O REGISTERS LOCATED IN THE RH11 CONTROLLER
1563
1564 002170 176722 RHDB: 176722 ;DATA BUFFER
1565 002172 176702 RHWC: 176702 ;WORD COUNT
1566 002174 176704 RHBA: 176704 ;BUS ADDRESS
1567 002176 176710 RHCS2: 176710 ;CONTROL AND STATUS 2
1568
1569 ;RPO4/5/6 DISK I/O REGISTERS LOCATED IN THE DEVICE CONTROL LOGIC (DCL)
1570
1571 002200 176700 RHCS1: 176700 ;CONTROL AND STATUS 1
1572 002202 176714 RHER1: 176714 ;ERROR #1
1573 002204 176706 RHDS1: 176706 ;DESIRED SECTOR/TRACK ADDRESS
1574 002206 176740 RHER2: 176740 ;ERROR #2
1575 002210 176732 RHOF: 176732 ;OFFSET
1576 002212 176734 RHCA: 176734 ;DESIRED CYLINDER ADDRESS
1577 002214 176742 RHER3: 176742 ;ERROR #3
1578 002216 176716 RHAS: 176716 ;ATTENTION SUMMARY
1579 002220 176724 RHMR: 176724 ;MAINTAINABILITY
1580 002222 176712 RHOS1: 176712 ;DRIVE STATUS
1581 002224 176726 RHDT: 176726 ;DRIVE TYPE
1582 002226 176730 RHSN: 176730 ;SERIAL NUMBER
1583 002230 176744 RHEC1: 176744 ;ECC POSITION
1584 002232 176746 RHEC2: 176746 ;ECC PATTERN
1585 002234 176736 RHCC: 176736 ;CURRENT CYLINDER ADDRESS
1586 002236 176720 RHLA: 176720 ;LOOK-AHEAD
1587
1588 ;ADDITIONAL REGISTERS LOCATED IN THE RH70 CONTROLLER LOGIC
1589
1590 002240 176750 RHBAE: 176750 ;BUS ADDRESS EXTENSION REGISTER
1591 002242 176752 RHCS3: 176752 ;CONTROL AND STATUS REGISTER #3
1592
1593
1594 ;P-CLOCK (KW11-P) I/O REGISTERS
1595
1596 002244 172540 PCLCSR: 172540 ;CONTROL AND STATUS REGISTERS
1597 002246 172542 PCLBUF: 172542 ;COUNT SET BUFFER
1598 002250 172544 PCLCTR: 172544 ;COUNTER
1599
    
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002260 000000  
  
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002274 000000  
002276 000000  
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002310 000000  
002312 000000  
002314 000000  
002316 000000  
002320 000000

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

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;FUNCTION EQUATES

; \*TABLE OF FUNCTIONS FOR RHCSI 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
WRCHEK:	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

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1666
1667
1668 ;RESERVED LOCATIONS FOR FLAGS AND INTERNAL PROGRAM CONTROL WORDS
1669
1670 004500 000000 REGADR: 0 ;SAVE REGISTER ADDRESS HERE
1671 004502 000000 ERWORD: 0 ;SAVE ERROR WORD NUMBER HERE
1672 004504 000000 TSTNM: 0 ;TEST NUMBER
1673 004506 000000 RP4VEC: 0 ;CONTAINS ADDRESS OF LOCATION
;WHERE AN RPO4 INTERRUPT IS TO VECTOR TO
;THIS MUST BE MOVED INTO 'RPVEC' TO BE
;EFFECTIVE.
1674
1675
1676
1677
1678 004510 000000 OFSTVL: 0 ;OFFSET VALUE USED IN OFFSET TEST
1679
1680
1681 004512 000024 SAVERE: .BLKW 20. ;BLOCK TO SAVE REGISTERS
1682 004562 000000 FINALA: 0 ;SAVE LOOK AHEAD REGISTER AT END OF OPERATION
1683 004564 000000 FINACC: 0 ;SAVE CURRENT CYLINDER REGISTER AT END OF OPERATION
1684
1685
1686 ;TABLE FOR ATTENTION BITS
1687 ;ATTENTION TABLE
1688
1689 004566 001 002 004 ATABLE: .BYTE 1,2,4,10,20,40,100,200
1690 004571 010 020 040
1691 004574 100 200
1692
1693
1694
1695 ;RESERVED LOCATIONS FOR UNIT SELECT
1696
1697 004576 000010 UNITS: .BLKW 8. ;THIS IS FILLED WITH -1
1698 004616 000000 UNIT: .WORD 0 ;UNIT UNDER TEST
1699 004620 000000 NOUNIT: .WORD 0 ;NUMBER OF UNITS PRESENT
1700 ;USED TO KEEP TRACK OF UNIT UNDER TEST
1701 004622 000000 NUNIT: .WORD 0 ;USED TO DETERMIN IF THERE ARE MORE
;THAN ONE UNIT
1702 ;ALL ONES INDICATE NONE OF THE OPERATOR
1703 004624 000000 NOPUSH: 0 ;INTERVENTION TESTE WILL BE PERFORMED
1704 ;ALL ONES INDICATE UNIT TO BE SELECTED
1705 004626 000000 SELECT: .WORD 0 ;UNIT NO. SELECTED
1706 004630 000000 UNITSL: .WORD 0
1707
1708
1709
1710 004632 000000 ERFLGS: 0 ;ERROR FLAG
1711
1712 004634 000000 FIRST: 0 ;IF ZERO WILL TYPE HEADER
;IF ONES WILL NOT TYPE HEADER
1713
1714
1715 004636 000000 RPO6: 0 ;DEVICE TYPE FLAG
1716
1717 004640 000000 RH70: 0 ;IF 1, PROGRAM IS RUNNING ON AN RH70
;IF 0, PROGRAM IS ON AN RH11
1718
1719
1720 004642 000000 RUNC'R: .WORD 0 ;'RUN' LINE DELAY COUNTER TO BE USED
;WHILE THE SILO IS FILLING
1721

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1722					
1723	004644	000000	ATTENT: 0		;ATTENTION BIT FOR PRESENT UNIT
1724	004646	000000	TOTALAT: 0		;TOTAL ATTENTION BITS
1725					
1726	004650	000000	TMP0: .WORD 0		;TEMP STORAGE
1727	004652	000000	TMP1: .WORD 0		
1728	004654	000000	TMP4: .WORD 0		;TEMP STORAGE
1729	004656	000000	TMP5: .WORD 0		;TEMP STORAGE

```

1730 .SBTTL
1731 .SBTTL *** DIAGNOSTIC CODE ***
1732 .SBTTL
1733
1734
1735 .SBTTL SETUP TESTS
1736
1737
1738 004660 012737 177777 004624 BEGIN1: MOV #-1, @#NOPUSH ; JUMP OVER OPERATOR REQUIRED TESTS
1739 004666 005037 004626 CLR @#SELECT ; DO NOT SELECT UNIT
1740 004672 000412 BR START
1741 004674 012737 177777 004626 BEGIN2: MOV #-1, @#SELECT ; SELECT UNIT
1742 004702 005037 004624 CLR @#NOPUSH ; DO NOT JUMP OVER ANY TEST
1743 004706 000404 BR START
1744 004710 005037 004626 BEGIN: CLR @#SELECT ; DO NOT SELECT UNIT
1745 004714 005037 004624 CLR @#NOPUSH ; DO NOT JUMP OVER ANY TEST
1746 ; NORMAL RUN
1747
1748 004720 START:
1749 004720 000005 RESET
1750
1751
1752 005142 012737 000000 177776 MOV #0, PS ; SET PROCESSOR STATUS TO 0
1753 005150 012737 000200 000036 MOV #200, @#TRAPVEC+2 ; TRAP PRIORITY = 4
1754 005156 013700 002166 MOV @#RPVEC, R0 ; GET RP VECTOR ADDRESS
1755 005162 012720 036306 MOV @#RPVECT, (R0)+ ; THIS IS FOR UNTIMELY INTERRUPTS
1756 005166 012710 000340 MOV #340, (R0) ; RPO4 INTERRUPT SERVICE ROUTINE
1757 ; PRIORITY = 7
1758
1759 005172 004737 037334 JSR PC, @#STKINT ; INITIALIZE THE TTY KEYBOARD
1760 005176 005737 004634 TST @#FIRST ; IS THIS FIRST TIME ROUND ?
1761 005202 001001 BNE 1$ ; DO NOT GIVE HEADER IF NOT
1762 005204 000402 BR 2$ ; GIVE HEADER IF SO
1763 005206 000137 005774 1$: JMP @#SND1 ; SKIP OVERALL PROGRAM HEADER
1764
1765 005212 2$:
1766
1767
1768
1769 005774 012737 177777 004634 SND1: MOV #-1, @#FIRST ; NEXT TIME DO NOT GIVE HEADER
1770
1771
1772 006032 032777 010000 173100 RH70CK: BIT #SW12, @SWR ; LOOK TO SEE IF USING RH70
1773 006040 001403 BEQ 3$ ; IF SW12 = 0, SKIP NEXT
1774 006042 012737 000001 004640 MOV #1, @#RH70 ; IF SW12 = 1, CU IS AN RH70
1775 006050 3$:
    
```



```

1776 ;*IS THERE A P-CLOCK (KW11-P) ON THE SYSTEM ?
1777 ;*IF SO MAKE 'WAT' TRAPS GO TO 'WAIT.P'
1778 ;*IF SO MAKE RPO4 INTERRUPTS GO TO 'TIME 1'
1779 ;*IF NOT MAKE 'WAT' TRAPS GO TO 'WAIT.T'
1780 ;*IF NOT MAKE RPO4 INTERRUPTS GO TO 'TIME 2'
1781
1782 ;*THE NEXT LINE IS TO BE ADDED LATER
1783 ;*AND THE JUMP AND NOP REMOVED
1784 ;*FOR NOW NO CLOCK WILL BE USED
1785
1786 ;*MOV @#15,@#ERRVEC ;SET TIME-OUT VECTOR
1787
1788 ; JMP @#15 ;DO NOT USE CLOCK
1789 ; NOP
1790 ; TST @#PCLCSR ;REFERENCE P-CLOCK STATUS REGISTER
1791 ; ;ADDRESS = 172540
1792 ; MOV #WAIT.P,@#STRPAD+20 ;THERE IS A P-CLOCK
1793 ; MOV #TIME1,@#RP4VEC ;THERE IS A P CLOCK SO
1794 ; ;VECTOR TO TIME1
1795 ; BR 25
1796 ; ;15: MOV #WAIT.T,@#STRPAD+20 ;THERE IS NO P-CLOCK
1797
1798
1799 006050 012737 033300 004506 MOV #TIME2,@#RP4VEC ;MAKE RPO4/5/6 INTERRUPTS GO TO 'TIME 2'
1800 006056 012737 177777 040742 25: MOV #-1,@#PRITEM ;CLEAR PREVIOUS ITEM NUMBER
1801
1802 006064 005737 004626 TST @#SELECT ;WAS IT A 200 START
1803 006150 104412 RDOCT
1804 006152 042716 177770 BIC #177770,(SP) ;ONLY KEEP LAST 3 BITS
1805 006156 011637 004616 MOV (SP),@#UNIT ;SAVE UNIT TO BE TESTED
1806 006162 012637 004630 MOV (SP)+,@#UNITSL ;SAVE UNIT TO BE TESTED
1807 006170 013737 004630 004616 MOV @#UNITSL,@#UNIT ;SET UNIT NUMBER
1808
    
```

```

1809
1810 006214 012706 001000      MOV      #STACK, SP      ;SET UP STACK POINTER
1811 006220 012737 040604 000030      MOV      #REGSA1, @#EMTVEC ;ERROR VECTOR SO THAT
1812                                     ;NO REGISTERS ARE SAVED
1813 006226 012737 006254 000004      MOV      #25, @#ERRVEC   ;SET UP FOR BUS TIMEOUT
1814
1815 006234 012700 000024      MOV      #24, R0        ;THERE ARE 24 REG TO TEST
1816 006240 012701 002170      MOV      #RH0B, R1     ;R1 NOW HAS ADDR OF ADDR OF FIRST REG.
1817 006244 013102          1$:      MOV      @ (R1)+, R2    ;READ HARDWARE REG.
1818 006246 005300          DEC      R0            ;COUNT DOWN
1819 006250 001375          BNE     1$            ;BRANCH IF 24 NOT DONE
1820 006252 000454          BR      3$            ;BRANCH IF 24 DONE
1821 006254 012737 000006 000004      MOV      #ERRVEC+2, @#ERRVEC ;RESTORE TRAP CATCHER
1822 006262 022626          CMP      (SP)+, (SP)+  ;CLEAN STACK
1823 006264 016137 177776 001200      MOV      -2(R1), $TMP1  ;STORE FAILING REG ADDR
1824 006272 104007          ERROR   7            ;REGISTER NON EXISTANT
1825 006274 032777 020000 172636      BIT      #SW13, @SWR   ;INHIBIT ERROR PRINTOUT ?
1826 006302 001036          BNE     4$            ;BRANCH IF YES
1827
1828
1829 006370 012746 000204      MOV      #ADDMOD, -(SP) ;GET READY TO TYPE STARTING ADDRESS
1830                                     ;OF "CHANGE OF BASE ADDRESS" ROUTINE
1831 006374 104402          TYPOC
1832 006376 000000          HALT
1833 006400 000137 032570          4$:      JMP      @#SEOP        ;GO TO END OF PROGRAM -----
1834
1835 006404 012737 006460 000004      MOV      #TRP, @#4     ;INITIALIZE VECTOR
1836 006412 005737 002240      TST     @#RHBAE       ;ADDRESS RPBAE(RH11/RH70?)
1837 006416 005237 004640      INC     @#RH70        ;FOUND AN RH70-SET MASK
1838 006456 000417          BR      RTN          ;GET OUT
1839 006460 022626          TRP:    CMP      (SP)+, (SP)+ ;SET UP THE
1840 006516 012737 040574 000030      RTN:    MOV      #SEERROR, @#EMTVEC ;RESTORE ERROR VECTOR
1841                                     ;SO THAT REGISTERS ARE SAVED
1842 006524 012737 000006 000004      MOV      #ERRVEC+2, @#ERRVEC ;RESTORE TRAP CATCHER
1843

```

1844						
1845	006542	012706	001000	MOV	#STACK, SP	;SET STACK POINTER
1846						
1847	006546	013701	002216	MOV	@RHAS, R1	;R1 HAS ADDRESS OF RHAS
1848	006552	012711	177777	MOV	#-1, @R1	;WRITE ALL ONES INTO RHAS
1849	006556	105711		TSTB	@R1	;TEST IT FOR ALL 0'S
1850	006562	011137	001126	MOV	@R1, @#SBDDAT	;BAD DATA
1851	006566	005037	001124	CLR	@#SGDDAT	;GOOD DATA
1852	006572	010137	004500	MOV	R1, @#REGADR	;FAILING REG. RHAS
1853	006576	104005		ERRUR	S	;RHAS DOES NOT CLEAR BY WRITING ALL
1854						;ONES INTO IT
1855						

E04

```

1856
1857
1858 006616 000005 RESET ; START WITH AN INIT
1859 006620 004737 037334 JSR PC, @#STKINT ; INITILIZE THE TTY KEYBOARD
1860
1861 006624 032777 020000 172306 BIT #SW13, @SWR ; INHIBIT ERROR TYPEOUT?
1862 006632 001026 BNE 4$ ; BRANCH IF YES
1863 006710 013701 002216 4$: MOV @#RHAS, R1 ; R1 HAS ADDR. OF RHAS
1864 006714 013702 002176 MOV @#RHCS2, R2 ; R2 HAS ADDR. OF RHCS2
1865 006720 005012 CLR @R2 ; CLEAR RHCS2
1866 006722 012700 000010 MOV #8, R0 ; COUNT
1867 006726 013704 002202 MOV @#RHER1, R4 ; R4 HAS ADDR. OF RHER1
1868 006732 012714 177777 1$: MOV #-1, @R4 ; MOVE ERRORS INTO RHER1
1869 006736 005212 INC @R2 ; INCREMENT UNIT NO.
1870 006740 005300 DEC R0 ; COUNT
1871 006742 001373 BNE 1$ ; BRANCH IF 8 NOT DONE
1872 006744 111137 004646 MOV @R1, @#TOTALAT ; SAVE TOTAL ATTENTION
1873
1874 006750 105037 004647 CLRB @#TOTALAT+1 ; USED IN DRIVE CLEAR TEST
1875 006754 105711 TSTB @R1 ; CLEAR UPPER BYTE
1876 006756 001402 BEQ 2$ ; TEST FOR ANY DRIVES PRESENT
1877 006760 000137 007342 JMP XE2 ; IF NONE THERE - SAY SO
1878
1879 006764 032777 020000 172146 2$: BIT #SW13, @SWR ; INHIBIT ERROR TYPE OUT?
1880 006772 001402 BFO 3$ ; BRANCH IF NO
1881 006774 000137 007700 JMP SELTST ; CHECK FOR SELECTED UNIT START AND LOAD
1882
1883
1884 007000 3$: ; "UNITS" TABLE WITH DESIRED DRIVE IF SO
1885
1886 007336 000137 032570 JMP @#SEOP ; GO OUT ----->
1887
1888
1889 ; *SET UP THE UNITS TABLE
1890
1891 007342 XE2:
1892 007342 012700 000010 2$: MOV #8, R0 ; COUNTER
1893 007346 012703 004576 MOV #UNITS, R3 ; POINTER
1894 007352 012723 177777 3$: MOV #-1, (R3)+ ; PRESET BLOCK TO ALL ONES
1895 007356 005300 DEC R0 ; COUNT
1896 007360 001374 BNE 3$ ; BRANCH IF 8 NOT DONE
1897 007362 012703 004576 MOV #UNITS, R3 ; POINTER
1898 007366 005005 CLR R5
1899 007370 005037 004620 CLR @#NUNIT ; NO. OF UNITS PRESENT
1900 007374 012700 000010 MOV #8, R0 ; COUNTER
1901 007400 011137 001176 MOV @R1, @#STMP0 ; TEMPORARY STORAGE
1902 007404 006037 001176 4$: ROR @#STMP0 ; SET CARRY IF ONE IN 0 BIT
1903 007410 103120 BCC 5$ ; CHECK NEXT UNIT IF ONE NOT IN BIT 0
1904
1905 007412 010577 172560 MOV R5, @RHCS2 ; INSERT UNIT NUMBER INTO UA BITS
1906 007416 022777 024020 172600 CMP #24020, @RHDT ; IS THIS A DUAL PORT RPO4 ?
1907 007424 001503 BEQ 6$ ; TYPE DRIVE NO. IF SO
1908 007426 022777 020020 172570 CMP #20020, @RHDT ; IS THIS A SINGLE PORT RPO4 ?
1909 007434 001477 BEQ 6$ ; TYPE NO. IF SO
1910
1911 007436 022777 024021 172560 CMP #24021, @RHDT ; IS THIS A DUAL PORT RPO5 ?
    
```



```

1945
1946
1947
1948 007750 005037 004644 CLR @#ATTENT ;CLEAR UNIT UNDER TEST ATTENTION
1949
1950 007754 005737 004616 TST @#UNIT ;IS THE "UNIT" = 0 ?
1951 007760 001107 BNE 20$ ;IF NOT, SKIP NEXT MODS
1952 007762 012700 000041 MOV @41,RO ;IF SO, CHECK THE LOAD MEDIA LOCATION
1953 007766 122710 000011 CMPB @11,(RO) ;WAS IT AN RPO4/5/6 ?
1954 007772 001102 BNE 20$ ;IF NOT, GO AHEAD AND TEST UNIT #0
1955 007774 005737 004626 TST @#SELECT ;WAS UNIT #0 SELECTED ?
1956 ;(IE. 210 START ?)
1957 010000 001006 BNE 19$ ;IF SO, CHANGE PACK
1958
1959 ;*INCREMENT THE UNITS TABLE TO NEXT DRIVE (IF ANY)
1960 ;*& DECREMENT "NOUNITS" PRESENT TO BE TESTED
1961
1962 010002 012700 004576 MOV @UNITS,RO ;IF NOT, LOAD THE UNITS TABLE POINTER
1963 010006 005720 TST (RO)+ ;SELECT THE NEXT UNIT IN TABLE
1964 ;(DOUBLE INCREMENT THE POINTER, RO)
1965 010010 022710 177777 CMP #-1,(RO) ;IS THERE ANOTHER TABLE ENTRY PRESENT ?
1966 010014 001065 BNE 18$ ;IF SO, USE NEXT DRIVE & DECR "NOUNITS"
1967 ;IF NOT, CHANGE PACK ON UNIT #0
1968
1969 010016 19$: HALT
1970 010164 000000 BR 20$ ;CONTINUE, USING SCRATCH PACK ON UNIT #0
1971 010166 000404
1972
1973 010170 011037 004616 18$: MOV (RO),@#UNIT ;SET UP NEW UNIT UNDER TEST
1974 010174 005337 004620 DEC @#NOUNITS ;DECR BECAUSE UNIT #0 WON'T BE TESTED
1975
1976 010200 013700 004616 20$: MOV @#UNIT,RO ;RO NOW CONTAINS UNIT NO
1977
1978
1979
1980
1981 010204 005037 004636 CLR @#RPO6 ;CLEAR RPO6 DEVICE TYPE FLAG
1982 010210 010077 171762 MOV RO,@RHCS2 ;SET UP UNIT ADDRESSING
1983 010214 022777 024022 172002 CMP #24022,@RHDT ;DUAL PORT RPO6 ?
1984 010222 001405 BEQ 2$ ;YES...SET FLAG
1985 010224 022777 020022 171772 CMP #20022,@RHDT ;SINGLE PORT RPO6 ?
1986 010232 001401 BEQ 2$ ;YES...SET FLAG
1987 010234 000403 BR 3$ ;DON'T SET RPO6 FLAG
1988 010236 012737 177777 004636 2$: MOV #-1,@#RPO6 ;SET THE FLAG
1989
1990 010244 3$: ;ASSUME THE NEXT UNIT IS AN RPO4/RPO5
1991
1992
1993 010244 116037 004566 004644 MOVB @TABLE(RO),@#ATTENT ;SET APPROPRIATE ATTENTION BIT
1994 010310 013746 004616 MOV @#UNIT,-(SP) ;UNIT NO. TO STACK
1995 010314 104405 TYPDS ;TYPE DRIVE NO.
    
```

```

1996
1997
1998
1999
2000 010406 022777 024020 171610 CMP #24020, @RHDT ;DUAL PORT RPO4 ?
2001 010414 001424 BEQ 4$ ;TYPE ASCII MESSAGE OUT
2002 010416 022777 020020 171600 CMP #20020, @RHDT ;SINGLE PORT RPO4 ?
2003 010424 001420 BEQ 4$ ;TYPE THE MESSAGE
2004
2005 010426 022777 024021 171570 CMP #24021, @RHDT ;DUAL PORT RPO5 ?
2006 010434 001433 BEQ 5$ ;TYPE THE MESSAGE
2007 010436 022777 020021 171560 CMP #20021, @RHDT ;SINGLE PORT RPO5 ?
2008 010444 001427 BEQ 5$ ;TYPE THE MESSAGE
2009
2010 010446 022777 024022 171550 CMP #24022, @RHDT ;DUAL PORT RPO6 ?
2011 010454 001442 BEQ 6$ ;TYPE THE MESSAGE
2012 010456 022777 020022 171540 CMP #20022, @RHDT ;SINGLE PORT RPO6 ?
2013 010464 001436 BEQ 6$ ;TYPE THE MESSAGE
2014
2015 010466 4$:
2016 010522 000435 BR 1$ ;SKIP NEXT ONES
2017 010524 5$:
2018 010560 000416 BR 1$ ;SKIP NEXT
2019 010562 6$:
2020
2021
2022
2023
2024 010616 005777 171404 1$: TST @RHSN ;READ SERIAL NO. AND DRIVE TYPE
2025 010622 005777 171376 TST @RHDT ;THESE TWO ARE TO HELP SCOPE LOOPS
2026 010626 017737 171374 002310 MOV @RHSN, @#SN ;SAVE TO CHECK IF DRIVE CLEAR CLEARS ANY BITS
2027 010634 017737 171364 002306 MOV @RHDT, @#DT ;SAVE TO CHECK IF DRIVE CLEAR CLEARS ANY BITS

```

2028  
2029  
2030  
2031  
2032  
2033  
2034  
2035  
2036  
2037  
2038

010652 004737 033066  
010656 032713 010000  
011100 032713 010000  
011104 001775

IS:

JSR PC, @CLDISK  
BIT #MOL, @R3  
BIT #MOL, @R3  
BEQ IS

;GIVE INITILIZE  
;CHECK MOL IN RHDS1  
;CHECK MOL IN RHDS1  
;WAIT IF MOL IS STILL LOW



```

2039
2040
2041 011204 012706 001000      MOV      #STACK,SP      ;RESET STACK
2042
2043 011214 013700 002166      MOV      @#RPVEC,RO     ;GET RP VECTOR ADDRESS
2044 011220 012720 011266      MOV      #RPTR1,(RO)+  ;THIS IS FOR TIMELY INTERRUPTS
2045 011224 012710 000340      MOV      #340,(RO)     ;RPO4 INTERRUPT SERVICE ROUTINE
2046                                     ;PRIORITY = 7
2047 011230 012737 000200 177776  MOV      #200,PS       ;SET PROCESSOR PRIORITY @ 4
2048 011236 012711 000300      MOV      #RDY!IE,@R1  ;RDY, IE IN RHSC1 SHOULD CAUSE INTERRUPT
2049
2050 011242 013737 033564 001200  MOV      @#TIMCNT,@#STMP1 ;COUNTER
2051 011250 005337 001200 15:    DEC      @#STMP1       ;WAIT FOR INTERRUPT
2052 011254 001375                                     BNE     15             ;BRANCH IF NOT ZERO
2053                                     ;BEFORE THIS IS ZERO INTERRUPT SHOULD OCCUR
2054 011256 104065      ERROR   65            ;INTERRUPT DID NOT OCCUR
2055 011260 012712 000040      MOV      #CLR,@R2     ;CLEAR CONTROLLER VIA CS2
2056
2057 011266 022626      RPTR1:  CMP      (SP)+,(SP)+ ;RESTORE STACK
2058 011270 022711 004200      CMP      #DVA!RDY,@R1 ;IE SHOULD BE LOW
2059 011276 104065      ERROR   65            ;INTERRUPT OCCURED BUT
2060                                     ;IE FAILED TO RESET
2061 011300 012712 000040      MOV      #CLR,@R2     ;CLEAR CONTROLLER

```

```

2062
2063
2064
2065 011314 012706 001000      MOV      #STACK,SP      ;RESET STACK
2066
2067 011324 013700 002166      MOV      @#RPVEC,RO      ;GET RP VECTOR ADDRESS
2068 011330 012720 011374      MOV      #RTRP2,(RO)+    ;THIS IS FOR UNTIMELY INTERRUPTS
2069 011334 012710 000340      MOV      #340,(RO)      ;RPO4 INTERRUPT SERVICE ROUTINE
2070                                ;PRIORITY = 7
2071 011340 012737 000240 177776  MOV      #240,PS        ;SET PROCESSOR PRIORITY = 5
2072 011346 012711 000300      MOV      #RDY!IE,@R1    ;RDY, IE IN RHSC1 WHOULD CAUSE INTERRUPT
2073
2074 011352 013737 033564 001200  MOV      @#TIMCNT,@#STMP1 ;COUNTER
2075 011360 005337 001200 1$:  DEC      @#STMP1        ;WAIT FOR INTERRUPT
2076 011364 001375                BNE      1$             ;BRANCH IF NOT ZERO
2077                                ;BEFORE THIS IS ZERO INTERRUPT WHOULD OCCUR
2078 011366 012712 000040      MOV      #CLR,@R2      ;CLEAR CONTROLLER
2079
2080 011374 022626                RTRP2:  CMP      (SP)+,(SP)+ ;RESTORE STACK
2081 011376 104065                ERROR  65              ;INTERRUPT OCCURRED WITH
2082                                ;PROCESSOR PRIORITY SAME AS DISK
2083 011400 012712 000040      MOV      #CLR,@R2      ;CLEAR CONTROLLER
2084
2085
2086
2087

```

L04

CZRJJ80, RPO4 5.6 FCTNL CTRLR2  
CZRJJ8.P11 10-NOV-77 11:20

MACY11 30(1046)  
T7

10-NOV-77 13:16 PAGE 50  
INTERRUPT AT PROCESSOR AND DISK PRIORITY SAME

SEG 0050

```

2088
2089
2090
2091
2092 011406 000005
2093 011410 004737 037334
2094 011414 012737 000000 177776
2095
2096
2097
2098
2099
2100
2101
2102
2103
2104
2105
2106
2107
2108 011644 104015
2109 011646 000207
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119 01165C
2120
2121
2122

```

; \*IN CASE THERE IS ANY DRIVE ERRORS DURING POWER UP  
; \*OR POWER DOWN OR ANY PARITY ERRORS A RESET IS GIVEN  
RESET  
JSR PC, 2#STKINT ;INITILIZE TK  
MOV #0, PS  
  
; \*NOW SAVE REGISTERS FOR COMPARISON AFTER PACK ACKNOWLEDGE  
  
  
; \*NOW COMPARE REGISTERS BEFORE PACK ACKNOWLEDGE  
; \*WITH AFTER PACK ACKNOWLEDGE  
  
15: ERROR 15  
RTS PC  
; GIVING A PACK ACKNOWLEDGE  
; CAUSED AN ERROR  
; PACK ACKNOWLEDGE SHOULD  
; SET VV IN RHDSI  
; INTERRUPT SHOULD MAKE  
; IE = 0  
; NO OTHER REGISTERS SHOULD  
; CHANGE  
; GOOD DATA GIVES CONTENTS  
; OF REGISTER BEFORE COMMAND  
; RECEIVED DATA GIVES CONTENTS  
; OF REGISTER AFTER COMMAND  
  
25:

M04

CZRJJBO RPO4/5/6 FCTNL CTRLR2  
CZRJJB.P11 10-NOV-77 11:20

MACY11 30(1046) 10-NOV-77 13:16 PAGE 51  
DATA TRANSFER RELATED ERRORS (USING MEDIA)

SEQ 0051

.SBTTL DATA TRANSFER RELATED ERRORS (USING MEDIA)

2125  
2126  
2127  
2128  
2129  
2130  
2131  
2132  
2133  
2134  
2135  
2136  
2137  
2138  
2139  
2140  
2141  
2142

011670 005737 004636  
011674 001412  
  
011720 000411  
  
011722  
011744

11S:  
12S:

;\*CHECK THE DRIVE TYPE AND THEN FILL THE  
;\*WRITE FROM BUFFER WITH APPROPRIATE HEADER  
1ST 2#RPO6 ;TEST FOR RPO6 DRIVE  
BEQ 11S ;TREAT UNIT AS AN RPO4  
;TREAT UNIT AS AN RPO6  
  
BR 12S ;CONTINUE WITH SET UP  
  
;\*FILL READ INTO BUFFER WITH ALL ONES

N04

```

2143
2144
2145
2146
2147 011756 005737 004636 TST 2#RPO6 ;TEST FOR RPO6 DRIVE
2148 011762 001412 BEQ 7$ ;TREAT UNIT AS RPO4
2149
2150 012006 000411 BR 8$ ;CONTINUE WITH TEST
2151
2152 012010 7$:
2153 012032 8$:
2154
2155
2156 ;*NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE
2157
2158
2159
2160 ;*TIME IS NOT CRITICAL HERE
2161
2162 ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE
2163
2164 ;*COMPARE ALL REGISTERS
2165
2166 012210 104045 1$: ERROR 45 ; WRITING ON THE LAST BLOCK
2167 012212 000207 RTS PC ; IE. CYLINDER 410./814., SECTOR 21
2168 ; TRACK 18 CAUSED
2169 ; IMPROPER REGISTER CHANGE
2170 ; GOOD DATA GIVES WHAT
2171 ; SHOULD BE THERE
2172 ; RECEIVED DATA GIVES WHAT
2173 ; WAS THERE AFTER WRITE
2174 ; ON LAST BLOCK

```

2175  
2176  
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2199  
2200  
2201  
2202  
2203  
2204  
2205  
2206  
2207  
2208  
2209  
2210  
2211  
2212  
2213  
2214  
2215  
2216  
2217  
2218  
2219  
2220  
2221  
2222

012214  
  
012244 005737 004636  
012250 001412  
  
012274 000411  
  
012276  
012320  
  
  
  
  
  
  
  
  
  
012476 104045  
012500 000207  
  
  
  
  
012502  
  
012523 104046  
012522 000207  
  
012524

2\$:  
  
  
  
  
  
  
  
  
  
9\$:  
10\$:  
  
  
  
  
  
  
  
  
  
3\$:  
  
  
  
  
  
  
  
  
  
4\$:  
  
5\$:  
  
6\$:

; \*NOW A READ DATA WILL BE DONE ON SAME CYLINDER, SECTOR & TRACK  
; \*CLEAR ANY PREVIOUS ERRORS  
; \*FILL WRITE FROM BUFFER WITH EXPECTED DATA  
; \*FIRST THE DRIVE TYPE IS CHECKED AND THEN THE APPROPRIATE  
; \*READ COMMAND IS LOADED  
TST 2#RPO6 ; TEST FOR RPO6 DRIVE  
BEQ 9\$ ; TREAT UNIT AS RPO4  
BR 10\$ ; CONTINUE WITH TEST  
  
; \*SAVE REGISTERS FOR COMPARISON AFTER READ DATA  
; \*TIME IS NOT CRITICAL HERE  
; \*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE  
  
; \*COMPARE ALL REGISTERS  
ERROR 45 ; READING ON LAST BLOCK IE.  
RTS PC ; CYLINDER 410./814., SECTOR 21, TRACK 18  
; CAUSED AN ERROR  
; GOOD DATA GIVES WHAT SHOULD  
; BE THERE  
; RECEIVED DATA GIVES WHAT  
; WAS THERE AFTER READ  
; FROM LAST BLOCK  
  
; \*READ DATA WILL BE COMPARED  
  
; DATA READ FROM  
; LAST BLOCK IN ERROR

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;\*GET HEADS TO CYLINDER 0

;\*FILL WRITE FROM BUFFER WITH HEADER

;\*FILL WRITE FROM BUFFER WITH DATA

;\*FILL WRITE FROM BUFFER WITH NEXT SECTOR HEADER

;\*FILL WRITE FROM BUFFER WITH NEXT SECTOR DATA

;\*CLEAR READ INTO BUFFER WITH DATA OTHER THAN EXPECTED DATA

;\*THE WRITE HEADER AND DATA WILL BE LOADED

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

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

;\*NOW CHANGE SAVE REGISTERS TO EXPECTED VALUES

;\*NOW COMPARE REGISTERS BEFORE WRITE HEADER AND DATA

;\*WITH REGISTERS AFTER COMMAND

013150 104027  
013152 000207

15:

ERROR 27 ;WRITE HEADER AND DATA  
RTS PC ;CAUSED IMPROPER REGISTER  
;CHANGE  
;GOOD DATA GIVES WHAT SHOULD  
;BE THERE  
;RECEIVED DATA GIVES WHAT  
;WAS THERE AFTER COMMAND

;\*NOW A SEARCH COMMAND WILL BE GIVEN  
;\*BUT BEFORE THAT ALL POSSIBLE REGISTERS  
;\*WILL BE FILLED FOR THE READ HEADER AND DATA SECTOR 1  
;\*AS THERE WILL NOT BE MUCH TIME BETWEEN THE  
;\*COMPLETION OF THE SEARCH AND THE SECTOR 1 COMING.

;\*FILL FOR THE READ HEADER AND DATA COMMAND WHICH WILL NOT  
;\*BE EXECUTED TILL AFTER THE SEARCH  
;\*THE SEARCH WILL ONLY LEAVE RHCSI AND RHDST  
;\*CHANGED ALL THE REST WILL BE UNCHANGED

013154

25:

;\*SAVE REGISTERS FOR COMPARISON NOT AFTER THE  
;\*SEARCH COMMAND BUT AFTER THE READ HEADER AND DATA

;\*NOW SAVE VALUES FOR RHCSI AND RHDST WHICH  
;\*WILL CHANGE AFTER THE SEARCH





```

2329
2330
2331 ;*GET THE HEADS TO CYLINDER 10
2332
2333 ;*FILL REGISTERS FOR READ HEADER AND DATA TO BE DONE AFTER SEARCH
2334
2335 ;*SAVE REGISTERS FOR COMPARISON AFTER SEARCH
2336 ;*AND READ HEADER AND DATA
2337
2338 ;*NOW GIVE THE SEARCH COMMAND
2339 013652 012777 014036 166306 MOV #3$ ,R1,RO ; INTERRUPT VECTOR SET TO 3$
2340 013670 013700 002334 MOV #SERCH,R0 ; EXPECTED CONTENTS OF RHCSI
2341 ; IMMEDIATELY AFTER GO
2342 013674 052700 004301 BIS #DVA!RDY!IE!GO,R0 ; EXPECTED BITS IN RHCSI
2343 013700 012705 010500 MOV #MOL!DPR!VV,R5 ; EXPECTED BITS IN RHDS1
2344 ; IMMEDIATELY AFTER GO
2345
2346 013720 021100 CMP #R1,R0 ; IS RHCSI GOOD
2347 013722 001413 BEQ 1$ ; BRANCH IF GOOD
2348 013724 011137 001126 MOV #R1,#$BDDAT ; BAD DATA FOR RHCSI
2349 013730 010037 001124 MOV R0,#$GDDAT ; GOOD DATA
2350 013734 010137 004500 MOV R1,#REGADR ; FAILING REGISTER RHCSI
2351 013740 012737 000340 000036 MOV #340,#TRAPVEC+2 ; TRAP PRIORITY = 7
2352 013746 104021 ERROR 21 ; DURING SEARCH COMMAND
2353 ; CONTENTS OF RHCSI WAS
2354 ; NOT AS EXPECTED
2355 013750 000414 BR 2$ ; IF LAST ERROR 21 OCCURRED
2356 ; THEN DO NOT CHECK RHDS1
2357 ; AS TOO MUCH TIME HAS
2358 ; PASSED
2359
2360 013752 021305 1$: CMP #R3,R5 ; IS RHDS1 GOOD
2361 013754 001412 BEQ 2$ ; BRANCH IF GOOD
2362 013756 011337 001126 MOV #R3,#$BDDAT ; BAD DATA FOR RHDS1
2363 013762 010537 001124 MOV R5,#$GDDAT ; GOOD DATA
2364 013766 010337 004500 MOV R3,#REGADR ; FAILING REGISTER RHDS1
2365 013772 012737 000340 000036 MOV #340,#TRAPVEC+2 ; TRAP PRIORITY = 7
2366 014000 104063 ERROR 63 ; DURING SEARCH COMMAND
2367 ; CONTENTS OF RHDS1 WAS
2368 ; IN CORRECT
2369
2370 014002 013737 002350 004650 2$: MOV #REFOR,#TMPD ; SAVE READ HEADER AND DATA
2371 014010 052737 000101 004650 BIS #IE!GO,#TMPD ; INCLUDE INTERRUPT ENABLE, GO
2372 014016 012737 000001 004656 MOV #1,#TMP5 ; SAVE TRACK 0, SECTOR 1
2373
2374 ;*THIS IS ONLY A WAIT LOOP
2375
2376 014036 012737 000200 000036 3$: MOV #200,#TRAPVEC+2 ; TRAP PRIORITY = 4
2377 014044 012737 000000 177776 MOV #0,PS ; SET PROSESSOR STATUS TO 0
2378 014052 013777 004656 166124 MOV #TMP5,#RHDS1 ; SET DESIRED SECTOR/TRACK
2379 ; REGISTER TO SECTOR 1, TRACK 0
2380
2381 014066 013711 004650 MOV #TMPD,R1 ; FILL RHCSI WITH READ COMMAND
2382 ; TOGETHER WITH INTERRUPT ENABLE
2383 ; AND GO
2384

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F05

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; \*TIME ALLOWED HERE IS CRITICAL ANY TIME ERROR  
; \*INDICATES WRONG SEARCH IN THE SEARCH COMMAND  
; \*WRITE FROM BUFFER WILL BE FILLED WITH EXPECTED DATA  
; \*CHANGE SAVED REGISTERS TO EXPECTED VALUES  
; \*COMPARE REGISTER BEFORE READ HEADER AND DATA  
; \*WITH REGISTERS AFTER COMMAND

014224 104031  
014226 000207

4\$:

ERROR 31  
RTS PC

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

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

014230

5\$:

014246 104053  
014250 000207

6\$:

ERROR 53  
RTS PC

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

014252

7\$:

G05

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:\* THE NEXT TEST REMOVES SECTOR 1 ON CYLINDER 0  
:\* TRACK0 AND PUTS SECTOR 0 THERE.  
:\* HENCE THE PACK IS UNFORMATTED FROM  
:\* THIS POINT ON TO THE TEST WHEN SECTOR  
:\* 1 IS REPLACED. IF TESTING IS STOPPED WITH  
:\* AN ERROR IN THE SECTION OF THE PROGRAM BETWEEN  
:\* THIS AND WHEN SECTOR 1 IS REPLACED THEN THE  
:\* DISK BEING USED MAY HAVE BEEN UNFORMATTED  
:\* IF THE LAST PASS OF THIS PROGRAM GIVES  
:\* NO ERRORS IN THIS SECTION THEN THE DISK  
:\* MAY NOT HAVE BEEN UNFORMATTED. HOWEVER IT  
:\* IS RECOMMENDED THAT AFTER A PASS OF THIS  
:\* PROGRAM THE DISK BE REFORMATTED.

;\*FILL WRITE FROM BUFFER WITH HEADER  
;\*FILL READ INTO BUFFER WITH ALL ONES  
  
;\*WRITE HEADER AND DATA IS LOADED  
;\*NOW SAVE REGISTERS FOR COMPARISON AFTER WRITE

;\*TIME IS NOT CRITICAL  
;\*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE  
;\*COMPARE ALL REGISTERS

014476 104027  
014500 000207

1\$: ERROR 27 ; WRITING HEADER AND DATA CAUSED  
RTS PC ; IMPROPER REGISTER CHANGE  
; GOOD DATA GIVES WHAT  
; SHOULD BE THERE  
; RECEIVED DATA GIVES WHAT  
; WAS THERE AFTER WRITE

H05

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014502

2\$:

; \*NOW A READ DATA WILL BE DONE ON CYLINDER=0, SECTOR=1,  
; \*TRACK=0  
; \*FILL WRITE FROM BUFFER WITH EXPECTED DATA

; \*READ COMMAND IS LOADED  
; \*SAVE REGISTERS FOR COMPARISON AFTER READ DATA

; \*TIME IS NOT CRITICAL  
; \*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE

014732 104047  
014734 000207

3\$:

; \*COMPARE ALL REGISTERS  
ERROR 47 ; READING ON NON EXISTANT SECTOR  
RTS PC ; CAUSED AN ERROR  
; GOOD DATA GIVES WHAT SHOULD  
; BE THERE  
; RECEIVED DATA GIVES WHAT  
; WAS THERE AFTER READ

; \*READ DATA WILL BE COMPARED

014736  
014754 104050  
014756 000207  
014760

4\$:  
5\$:  
6\$:

ERROR 50 ; DATA READ FROM NON  
RTS PC ; EXISTANT SECTOR CAUSED AN ERROR

105

CZRJJ80 RPO4 5.6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 60  
CZRJJ8.P11 10-NOV-77 11:20 T15

HEADER COMPARE ERROR - RHER1 BIT #7 (HCE)

SEQ 0060

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015206 104027  
015210 000207

15:

; \*FILL WRITE FROM BUFFER WITH HEADER AND DATA  
; \*FILL READ INTO BUFFER WITH ALL ONES  
; \*WRITE HEADER AND DATA IS LOADED  
; \*NOW SAVE REGISTERS FOR COMPARISON AFTER  
; \*WRITE HEADER AND DATA  
  
; \*TIME IS NOT CRITICAL  
; \*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUE  
; \*COMPARE ALL REGISTERS  
ERROR 27 ; WRITING HEADER AND DATA CAUSED  
RTS PC ; IMPROPER REGISTER CHANGE  
; GOOD DATA GIVES WHAT  
; SHOULD BE THERE  
; RECEIVED DATA GIVES WHAT  
; WAS THERE AFTER WRITE

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; *NOW A WRITE DATA WILL BE DONE ON SAME CYLINDER, SECTOR
; *TRACK
015212      2$:
; *FILL WRITE FROM BUFFER WITH DATA
; *WRITE DATA COMMAND IS LOADED
; *SAVE REGISTERS FOR COMPARISON AFTER WRITE DATA

; *TIME IS NOT CRITICAL
; *NOW CHANGE REGISTERS TO EXPECTED VALUE
TST      2#RH70      ; RUNNING ON RH70 ?
BEQ      9$          ; IF NOT, SKIP NEXT RH70 CODE
015326    005737    004640
015332    001421
015374    000416    BR      10$      ; SKIP NEXT RH11 CODE
015376      9$:
015432      10$:
; *COMPARE ALL REGISTERS
015542    104052    3$:  ERROR  52      ; WRITE DATA ON NON EXISTANT SECTOR
015544    000207      RTS      PC      ; CAUSED IMPROPER REGISTER CHANGE
; ATTEMPTED WRITE WAS ON
; CYLINDER 0 SECTOR 1 TRACK 0
; GOOD DATA GIVES WHAT SHOULD BE THERE
; RECEIVED DATA GIVES WHAT WAS THERE
; AFTER COMMAND

; *READ HEADER AND DATA SECTOR 1, TRACK 0, CYLINDER 0
; *WILL BE ATTEMPTED
015546      4$:
; *FILL WRITE FROM BUFFER WITH EXPECTED DATA
; *FILL READ INTO BUFFER WITH ALL ONES
; *FILL REGISTERS WITH READ HEADER AND DATA COMMAND
; *SAVE REGISTERS FOR COMPARISON AFTER READ
; *HEADER AND DATA

; *TIME IS NOT CRITICAL
; *CHANGE SAVED REGISTERS TO EXPECTED VALUE

```

K05

CZRJJBO RPO4.5.6 FCTNL CTRLR2  
CZRJJB.P11 10-NOV-77 11:20

MACY11 30(1046)  
T15

10-NOV-77 13:16 PAGE 62  
HEADER COMPARE ERROR - RHER1 BIT #7 (HCE)

SEQ 0062

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2579 ;*COMPARE REGISTERS BEFORE READ HEADER AND DATA
2580 ;*WITH AFTER
2581
2582 016062 104031 5$: ERROR 31 ; READ HEADER AND DATA WITH
2583 016064 000207 RTS PC ; FORCED HEADER COMPARE ERROR
2584 ; CAUSED ERROR
2585 ; GOOD DATA GIVES WHAT SHOULD
2586 ; BE THERE
2587 ; RECEIVED DATA GIVES WHAT
2588 ; WAS THERE AFTER READ
2589
2590 ;*NOW COMPARE READ DATA
2591 ;*THE COMMAND READ ONLY 204 WORDS, 4 HEADER WORDS
2592 ;*AND 200 DATA WORDS
2593
2594 016066 6$:
2595 016104 104034 7$: ERROR 34 ; DATA READ FROM A FORCED
2596 016106 000207 RTS PC ; HEADER COMPARE ERROR IS
2597 ; INCORRECT
2598 ; GOOD DATA GIVES WHAT
2599 ; THE READ HEADER AND DATA
2600 ; SHOULD HAVE READ
2601 ; BAD DATA GIVES WHAT
2602 ; WAS IN BUFFER AFTER
2603 ; READ COMMAND
2604 01611C 8$:
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;\*GET HEADS TO CYLINDER 0

;\*FILL REGISTERS FOR SEARCH

;\*SAVE REGISTERS FOR COMPARISON AFTER SEARCH

;\*CHANGE SAVED REGISTERS TO EXPECTED VALUE

;\*COMPARE REGISTERS BEFORE SEARCH WITH AFTER SEARCH

016436 104047

1\$:

ERROR 47

;SEARCH TO A NON-EXISTANT

016440 000207

RTS PC

;SECTOR CAUSED IMPROPER  
;REGISTER CHANGE  
;GOOD DATA GIVES WHAT SHOULD  
;BE THERE  
;RECEIVED DATA GIVES  
;WHAT WAS THERE AFTER  
;SEARCH

016442

2\$:



M05

CZRJJ80, RPO4/5/6 FCTNL CTRLR2  
CZRJJ8.P11 10-NOV-77 11:20

MACY11 30(1046)  
T17

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RESTORE SECTOR 1 CYLINDER 1 TRACK 1

SEQ 0064

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017002 104027  
017004 000207

15:

ERROR 27  
RTS PC

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

017006

25:

;\*NOW WRITE FROM BUFFER WILL BE CHECKED TO SEE THAT  
;\*NOTHER GOT CHANGED

017024 104030  
017026 000207

35:

ERROR 30  
RTS PC

;WRITE HEADER AND DATA  
;CHANGED WRITE FROM BUFFER

017030

45:

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

;\*NOW FILL COMMAND

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

;\*CHANGE SAVED REGISTERS TO EXPECTED VALUES

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

N05

CZRJJBO RPO4/5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 65  
CZRJJB.P11 10-NOV-77 11:20 T17 RESTORE SECTOR 1 CYLINDER 1 TRACK 1

SEQ 0065

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2700
2701 017302 104031          5S:  ERROR  31          : READ HEADER AND DATA CAUSED
2702 017304 000207          RTS    PC          : IMPROPER REGISTER CHANGE
2703                                     : GOOD DATA GIVES WHAT SHOULD
2704                                     : BE THERE
2705                                     : RECEIVED DATA GIVES WHAT WAS
2706                                     : THERE AFTER COMMAND
2707
2708                                     ; *NOW READ INTO BUFFER WILL BE CHECKED TO SEE
2709                                     ; *THE READ WAS GOOD
2710
2711 017306          6S:
2712
2713 017324 104032          7S:  ERROR  32          : WRITE HEADER AND DATA
2714 017326 000207          RTS    PC          : FOLLOWED BY A READ HEADER
2715                                     : AND DATA GAVE A READ ERROR
2716                                     : ERROR MAY BE IN READ OR WRITE
2717 017330          10S:
2718
2719
2720

```

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2727 017350 005737 004636
2728 017354 001411
2729
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2731 017376 000410
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2733 017400
2734 017420
2735
2736
2737
2738
2739
2740
2741
2742 017432 005737 004636
2743 017436 001412
2744
2745
2746
2747 017462 000411
2748 017464
2749 017506
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2768 017566 017737 162400 004512
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2770 017574 017737 162374 004514
2771
2772 017602 017737 162370 004516
2773
2774 017610 017737 162364 004520
2775
2776 017660 017737 162320 004524

```

```

; *CHECK THE DRIVE TYPE AND THEN FILL THE
; *WRITE FROM BUFFER WITH APPROPRIATE HEADER
TST    @#RPO6 ;TEST FOR RPO6 DRIVE
BEQ    5$      ;TREAT UNIT AS AN RPO4
                ;TREAT AS AN RPO6
BR     6$      ;CONTINUE WITH SET UP
5$:
6$:
; *FILL WRITE FROM BUFFER WITH DATA
; *THE DRIVE TYPE IS CHECKED AND THE APPROPRIATE
; *WRITE HEADER AND DATA COMMAND IS LOADED
TST    @#RPO6 ;TEST FOR RPO6 DRIVE
BEQ    3$      ;TREAT UNIT AS RPO4
                ;TREAT UNIT AS RPO6
BR     4$      ;CONTINUE WITH TESTING
3$:
4$:
; *NOW SAVE REGISTERS FOR COMPARISON AFTER
; *WRITE HEADER AND DATA
; *CHANGE THE SAVED REGISTERS TO EXPECTED VALUES
; *AS EXCEPTION IS ASSERTED BEFORE RUN IS LATCHED
; *RHWC, RHBA, RHCS1 & RHCS2 CANNOT BE PREDETERMINED -
; *THEY WILL VARY DEPENDING ON GATE DELAYS FOR DIFFERENT UNITS
MOV    @RHWC, @#SAVERE ;RHWC IS UNPREDICTABLE
                ;AS EXPLAINED ABOVE
MOV    @RHBA, @#SAVERE+2; RHBA IS UNPREDICTABLE
                ;AS EXPLAINED ABOVE
MOV    @RHCS2, @#SAVERE+4; RHCS2 IS UNPREDICTABLE
                ;AS EXPLAINED ABOVE
MOV    @RHCS1, @#SAVERE+6; RHCS1 IS UNPREDICTABLE
                ;AS EXPLAINED ABOVE
MOV    @RHDST, @#SAVERE+12; RHDST IS INDETERMINATE

```

```

2777 ;SO IT IS NOT CHECKED
2778
2779
2780 ;*COMPARE REGISTERS BEFORE ATTEMPTED WRITE WITH
2781 ;*CONTENTS AFTER ATTEMPTED WRITE WITH AN 'IAE' ERROR
2782
2783
2784 017704 104054 1S: ERROR 54 ;ATTEMPTED OPERATION WITH
2785 017706 000207 RTS PC ;INVALID ADDRESS CAUSED
2786 ;IMPROPER REGISTER CHANGE
2787 ;GOOD DATA GIVES WHAT SHOULD
2788 ;BE THERE
2789 017710 2S: ;RECEIVED DATA GIVES REGISTER
2790 ;CONTENTS AFTER ATTEMPTED
2791 ;WRITE HEADER AND DATA
2792

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020044 017737 162122 004512  
020052 017737 162116 004514  
020060 017737 162112 004516  
020066 017737 162106 004520  
020114 017737 162064 004524  
  
020162 104054  
020164 000207  
  
020166

1S:  
  
2S:

;  
;\*FILL WRITE FROM BUFFER WITH DATA  
;  
;\*WRITE DATA COMMAND WILL BE FILLED  
;  
;\*SAVE REGISTERS FOR COMPARISON AFTER ATTEMPTED WRITE DATA  
  
;  
;\*CHANGE SAVED REGISTERS TO EXPECTED VALUES  
  
;  
;\*AS EXCEPTION IS ASSERTED BEFORE RUN IS LATCHED  
;\*RHWC,RHBA,RHCS1,RHCS2 CANNOT BE PEREDETERMINED  
;\*THEY WILL VARY DEPENDING ON GATE DELAYS ON DIFFRENT UNITS  
MOV 2RHWC,2SAVERE ;RHWC IS UNPREDICTABLE  
;AS EXPLAINED ABOVE  
MOV 2RHBA,2SAVERE+2 ;RHBA IS UNPREDICTABLE  
;AS EXPLAINED ABOVE  
MOV 2RHCS2,2SAVERE+4 ;RHCS2 IS UNPREDICTABLE  
;AS EXPLAINED ABOVE  
MOV 2RHCS1,2SAVERE+6 ;RHCS1 IS UNPREDICTABLE  
;AS EXPLAINED ABOVE  
MOV 2RHDS1,2SAVERE+12 ;RHDS1 IS INDETERMINATE SO IT IS NOT CHECKED  
  
;  
;\*COMPARE REGISTERS BEFORE ATTEMPTED WRITE DATA  
;\*WITH AFTER ATTEMPT, IAE SHOULD BE SET  
ERROR 54 ;ATTEMPTED WRITE DATA  
RTS PC ;WITH INVALID ADDRESS  
;CAUSED IMPROPER REGISTER  
;CHANGE  
;GOOD DATA GIVES WHAT  
;SHOULD BE THERE  
;RECEIVED DATA GIVES WHAT  
;WAS THERE AFTER AFTER ATTEMPT

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2888

;\*GET THE HEADS TO CYLINDER 10

;\*FILL READ INTO BUFFER WITH 125252

;\*THE READ HEADER AND DATA COMMAND IS FILLED

;\*SAVE REGISTERS FOR COMPARISON AFTER ATTEMPTED READ

;\*CHANGE SAVED REGISTERS TO EXPECTED VALUES

;\*AS EXCEPTION IS ASSERTED BEFORE RUN IS LATCHED  
;\*RHWC, RHBA, RHCS1, RHCS2, CANNOT BE PEREDETERMINED  
;\*THEY WILL VARY DEPENDING ON GATE DELAYS ON DIFFRENT UNITS

020402 017737 161564 004512  
020410 017737 161560 004514  
020416 017737 161554 004516  
020424 017737 161550 004520  
020452 017737 161526 004524

MOV @RHWC, @SAVERE ;RHWC IS UNPREDICTABLE  
;AS EXPLAINED ABOVE  
MOV @RHBA, @SAVERE+2 ;RHBA IS UNPREDICTABLE  
;AS EXPLAINED ABOVE  
MOV @RHCS2, @SAVERE+4 ;RHCS2 IS UNPREDICTABLE  
;AS EXPLAINED ABOVE  
MOV @RHCS1, @SAVERE+6 ;RHCS1 IS UNPREDICTABLE  
;AS EXPLAINED ABOVE  
MOV @RHDST, @SAVERE+12 ;RHDST IS INDETERMINATE SO IT IS NOT CHECKED

;\*COMPARE REGISTERS BEFORE ATTEMPTED READ HEADER  
;\*AND DATA WITH AFTER ATTEMPTED READ

020520 104054  
020522 000207

1\$: ERROR 54 ;ATTEMPTED READ HEADER  
RTS PC ;AND DATA WITH INVALID  
;ADDRESS CAUSED IMPROPER  
;REGISTER CHANGE  
;GOOD DATA GIVES WHAT  
;SHOULD BE THERE  
;RECEIVED DATA GIVES  
;REGISTER CONTENTS  
;AFTER ATTEMPTED  
;READ

020524 2\$:

F06

```

2889
2890
2891 ;*FILL READ INTO BUFFER WITH 125252
2892
2893 ;*THE READ HEADER AND DATA COMMAND IS FILLED
2894
2895 ;*SAVE REGISTERS FOR COMPARISON AFTER ATTEMPTED READ
2896
2897
2898
2899
2900
2901 ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES
2902 020700 017737 161300 004524 MOV @RHDST,@SAVERE+12;RHDST IS UNPREDICTABLE
2903
2904 ;*COMPARE REGISTERS BEFORE ATTEMPTED READ
2905 ;*DATA WITH AFTER ATTEMPTED READ DATA
2906
2907 020766 104054 1$: ERROR 54 ; ATTEMPTED READ
2908 020770 000207 RTS PC ; DATA WITH INVALID
2909 ; ADDRESS CAUSED IMPROPER
2910 ; REGISTER CHANGE
2911 ; GOOD DATA GIVES WHAT
2912 ; SHOULD BE THERE
2913 ; RECEIVED DATA GIVES
2914 ; REGISTERS CONTENTS
2915 ; AFTER ATTEMPTED
2916 ; READ
2917 020772 2$:
2918

```

G06

CZRJJ80, RPO4, 5.6 FCTNL CTRLR2  
CZRJJ8.P11 10-NOV-77 11:20

MACY11 30(1046)  
T23

10-NOV-77 13:16 PAGE 71  
INVALID ADDRESS ERROR - RHER1 (BIT #10)IAE

SEQ 0071

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2974

;\*FILL WRITE FROM BUFFER WITH HEADER

;\*FILL WRITE FROM BUFFER WITH DATA

;\*THE FIRST WRITE OPERATION IS DONE  
;\*FILL WRITE HEADER AND DATA COMMAND

;\*CHECK THE DRIVE TYPE AND DO THE  
;\*APPROPRIATE SECOND WRITE OPERATION

;\*FILL WRITE FROM BUFFER WITH HEADER

021140 005737 004636  
021144 001411

TST 0#RPO6 ;TEST FOR RPO6 DRIVE  
BEQ 15\$ ;TREAT DRIVE AS AN RPO4  
;TREAT AS AN RPO6

021166 000410

BR 16\$ ;CONTINUE WITH THE SECOND WRITE

021170  
021210

15\$:  
16\$:

;CONTINUE WRITE

;\*FILL WRITE FROM BUFFER WITH DATA - 65125

;\*CHECK THE DRIVE TYPE AND  
;\*FILL WRITE FROM BUFFER WITH APPROPRIATE NEXT HEADER

;\*THIS IS A NON EXISTANT HEADER AND SHOULD NOT BE WRITTEN  
;\*SINCE 'AOE' SHOULD INHIBIT THE WRITE OPERATION

021222 005737 004636  
021226 001411

TST 0#RPO6 ;TEST FOR RPO6 DRIVE  
BEQ 17\$ ;TREAT UNIT AS AN RPO4  
;TREAT AS AN RPO6

021250 000410

BR 18\$ ;CONTINUE WITH TEST

021252  
021272

17\$:  
18\$:

;CONTINUE

;\*FILL WRITE FROM BUFFER WITH DATA FOR NEXT SECTOR

;\*CHECK THE DRIVE TYPE AND DO THE APPROPRIATE  
;\*FILL WRITE HEADER AND DATA COMMAND



# H06

CZRJJB, RPO4.5/6 FCTNL CTRLR2  
CZRJJB.P11 10-NOV-77 11:20

MACY11 30(1046)  
T24

10-NOV-77 13:16 PAGE 72  
ADDRESS OVERFLOW ERROR - RHER1 (BIT#9) AOE

SEG 0072

```
2975  
2976 021304 005737 004636 TST 2#RPO6 ;TEST FOR RPO6 DRIVE  
2977 021310 001412 BEQ 7$ ;TREAT UNIT AS AN RPO4  
2978 ;TREAT UNIT AS AN RPO6  
2979  
2980 021334 000411 BR 8$  
2981 021336 7$:  
2982 021360 8$:  
2983  
2984 ;*SAVE REGISTERS FOR COMPARISON AFTER WIRTE HEADER AND DATA  
2985  
2986  
2987  
2988  
2989  
2990 ;*CHANGE SAVED REGISTERS TO EXPECTED VALUES  
2991  
2992 ;*CHECK DEVICE TYPE BEFORE SETTING UP 'RHCA' & 'RHCC'  
2993  
2994  
2995 021562 005737 004636 TST 2#RPO6 ;TEST FOR RPO6 DRIVE  
2996 021566 001411 BEQ 9$ ;TREAT AS RPO4  
2997 ;TREAT AS RPO6  
2998 021610 000410 BR 10$ ;CONTINUE WITH TEST  
2999 021612 9$:  
3000 021632 10$:  
3001  
3002  
3003  
3004 021632 017737 160346 004524 MOV 2#RHDST,2#SAVERE+12 ;RHDST IS UNPREDICTABLE  
3005  
3006 ;*COMPARE REGISTERS BEFORE WRITE HEADER AND DATA WITH AFTER  
3007  
3008 021656 104055 1$: ERROR 55 ;WRITING HEADER AND DATA WITH  
3009 021660 000207 RTS PC ;EXPECTED ADDRESS OVERFLOW ERROR  
3010 ;CAUSED IMPROPER REGISTER  
3011 ;CHANGE  
3012 ;GOOD DATA GIVES WHAT SHOULD  
3013 ;BE THERE  
3014 ;RECEIVED DATA GIVES WHAT  
3015 ;WAS THERE AFTER WRITE  
3016 ;HEADER AND DATA  
3017
```

```

3018
3019
3020
3021
3022
3023
3024 021662          2$:
3025
3026
3027 021666 005737 004636  TST  2#RPO6 ;TEST FOR RPO6 DRIVE
3028 021672 001411          BEQ  19$      ;TREAT UNIT AS AN RPO4
3029                          ;TREAT AS AN RPO6
3030
3031 021714 000410          BR   20$      ;CONTINUE WITH TEST
3032
3033
3034 021716          19$:
3035 021736          20$:
3036
3037
3038
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3044
3045
3046
3047
3048
3049 022000 005737 004636  TST  2#RPO6 ;TEST FOR RPO6 DRIVE
3050 022004 001412          BEQ  11$      ;TREAT UNIT AS AN RPO4
3051                          ;TREAT UNIT AS AN RPO6
3052 022030 000411          BR   12$      ;CONTINUE
3053 022032          11$:
3054 022054          12$:
3055
3056
3057
3058
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3060
3061
3062
3063
3064
3065
3066
3067
3068 022230 005737 004636  TST  2#RPO6 ;TEST FOR RPO6 DRIVE
3069 022234 001405          BEQ  13$      ;TREAT UNIT AS AN RPO4
3070                          ;TREAT UNIT AS AN RPO6
3071 022246 000404          BR   14$      ;CONTINUE
3072 022250          13$:
3073 022260          14$:

```

```

; *NOW PREPARE TO DO A READ HEADER AND DATA
; *(THE FIRST READ OPERATION)

; *CHECK THE DRIVE TYPE AND FILL
; *WRITE FROM BUFFER WITH APPROPRIATE EXPECTED HEADER

; *FILL WRITE FROM BUFFER WITH EXPECTED DATA
; *FILL WRITE FROM BUFFER WITH 377 FROM WORDS 261 TO 266
; *CLEAR READ INTO BUFFER

; *CHECK THE DRIVE TYPE AND DO THE APPROPRIATE
; *FILL READ HEADER AND DATA COMMAND

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

; *CHANGE          SAVED REGISTERS TO EXPECTED VALUES
; *CHECK DRIVE TYPE BEFORE SETTING UP 'RHCA'

```

# J06

CZRJJ80 RPO4 5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 74  
CZRJJ8.P11 10-NOV-77 11:20 T24 ADDRESS OVERFLOW ERROR - RHER1 (BIT#9) AOE

SEQ 0074

```
3074
3075
3076 022266 017737 157712 004524      MOV    @RHDST,@#SAVERE+12 ;RHDST IS UNPREDICTABLE
3077
3078                                     ;*COMPARE REGISTERS BEFORE READ HEADER AND DATA WITH
3079                                     ;*REGISTERS AFTEP COMMAND
3080
3081 022312 104055      3$:      ERROR  55      ;READING HEADER AND DATA WITH
3082 022314 000207      RTS    PC      ;EXPECTED ADDRESS OVERFLOW
3083                                     ;ERROR CAUSED IMPROPER
3084                                     ;REGISTER CHANGE
3085                                     ;GOOD DATA GIVES WHAT SHOULD
3086                                     ;BE THERE
3087                                     ;RECEIVED DATA GIVES WHAT
3088                                     ;WAS THERE AFTER COMMAND
3089
3090                                     ;*NOW COMPARE THE DATA READ
3091 022316      4$:
3092
3093 022334 104056      5$:      ERROR  56      ;DATA READ WITH AN EXPECTED
3094 022336 000207      RTS    PC      ;ADDRESS OVERFLOW ERROR
3095                                     ;IS INCORRECT
3096                                     ;WORD NO 1 TO 260 SHOULD
3097                                     ;BE READ CORRECTLY
3098                                     ;WORD NO 261 TO 266 SHOULD
3099                                     ;NOT CHANGE DUE TO THE READ
3100 022340      6$:
3101
```



L06

CZRJJBC, RPO4/5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 76  
CZRJJ5.P11 10-NOV-77 11:20 T24 ADDRESS OVERFLOW ERROR - RHER1 (BIT#9) AOE

SEQ 0076

3157  
3158  
3159  
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3163  
3164  
3165  
3166  
3167  
3168  
3169  
3170

;  
; \*FIRST WRITE HEADER AND DATA CYLINDER 0, TRACK 0, SECTOR 0  
; \*FILL WRITE FROM BUFFER WITH HEADER  
;  
; \*FILL WRITE FROM BUFFER WITH DATA  
;  
; \*FILL COMMAND

M06

```

3171
3172 ;*NOW PREPARE TO WRITE WITH WRONG FORMAT
3173
3174 ;*FILL WRITE FROM BUFFER
3175
3176 ;*FILL WRITE DATA COMMAND
3177
3178 ;*SAVE REGISTERS FOR COMPARISON AFTER ATTEMPTED WRITE DATA
3179 ;*WITH WRONG FORMAT
3180
3181
3182
3183
3184
3185 ;*CHANGE SAVED REGISTERS TO EXPECTED VALUE
3186 023074 005737 004640 1ST 0RH70 ;RH70 CONTROLLER ?
3187 023100 001411 BEQ 7S ;IF NOT, SKIP NEXT RH70 CODE
3188
3189 023122 000+10 BR 8S ;SKIP NEXT RH11 CODE
3190
3191
3192
3193 023124 7S:
3194
3195 023144 8S:
3196
3197
3198
3199 ;*COMPARE REGISTERS BEFORE WRITE DATA WITH AFTER ATTEMPT
3200
3201 023312 104057 1S: ERROR 57 ;ATTEMPTING TO WRITE DATA
3202 023314 000207 RTS PC ;WITH WRONG FORMAT BIT CAUSED
3203 ;IMPROPER REGISTER CHANGE
3204 ;GOOD DATA GIVES WHAT SHOULD
3205 ;BE THERE
3206 ;RECEIVED DATA GIVES WHAT WAS
3207 ;THERE AFTER ATTEMPTED WRITE
3208
3209 ;*NOW PREPARE TO READ WITH CORRECT FORMAT TO CHECK
3210 ;*THAT NOTHING GOT WRITTEN
3211 023316 2S:
3212 ;*FILL WRITE FROM BUFFER WITH EXPECTED DATA
3213
3214 ;*FILL READ INTO BUFFER WITH 125252
3215
3216 ;*FILL COMMAND TO READ DATA
3217
3218 ;*SAVE REGISTERS FOR COMPARISON AFTER NORMAL READ
3219
3220
3221
3222
3223
3224 ;*CHANGE SAVED REGISTERS TO EXPECTED VALUE
3225
3226

```

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3227
3228
3229
3230
3231 023540 104033
3232 023542 000207
3233
3234
3235
3236
3237
3238
3239
3240
3241
3242 023544
3243
3244 023562 104034
3245 023564 000207
3246
3247
3248 023566
3249

```

```

; *COMPARE REGISTERS BEFORE READ WITH AFTER
3$: ERROR 33 ; READ DATA AFTER AN
RTS PC ; ATTEMPTED WRITE WITH WRONG
; IMPROPER REGISTER CHANGE
; FORMAT CAUSED
; GOOD DATA GIVES WHAT SHOULD
; BE THERE
; RECEIVED DATA GIVES WHAT
; WAS THERE AFTER READ

; *COMPARE DATA READ AFTER ATTEMPTED WRITE WITH
; *WRONG FORMAT BIT
4$:
5$: ERROR 34 ; DATA READ AFTER AN ATTEMPT
RTS PC ; TO WRITE WITH WRONG FORMAT
; WAS INCORRECT
6$:

```

```

3250
3251 ;*FILL WRITE FROM BUFFER WITH 107070
3252
3253 ;*FILL READ INTO BUFFER WITH 107070
3254
3255 ;*FILL COMMAND TO READ WITH WRONG FORMAT
3256
3257 ;*SAVE REGISTERS FOR COMPARAISON AFTER READ
3258
3259
3260
3261
3262
3263 ;*CHANGE SAVED REGISTERS TO EXPECTED VALUE
3264
3265
3266
3267
3268 ;*COMPARE REGISTERS BEFORE WRITE DATA WITH AFTER ATTEMPT
3269
3270 024066 104057 1S: ERROR 57 ; ATTEMPTING TO READ DATA
3271 024070 000207 RTS PC ; WITH WRONG FORMAT BIT CAUSED
; IMPROPER REGISTER CHANGE
; GOOD DATA GIVES WHAT SHOULD BE
; THERE
; RECEIVED DATA GIVES WHAT WAS THERE
; AFTER READ DATA
3272
3273
3274
3275
3276
3277
3278 ;*COMPARE READ INTO BUFFER TO CHECK THAT NOTHING WAS READ
3279 024072 2S:
3280
3281 024110 104034 3S: ERROR 34 ; ATTEMPT TO READ
3282 024112 000207 RTS PC ; WITH WRONG FORMAT BIT
; CHANGED READ INTO BUFFER
; GOOD DATA GIVES WHAT SHOULD
; BE THERE
; BAD DATA GIVES WHAT WAS
; THERE AFTER READ DATA
3283
3284
3285
3286
3287
3288
3289 024114 4S:
3290

```



```

3291
3292 024134 012737 002200 004650 MOV #RHCS1,2#TMP0 ;FIRST REGISTER TO BE TESTED
3293 024142 012737 000007 004656 MOV #7,2#TMP5 ;NUMBER OF REGISTERS TO BE TESTED
3294
3295 ;*PREPARE TO WRITE HEADER AND DATA CYLINDER 1, TRACK 0, SECTOR 0
3296 ;*FILL WRITE FROM BUFFER WITH HEADER
3297
3298 024150 ST22:
3299
3300 ;*FILL WRITE FROM BUFFER WITH DATA
3301 ;*FILL COMMAND
3302
3303
3304
3305
3306 ;*TIME IS NOT IMPORTANT
3307
3308 ;*NOW BRING THE HEADS TO CYLINDER 0
3309
3310
3311
3312
3313
3314
3315 ;*PREPARE FOR A READ DATA
3316
3317 ;*FILL WRITE FROM BUFFER WITH EXPECTED DATA FROM READ
3318
3319 ;*FILL READ INTO BUFFER WITH DATA OTHER THAN WHAT IS EXPECTED
3320 ;*FILL READ DATA COMMAND
3321
3322 ;*SAVE REGISTERS FOR COMPARISON AFTER ATTEMPTED WRITE
3323 ;*INTO A REGISTER WHILE THE READ IS GOING ON
3324
3325
3326
3327
3328 024500 013700 004650 MOV 2#TMP0,RO ;SET UP RO FOR WRITE
3329 024504 012730 002006 MOV #BIT1!BIT2!BIT10,2(RO)+ ;ATTEMPT TO WRITE INTO
3330 ;REGISTERS DURING IMPLIED SEEK
3331 024510 010037 004650 MOV RO,2#TMP0 ;SAVE OFF RO
3332
3333 ;*NOW RMP IS SET BUT THE COMPLETION OF READ MUST BE
3334 ;*WAITED ON
3335
3336
3337 ;*CHANGE SAVED REGISTERS TO EXPECTED VALUE
3338
3339 ;*COMPARE REGISTERS BEFORE READ DATA WITH REGISTERS
3340 ;*AFTER READ AND ATTEMPTED MODIFICATION OF REGISTER
3341
3342 024666 25:
3343 024670 013700 004650 MOV 2#TMP0,RO ;GET REGISTER BEEING MODIFIED + 2 POINTER
3344 024674 014037 001122 MOV -(RO),2#SBDADR ;GET ADDRESS OF REGISTER BEING MODIFIED
3345 024700 104060 ERROR 60 ;ATTEMPTING TO MODIFY REGISTER
3346 024704 000207 RTS PC ;DURING A READ COMMAND CAUSED
  
```



E07

CZRJJ80 RPO4 5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 82  
 CZRJJ8.P11 10-NOV-77 11:20 T30

REGISTER MODIFICATION REFUSED - RHER1 (BIT #2), 'RMR'

SEQ 0082

```

3362
3363 024764 012737 002200 004650 MOV #RHCS1,@#TMP0 ;FILL REGISTER TO BE MODIFIED
3364 024772 012737 000007 004656 MOV #7,@#TMP5 ;NUMBER OF REGISTERS TO BE TESTED
3365
3366 ;*PREPARE TO WRITE HEADER AND DATA
3367
3368 025000 ST24:
3369
3370
3371 ;*FILL WRITE FROM BUFFER WITH HEADER
3372
3373 ;*FILL WRITE FROM BUFFER WITH DATA
3374
3375 ;*FILL WRITE FROM BUFFER WITH NEXT SECTOR HEADER
3376
3377 ;*FILL WRITE FROM BUFFER WITH WITH NEXT SECTOR DATA
3378
3379 ;*NOW THE WRITE HEADER AND DATA COMMAND WILL BE FILLED
3380
3381
3382
3383
3384 ;*ONE REVOLUTION=16670 MICRO SEC, ONE SECTOR=760 MICRO SEC
3385
3386 ;*NOW PREPARE FOR THE WRITE DATA COMMAND
3387
3388 ;*FILL WRITE FROM BUFFER WITH 256 OF 2000 AND 4 OF 2001
3389
3390 ;*FILL WRITE DATA COMMAND
3391
3392 ;*SAVE REGISTERS FOR COMPARISON AFTER ATTEMPTED
3393 ;*REGISTER MODIFICATION DURING A WRITE DATA
3394
3395
3396
3397
3398 025274 013700 004650 MOV @#TMP0,RO ;SET RO TO REG ADDRESS
3399 025300 012730 002002 MOV #BIT1!BIT10,@(RO)+ ;ATTEMPT TO WRITE INTO A REGISTER
3400 ;DURING WRITE DATA
3401 025304 010037 004650 MOV RO,@#TMP0 ;SAVE OFF NEW REG ADDRESS
3402
3403 ;*NOW RMR MUST BE SET BUT THE COMPLETION OF
3404 ;*WRITE DATA MUST BE WAITED ON
3405
3406
3407 ;*CHANGE SAVED REGISTERS TO EXPECTED VALUE
3408
3409 ;*COMPARE REGISTERS BEFORE WRITE DATA WITH REGISTERS
3410 ;*AFTER WRITE AND ATTEMPTED MODIFICATION OF REGISTER
3411
3412 025462 2$:
3413 025464 013700 004650 MOV @#TMP0,RO ;GET REGISTER BEEING MODIFIED + 2 POINTER
3414 025470 014037 001122 MOV -(RO),@#SBDADR ;GET ADDRESS OF REGISTER BEING MODIFIED
3415 025474 104060 ERROR 60 ;ATTEMPTING TO MODIFY REGISTER
3416 025500 000207 RTS PC ;DURING A WRITE COMMAND CAUSED
3417 ;IMPROPER REGISTER GIVES WHAT SHOULD

```

# F07

```

3418                                     ;GOOD DATA GIVES WHAT SHOULD
3419                                     ;BE THERE
3420                                     ;RECEIVED DATA GIVES WHAT WAS
3421                                     ;THERE AFTER REFO
3422
3423 025502          3$:      ;*CLEAR ALL ERROR FLAGS
3424
3425                                     ;*FILL WRITE FROM BUFFER WITH EXPECTED DATA
3426
3427                                     ;*NOW THE READ DATA COMMAND WILL BE FILLED
3428
3429                                     ;*NOW SAVE REGISTERS FOR COMPARISON AFTER READ DATA COMMAND
3430
3431
3432
3433
3434
3435                                     ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
3436
3437
3438                                     ;*NOW COMPARE REGISTERS BEFORE READ DATA WITH
3439                                     ;*AFTER COMMAND
3440
3441 025766 104033          4$:      ERROR   33      ;READ DATA CAUSED IMPROPER REGISTER
3442 025770 000207          RTS       PC          ;CHANGE
3443                                     ;GOOD DATA GIVES WHAT SHOULD BE THERE
3444                                     ;RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND
3445                                     ;*NOW READ INTO BUFFER WILL BE CHECKED TO SEE THAT READ
3446                                     ;*WAS GOOD
3447 025772          5$:
3448
3449 026010 104034          6$:      ERROR   34      ;READ DATA ERROR AFTER A WRITE DATA
3450 026012 000207          RTS       PC          ;WITH REGISTER MODIFICATION
3451                                     ;WITHIN THE WRITE DATA
3452                                     ;*IF ALL 7 REGISTERS NOT COMPLETE THEN REPEAT
3453 026014 005337 004656  ST28:    DEC      2#TMP5  ;COUNT DOWN
3454 026020 001002          BNE      1$      ;BRANCH IF 7 NOT DONE
3455 026026 000137 025000          JMP      ST24  ;JUMP TO BEGINING OF TEST
3456

```

G07

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3457
3458
3459
3460
3461
3462
3463
3464
3465
3466
3467
3468 026172 012777 177777 154016 MOV # -1, @RHAS ;WRITE INTO RHAS THIS SHOULD
3469 ;NOT SET RMR
3470
3471 ;*TIME IS NOT IMPORTANT
3472
3473 ;*NOW CHANGE SAVED REGISTERS TO EXPECTED VALUES
3474
3475 ;*NOW COMPARE REGISTERS BEFORE READ DATA WITH
3476 ;*AFTER COMMAND
3477
3478 026350 104033 1$: ERROR 33 ;READ DATA CAUSED IMPROPER REGISTER
3479 026352 000207 RTS PC ;CHANGE
3480 ;GOOD DATA GIVES WHAT SHOULD BE THERE
3481 ;RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND
3482 ;*NOW READ INTO BUFFER WILL BE CHECKED TO SEE THAT READ
3483 ;*WAS GOOD
3484 026354 2$:
3485
3486 026372 104034 3$: ERROR 34 ;READ DATA ERROR AFTER WRITING INTO
3487 026374 000207 RTS PC ;RHAS DURING READ
3488
3489 026376 4$:
  
```

```

3490
3491
3492 026416 005737 004640      TST      2#RH70      ;RH70 CONTROLLER ?
3493 026422 001402              BEQ      30$        ;SKIP NEXT IF NOT = 1
3494 026430
3495
3496              ;*GENERATE ILLEGAL FUNCTION
3497
3498 026430 005037 001200      CLR      2#STMP1    ;GET READY TO MAKE ILLEGAL FUNCTION
3499 026434 012700 002322      MOV      #FUTABL,RO ;GET POINTER TO BEGINNING OF COMMANDS
3500 026440 012705 000021      MOV      #17,R5    ;COUNTER (17 GOOD FUNCTIONS)
3501 026444 023720 001200      CMP      2#STMP1,(RO)+ ;IS THIS A LEGAL FUNCTION
3502 026450 001004              BNE      3$        ;BRANCH IF NOT LEGAL
3503 026452 062737 000002 001200      ADD      #2,2#STMP1 ;MAKE ANOTHER FUNCTION
3504 026460 000765              BR       1$        ;GET READY TO TEST NEW FUNCTION
3505 026462 005305              DEC      R5        ;NOT LEGAL SO DECREMENT COUNTER
3506 026464 001367              BNE      2$        ;BRANCH IF 17 NOT DONE
3507 026466 032737 000100 001200      BIT      #100,2#STMP1 ;ALL BITS UP TO BIT #5 COMPARED?
3508 026474 001001              BNE      20$       ;BRANCH OUT IF DONE
3509 026476 000402              BR       19$       ;BRANCH TO CONTINUE
3510 026500 000137 027224      JMP      2#7$      ;DONE
3511 026504 013737 001200 002364      MOV      2#STMP1,2#ILLEGL ;AN ILLEGAL FUNCTION IS FOUND
3512 026512 062737 000002 001200      ADD      #2,2#STMP1 ;GET READY FOR NEW FUNCTION NEXT TIME
3513
3514              ;*ILLEGAL FUNCTION HAS BEEN FOUND
3515              ;*IT IS IN 'ILLEGL'
3516 026520 012737 026526 001110      MOV      #4$,2#SLPERR ;ERROR RETURN POINT
3517
3518              ;*SAVE REGISTERS FOR COMPARISON AFTER GO
3519
3519 026526              4$:
3520 026532 005077 153434      CLR      2#RHWC    ;CLEAR WORD COUNT
3521 026536 005077 153432      CLR      2#RHBA    ;CLEAR BUS ADDRESS
3522 026542 023727 002364 000050      CMP      2#ILLEGL,#50 ;50 AND HIGHER FUNCTIONS ARE DATA
3523              ;FUNCTIONS WHICH WILL SET MXF AND TRE
3524 026550 103014      BHIS     13$      ;BRANCH IF ILLEGL IS HIGHER THAN 50
3525 026552 012737 100000 027126      MOV      #SC,2#11$+12 ;EXPECTED VALUE OF RHCS1 SHOULD HAVE
3526              ;ONLY SC ADDED
3527 026560 005037 027150      CLR      2#12$+12 ;EXPECTED VALUE OF RHCS2 SHOULD HAVE
3528              ;NOTHING ADDED
3529 026564 005037 027154      CLR      2#12$+16 ;NO BITS TO BE CLEARED IN RHCS2
3530 026570 005037 027164      CLR      2#15$+6   ;RHBA SHOULD BE 0
3531 026574 005037 027174      CLR      2#16$+6   ;CLEAR SAVED RHWC
3532 026600 000500              BR       14$      ;BRANCH
3533 026602 022737 000064 002364      CMP      #64,2#ILLEGL ;IS FUNCTION 64
3534 026610 001020              BNE      17$      ;BRANCH IF NOT
3535 026612 012737 140000 027126      MOV      #SC!TRE,2#11$+12 ;SAVED RHCS1 SHOULD HAVE SC AND TRE
3536 026620 012737 000204 027164      MOV      #204,2#15$+6 ;RHBA SHOULD HAVE 204
3537 026626 012737 000102 027174      MOV      #102,2#16$+6 ;RHWC SHOULD HAVE 102
3538 026634 012737 001200 027150      MOV      #MXF!OR,2#12$+12 ;RHCS2 SHOULD HAVE MXF AND OR
3539 026642 012737 000100 027154      MOV      #IR,2#12$+16 ;RHCS2 SHOULD HAVE IR CLEARED
3540 026650 000454              BR       14$      ;BRANCH
3541 026652 022737 000066 002364      CMP      #66,2#ILLEGL ;IS FUNCTION 66
3542 026660 001030              BNE      18$      ;BRANCH IF NOT
3543 026662 012777 177672 153302      MOV      #-70,2#RHWC ;MOVE 70 INTO RHWC
3544 026670 012777 002370 153276      MOV      #WRFROM,2#RHBA ;FILL RHBA WITH WRFROM
3545 026676 012737 140000 027126      MOV      #SC!TRE,2#11$+12 ;SAVED RHCS1

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3546	026704	012737	002164	027164	MOV	#WRFROM-(66.*2),15\$+6	RHBA	
3547	026712	012737	177774	027174	MOV	#-4,16\$+6		SAVED RHWC
3548	026720	012737	001200	027150	MOV	#MXF!OR,0#12\$+12		SAVED RHCS2
3549	026726	005037	027154		CLR	0#12\$+16		RHCS2
3550	026732	012737	000100	027154	MOV	#IR,0#12\$+16		RHCS2 SHOULD HAVE IR CLEARED
3551	026740	000420			BR	14\$		BRANCH
3552	026742	005077	153224	18\$:	CLR	0RHWC		CLEAR RHWC
3553	026746	005077	153222		CLR	0RHBA		CLEAR RHBA
3554	026752	012737	140000	027126	MOV	#SC!TRE,0#11\$+12		RHCS1 SHOULD HAVE SC AND TRE
3555	026760	005037	027164		CLR	0#15\$+6		RHBA
3556	026764	005037	027174		CLR	0#16\$+6		RHWC
3557	026770	012737	001000	027150	MOV	#MXF,0#12\$+12		RHCS2
3558	026776	005037	027154		CLR	0#12\$+16		RHCS2
3559	027002			14\$:				
3560								
3561	027026	013746	002364		MOV	0#ILLEGL, -(SP)		GET ILLEGAL FUNCTION
3562	027032	052716	000101		BIS	#GO!IE, (SP)		INCLUDE IE AND GO
3563	027036	C12611			MOV	(SP)+,0R1		GO TO RHCS1 WITH ILLEGAL FUNCTION
3564								
3565								;*CHANGE SAVED REGISTERS TO EXPECTED VALUE
3566								
3567								;*RHCS1 WILL HAVE SC AND TRE ADDED IF FUNCTION IS GREATER THAN 50
3568	027114			11\$:				
3569	027130	053737	002364	004520	BIS	0#ILLEGL,0#SAVERE+6		INCLUDE ILLEGAL FUNCTION
3570								IN RHCS1
3571								;*RHCS2 WILL HAVE NOTHING ADDED IF FUNCTION IS LESS THAN 50
3572	027136			12\$:				
3573	027156			15\$:				
3574	027166			16\$:				
3575								
3576								;*NOW COMPARE REGISTERS AFTER GIVING AN ILLEGAL COMMAND
3577								
3578	027214	104051		5\$:	ERROR	51		;GIVING ILLEGAL FUNCTION CAUSED
3579	027216	000207			RTS	PC		;IMPROPER REGISTER CHANGE
3580								;GOOD DATA GIVES WHAT
3581								;SHOULD BE THERE
3582								;RECEIVED DATA GIVES REGISTER
3583								;CONTENTS AFTER ILLEGAL
3584								;FUNCTION WA GIVEN
3585	027220	000137	026434	6\$:	JMP	0#1\$		;BRANCH FOR NEXT FUNCTION
3586	027224			7\$:				
3587								
3588	027224			10\$:				
3589								
3590								
3591								
3592								

3593						
3594						
3595						; *THESE ARE REGULAR SETUPS
3596	027244	012777	177374	152720		MOV #260, @RHWC ; 256 DATA WORDS 4 HEADER WORDS
3597	027252	012700	002370			MOV @WRFROM, RO ; THESE TWO INSTRUCTIONS GETS
3598	027256	010077	152712			MOV RO, @RHBA ; ADDR. OF WRFROM BUFFER INTO RO AND
3599						; BUS ADDRESS REGISTER
3600	027262	012710	010000			MOV #FMT22, (RO); ; FORMAT=16 BIT WORDS
3601						; CYLINDER=0
3602	027266	012720	000001			MOV #1, (RO)+ ; TRACK=0, SECTOR=1, KEYS=0
3603	027272	005020				CLR (RO)+ ; KEY1=0
3604	027274	005020				CLR (RO)+ ; KEY2=0
3605	027276	012705	000400			MOV #256., R5 ; COUNTER
3606						
3607						; *SETUP DATA, WRITE HEADER & DATA, AND FORMAT OF THE WRITE
3608	027302	012720	177777	15:		MOV #-1, (RO)+ ; MOVE ALL ONES FOR DATA
3609	027306	005305				DEC R5
3610	027310	001374				BNE 15 ; BRANCH IF DATA NOT COMPLETE
3611	027312	012777	000001	152664		MOV #1, @RMDST ; TRACK=0 SECTOR=1
3612	027332	013711	002344			MOV @WRIFOR, @R1 ; GET READY FOR WRITE HEADER AND
3613						; DATA WITH 62 IN RHCS1
3614	027336	005037	004632			CLR @ERFLGS ; CLEAR ERROR FLAG
3615	027342	012777	010000	152640		MOV #FMT22, @RHOF ; FORMAT BIT=1 (16 BIT WORDS)
3616	027350	005077	152636			CLR @RHCA ; CYLINDER =0
3617						
3618						; *SAVE REGISTERS FOR COMPARISON AFTER READ



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3619
3620
3621 ;*GO TO WRITE HEADER AND DATA
3622 ;*BUT BEFORE GO, ONE INDEX PULSE IS GIVEN
3623 ;*TO CLEAR OUT THE SECTOR CLOCK COUNTER IN THE RH11
3624 ;*SO THAT NO SECTOR PULSES COME DURING THIS TEST
3625 027366 013700 002220 MOV @#RHMR,RO ;NOW RO HAS MAINTENANCE REG. ADDR.
3626 027372 012710 000001 MOV @#DMD,@RO ;SET DIAGNOSTIC MODE
3627 027376 052710 000004 BIS @#MINX,@RO ;SET INDEX
3628 027402 042710 000004 BIC @#MINX,@RO ;CLEAR INDEX THIS GIVES
3629 ;ONE INDEX PULSE
3630
3631 027406 052777 000001 152564 BIS @#GO,@RHCS1 ;ISSUE THE 'GO' BIT TO THE RH11
3632 027414 012737 000113 004642 RUNWAT: MOV @#75,@#RUNCTR ;LOAD 'RUN' LINE DELAY COUNTER
3633 ;= APPROX 450 US ON 11/50 CPU WITH CORE
3634 ;AND PROVIDES FOR TIME TO FILL THE SILO
3635 027422 005337 004642 1$: DEC @#RUNCTR ;COUNT DOWN ONCE
3636 027426 001375 BNE 1$ ;CONTINUE UNTIL = 0
3637
3638 ;*ISSUE THE FIRST DIAGNOSTIC INDEX PULSE
3639 027430 052710 000004 BIS @#MINX,@RO ;SET INDEX PULSE
3640 027434 042710 000004 BIC @#MINX,@RO ;RESET INDEX
3641
3642 ;*SECOND INDEX PULSE
3643 027440 052710 000004 BIS @#MINX,@RO ;SET INDEX
3644 027444 042710 000004 BIC @#MINX,@RO ;CLEAR INDEX
3645
3646 ;*THIRD INDEX PULSE
3647 027450 052710 000004 BIS @#MINX,@RO ;SET INDEX
3648 027454 042710 000004 BIC @#MINX,@RO ;CLEAR INDEX
3649
3650
3651 ;*CHANGE SAVED REGISTERS TO EXPECTED VALUE
3652
3653
3654 ;*RHWC, RHBA AND OR AND IR BITS OF RHCS2 WILL NOT BE CHECKED
3655 027566 017737 152400 004512 MOV @#RHWC,@#SAVERE ;SAVED RHWC
3656 027574 017737 152374 004514 MOV @#RHBA,@#SAVERE+2 ;SAVED RHBA
3657 027602 017746 152370 MOV @#RHCS2-(SP) ;GET RHCS2
3658 027606 042716 177477 BIC @#IC<IR!OR>(SP) ;GET 'IR' & 'OR' STATES
3659 027612 042737 000300 004516 BIC @#IR!OR,@#SAVERE+4 ;CLEAR 'IR' & 'OR' BITS
3660 027620 052637 004516 BIS (SP)+,@#SAVERE+4 ;SET 'OR' & 'IR' AS REQUIRED
3661
3662
3663 ;*COMPARE REGISTERS BEFORE WRITE WITH RESULTS AFTER WRITE
3664
3665 027642 104071 2$: ERROR 71 ;FORCING OPI CAUSED
3666 027644 000207 RTS PC ;IMPROPER REGISTER CHANGE
3667 ;GOOD DATA GIVES WHAT SHOULD BE THERE
3668 ;RECEIVED DATA GIVES WHAT WAS THERE
3669 ;AFTER 3 INDEX PULSES WERE ISSUED
3670
3671
3672 027646 004737 033066 3$: JSR PC,@#CLDISK ;CLEAR THE 'GO' BIT

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3673
3674 027672 012737 000025 027726      MOV    #21.,@#1$+12      ;SET UP TO START FROM
3675 027700 012737 000025 027742      MOV    #21.,@#2$+6      ;SECTOR 21.
3676 027706 012737 000056 004652      MOV    #46.,@#TMP1      ;46 SECTORS TO COVER 3 TRACKS
3677
3678                                     ;*FILL WRITE FROM BUFFER WITH THE HEADER
3679 027714                                     1$:
3680
3681                                     ;*NOW THE WRITE HEADER AND DATA COMMAND WILL BE SETUP
3682 027734                                     2$:
3683
3684
3685
3686
3687                                     ;*ONE REVOLUTION=16670 MICRO SEC, ONE SECTOR=760 MICRO SEC
3688
3689                                     ;*NOW ONE MORE SECTOR HAS BEEN WRITTEN
3690                                     ;*'SC' WILL BE CHECKED TO MAKE SURE
3691                                     ;*NO ERRORS OCCURED
3692
3693 030030 017737 152144 002262      MOV    @RHCS1,@#CS1      ;GET RHCS1
3694 030036 032737 100000 002262      BIT    #SC,@#CS1        ;IS 'SC' SET ?
3695 030044 001403                                     BEQ    3$                ;BRANCH IF "SPECIAL CONDITION" NOT SET
3696 030046 004737 035010      JSR    PC,@#PUTREG      ;READ & SAVE ALL RH11 & RPO4 REGISTERS
3697 030052 104072      ERROR  72                ;THERE WAS AN UNDEFINED ERROR AFTER
3698                                     ;A WRITE HEADER AND DATA
3699
3700                                     ;*A SECTOR HAS BEEN FORMATTED NOW,
3701                                     ;*THE HARDWARE WILL BE CLEARED AND
3702                                     ;*CHANGES WILL BE MADE TO FORMAT NEXT SECTOR.
3703
3704 030054                                     3$:
3705 030060 013705 027726      MOV    @#1$+12,R5        ;GET SECTOR TRACK WORD
3706 030064 005205      INC    R5                ;+ 1
3707 030066 122705 000026      CMPB  #22.,R5            ;IS IT 22 SECTORS (WHOLE TRACK DONE) ?
3708 030072 001405      BEQ    4$                ;YES... DO NEXT TRACK
3709 030074 010537 027726      MOV    R5,@#1$+12        ;NO... RESTORE SECTOR TRACK FOR DATA
3710 030100 010537 027742      MOV    R5,@#2$+6        ;RESTORE SECTOR TRACK FOR "RUN" ROUTINE
3711 030104 000410      BR    5$                ;CHECK FOR 46 SECTORS COMPLETED
3712
3713 030106 105037 027726      CLRB  @#1$+12            ;SET SECTOR = 0 FOR DATA WRITTEN
3714 030112 105237 027727      INCB  @#1$+13            ;INCR TRACK FOR DATA WRITTEN
3715 030116 105037 027742      CLRB  @#2$+6            ;SET SECTOR = 0 FOR "RUN" ROUTINE
3716 030122 105237 027743      INCB  @#2$+7            ;INCR TRACK FOR THE "RUN" ROUTINE
3717
3718 030126 005337 004652      4$:      DEC    @#TMP1            ;ARE 46 SECTORS DONE ?
3719 030132 001270      BNE   1$                ;CONTINUE FORMATTING IF NOT
3720
3721 030134      5$:      ;GO ON TO NEXT TEST IF SO
    
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MO7

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3722
3723
3724 030154 012737 000025 030210 MOV #21.,@#1$+12 ;SET UP TO START FROM
3725 030162 012737 000025 030224 MOV #21.,@#2$+6 ;SECTOR 21.
3726 030170 012737 000056 004652 MOV #46.,@#TMP1 ;46 SECTORS TO COVER 3 TRACKS
3727
3728 ;*FILL WRITE FROM BUFFER WITH HEADER
3729 030176 1$:
3730
3731 ;*NOW THE WRITE HEADER AND DATA COMMAND WILL BE FILLED
3732 030216 2$:
3733
3734
3735
3736
3737 ;*ONE REVOLUTION=16670 MICRO SEC, ONE SECTOR=760 MICRO SEC
3738
3739 ;*NOW ONE MORE SECTOR HAS BEEN WRITTEN
3740 ;*'SC' WILL BE CHECKED TO MAKE SURE
3741 ;*NO ERRORS OCCURED
3742
3743 030312 017737 151662 002262 MOV @RHCS1,@#CS1 ;GET RHCS1
3744 030320 032737 100000 002262 BIT #SC,@#CS1 ;IS 'SC' SET ?
3745 030326 001405 BEQ 3$ ;BRANCH IF "SPECIAL CONDITION" NOT SET
3746 030330 004737 035010 JSR PC,@#PUTREG ;READ & SAVE ALL RH11 & RPO4 REGISTERS
3747 030334 104072 ERROR 72 ;THERE WAS AN UNDEFINED ERROR AFTER
3748 ;A WRITE HEADER AND DATA
3749
3750 ;GO ON TO NEXT TEST
3751
3752 ;*ONE SECTOR HAS BEEN FORMATTED NOW,
3753 ;*THE HARDWARE WILL BE CLEARED AND
3754 ;*CHANGES WILL BE MADE TO FORMAT NEXT SECTOR.
3755
3756 030342 3$:
3757 030346 013705 030210 MOV @#1$+12,R5 ;GET SECTOR TRACK WORD
3758 030352 005205 INC R5 ;+ 1
3759 030354 122705 000026 CMPB #22.,R5 ;IS IT 22 (WHOLE TRACK) ?
3760 030360 001405 BEQ 4$ ;YES...DO NEXT TRACK
3761 030362 010537 030210 MOV R5,@#1$+12 ;NO...RESTORE SECTOR TRACK FOR DATA WRITTEN
3762 030366 010537 030224 MOV R5,@#2$+6 ;RESTORE SECTOR TRACK FOR "RUN" ROUTINE
3763 030372 000410 BR 5$ ;CHECK FOR 46 SECTORS COMPLETED
3764
3765 030374 105037 030210 4$: CLRB @#1$+12 ;SET SECTOR = 0 FOR DATA WRITTEN
3766 030400 105237 030211 INCB @#1$+13 ;INCR TRACK FOR THE "RUN" ROUTINE
3767 030404 105037 030224 CLRB @#2$+6 ;SET SECTOR = 0 FOR DATA WRITTEN
3768 030410 105237 030225 INCB @#2$+7 ;INCR TRACK FOR THE "RUN" ROUTINE
3769
3770 030414 005337 004652 5$: DEC @#TMP1 ;ARE 46 SECTORS DONE ?
3771 030420 001266 BNE 1$ ;CONTINUE IF NOT
3772
3773 ;*NOW 46 SECTORS HAVE BEEN FORMATTED
3774
3775 ;*READ HEADER AND DATA FOR 46 SECTORS=11960 WORDS
3776 ;*WITH BUS ADDRESS INHIBITED
3777

```

3778  
 3779  
 3780  
 3781  
 3782  
 3783  
 3784  
 3785  
 3786  
 3787  
 3788  
 3789  
 3790  
 3791  
 3792  
 3793  
 3794  
 3795  
 3796  
 3797  
 3798  
 3799  
 3800  
 3801  
 3802  
 3803  
 3804  
 3805  
 3806  
 3807

030522 017737 151454 002264  
 030530 032737 020000 002264  
 030536 001403  
 030540 004737 035010  
 030544 104074  
  
 030546 017737 151426 002262 6\$:  
 030554 032737 100000 002262  
 030562 001403  
 030564 004737 035010  
 030570 104072  
  
 030572 7\$:

; \*FILL READ HEADER AND DATA COMMAND

; \*TIME IS NOT IMPORTANT

; \*NOW THAT ALL 11960 WORDS HAVE BEEN READ  
 ; \*'OPI' WILL BE CHECKED TO BE NOT SET

MOV @RHER1,@#ER1 ;GET RHER1  
 BIT #OPI,@#ER1 ;IS 'OPI' SET ?  
 BEQ 6\$ ;CHECK 'SC' IF NOT  
 JSR PC,@#PUTREG ;READ & SAVE ALL RH11 & RPO4 REGISTERS  
 ERROR 74 ;READ HEADER AND DATA  
 ;OVER 3 INDEX PULSES  
 ;CAUSED 'OPI' TO SET

; \*'SC' WILL BE CHECKED

MOV @RHCSI,@#CSI ;GET RHCSI  
 BIT #SC,@#CSI ;IS 'SC' SET ?  
 BEQ 7\$ ;CONTINUE TESTING IF NOT  
 JSR PC,@#PUTREG ;READ & SAVE ALL RH11 & RPO4 REGISTERS  
 ERROR 72 ;READ HEADER AND DATA  
 ;FOR 11960 WORDS, THAT IS OVER THREE  
 ;INDEX PULSES. CAUSED AN UNDEFINED ERROR  
  
 ;CONTINUE WITH THE NEXT TEST

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3808
3809
3810
3811
3812 030612 005037 030720
3813 030616 005037 030736
3814 030622 005037 030746
3815
3816 030626 012737 000023 001200
3817
3818
3819
3820
3821
3822
3823
3824
3825
3826
3827 030706 1$:
3828
3829
3830 030726 2$:
3831
3832
3833 030740 3$:
3834
3835
3836
3837
3838
3839
3840
3841
3842
3843
3844
3845
3846
3847
3848
3849
3850 031030 004737 035010
3851
3852 031034 032737 040000 002304
3853 031042 001004
3854 031044 032737 040000 002262
3855 031052 001401
3856
3857 031054 104066 9$:
3858
3859
3860
3861
3862
3863 031056 062737 000400 030720 4$:
    
```

```

; *THE FOLLOWING CLEARS ARE TO INITIALIZE TEST FROM CYLINDER 0
CLR    @#1$+12      ; START WITH SECTOR/TRACK = 0
CLR    @#2$+10      ; START WITH DATA = 0
CLR    @#3$+6        ; START WITH 0 FOR COMMAND
MOV     #19.,@#STMP1 ; 19 TRACKS TO BE WRITTEN
; *THIS GETS THE HEADS TO CYLINDER 0

; *FILL WRITE FROM BUFFER WITH HEADER
1$:
; *FILL WRITE FROM BUFFER WITH DATA
2$:
; *THE WRITE HEADER AND DATA COMMAND WILL BE FILLED
3$:

; *ONE REVOLUTION = 16670 MICRO SEC., ONE SECTOR = 760
; *MICRO SEC. MAX TIME ALLOWED = ONE REVOLUTION + HEAD
; *SWITCH + 2 SECTORS, MIN TIME ALLOWED - SECTOR (FIRST CASE)
; *IF THERE IS A FAILURE HERE HALT PROGRAM AFTER ERROR WITH
; *SWITCH IS AND SEE CURRENT CYLINDER REGISTER TO DETERMINE
; *WHAT CYLINDER IS FAILING

; *NOW SECTOR 0 OF ONE TRACK HAS BEEN WRITTEN CHECK COMPOSIT
; *ERROR BIT TO BE SURE NO ERRORS HAPPENED

; *SAVE REGISTERS IN SAVE TABLE
JSR    PC,@#PUTREG

BIT    #ERR,@#DS1    ; ANY DISK ERRORS
BNE    9$            ; BRANCH IF YES
BIT    #TRE,@#CS1    ; ANY RH ERRORS
BEQ    4$            ; BRANCH IF NO

9$:    ERROR    66    ; SOME ERRORS OCCURRED
        ; WHILE DOING WRITE HEADER
        ; AND DATA

; *THE FOLLOWING 3 ADDS SETS UP FOR NEXT TRACK WRITING
4$:    ADD     #400,@#1$+12 ; NEXT TRACK FOR HEADER
    
```

C08

CZRJJ80, RPO4/5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 93  
 CZRJJ8.P11 10-NOV-77 11:20 T36 HEAD SELECTION TEST ERR & TRE

SEQ 0093

```

3864 031064 062737 000040 030736 ADD #40,2#2$+10 ;NEXT TRACK FOR DATA
3865 031072 062737 000400 030746 ADD #400,2#3$+6 ;NEXT TRACK FOR COMMAND
3866
3867 031100 005337 001200 DEC 2#STMP1 ;COUNT 19 TRACKS
3868 031104 001300 BNE 1$
3869
3870 ;*THE FOLLOWING CLEARS SETS UP FOR READ HEADER AND DATA
3871 031106 005037 031166 CLR 2#SST3+12 ;START WITH SECTOR/TRACK = 0
3872 031112 005037 031204 CLR 2#SST4+10 ;START WITH DATA = 0
3873 031116 005037 031214 CLR 2#SST5+6 ;START WITH 0 FOR COMMAND
3874
3875
3876 ;*SET UP FOR READ HEADER AND DATA
3877 031126 012737 000023 001200 SST1: MOV #19.,2#STMP1 ;19 TRACKS TO BE READ
3878 ;*FILL READ INTO BUFFER WITH ALL ONES
3879
3880 031134 SST2:
3881 031146 013737 031134 001110 MOV 2#SST2,2#SLPERR ;SET LOOP POINT
3882 ;*FILL WRITE FROM BUFFER WITH EXPECTED HEADER
3883
3884 031154 SST3:
3885
3886 ;*FILL WRITE FROM BUFFER WITH EXPECTED DATA
3887 031174 SST4:
3888
3889 ;*FILL COMMAND FOR READ HEADER AND DATA
3890 031206 SST5:
3891
3892
3893
3894
3895
3896 ;*NOW SECTOR 0 OF ONE TRACK HAS BEEN READ CHECK COMPOSIT
3897 ;*ERROR BIT TO BE SURE NO ERROR HAPPENED
3898
3899 ;*SAVE REGISTERS IN SAVE TABLE
3900 031276 004737 035010 JSR PC,2#PUTREG
3901
3902 031302 032737 040000 002304 BIT #ERR,2#DS1 ;ANY DISK ERRORS
3903 031310 001004 BNE 10$ ;BRANCH IF YES
3904 031312 032737 040000 002262 BIT #TFE,2#CS1 ;ANY RH ERRORS
3905 031320 001401 BEQ 11$ ;BRANCH IF NO
3906
3907 031322 104066 10$: ERROR 66 ;SOME ERRORS OCCURRED
3908 ;WHILE DOING READ
3909 ;HEADER AND DATA
3910
3911 ;*NOW THE READ DATA WILL BE COMPARED DATA IN EACH SECTOR
3912 ;*IS UNIQUE IF PROGRAM IS HALTED ON ERROR THEN LOOK AT
3913 ;*RHDST TO GET WHAT TRACK IS IN ERROR. LOOKING AT THE DATA
3914 ;*BITS NO 4 5 6 7 8 IN GOOD DATA ALSO GIVES TRACK NUMBER
3915 ;*IN GOOD DATA ALSO GIVES TRACK NUMBER
3916
3917 031324 11$:
3918
3919 ;BITS 4.5.6.7,8
  
```

```

3920 031342 104067          12$:  ERROR  67          ; READ HEADER AND DATA
3921 031344 000207          RTS    PC          ; ERROR
3922                                     ; HEAD SELECTION ERROR
3923                                     ; DATA READ GIVES NATURE
3924                                     ; OF ERROR
3925                                     ; EXCEPT FOR THE
3926                                     ; FOUR HEADER WORDS
3927                                     ; THE BITS 4,5,6,7,8
3928                                     ; GIVE THE TRACK NUMBER
3929
3930                                     ; *NOW INCREMENT TO READ NEXT TRACK
3931
3932 031346 062737 000400 031166 13$:  ADD    #400, @#SST3+12 ; NEXT TRACK FOR HEADER
3933 031354 062737 000040 031204      ADD    #40, @#SST4+10  ; NEXT TRACK FOR DATA
3934 031362 062737 000400 031214      ADD    #400, @#SST5+6  ; NEXT TRACK FOR COMMAND
3935
3936 031370 005337 001200      DEC    @#STMP1        ; COUNT 19 TRACKS
3937 031374 001001          BNE    5$
3938 031400 000137 031134      5$:   JMP    @#SST2        ; JUMP BACK

```

E08

CZRJJ80, RPO4.5.6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 95  
CZRJJ8.P11 10-NOV-77 11:20 T36

HEAD SELECTION TEST ERR & TRE

SEQ 0095

3939  
3940  
3941  
3942  
3943  
3944 031436 012737 010000 031550  
3945 031444 005037 031570  
3946 031450 005037 031576  
3947  
3948  
3949  
3950  
3951  
3952  
3953  
3954  
3955 031510 005737 004636  
3956 031514 001404  
3957  
3958  
3959 031516 012737 001001 001200  
3960 031524 000403  
3961  
3962 031526 012737 000401 001200 14\$:  
3963 031534 15\$:  
3964  
3965  
3966  
3967 031540 1\$:  
3968  
3969  
3970 031560 2\$:  
3971  
3972  
3973 031572 3\$:  
3974  
3975  
3976  
3977  
3978  
3979  
3980  
3981  
3982  
3983  
3984  
3985  
3986  
3987 031662 005237 031550  
3988 031666 005237 031570  
3989 031672 005237 031576  
3990 031676 005337 001200  
3991 031702 001316  
3992  
3993  
3994

;  
;\*SET UP TO INITIALIZE TEST FROM CYLINDER 0, TRACK 0,  
;\*SECTOR 0  
MOV #10000, @#1\$+10 ;CYLINDER HEADER DATA  
CLR @#2\$+10 ;DATA  
CLR @#3\$+4 ;CYLINDER COMMAND RHCA  
;  
;\*THIS IS TO GET THE HEADS TO CYLINDER ZERO

;  
;\*THE DRIVE TYPE IS CHECKED AND THE APPROPRIATE MAX.  
;\*CYLINDER DIFFERENCE IS SET UP

TST @#RPO6 ;TEST FOR RPO6 DRIVE  
BEQ 14\$ ;TREAT UNIT AS AN RPO4  
;TREAT AS AN RPO6

MOV #513., @#STMP1 ;513 CYLINDERS  
BR 15\$ ;CONTINUE

MOV #257., @#STMP1 ;257 CYLINDERS  
;CONTINUE WITH TEST

;  
;\*FILL WRITE FROM BUFFER WITH HEADER

;  
;\*FILL WRITE FROM BUFFER WITH DATA

;  
;\*THE WRITE HEADER AND DATA COMMAND WILL BE LOADED

;  
;\*ONE REVOLUTION = 16670 MICRO SECONDS, ONE SECTOR = 760  
;\*MICRO SECONDS, ONE SEEK = 7000 MICRO SECONDS.  
;\*MAX TIME = 1 REVOLUTION + 1 SEEK + 2 SECTORS  
;\*MIN TIME = 1 SECTOR

;  
;\*NOW ONE SECTOR WRITE IS COMPLETE. CHANGES WILL BE MADE  
;\*FOR THE NEXT SECTOR, THEN THE ABOVE WILL BE REPEATED  
;\*UNTIL CYLINDER 256./512. IS REACHED  
INC @#1\$+10 ;CYLINDER HEADER DATA  
INC @#2\$+10 ;DATA  
INC @#3\$+4 ;CYLINDER COMMAND (RHCA)  
DEC @#STMP1 ;COUNT DOWN FOR 256./512. CYLINDERS  
BNE 1\$ ;DO NEXT WRITE IF 256./512. NOT DONE

;  
;\*NOW ALL 256./512. CYLINDERS HAVE CYLINDER NUMBER WRITTEN  
;\*AS DATA ON SECTOR 0, TRACK 0. NOW A RECALIBRATE, FOLLOWED



F08

CZRJJBO RPO4 5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 96  
CZRJJB.P11 10-NOV-77 11:20 T37 DIFFERENCE LINES

SEQ 0096

3995  
3996  
3997  
3998 031704 013737 031734 001110  
3999 031712 005037 001200

;\*BY READ HEADER AND DATA, THEN A CHECK WILL BE DONE ON  
;\*CYLINDER 0,1,2,4,8,16,32,64,128,256,512, AND 0  
MOV 2#45,2#SLPERR ;LOOP ON ERROR  
CLR 2#STMP1 ;CYLINDER COUNTER

```

4000
4001      ;*INITIALIZE, RECALIBRATE, AND READ CYLINDERS
4002
4003      ;*SETUP FOR CYLINDER 0
4004 031716 012737 010000 032016      MOV    #10000, @#55+10      ;CYLINDER HEADER (DATA)
4005 031724 005037 032036              CLR    @#65+10              ;DATA
4006 031730 005037 032044              CLR    @#75+4                ;CYLINDER COMMAND (RHCA)
4007 031734                                4$:
4008
4009
4010
4011
4012      ;*CLEAR READ INTO BUFFER WITH ALL ONES
4013
4014      ;*FILL WRITE FROM BUFFER WITH EXPECTED HEADER
4015 032006                                5$:
4016 032026                                6$:
4017
4018
4019 032040                                7$:
4020
4021
4022
4023      ;*ONE SECTOR = 760 MICRO SECONDS, ONE REVOLUTION =
4024      ;*16670 MICRO SECONDS, MAX SEEK = 52000 MICRO SECONDS
4025      ;*MAX TIME = ONE REV + 1 SEEK + 1 SECTOR
4026      ;*MIN TIME = 1 SECTOR
4027
4028
4029
4030      ;*CHECK READ WORDS AS ALL READ COMMANDS HAVE BEEN CHECKED
4031
4032      ;*(DATA ERRORS MAY IMPLY "IMPLIED SEEK" ERRORS)
4033
4034
4035
4036 032146 104070                                8$:  ERROR    70                ;READ HEADER AND DATA ERROR
4037 032150 000207                                RTS     PC                  ;DATA GIVES EXPECTED CYLINDER
4038
4039      ;*NOW ONE CYLINDER HAS BEEN CHECKED. CHANGES WILL BE MADE
4040      ;*TO READ THE NEXT CYLINDER AND THE ABOVE SECTOR READ WILL BE
4041      ;*REPEATED
4042
4043 032152 005737 001200                                9$:  TST     @#STMP1            ;IS IT ZERO ?
4044 032156 001003                                BNE    10$                 ;BRANCH IF NOT ZERO
4045 032160 005237 001200                                INC    @#STMP1            ;ADD ONE IF = 0
4046 032164 000416                                BR     11$                 ;PUT ONE IN CYLINDER
4047
4048 032166 005737 004636                                10$: TST     @#RPO6           ;TEST FOR RPO6 DRIVE
4049 032172 001404                                BEQ    16$                 ;TREAT UNIT AS AN RPO4
4050                                ;TREAT AS AN RPO6
4051
4052 032174 022737 001000 001200                                CMP    #512., @#STMP1     ;IS IT PASSED 512 CYLINDERS YET ?
4053 032202 000403                                BR     17$                 ;CONTINUE
4054 032204 022737 000400 001200 16$:  CMP    #256., @#STMP1     ;IS IT PASSED 256 CYLINDERS YET ?
4055 032212                                17$:  ;CONTINUE
    
```

```

4056
4057 032212 101421          BLOS      12$          ;YES, SO GO TO ZERO
4058 032214 063737 001200 001200      ADD      @#STMP1,@#STMP1 ;DOUBLE THE CYLINDER
4059 032222 013737 001200 032036 11$:      MOV      @#STMP1,@#6$+10 ;MAKE CYLINDER ADDRESS THE DATA
4060 032230 013746 001200          MOV      @#STMP1,-(SP)   ;GET CYLINDER NUMBER
4061 032234 052716 010000          BIS      #FMT22,(SP)    ;INCLUDE FORMAT BIT
4062 032240 012637 032016          MOV      (SP)+,@#5$+10  ;HEADER DATA (CYLINDER)
4063 032244 013737 001200 032044      MOV      @#STMP1,@#7$+4 ;CYLINDER COMMAND (RHCA)
4064 032252 000137 031734          JMP      @#4$          ;RETURN TO RECALIBRATE
4065
4066 032256 005737 004636          TST      @#RPO6 ;TEST FOR RPO6 DRIVE
4067 032262 001405          BEQ      18$          ;TREAT UNIT AS AN RPO4
4068                                     ;TREAT AS AN RPO6
4069
4070 032264 022737 002000 001200      CMP      #1024.,@#STMP1 ;512 DONE YET ?
4071 032272 00142.          BEQ      13$          ;OUT -----,
4072 032274 00040.          BR       19$          ;CONTINUE
4073 032276 022737 001000 001200 18$:      CMP      #512.,@#STMP1 ;256 DONE YET ?
4074 032304 001414          BEQ      13$          ;OUT -----,
4075 032306                                     ;CONTINUE
4076
4077 032306 063737 001200 001200      ADD      @#STMP1,@#STMP1 ;DOUBLE THE CYLINDER
4078 032314 012737 010000 032016      MOV      #10000,@#5$+10 ;CYLINDER HEADER DATA
4079 032322 005037 032036          CLR      @#6$+10      ;DATA
4080 032326 005037 032044          CLR      @#7$+4      ;CYLINDER COMMAND (RHCA)
4081 032332 000137 031734          JMP      @#4$          ;RETURN TO THE RECALIBRATE
4082
4083 032336          13$:          ;END OF TEST

```

```

4084
4085 032346 012737 000000 177776      MOV      #0,PS          ;REINSTATE PS TO 0
4086 032434 013746 004616      MOV      @#UNIT,-(SP)  ;GET READY TO TYPE UNIT NUMBER
4087 032440 104405      TYPDS
4088 032454 013746 001112      MOV      @#SERTTL,-(SP) ;GET READY TO TYPE NUMBER OF ERRORS
4089 032460 104405      TYPDS
4090 032462 005037 001112      CLR      @#SERTTL      ;CLEAR TOTAL NUMBER OF ERRORS
4091 032466 005037 001102      CLR      @#STSTNM      ;CLEAR TEST NUMBER
4092 032472 005737 004626      TST      @#SELECT      ;STARTING FROM 200 ?
4093 032476 001413      BEQ      3$            ;TEST NEXT DRIVE IF 50
4094
4095
4096 032500 005237 001100      INC      @#SPASS        ;INCREASE PASS COUNT
4097 032504 104401 032675      TYPE
4098 032510 013746 001100      MOV      @#SPASS,-(SP) ;TYPE END PASS #
4099 032514 104405      TYPDS                ;GET PASS NO.
4100 032516 104401 032672      TYPE                ;TYPE IT OUT
4101 032522 000137 007714      JMP      @#TST4        ;JUMP TEST 4 -----
4102
4103 032526 012737 177777 040742 3$:      MOV      #-1,@#PRITEM  ;CLEAR PREVIOUS ITEM NUMBER
4104 032534 005337 004620      DEC      @#NOUNITS     ;NO. OF UNITS PRESENT DECREMENTED
4105 032540 001413      BEQ      $EOP          ;BRANCH IF ALL DRIVES COMPLETE
4106 032542 013700 004616      MOV      @#UNIT,R0     ;UNIT UNDER TEST
4107 032546 012701 004576      MOV      @#UNITS,R1    ;TABLE
4108 032552 022100      CMP      (R1)+,R0      ;IS THIS UNIT JUST TESTED ?
4109 032554 001401      BEQ      2$            ;CONTINUE IF YES
4110 032556 000775      BR       1$            ;INCREMENT IF NO
4111 032560 011137 004616      MOV      (R1) @#UNIT   ;THIS IS NEXT UNIT
4112 032564 000137 007714      JMP      @#TST4        ;TEST THE NEXT DRIVE -----
4113

```

JOB

CZRJJBO RPO4/5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 100  
CZRJJB.P11 10-NOV-77 11:20 T40 END OF DRIVE

SEQ 0100

4114  
4115  
4116  
4117  
4118  
4119  
4120  
4121  
4122

.SBTTL  
.SBTTL \*\*\*SUBROUTINES\*\*\*  
.SBTTL

```

4123
4124
4125          ; THIS FILLS MEMORY WITH GIVEN DATA
4126          ; USED CHIEFLY FOR HEADER INFORMATION
4127          ; CALL IS
4128          JSR      RO,@#FLHEAD      ; FILL HEADER
4129          LOC      ; LOCATION WHERE SAVED
4130          XN      ; NUMBER OF WORDS
4131          XD1     ; DATA REPEATED XN TIMES
4132          XD2     ; DATA REPEATED XN TIMES
4133          ;
4134          ;
4135          ;
4136          ;
4137          032712
4138          032716 012001
4139          032720 012002
4140
4141          ; *NOW FILL DATA
4142
4143          032722 012021
4144          032724 005302
4145          032726 001375
4146          032734 000200
4147
4148
4149
4150          ; THIS CLEARS ANY BLOCK OF MEMORY.
4151          ; FILLING IT WITH ANY DATA
4152          ; CALL IS
4153          JSR      RO,@#CLAREA
4154          F        ; FROM
4155          N        ; NUMBER OF WORDS
4156          D        ; DATA TO BE FILLED
4157
4158          ; R1 WILL HAVE STARTING ADDRESS OF BLOCK TO BE FILLED
4159          ; R2 WILL HAVE NUMBER OF WORDS
4160          ; R3 WILL HAVE DATA
4161
4162          032736
4163          032744 012001
4164          032746 012002
4165          032750 012003
4166          032752 010321
4167          032754 005302
4168          032756 001375
4169          032766 000200
4170
4171
4172
4173
4174
4175
4176          ; THIS IS A SUBROUTINE TO FILL SAVED REGISTER LOCATION
4177          ; WITH GIVEN VALJE
4178          ; CALL IS

```

L08

```

4179      :      JSR      RO,#FILLRE
4180      :      RHXX      ;REGISTER NAME
4181      :      D          ;DATA
4182      :
4183      :
4184      :      FILLRE:
4185      032770      MOV      (RO)+,R1      ;ADDRESS OF ADDRESS OF REGISTER
4186      032774      012001      MOV      (RO)+,R2      ;DATA
4187      032776      012002      SUB      #RHW, R1      ;OFFSET
4188      033000      162701      002172      MOV      R2,SAVERE(R1) ;DATA IS MOVED IN
4189      033004      010261      004512      RTS      RO      ;RETURN TO MAIN PROGRAM
4190
4191
4192

```

```

4193      ; THIS SUBROUTINE SETS UP FOR SEARCH
4194      ; CALL IS
4195      ;       JSR      RO,@#SRCH
4196      ;       C       ; CYLINDER
4197      ;       S       ; SECTOR
4198      ;       T       ; TRACK
4199
4200 033016 012077 147170      SRCH:  MOV      (RO)+,@RHCA      ; SET DESIRED CYLINDER ADDRESS
4201 033022 012077 147156      MOV      (RO)+,@RHDS1    ; SET DESIRED SECTOR/TRACK ADDRESS
4202 033026 013777 002334 147144  MOV      @#SERCH,@RHCS1 ; GET READY FOR SEARCH
4203                                     ; WITH 30 IN RHCS1
4204 033034 000200      RTS      RO
4205
4206
4207
4208
4209
4210
4211
4212      ; THIS SUBROUTINE SETS UP FOR SEEK COMMANDS
4213      ; CALL IS
4214      ;       JSR      RO,@#SEEKCY
4215      ;       C       ; CYLINDER
4216
4217
4218 033036 012077 147150      SEEKCY: MOV      (RO)+,@RHCA      ; SET DESIRED CYLINDER ADDRESS
4219 033042 013777 002352 147130  MOV      @#SEECOM,@RHCS1 ; MOV 4 INTO RHCS1
4220 033050 000200      RTS      RO      ; RETURN TO MAIN PROGRAM

```



```

4221
4222      ; THIS SUBROUTINE SETS UP FOR OFFSET COMMANDS
4223      ; CALL IS
4224      ;
4225      ; JSR      RO, @#OFFSET      ; MICRO INCHES OFFSET
4226      ;
4227 033052 052077 147132      OFFSET: BIS      (RO)+, @RHOF      ; SET OFFSET REGISTER
4228 033056 013777 002354 147114      MOV      @#OFFS@TC, @RHCS1 ; MOV14 INTO RHCS1
4229 033064 000200      RTS      RO      ; RETURN TO MAIN PROGRAM
4230
4231
4232 033066 013701 002200      CLDISK: MOV      @#RHCS1, R1      ; R1 WILL BE CONTROL AND STATUS1
4233 033072 013702 002176      MOV      @#RHCS2, R2      ; R2 WILL BE CONTROL AND STATUS2
4234 033076 013703 002222      MOV      @#RHDS1, R3      ; R3 WILL BE DISK STATUS REGISTER1
4235 033102 013704 002202      MOV      @#RHER1, R4      ; R4 WILL BE ERROR REGISTER #1
4236
4237 033106 012712 000040      MOV      #CLR, @R2      ; CLEAR ALL REG.
4238 033112 013712 004616      MOV      @#UNIT, @R2      ; REINSTATE UNIT NO.
4239 033116 005011      CLR      @R1      ; CLEAR FUNCTION BITS
4240 033120 000207      RTS      PC
    
```

4241  
4242  
4243  
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4280  
4281  
4282

033122 000000  
033124 011637 033122  
033130 162737 000004 033122  
033136 011346  
033140 052716 000100  
033144 000406  
033146 011637 033122  
033152 162737 000004 033122  
033160 011346  
033162 011146  
033164 042716 173577  
033170 022726 004200  
033174 001403  
033176 011137 001122  
033202 104062  
033204 042716 102000  
033210 022726 010700  
033214 001404  
033216 011337 001122  
033222 104061  
033224 000207  
033226 062716 000006  
033232 000207

; THIS CHECKS DEVICE AVAILABLE (DVA) AND READY (RDY) IN RHCS1  
; AND CHECKS MEDIUM ON LINE (MOL), DEVICE PRESENT (DPR), DEVICE READY (DRY) IN RHDS1  
; IT MAY CHECK VOLUME VALID (VV) IN RHDS1, DEPENDING ON ENTRY POINT

PCJSR: 0 ; PC OF JSR  
CHECK: MOV (SP), 2(PCJSR) ; SAVE PC OF JSR+4  
SUB #4, 2(PCJSR) ; GET PC OF JSR  
MOV 2R3, -(SP) ; GET RHDS1  
BIS #VV, (SP) ; DONT CHECK VV BIT  
BR CHECKC ; GOTO COMMON CHECK ROUTINE  
CHECKT: MOV (SP), 2(PCJSR) ; SAVE PC OF JSR+4  
SUB #4, 2(PCJSR) ; GET PC OF JSR  
MOV 2R3, -(SP) ; GET RHDS1 & DO VV CHECK AT 3\$  
CHECKC: MOV 2R1, -(SP) ; GET CS1  
BIC #173577, (SP) ; CLEAR UNWANTED BITS  
CMP #DVA!RDY, (SP)+ ; RHCS1 SHOULD HAVE DEVICE AVAILABLE  
; AND BE READY  
BEQ 3\$ ; BRANCH IF GOOD  
MOV 2R1, 2(\$BDADR) ; BAD DATA REGISTER (RHCS1)  
ERROR 62 ; RHCS1 DID NOT HAVE DEVICE  
; AVAILABLE RIGHT AT THE START  
; ALL OTHER BITS SHOULD BE 0  
3\$: BIC #ATA!LBT, (SP) ; CLEAR UNWANTED BITS  
CMP #MOL!DPR!DRY!VV, (SP)+ ; RHDS1 SHOULD HAVE THESE SET  
BEQ 7\$ ; BRANCH IF GOOD  
MOV 2R3, 2(\$BDADR) ; BAD DATA IN REGISTER (RHDS1)  
ERROR 61 ; RHDS1 HAS SOME BITS OTHER  
; THAN MOL, DRY, DPR, VV SET  
; ALL OTHER BITS SHOULD BE 0  
RTS PC ; RETURN TO TEST AND HALT  
7\$: ADD #6, (SP) ; ADJUST STACK TO JUMP OVER HALT IN TEST  
RTS PC ; RETURN TO TEST AND CONTINUE

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033234  
033242 012001  
033244 012002  
033246 012003  
033250 013122  
033252 005303  
033254 001375  
033264 000200

SAVER:

```
MOV (R0)+,R1 ;FROM
MOV (R0)+,R2 ;TO
MOV (R0)+,R3 ;NUMBER
IS: MOV @R1+,(R2)+ ;SAVE REGISTER CONTENTS
DEC R3 ;COUNT
BNE IS ;BRANCH IF NOT DONE
RTS R0
```

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

033266 005077 146752  
033272 017737 146752 033324  
033300 017737 146730 004564  
033306 017737 146724 004562  
033314 000002

```
TIME1: CLR @PCLCSR ;STOP THE CLOCK
MOV @PCLCTR,@WAITM ;GET TIME ON CLOCK
TIME2: MOV @RHCC,@FINACC ;GET CURRENT CYLINDER
MOV @RHLA,@FINALA ;GET LOOK AHEAD
RTI ;RETURN TO WAIT P OR WAIT.T
```

```
; THIS IS A WAIT LOOP WHEN AN EVENT IS TO BE TIMED
; THE CALL IS
```

```
WAT
A ;ABSOLUTE REGISTER ADDRESS
B ;BIT WAITED FOR
TA ;TIME ALLOWED GIVEN IN 10 MICROSEC
TC ;TOLERANCE PLUS/MINUS IN 10 MICROSEC
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4339 ;R1-WILL HAVE TIME ALLOWED IN 10 MICRO SECONDS
4340 ;R2-WILL HAVE TOLERANCE PLUS/MINUS IN 10 MICRO SECONDS
4341 ;MINIMUM TIME THAT CAN BE MEASURED IS ABOUT 12 MICRO SECONDS
4342 ;FOR THE SLOWEST PROCESSOR
4343
4344 033316 000000 WAITPC: 0 ;WAT PC
4345 033320 000000 WAITRE: 0 ;WAIT ON REGISTER ADDRESS
4346 033322 000000 WAITBT: 0 ;WAIT ON BIT
4347 033324 000000 WAITTM: 0 ;WAITED TIME
4348 033326 005037 033324 WAIT.P: CLR @#WAITTM ;CLEAR WAITED TIME
4349 033332 005077 146710 CLR @PCLBUF ;CLEAR COUNT SET BUFFER
4350 033336 012777 000021 146700 MOV @GO!BIT4,@PCLCSR ;COUNT UP 100 KHZ, START CLOCK
4351 033354 016600 000010 MOV 10(SP),R0 ;R0 HAS ADDRESS OF NEXT LOCATION
4352 033360 010037 033316 MOV R0,@#WAITPC ;NOW WAITPC HAS WAT PC + 2
4353 033364 162737 000002 033316 SUB #2,@#WAITPC ;WAT PC IS IN WAITPC
4354 033372 013037 033320 MOV @#(R0)+,@#WAITRE ;WAIT ON REGISTER ADDRESS
4355 033376 012037 033322 MOV (R0)+,@#WAITBT ;WAIT ON BIT
4356 033402 012001 MOV (R0)+,R1 ;R1 HAS TIME IN 10 MSEC
4357 033404 012002 MOV (R0)+,R2 ;R2 HAS TOLERANCE IN 10 MSEC
4358 033406 010066 000010 MOV R0,10(SP) ;RESTORE RETURN ON STACK
4359
4360 ;*THIS SECTION WAITS FOR BIT, THROUGH TWO COUNT DOWNS
4361
4362 033412 013703 033564 MOV @#TIMCNT,R3 ;R3 IS A TEMPORARY COUNTER
4363 033416 033777 033322 177674 1$: BIT @#WAITBT,@#WAITRE ;IS REQUIRED BIT THERE
4364 033424 001025 BNE 4$ ;BRANCH IF YES
4365 033426 005303 DEC R3 ;COUNT IF REQUIRED BIT NOT THERE
4366 033430 001372 BNE 1$
4367 033432 013703 033564 MOV @#TIMCNT,R3 ;TEMPORARY COUNTER
4368 033436 033777 033322 177654 2$: BIT @#WAITBT,@#WAITRE ;IS REQUIRED BIT THERE
4369 033444 001015 BNE 4$ ;BRANCH IF YES
4370 033446 005303 DEC R3 ;COUNT IF REQUIRED BIT NOT THERE
4371 033450 001372 BNE 2$
4372 033452 017737 177642 001126 MOV @#WAITRE,@#SBD0AT ;REGISTER CONTENTS FOR TYPEOUT
4373 033460 032777 000100 146512 BIT #IE,@#RHC$1 ;DID ANY INTERRUPT OCCUR
4374 033466 001402 BEQ 3$ ;BRANCH IF YES
4375 033470 104001 ERROR 1 ;RPO4 DID NOT INTERRUPT
4376 033472 000427 BR 7$ ;OUT
4377 033474 104002 3$: ERROR 2 ;RPO4 INTERRUPTED BUT WAITED
4378 ;ON BIT DID NOT OCCUR
4379 ;EVEN AFTER TWO COUNT DOWNS
4380 ;FROM 177777 TO 0
4381 033476 000425 BR 7$ ;OUT
4382
4383 ;*NOW TIME AND TOLERANCE WILL BE CHECKED
4384 033500 017737 177614 001126 4$: MOV @#WAITRE,@#SBD0AT ;REGISTER CONTENTS FOR TYPEOUT
4385 033506 032777 000100 146464 BIT #IE,@#RHC$1 ;DID ANY INTERRUPT OCCUR
4386 033514 001402 BEQ 5$ ;BRANCH IF YES
4387 033516 104003 ERROR 3 ;INTERRUPT DID NOT OCCUR EVEN
4388 ;AFTER ONE BNE AND ONE MOV
4389 ;OF THE WAITED ON BIT SETTING
4390 BR 7$ ;OUT
4391 033522 160201 5$: SUB R2,R1 ;R1 NOW HAS LOWER LIMIT OF TIME
4392 033524 023701 033324 CMP @#WAITTM,R1 ;FOR GOOD RESULTS, WAITTM
4393 ;MUST BE GREATER OR EQUAL
4394 ;TORI

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4395 033530 103002          BHIS 6$          ;BRANCH IF GOOD
4396 033532 104004          ERROR 4          ;BIT DID OCCUR BUT TIME
4397                                ;TAKEN IS BELOW LOWER LIMIT
4398 033534 000406          BR 7$          ;OUT
4399
4400 033536 060202          6$: ADD R2,R2          ;DOUBLE TOLERANCE
4401 033540 060201          ADD R2,R1          ;R1 NOW HAS UPPER LIMIT OF TIME
4402 033542 020137 033324  CMP R1,2#WAITTM    ;FOR GOOD RESULTS, WAITTM
4403                                ;MUST BE LESS OR EQUAL TO R1
4404 033546 103001          BHIS 7$          ;BRANCH IF GOOD
4405 033550 104004          ERROR 4          ;BIT DID OCCUR BUT TIME TAKEN
4406                                ;IS ABOVE UPPER LIMIT
4407 033552          7$: RTI          ;RETURN TO MAIN TEST
4408 033562 000002
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4415                                ;THIS IS A WAIT LOOP WHEN NO P-CLOCK IS AVAILABLE
4416                                ;NO TIMING IS DONE
4417                                ;CALL IS
4418                                ;
4419                                ; WAT
4420                                ; A          ;ABSOLUTE REGISTER ADDRESS
4421                                ; B          ;BIT WAITED FOR
4422                                ; TA         ;TIME-NOT USED HERE
4423                                ; TO         ;TIME-NOT USED HERE
4424                                ;R3-IS A TEMPORARY COUNTER
4425 033564 177777          TIMCNT: 177777          ;COUNT FOR WAIT LOOP
4426 033566 000025          RPTCTR: 25          ;COUNT FOR INTERRUPT WAIT (11/70 CPU)
4427
4428
4429 033570          WAIT.T:
4430
4431 033574 016600 000004          MOV 4(SP),R0          ;R0 HAS ADDRESS OF NEXT LOCATION
4432 033600 010037 033316          MOV R0,2#WAITPC      ;WAT PC +2 IS IN WAITPC
4433 033604 162737 000002 033316  SUB #2,2#WAITPC      ;WAT PC IS IN .ITPC
4434 033612 013037 033320          MOV 2(R0)+,2#WAITRE  ;WAIT ON REGISTER ADDRESS
4435 033616 012037 033322          MOV (R0)+,2#WAITBT  ;WAIT ON BIT
4436 033622 022020          CMP (R0)+,(R0)+      ;DUMP NEXT TWO WORDS-TA, TO
4437 033624 010066 000004          MOV R0,4(SP)        ;RESTORE RETURN ON STACK
4438
4439                                ;*THIS HAS THE TWO COUNT DOWNS FROM 177777
4440
4441 033630 013703 033564          MOV 2#TIMCNT,R3      ;R3 HAS TEMPORARY COUNT
4442 033634 033777 033322 177456 1$: BIT 2#WAITBT,2#WAITRE ;IS REQUIRED BIT THERE ?
4443 033642 001025          BNE 4$              ;CHECK FOR THE INTERRUPT
4444 033644 005303          DEC R3              ;COUNT IF REQUIRED BIT NOT THERE
4445 033646 001372          BNE 1$
4446 033650 013703 033564          MOV 2#TIMCNT,R3      ;SECOND COUNT DOWN FROM 177777
4447 033654 033777 033322 177436 2$: BIT 2#WAITBT,2#WAITRE ;IS REQUIRED BIT THERE ?
4448 033662 001015          BNE 4$              ;CHECK FOR INTERRUPT
4449 033664 005303          DEC R3              ;COUNT IF REQUIRED BIT NOT THERE
4450 033666 001372          BNE 2$

```

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4451 033670 017737 177424 001126      MOV      @WAITRE,@#SBDDAT ;REGISTER CONTENTS FOR TYPEOUT
4452 033676 032777 000100 146274      BIT      #IE,@RHCS1      ;DID ANY INTERRUPT OCCUR ?
4453 033704 001402                      BEQ      3$              ;BRANCH IF YES
4454
4455 033706 104001                      ERROR    1              ;RPO4 DID NOT INTERRUPT
4456                                ;BIT DID NOT OCCUR
4457 033710 000417                      BR       5$              ;OUT ----->
4458
4459 033712 104002      3$:      ERROR    2              ;RPO4 INTERRUPTED BUT
4460                                ;WAITED ON BIT DID NOT OCCUR
4461                                ;EVEN AFTER TWO COUNT DOWNS
4462                                ;FROM 177777 TO 0
4463 033714 000415                      BR       5$              ;OUT ----->
4464
4465                                ;*BIT DID SET SO CHECK IF INTERRUPT OCCURRED
4466
4467                                ;*THE AMOUNT OF TIME ALLOWED CAN BE CHANGED BY ALTERING LOCATION
4468                                ;*"RPTCTR" ABOVE
4469
4470 033716 013703 033566      4$:      MOV      @RPTCTR,R3      ;LOAD COUNTER WITH COUNT
4471 033722 005303      6$:      DEC      R3              ;COUNT DOWN ONE
4472 033724 001376                      BNE     6$              ;DO AGAIN IF NOT ZERO YET
4473
4474
4475 033726 032777 000100 146244      BIT      #IE,@RHCS1      ;DID ANY INTERRUPT OCCUR ?
4476 033734 001405                      BEQ     5$              ;BRANCH IF YES
4477 033736 017737 177356 001126      MOV      @WAITRE,@#SBDDAT ;REGISTER CONTENTS FOR TYPEOUT
4478 033744 104003                      ERROR    3              ;INTERRUPT DID NOT OCCUR
4479                                ;EVEN AFTER ONE BNE OF
4480                                ;THE WAITED ON BIT OCCURING
4481 033746 000400                      BR       5$              ;OUT ----->
4482
4483 033750      5$:      RTI              ;RETURN TO MAIN TEST
4484 033754 000002
4485

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033762	012001	
033764	012002	
033766	162701	002172
033772	005720	
033774	001403	
033776	052061	004512
034002	000402	
034004	042061	004512
034010	005302	
034012	001367	
034020	000200	
034022		
034032	012001	
034034	012002	
034036	012003	
034040	012004	
034042	010321	
034044	060403	
034046	005302	
034050	001374	
034062	000200	

```

: THIS CHANGES REGISTER SAVED VALUE
: CALL IS
:       JSR      RO, @CHREG
:       R
:       N
:       NEW
:       P
: NEW AND P WILL BE REPEATED N NUMBER OF TIMES

CHREG:
MOV     (RO)+, R1      ; R1 HAS ADDRESS OF ADDRESS OF REGISTER
MOV     (RO)+, R2      ; R2 HAS NUMBER OF CHANGES
SUB     @RHWC, R1      ; R1 HAS OFFSET OF REQUIRED REGISTER
1$:    TST     (RO)+
       BEQ     2$
       BIS     (RO)+, SAVERE(R1) ; SET REQUIRED BIT
       BR     3$
       BIC     (RO)+, SAVERE(R1) ; CLEAR REQUIRED BIT
3$:    DEC     R2
       BNE     1$
       RTS
    
```

```

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

FILL:
MOV     (RO)+, R1      ; R1 HAS ADDRESS WHERE DATA IS TO GO
MOV     (RO)+, R2      ; R2 HAS NUMBER OF WORDS TO BE FILLED
MOV     (RO)+, R3      ; STARTING VALUE OF DATA
MOV     (RO)+, R4      ; R4 HAS INCREMENT

1$:    ; *NOW DATA WILL BE FILLED
       MOV     R3, (R1)+ ; FILL DATA
       ADD     R4, R3     ; GET NEXT VALUE OF DATA
       DEC     R2        ; DECREMENT COUNT
       BNE     1$       ; BRANCH IF ALL NOT DONE
       RTS
    
```

```

: THIS IS A SUBROUTINE TO COMPARE REGISTERS
: GOOD DATA IS ALREADY SAVED IN 'SAVERE'
    
```

```

4542 :TEST DATA IS IN THE REGISTERS
4543 :CALL IS
4544 JSR RO, @#COMREG
4545 SAVERE :GOOD DATA
4546 RHCSI :ADDRESS OF ADDRESS TEST DATA
4547 N. :RETURN FOR ERROR
4548 RG :RETURN FOR GOOD COMPARISON
4549 :ON RETURN WITH ERROR '$GDDAT' HAS GOOD DATA, '$BDDAT' HAS BAD DATA
4550 : 'REGADR' HAS REGISTER ADDRESS
4551
4552 034064 COMREG:
4553 034076 012001 MOV (RO)+, R1 ;R1 HAS ADDRESS OF GOOD DATA
4554 034100 012002 MOV (RO)+, R2 ;R2 HAS ADDRESS OF ADDRESS OF TEST DATA
4555 034102 012003 MOV (RO)+, R3 ;R3 HAS NUMBER OF WORDS
4556 034104 012004 MOV (RO)+, R4 ;R4 HAS RETURN FOR ERROR
4557 034106 011000 MOV (RO), R0 ;R0 HAS RETURN ON NO ERROR
4558 :*NOW SAVE REGISTERS
4559 034110 004737 035010 JSR PC, @#PUTREG ;SAVE REGISTERS
4560 034114 113737 004537 002301 MOVB @#SAVERE+25, @#AS+1 ;MAKE UPPER BYTE OF R HAS SAME
4561 034122 012705 177776 MOV #-2, R5 ;PRESET R5 TO -2
4562 :*NOW COMPARES WILL MADE
4563 034126 062705 000002 1$: ADD #2, R5 ;INCREMENT TO INDEX
4564 034132 022122 CMP (R1)+, (R2)+ ;COMPARE REGISTER CONTENTS
4565 034134 001420 BEQ 2$ ;BRANCH IF GOOD
4566 034136 014137 001124 MOV -(R1), @#$GDDAT ;SAVE GOOD DATA
4567 034142 014237 001126 MOV -(R2), @#$BDDAT ;SAVE BAD DATA
4568 034146 016537 002172 004500 MOV RHC(R5), @#REGADR ;SAVE ADDRESS OF FAILING REGISTER
4569 034154 004714 JSR PC, @R4 ;RETURN TO MAIN PROGRAM
4570 :TO PRINT ERROR
4571 034156 022122 CMP (R1)+, (R2)+ ;UNDO -(R1) AND -(R2) FOR ERRORS
4572 034160 017746 144754 MOV @SWR, -(SP) ;GET SWITCH SETTING
4573 034164 042716 177177 BIC #C600, (SP) ;KEEP ONLY SWITCH 7 AND 8
4574 034170 022726 000200 CMP #SW07, (SP)+ ;IS 7 SET AND 8 DOWN
4575 034174 001402 BEQ 3$ ;BRANCH OUT IF YES
4576 034176 005303 2$: DEC R3 ;ARE ALL COMPARES DONE
4577 034200 001352 BNE 1$ ;BRANCH IF NOT COMPLETE
4578
4579 034202 3$:
4580 034214 000200 RTS RO ;RETURN TO MAIN PROGRAM
4581 034216 000000 .WORD 0 ;TEMP STORAGE

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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.

034220 000000  
034222 005037 177776  
034226 012737 177777 040742  
034304 013746 004504  
034310 104402  
034350 013746 001110  
034354 104402  
034356 104401 001223  
034610 104412  
034612 062716 000002  
034616 012637 001106  
034774 104412  
034776 012637 001110  
035002 013746 001106  
035006 000002

TESTAD: 0 ;FIRST ADDRESS OF TEST  
OPERSEL:  
CLR PS ;MAKE PROCESSOR STATUS ZERO  
MOV #-1,@#PRITEM ;CLEAR PREVIOUS ITEM NUMBER  
MOV @#TSTNM,-(SP) ;GET READY TO TYPE TEST  
TYPOC ;NUMBER  
MOV @#SLPERR,-(SP) ;GET READY TO TYPE LOOP BACK PC  
TYPOC  
TYPE ,SCLF  
RDOCT  
ADD #2 (SP) ;GET LPADR  
MOV (SP)+,@#SLPADR  
RDOCT  
MOV (SP)+,@#SLPERR ;GET LPERR  
MOV @#SLPADR,-(SP)  
RTI

;\*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

035010  
035016 012700 002172  
035022 012701 002254  
035026 012702 000022

PUTREG: MOV #RHW, R0 ;STARTING ADDRESS OF REGISTERS  
MOV #WC, R1 ;STARTING ADDRESS OF SAVING LOCATIONS  
MOV #RHC-RHW+2/2, R2 ;NUMBER OF REG. INTO R2

J09

CZRJJBO RPO4.5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 113  
CZRJJB.P11 10-NOV-77 11:20 END OF PASS ROUTINE

SEQ 0113

4638	035032	013021	10S:	MOV	2(R0)+,(R1)+	;SAVE HARDWARE REG.
4639	035034	005302		DEC	R2	
4640	035036	001375		BNE	10S	
4641	035046	000207		RTS	PC	

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 4656 035054 012077 145124  
 4657 035060 012077 145106  
 4658 035064 012077 145104  
 4659 035070 013746 004616  
 4660 035074 052016  
 4661 035076 012677 145074  
 4662 035102 012077 145102  
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 4664 035106 013077 145066  
 4665 035112 000200  
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 4687 035126 012001  
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 4689 035132 012003  
 4690 035134 012005  
 4691 035136 011000  
 4692 035140 010304  
 4693 035142 005204  
 4694 035144 010437 004502  
 4695 035150 022122  
 4696 035152 001417  
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```

; THIS IS A DATA COMMAND SETUP SUBROUTINE
; THE CALL IS
; JSR      RO, @#RUN
; C
; S
; T
; -W
; B
; BAI
; FMT22!ECI!HCI
; CYLINDER
; SECTOR
; TRACK
; WORD COUNT
; BUS ADDRESS
; BUS ADDRESS INHIBIT
; FMT22=1 =16 BIT WORDS
; ECI = ECC CORRECTION INHIBIT
; HCI = HEADER COMPARE INHIBIT
; COMMAND ADDRESS
; CYLINDER
; DESIRED SECTOR/TRACK
; WORD COUNT
; BUS ADDRESS
; GET UNIT NO
; SET BUS ADDRESS INHIBIT
; UNIT NO AND BAI TO RHCS2
; FORMAT, ECC INHIBIT, HEADER
; COMPARE, IF THERE
; COMMAND IN RHCS1
; RETURN TO MAIN PROGRAM

RUN:  COM
      MOV      (RO)+, @RHCA
      MOV      (RO)+, @RHDS1
      MOV      (RO)+, @RHWC
      MOV      (RO)+, @RHBA
      MOV      @#UNIT, -(SP)
      BIS      (RO)+, (SP)
      MOV      (SP)+, @RHCS2
      MOV      (RO)+, @RHOF
      MOV      @#(RO)+, @RHCS1
      RTS      RD
    
```

```

; 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
; T
; N
; RE
; RG
; ADDRESS OF GOOD DATA
; ADDRESS OF TEST DATA
; NUMBER OF WORDS TO BE COMPARED
; RETURN ON ERROR
; RETURN ON NO ERROR
    
```

```

COMPAR: MOV      (RO)+, R1
        MOV      (RO)+, R2
        MOV      (RO)+, R3
        MOV      (RO)+, R5
        MOV      (RO), R0
        MOV      R3, R4
        INC      R4
1$:     MOV      R4, @#ERWORD
        CMP      (R1)+, (R2)+
        BEQ     2$
; ADDRESS OF GOOD DATA BUFFER
; ADDRESS OF TEST DATA BUFFER
; NO OF WORDS TO BE COMPARED
; RETURN ON ERROR
; RETURN ON NO ERROR
; NO OF WORDS TO BE COMPARED
; FOR ERROR WORD NO
; COMPARE GOOD WITH TEST DATA
; BRANCH IF GOOD
    
```

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4698 035154 014137 001124      MOV      -(R1),@#SGDDAT ;GOOD DATA
4699 035160 014237 001126      MOV      -(R2),@#SBDDAT ;BAD DATA
4700 035164 160337 004502      SUB      R3,@#ERWORD   ;ERROR WORD NO.
4701 035170 004715          JSR      PC,@#RS       ;RETURN TO PRINT ERROR
4702 035172 022122          CMP      (R1)+,(R2)+  ;UNDO -(R1) AND -(R2) FOR ERRORS
4703 035174 017746 143740      MOV      @SWR,-(SP)    ;GET SWITCH SETTING
4704 035200 042716 177177      BIC      #1C600,(SP)  ;KEEP ONLY SWITCH 7 AND 8
4705 035204 022726 000200      CMP      #SW07,(SP)+  ;IS 7 SET AND 8 RESET
4706 035210 001402          BEQ      3$           ;BRANCH OUT IF YES
4707 035212 005303          2$:     DEC      R3           ;COUNT
4708 035214 001353          BNE      1$           ;BRANCH IF ALL NOT DEVICE
4709 035216          3$:
4710 035230 000200          RTS      R0           ;RETURN TO MAIN PROGRAM
4711          ;* THIS ROUTINE WILL ALLOW THE CHANGE OF THE BASE
4712          ;* ADDRESS FROM 176700 TO ANY TYPED VALUE
4713
4714          BASECH:
4715 035232 013746 002200      MOV      @#RHCS1,-(SP) ;GET READY TO TYPE OLD BASE
4716 035312 104402          TYPOC
4717 035400 004737 037334      JSR      PC,@#STKINT  ;INITIALIZE THE TTY KEYBOARD
4718 035404 104412          RDOCT
4719 035406 012700 002170      MOV      @#RHDB,R0    ;GET STARTING ADDRESS OF REGISTERS
4720 035412 012701 000026      MOV      #22,R1       ;NUMBER OF REGISTERS
4721 035416 012737 036222 000004      MOV      @#ADTIMO,@#4 ;SET UP TRAP CATCHER FOR TEST
4722 035424 021637 002200      CMP      @SP,@#RHCS1 ;NEW ADDRESS
4723 035430 001407          BEQ      1$           ;NO, JUST OLD ONE RETYPED
4724 035432 005776 000000      TST      @0(SP)       ;DO THE ADDRESS ACCESS
4725 035436 163716 002200      SUB      @#RHCS1,@SP  ;GET THE ADDRESS OFFSET
4726 035442 061620 2$:     ADD      @SP,(R0)+    ;AND PLUG IT IN
4727 035444 005301          DEC      R1           ;ONE LESS REGISTER TO DO
4728 035446 001375          BNE      2$           ;BUT WE'RE NOT DONE YET!
4729 035450          1$:
4730 035514 013746 002166      MOV      @#RPVEC,-(SP) ;GET READY TO TYPE OLD VECTOR ADDRESS
4731 035520 104402          TYPOC
4732 035626 104412          RDOCT
4733 035630 012637 002166      MOV      (SP)+,@#RPVEC ;SETUP VECTOR ADDRESS
4734 035700 013746 002200      MOV      @#RHCS1,-(SP)
4735 035704 104402          TYPOC
4736 035752 013746 002166      MOV      @#RPVEC,-(SP)
4737 035756 104402          TYPOC
4738 036176 012746 000200      MOV      @#RA,-(SP)
4739 036202 104402          TYPOC
4740 036216 000137 004710      JMP      @#BEGIN      ;DO IT OVER AGAIN
4741 036222          ADTIMO:
4742 036300 022626          CMP      (SP)+,(SP)+ ;RESTORE STACK
4743 036302 000137 035232      JMP      @#BASECH    ;AND DO THE QUERY AGAIN!
4744

```

M09

CZRJJBO, RPO4 5/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 116  
CZRJJB.P11 10-NOV-77 11:20 END OF PASS ROUTINE

SEG 0116

4745	036306				RPVECT:	
4746	036364	104402			TYPOC	;TYPE FROM PC
4747	036366	012777	036306	143572	MOV	;RESTORE TRAP RPO4 VECTOR
4748	036374	000000			HALT	;CHANGE TO CONTINUE
4749						
4750						

N09

CZRJJBO, RPO4, S/6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 117  
CZRJJB.P11 10-NOV-77 11:20 SYSMAC LIBRARY ROUTINES

SEQ 0117

4751  
4752  
4753

.SBTTL SYSMAC LIBRARY ROUTINES

CZRIJBD RPO4 5.6 FCTNL CTRLR2  
CZRIJB.P11 10-NOV-77 11:20

MACY11 30(1046) 10-NOV-77  
TTY INPUT ROUTINE

13:16 PAGE 118

**B10**

4754

;FROM THE TTY

SEG C118

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4771 040742 000000
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4773 040744 017746 140170
4774 040750 042716 177277
4775 040754 022726 000100
4776 040760 001001
4777 040762 000402
4778 040764 000137 041704
4779
4780 040770
4781 041700 005037 040742
4782
4783 041704
4784 041704 104401 001223
4785 041710 010046
4786 041712 005000
4787 041714 153700 001114
4788 041720 001004
4789
4790 041722 013746 001116
4791
4792 041726 104402
4793 041730 000454
4794 041732 005300
4795 041734 006300
4796 041736 006300
4797 041740 006300
4798 041742 062700 001226
4799 041746 020037 040742
4800 041752 001002
4801 041754 022020
4802 041756 000420
4803 041760 010037 040742
4804 041764 012037 041774
4805 041770 001404
4806 041772 104401
4807 041774 000000
4808 041776 104401 001223
4809 042002 012037 042012
4810 042006 001404

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;*****
.SBTTL ERROR MESSAGE TYPEOUT ROUTINE

;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
;*IT IS A COPY OF THE $ERRTYP SUBROUTINE FROM SYSMAC.
;*WITH ONLY MINOR CHANGES
;*FIRST IF SWITCH 6 IS SET AND SWITCH 8 RESET THEN
;*ALL REGISTER CONTENTS WILL BE TYPED BEFORE 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.

PRITEM: 0 ;PREVIOUS ITEM NO. LOCATION

$ERRTYP: MOV 2$SWR, -(SP) ;GET SWITCH SETTING
          BIC 2$C500, (SP) ;KEEP ONLY SWITCH 8 AND 6
          CMP 2$SW06, (SP)+ ;IS 6 SET AND 8 RESET
          BNE 1$ ;IF NOT BRANCH
          BR 2$ ;BRANCH IF SW 6 IS SET AND 8 RESET
1$: JMP 2$TYPERR ;JUMP IF SW 8 IS SET
          ;OR IF SW 8 IS RESET AND SW 6 IS RESET
2$: CLR 2$PRITEM ;CLEAR PREVIOUS ERROR ITEM

TYPERR: TYPE $SCRLF ;"CARRIAGE RETURN" & "LINE FEED"
          MOV R0, -(SP) ;SAVE R0
          CLR R0 ;PICKUP THE ITEM INDEX
          BISB 2$ITEMB, R0 ;IF ITEM NUMBER IS ZERO, JUST
          BNE 1$ ;TYPE THE PC OF THE ERROR
          MOV $ERRPC, -(SP) ;SAVE $ERRPC FOR TYPEOUT
          ;ERROR ADDRESS
          GO TYPE--OCTAL ASCII(ALL DIGITS)
          GET OUT ;ADJUST THE INDEX SO THAT IT WILL
          ; WORK FOR THE ERROR TABLE

1$: BR 10$
          DEC R0
          ASL R0
          ASL R0
          ASL R0
          ADD $ERRTB, R0 ;FORM TABLE POINTER
          CMP R0, 2$PRITEM ;WAS PREVIOUS ERROR SAME
          BNE 13$ ;BRANCH IF NOT
          CMP (R0)+, (R0)+ ;POP R0 OVER EM AND DH
          BR 5$
13$: MOV R0, 2$PRITEM ;SAVE NEW ERROR ITEM
          MOV (R0)+, 2$ ;PICKUP "ERROR MESSAGE" POINTER
          BEQ 3$ ;SKIP TYPEOUT IF NO POINTER
          TYPE ;TYPE THE "ERROR MESSAGE"
          ;"ERROR MESSAGE" POINTER GOES HERE
2$: .WORD 0 ;"CARRIAGE RETURN" & "LINE FEED"
          TYPE $SCRLF ;"CARRIAGE RETURN" & "LINE FEED"
          MOV (R0)+, 4$ ;PICKUP "DATA HEADER" POINTER
          BEQ 5$ ;SKIP TYPEOUT IF 0

```



4811	042010	104401			TYPE			;TYPE THE "DATA HEADER"
4812	042012	000000		4\$:	.WORD	0		;"DATA HEADER" POINTER GOES HERE
4813	042014	104401	001223		TYPE	\$CRLF		;"CARRIAGE RETURN" & "LINE FEED"
4814	042020	010146		5\$:	MOV	R1, -(SP)		;SAVE R1
4815	042022	012001			MOV	(R0)+, R1		;PICKUP "DATA TABLE" POINTER
4816	042024	001415			BEQ	9\$		;BR IF NO DATA TO BE TYPED
4817	042026	012000			MOV	(R0)+, R0		;PICKUP "DATA FORMAT" POINTER
4818	042030	105720		6\$:	TSTB	(R0)+		;"OCTAL" OR "DECIMAL"
4819	042032	001003			BNE	7\$		;BR IF DECIMAL
4820	042034	013146			MOV	2(R1)+, -(SP)		;SAVE 2(R1)+ FOR TYPEOUT
4821	042036	104402			TYPOC			;GO TYPE--OCTAL ASCII(ALL DIGITS)
4822	042040	000402			BR	8\$		
4823	042042			7\$:				
4824	042042	013146			MOV	2(R1)+, -(SP)		;SAVE 2(R1)+ FOR TYPEOUT
4825	042044	104405			TYPOC			;GO TYPE--DECIMAL ASCII WITH SIGN
4826	042046	005711		8\$:	TST	(R1)		;IS THERE ANOTHER NUMBER?
4827	042050	001403			BEQ	9\$		;BR IF NO
4828	042052	104401	042066		TYPE	11\$		;TYPE TWO(2) SPACES
4829	042056	000764			BR	6\$		;LOOP
4830								
4831	042060	012601		9\$:	MOV	(SP)+, R1		;RESTORE R1
4832	042062	012600		10\$:	MOV	(SP)+, R0		;"CARRIAGE RETURN" & "LINE FEED"
4833	042064	000207			RTS	PC		;RETURN
4834	042066	020040	000	11\$:	.ASCIZ	/ /		;TWO(2) SPACES
4835		042072			.EVEN			

E10

CZRJJ80, RPO4.5.6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 121  
CZRJJ8.P11 10-NOV-77 11:20 ERROR MESSAGE TYPEOUT ROUTINE

SEQ 0121

4836

F10

CZRJJBO RPO4/5.6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 122  
CZRJJB.P11 10-NOV-77 11:20 POWER DOWN AND UP ROUTINES

SEG 0122

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042566 050122 032060 042040  
042574 042111 047040 052117  
042602 044440 052116 051105  
042610 052522 052120 000  
042615 052111 052116 051105  
042622 052522 052120 042440  
042630 040516 046102 020105  
042638 044502 020124 047504  
042644 047127 041040 052125  
042652 042440 050130 041505  
042660 042524 020104 044502  
042666 020124 044504 020104  
042674 047516 020124 042523  
042702 000124  
042704 050122 032060 042040  
042712 042111 047040 052117  
042720 044440 052116 051105  
042726 052522 052120 053440  
042734 042510 020116 054105  
042742 042520 052103 042105  
042750 041040 052111 042040  
042756 042111 051440 052105  
042764 000  
042765 050130 041505  
042772 042524 020104 044502  
043000 020124 044504 020104  
043006 042523 020124 052502  
043014 020124 044524 042515  
043022 044440 020123 047111  
043030 042440 051122 051117  
043036 026440 052040 046511  
043044 020105 047111 030440  
043052 020060 044515 051103  
043060 051517 041505 020056  
043066 042504 044503 040515  
043074 000114  
043076 044122 051501 042040  
043104 042517 020123 047516  
043112 020124 046103 040505  
043120 020122 054502 046440  
043126 053117 047111 020107  
043134 047111 040440 046114  
043142 047440 042516 000123  
043150 047514 042101 047111  
043156 020107 044122 051105  
043164 020061 047506 020122

\*\*\*\*\*  
: ERROR AND MESSAGE TABLE CONDIMENTS  
: \*\*\*\*\*

EM1: .ASCIZ /RPO4 DID NOT INTERRUPT/

EM2: .ASCIZ /INTERRUPT ENABLE BIT DOWN BUT EXPECTED BIT DID NOT SET/

EM3: .ASCIZ /RPO4 DID NOT INTERRUPT WHEN EXPECTED BIT DID SET/

EM4: .ASCIZ /EXPECTED BIT DID SET BUT TIME IS IN ERROR - TIME IN 10 MICROSEC. DECIMA

EM5: .ASCIZ /RHAS DOES NOT CLEAR BY MOVING IN ALL ONES/

EM6: .ASCIZ /LOADING RHER1 FOR ALL UNITS DID NOT SET ANY RHAS BITS

4894	043172	046101	020114	047125	
4895	043200	052111	020123	044504	
4896	043206	020104	047516	020124	
4897	043214	042523	020124	047101	
4898	043222	020131	044122	051501	
4899	043230	041040	052111	000123	
4900	043236	047516	020116	054105	EM7: .ASCIZ /NON EXISTENT REGISTER, PROGRAM ABORTED./
4901	043244	051511	042524	052116	
4902	043252	051040	043505	051511	
4903	043260	042524	026122	050040	
4904	043266	047522	051107	046501	
4905	043274	040440	047502	052122	
4906	043302	042105	000056		
4907	043306	052123	050117	042520	EM10: .ASCIZ /STOPPED DRIVE HAS MOL BIT IN RHDS1 SET/
4908	043314	020104	051104	053111	
4909	043322	020105	040510	020123	
4910	043330	047515	020114	044502	
4911	043336	020124	047111	051040	
4912	043344	042110	030523	051440	
4913	043352	052105	000		
4914					
4915	043355	05 127	052111	020110	EM11: .ASCIZ /WITH SPINDLE POWERED DOWN RHCS2 SHOULD ONLY HAVE UNIT NO: AND IR SET/
4916	043362	050123	047111	046104	
4917	043370	020105	047520	042527	
4918	043376	042522	020104	047504	
4919	043404	047127	051040	041510	
4920	043412	031123	051440	047510	
4921	043420	046125	020104	047117	
4922	043426	054514	044040	053101	
4923	043434	020105	047125	052111	
4924	043442	047040	035117	040440	
4925	043450	042116	044440	020122	
4926	043456	042523	000124		
4927	043462	043101	042524	020122	EM12: .ASCIZ /AFTER SPINDLE POWERED UP, NO PACK ACKN. RHDS1 SHOULD HAVE MOL=1, VV=0/
4928	043470	050123	047111	046104	
4929	043476	020105	047520	042527	
4930	043504	042522	020104	050125	
4931	043512	020054	047516	050040	
4932	043520	041501	020113	041501	
4933	043526	047113	020056	044122	
4934	043534	051504	020061	044123	
4935	043542	052517	042114	044040	
4936	043550	053101	020105	047515	
4937	043556	036514	026061	053040	
4938	043564	036526	000060		
4939	043570	044527	044124	051440	EM13: .ASCIZ /WITH SPINDLE POWERED, NO INTIALIZE, RHCS1 SHOULD HAVE GO=0, DVA=1, RDY=
4940	043576	044520	042116	042514	
4941	043604	050040	053517	051105	
4942	043612	042105	020054	047516	
4943	043620	044440	052116	040511	
4944	043626	044514	042532	020054	
4945	043634	044122	051503	020061	
4946	043642	044123	052517	042114	
4947	043650	044040	053101	020105	
4948	043656	047507	030075	020054	
4949	043664	053104	036501	026061	

4950	043672	051040	054504	030475	
4951	043700	020054	042511	030075	
4952	043706	000			
4953	043707	101	052106	051105	EM14: .ASCIZ /AFTER SPINDLE POWERED UP RHCC SHOULD BE=0/
4954	043714	051440	044520	042116	
4955	043722	042514	050040	053517	
4956	043730	051105	042105	052440	
4957	043736	020120	044122	041503	
4958	043744	051440	047510	046125	
4959	043752	020104	042502	030075	
4960	043760	000			
4961	043761	120	041501	020113	EM15: .ASCII /PACK ACKNOWLEDGE COMMAND CAUSED AN ERROR/<15><12>
4962	043766	041501	047113	053517	
4963	043774	042514	043504	020105	
4964	044002	047503	046515	047101	
4965	044010	020104	040503	051525	
4966	044016	042105	040440	020116	
4967	044024	051105	047522	006522	
4968	044032	012			
4969	044033	107	047517	020104	.ASCIZ /GOOD DATA IS BEFORE COMMAND, REC DATA IS AFTER COMMAND/
4970	044040	040504	040524	044440	
4971	044046	020123	042502	047506	
4972	044054	042522	041440	046517	
4973	044062	040515	042116	020054	
4974	044070	042522	020103	040504	
4975	044076	040524	044440	020123	
4976	044104	043101	042524	020122	
4977	044112	047503	046515	047101	
4978	044120	000104			
4979	044122	047516	047455	020120	EM16: .ASCII /NO-OP COMMAND CAUSED AN ERROR/<15><12>
4980	044130	047503	046515	047101	
4981	044136	020104	040503	051525	
4982	044144	042105	040440	020116	
4983	044152	051105	047522	006522	
4984	044160	012			
4985	044161	107	047517	020104	.ASCIZ /GOOD DATA IS BEFORE COMMAND, REC DATA IS AFTER COMMAND/
4986	044166	040504	040524	044440	
4987	044174	020123	042502	047506	
4988	044202	042522	041440	046517	
4989	044210	040515	042116	020054	
4990	044216	042522	020103	040504	
4991	044224	040524	044440	020123	
4992	044232	043101	042524	020122	
4993	044240	047503	046515	047101	
4994	044246	000104			
4995	044250	051104	053111	020105	EM17: .ASCII /DRIVE CLEAR COMMAND CAUSED AN ERROR/<15><12>
4996	044256	046103	040505	020122	
4997	044264	047503	046515	047101	
4998	044272	020104	040503	051525	
4999	044300	042105	040440	020116	
5000	044306	051105	047522	006522	
5001	044314	012			
5002	044315	107	047517	020104	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES AFTER COMMAND/
5003	044322	040504	040524	043440	
5004	044330	053111	051505	051440	
5005	044336	047510	046125	020104	

5006	044344	042502	020054	042522	
5007	044352	020103	040504	040524	
5008	044360	043440	053111	051505	
5009	044366	040440	052106	051105	
5010	044374	041440	046517	040515	
5011	044402	042116	000		
5012	044405	122	040505	026504	EM20: .ASCII /READ-IN COMMAND CAUSED AN ERROR/<15><12>
5013	044412	047111	041440	046517	
5014	044420	040515	042116	041440	
5015	044426	052501	042523	020104	
5016	044434	047101	042440	051122	
5017	044442	051117	005015		
5018	044446	047507	042117	042040	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONTENTS AFTER COMMAND/
5019	044454	052101	020101	044507	
5020	044462	042526	020123	044123	
5021	044470	052517	042114	041040	
5022	044476	026105	051040	041505	
5023	044504	042040	052101	020101	
5024	044512	044507	042526	020123	
5025	044520	042522	027107	041440	
5026	044526	047117	042524	052116	
5027	044534	020123	043101	042524	
5028	044542	020122	047503	046515	
5029	044550	047101	000104		
5030					
5031	044554	044122	051503	020061	EM21: .ASCIZ /RHCSI CONTENTS DURING COMMAND WAS IN ERROR/
5032	044562	047503	052116	047105	
5033	044570	051524	042040	051125	
5034	044576	047111	020107	047503	
5035	044604	046515	047101	020104	
5036	044612	040527	020123	047111	
5037	044620	042440	051122	051117	
5038	044626	000			
5039	044627	122	042110	030523	EM22: .ASCIZ /RHDSI CONTENTS DURING COMMAND WAS IN ERROR/
5040	044634	041440	047117	042524	
5041	044642	052116	020123	052504	
5042	044650	044522	043516	041440	
5043	044656	046517	040515	042116	
5044	044664	053440	051501	044440	
5045	044672	020116	051105	047522	
5046	044700	000122			
5047	044702	047125	047514	042101	EM23: .ASCII /UNLOAD COMMAND CAUSED AN ERROR/<15><12>
5048	044710	041440	046517	040515	
5049	044716	042116	041440	052501	
5050	044724	042523	020104	047101	
5051	044732	042440	051122	051117	
5052	044740	005015			
5053	044742	047507	042117	042040	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REGISTER CONT. AFTER COMMAND/
5054	044750	052101	020101	044507	
5055	044756	042526	020123	044123	
5056	044764	052517	042114	041040	
5057	044772	026105	051040	041505	
5058	045000	042040	052101	020101	
5059	045006	044507	042526	020123	
5060	045014	042522	044507	052123	
5061	045022	051105	041440	047117	

5062	045030	027124	040440	052106	
5063	045036	051105	041440	046517	
5064	045044	040515	042116	000	
5065	045051	117	043106	042523	EM24: .ASCII /OFFSET COMMAND CAUSED AN ERROR/<15><12>
5066	045056	020124	047503	046515	
5067	045064	047101	020104	040503	
5068	045072	051525	042105	040440	
5069	045100	020116	051105	047522	
5070	045106	006522	012		
5071	045111	107	047517	020104	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONT. AFTER COMMAND/
5072	045116	040504	040524	043440	
5073	045124	053111	051505	051440	
5074	045132	047510	046125	020104	
5075	045140	042502	020054	042522	
5076	045146	020103	040504	040524	
5077	045154	043440	053111	051505	
5078	045162	051040	043505	020056	
5079	045170	047503	052116	020056	
5080	045176	043101	042524	020122	
5081	045204	047503	046515	047101	
5082	045212	000104			
5083	045214	042522	052524	047122	EM25: .ASCII /RETURN TO CENTER LINE COMMAND CAUSED AN ERROR/<15><12>
5084	045222	052040	020117	042503	
5085	045230	052116	051105	046040	
5086	045236	047111	020105	047503	
5087	045244	046515	047101	020104	
5088	045252	040503	051525	042105	
5089	045260	040440	020116	051105	
5090	045266	047522	006522	012	
5091	045273	107	047517	020104	.ASCIZ /GOOD DATA GIVES SHOULD BE, REC DATA GIVES REG. CONT. AFTER COMMAND/
5092	045300	040504	040524	043440	
5093	045306	053111	051505	051440	
5094	045314	047510	046125	020104	
5095	045322	042502	020054	042522	
5096	045330	020103	040504	040524	
5097	045336	043440	053111	051505	
5098	045344	051040	043505	020056	
5099	045352	047503	052116	020056	
5100	045360	043101	042524	020122	
5101	045366	047503	046515	047101	
5102	045374	000104			
5103	045376	030065	020060	043117	EM26: .ASCIZ /500 OFFSET COMMANDS ONE AFTER THE OTHER CAUSED AN ERROR/
5104	045404	051506	052105	041440	
5105	045412	046517	040515	042116	
5106	045420	020123	047117	020105	
5107	045426	043101	042524	020122	
5108	045434	044124	020105	052117	
5109	045442	042510	020122	040503	
5110	045450	051525	042105	040440	
5111	045456	020116	051105	047522	
5112	045464	000122			
5113	045466	051127	052111	020105	EM27: .ASCII /WRITE HEADER AND DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
5114	045474	042510	042101	051105	
5115	045502	040440	042116	042040	
5116	045510	052101	020101	040503	
5117	045516	051525	042105	044440	



5118	045524	050115	047522	042520	
5119	045532	020122	042522	044507	
5120	045540	052123	051105	041440	
5121	045546	040510	042516	006505	
5122	045554	012			
5123	045555	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15>'12>
5124	045562	040504	040524	043440	
5125	045570	053111	051505	053440	
5126	045576	070510	020124	044123	
5127	045604	052517	042114	041040	
5128	045612	020105	044124	051105	
5129	045620	006505	012		
5130	045623	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
5131	045638	042526	020104	040504	
5132	045638	040524	043440	053111	
5133	045644	051505	053440	040510	
5134	045652	020124	040527	020123	
5135	045660	044124	051105	020105	
5136	045666	043101	042524	020122	
5137	045674	047503	046515	047101	
5138	045702	000104			
5139	045704	051127	052111	020105	EM30: .ASCIZ /WRITE HEADER AND DATA CHANGED WRITE FROM BUFFER/
5140	045712	042510	042101	051105	
5141	045720	040440	042116	042040	
5142	045726	052101	020101	044103	
5143	045734	047101	042507	020104	
5144	045742	051127	052111	020105	
5145	045750	051106	046517	041040	
5146	045756	043125	042506	000122	
5147					
5148	045764	042522	042101	044040	EM31: .ASCII /READ HEADER AND DATA CAUSED IMPROPER REGISTER CHANGE/<15>'12>
5149	045772	040505	042504	020122	
5150	046000	047101	020104	040504	
5151	046006	040524	041440	052501	
5152	046014	042523	020104	046511	
5153	046022	051120	050117	051105	
5154	046030	051040	043505	051511	
5155	046036	042524	020122	044103	
5156	046044	047101	042507	005015	
5157	046052	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5158	046060	052101	020101	044507	
5159	046066	042526	020123	044127	
5160	046074	052101	051440	047510	
5161	046102	046125	020104	042502	
5162	046110	052040	042510	042522	
5163	046116	005015			
5164	046120	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
5165	046126	042105	042040	052101	
5166	046134	020101	044507	042526	
5167	046142	020123	044127	052101	
5168	046150	053440	051501	052040	
5169	046156	042510	042522	040440	
5170	046164	052106	051105	041440	
5171	046172	046517	040515	042116	
5172	046200	000			
5173	046201	127	044522	042524	EM32: .ASCIZ /WRITE HEADER DATA FOLLOWED BY READ HEADER AND DATA CAUSED DATA ERROR

5174	046206	044040	040505	042504	
5175	046214	020122	040504	040524	
5176	046222	043040	046117	047514	
5177	046230	042527	020104	054502	
5178	046238	051040	040505	020104	
5179	046246	042510	042101	051105	
5180	046254	040440	042116	042040	
5181	046262	052101	020101	040503	
5182	046270	051525	042105	042040	
5183	046278	052101	020101	051105	
5184	046286	047522	020122		
5185	046294	047522	020101	042040	EM33: .ASCII /READ DATA CAUSED IMPROPER REGISTER CHANGE/<15><12>
5186	046302	052101	020101	040503	
5187	046310	051525	042105	044440	
5188	046318	050115	047522	042520	
5189	046326	020122	047522	044507	
5190	046334	052123	051105	041440	
5191	046342	040510	043516	006505	
5192	046350	012			
5193	046358	047517	047517	047104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5194	046366	040504	040524	043440	
5195	046374	053111	051505	053440	
5196	046382	040510	020124	044123	
5197	046390	052317	042114	041040	
5198	046398	020105	044124	051105	
5199	046406	006505	012		
5200	046414	041505	041505	044505	.ASCIZ /RECEIVED DATA GIVES WHAT WAS THERE AFTER COMMAND/
5201	046422	042526	020104	040504	
5202	046430	040524	043440	053111	
5203	046438	051505	053440	040510	
5204	046446	020124	040527	020123	
5205	046454	044124	051105	020105	
5206	046462	043101	042524	020122	
5207	046470	047503	046515	047101	
5208	046478	000104			
5209	046486	042522	042101	042040	EM34: .ASCIZ /READ DATA INCORRECT/
5210	046494	052101	020101	047111	
5211	046502	047503	051122	041505	
5212	046510	000124			
5213	046518	051127	052111	020105	EM35: .ASCII /WRITE DATA COMMAND CAUSED IMPROPER REGISTER CHANGE/<15><12>
5214	046526	040504	040524	041440	
5215	046534	046517	040515	042116	
5216	046542	041440	052501	042523	
5217	046550	020104	046511	051120	
5218	046558	050117	051105	051040	
5219	046566	043505	051511	042524	
5220	046574	020122	044103	047101	
5221	046582	042507	005015		
5222	046590	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5223	046598	052101	020101	044507	
5224	046606	042526	020123	044127	
5225	046614	052101	051440	047510	
5226	046622	046125	020104	042502	
5227	046630	052040	042510	042522	
5228	046638	005015			
5229	046646	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/

5230	046674	042105	042040	052101
5231	046702	020101	044507	042526
5232	046710	020123	042522	044507
5233	046716	052123	051105	041440
5234	046724	047117	042524	052116
5235	046732	020123	043101	042524
5236	046740	020122	047503	046515
5237	046746	047101	000104	
5238	046752	051127	052111	020105
5239	046760	040504	040524	041440
5240	046766	046517	040515	042116
5241	046774	041440	040510	043516
5242	047002	042105	053440	044522
5243	047010	042524	043040	047522
5244	047016	020115	052502	043106
5245	047024	051105	000	
5246	047027	123	042505	020113
5247	047034	047503	046515	047101
5248	047042	020104	040503	051525
5249	047050	042105	044440	050115
5250	047056	047522	042520	020122
5251	047064	042522	044507	052123
5252	047072	051105	041440	040510
5253	047100	043516	006505	012
5254	047105	107	047517	020104
5255	047112	040504	040524	043440
5256	047120	053111	051505	053440
5257	047126	040510	020124	044123
5258	047134	052517	042114	041040
5259	047142	020105	044124	051105
5260	047150	006505	012	
5261	047153	122	041505	044505
5262	047160	042526	020104	040504
5263	047166	040524	043440	053111
5264	047174	051505	051040	043505
5265	047202	051511	042524	020122
5266	047210	047503	052116	047105
5267	047216	051524	040440	052106
5268	047224	051105	051440	042505
5269	047232	020113	047503	046515
5270	047240	047101	000104	
5271	047244	051127	052111	020105
5272	047252	044103	041505	020113
5273	047260	040503	051525	042105
5274	047266	044440	050115	047522
5275	047274	042520	020122	042522
5276	047302	044507	052123	051105
5277	047310	041440	040510	043516
5278	047316	006505	012	
5279	047321	107	047517	020104
5280	047326	040504	040524	043440
5281	047334	053111	051505	053440
5282	047342	040510	020124	044123
5283	047350	052517	042114	041040
5284	047356	020105	044124	051105
5285	047364	006505	012	

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>

5286	047367	042122	041505	044505
5287	047374	042122	020104	040504
5288	047402	042122	043440	053111
5289	047410	051505	051040	043505
5290	047416	051511	042524	020122
5291	047424	047503	052116	047105
5292	047432	051524	040440	052106
5293	047440	051105	041440	046517
5294	047446	040515	042116	000
5295				
5296	047453	043114	041517	044513
5297	047460	043516	047440	052125
5298	047466	053440	044522	042524
5299	047474	041040	020131	051127
5300	047502	052111	020105	047514
5301	047510	045503	041040	052125
5302	047516	047524	020116	040503
5303	047524	051525	042105	044440
5304	047532	050115	047522	042520
5305	047540	020122	042522	044507
5306	047546	052123	051105	041440
5307	047554	040510	043516	006505
5308	047562	012		
5309	047563	107	047517	020104
5310	047570	040504	040524	043440
5311	047576	053111	051505	053440
5312	047604	040510	020124	044123
5313	047612	052517	042114	041040
5314	047620	040105	044124	051105
5315	047626	006505	012	
5316	047631	122	041505	044505
5317	047636	042526	020104	040504
5318	047644	040524	043440	053111
5319	047652	051505	051040	043505
5320	047660	051511	042524	020122
5321	047666	047503	052116	047105
5322	047674	051524	040440	052106
5323	047702	051105	053440	044522
5324	047710	042524	020123	042527
5325	047716	042522	046040	041517
5326	047724	042513	020104	052517
5327	047732	000124		
5328	047734	052101	042524	050115
5329	047742	044524	043516	052040
5330	047750	020117	051127	052111
5331	047756	020105	044527	044124
5332	047764	053440	044522	042524
5333	047772	020123	047514	045503
5334	050000	042105	047440	052125
5335	050006	041440	052501	042523
5336	050014	020104	046511	051120
5337	050022	050117	051105	051040
5338	050030	043505	051511	042524
5339	050036	020122	044103	047101
5340	050044	042507	005015	
5341	050050	047507	042117	042040

.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/

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

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

.ASCIZ /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>

5342	050056	052101	020101	044507
5343	050064	042526	020123	044127
5344	050072	052101	051440	047510
5345	050100	046125	020104	042502
5346	050106	052101	042510	042522
5347	050114	0505015		
5348	050116	042522	042503	053111
5349	050124	042105	042040	052101
5350	050132	020101	044507	042526
5351	050140	020123	042522	044507
5352	050146	042123	051105	047540
5353	050154	047117	042524	052116
5354	050162	020123	043101	042524
5355	050170	020122	052101	042524
5356	050176	050115	042524	020104
5357	050204	051127	052111	000105
5358	050212	051127	052111	047111
5359	050220	020107	044527	044124
5360	050226	053440	044522	042524
5361	050234	020123	047514	045503
5362	050242	042105	047440	052125
5363	050250	041440	040510	043516
5364	050256	042105	042040	051511
5365	050264	020113	040504	040524
5366	050272	0505015		
5367	050274	047507	042117	042040
5368	050302	052101	020101	044507
5369	050310	042526	020123	044127
5370	050316	052101	053440	051501
5371	050324	047440	020116	044504
5372	050332	045523	041040	043105
5373	050340	051117	020105	051127
5374	050346	052111	020105	044527
5375	050354	044124	053440	044522
5376	050362	042524	046040	041517
5377	050370	042513	020104	052517
5378	050376	006524	012	
5379	050401	127	051501	040440
5380	050406	052124	046505	052120
5381	050414	042105	005015	
5382	050420	042522	042503	053111
5383	050426	042105	042040	052101
5384	050434	020101	044507	042526
5385	050442	020123	044127	052101
5386	050450	053440	051501	051040
5387	050456	040505	020104	040502
5388	050464	045503	040440	052106
5389	050472	051105	053440	044522
5390	050500	042524	005015	
5391	050504	044527	044124	053440
5392	050512	044522	042524	046040
5393	050520	041517	042513	020104
5394	050526	052517	020124	040527
5395	050534	020123	052101	042524
5396	050542	050115	042524	000104
5397	050550	047105	041101	044514

.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED WRITE/

EM43: .ASCII /WRITING WITH WRITES LOCKED OUT CHANGED DISK DATA/<15><12>

.ASCII /GOOD DATA GIVES WHAT WAS ON DISK BEFORE WRITE WITH WRITE LOCKED OUT/<15>

.ASCII /WAS ATTEMPTED/<15><12>

.ASCII /RECEIVED DATA GIVES WHAT WAS READ BACK AFTER WRITE/<15><12>

.ASCIZ /WITH WRITE LOCKED OUT WAS ATTEMPTED/

EM44: .ASCII /ENABLING WRITES BY WRITE LOCK BUTTON CAUSED IMPROPER REGISTER CHANGE/<1

5398	050556	043516	053440	044522
5399	050564	042524	020123	054502
5400	050572	053440	044522	042524
5401	050600	046040	041517	020113
5402	050606	052502	052124	047117
5403	050614	041440	052501	042523
5404	050622	020104	046511	051120
5405	050630	050117	051105	051040
5406	050636	043505	051511	042524
5407	050644	020122	044103	047101
5408	050652	042507	005015	
5409	050656	047507	042117	042040
5410	050664	052101	020101	044507
5411	050672	042526	020123	044127
5412	050700	052101	051440	047510
5413	050706	046125	020104	042502
5414	050714	052040	042510	042522
5415	050722	005015		
5416	050724	042522	042503	053111
5417	050732	042105	042040	052101
5418	050740	020101	044507	042526
5419	050746	020123	042522	044507
5420	050754	052123	051105	041440
5421	050762	047117	042524	052116
5422	050770	020123	043101	042524
5423	050776	020122	051127	052111
5424	051004	020105	047514	045503
5425	051012	041040	052125	047524
5426	051020	006516	012	
5427	051023	105	040516	046102
5428	051030	042105	053440	044522
5429	051036	042524	000123	
5430	051042	051124	047101	043123
5431	051050	051105	044522	043516
5432	051056	047440	020116	040514
5433	051064	052123	041040	047514
5434	051072	045503	026440	041440
5435	051100	046131	047111	042504
5436	051106	020122	030464	027060
5437	051114	026440	034040	032061
5438	051122	026056	051440	041505
5439	051130	047524	020122	030462
5440	051136	020054	005015	
5441	051142	051124	041501	020113
5442	051150	034061	020054	040503
5443	051156	051525	042105	044440
5444	051164	050115	047522	042520
5445	051172	020122	042522	044507
5446	051200	052123	051105	041440
5447	051206	040510	043516	006505
5448	051214	012		
5449	051215	107	047517	020104
5450	051222	040504	040524	043440
5451	051230	053111	051505	053440
5452	051236	040510	020124	044123
5453	051244	052517	042114	041040

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

.ASCII /RECEIVED DATA GIVES REGISTER CONTENTS AFTER WRITE LOCK BUTTON/<15><12>

.ASCIZ /ENABLED WRITES/

EM45: .ASCII /TRANSFERRING ON LAST BLOCK - CYLINDER 410. - 814., SECTOR 21, /<15><12>

.ASCII /TRACK 18, CAUSED IMPROPER REGISTER CHANGE/<15><12>

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

5454	051252	020105	044124	051105	
5455	051260	006505	012		
5456	051263	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER TRANSFER/
5457	051270	042526	020104	040504	
5458	051276	040524	043440	053111	
5459	051304	051505	051040	043505	
5460	051312	051511	042524	020122	
5461	051320	047503	052116	047105	
5462	051326	051524	040440	052106	
5463	051334	051105	052040	040522	
5464	051342	051516	042506	000122	
5465	051350	040504	040524	051040	EM46: .ASCII /DATA READ FROM LAST BLOCK - CYLINDER 410. - 814., SECTOR 21, /<15><12>
5466	051356	040505	020104	051106	
5467	051364	046517	046040	051501	
5468	051372	020124	046102	041517	
5469	051400	020113	020055	054503	
5470	051406	044514	042116	051105	
5471	051414	032040	030061	020056	
5472	051422	020055	030470	027064	
5473	051430	020054	042523	052103	
5474	051436	051117	031040	026061	
5475	051444	005015			
5476	051446	051124	041501	020113	.ASCIZ /TRACK 18, IS IN ERROR/
5477	051454	034061	020054	051511	
5478	051462	044440	020116	051105	
5479	051470	047522	000122		
5480	051474	051124	047101	043123	EM47: .ASCII /TRANSFERRING DATA FROM NONEXISTANT SECTOR CAUSED IMPROPER /<15><12>
5481	051502	051105	044522	043516	
5482	051510	042040	052101	020101	
5483	051516	051106	046517	047040	
5484	051524	047117	054105	051511	
5485	051532	040524	052116	051440	
5486	051540	041505	047524	020122	
5487	051546	040503	051525	042105	
5488	051554	044440	050115	047522	
5489	051562	042520	020122	005015	
5490	051570	042522	044507	052123	.ASCII /REGISTER CHANGE, GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5491	051576	051105	041440	040510	
5492	051604	043516	026105	043440	
5493	051612	047517	020104	040504	
5494	051620	040524	043440	053111	
5495	051626	051505	053440	040510	
5496	051634	020124	044123	052517	
5497	051642	042114	041040	020105	
5498	051650	044124	051105	006505	
5499	051656	012			
5500	051657	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED TRANSFER/
5501	051664	042526	020104	040504	
5502	051672	040524	043440	053111	
5503	051700	051505	051040	043505	
5504	051706	051511	042524	020122	
5505	051714	047503	052116	047105	
5506	051722	051524	040440	052106	
5507	051730	051105	040440	052124	
5508	051736	046505	052120	042105	
5509	051744	052040	040522	051516	

5510	051752	042506	000122			
5511	051756	051124	047101	043123	EM50:	.ASCII /TRANSFERRING FROM NONEXISTANT SECTOR CAUSED DATA ERROR/<15><12>
5512	051764	051105	044522	043516		
5513	051772	043040	047522	020115		
5514	052000	047516	042516	044530		
5515	052006	052123	047101	020124		
5516	052014	042523	052103	051117		
5517	052022	041440	052501	042523		
5518	052030	020104	040504	040524		
5519	052036	042440	051122	051117		
5520	052044	005015				
5521	052046	047507	042117	042040		.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5522	052054	052101	020101	044507		
5523	052062	042526	020123	044127		
5524	052070	052101	051440	047510		
5525	052076	046125	020104	042502		
5526	052104	052040	042510	042522		
5527	052112	005015				
5528	052114	040502	020104	040504		.ASCIZ /BAD DATA GIVES WHAT WAS IN BUFFER AFTER TRANSFER/
5529	052122	040524	043440	053111		
5530	052130	051505	053440	040510		
5531	052136	020124	040527	020123		
5532	052144	047111	041040	043125		
5533	052152	042506	020122	043101		
5534	052160	042524	020122	051124		
5535	052166	047101	043123	051105		
5536	052174	000				
5537						
5538	052175	107	053111	047111	EM51:	.ASCII /GIVING ILLEGAL FUNCTION CAUSED IMPROPER REGISTER CHANGE/<15><12>
5539	052202	020107	046111	042514		
5540	052210	040507	020114	052506		
5541	052216	041516	044524	047117		
5542	052224	041440	052501	042523		
5543	052232	020104	046511	051120		
5544	052240	050117	051105	051040		
5545	052246	043505	051511	042524		
5546	052254	020122	044103	047101		
5547	052262	042507	005015			
5548	052266	047507	042117	042040		.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<15><12>
5549	052274	052101	020101	044507		
5550	052302	042526	020123	044127		
5551	052310	052101	051440	047510		
5552	052316	046125	020104	042502		
5553	052324	052040	042510	042522		
5554	052332	005015				
5555	052334	042522	042503	053111		.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ILLEGAL FUNCTION IS GIVEN/
5556	052342	042105	042040	052101		
5557	052350	020101	044507	042526		
5558	052356	020123	042522	044507		
5559	052364	052123	051105	041440		
5560	052372	047117	042524	052116		
5561	052400	020123	043101	042524		
5562	052406	020122	046111	042514		
5563	052414	040507	020114	052506		
5564	052422	041516	044524	047117		
5565	052430	044440	020123	044507		



5566	052436	042526	000116		
5567	052442	051127	052111	020105	EMS2: .ASCII /WRITE DATA ON NONEXISTANT SECTOR CAUSED IMPROPER REGISTER CHANGE/'15'<1
5568	052450	040504	040524	047440	
5569	052456	020116	047516	042516	
5570	052464	044530	052123	047101	
5571	052472	020124	042523	052103	
5572	052500	051117	041440	052501	
5573	052506	042523	020104	046511	
5574	052514	051120	050117	051105	
5575	052522	051040	043505	051511	
5576	052530	042524	020122	044103	
5577	052536	047101	042507	005015	
5578	052544	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/'15'<12>
5579	052552	052101	020101	044507	
5580	052560	042526	020123	044127	
5581	052566	052101	051440	047510	
5582	052574	046125	020104	042502	
5583	052602	052040	042510	042522	
5584	052610	005015			
5585	052612	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED WRITE DATA/
5586	052620	042105	042040	052101	
5587	052626	020101	044507	042526	
5588	052634	020123	042522	044507	
5589	052642	052123	051105	041440	
5590	052650	047117	042524	052116	
5591	052656	020123	043101	042524	
5592	052664	020122	052101	042524	
5593	052672	050115	042524	020104	
5594	052700	051127	052111	020105	
5595	052706	040504	040524	000	
5596	052713	122	040505	020104	EMS3: .ASCIZ /READ HEADER AND DATA AFTER A SEARCH CAUSED DATA ERROR/
5597	052720	042510	042101	051105	
5598	052726	040440	042116	042040	
5599	052734	052101	020101	043101	
5600	052742	042524	020122	020101	
5601	052750	042523	051101	044103	
5602	052756	041440	052501	042523	
5603	052764	020104	040504	040524	
5604	052772	042440	051122	051117	
5605	053000	000			
5606	053001	101	052124	046505	EMS4: .ASCII /ATTEMPTING COMMAND WITH INVALID ADDRESS CAUSED IMPROPER REGISTER CHANGE
5607	053006	052120	047111	020107	
5608	053014	047503	046515	047101	
5609	053022	020104	044527	044124	
5610	053030	044440	053116	046101	
5611	053036	042111	040440	042104	
5612	053044	042522	051523	041440	
5613	053052	052501	042523	020104	
5614	053060	046511	051120	050117	
5615	053066	051105	051040	043505	
5616	053074	051511	042524	020122	
5617	053102	044103	047101	042507	
5618	053110	005015			
5619	053112	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/'15'<12>
5620	053120	052101	020101	044507	
5621	053126	042526	020123	044127	

5622	053134	052101	051440	047510
5623	053142	046125	020104	042502
5624	053150	052040	042510	042522
5625	053156	005015		
5626	053160	042522	042503	053111
5627	053166	042105	042040	052101
5628	053174	020101	044507	042526
5629	053202	020123	042522	044507
5630	053210	052123	051105	041440
5631	053216	047117	042524	052116
5632	053224	020123	043101	042524
5633	053232	020122	050117	051105
5634	053240	052101	047511	000116
5635	053246	051127	052111	047111
5636	053254	020107	051117	051040
5637	053262	040505	044504	043516
5638	053270	053440	052111	020110
5639	053276	054105	042520	052103
5640	053304	042105	040440	042104
5641	053312	042522	051523	047440
5642	053320	042526	043122	047514
5643	053326	020127	051105	047522
5644	053334	006522	012	
5645	053337	103	052501	042523
5646	053344	020104	046511	051120
5647	053352	050117	051105	051040
5648	053360	043505	051511	042524
5649	053366	020122	044103	047101
5650	053374	042507	005015	
5651	053400	047507	042117	042040
5652	053406	052101	020101	044507
5653	053414	053414	042526	020123
5654	053422	052101	051440	047510
5655	053430	046125	020104	042502
5656	053436	052040	042510	042522
5657	053444	005015		
5658	053446	042522	042503	053111
5659	053454	042105	042040	052101
5660	053462	020101	044507	042526
5661	053470	020123	042522	044507
5662	053476	052123	051105	041440
5663	053504	047117	042524	052116
5664	053512	020123	043101	042524
5665	053520	020122	050117	051105
5666	053526	052101	047511	000116
5667	053534	040504	040524	051040
5668	053542	040505	020104	044527
5669	053550	044124	040440	020116
5670	053556	054105	042520	052103
5671	053564	042105	040440	042104
5672	053572	042522	051523	047440
5673	053600	042526	043122	047514
5674	053606	020127	051105	047522
5675	053614	020122	051511	044440
5676	053622	041516	051117	042522
5677	053630	052103	005015	

.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER OPERATION/

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>

5678	053634	047527	042122	047040
5679	053642	027117	030440	052040
5680	053650	020117	033062	020060
5681	053656	044123	052517	042114
5682	053664	041040	020105	042522
5683	053672	042101	020054	047527
5684	053700	042122	047040	020117
5685	053706	033062	020061	047524
5686	053714	031040	033066	051440
5687	053722	047510	046125	006504
5688	053730	012		
5689	053731	102	020105	044103
5690	053736	047101	042507	000104
5691	053744	052101	042524	050115
5692	053752	044524	043516	042040
5693	053760	052101	020101	047503
5694	053766	046515	047101	020104
5695	053774	044527	044124	053440
5696	054002	047522	043516	043040
5697	054010	051117	040515	020124
5698	054016	044502	020124	040503
5699	054024	051525	042105	005015
5700	054032	046511	051120	050117
5701	054040	051105	051040	043505
5702	054046	051511	042524	020122
5703	054054	044103	047101	042507
5704	054062	005015		
5705	054064	047507	042117	042040
5706	054072	052101	020101	044507
5707	054100	042526	020123	044127
5708	054106	052101	051440	047510
5709	054114	046125	020104	042502
5710	054122	052040	042510	042522
5711	054130	005015		
5712	054132	042522	042503	053111
5713	054140	042105	042040	052101
5714	054146	020101	044507	042526
5715	054154	020123	042522	044507
5716	054162	052123	051105	041440
5717	054170	047117	042524	052116
5718	054176	020123	043101	042524
5719	054204	020122	052101	042524
5720	054212	050115	042524	020104
5721	054220	040504	040524	052040
5722	054226	040522	051516	042506
5723	054234	000122		
5724	054236	052101	042524	050115
5725	054244	044524	043516	052040
5726	054252	020117	047515	044504
5727	054260	054506	051040	043505
5728	054266	051511	042524	020122
5729	054274	052504	044522	043516
5730	054302	040440	020116	050117
5731	054310	051105	052101	047511
5732	054316	020116	040503	051525
5733	054324	042105	044440	050115

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

.ASCIZ /BE CHANGED/

EM57: .ASCII /ATTEMPTING DATA COMMAND WITH WRONG FORMAT BIT CAUSED/'15'12'

.ASCII /IMPROPER REGISTER CHANGE/'15'12'

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

.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER ATTEMPTED DATA TRANSFER/

EM60: .ASCII /ATTEMPTING TO MODIFY REGISTER DURING AN OPERATION CAUSED IMPROPER '15'12'

5734	054332	047522	042520	006522	
5735	054340	012			
5736	054341	122	043505	051511	.ASCII /REGISTER CHANGE. GOOD DATA GIVES WHAT SHOULD BE THERE/15<<12>
5737	054346	042524	020122	044103	
5738	054354	047101	042507	020056	
5739	054362	047507	042117	042040	
5740	054370	052101	020101	044507	
5741	054376	042526	020123	044127	
5742	054404	052101	051440	047510	
5743	054412	046125	020104	042502	
5744	054420	052040	042510	042522	
5745	054426	005015			
5746	054430	042522	042503	053111	.ASCII /RECEIVED DATA GIVES REGISTER CONTENTS AFTER OPERATION WAS ATTEMPTED/15
5747	054436	042105	042040	052101	
5748	054444	020101	044507	042526	
5749	054452	020123	042522	044507	
5750	054460	052123	051105	041440	
5751	054466	047117	042524	052116	
5752	054474	020123	043101	042524	
5753	054502	020122	050117	051105	
5754	054510	052101	047511	020116	
5755	054516	040527	020123	052101	
5756	054524	042524	050115	042524	
5757	054532	006504	012		
5758	054535	115	042117	044506	.ASCIZ /MODFING REG GIVES ADDRESS OF REGISTER BEING MODIFIED WHICH CAUSED ERROR
5759	054542	043516	051040	043505	
5760	054550	043440	053111	051505	
5761	054556	040440	042104	042522	
5762	054564	051523	047440	020106	
5763	054572	042522	044507	052123	
5764	054600	051105	041040	044505	
5765	054606	043516	046440	042117	
5766	054614	043111	042511	020104	
5767	054622	044127	041511	020110	
5768	054630	040503	051525	042105	
5769	054636	042440	051122	051117	
5770	054644	000			
5771					
5772	054645	104	053105	041511	EM61: .ASCIZ /DEVICE NOT AVAILABLE BEFORE COMMAND WAS TO BE GIVEN/
5773	054652	020105	047516	020124	
5774	054660	053101	044501	040514	
5775	054666	046102	020105	042502	
5776	054674	047506	042522	041440	
5777	054702	046517	040515	042116	
5778	054710	053440	051501	052040	
5779	054716	020117	042502	043440	
5780	054724	053111	047105	000	
5781	054731	122	042110	030523	EM63: .ASCIZ /RHDS1 CONTENTS DURING COMMAND WAS IN ERROR/
5782	054736	041440	047117	042524	
5783	054744	052116	020123	052504	
5784	054752	044522	043516	041440	
5785	054760	046517	040515	042116	
5786	054766	053440	051501	044440	
5787	054774	020116	051105	047522	
5788	055002	000122			
5789	055004	042522	040503	044514	EM64: .ASCII /RECALIBRATE COMMAND CAUSED IMPROPER REGISTER CHANGE/15<<12>

5790	055012	051102	052101	020105	
5791	055020	047503	046515	047101	
5792	055026	020104	040503	051525	
5793	055034	042105	044440	050115	
5794	055042	047522	042520	020122	
5795	055050	042522	044557	052123	
5796	055056	051105	041440	040510	
5797	055064	043516	006505	012	
5798	055071	107	047517	020104	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<<15><12>
5799	055076	040504	040524	043440	
5800	055104	053111	051505	053440	
5801	055112	040510	020124	044123	
5802	055120	052517	042114	041040	
5803	055126	020105	044124	051105	
5804	055134	006505	012		
5805	055137	122	041505	044505	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER COMMAND/
5806	055144	042526	020104	040504	
5807	055152	040524	043440	053111	
5808	055160	051505	051040	043505	
5809	055166	051511	042524	020122	
5810	055174	047503	052116	047105	
5811	055202	051524	040440	052106	
5812	055210	051105	041440	046517	
5813	055216	040515	042116	000	
5814	055223	111	052116	051105	EM65: .ASCIZ /INTERRUPT FAILING/
5815	055230	052522	052120	043040	
5816	055236	044501	044514	043516	
5817	055244	000			
5818	055245	110	040505	042504	EM66: .ASCII /HEADER AND DATA COMMAND FOR HEAD SELECTION TEST/<<15><12>
5819	055252	020122	047101	020104	
5820	055260	040504	040524	041440	
5821	055266	046517	040515	042116	
5822	055274	043040	051117	044040	
5823	055302	040505	020104	042523	
5824	055310	042514	052103	047511	
5825	055316	020116	042524	052123	
5826	055324	005015			
5827	055326	040503	051525	042105	.ASCII /CAUSED ERROR/<<15><12>
5828	055334	042440	051122	051117	
5829	055342	005015			
5830	055344	044122	051504	020124	.ASCII /RHDST GIVES WHAT TRACK WAS BEING WRITTEN OR READ/<<15><12>
5831	055352	044507	042526	020123	
5832	055360	044127	052101	052040	
5833	055366	040522	045503	053440	
5834	055374	051501	041040	044505	
5835	055402	043516	053440	044522	
5836	055410	052124	047105	047440	
5837	055416	020122	042522	042101	
5838	055424	005015			
5839	055426	047117	041440	046131	.ASCIZ /ON CYLINDER 0, SECTOR 0/
5840	055434	047111	042504	020122	
5841	055442	026060	051440	041505	
5842	055450	047524	020122	000060	
5843	055456	042522	042101	044040	EM67: .ASCII /READ HEADER AND DATA ERROR IN HEAD SELECTION TEST/<<12><15>
5844	055464	040505	042504	020122	
5845	055472	047101	020104	040504	

5846	055500	040524	042440	051122	
5847	055506	051117	044440	020116	
5848	055514	042510	042101	051440	
5849	055522	046105	041505	044524	
5850	055530	047117	052040	051505	
5851	055536	005124	05 015		
5852	055541	106	051111	052123	.ASCII /FIRST FOUR WORD NUMBERS ARE HEADER/<12><15>
5853	055546	043040	052517	020122	
5854	055554	047527	042122	047040	
5855	055562	046525	042502	051522	
5856	055570	040440	042522	044040	
5857	055576	040505	042504	005122	
5858	055604	015			
5859	055605	127	051117	020104	.ASCII /WORD NUMBERS 5 TO 260 ARE DATA WORDS/<12><15>
5860	055612	052516	041115	051105	
5861	055620	020123	020065	047524	
5862	055626	031040	030066	040440	
5863	055634	042522	042040	052101	
5864	055642	020101	047527	042122	
5865	055650	005123	015		
5866	055653	111	020116	040504	.ASCIZ /IN DATA WORDS BITS 4,5,6,7,8 GIVE TRACK NUMBER/
5867	055660	040524	053440	051117	
5868	055666	051504	041040	052111	
5869	055674	020123	026064	026065	
5870	055702	026066	026067	020070	
5871	055710	044507	042526	052040	
5872	055716	040522	045503	047040	
5873	055724	046525	042502	000122	
5874					
5875	055732	042522	042101	044040	EM70: .ASCII /READ HEADER AND DATA ERROR IN/<15><12>
5876	055740	040505	042504	020122	
5877	055746	047101	020104	040504	
5878	055754	040524	042440	051122	
5879	055762	051117	044440	006516	
5880	055770	012			
5881	055771	104	043111	042506	.ASCII /DIFFERENCE LINE TEST/<15><12>
5882	055776	042522	041516	020105	
5883	056004	044514	042516	052040	
5884	056012	051505	006524	012	
5885	056017	127	051117	020104	.ASCII /WORD NOS 1-4 GIVE HEADER/<15><12>
5886	056024	047516	020123	026461	
5887	056032	020064	044507	042526	
5888	056040	044040	040505	042504	
5889	056046	006522	012		
5890	056051	127	051117	020104	.ASCIZ /WORD NOS 5-260 GIVE DATA WHICH IS THE CYLINDER ADDRESS/
5891	056056	047516	020123	026465	
5892	056064	033062	020060	044507	
5893	056072	042526	042040	052101	
5894	056100	020101	044127	041511	
5895	056106	020110	051511	052040	
5896	056114	042510	041440	046131	
5897	056122	047111	042504	020122	
5898	056130	042101	051104	051505	
5899	056136	000123			
5900	056140	047506	041522	047111	EM71: .ASCII /FORCING OPI BY 3 INDEX PULSES/<15><12>
5901	056146	020107	050117	020111	

5902	056154	054502	031440	044440	
5903	056162	042116	054105	050040	
5904	056170	046125	042523	006523	
5905	056176	012			
5906	056177	103	052501	042523	.ASCII /CAUSED IMPROPER REGISTER CHANGE/<<15><12>
5907	056204	020104	046511	051120	
5908	056212	050117	051105	051040	
5909	056220	043505	051511	042524	
5910	056226	020122	044103	047101	
5911	056234	042507	005015		
5912	056240	047507	042117	042040	.ASCII /GOOD DATA GIVES WHAT SHOULD BE THERE/<<15><12>
5913	056246	052101	020101	044507	
5914	056254	042526	020123	044127	
5915	056262	052101	051440	047510	
5916	056270	046125	020104	042502	
5917	056276	052040	042510	042522	
5918	056304	005015			
5919	056306	042522	042503	053111	.ASCIZ /RECEIVED DATA GIVES REGISTER CONTENTS AFTER 3 INDEX PULSES/
5920	056314	042105	042040	052101	
5921	056322	020101	044777	042526	
5922	056330	020123	042522	044507	
5923	056336	052123	051105	041440	
5924	056344	047117	042524	052116	
5925	056352	020123	043101	042524	
5926	056360	020122	020063	047111	
5927	056366	042504	020130	052520	
5928	056374	0514	051505	000	
5929	056401	124	042510	042522	EM72: .ASCII /THERE WAS A SETUP ERROR DURING MULTIPLE WRITE/<<15><12>
5930	056406	053440	051501	040440	
5931	056414	051440	052105	050125	
5932	056422	042440	051122	051117	
5933	056430	042040	051125	047111	
5934	056436	020107	052515	052114	
5935	056444	050111	042514	053440	
5936	056452	044522	042524	005015	
5937	056460	042510	042101	051105	.ASCII /HEADER AND DATA COMMANDS RESULTING IN AN ABORT/<<15><12>
5938	056466	040440	042116	042040	
5939	056474	052101	020101	047503	
5940	056502	046515	047101	051504	
5941	056510	051040	051505	046125	
5942	056516	044524	043516	044440	
5943	056524	020116	047101	040440	
5944	056532	047502	052122	005015	
5945	056540	043117	052040	044510	.ASCII /OF THIS 'OPI' TEST./<<15><12><15><12>
5946	056546	020123	047447	044520	
5947	056554	020047	042524	052123	
5948	056562	006456	006412	012	
5949	056567	124	020117	051124	.ASCIZ /TO TROUBLE SHOOT SETUP ERROR, LOOP ON THIS TEST/
5950	056574	052517	046102	020105	
5951	056602	044123	047517	020124	
5952	056610	042523	052524	020120	
5953	056616	051105	047522	026122	
5954	056624	046040	047517	020120	
5955	056632	047117	052040	044510	
5956	056640	020123	042524	052123	
5957	056646	000			

5958	056647	122	040505	020104	EM73: .ASCII /READ HEADER AND DATA FOR 11960 WORDS /<15><12>
5959	056654	042510	042101	051105	
5960	056662	040440	042116	042040	
5961	056670	052101	020101	047506	
5962	056676	020122	030461	033071	
5963	056704	020060	047527	042122	
5964	056712	020123	005015		
5965	056716	044124	052101	044440	.ASCII /THAT IS 46 SECTORS /<15><12>
5966	056724	020123	033064	051440	
5967	056732	041505	047524	051522	
5968	056740	006440	012		
5969	056743	124	040510	020124	.ASCIZ /THAT IS OVER 3 INDEX PULSES CAUSED AN ERROR/
5970	056750	051511	047440	042526	
5971	056756	020122	020063	047111	
5972	056764	042504	020130	052520	
5973	056772	051514	051505	041440	
5974	057000	052501	042523	020104	
5975	057006	047101	042440	051122	
5976	057014	051117	000		
5977	057017	122	040505	020104	EM74: .ASCII /READ HEADER AND DATA FOR 11960 WORDS /<15><12>
5978	057024	042510	042101	051105	
5979	057032	040440	042116	042040	
5980	057040	052101	020101	047506	
5981	057046	020122	030461	033071	
5982	057054	020060	047527	042122	
5983	057062	020123	005015		
5984	057066	044124	052101	044440	.ASCII /THAT IS 46 SECTORS, THAT IS OVER 3 INDEX /<15><12>
5985	057074	020123	033064	051440	
5986	057102	041505	047524	051522	
5987	057110	020054	044124	052101	
5988	057116	044440	020123	053117	
5989	057124	051105	031440	044440	
5990	057132	042116	054105	006440	
5991	057140	012			
5992	057141	120	046125	042523	.ASCIZ /PULSES CAUSED OPI TO SET/
5993	057146	020123	040503	051525	
5994	057154	042105	047440	044520	
5995	057162	052040	020117	042523	
5996	057170	000124			



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5997
5998 057172 040507 040524 020114 CPHALT: .ASCII /FATAL ERROR - SEE DOCUMENT LISTING (15)(12)
5999 057200 051106 047522 020122
6000 057206 020055 042523 020105
6001 057214 047504 052503 042515
6002 057222 052116 046040 051511
6003 057230 044524 043516 005015
6004 057236 006440 103412 177777 .ASCII / ((15)(12)(207)(377)(377)(207)(377)(377)(207)(377)(377)
6005 057244 177607 103777 177777
6006 057252 044124 020105 047503 .ASCII /THE CONTROLLER OR DEVICE HAS GONE OFFLINE, LOST(15)(12)
6007 057260 052116 047522 046114
6008 057266 051105 047440 020122
6009 057274 042504 044526 042503
6010 057302 044040 051501 043440
6011 057310 047117 020105 043117
6012 057316 046106 047111 026105
6013 057324 046040 051517 006524
6014 057332 012
6015 057333 047 042522 042101 .ASCII /'READY', BECOME UNAVAILABLE, OR HAS STATUS BITS/(15)(12)
6016 057340 023531 020054 042502
6017 057346 047503 042515 052440
6018 057354 040516 040526 046111
6019 057362 041101 042514 020054
6020 057370 051117 044040 051501
6021 057376 051440 040524 052524
6022 057404 020123 044502 051524
6023 057412 005015
6024 057414 044127 041511 020110 .ASCII /WHICH CANNOT BE CLEARED/
6025 057422 040503 047116 052117
6026 057430 041040 020105 046103
6027 057436 040505 042522 000104
6028
6029
6030
6031 057444 041520 020040 020040 DH1: .ASCII /PC TEST WAIT BIT REG REG RHCS1/(15)(12)
6032 057452 020040 042524 052123
6033 057460 020040 020040 040527
6034 057466 052111 020040 020040
6035 057474 044502 020124 020040
6036 057502 020040 042522 020107
6037 057510 020040 020040 042522
6038 057516 020107 020040 020040
6039 057524 044122 051503 006461
6040 057532 012
6041 057533 040 020040 020040 .ASCII / NO PC EXPCTD ADDRESS CONTENT CONTENT /
6042 057540 020040 047040 020117
6043 057546 020040 020040 050040
6044 057554 020103 020040 020040
6045 057562 042440 050130 052103
6046 057570 020104 040440 042104
6047 057576 042522 051523 041440
6048 057604 047117 042524 052116
6049 057612 041440 047117 042524
6050 057620 052116 000011
6051 057624 041520 020040 020040 DH4: .ASCII /PC TEST WAIT BIT REG TIME IN/(15)(12)
6052 057632 020040 042524 052123

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6053	057640	020040	020040	040527						
6054	057646	052111	020040	020040						
6055	057654	044502	020124	020040						
6056	057662	020040	042522	020107						
6057	057670	020040	020040	044524						
6058	057676	042515	044440	006516						
6059	057704	012								
6060	057705	040	020040	020040	.ASCIZ /	NO	PC	EXPCTD	ADDRESS 10 MSEC/	
6061	057712	020040	047040	020117						
6062	057720	020040	020040	050040						
6063	057726	020103	020040	020040						
6064	057734	042440	050130	052103						
6065	057742	020104	040440	042104						
6066	057750	042522	051523	030440						
6067	057756	020060	051515	041505						
6068	057764	000								
6069	057765	120	020103	020040	DH5:	.ASCII /PC	TEST	REG	GOOD	RECEIVED/<15><12>
6070	057772	020040	052040	051505						
6071	060000	020124	020040	051040						
6072	060006	043505	020040	020040						
6073	060014	043440	047517	020104						
6074	060022	027040	051040	041505						
6075	060030	041505	042526	006504						
6076	060036	012								
6077	060037	040	020040	020040	.ASCIZ /	NO		ADDRESS DATA	DATA/	
6078	060044	020040	047040	020117						
6079	060052	020040	020040	040440						
6080	060060	042104	042522	051523						
6081	060066	042040	052101	020101						
6082	060074	020040	042040	052101						
6083	060102	000101								
6084	060104	041520	020040	020040	DH6:	.ASCII /PC	TEST	REG	RECEIVED/<15><12>	
6085	060112	020040	042524	052123						
6086	060120	020040	020040	042522						
6087	060126	020107	020040	020040						
6088	060134	042522	042503	053111						
6089	060142	042105	005015							
6090	060146	020040	020040	020040	.ASCIZ /	NO		ADDRESS DATA/		
6091	060154	020040	047516	020040						
6092	060162	020040	020040	042101						
6093	060170	051104	051505	020123						
6094	060176	040504	040524	000						
6095	060203	120	020103	020040	DH7:	.ASCIZ /PC	TEST	REG	ADDRESS/	
6096	060210	020040	052040	051505						
6097	060216	020124	020040	051040						
6098	060224	043505	020040	020040						
6099	060232	040440	042104	042522						
6100	060240	051523	000							
6101										
6102	060243	120	020103	020040	DH10:	.ASCII /PC	TEST		FAILING CONTENT CONTENT CONTENT CONTENT/<15><12>	
6103	060250	020040	052040	051505						
6104	060256	020124	020040	043040						
6105	060264	044501	044514	043516						
6106	060272	041440	047117	042524						
6107	060300	052116	041440	047117						
6108	060306	042524	052116	041440						

6109 060314 047117 042524 052116  
6110 060322 041440 047117 042524  
6111 060330 052116 005015  
6112 060334 020040 020040 020040  
6113 060342 020040 047516 020040  
6114 060350 020040 020040 042522  
6115 060356 027107 020040 020040  
6116 060364 044122 051503 020061  
6117 060372 020040 044122 051503  
6118 060400 020062 020040 044122  
6119 060406 051504 020061 020040  
6120 060414 044122 051105 000061  
6121  
6122 060422 041520 020040 020040  
6123 060430 020040 042524 052123  
6124 060436 020040 020040 047503  
6125 060444 052116 047440 020106  
6126 060452 047503 052116 047440  
6127 060460 020106 047503 052116  
6128 060466 047440 020106 047503  
6129 060474 052116 047440 020106  
6130 060502 047503 052116 047440  
6131 060510 020106 047503 052116  
6132 060516 047440 006506 012  
6133 060523 040 020040 020040  
6134 060530 020040 047040 020117  
6135 060536 020040 020040 051040  
6136 060544 041510 030523 020040  
6137 060552 051040 041510 031123  
6138 060560 020040 051040 042110  
6139 060566 030523 020040 051040  
6140 060574 042510 030522 020040  
6141 060602 051040 042510 031122  
6142 060610 020040 051040 042510  
6143 060616 031522 000011  
6144  
6145 060622 041520 020040 020040  
6146 060630 020040 042524 052123  
6147 060636 020040 020040 047527  
6148 060644 042122 020040 020040  
6149 060652 047507 042117 020040  
6150 060660 020040 040502 006504  
6151 060666 012  
6152 060667 040 020040 020040  
6153 060674 020040 047040 020117  
6154 060702 020040 020040 047040  
6155 060710 020117 020040 020040  
6156 060716 042040 052101 020101  
6157 060724 020040 042040 052101  
6158 060732 000101  
6159  
6160 060734 041520 020040 020040  
6161 060742 020040 042524 052123  
6162 060750 020040 020040 042522  
6163 060756 020107 020040 020040  
6164 060764 047507 042117 020040

.ASCIZ / NO REG. RHCS1 RHCS2 RHDS1 RHER1/  
DH26: .ASCII /PC TEST CONT OF CONT OF CONT OF CONT OF CONT OF CONT OF//15><12  
.ASCIZ / NO RHCS1 RHCS2 RHDS1 RHER1 RHER2 RHER3 /  
DH30: .ASCII /PC TEST WORD GOOD BAD/<15><12>  
.ASCIZ / NO NO DATA DATA/  
DH51: .ASCII /PC TEST REG GOOD RECVD ILLEGL/<15><12>

6165	060772	020040	042522	053103							
6166	061000	020104	020040	046111							
6167	061006	042514	046107	005015							
6168	061014	020040	020040	020040		.ASCIZ /	NO	ADDRESS DATA	DATA	FUNCTN/	
6169	061022	020040	047516	020040							
6170	061030	020040	020040	042101							
6171	061036	051104	051505	020123							
6172	061044	040504	040524	020040							
6173	061052	020040	040504	040524							
6174	061060	020040	020040	052506							
6175	061066	041516	047124	000							
6176											
6177	061073	120	020103	020040	DH60:	.ASCII /PC	TEST	REG	GOOD	RECVD	MODFING/<15><12>
6178	061100	020040	052040	051505							
6179	061106	020124	020040	051040							
6180	061114	043505	020040	020040							
6181	061122	043440	047517	020104							
6182	061130	020040	051040	041505							
6183	061136	042126	020040	046440							
6184	061144	042117	044506	043516							
6185	061152	005015									
6186	061154	020040	020040	020040		.ASCIZ /	NO	ADDRESS DATA	DATA	REG/	
6187	061162	020040	047516	020040							
6188	061170	020040	020040	042101							
6189	061176	051104	051505	020123							
6190	061204	040504	040524	020040							
6191	061212	020040	040504	040524							
6192	061220	020040	020040	042522							
6193	061226	000107									
6194	061230	041520	020040	020040	DH61:	.ASCII /PC	TEST	PC OF	RHDS1/<15><12>		
6195	061236	020040	042524	052123							
6196	061244	020040	020040	041520							
6197	061252	047440	004506	051040							
6198	061260	042110	030523	005015							
6199	061266	020040	020040	020040		.ASCIZ /	NO	JSR	WAS/		
6200	061274	020040	047516	020040							
6201	061302	020040	020040	051512							
6202	061310	020122	020040	020040							
6203	061316	040527	000123								
6204	061322	041520	020040	020040	DH62:	.ASCII /PC	PC OF	RHCS1/<15><12>			
6205	061330	020040	041520	047440							
6206	061336	020106	020040	044122							
6207	061344	051503	006461	012							
6208	061351	040	020040	020040		.ASCIZ /	JSR	WAS/			
6209	061356	020040	045040	051123							
6210	061364	020040	020040	053440							
6211	061372	051501	000								
6212	061375	120	020103	020040	DH65:	.ASCII /PC	TEST	CONT	CONT	CONT/<15><12>	
6213	061402	020040	052040	051505							
6214	061410	020124	020040	041440							
6215	061416	047117	020124	020040							
6216	061424	041440	047117	020124							
6217	061432	020040	041440	047117							
6218	061440	006524	012								
6219	061443	040	020040	020040		.ASCIZ /	NO	RHCS1	RHAS	RHDS1/	
6220	061450	020040	047040	020117							

6221	061456	020040	020040	051040
6222	061464	041510	030523	020040
6223	061472	051040	040510	020123
6224	061500	020040	051040	042110
6225	061506	030523	000	
6226	061511	120	020103	020040
6227	061516	020040	052040	051505
6228	061524	020124	020040	051040
6229	061532	042110	052123	020040
6230	061540	051040	042510	030522
6231	061546	020040	051040	042510
6232	061554	031122	020040	051040
6233	061562	042510	031522	020040
6234	061570	051040	041510	030523
6235	061576	020040	051040	041510
6236	061604	031123	000	
6237				
6238	061607	120	020103	020040
6239	061614	020040	052040	051505
6240	061622	020124	020040	051040
6241	061630	041510	044523	020040
6242	061636	051040	041510	031123
6243	061644	020040	051040	042110
6244	061652	030523	020040	051040
6245	061660	042110	052123	020040
6246	061666	051040	041510	020101
6247	061674	020040	051040	042510
6248	061702	030522	020040	051040
6249	061710	053510	000103	
6250				
6251				
6252				
6253				
6254	061714	001116	004504	033316
6255	061722	033322	033320	001126
6256	061730	002262	000000	
6257	061734	001116	004504	004504
6258	061742	033316	033322	033320
6259	061750	001126	033324	000000
6260	061756	001116	004504	004500
6261	061764	001124	001126	000000
6262	061772	001116	004504	004500
6263	062000	001126	000000	
6264	062004	001116	004504	001200
6265	062012	000000		
6266	062014	001116	004504	001122
6267	062022	002262	002260	002304
6268	062030	002264	000000	
6269	062034	001116	004504	002262
6270	062042	002260	002304	002264
6271	062050	002270	002276	000000
6272	062056	001116	004504	004502
6273	062064	001124	001126	000000
6274	062072	001116	004504	004500
6275	062100	001124	001126	002364
6276	062106	000000		

DM66: .ASCIZ /PC TEST RHDST RHER1 RHER2 RHER3 RHCS1 RHCS2/

DM72: .ASCIZ /PC TEST RHCSI RHCS2 RHDS1 RHDST RHCA RHER1 PHWC/

.EVEN

DT1: .WORD \$ERRPC, TSTNM, WAITPC, WAITBT, WAITRE, \$BDDAT, CS1, 0

DT4: .WORD \$ERRPC, TSTNM, TSTNM, WAITPC, WAITBT, WAITRE, \$BDDAT, WAITTM, 0

DT5: .WORD \$ERRPC, TSTNM, REGADR, \$GDDAT, \$BDDAT, 0

DT6: .WORD \$ERRPC, TSTNM, REGADR, \$BDDAT, 0

DT7: .WORD \$ERRPC, TSTNM, \$TMP1, 0

DT10: .WORD \$ERRPC, TSTNM, \$BDADR, CS1, CS2, DS1, ER1, 0

DT26: .WORD \$ERRPC, TSTNM, CS1, CS2, DS1, ER1, ER2, ER3, 0

DT30: .WORD \$ERRPC, TSTNM, ERWORD, \$GDDAT, \$BDDAT, 0

DT51: .WORD \$ERRPC, TSTNM, REGADR, \$GDDAT, \$BDDAT, ILLEGL, 0

6277	062110	001116	004504	004500	DT60:	.WORD	SERRPC,TSTNM,REGADR,\$GDDAT,\$BDDAT,\$BDADR,0
6278	062116	001124	001126	001122			
6279	062124	000000					
6280	062126	001116	004504	033122	DT61:	.WORD	SERRPC,TSTNM,PCJSR,\$BDADR,0
6281	062134	001122	000000				
6282	062140	001116	004504	033122	DT62:	WORD	SERRPC,TSTNM,PCJSR,\$BDADR,0
6283	062146	001122	000000				
6284	062152	001116	004504	002262	DT65:	.WORD	SERRPC,TSTNM,CS1,AS,DS1,0
6285	062160	002300	002304	000000			
6286	062166	001116	004504	002266	DT66:	.WORD	SERRPC,TSTNM,DST,ER1,ER2,ER3,CS1,CS2,0
6287	062174	002264	002270	002276			
6288	062202	002262	002260	000000			
6289	062210	001116	004504	002262	DT72:	.WORD	SERRPC,TSTNM,CS1,CS2,DS1,DST,CA,ER1,WC,0
6290	062216	002260	002304	002266			
6291	062224	002274	002264	002254			
6292	062232	000000					
6293							
6294	062234	000	000	000	DF1:	.BYTE	0,0,0,0,0,0,0
6295	062237	000	000	000			
6296	062242	000					
6297	062243	000	000	000	DF4:	.BYTE	0,0,0,0,0,1,0
6298	062246	000	000	001			
6299	062251	000					
6300	062252	000	000	000	DF5:	.BYTE	0,0,0,0,0
6301	062255	000	000				
6302	062257	000	000	000	DF6:	.BYTE	0,0,0,0
6303	062262	000					
6304	062263	000	000	000	DF7:	.BYTE	0,0,0
6305	062266	000	000	000	DF10:	.BYTE	0,0,0,0,0,0,0
6306	062271	000	000	000			
6307	062274	000					
6308							
6309	062275	000	000	000	DF26:	.BYTE	0,0,0,0,0,0,0,0
6310	062300	000	000	000			
6311	062303	000	000				
6312							
6313	062305	000	000	000	DF30:	.BYTE	0,0,0,0,0
6314	062310	000	000				
6315							
6316	062312	000	000	000	DF51:	.BYTE	0,0,0,0,0,0
6317	062315	000	000	000			
6318							
6319	062320	000	000	000	DF60:	.BYTE	0,0,0,0,0,0
6320	062323	000	000	000			
6321	062326	000	000	000	DF61:	.BYTE	0,0,0,0
6322	062331	000					
6323	062332	000	000	000	DF62:	.BYTE	0,0,0,0
6324	062335	000					
6325	062336	000	000	000	DF65:	.BYTE	0,0,0,0,0
6326	062341	000	000				
6327	062343	000	000	000	DF66:	.BYTE	0,0,0,0,0,0,0,0,0
6328	062346	000	000	000			
6329	062351	000	000	000			
6330							
6331	062354	000	000	000	DF72:	.BYTE	0,0,0,0,0,0,0,0,0
6332	062357	000	000	000			

H12

CZRJJBO, RPO4 5 6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 150  
CZRJJB.P11 10-NOV-77 11:20 POWER DOWN AND UP ROUTINES

SEQ 0150

6333 062362 000 000 000  
6334  
6335 062366 .EVEN  
6336  
6337 000001 .END







# K12

CZRJJ80 RPO4 5 6 FCTNL CTRLR2 MACY11 30(1046) 10-NOV-77 13:16 PAGE 154  
 CZRJJ8.P11 10-NOV-77 11:20 CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0153

DF62	062332	1205	6323#													
DF65	062336	1237	6325#													
DF66	062343	1255	6327#													
DF7	062263	719	6304#													
DF72	062354	1307	1318	1325	6331#											
DH1	057444	648	660	672	6031#											
DH10	060243	724	738	752	768	6102#										
DH26	060422	887	6122#													
DH30	060622	911	933	949	966	1027	1061	1085	1121	1157	1264	1275	6145#			
DH4	057624	685	6051#													
DH5	057765	696	781	793	807	821	833	844	851	861	870	881	904	925		
		943	959	977	988	1002	1014	1039	1052	1074	1114	1133	1145	1170		
		1211	1223	1286	6069#											
DH51	060734	1096	6160#													
DH6	060104	707	6084#													
DH60	061073	1183	6177#													
DH61	061230	1193	6194#													
DH62	061322	1201	6204#													
DH65	061375	1231	6212#													
DH66	061511	1247	6226#													
DH7	060203	716	6095#													
DH72	061607	1298	1316	1323	6238#											
DIG8	= 000004	1393#														
DISPLA	= 001142	642#	1750*	4754*	4755*											
DISPRE	= 000174	621#	1750													
DLT	= 100000	1361#														
DL64	= 000020	1395#														
DMD	= 000001	1428#	3626	3652												
DPR	= 000400	1399#	2102	2247	2343	2627	2661	2694	3434	3472	4273					
DRY	= 000200	1398#	2102	2291	2332	2617	2627	2844	3314	3823	3951	4011	4273			
DST	= 002266	1615#	4781	6286	6289											
DSWR	= 177570	620#	642	1750												
DS1	= 002304	1622#	3852	3902	4781	6266	6269	6284	6289							
DT	= 002306	1623#	2027*	4781												
DTE	= 010000	1421#														
DTSY	= 001000	1434#														
DT1	= 061714	654	666	677	6254#											
DT10	= 062014	731	745	759	775	6266#										
DT26	= 062034	894	6269#													
DT30	= 062056	915	934	950	967	1028	1062	1086	1122	1158	1265	1276	6272#			
DT4	= 061734	690	6257#													
DT5	= 061756	700	785	797	811	825	837	845	852	862	871	882	905	926		
		944	960	978	989	1003	1015	1040	1053	1075	1115	1134	1146	1171		
		1212	1224	1290	6260#											
DT51	= 062072	1101	6274#													
DT6	= 061772	710	6262#													
DT60	= 062110	1188	6277#													
DT61	= 062126	1196	6280#													
DT62	= 062140	1204	6282#													
DT65	= 062152	1236	6284#													
DT66	= 062166	1254	6286#													
DT7	= 062004	718	6264#													
DT72	= 062210	1306	1317	1324	6289#											
DVA	= 004000	1384#	2058	2102	2247	2342	2627	2661	2694	3434	3472	4265				
ECH	= 000100	1415#														
EC1	= 004000	1514#	2150	2153	2190	2193	2240	2273	2334	2442	2471	2503	2531	2568		



















TYPDS = 104405	1923	1931	1995	4087	4089	4099	4122	4825	4837#				
TYPE = 104401	1766	1767	1768	1803	1828	1838	1840	1863	1885	1922	1924	1926	1929
	1970	1994	1996	2016	2018	2020	2034	2036	2096	2159	2196	2225	2243
	2289	2332	2339	2446	2474	2508	2534	2572	2614	2624	2658	2691	2756
	2801	2840	2852	2897	2929	2986	3060	3115	3166	3181	3220	3259	3303
	3310	3325	3381	3395	3431	3464	3561	3612	3684	3734	3782	3820	3835
	3892	3940	3975	4021	4086	4088	4097	4100	4122	4607	4609	4611	4612
	4615	4715	4717	4730	4732	4734	4736	4738	4740	4742	4746	4754	4755
	4781	4784	4806	4808	4811	4813	4828	4837#					
TYPERR = 041704	4778	4783#											
TYPOC = 104402	1831	1925	1996	4608	4610	4716	4731	4735	4737	4739	4746	4754	4781
	4792	4821	4837#										
TYPON = 104404	4837#												
TYPOS = 104403	4837#												
UNIB = 000020	1350#												
UNIT = 004616	1698#	1805*	1807*	1938*	1944*	1950	1973*	1976	1994	4086	4106	4111*	4238
	4659												
UNITS = 004576	1697#	1893	1897	1938	1962	4107							
UNITSL = 004630	1706#	1806*	1807	1944									
JNLOAD = 002324	1640#												
UN = 040000	1423#												
UFL = 020000	1359#												
JS1 = 000001	1346#												
JS2 = 000002	1347#												
JS4 = 000004	1348#												
UWR = 000010	1539#												
VUF = 000002	1538#												
VU30 = 010000	1499#												
VV = 000100	1397#	2102	2247	2343	2627	2661	2694	3434	3472	4256	4273		
WAITBT = 033322	4346#	4355*	4363	4368	4435*	4442	4447	6254	6257				
WAITPC = 033316	4344#	4352*	4353*	4432*	4433*	6254	6257	4442	4447	4451	4477	6254	6257
WAITRE = 033320	4345#	4354*	4363	4368	4372	4384	4434*						
WAITTH = 033324	4324#	4347#	4348*	4392	4402	6257							
WAIT.P = 033326	4348#												
WAIT.T = 033370	4429#	4837											
WAT = 104413	2102	2161	2198	2227	2247	2291	2305	2332	2375	2387	2450	2478	2512
	2538	2576	2617	2627	2661	2694	2759	2804	2844	2854	2900	2932	2989
	3063	3118	3169	3184	3223	3262	3307	3314	3336	3385	3406	3434	3472
	3564	3688	3738	3785	3823	3845	3895	3951	3983	4011	4029	4837#	
WC = 002254	1608#	2107	2165	2203	2252	2313	2395	2455	2482	2516	2551	2581	2631
	2667	2700	2783	2826	2876	2906	3007	3080	3122	3200	3230	3269	3341
	3411	3440	3477	3577	3664	4636	4781	6289					
WCE = 040000	1360#												
WCF = 000040	1414#												
WCU = 000001	1487#												
WLE = 004000	1420#												
WPCDOT = 002340	1646#												
WPCHEK = 002336	1645#												
WFFROM = 002370	1663#	2135	2138	2150	2153	2163	2183	2215	2230	2232	2234	2236	2240
	2249	2307	2323	2389	2406	2437	2442	2452	2469	2493	2499	2503	2514
	2529	2531	2543	2546	2565	2595	2645	2647	2655	2663	2679	2712	2731
	2734	2736	2747	2749	2796	2798	2922	2924	2928	2944	2948	2951	2964
	2968	2970	2980	2982	2991	3031	3035	3039	3041	3092	3108	3144	3161
	3163	3165	3175	3177	3189	3194	3213	3243	3252	3280	3299	3301	3302
	3318	3354	3372	3374	3376	3378	3380	3389	3391	3408	3426	3449	3460
	3485	3544	3546	3597	3680	3683	3730	3733	3828	3831	3834	3885	3888









POP	620#	3346	3416	4146	4169	4189	4301	4407	4483	4507	4533	4579	4641	4709	4754
	4755	4837													
PUSH	620#	3342	3412	4137	4162	4184	4294	4351	4429	4496	4522	4552	4634	4686	4754
	4755	4837													
REPORT	620#														
RFORGC	619#														
RHICLEA	619#	1948	2042	2066	2096	2128	2180	2224	2228	2272	2330	2334	2435	2468	2497
	2562	2612	2618	2643	2685	2722	2794	2837	2845	2890	2920	2932	3024	3044	3100
	3111	3158	3170	3211	3250	3292	3298	3362	3368	3423	3458	3491	3519	3594	3674
	3704	3724	3756	3779	3810	3824	3875	3940	3965	4007					
SAVE	619#	4755													
SAVTST	619#	1810	1858	2029	2041	2065									
SCH	619#	2340	2620												
SCOPE	620#	1810	1845	1857	1947	2029	2040	2064	2089	2128	2224	2330	2435	2497	2612
	2643	2722	2794	2837	2890	2920	3158	3250	3292	3362	3458	3491	3594	3674	3724
	3810	3940	4085	4122											
SEEKCO	619#	2332	2842	3311											
SETPRI	620#	4754													
SETTRA	4837#														
SETUP	620#	1750													
SKIP	619#	620#	1803	1807	1850	1944	2034	2056	2059	2079	3938				
SLASH	620#														
SPACE	620#														
SREGIS	619#	2099	2158	2196	2242	2276	2337	2445	2473	2507	2533	2571	2622	2657	2690
	2755	2800	2851	2896	2985	3059	3115	3180	3219	3258	3324	3394	3430	3463	3559
	3619														
STARS	613	618	620#	622	642	1327	1328	1372	1373	1776	1797	1810	1845	1857	1911
	1920	1947	1981	1991	2000	2020	2029	2040	2064	2089	2128	2131	2134	2147	2149
	2187	2189	2224	2330	2416	2429	2435	2497	2612	2643	2722	2727	2730	2742	2745
	2782	2794	2837	2890	2920	2928	2938	2940	2943	2960	2963	2976	2979	2994	2997
	3024	3027	3030	3049	3052	3068	3071	3106	3158	3250	3292	3362	3458	3491	3594
	3674	3724	3810	3940	3955	3958	4002	4048	4051	4066	4069	4085	4122	4745	4749
	4754	4755	4837												
STARTT	619#	1948	2096	2128	2224	2330	2435	2497	2612	2643	2722	2794	2837	2890	2920
	3158	3250	3292	3362	3458	3491	3594	3674	3724	3810	3940				
SWRSU	620#	1750#													
TJUMP	619#	3360	3455	3494	3750										
TRMTRP	4837#														
TSCLR2	619#														
TSCLR5	619#														
TTSTNO	619#	1948	2096	2128	2224	2330	2435	2497	2612	2643	2722	2794	2837	2890	2920
	3158	3250	3292	3362	3458	3491	3594	3674	3724	3810	3940				
TYPBIN	620#														
TYPDEC	620#	4122													
TYPNAM	620#														
TYPNUM	620#														
TYPOCS	620#														
TYPOCT	620#	1996	4754												
TYPTXT	620#	1765	1766	1767	1768	1803	1828	1838	1840	1863	1884	1885	1922	1924	1926
	1969	1970	1994	1996	2015	2017	2019	2034	2036	4086	4088	4607	4609	4612	4615
	4714	4717	4729	4732	4734	4736	4738	4740	4741	4745	4781				
VECSET	619#	2100	2159	2196	2226	2244	2298	2332	2381	2447	2475	2509	2535	2573	2615
	2625	2659	2692	2757	2802	2841	2853	2898	2930	2987	3061	3116	3167	3182	3221
	3260	3304	3312	3326	3382	3396	3432	3465	3685	3735	3782	3821	3836	3893	3949
	3976	4009	4022												
WT	619#	2102	2161	2198	2227	2247	2291	2305	2332	2375	2387	2450	2478	2512	2538



	2576	2617	2627	2661	2694	2759	2804	2844	2854	2900	2932	2989	3063	3118	3169
	3184	3223	3262	3307	3314	3336	3385	3406	3434	3472	3564	3688	3738	3785	3823
WTT	3845	3895	3951	3983	4011	4029									
	619#	2102	2161	2198	2227	2247	2291	2305	2332	2375	2387	2450	2478	2512	2538
	2576	2617	2627	2661	2694	2759	2804	2844	2854	2900	2932	2989	3063	3118	3169
	3184	3223	3262	3307	3314	3336	3385	3406	3434	3472	3564	3688	3738	3785	3823
	3845	3895	3951	3983	4011	4029									
\$\$CMRE	642#														
\$\$CMTM	642#														
\$\$ESCA	620#														
\$\$NEWT	620#	1810	1845	1857	1947	2029	2040	2064	2089	2128	2224	2330	2435	2497	2612
	2643	2722	2794	2837	2890	2920	3158	3250	3292	3362	3458	3491	3594	3674	3724
	3810	3940	4085												
\$\$SET	4837#														
\$\$SKIP	620#														
.EQUAT	595#	620													
.HEADE	595#														
.KT11	595#	640													
.SETUP	595#	1748													
.SWRHI	595#	619													
.SWRLO	595#	619#													
.SACT1	595#	622													
.SCATC	595#	621													
.SCMTA	595#	642													
.SEOP	595#	4122													
.SERRO	595#	4755													
.SERRT	595#														
.SPOWE	595#	4837													
.SRDOC	595#	4755													
.SREAD	595#	4754													
\$\$SCOP	595#	4754													
\$.STRAP	595#	4837													
\$.STYPD	595#	4754													
\$.STYPE	595#	4754													
\$.STYPO	595#	4837													

. ABS. 062366 000

ERRORS DETECTED: 0

RM03: CZRJJB, CZRJJB, SEQ/CRF/SOL/NL: MC: ME: CND=RM03: CZRJJB.P11  
RUN-TIME: 41 32 2 SECONDS  
RUN-TIME RATIO: 588/76=7.7  
CORE USED: 28K (55 PAGES)

N13