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1. PURPOSE

THE ONE-CARD PROGRAMS ARE SHORT TESTS USED TO HELP ISOLATE FAILING FUNCTIONS THAT KEEP THE BASIC DIAGNOSTIC LOADER FROM OPERATING CORRECTLY. THERE ARE SEVEN ONE-CARD PROGRAMS, SEQUENCE NUMBERED 01 THROUGH 07 IN HOLLERITH - HEXADECIMAL CODE IN COLUMNS 79 AND 80. EACH PROGRAM IS RUN INDIVIDUALLY AND IS LOADED INTO CORE STORAGE USING THE PROGRAM LOAD MODE. REFER TO PARAGRAPH 5., COMMENTS, FOR PURPOSE AND DESCRIPTION OF EACH ONE-CARD PROGRAM.

INCLUDED IN THE APPENDIX, PARAGRAPHS 6.1 AND 6.2, ARE MANUAL ENTRY TEST PROGRAMS WHICH ARE LOADED BY MEANS OF THE CONSOLE ENTRY SWITCHES. ONE PROGRAM IS A DATA PATH TEST, AND THE OTHER IS AN ADD TEST. THESE PROGRAMS PROVIDE ADDITIONAL AID IN ISOLATING MALFUNCTIONS.

2. PREREQUISITES

2.1 PROGRAM PREREQUISITES

NO ADDITIONAL PROGRAMS ARE REQUIRED.

2.2 EQUIPMENT PREREQUISITES

- A. 1131 CENTRAL PROCESSING UNIT (CPU).
- B. 1442 CARD READ/PUNCH OR PAPER TAPE.
- C. 2501 CARD READER (USE ONLY CARDS 1-6) 7=ERROR.

3. USE PROCEDURE

3.1 GENERAL INFORMATION

THE FASTEST WAY TO ISOLATE A FAILURE WITH THE ONE-CARD PROGRAMS IS TO STEP THROUGH EACH ONE-CARD PROGRAM LOOKING FOR ONE OF THE ERROR CONDITIONS POSSIBLE.

THE POSSIBLE ERROR CONDITIONS ARE,

- A. STOP AT ERROR WAIT.
- B. INCORRECT REGISTER READINGS AT A NORMAL WAIT.
- C. FAILURE TO STOP AT A NORMAL WAIT.

IF THE ABOVE ERROR CONDITIONS DO NOT OCCUR, IT WILL BE NECESSARY TO RELY ON WHATEVER ERROR CONDITIONS APPEAR.

NORMAL WAITS-300X. NORMAL WAITS HAVE AS THEIR LAST DIGIT THE NUMBER OF THE ONE-CARD PROGRAM WHERE THEY OCCUR. FOR EXAMPLE WAIT 3003 IDENTIFIES A NORMAL WAIT IN ONE-CARD PROGRAM 03. WHEN A PROGRAM HAS MORE THAN ONE NORMAL WAIT, REFERENCE TO THE INSTRUCTION ADDRESS REGISTER READING IS NECESSARY, TO CORRECTLY IDENTIFY THE WAIT.

ERROR WAITS - 30FX. THE LAST DIGIT OF AN ERROR WAIT IDENTIFIES THE ONE-CARD PROGRAM WHERE WAIT OCCURS. THE NEXT TO LAST DIGIT, F, IDENTIFIES THE WAIT AS BEING AN ERROR WAIT. WHEN MORE THAN ONE ERROR WAIT OCCURS IN A ONE-CARD PROGRAM, REFERENCE TO THE INSTRUCTION ADDRESS REGISTER IS NECESSARY TO CORRECTLY IDENTIFY THE ERROR WAIT.

WHEN AN ERROR INDICATION OCCURS, THE LISTING OF THE PROGRAM BEING EXECUTED MUST BE REFERENCED TO DETERMINE THE CAUSE OF THE ERROR. CORRECT LOADING SHOULD BE VERIFIED BY DISPLAYING CONTENTS OF LOCATIONS WHERE THE PROGRAM IS STORED. THE PROGRAM SHOULD THEN BE RUN IN SI MODE TO LOCATE POINT OF FAILURE.

3.2 OPERATING PROCEDURE

- A. PLACE ALL SEVEN ONE-CARD PROGRAMS, FOLLOWED BY DECK OF BLANK CARDS IN 1442 HOPPER AND PRESS START BUTTON.
- B. CLEAR CORE STORAGE TO 33FF AS FOLLOWS.
1. SET MODE SWITCH TO RUN.
 2. SET CONSOLE ENTRY SWITCHES TO 33FF.
 3. TURN ON STORAGE LOAD SWITCH (ON CE PANEL).
 4. PRESS START.
 5. PRESS IMM STOP.
 6. TURN OFF STORAGE LOAD SWITCH (ON CE PANEL).
- C. PRESS IMM STOP KEY.
- D. PRESS RESET KEY.
- E. PRESS PROGRAM LOAD.

ONE-CARD 01 SHOULD LOAD AND PROGRAM SHOULD STOP AT NORMAL WAIT 3001 (IAR = 0002). FROM THIS POINT ON, PROCEED ACCORDING TO INSTRUCTIONS GIVEN FOR THE WAIT THE PROGRAM HAS STOPPED AT. SEE TABLE 1 FOR NORMAL WAITS, AND TABLE 2 FOR ERROR WAITS.

TABLE 1. NORMAL WAITS

NOTE. IN THIS TABLE SBR=STORAGE BUFFER REG, IAR=INSTRUCTION ADDRESS REG, AND ACC=ACCUMULATOR.

***** WAITS *****			INDICATES / ACTION	*****

* SBR	* IAR	*		

* 3001	* 0002	* ACCUMULATOR SHOULD READ F0F0. IF OK PRESS START.		
*	*	* IF NOT F0F0 ERROR IS INDICATED. REPAIR IF CAUSE IS CLEAR.		
*	*	* IF NOT, CONTINUING TEST MAY HELP		

* 3001	* 0004	* ACCUMULATOR SHOULD READ 080F. IF OK PRESS START.		
*	*	* IF NOT 080F ERROR IS INDICATED. REPAIR IF CAUSE IS CLEAR.		
*	*	* IF NOT, CONTINUING TEST MAY HELP.		

* 3001	* 004E	* DEPRESS IMM STOP, RESET, AND PROGRAM LOAD BUTTONS TO LOAD CARD		
*	*	* 02. FAILURE OF PROGRAM TO STOP AT THIS WAIT INDICATES FAILURE		
*	*	* OF AN MDX OPERATION. STEPPING THROUGH PROGRAM IN SI MODE MAY		
*	*	* HELP LOCATE FAILURE. IF CAUSE OF FAILURE IS CLEAR, REPAIR.		
*	*	* IF THE FAILURE IS NOT CLEAR CONTINUING MAY HELP TO IDENTIFY		
*	*	* THE FAILURE.		

* 3002	* 003F	* ACCUMULATOR SHOULD READ 003E. IF OK LOAD CARD 03 BY PRESSING		
*	*	* IMM STOP, RESET, AND PROGRAM LOAD BUTTONS. IF ADD. IS NOT		
*	*	* 003E, AN ERROR HAS OCCURRED. STEP THROUGH PROGRAM IN SING INST		
*	*	* MODE, CHECKING THAT IAR AND ACC DISPLAY THE SAME INFORMATION		
*	*	* AND ARE INCREMENTED BY ONE AT EACH STEP.		

* 3003	* 0021	* ACC SHOULD READ 0001. IF OK PRESS START.		
*	*	* IF ACC IS NOT 0001, AN ERROR HAS OCCURED. STEP THROUGH		
*	*	* PROGRAM IN SI MODE, CHECKING THAT (1) ACC CONTAINS A ONE IN		
*	*	* BIT 0, (2) EACH SRA 1 INSTRUCTION IS EXECUTED PROPERLY, AND (3)		
*	*	* NO BSC 2 CAUSES A SKIP UNLESS ACCUMULATOR EQUALS ZERO.		

TABLE 1. NORMAL WAITS (CONTINUED)

***** WAITS *****		***** INDICATES / ACTION *****
SBR	IAR	
3003	0025	ACC SHOULD READ 0000. IF CK PRESS START. IF ACC IS NOT 0000, ERROR HAS OCCURRED. SI THROUGH PROGRAM FROM LOCATION 0021. COMPARE RESULTS OF TEST WITH LISTING.
3003	0030	ACC SHOULD READ 0F0F. IF CK PRESS START. IF ACC IS NOT 0F0F, ERROR HAS OCCURRED. SI THROUGH PROGRAM FROM LOCATION 0025. COMPARE RESULTS OF TEST WITH LISTING. CHECK FOR SINGLE-BIT OMISSION. TRY SWAPPING APPROPRIATE SLT CARDS. (SEE LISTING).
3003	0033	ACC SHOULD READ FFFF. IF CK PRESS START. IF ACC IS NOT FFFF, ERROR HAS OCCURRED. SI THROUGH PROGRAM FROM LOCATION 002E. COMPARE RESULTS OF TEST WITH LISTING.
3003	003C	ACC SHOULD READ FFFF. IF CK LOAD CARD 04 BY PRESSING IMM STOP, RESET, AND PROGRAM LOAD BUTTONS IF ACC IS NOT FFFF, ERROR HAS OCCURRED. SI THROUGH PROGRAM FROM LOCATION 002E. CCM RE RESULTS OF TEST WITH LISTING.
3004	001E	ACC SHOULD READ FFFF. IF CK PRESS START. IF ACC IS NOT FFFF, ERROR HAS OCCURRED. SI THROUGH PROGRAM. COMPARE RESULTS OF TEST WITH LISTING.
3004	0023	ACC SHOULD READ 0000. IF CK PRESS START. *** NOTE *** IF NO ERRORS OCCUR, THIS PROGRAM SHOULD RUN CONTINUOUSLY UNTIL STOPPED. IF NO ERRORS OCCUR, LOAD CARD 05 BY PRESSING IMM STOP, RESET, AND PROGRAM LOAD BUTTONS. IF ACC IS NOT 0000, ERROR HAS OCCURRED. SI THROUGH PROGRAM FROM LOCATION 001E. REFER TO LISTING.
3005	1000	PRESS RESET THEN START TO CONTINUE. MOST LIKELY ERROR WILL BE FAILURE OF PROGRAM TO STOP AT THIS WAIT. REFER TO LISTING. REFER TO PARAGRAPH 5.2.5 OF THIS DOCUMENT FOR DESCRIPTION OF CARD 05 PROGRAM.
3005	004C	ACC SHOULD READ 0FAF. IF DK LOAD CARD 06 BY PRESSING IMM STOP, RESET, AND PROGRAM LOAD BUTTONS. IF ACC IS NOT 0FAF, IT INDICATES THAT THE NUMBER OF LOCATIONS TESTED IS INCORRECT, ERROR MAY BE CAUSED BY ADD FAILURE, WHICH SHOULD BE DETECTABLE BY CARD 04 PROGRAM. PRESS START TO RESTART PROGRAM.

ONE-CARD DIAGNOSTIC PROGRAMS

TABLE 1. NORMAL WAITS (CONTINUED)

***** WAITS *****		INDICATES / ACTION
***** SBR * IAR *****		
* 3006 * 002E *	* A. SET CONSOLE ENTRY SWITCHES TO 0003 (BUSY, NOT READY SIMULATED DSW). PRESS START. PROGRAM SHOULD RETURN TO THIS WAIT. IF OK PRESS START TO REPEAT TEST OR GO TO STEP B.	
	* B. SET CONSOLE ENTRY SWITCHES TO 0800 (END OF CARD SIMULATED DSW). PRESS START. PROGRAM SHOULD RETURN TO THIS WAIT. IF OK PRESS START TO REPEAT TEST, OR GO TO STEP C.	
	* C. SET CONSOLE ENTRY SWITCHES TO 8003 (COL. REQUEST, BUSY, NOT READY SIMULATED DSW). PRESS START. PROGRAM SHOULD RETURN TO THIS WAIT. IF OK PRESS START TO REPEAT TEST, OR GO TO STEP D.	
	* D. SET CONSOLE ENTRY SWITCHES TO AN INVALID DSW SETTING (OTHER THAN 0003, 0800, OR 8003). PRESS START. PROGRAM SHOULD STOP AT ERROR WAIT B=30F6, INDICATING THAT THE PROGRAM CORRECTLY SENSES AN ERROR DSW. PRESS START TO RETURN TO WAIT B=3006 (THIS WAIT) TO REPEAT TEST WITH SAME, OR DIFFERENT INVALID DSW.	
	* E. AFTER DETERMINING THAT CARD 06 PROGRAM REACTS CORRECTLY TO THE SIMULATED DSW'S, LOAD CARD 07 BY PRESSING IMM STOP, RESET, AND PROGRAM LOAD BUTTONS.	
* 3007 * 0007 *	* A. ACC AND ACC EXTENSION SHOULD READ FFFF. IF OK GO TO STEP B. IF NOT FFFF, LOAD DOUBLE OR ADD DOUBLE ERROR HAS OCCURRED. SI THROUGH PROGRAM. REFER TO LISTING.	
	* B. TURN ON INTERRUPT DELAY SWITCH (ON CE PANEL).	
	* C. PRESS START. BLANK CARDS SHOULD FEED CONTINUOUSLY THROUGH THE READ STATION OF THE 1442.	
	*** NOTE ***	
	THERE ARE NO OTHER WAITS IN CARD 07 PROGRAM IN ORDER TO PERMIT SCOPING OF X10 FUNCTIONS. CHANGE NO OP INSTRUCTION IN LOCATION 002C TO AN ERROR WAIT (30F7) TO CAUSE PROGRAM TO STOP ON ERROR DSW.	
	* D. PRESS STOP TO TERMINATE PROGRAM	
	* E. TURN OFF INTERRUPT DELAY SWITCH (ON CE PANEL).	

TABLE 2. ERROR WAITS

NOTE. IN THIS TABLE SBR=STORAGE BUFFER REG, IAR=INSTRUCTION ADDRESS REG, AND ACC=ACCUMULATOR.

***** WAITS *****		***** INDICATES / ACTION *****
SBR	IAR	
30F1	0006	STOPPING AT ANY ONE OF THIS WAITS INDICATES FAILURE OF MDX TO OPERATION. SI THROUGH PROGRAM. IF FAILURE APPEARS AND ITS CAUSE IS CLEAR, REPAIR. IF CAUSE OF FAILURE IS NOT CLEAR, RUNNING ADDITIONAL ONE-CARD PROGRAMS MAY HELP IDENTIFY THE FAILURE.
30F3	0024	ACC NOT 0000 WHEN TESTED. SI THROUGH PROGRAM CHECKING THAT (1) ACC CONTAINS A ONE IN BIT 0, (2) EACH SRA 1 INSTRUCTION IS EXECUTED CORRECTLY, AND (3) A SKIP OCCURS WHEN ACC EQUALS 0000.
30F3	0036	ACC NOT 0000 WHEN TESTED. SI THROUGH PROGRAM FROM LOCATION 002E. COMPARE RESULTS OF TEST WITH LISTING.
30F4	0014	LDX LONG FAILURE. SI THROUGH PROGRAM. COMPARE RESULTS WITH LISTING.
30F4	002C	SUM OF SUMPL AND SUMMI IS NOT EQUAL TO 0000. IF THEIR SUM SHOULD EQUAL 0000, DIAGNOSE AND CORRECT TROUBLE. IF THEIR SUM SHOULD NOT BE 0000, RUU MANUAL-ENTRY ADD TEST (PARAGRAPH 6.2).
30F5	001E	SUM OF LOCATIONS 0014 THROUGH 004F IS NOT 0000. ACC CONTAINS OBTAINED SU. (1) RELOAD CARD 05, (2) RUN IN SI MODE THROUGH LOCATION 0010, (3) DISPLAY REMAINDER OF PROGRAM, AND (4) COMPARE RESULTS WITH LISTING.
		IF NO ERROR IS EVIDENT, SI THROUGH CHECKSUM LOOP (LOCATIONS 0012 THROUGH 001A).
		IF NO ERROR IS EVIDENT, (1) RELOAD CARD 05, (2) SI THROUGH LOCATION 0008, (3) INSERT WAIT OP IN LOCATION 0011, (4) SET 70F6 IN LOCATION 001A, AND (5) RUN CHECKSUM LOOP USING SI MODE FOR LOCATIONS 0011 AND 0013. VERIFY CHECKSUM ADDITION. REPAIR ANY FAILURES DISCOVERED.
30F5	0038	A LOCATION DOES NOT CONTAIN ITS OWN ADDRESS PLUS ONE. PERFORM FOLLOWING INSTRUCTION IN SI MODE. ADDRESS OF LOCATION IN ERROR WILL BE IN ACC. DISPLAY ERROR LOCATION. IT SHOULD CONTAIN ITS OWN ADDRESS PLUS ONE, AS A RESULT OF EXECUTING A BJI-1 AT THAT LOCATION. DIAGNOSE AND CORRECT.
30F6	002D	A. IF PROGRAM STOPS AT THIS WAIT FOLLOWING SETTING OF A VALID SIMULATED DSW IN CONSOLE ENTRY SWITCHES (0003, 0800, 8003). AN ERROR IN INTERPRETING THE DSW HAS OCCURRED. SI THROUGH PROGRAM AND REFER TO LISTING, TO LOCATE CAUSE OF ERROR.
		B. IF PROGRAM STOPS AT THIS WAIT AFTER SETTING AN INVALID IN THE CONSOLE ENTRY SWITCHES, THE PROGRAM OPERATED CORRECTLY. PRESS START TO RETURN TO NORMAL WAIT B=3006.

4. PRINTOUTS (NOT APPLICABLE)

5. COMMENTS

THE ONE-CARD DIAGNOSTIC PROGRAMS ARE DESIGNED TO HELP DIAGNOSE MALFUNCTIONS THAT OCCUR WHILE ATTEMPTING TO LOAD A PROGRAM WITH THE 1130 BASIC DIAGNOSTIC LOADER. THERE ARE SEVEN ONE-CARD PROGRAMS. EACH ONE-CARD PROGRAM TESTS A SPECIFIC FUNCTION OR GROUP OF FUNCTIONS. THE CARDS ARE NUMBERED FROM 01 THROUGH 07 IN HOLLERITH-HEXADECIMAL CODE IN COLUMNS 79 AND 80.

FUNCTIONS OF ONE-CARD DIAGNOSTIC PROGRAMS
THE SEVEN ONE-CARD PROGRAMS PERFORM THE FOLLOWING FUNCTIONS.

- A. CARD 01. TESTS MDX INSTRUCTION AND DATA TRANSFER FROM INSTRUCTION ADDRESS REGISTER TO ACCUMULATOR.
- B. CARD 02. EXECUTES A SIMPLE-ADDITION TEST AND TESTS INCREMENTING OF INSTRUCTION ADDRESS REGISTER.
- C. CARD 03. TESTS BSC Z, SRA 1, LD, STO, AND EOR INSTRUCTIONS AND DATA TRANSFER BETWEEN REGISTERS.
- D. CARD 04. TESTS LONG FORMAT OF LD, A, STO, LDX, EOR. TEST ADDITION OF POSITIVE AND NEGATIVE NUMBERS.
- E. CARD 05. TESTS ADDRESSING OF LOCATIONS 0050 THROUGH 00FE.
- F. CARD 06. DETERMINES WHETHER 1131 CPU CORRECTLY INTERPRETS SIMULATED DSW'S.
- G. CARD 07. TESTS LOAD DOUBLE AND ADD DOUBLE INSTRUCTIONS, AND SETS UP LOOPS TO ALLOW X10 FUNCTIONS TO BE CHECKED WITH AN OSCILLOSCOPE. X10 ROUTINES ARE DIAGNOSTIC LOADER BUT DO NOT STOP ON DSW ERROR.

5.2 DESCRIPTION OF ONE-CARD DIAGNOSTIC PROGRAMS

5.2.1. CARD-031 PROGRAM

THE CARD-01 PROGRAM LOADS ACCUMULATOR WITH FOFO FROM LOCATION 0030 AND STOPS AT WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 0002, STORAGE BUFFER INDICATING 3001, AND ACCUMULATOR INDICATING FOFO. FAILURE OF INDICATOR TO APPEAR AS DESCRIBED INDICATES A POSSIBLE READ-IN FAILURE DURING PROGRAM LOAD OR FAILURE OF THE LOAD-ACCUMULATOR INSTRUCTION. FOLLOWING DEPRESSION OF START PUSHBUTTON BY OPERATOR, PROGRAM LOADS ACCUMULATOR WITH 080F FROM LOCATION 0031 AND STOPS AT WAIT WITH INSTRUCTION ADDRESS INDICATING 0004, STORAGE BUFFER INDICATING 3001, AND ACCUMULATOR INDICATING 080F. AGAIN, FAILURE IF INDICATORS TO APPEAR AS DESCRIBED INDICATES POSSIBLE READ-IN FAILURE OR LOAD-ACCUMULATOR FAILURE. NEXT DEPRESSION OF START PUSHBUTTON, THE PROGRAM PERFORMS A SERIES OF MDX INSTRUCTIONS AND STOPS AT A WAIT WITH INSTRUCTION ADDRESS INDICATING 004E AND STORAGE BUFFER INDICATING 3001. IF PROGRAM STOPS AT ANY OTHER WAIT INSTRUCTION, AN MDX FAILURE IS INDICATED.

5.2.2 CARD-02 PROGRAM

THE CARD-02 PROGRAM TESTS ADD FUNCTION AND INCREMENTING OF STORAGE ADDRESS REGISTER. THE PROGRAM LOADS A CONSTANT OF 0001 IN ACCUMULATOR FROM LOCATION 003F AND CONTINUOUSLY ADDS THAT SAME CONSTANT UNTIL STOPPED BY WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 003E. THE ACCUMULATED TOTAL IS DISPLAYED BY ACCUMULATOR INDICATOR AND SHOULD BE 003E. ANY OTHER TOTAL INDICATES AN ADD-FUNCTION FAILURE OR INSTRUCTION ADDRESS REGISTER INCREMENT FAILURE

5.2.3 CARD-03 PROGRAM

- A. PART ONE TESTS THE SKIP-ON-ZERO OPERATION AND SHIFT-RIGHT-ONE OPERATION.
- B. PART TWO TESTS DATA TRANSFER BETWEEN REGISTERS AS FOLLOWS.
 - 1. DATA TRANSFER FROM STORAGE BUFFER REGISTER TO ARITHMETIC FACTOR REGISTER TO ACCUMULATOR REGISTER.
 - 2. DATA TRANSFER FROM ACCUMULATOR REGISTER TO ACCUMULATOR EXTENSION REGISTER AND BACK TO ACCUMULATOR REGISTER.
 - 3. DATA TRANSFER FROM ACCUMULATOR REGISTER TO STORAGE BUFFER REGISTER.
- C. PART THREE TESTS OPERATION FOR FUNCTION.

PART ONE

PROGRAM SETS A 1 IN ACCUMULATOR-BIT 0 AND THEN TRIES TO SKIP-ON-ZERO. AS THE ACCUMULATOR IS NOT ZERO, PROGRAM FALLS THROUGH AND SHIFTS RIGHT ONE POSITION. TESTING FOR ZERO AND SHIFTING RIGHT ONE IS CONTINUED UNTIL PROGRAM IS STOPPED BY WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 0021. THE ACCUMULATOR SHOULD INDICATE 0001. ANY OTHER ACCUMULATOR INDICATION INDICATES FAILURE OF SRA 1 OR BSC 2.

AFTER DEPRESSION OF START PUSHBUTTON, PROGRAM PERFORMS A SHIFT-RIGHT-ONE OPERATION, AND SKIPS-ON-ZERO TO A WAIT 0025, STORAGE BUFFER INDICATING 3003. ACCUMULATOR SHOULD INDICATE 0000.

PART TWO

UPON DEPRESSING START PUSHBUTTON, PROGRAM PERFORMS A SERIES OF ALTERNATE LD AND STO INSTRUCTIONS AND STOPS ON A WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 0030 AND STORAGE BUFFER INDICATING 3003. ACCUMULATOR INDICATION SHOULD BE 000F, OR DATA-TRANSFER FAILURE IS INDICATED. FAILURE MAY BE OCCURRING DURING A LD OR STO INSTRUCTION.

PART THREE

PROGRAM TAKES ACCUMULATOR CONTENTS OF DFOF LEFT AT END OF PART TWO AND PERFORMS EOR OPERATION WITH CONSTANT FOFO. THE FFFF RESULT IS STORED AT SYMBOLIC LOCATION KFFFF, AND PROGRAM STOPS ON WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 0033. ACCUMULATOR INDICATOR SHOULD INDICATE FFFF, OR EOR FAILURE IS INDICATED.

AFTER DEPRESSING START PUSHBUTTON, PROGRAM PERFORMS EOR OF FFFF IN ACCUMULATOR WITH FFFF CONTAINED AT SYMBOLIC LOCATION KFFFF TO SET ACCUMULATOR TO 0000. A SKIP-ON-ZERO OPERATION IS THEN ATTEMPTED. IF EOR INSTRUCTION FAILS TO ZERO ACCUMULATOR, PROGRAM FALLS THROUGH TO AN ERROR WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 0036, STORAGE BUFFER INDICATING 30F3. IF THE SKIP-ON-ZERO IS SUCCESSFULLY COMPLETED, THE PROGRAM PERFORMS EOR OF 0000 IN ACCUMULATOR AND 0000 AT SYMBOLIC LOCATION K0000. THE RESULTS OF EOR SHOULD BE 0000. PROGRAM TESTS THAT ACCUMULATOR IS 0000 BY ATTEMPTING SKIP-ON-ZERO. FAILURE TO SKIP STOPS PROGRAM AT WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 0039, AND STORAGE BUFFER INDICATING 30F3, ACCUMULATOR INDICATOR SHOULD DISPLAY RESULT OF FAULTY EOR.

IF PROGRAM SKIPS, PROGRAM PERFORMS EOR OF 0000 IN ACC WITH CONSTANT FOFO IN SYMBOLIC LOCATION KFOFO. ACC CONTENTS BECOME FOFO. ANOTHER EOR IS PERFORMED WITH CONSTANT CFOF STORED IN HIGHEST STORAGE LOCATION. PROGRAM STOPS AT WAIT WITH IAR REG EQUAL 003C AND SBR REG EQUAL 3003. ACC SHOULD READ FFFF. ANY OTHER READING INDICATES EOR FAILURE.

5.2.4 CARD-04 PROGRAM

THE CARD-04 PROGRAM LONG FORMAT OF LD, A, STO, LDX, EOR. THEN THE CARD-04 PROGRAM LONG FORMAT OF LD, A, STO, LDX, EOR. THEN PART OF THE PROGRAM MAKES UP LONG FORM INSTRUCTIONS THEN PERFORMS AN LDX LONG OVER AN ERROR WAIT. THE ERROR WAIT WITH INSTRUCTION ADDRESS INDICATING 0014 AND THE STORAGE BUFFER INDICATING 30F4 SHOWS A FAILURE OF THE LDX LONG FORMAT.

LONG FORMAT FOR THE REMAINING TESTS ARE DONE WHEN THE PROGRAM MAKES UP CONSTANTS FFFF AND 0000. THESE CONSTANTS ARE DISPLAYED AT NORMAL WAITS. AT EACH OF THESE WAITS THE REGISTERS REFERENCED SHOULD BE CHECKED. IF THE REGISTERS ARE OK, START SHOULD BE PRESSED.

AFTER THE START IS PUSHED FOLLOWING THE SECOND NORMAL WAIT, THE ADD TEST IS STARTED. THE ADD TEST MUST BE STOPPED BY THE OPERATOR.

THE ADD LOOP PROGRAM ADDS A MINUS ONE (FFFF) TO SUMMI (SUM MINUS), ADDS A PLUS ONE (0001) TO SUMPL (SUM PLUS), AND ADDS SUMMI AND SUMPL. THE RESULTANT SUM, WHICH SHOULD BE 0000, IS USED TO CHECK FOR ERROR. IF THE SUM IS 0000, THE LOOP IS REPEATED. IF SUM IS NOT 0000, PROGRAM STOPS AT ERROR WAIT WITH IAR REG EQUAL 002C AND SBR REG EQUAL 30F4. ACC DISPLAYS ERROR SUM.

5.2.5 CARD-05 PROGRAM

TESTS ADDRESSING OF LOCATIONS 0050 THROUGH 00FE. AFTER INITIAL SETUP, PROGRAM LOADS A WAIT INSTRUCTION AT LOCATION 00FF AND LOADS A BRANCH TO SYMBOLIC LOCATION (CHECK) IN LOCATION 0000. THE PROGRAM FORMS A CHECKSUM OF LOCATIONS 0014 THROUGH 004F. IF CHECKSUM IS IN ERROR, PROGRAM STOPS AT WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 001F AND STORAGE BUFFER INDICATING 30F5. ACCUMULATOR INDICATOR DISPLAYS ERROR CHECKSUM.

IF CHECKSUM IS CORRECT PROGRAM LOADS A SERIES OF BSI -1 INSTRUCTIONS IN LOCATIONS 005C THROUGH 00FE AND BRANCHES TO LOCATION 0050 TO EXECUTE THE BSI -1 CHAIN, WHICH CAUSES EACH LOCATION FROM 0050 THROUGH 00FE TO CONTAIN ITS OWN ADDRESS PLUS ONE. THE PROGRAM THEN STOPS AT A WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 1000 AND STORAGE BUFFER INDICATING 3005. UPON DEPRESSION OF RESET AND START PUSHBUTTONS PROGRAM BRANCHES TO SYMBOLIC LOCATION (CHECK).

THE (CHECK) ROUTINE DETERMINES IF EACH LOCATION FROM 0050 THROUGH 00FE CONTAINS ITS OWN ADDRESS PLUS ONE, KEEPS COUNT OF LOCATIONS TESTED, AND STOPS AT WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 004C AND STORAGE BUFFER INDICATING 3005. ACCUMULATOR SHOULD INDICATE 0FAF. IF THE CONTENTS OF A LOCATION ARE IN ERROR PROGRAM STOPS AT WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 0038 AND STORAGE BUFFER INDICATING 30F5.

5.2.6 CARD-06 PROGRAM

THE CARD 06 PROGRAM CHECKS THE 1131 CPU FOR CORRECT RESPONSE TO A SIMULATED DSW. THE SIMULATED DSW IS SET IN THE CONSOLE ENTRY SWITCHES AND CAN BE A VALID OR INVALID DSW. PORTIONS OF THE CARD 06 PROGRAM DUPLICATE SECTIONS OF CARD 1 OF THE 1130 BASIC DIAGNOSTIC LOADER. THERE ARE THREE VALID DSW'S.

- A. 8003 BITS 0,14 AND 15 ON. COLUMN REQUESTS, BUSY, AND NOT READY.
- B. 0003 BITS 14 AND 15 ON. BUSY AND NOT READY.
- C. 0800 BIT 4 ON. END OF CARD (CP COMPLETE).

AFTER INITIAL SET UP, PROGRAM STOPS AT WAIT WITH IAR REG READING 002E AND SBR REG READING OF 3006, TO PERMIT OPERATOR TO ENTER A SIMULATED DSW IN THE CONSOLE ENTRY SWITCHES.

AFTER DEPRESSION OF START BUTTON, PROGRAM READS SETTING OF CONSOLE ENTRY SWITCHES INTO CORE AND THEN LOADS READING INTO ACC. IF THE READING IS 8003, THE PROGRAM REREADS THE SWITCHES AND STORES THE READING. PROGRAM BRANCHES BACK TO NORMAL WAIT 3006 TO PERMIT ENTRY OF DIFFERENT DSW IF DESIRED.

IF THE READING IS NOT 8003, PROGRAM CHECKS FOR READING OF 0003. IF TRUE, PROGRAM BRANCHES BACK TO NORMAL WAIT 3006 TO PERMIT ENTRY OF DIFFERENT DSW. IF 8003 READING IS NOT TRUE, PROGRAM READS CONSOLE SWITCHES AND CHECKS FOR ENTRY 0800. IF TRUE, PROGRAM ADDS 1 TO SUM WORD (WHICH CONTAINS NUMBER OF 1800 CONDITIONS ENCOUNTERED 0. PROGRAM THEN BRANCHES TO NORMAL WAIT 3006 TO PERMIT ENTRY OF NEW DSW. IF 0800 CONDITION IS NOT TRUE, PROGRAM STOPS AT ERROR WAIT WITH IAR REG READING OF 002D. ACC DISPLAYS ERROR DSW. PRESSING START BRANCHES PROGRAM TO NORMAL WAIT 3006 TO PERMIT ENTRY OF NEW DSW. IF IT IS DESIRED TO LOOP PROGRAM ON A SINGLE DSW, THE NORMAL WAIT THAT PERMITS ENTRY OF DSW'S, MAY BE CHANGED TO A NO OP (7000).

ONE-CARD DIAGNOSTIC PROGRAMS

5.2.7 CARD-07 PROGRAM

PART ONE OF CARD 07 PROGRAM TESTS LOAD DOUBLE AND ADD DOUBLE INSTRUCTIONS. AT THE END OF THE TEST, PROGRAM STOPS AT NORMAL WAIT 3007, WITH IAR READING OF 0006. THE ACCUMULATOR AND ACCUMULATOR EXTENSION SHOULD READ FFFF, OR AN ERROR IS INDICATED. PRIOR TO DEPRESSING THE START KEY TO CONTINUE TO PART TWO, OPERATOR MUST TURN ON THE INTERRUPT DELAY SWITCH ON THE CE PANEL.

PART TWO OF CARD 07 PROGRAM IS DESIGNED TO PERMIT SCOPING OF THE XIO FUNCTIONS, WHILE CONTINUOUSLY READING CARDS WITH THE 1442. THE READ-CARD ROUTINE IS A DUPLICATE OF READ-CARD ROUTING IN CARD 1 OF THE 1130 BASIC DIAGNOSTIC LOADER.

AFTER INITIAL SET UP, PROGRAM CAUSES CARD TO FEED, RESET DSW, AND SENSE DSW. IT THEN CHECKS DSW FOR A 8003 INDICATION. IF TRUE, PROGRAM READS CARD COLUMN INTO LOCATION 0000 OR 0001. ODD NUMBERED COLUMNS ARE READ INTO LOCATION 0001. EVEN NUMBERED CARD COLUMNS ARE READ INTO LOCATION 0000. PROGRAM THEN LOADS ACC FROM LOCATION JUST LOADED, AND BRANCHES BACK TO RESET AND SENSE DSW, AND CHECK FOR 8003 DSW AGAIN.

IF DSW IS NOT 8003, THE PROGRAM CHECKS FOR A 0003 DSW. IF TRUE, PROGRAM BRANCHES BACK TO SENSE DSW AND CHECK FOR 8003 DSW. PROGRAM WILL REMAIN IN THIS CLOSED LOOP UNTIL THE 8003 CONDITION IS TRUE OR THE 0003 CONDITION IS NOT TRUE. WHEN THE PROGRAM FINDS THE 0003 CONDITION NOT TRUE, IT SENSES AND RESETS THE DSW AND CHECKS FOR 0800 CONDITION. IF TRUE, PROGRAM BRANCHES TO START ANOTHER CARD FEEDING AND REPEATS THE ENTIRE PROCESS. IF 0003 IS NOT TRUE, PROGRAM WILL AGAIN BRANCH TO START ANOTHER CARD FEEDING. THE OPERATOR HAS AN OPTION TO STOP THE PROGRAM AT LOCATION 002C BY INSERTING A WAIT.

6. APPENDIX

6.1 DATA PATH TEST PROGRAM

THIS PROGRAM IS LOADED USING THE CONSOLE ENTRY SWITCHES AND TESTS THE ABILITY OF THE 1131 CPU TO TRANSFER ONES AND ZEROES BETWEEN THE FOLLOWING REGISTERS.

- A. FROM STORAGE BUFFER REGISTER TO ARITHMETIC FACTOR REGISTER TO ACCUMULATOR REGISTER TO STORAGE ADDRESS REGISTER TO INSTRUCTION ADDRESS REGISTER.
- B. FROM ACCUMULATOR REGISTER TO ACCUMULATOR EXTENSION REGISTER TO ACCUMULATOR REGISTER.
- C. FROM ACCUMULATOR REGISTER TO STORAGE BUFFER REGISTER.
- D. FROM INSTRUCTION ADDRESS REGISTER TO STORAGE BUFFER REGISTER.
- E. FROM INSTRUCTION ADDRESS REGISTER TO ACCUMULATOR REGISTER.

6.1.1 TEST PROCEDURE

- A. CLEAR STORAGE TO WAIT INSTRUCTION 33FF. SEE PARAGRAPH 3.3.6.
- B. ENTER THE FOLLOWING PROGRAM USING CONSOLE ENTRY SWITCHES.

NOTE

ALL NUMBERS SHOWN BELOW ARE IN HEXADECIMAL NOTATION.

LOCATION	CONTENT	MNEMONIC	COMMENTS
FFFA	0006	LD	LOAD ACCUMULATOR WITH CONTENTS OF LOCATION 0001.
FFF3	4480	BSI I	STORE CONTENTS OF I COUNTER (FFFD) AT ADDRESS STORED IN LOCATION FFFD. SET I COUNTER TO THAT ADDRESS AND ADD ONE TO I COUNTER.
FFFC	FFFD		ADDRESS POSITION OF BSI I INSTRUCTION.
FFFD	FFFD		THIS IS THE ACTUAL BRANCH ADDRESS FOR THE THE BSI I INSTRUCTION AND IS REPLACED BY THE BSI I.
FFFE	D002	STO	STORE CONTENTS OF ACCUMULATOR AT LOCATION 0001 (SHOULD NOT CHANGE).
FFFF	C0FC	LD	LOAD ACCUMULATOR WITH CONTENTS OF LOCATION FFFC.
0000	4480	BSI I	STORE CONTENTS OF I COUNTER (0002) AT ADDRESS STORED IN LOCATION 0002. SET I COUNTER TO THAT ADDRESS AND ADD ONE TO I COUNTER.
0001	0002		THIS IS ADDRESS POSITION OF BSI I INSTRUCTION.
0002	0002		THIS IS THE ACTUAL BRANCH ADDRESS FOR THE BSI I INSTRUCTION AND IS REPLACED BY THE BSI I INSTRUCTION.
0003	D0F8	STO	STORE CONTENTS OF ACCUMULATOR AT LOCATION FFFC (SHOULD NOT CHANGE).
0004	70F5	MDX	BRANCH TO LOCATION FFFA.

C. LOAD INSTRUCTION ADDRESS REGISTER WITH FFFA.

D. STEP THROUGH PROGRAM IN SI MODE, CHECKING THAT PROGRAM LOOPS PROPERLY. ANY DATA-PATH ERROR SHOULD RESULT IN THE IMPROPER BRANCHING OF A BSI I INSTRUCTION AND STOPPING AT A WAIT. THE LOCATION BEFORE THE WAIT SHOULD CONTAIN THE CONTENTS OF INSTRUCTION ADDRESS REGISTER WHEN THE BRANCH OCCURRED. LOGICAL RECONSTRUCTION OF THE ERROR SHOULD ISOLATE A DATA-TRANSFER ERROR AND SUGGEST THE CIRCUIT CARD CAUSING THE ERROR.

NOTE

A BRANCH OUTSIDE OF THE PROGRAM INTO A CORE LOCATION LOADED WITH 33FF INDICATES AN ERROR HAS OCCURRED. SUBTRACT TWO FROM INSTRUCTION ADDRESS INDICATOR READING AND DISPLAY LOCATION. THE CONTENT OF LOCATION DISPLAYED IS THE INSTRUCTION ADDRESS REGISTER SETTING WHEN THE ERRONEOUS BRANCH OCCURRED. IF THE BRANCH WAS CAUSED BY A BSI I INSTRUCTION FAILURE, THE LOCATION JUST CHECKED WILL HAVE A VALUE HIGHER BY ONE THAN THE ADDRESS OF THE SECOND WORD OF THE BSI I INSTRUCTION. IF THIS IS THE CASE, DISPLAY LOCATIONS WHERE PROGRAM IS STORED TO DETERMINE IF THE LOCATIONS HAVE CHANGED. THE ADDRESSES OF BSI I INSTRUCTIONS ARE STORED BY THE STO INSTRUCTIONS, AND THE LOCATIONS FFFD AND 0002 ARE STORED BY THE BSI I INSTRUCTIONS. STATIC OR INTERMITTENT DATA TRANSFER ERRORS SHOULD BE READILY DETECTED BY THIS MEANS AND BE EASY TO ISOLATE BECAUSE OF THE UNIQUE FAILURE INDICATIONS.

ERRORS IN THE DATA PATH PROGRAM SHOULD BE CAUSED BY SINGLE BIT FAILURES, OR BY HALF-WORD FAILURES. THUS, DROPPED OR ADDED BITS CAN BE REFERENCED DIRECTLY TO A CIRCUIT CARD. SWAP INDICATED CIRCUIT CARD TO SEE IF FAILURE CHANGES.

THE Q, U, A, AND E REGISTERS' CIRCUIT CARDS ARE LOCATED IN ROW 4 OF THE CARD GATE, AND ARE INTERCHANGEABLE.

THE I, B, AND M REGISTERS' CIRCUIT CARDS ARE LOCATED IN ROW 5 OF THE CARD GATE, AND ARE INTERCHANGEABLE.

FAILING BIT-	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
COLUMN-----	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q

THE FOLLOWING CARDS CONTROL HALF-WORD TRANSFERS AND ARE INTERCHANGEABLE.

M4, M5, M7, L5, AND L6.

6.1.2 PROGRAM DESCRIPTION

THE LD INSTRUCTION AT LOCATION FFFA PERFORMS THE FUNCTION OF SETTING THE ACCUMULATOR TO 0002 SO THAT WHEN THE FOLLOWING BSI I INSTRUCTION IS PERFORMED, A COMPLEMENT BIT PATTERN (FFFD) WILL BE SENT THROUGH THE ACCUMULATOR, THUS TESTING THAT THE ACCUMULATOR IS RETURNED TO 0002 AT THE END OF THE BSI I INSTRUCTION. THIS TEST IS ACCOMPLISHED BY STORING THE CONTENTS OF THE ACCUMULATOR BACK INTO LOCATION 0001 AFTER THE BSI I INSTRUCTION. THE SAME PHILOSOPHY IS USED DURING THE BSI I INSTRUCTION AT LOCATION 0000 BY SETTING THE ACCUMULATOR TO FFFD WHILE 0002 IS SENT THROUGH IT DURING THE BSI I INSTRUCTION. A FAILURE OF EITHER BSI I INSTRUCTION THAT AFFECTS THE ACCUMULATOR WILL CAUSE THE FOLLOWING BSI I INSTRUCTION TO TAKE ITS ADDRESS FROM THE WRONG LOCATION. THIS LOCATION WILL PROBABLY BE ONE OF THE COPE LOCATIONS LOADED WITH 33FF, THUS CAUSING THE PROGRAM TO STOP.

6.2 ADD TEST PROGRAM

THIS PROGRAM HELPS LOCATE AN ADD FAILURE THAT CANNOT BE LOCATED WHEN RUNNING CARD 04 OF ONE-CARD PROGRAMS IN SI MODE, BECAUSE OF THE DYNAMIC NATURE OF THE PROBLEM. IF THE CONTENTS OF SUMPL AND SUMMI DO NOT ADD TO 0000, THERE HAS BEEN A FAILURE IN ADDING 0001 TO SUMPL, OR A FAILURE IN ADDING FFFF TO SUMMI. TO DETERMINE WHICH OF THE TWO SUMS IS IN ERROR, IT MUST BE ASSUMED THAT ONE OF THEM IS CORRECT IN ORDER TO ARRIVE AT THE VALUE OF THE OTHER PRIOR TO THE FAILURE, IN OTHER WORDS, TO DETERMINE VALUE OF SUMPL PRIOR TO FAILURE. IT MUST BE ASSUMED THAT PRESENT VALUE OF SUMMI IS CORRECT AND VICEVERSA. EXECUTE ADD TEST PROGRAM AS FOLLOWS,

- A. OBTAIN VALUE OF SUMPL PRIOR TO FAILURE BY DETERMINING TWO'S COMPLEMENT OF (SUMMI - FFFF).
- B. OBTAIN VALUE OF SUMMI PRIOR TO FAILURE BY DETERMINING TWO'S COMPLEMENT OF (SUMPL - 0001).
- C. LOAD FOLLOWING PROGRAM BY MEANS OF CONSOLE ENTRY SWITCHES.

NOTE

ALL NUMBERS SHOWN BELOW ARE IN HEXADECIMAL NOTATION.

LOCATION	CONTENTS	MNEMONIC	COMMENTS
0000	VALUE OF SUMP PRIOR TO ERROR		WILL BE IN ACCUMULATOR WHEN ADD OCCURS.
0001	0001		WILL BE ADDED TO ACCUMULATOR DURING ADD.
0002	CORRECT SUM OF ADDITION		USED TO CHECK ADD OPERATION.
0003	00FC	LD	LOAD ACCUMULATION FROM LOCATION 0000.
0004	80FC	A	ADD CONTENTS OF LOCATION 0001 TO ACCUMULATOR.
0005	F0FC	EOR	EOR ACCUMULATOR WITH CORRECT ANSWER.
0006	4820	BSC Z	SKIP ON ZERO TO LOCATION 0008.
0007	3000	WAIT	WAIT ON ERROR HAS OCCURRED.
0009	6003	LDX	BRANCH TO LOCATION 0003.

- D. LOAD INSTRUCTION ADDRESS REGISTER WITH 0003.
- E. RUN PROGRAM IN RUN MODE. ANY ADD FAILURE WILL CAUSE PROGRAM TO STOP AT WAIT INSTRUCTION WITH INSTRUCTION ADDRESS INDICATING 0008.
- F. IF PROGRAM RUNS CONTINUOUSLY WITHOUT ERRORS.
 - 1. PRESS STOP PUSHBUTTON.
 - 2. LOAD LOCATION 0000 WITH VALUE OF SUMMI PRIOR TO ERROR.
 - 3. LOAD LOCATION 0001 WITH FFFF.
 - 4. LOAD LOCATION 0002 WITH CORRECT SUM OF SUMMI PLUS FFFF.
 - 5. RUN AGAIN IN RUN MODE.

----- LAST PAGE -----

ONE-CARD DIAGNOSTIC PROGRAMS
CARD C1

```

07BC      ABS
          ORG      0
          * TST MDX AND I TO A TRANSFER
          *      TEST READ IN ON PROG. LOAD.

0000 0  C02F      LD      /0030
0001 0  3001      WAIT    /0001      --SEE ACC IS F0F0
0002 0  C02E      LD      /0031
0003 0  3001      WAIT    /0001      --SEE ACC IS 080F
0004 0  703F      MDX     /0044
0005 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0006 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0007 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0008 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0009 0  30F1      WAIT    -15      **ERR., RESET THEN SI
000A 0  30F1      WAIT    -15      **ERR., RESET THEN SI
000B 0  30F1      WAIT    -15      **ERR., RESET THEN SI
000C 0  30F1      WAIT    -15      **ERR., RESET THEN SI
000D 0  30F1      WAIT    -15      **ERR., RESET THEN SI
000E 0  30F1      WAIT    -15      **ERR., RESET THEN SI
000F 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0010 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0011 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0012 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0013 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0014 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0015 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0016 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0017 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0018 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0019 0  30F1      WAIT    -15      **ERR., RESET THEN SI
001A 0  30F1      WAIT    -15      **ERR., RESET THEN SI
001B 0  30F1      WAIT    -15      **ERR., RESET THEN SI
001C 0  30F1      WAIT    -15      **ERR., RESET THEN SI
001D 0  30F1      WAIT    -15      **ERR., RESET THEN SI
001E 0  30F1      WAIT    -15      **ERR., RESET THEN SI
001F 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0020 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0021 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0022 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0023 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0024 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0025 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0026 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0027 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0028 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0029 0  30F1      WAIT    -15      **ERR., RESET THEN SI
002A 0  30F1      WAIT    -15      **ERR., RESET THEN SI
002B 0  30F1      WAIT    -15      **ERR., RESET THEN SI
002C 0  30F1      WAIT    -15      **ERR., RESET THEN SI
002D 0  30F1      WAIT    -15      **ERR., RESET THEN SI
002E 0  30F1      WAIT    -15      **ERR., RESET THEN SI
002F 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0030 0  F0F0      DC      /F0F0
0031 0  080F      DC      /080F
0032 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0033 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0034 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0035 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0036 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0037 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0038 0  30F1      WAIT    -15      **ERR., RESET THEN SI
0039 0  30F1      WAIT    -15      **ERR., RESET THEN SI
003A 0  30F1      WAIT    -15      **ERR., RESET THEN SI
003B 0  30F1      WAIT    -15      **ERR., RESET THEN SI
003C 0  30F1      WAIT    -15      **ERR., RESET THEN SI
003D 0  30F1      WAIT    -15      **ERR., RESET THEN SI
003E 0  7000      MDX     *
003F 0  7000      MDX     /0040

```

```

000020
000030
000040
000050
000060
000070
000080
000090
000100
000110
000120
000130
000140
000150
000160
000170
000180
000190
000200
000210
000220
000230
000240
000250
000260
000270
000280
000290
000300
000310
000320
000330
000340
000350
000360
000370
000380
000390
000400
000410
000420
000430
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000470
000480
000490
000500
000510
000520
000530
000540
000550
000560
000570
000580
000590
000600
000610
000620
000630
000640
000650
000660
000670
000680
000690

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ONE-CARD DIAGNOSTIC PROGRAMS
CARD 01

0040 0	30F1	WAIT	-15	**ERR., RESET THEN SI	000700
0041 0	30F1	WAIT	-15	**ERR., RESET THEN SI	000710
0042 0	30F1	WAIT	-15	**ERR., RESET THEN SI	000720
0043 0	30F1	WAIT	-15	**ERR., RESET THEN SI	000730
0044 0	70F9	MDX	/003E		000740
0045 0	30F1-	WAIT	-15	**ERR., RESET THEN SI	000750
0046 0	30F1-	WAIT	-15	**ERR., RESET THEN SI	000760
0047 0	30F1-	WAIT	-15	**ERR., RESET THEN SI	000770
0048 0	30F1-	WAIT	-15	**ERR., RESET THEN SI	000780
0049 0	30F1-	WAIT	-15	**ERR., RESET THEN SI	000790
004A 0	30F1-	WAIT	-15	**ERR., RESET THEN SI	000800
004B 0	30F1-	WAIT	-15	**ERR., RESET THEN SI	000810
004C 0	30F1-	WAIT	-15	**ERR., RESET THEN SI	000820
004D 0	3001	WAIT	/0001	--STOP HERE INDICATES OK	000830
004E 0	2000	DC	/2000	HEXIDECIMAL NUMBER 0	000840
004F 0	1000	DC	/1000	HEXIDECIMAL NUMBER 1	000850
0050	0000	END	0		000860

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 01

CROSS REFERENCE LISTING

SYMBOL VALUE REFERENCES

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 02

02BC	ABS ORG	/0000	000890
	* TEST ADD BY ONE AND INCREMENT I COUNTER		000900
0000 0 C03E	LD	/003F	000910
0001 0 8030	A	/003F	000920
0002 0 803C	A	/003F	000930
0003 0 8038	A	/003F	000940
0004 0 803A	A	/003F	000950
0005 0 8039	A	/003F	000960
0006 0 8038	A	/003F	000970
0007 0 8037	A	/003F	000980
0008 0 8036	A	/003F	000990
0009 0 8035	A	/003F	001000
000A 0 8034	A	/003F	001010
000B 0 8033	A	/003F	001020
000C 0 8032	A	/003F	001030
000D 0 8031	A	/003F	001040
000E 0 8030	A	/003F	001050
000F 0 802F	A	/003F	001060
0010 0 802E	A	/003F	001070
0011 0 802D	A	/003F	001080
0012 0 802C	A	/003F	001090
0013 0 802B	A	/003F	001100
0014 0 802A	A	/003F	001110
0015 0 8029	A	/003F	001120
0016 0 8028	A	/003F	001130
0017 0 8027	A	/003F	001140
0018 0 8026	A	/003F	001150
0019 0 8025	A	/003F	001160
001A 0 8024	A	/003F	001170
001B 0 8023	A	/003F	001180
001C 0 8022	A	/003F	001190
001D 0 8021	A	/003F	001200
001E 0 8020	A	/003F	001210
001F 0 801F	A	/003F	001220
0020 0 801E	A	/003F	001230
0021 0 801D	A	/003F	001240
0022 0 801C	A	/003F	001250
0023 0 801B	A	/003F	001260
0024 0 801A	A	/003F	001270
0025 0 8019	A	/003F	001280
0026 0 8018	A	/003F	001290
0027 0 8017	A	/003F	001300
0028 0 8016	A	/003F	001310
0029 0 8015	A	/003F	001320
002A 0 8014	A	/003F	001330
002B 0 8013	A	/003F	001340
002C 0 8012	A	/003F	001350
002D 0 8011	A	/003F	001360
002E 0 8010	A	/003F	001370
002F 0 800F	A	/003F	001380
0030 0 800E	A	/003F	001390
0031 0 800D	A	/003F	001400
0032 0 800C	A	/003F	001410
0033 0 800B	A	/003F	001420
0034 0 800A	A	/003F	001430
0035 0 8009	A	/003F	001440
0036 0 8008	A	/003F	001450
0037 0 8007	A	/003F	001460
0038 0 8006	A	/003F	001470
0039 0 8005	A	/003F	001480
003A 0 8004	A	/003F	001490
003B 0 8003	A	/003F	001500
003C 0 8002	A	/003F	001510
003D 0 8001	A	/003F	001520
003E 0 8000	WAIT	/0002	001530
003F 0 0001	DC	/0001	001540
0040 0 F8FF	DC	/F8FF	001550

ADD /0001 TO ACC. AT EACH
 INST. FROM LOC. /0000
 TO LOC. /003E. TOTAL
 AT WAIT AT /003E SHOULD
 BE /003E.
 IF ANSWER WRONG
 1. DISPLAY LDCS. /003F
 /0040
 /0041
 /0000.
 2. LOAD OK. CHECK THE
 FOLLOWING CARDS
 BY SWAP + RE-RUN
 QWAD + IBM.
 OR SINGLE INSTRUCTION
 FROM 70000 + SEE
 WHEN ACC. NOT EQU.
 I COUNTER.

—SEE ACC. IS 003E
 CONSTANT ADDED AT 0-3D
 CONSTANT TO CHECK CRD READ

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 02

0041 0000
004F 0 2000
004F 0 0900
0050 0000

BSS /0
DC /2000
DC /0800
END 0

HEXIDECIMAL NUMBER 0
HEXIDECIMAL NUMBER 2

001570
001580
001590
001600

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 02

CROSS REFERENCE LISTING

SYMBOL	VALUE	REFERENCES
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ONE-CARD DIAGNOSTIC PROGRAMS
CARD 03

029C

ABS
ORG /C000

- * CHECK BSC Z, SRA 1, AND EOR.
- * LOAD CARD AND RUN PROGRAM. PROGRAM SHOULD STOP
- * AT WAITS FOLLOWED BY -- FOR SEEING THAT THE REGS.
- * SHOWN ARE CORRECT, DIFFERENCES INDICATE ERRORS.
- * WAITS FOLLOWED BY ** OCCUR ONLY ON ERRORS.
- * THE FIRST TEST IS OF SRA 1 AND BSC Z.
- * A ONE IS PLACED INTO THE BIT ZERO POSITION AND
- * TESTED AT EACH TIME BY A BSC Z WHICH SHOULD NOT
- * SKIP THE ACC. IS SHOWN AFTER EACH SRA 1.

0000 0 C03C
0001 0 4920
0002 0 1901
0003 0 4920
0004 0 1901
0005 0 4920
0006 0 1901
0007 0 4920
0008 0 1901
0009 0 4920
000A 0 1901
000B 0 4920
000C 0 1901
000D 0 4920
000E 0 1901
000F 0 4920
0010 0 1901
0011 0 4920
0012 0 1901
0013 0 4920
0014 0 1901
0015 0 4920
0016 0 1901
0017 0 4920
0018 0 1901
0019 0 4920
001A 0 1901
001B 0 4920
001C 0 1901
001D 0 4920
001E 0 1901
001F 0 4920
0020 0 3003

0021 0 1901
0022 0 4920
0023 0 30F3
0024 0 3003

LD K000 8000
BSC Z SHOULD NOT SKIP
SRA 1 4000
BSC Z SHOULD NOT SKIP
SRA 1 2000
BSC Z SHOULD NOT SKIP
SRA 1 1000
BSC Z SHOULD NOT SKIP
SRA 1 0800
BSC Z SHOULD NOT SKIP
SRA 1 0400
BSC Z SHOULD NOT SKIP
SRA 1 0200
BSC Z SHOULD NOT SKIP
SRA 1 0100
BSC Z SHOULD NOT SKIP
SRA 1 0080
BSC Z SHOULD NOT SKIP
SRA 1 0040
BSC Z SHOULD NOT SKIP
SRA 1 0020
BSC Z SHOULD NOT SKIP
SRA 1 0010
BSC Z SHOULD NOT SKIP
SRA 1 0008
BSC Z SHOULD NOT SKIP
SRA 1 0004
BSC Z SHOULD NOT SKIP
SRA 1 0002
BSC Z SHOULD NOT SKIP
SRA 1 0001
BSC Z SHOULD NOT SKIP
WAIT /0003 -- 1 EQU. 0021 A EQU. 0001
ERROR, RESET THEN SI, SEE EACH INST.
OK PRESS START
SRA 1 0000
BSC Z SHOULD SKIP
WAIT -13 **ERR. A SHOULD BE ZERO
WAIT /0003 -- 1 EQU. 0025 A EQU. 0000
ERROR, RESET THEN SI, SEE EACH INST.
OK PRESS START
*OK. SHOWS 1 CNTR. OK FROM 0000 TO /0025
* BSC Z SKIPS ONLY WHEN ACC = 0000
* SRA 1 OK FOR ONE BIT IN ANY POSITION
*BEGIN TEST OF TRANSFERS OF B-D-A-A-----
* AND A-U-A AND A-B
* THE CONTENTS OF ACC. IS SHOWN AFTER EACH CHANGE
LD K000 F0F0
STO /FFFF
LD /FFFF
STO /0000
LD /0000
SRA 4 0F0F
STO /FFFF
LD /FFFF
STO /0000
LD /0000

0025 0 C018
0026 0 D008
0027 0 C0D7
0028 0 00D7
0029 0 C006
002A 0 18G4
002B 0 00D3
002C 0 C0D2
002D 0 00D2
002E 0 C0D1

001630
001640
001650
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001920
001930
001940
001950
001960
001970
001980
001990
002000
002010
002020
002030
002040
002050
002060
002070
002080
002090
002100
002110
002120
002130
002140
002150
002160
002170
002180
002190
002200
002210
002220
002230
002240
002250
002260
002270
002280
002290
002300

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 03

002F 0 1003

WAIT /0003 --1 EQU. 0030 A EQU. 0F0F
 * IF ERROR, LOAD 1 CTR. /0025, THEN SI AND
 * SEE THAT REGS. AS SHOWN FOR EACH INSTRUCTION.
 * QUAD CARDS GATE A2 ROWS 4,5
 * IBM CARDS GATE A2 ROWS 6,7
 * BIT POS. -- 0-1 2-3 4-5 6-7 8-9 10-11 12-13 14-15
 * CARD COL.-- C D E F G H J K
 * IF OK , PRESS START-----

* TEST EOR

0030 0 F000

EOR KFOFO SET ACC TO FFFF

0031 0 0000

STO KFFFF STORE IT

0032 0 3003

WAIT /0003 --1 EQU. 0033 A EQU. FFFF

0033 0 F008

EOR KFFFF CLEAR ACC TO 0000

0034 0 4920

BSC 2 SHOULD SKIP

0035 0 30F3

WAIT -13 **ERR. ACC SHOULD BE 0000

0036 0 F009

EOR K0000 ACC SHOULD STAY 0000

0037 0 4820

BSC 2 SHOULD SKIP

0038 0 37F3

WAIT -13 **ERR. ACC SHOULD BE 0000

0039 0 F004

EOR KFOFO ACC SHOULD GO TO FOFO

003A 0 F0C4

EOR /FFFF ACC SHOULD BE FFFF

* LOC. /FFFF SHOULD BE 0F0F

003B 0 3003

WAIT /0003 --1 EQU. 003C A EQU. FFFF

* IF ERROR PUT IN SI MODE AND START

003C 0 70F1

MDX /002E

* OK , TEST ON THIS CARD COMPLETE.

* NO ERRORS ON THIS TEST SHOW ALL BITS TRANSFER

* CORRECTLY FROM CORE-B-D-A-M AND A-U-A-D-B-CORE.

* THAT EOR WORKS RIGHT. THAT BSC 2 WORKS RIGHT.

* THAT ACC. WILL SHIFT A ONE BIT RIGHT FROM ANY

* POSITION. THAT LD, STO, EOR, BSC 2, SRA 1, WAIT

* INSTRUCTIONS OK. 1 CNTR. STEPS FROM /0000 TO/003C

003D 0 8000

K9000 DC /0000

003E 0 F0F0

KFOFO DC /FOFO

003F 0 FFFF

KFFFF DC /FFFF

0040 0 0000

K0000 DC /0000

0041 0 7000

BSS /0

004F 0 2000

DC /7000 HEXIDECIMAL NUMBER 0

004F 0 0040

DC /0040 HEXIDECIMAL NUMBER 3

0050 0000

END 0

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 03

CROSS REFERENCE LISTING

SYMBOL	VALUE	REFERENCES
KFFFF	003F	0031,0033
KF3F0	003E	0025,0030,0039
K0000	0040	0036
K8000	003D	0000

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 04

ABS

- TEST LONG FORMAT OF LD A STO LDX EDR.
- THEN-
- TEST ADD OF POSITIVE AND NEGATIVE ONES.
- A COMPREHENSIVE TEST OF ADD IS PERFORMED ON
- EACH PASS. A PASS TAKES ABOUT 4 SECONDS.
- VERIFY CORRECT LOOPING BY SINGLE INSTRUCTION.
- PROGRAM FORMS CONTINUOUS LOOP.
- TO EXIT- PRESS RESET + PROGRAM LOAD.

028C		ORG	/0000		002770
0000 0	C013	LD	K4000	MAKE LONG FORM INSTRUCTIONS	002728
0001 0	1804	SRA	4		002729
0002 0	D012	STO	K0400		002730
0003 0	F012	EDR	LD		002740
0004 0	D011	STO	LD		002750
0005 0	C00F	LD	K0400		002760
0006 0	F012	EDR	EDR		002770
0007 0	D011	STO	EDR		002780
0008 0	C00C	LD	K0400		002790
0009 0	F011	EDR	STO		002791
000A 0	D010	STO	STO		002792
000B 0	C009	LD	K0400		002793
000C 0	F011	EDR	A		002794
000D 0	D010	STO	A		002795
000E 0	C006	LD	K0400		002796
000F 0	F001	EDR	LDX		002797
0010 0	D000	STO	LDX		002798
0011 00	64000016	LDX LDX L	LD	BRANCH TO TEST LONG FORM.	002800
0013 0	30F4	WAIT	-12	**ERR. LDX FAILED	002809
0014 0	4000	K4000 DC	/4000		002810
0015 0	0400	K0400 DC	/0400		002812
0016 00	C4000031	LD LD L	KFOF0	BEGIN LONG FORM TEST	002813
0018 0	1804	SRA	4		002814
0019 00	F4000031	EDR EDR L	KFOF0		002815
001B 00	D400002F	STO STO L	KFFFF		002816
001D 0	3004	WAIT	/0004	-- SEE ACC. EQU. FFFF	002840
001E 00	94000030	A A L	K0001		002841
0020 0	D000	STO	SUMPL	CLEAR SUM PLUS LOCATION	002860
0021 0	D00B	STO	SUMMI	CLEAR SUM MINUS LOCATION	002873
0022 0	3004	WAIT	/0004	--SEE ACC. EQU. 0000	002880
0023 0	C009	BEGIN LD	SUMMI	LOAD SUM OF MINUS ONES	002890
0024 0	800A	A	KFFFF	ADD MINUS ONE TO IT	002900
0025 0	D007	STO	SUMMI	STORE SUM OF MINUS ONES	002910
0026 0	C007	LD	SUMPL	LOAD SUM OF PLUS ONES	002920
0027 0	800B	A	K0001	ADD PLUS ONE TO IT	002930
0028 0	D005	STO	SUMPL	STORE SUM OF PLUS ONES	002940
0029 0	8003	A	SUMMI	ADD SUMMI TO SUMPL	002950
002A 0	4820	BSC	Z	SHOULD ALWAYS SKIP	002960
002B 0	30F4	WAIT	-12	**ERR. ACC NOT ZERO	002970
002C 0	70F6	MDX	BEGIN		002980
002D 0	0000	SUMMI DC	/0000		002990
002E 0	0000	SUMPL DC	/0000		003000
002F 0	0000	KFFFF DC	/0000		003010
0030 0	0001	K0001 DC	/0001		003020
0031 0	F0F0	KFOF0 DC	/F0F0		003030
0032 0	001C	BSS	/1C		003040
004E 0	2000	DC	/2000	HEXIDECIMAL NUMBER 0	003050
004F 0	0020	DC	/0020	HEXIDECIMAL NUMBER 4	003060
0050	0000	END	0		003070

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 04

CROSS REFERENCE LISTING

SYMBOL	VALUE	REFERENCES
A	001E	000C,000D
BEGIN	0023	002C
EDR	0019	0006,0007
KFFFF	002F	0018,0024
KFOFO	0031	0016,0019
K0001	0030	001E,0027
K0400	0015	0002,0005,0008,000A,000E
K4000	0014	0000
LD	0016	0003,0004,0011
LDX	0011	000F,0010
STO	0018	0009,000A
SUMMI	002D	0021,0023,0025,0029
SUMPL	002E	0020,0026,0028

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 05

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028C      ABS
          ORG      0
          * TEST THAT LOCS. 0050 THRU FFF CAN BE ADDRESSED
          * PROGRAM SHOULD STOP AT LOC. 0FFF WITH B 300A
          * PRESS RESET AND START. PROGRAM THEN SHOULD STOP
          * AT LOC. 004A WITH B 300A AND ACC. 0FAF WHICH
          * IS THE NUMBER OF LOCATIONS TESTED. PROGRAM
          * CAN BE RE-RUN BY PRESSING START.
MOD1 LD      K1000      PROGRAM REPLACES THIS
      SRA      2
      EOR      STLN
      STD      STWT      MAKE UP LONG INSTRUCTIONS
      STO      STLN
      LD      K1000
      SRA      2
      EOR      CHCK
      STD      CHCK
      LD      KF000
      SRA      4
      EOR      STWT+1
      STD      STWT+1
      LD      CON1
      STO      MOD1      MODIFY LOCATION 0000
      LD      KWAIT
      STWT STD L /00FF      PUT WAIT INTO /00FF
      LD      SUMC
MOD3 A      MOD3+1      FORM CHECK SUM
      STD      SUMC
      LD      MOD3
      A      K0001
      STD      MOD3
      EOR      CON3
      BSC      2
      MDX      MOD3-1
      LD      SUMC
      BSC      2      SHOULD SKIP
      WAIT      -11      **ERR. SUM SHOULD BE 0000
      MDX      RSTR
      DC      /00DC      USED TO MAKE CHECK SUM
      DC      /00DC      USED TO MAKE CHECK SUM
      K0001 DC      /0001
      K8GIN DC      /5000
      K1000 DC      /1000
      KF000 DC      /F000
      KBSI BSI X -1
      CON1 MDX X CHECK-MOD1-1
      CON3 A X BGIN-MOD3
      SUMC DC      /00FC
      SUML DC      /2030
      RSTR LD      KBGIN      LOAD ACC. TO 5000
      SRA      8      SHIFT TO /0050
      STD      STLN+1      RESTORE
      STO      CHCK+1      RESTORE
      SRA      16      ACC = /0000
      STO      SUML      RESTORE
      LD      KBSI      PUT BSI-1 INTO CORE
      STLN STD L /0050
      LD      STLN+1
      A      K0001      MODIFY STORE ADDRESS
      STO      STLN+1
      EOR      STWT+1
      BSC      2      SKIP WHEN LOC. 0FFE STORED
      MDX      STLN-1
      MDX      /0050      RUN SERIFS OF BSI-1 STORED
      WAIT      -11      **ERR. ADDRESS PLUS ONE
          * DOES NOT EQUAL ADDRESS OF LOCATION TESTED.
CHECK LD      CHCK+1      LOAD THE ADDRESS BEING
      A      K0001      TESTED AND ADD ONF.
0000 0 C022
0001 0 1A02
0002 0 F02E
0003 0 D00C
0004 0 D02C
0005 0 C010
0006 0 1802
0007 0 F035
0008 0 D034
0009 0 C01A
000A 0 1804
000B 0 F005
000C 0 D004
000D 0 C018
000E 0 70F1
000F 0 C03B
0010 00 D40000FF
0012 0 C015
0013 0 8000
0014 0 7013
0015 0 C0FD
0016 0 800A
0017 0 70FB
0018 0 F00E
0019 0 4820
001A 0 70F7
001B 0 C00C
001C 0 4820
001D 0 30F5
001E 0 700B
001F 0 00DC
0020 0 00DC
0021 0 0001
0022 0 5000
0023 0 1000
0024 0 F000
0025 0 40FF
0026 0 703A
0027 0 803C
0028 0 00FC
0029 0 2030
002A 0 C0F7
002B 0 1808
002C 0 D005
002D 0 D010
002E 0 1810
002F 0 00F9
0030 0 C0F4
0031 00 D4000050
0033 0 C0FE
0034 0 90EC
0035 0 D0FC
0036 0 F00A
0037 0 4820
0038 0 70F7
0039 0 7016
003A 0 30F5
003B 0 C002
003C 0 80E4

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003100
003110
003120
003130
003140
003150
003160
003170
003180
003190
003200
003210
003220
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003250
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003750
003760

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ONE-CARD DIAGNOSTIC PROGRAMS
CARD 05

003D 00 F4000050	CHCK FOR L	/0050	COMPARE WITH CONTENTS.	003770
003F 0 4820	BSC	Z	SHOULD BE ZERO AND SKIP	003780
0040 0 70F9	MDX	CHECK-1	ERROR, STOP + SING. INST.	003790
0041 0 C0F7	LD	SUML		003800
0042 0 80DE	A	K0001	FORM SUM OF = LOCS. TESTED	003810
0043 0 00E5	STO	SUML		003820
0044 0 C0F9	LD	CHCK+1	MODIFY TO TEST NEXT LOC.	003830
0045 0 80DB	A	K0001		003840
0046 0 00F7	STO	CHCK+1		003850
0047 0 F0C9	EOR	STWT+1	CHECK IF ALL TESTED	003860
0048 0 4820	BSC	Z	SKIP, ALL LOCS. TESTED	003870
0049 0 70F1	MDX	CHECK-2	GO CHECK NEXT LOCATION	003880
004A 0 C0DE	LD	SUML	LOAD SUM OF NUMBER TESTED.	003890
004B 0 3005	KWAIT WAIT	/0005	--ACC. EQU. OFAF IS NUMBER	003900
004C 0 70DD	MDX	RSTR	TESTED.	003910
004D 0 08FF	DC	/08FF	USED TO MAKE CHECK SUM	003920
004E 0 2000	DC	/2000	HEXIDEcimal NUMBER 0	003940
004F 0 0010	BGIN DC	/0010	HEXIDEcimal NUMBER 5	003950
0050 0000	END	0		003960

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 05

CROSS REFERENCE LISTING

SYMBOL	VALUE	REFERENCES
BGIN	004F	0027
CHK	003D	0007,0008,002D,003B,0044,0046,0049
CHECK	003B	0026,0040
CON1	0026	000D
CON3	0027	0018
KBGIN	0022	002A
KBSI	0025	0030
KF000	0024	0009
KWAIT	004B	000F
K0001	0021	0016,0034,003C,0042,0045
K1000	0023	0000,0005
MOD1	0000	000E,0026
MOD3	0013	0013,0015,0017,001A,0027
RSTR	002A	001E,004C
STLN	0031	0002,0004,002C,0033,0035,0038
STWT	0010	0003,000B,000C,0036,0047
SUMC	0028	0012,0014,001B
SUML	0029	002F,0041,0043,004A

003990
004000
004010
004020
004030
004040
004050
004060
004070
004080
004090
004100
004110
004120
004130
004140
004150
004160
004170
004180
004190
004200
004210
004220
004230
004240
004250
004260
004270
004280
004290
004300
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004370
004380
004390
004400
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004660

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 06

003F 0	C0FE	LD	STORE+1		004670
003F 0	30E3	A	K0001+1	DUMMY MODIFY OF STO L	004680
0040 0	00FC	STO	STORE+1		004690
0041 0	70E8	MDX	SRTRD		004700
0042 0	F0DE	CONT1 FOR	K8000	CHECK FOR BITS 14+15 ONLY	004710
0043 0	4820	BSC	Z	SKIP BUSY AND NOT READY	004720
0044 0	7001	MDX	CONT2		004730
0045 0	70F7	MDX	SRTRD		004740
0046 0	C0E1	CONT2 LD	SENSE	BIT SWS. LOADED TO ACC.	004750
0047 0	F0D7	EOR	K0800	CHECK FOR BIT 4 ONLY	004760
0048 0	4820	BSC	Z	SKIP END OF CARD	004770
0049 0	70E1	MDX	ERROR		004780
004A 0	C0DF	LD	COUNT	COUNT PASSES	004790
004A 0	80D6	A	KC001		004800
004C 0	70F0	MDX	SRTRD		004810
004D 0	0000	DC	0		004820
004E 0	2000	DC	/2000	HEXIDECIMAL NUMBER 0	004830
004F 0	0008	DC	/0008	HEXIDECIMAL NUMBER 6	004840
0050	0000	END	0		004850

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 05

CROSS REFERENCE LISTING

SYMBOL	VALUE	REFERENCES
CHKSM	001E	0009
CONT1	0042	0032
CONT2	0046	0044
COUNT	002A	004A
ENDCK	001D	
ERROR	002B	0049
K0001	0022	0035,003F,0048
K0000	001F	002B,0047
K8000	0021	0042
K8003	0020	0030
RDIN	0024	0000,0003,0033,0034,0036
RDSW	0026	0002,0004,002E
SENSE	0028	0005,0026,002F,0046
SRTD	002D	000D,001D,003B,0041,0045,004C
START	0000	0039,003B
STORE	003C	0007,0008,000B,000C,003E,0040

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 07

028C		ABS			004880
		ORG	0		004890
		* TEST DOUBLE PRECISION LOAD AND ADD AND			004891
		* PROGRAM FOR SCOPE LOOPS ON READ CARD			004900
		* XIO FUNCTIONS ARE IDENTICAL TO CARD1 BUT NO STOP			004910
		* ON ERROR.			004920
0000 0	C017	LD	KFOF0	SET UP CONSTANT /OF0F	004921
0001 0	1804	SRA	4		004922
0002 0	7016	STO	KFOF0+1		004923
0003 0	7016	STO	KFOF0+2		004924
0004 0	C813	LDD	KFOF0	TEST LOAD DOUBLE	004925
0005 0	8814	AD	KFOF0+2	TEST ADD DOUBLE	004926
0006 0	3007	WAIT	/0007	--SEE ACC. FFFF @ FFFF IF OK	004927
				CONT. IF NOT RESET AND SI.	004928
0007 0	C01D	START LD	RDIN+1	CORRECT I/O CONT. COMM.	004930
0008 0	1802	SRA	2	SHIFT IT	004940
0009 0	D018	STO	RDIN+1	STORE IT	004950
000A 0	C018	LD	K0001+1	CORRECT I/O CONT. COMM.	004960
000B 0	1801	SRA	1	SHIFT IT	004970
000C 0	D016	STO	K0001+1	STORE IT	004980
000D 0	C018	LD	SENSE+1	CORRECT I/O CONT. COMM.	004990
000E 0	1803	SRA	3	SHIFT IT	005000
000F 0	7019	STO	SENSE+1	STORE IT	005010
0010 0	F016	FOR	RESET+1		005020
0011 0	7015	STO	RESET+1		005030
0012 0	700A	MDX	ENDCK		005040
0013 0	0000	DC	0		005060
0014 0	0000	DC	0		005070
0015 0	0000	DC	0		005080
0016 0	0000	DC	0		005090
0017 0	0000	DC	0		005100
0018 0	F0F0	KFOF0 DC	/F0F0		005110
0019 0	0F0F	DC	/0F0F		005120
001A 0	0F0F	DC	/0F0F	PUT IN BY PROGRAM	005200
001B 0	F0F0	DC	/F0F0		005210
001C 0	0000	DC	0		005215
001D 0	700F	ENDCK MDX	SRTD		005220
001E 0	0800	K0800 DC	/0800		005230
001F 0	8003	K8003 DC	/8003		005240
0020 0	8000	K8000 DC	/8000		005250
0021 0	0000	DC	0		005260
0022 0	0001	K0001 DC	/0001	START RD, USED AS CONSTANT	005270
0023 0	2808	DC	/2808	/1404 SET BY PROG.	005280
0024 0	0000	RDIN DC	/0000	READ IN LOCATIONS 0 AND 1	005290
0025 0	4800	DC	/4800	/1200 SET BY PROG.	005300
0026 0	0000	RESET DC	0	RESET DSW CONTROL COMMAND	005310
0027 0	0003	DC	/0003	/1703 SET BY PROG.	005320
0028 0	0004	SENSE DC	/0004	SENSE DSW CONTROL COMMAND	005330
0029 0	8800	DC	/8800	/1700 SET BY PROG.	005340
002A 0	0000	DC	0		005350
002B 0	F0F2	ERROR EOR	K0800	RESTORE ACC. TO DSW	005360
002C 0	7000	MDX	*	PUT WAIT HERE FOR ERR. STOP	005370
002D 0	08F4	SRTD XIO	K0001	START READ	005380
002E 0	08F7	XIO	RESET	RESET DSW	005390
002F 0	08F8	XIO	SENSE	SENSE DSW FOR CRP	005400
0030 0	F0EE	EOR	K8003	CHECK BITS 0,14+15 ONLY	005410
0031 0	4920	BSC	2	SKIP IF BITS 0,14+15 ONLY	005420
0032 0	700F	MDX	CONT1	RD COL.	005430
0033 0	08F0	XIO	RDIN		005440
0034 0	C0FF	LD	RDIN		005450
0035 0	F0EC	EOR	K0001		005460
0036 0	D0ED	STO	RDIN		005470
0037 0	4820	BSC	2	SKIP, ODD COL. JUST READ	005480
0038 0	7002	MDX	HOP		005490
0039 0	C0C7	L7	/0001	LOAD ODD COL. JUST READ	005500
003A 0	7006	MDX	JUMP		005510
003B 0	C0C4	HOP LD	/0000	LOAD EVEN COL. JUST READ	005520
003C 0	7004	MDX	JUMP		005530

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 07

003D 0	0000	DC	0		005540
003E 0	0000	DC	0		005550
003F 0	0000	DC	0		005560
0040 0	0000	DC	0		005570
0041 0	70EC	JUMP	NDX	SATRD+1	005580
0042 0	F00D	CONT1	EDR	K0000	005590
0043 0	4870		BSC	Z	005600
0044 0	7001		NDX	CONT2	005610
0045 0	70E9		NDX	SATRD+2	005620
0046 0	08DF	CONT2	XIO	RESET	005630
0047 0	F0D6		EDR	K0800	005640
0048 0	4920		BSC	Z	005650
0049 0	70F1		NDX	ERROR	005660
004A 0	7002		NDX	/004D	005670
004B 0	0000		DC	0	005680
004C 0	0000		DC	0	005690
004D 0	70DF		NDX	SATRD	005700
004E 0	2000		DC	/2000	005710
004F 0	0004		DC	/0004	005720
0050	0000	END	0		005730

CHECK FOR BITS 14+15 ONLY
SKIP BUSY AND NOT READY

SENSE AND RESET DSM
CHECK FOR BIT 4 ONLY
SKIP END OF CARD

HEXIDECIMAL NUMBER 0
HEXIDECIMAL NUMBER 7

ONE-CARD DIAGNOSTIC PROGRAMS
CARD 07

CROSS REFERENCE LISTING

SYMBOL	VALUE	REFERENCES
CONT1	0042	0032
CONT2	0046	0044
ENDCK	0010	0012
ERROR	0028	0049
HOP	0038	0038
JUMP	0041	003A,003C
KFOFO	0018	0000,0002,0003,0004,0005
K0001	0022	000A,000C,002D,0035
K0800	001E	002B,0047
K8000	0020	0042
K8003	001F	0030
RDIN	0024	0007,0009,0033,0034,0036
RESET	0026	0010,0011,002E,0046
SENSE	0028	000D,000F,002F
SRTRD	002D	001D,0041,0045,004D
START	0007	