

TEST ROUTINES

for the

**CONTROL DATA
160-A Systems**

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Paper tapes for the 160-A Systems Maintenance Test Routines are available through Customer Engineering Department, Control Data Corporation, 8100 - 34th Avenue South, Minneapolis 20, Minnesota.

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RECORD OF CHANGE NOTICES

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NUMBER: T002-A
TITLE: Memory Test - Worst Pattern
CATEGORY: 160-A
MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

The memory test creates in memory the pattern of information which will cause the memory to be most susceptible to internally generated noise.

DESCRIPTION

1. See flow chart.
2. Noise will be detected by the picking up or dropping bits in a location.
3. The test does a check sum periodically to determine if the program has picked up or dropped bits.
4. The test uses both banks of memory; one bank for the program, the other bank for the worst pattern information.

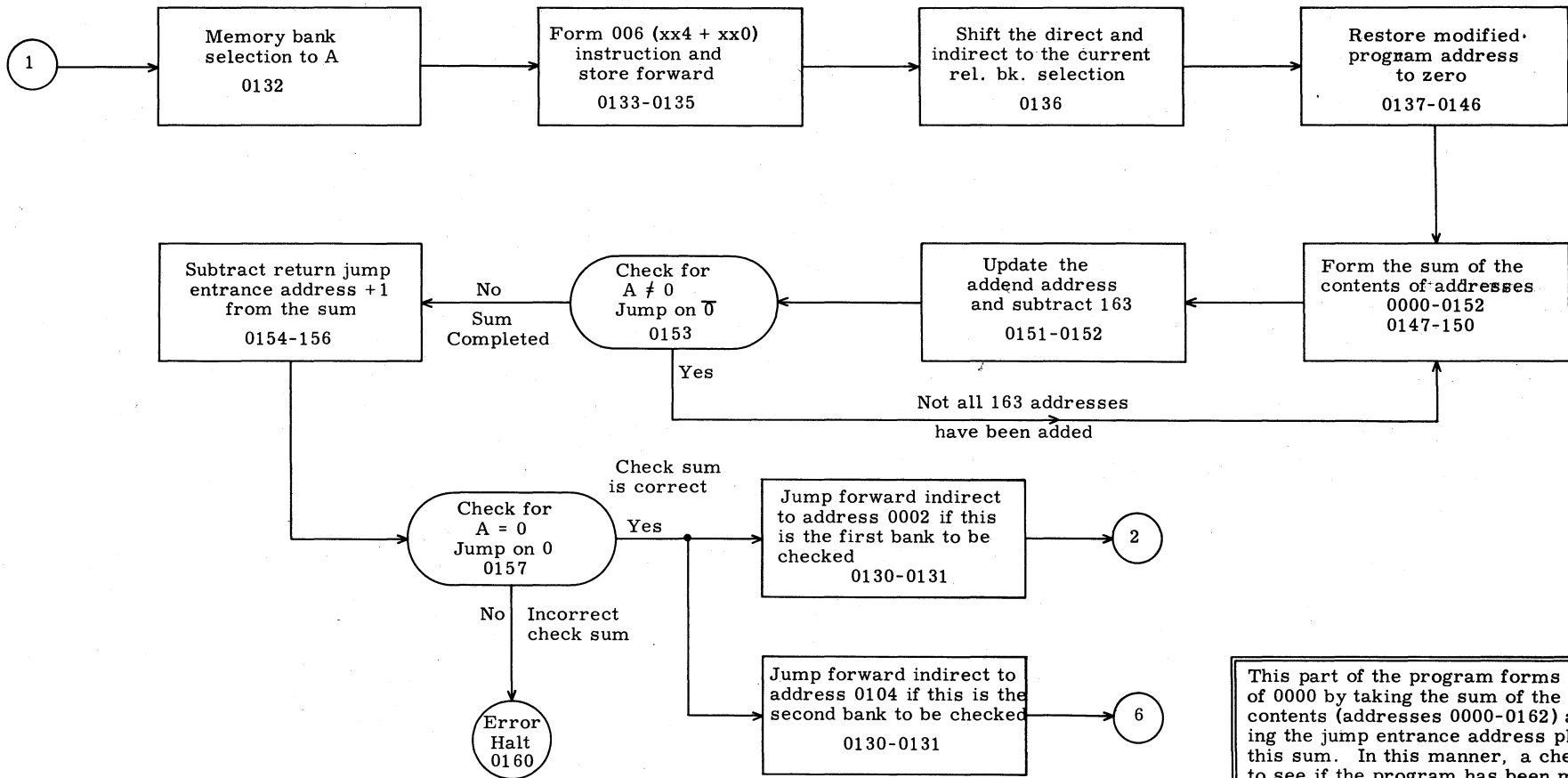
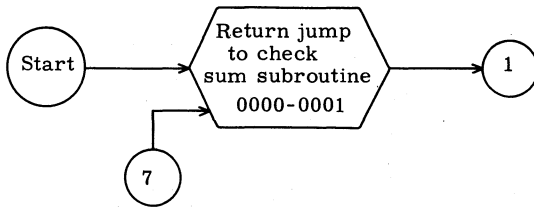
The program and worst pattern information alternate between banks. If the program is in bank 0 the worst pattern information is in bank 1.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape
LOADING ADDRESS: 0000
TERMINAL ADDRESS: 0162
CHECK SUM: 0001
STARTING ADDRESS: 0000

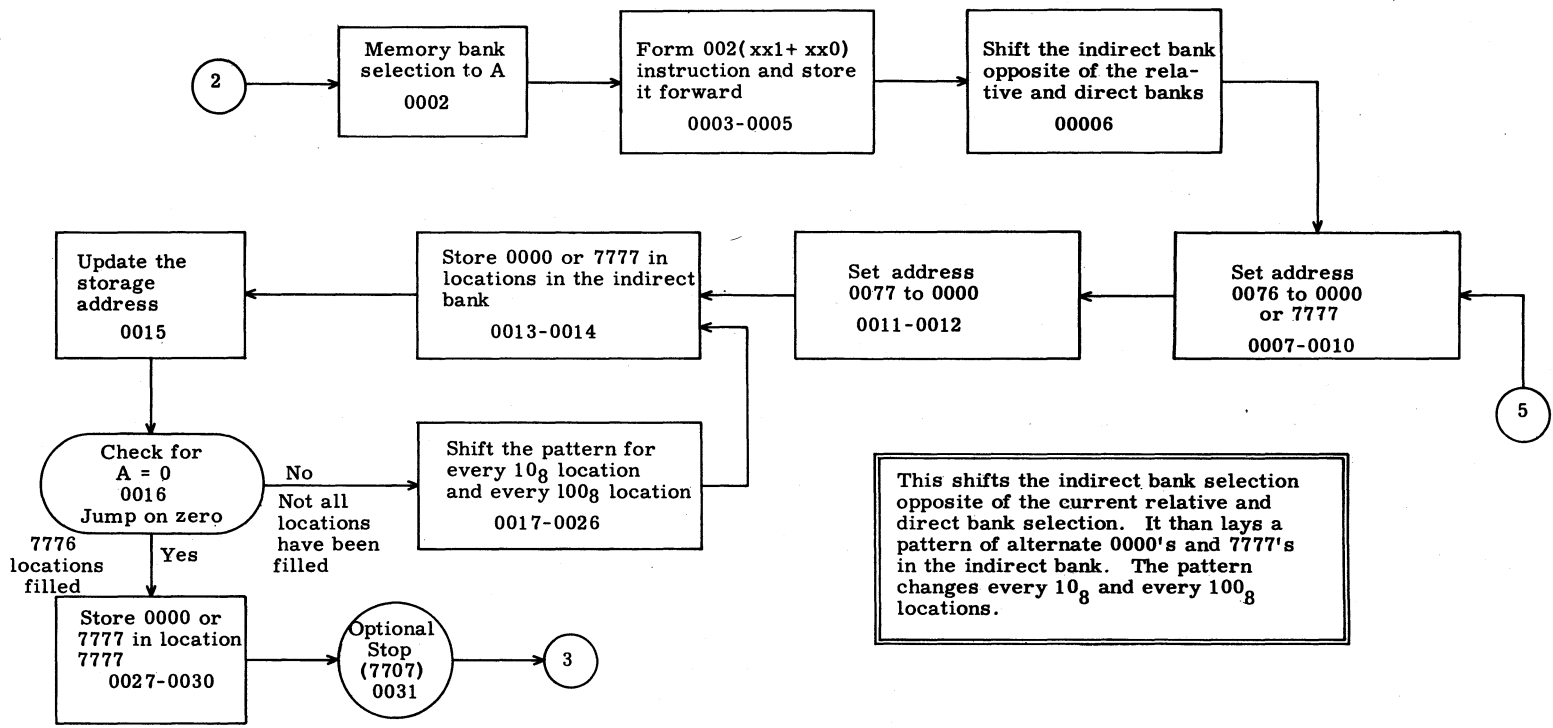
HALTS	EXPLANATION
0000	Check sum error at 0160.
7700	Incorrect data in A at 0052.
7707	Optional stop after one pass at 0031.
7777	Address of incorrect data in A at 0054.

The program will stop if any error occurs. Check with the coding sheet to locate cause of error. With any SLS switch ON, the program will stop each time the worst pattern has been written in memory.



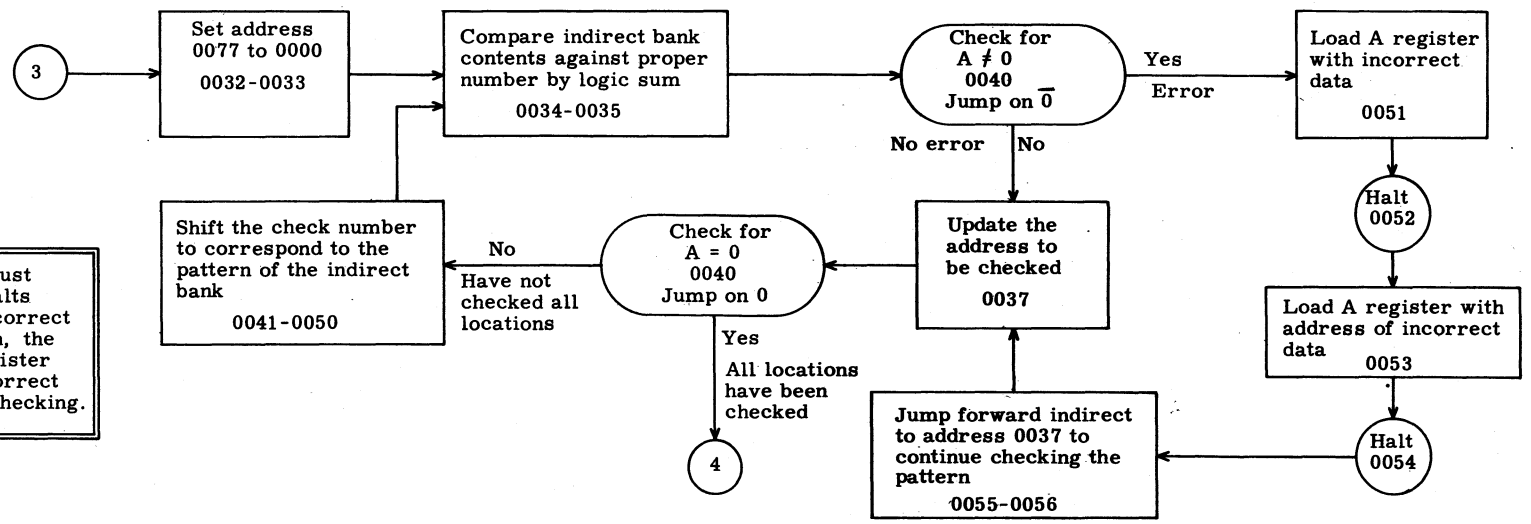
This part of the program forms a check sum of 0000 by taking the sum of the program contents (addresses 0000-0162) and subtracting the jump entrance address plus one from this sum. In this manner, a check is made to see if the program has been modified.

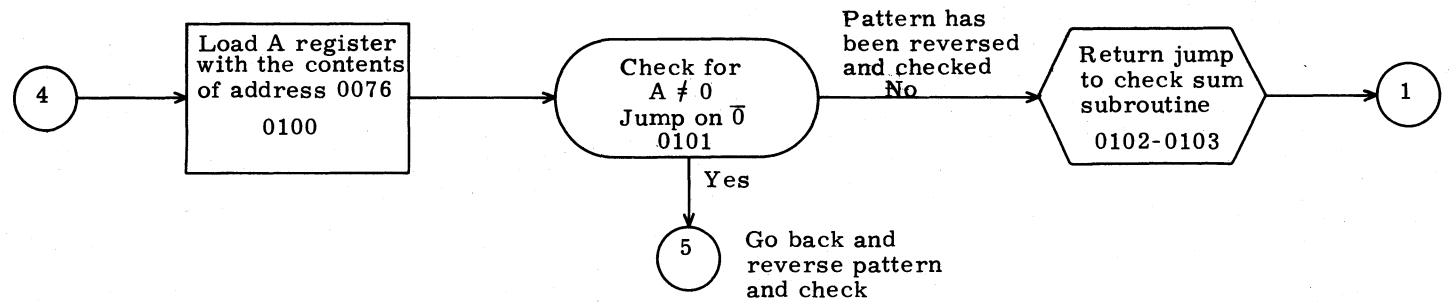
160-A:2



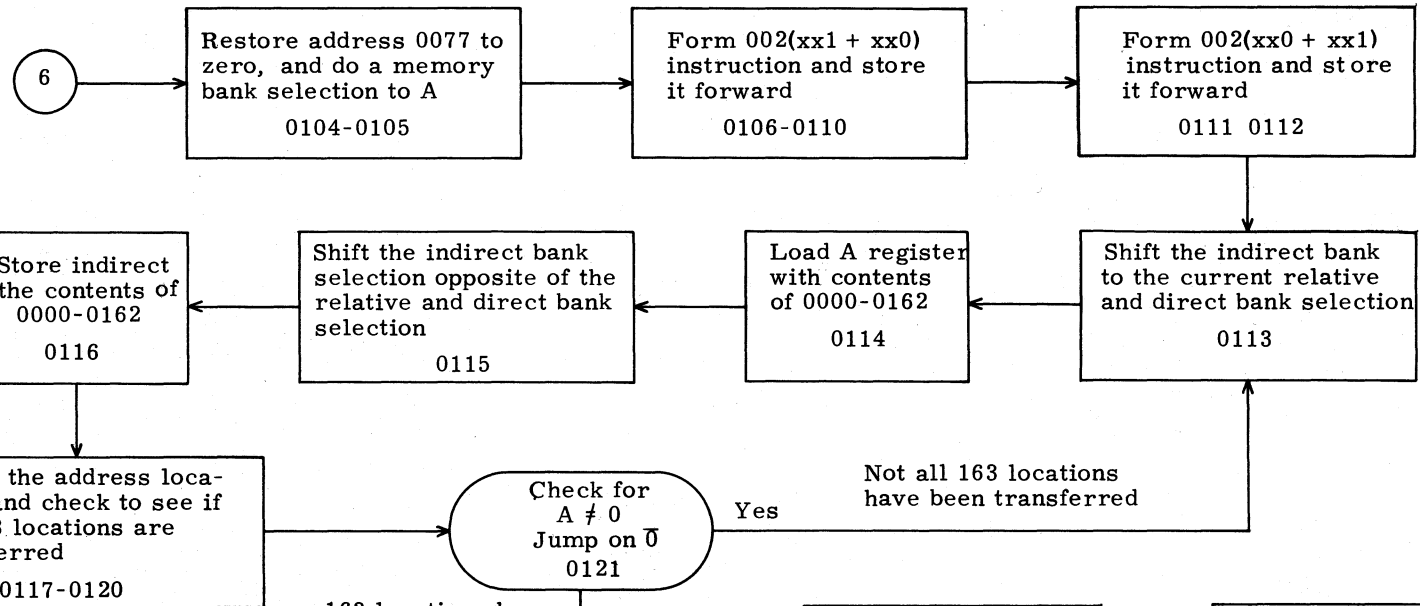
This shifts the indirect bank selection opposite of the current relative and direct bank selection. It then lays a pattern of alternate 0000's and 7777's in the indirect bank. The pattern changes every 10_g and every 100_g locations.

This checks the pattern that has just been layed out for errors, and halts with the A register containing incorrect data. Upon hitting the run switch, the computer will halt with the A register containing the address of the incorrect data. Hit run again to continue checking.

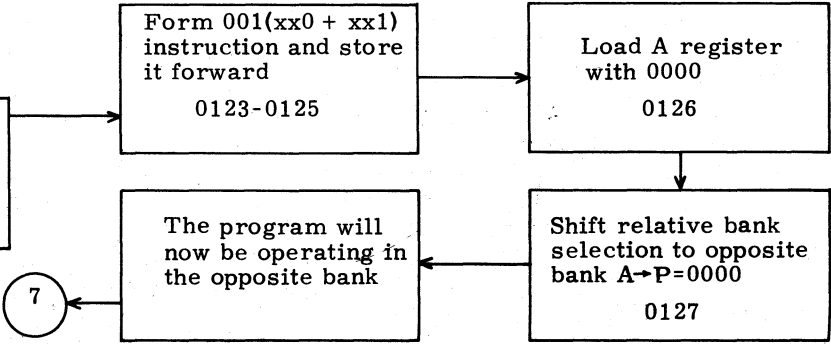




This changes the beginning pattern number from 0000 to 7777, and jumps back to lay out a pattern in the indirect bank that is the complement of the first pattern. Upon completing this and checking it, the program makes a return jump from address 0103 into the check sum subroutine.



Transfer the program into the other bank and begin at address 0000. This will check the bank the program was just transferred from.



160-A:4

160-A MEMORY TEST

0000	7100	Enter check sum subroutine
0001	0131	Location check sum subroutine
0002	0130	
0003	0207	Select indirect selection
0004	0321	to opposite memory bank
0005	4201	of module
0006	(002X)	
0007	0400	
0010	4076	Set initial data
0011	0400	Set starting address
0012	4077	
0013	2076	
0014	4177	
0015	5477	
0016	6011	Finished setting pattern
0017	0277	
0020	6003	
0021	0207	
0022	6407	
0023	2476	
0024	4076	
0025	7101	
0026	0013	
0027	2476	
0030	4154	
0031	7707	Optional stop
0032	0400	
0033	4077	
0034	2076	
0035	1577	
0036	6113	Error detected
0037	5477	
0040	6040	Pattern checked: See if both patterns were used
0041	0277	
0042	6003	
0043	0207	
0044	6410	
0045	2476	
0046	4076	
0047	7101	

160-A MEMORY TEST

0050	0034	
0051	2177	
0052	7700	Error stop. Bit data in A
0053	2077	
0054	7777	Display address of location that failed
0055	7101	Test next location
0056	0037	
0057	0037	
0060	0000	
0061	0000	
0062	0000	
0063	0000	
0064	0000	
0065	0000	
0066	0000	
0067	0000	
0070	0000	
0071	0000	
0072	0000	
0073	0000	
0074	1311	Check sum constant
0075	0163	Final address
0076	0000	Data
0077	0077	Current address
0100	2476	
0101	6571	Lay down complement worst pattern
0102	7100	Enter check sum subroutine
0103	0131	Location of check sum subroutine
0104	4077	Reset initial address
0105	0130	
0106	0207	
0107	0320	Set bank selection up to transfer
0110	4203	program to other bank
0111	0301	
0112	4203	
0113	(002X)	
0114	2177	
0115	(002X)	Transfer program to other
0116	4177	bank
0117	5477	

160-A MEMORY TEST

0120	3475	
0121	6506	
0122	0130	
0123	0207	
0124	0311	
0125	4202	
0126	0400	
0127	(001X)	Repeat program in other bank
0130	7101	
0131	(XXXX)	Check sum entrance
0132	0130	
0133	0207	
0134	0360	
0135	4201	
0136	(006X)	Set all bank selections to relative bank
0137	0400	
0140	4006	Clear all locations
0141	4326	Modified by program
0142	4325	
0143	4314	
0144	4306	
0145	4300	Clear previous check sum
0146	4077	Set initial address
0147	2177	
0150	5300	Form check sum in location 07777
0151	5477	
0152	3475	
0153	6504	
0154	2723	
0155	5300	Substract exit address from check sum
0156	0701	
0157	6427	Exit if check sum if OK
0160	0000	Check sum error
0161	7101	Hang up on check sum error
0162	0160	
0163	0000	
0164	0000	
0165	0000	
0166	0000	
0167	0000	

NUMBER: T034-A
TITLE: Logic Test
CATEGORY: 160-A
MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

This program will test the instructions not checked by Input/Output tests, Buffer tests, and Memory bank selection tests.

DESCRIPTION

1. See flow chart.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape
LOADING ADDRESS: 0000 Spares located from 2100 to 3500
TERMINAL ADDRESS: 3772
CHECK SUM: 0160
STARTING ADDRESS: 0000 in bank 0

HALTS

3677 through 3702

EXPLANATION

Memory locations containing selective stops. With any selective stop up, the program will run approximately 30 seconds and stop at the appropriate selective stop.

If no selective stop or selective jump switches are up, the program running time will be determined by the count in memory location 1375 as follows:

The complement of the contents of memory location 1375 converted to decimal and multiplied by 30 seconds determines the running time.

P = 3705, Z = 7777,
A = 0000

Program stop

Memory Location 1375 - Running time
7776 - 30 seconds

HALTS

EXPLANATION (Cont'd.)

7767 - 4 minutes

0000 - 34 hours, 15 minutes

Running time may also be controlled with (SLJ) selective jump switches.

Switch	Position	Program Run time
SLJ1	UP	1 minute
SLJ2 only	UP	2 minutes
SLJ4 only	UP	4 minutes

P = 3705, Z = 7777
A = 0000

Program stop

If an error occurs in this test, "A" register will display the most logical instruction that failed.

If an error occurs or if a master clear follows a stop other than the stops described, it may be necessary to reload the program.

00000	2206	Load A with content of 0005 -7643(A)
	4160	Store Content of A in location 7777 which is stored at 0060
	4161	Store A at location 3504
	0400	Load A with 0000
	7101	Jump to location 0100
	0100	
	7643	
	0000	
00010	0000	
	0041	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00020	0000	
	0000	
	0000	
	0000	
	0000	
	3724	
	0000	
	0000	
00030	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0530	
	0667	
00040	4062	
	5473	
	5473	
	7643	
	1171	
	5624	
	1230	
	0000	
00050	1303	
	1355	
	7070	
	1375	
	0000	
	0000	
	0000	
	0000	

00060	7777 3504 0000 0000 0000 0000 0000 1673		
00070	0000 0000 0000 0000 0000 0000 0000 0000		
00100	6005 0460 0000 0465 0000 6502 6205 0462	If A = 0 Jump to 0105 Load A with 0060 Error Stop Load A with 0065 Error Stop If A ≠ 0 Jump to 0103 If A is pos. Jump to 0113 (0 is pos.) Load A with 0062	A=0000
00110	0000 0467 0000 6702 0577 6105 0461 0000	Error Stop Load A with 0067 Error Stop If A is neg. Jump to 0111 Load A with 7700 If A is non-zero Jump to 0122 Load A with 0061 Error Stop	A=7700
00120	0464 0000 6402 6305 0463 0000 0466 0000	Load A with 0064 Error Stop If A = 0 Jump to 0120 If A is neg. Jump to 0130 Load A with 0063 Error Stop Load A with 0066 Error Stop	
00130	6602 0110 6303 0463 0000 0110 6205 0462	If A is pos. Jump to 0126 Left shift 3 places If A is neg. Jump to 0135 Load A with 0063 Error Stop Left shift 3 places If A is pos. Jump to 0143 Load A with 0062	A=7007 A=0077

00140	0000	Error Stop	
	0467	Load A with 0067	
	0000	Error Stop	
	6702	If A is neg. Jump to 0141	A=0077
	0400	Load A with 0000	A=0000
	6005	If A = 0 Jump to 0152	
	0400	Load A with 0000	
	6003	If A = 0 Jump to 0152	
00150	0404	Load A with 0004	
	0000	Error Stop	
	2307	Load A with the content of 0143	A=6702
	6304	If A is neg. Jump to 0157	
	0423	Load A with 0023	
	0000	Error Stop	
	1075		
	2301	Load A with the content of 0156	A=1075
00160	3315	Add to A the content of 0143	A=0000
	6003	If A = 0 Jump to 0164	
	0433	Load A with 0033	
	0000	Error Stop	
	2706	Load A with complement of content of Loc. 0156	A=6702
	3307	Add content of Loc. 0156 to content of A	A=0000
	6003	If A = 0 Jump to 0171	
	0427	Load A with 0027	
00170	0000	Error Stop	
	2313	Load A with the content of 0156	A=1075
	3714	Subtract cont. of 0156 from A	A=0000
	6003	If A = 0 Jump to 0176	
	0437	Load A with 0037	
	0000	Error Stop	
	2320	Load A with content of 0156	A=1075
	4035	Store content of A at Loc. 0035	A=1075
00200	3435	Subtr. cont. of 0035 from A	A=0000
	6003	If A = 0 Jump to 0204	
	0434	Load A with 0034	
	0000	Error Stop	
	2313	Load A with cont. of 0171	A=2313
	0102	Left shift 1	A=4626
	6303	If A is neg. Jump to 0211	
	0401	Load A with 0001	
00210	0000	Error Stop	
	0102	Left shift 1	A=1455
	6203	If A is pos. Jump to 0215	
	0401	Load A with 0001	
	0000	Error Stop	
	0102	Left shift 1	A=3132
	6203	If A is pos. Jump to 0221	
	0401	Load A with 0001	

00220	0000	Error Stop	
	0102	Left shift 1	A=6264
	6303	If A is neg. Jump to 0225	
	0401	Load A with 0001	
	0000	Error Stop	
	0102	Left shift 1	A=4551
	6303	If A is neg. Jump to 0231	
	0401	Load A with 0001	
00230	0000	Error Stop	
	0102	Left shift 1	A=1323
	6203	If A is pos. Jump to 0235	
	0401	Load A with 0001	
	0000	Error Stop	
	0102	Left shift 1	A=2646
	6203	If A is pos. Jump to 0241	
	0401	Load A with 0001	
00240	0000	Error Stop	
	0102	Left shift 1	A=5514
	6303	If A is neg. Jump to 0245	
	0401	Load A with 0001	
	0000	Error Stop	
	0102	Left shift 1	A=3231
	6203	If A is pos. Jump to 0251	
	0401	Load A with 0001	
00250	0000	Error Stop	
	0102	Left shift 1	A=6462
	6303	If A is neg. Jump to 0255	
	0401	Load A with 0001	
	0000	Error Stop	
	0102	Left shift 1	A=5145
	6303	If A is neg. Jump to 0261	
	0401	Load A with 0001	
00260	0000	Error Stop	
	0102	Left shift 1	A=2313
	6204	If A is pos. Jump to 0266	
	0401	Load A with 0001	
	0000	Error Stop	
	0404		
	2301	Load A with cont. of 0265	A=0404
	0110	Left Shift 3	A=4040
00270	6303	If A is neg. Jump to 0273	
	0401	Load A with 0001	
	0000	Error Stop	
	0110	Left shift 3	A=0404
	6203	If A is pos. Jump to 0277	
	0401	Load A with 0001	
	0000	Error Stop	
	0110	Left shift 3	A=4040

00300	6303	If A is neg. Jump to 0303	
	0401	Load A with 0001	
	0000	Error Stop	
	0110	Left Shift 3	A=0404
	6203	If A is pos. Jump to 0307	
	0401	Load A with 0001	
	0000	Error Stop	
	2303	Load in A the content of 0304	A=6203
00310	1301	Log. prod of A and contents of 0307	A=2203
	6203	If A is pos. Jump to 0314	
	0413	Load A with 0013	
	0000	Error Stop	
	0102	Left Shift 1	A=4406
	6303	If A is neg. Jump to 0320	
	0413	Load A with 0013	
	0000	Error Stop	
00320	0102	Left Shift 1	A=1015
	6203	If A is pos. Jump to 0324	
	0413	Load A with 0013	
	0000	Error Stop	
	0102	Left Shift 1	A=2032
	6203	If A is pos. Jump to 0330	
	0413	Load A with 0013	
	0000	Error Stop	
00330	0102	Left Shift 1	A=4064
	6303	If A is neg. Jump to 0334	
	0413	Load A with 0013	
	0000	Error Stop	
	0102	Left Shift 1	A=0151
	6203	If A is pos. Jump to 0340	
	0413	Load A with 0013	
	0000	Error Stop	
00340	0102	Left Shift 1	A=0322
	6203	If A is pos. Jump to 0344	
	0413	Load A with 0013	
	0000	Error Stop	
	0102	Left Shift 1	A=0644
	6203	If A is pos. Jump to 0350	
	0413	Load A with 0013	
	0000	Error Stop	
00350	0102	Left Shift 1	A=1510
	6203	If A is pos. Jump to 0354	
	0413	Load A with 0013	
	0000	Error Stop	
	0102	Left Shift 1	A=3220
	6203	If A is pos. Jump to 0360	
	0413	Load A with 0013	
	0000	Error Stop	

00360	0102	Left Shift 1	A=6440
	6303	If A is neg. Jump to 0364	
	0413	Load A with 0013	
	0000	Error Stop	
	0102	Left Shift 1	A=5101
	6303	If A is neg. Jump to 0370	
	0413	Load A with 0013	
	0000	Error Stop	
00370	2307	Load A with content of 0361	A=6303
	1764	Logical sum of A and content of 0305	A=6702
	6303	If A is neg. Jump to 0375	
	0417	Load A with 0017	
	0000	Error Stop	
	0102	Left Shift 1	A=5605
	6303	If A is neg. Jump to 0401	
	0417	Load A with 0017	
00400	0000	Error Stop	
	0102	Left Shift 1	A=3413
	6203	If A is pos. Jump to 0405	
	0417	Load A with 0017	
	0000	Error Stop	
	0102	Left Shift 1	A=7026
	6303	If A is neg. Jump to 0411	
	0417	Load A with 0017	
00410	0000	Error Stop	
	0102	Left Shift 1	A=6055
	6303	If A is neg. Jump to 0415	
	0417	Load A with 0017	
	0000	Error Stop	
	0102	Left Shift 1	A=4133
	6303	If A is neg. jump to 0421	
	0417	Load A with 0017	
00420	0000	Error Stop	
	0102	Left Shift 1	A=0267
	6203	If A is pos. Jump to 0425	
	0417	Load A with 0017	
	0000	Error Stop	
	0102	Left Shift 1	A=0556
	6203	If A is pos. Jump to 0431	
	0417	Load A with 0017	
00430	0000	Error Stop	
	0102	Left Shift 1	A=1334
	6203	If A is pos. Jump to 0435	
	0417	Load A with 0017	
	0000	Error Stop	
	0102	Left Shift 1	A=2670
	6203	If A is pos. Jump to 0441	
	0417	Load A with 0017	

00440	0000	Error Stop	
	0102	Left Shift 1	A=5560
	6303	If A is neg. Jump to 0445	
	0417	Load A with 0017	
	0000	Error Stop	
	0102	Left Shift 1	A=3341
	6204	If A is pos. Jump to 0452	
	0417	Load A with 0017	
00450	0000	Error Stop	
	5252		
	2701	Load complement of content 0451	A=2525
	6203	If A is pos. Jump to 0456	
	0427	Load A with 0027 (0446) cont. during 46 instr. check	
	0000	Error Stop	
	0102	Left Shift 1	A=5252
	6303	If A is neg. Jump to 0462	
00460	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=2525
	6203	If A is pos. Jump to 0466	
	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=5252
	6303	If A is neg. Jump to 0472	
00470	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=2525
	6203	If A is pos. Jump to 0476	
	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=5252
	6303	If A is neg. Jump to 0502	
00500	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=2525
	6203	If A is pos. Jump to 0506	
	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=5252
	6303	If A is neg. Jump to 0512	
00510	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=2525
	6203	If A is pos. Jump to 0516	
	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=5252
	6303	If A is neg. Jump to 0522	

00520	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=2525
	6203	If A is pos. Jump to 0526	
	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0102	Left Shift 1	A=5252
	6303	If A is neg. Jump to 0532	
00530	0427	Load A with 0027 (0446)	
	0000	Error Stop	
	0404	Load A with 0004	A=0004
	0704	Subtr. 0004 from content of A	A=0000
	6003	If A=0 Jump to 0537	
	0407	Load A with 0007	
	0000	Error Stop	
	7101	Jump to Loc. stored in 0540	
00540	0563	0566	
	2211	Load A with content of 0552	A=0446
	4366	Store content of A at Loc. 0454	A=0446
	2301	Load A with content of 0542	A=4366
	0704	Subtr. 0004 from content of A	A=4362
	4303	Store content of A at 0542	A=4362
	3607	Subtr. content of 0555 from A	A=0054
	6506	If A ≠ 0 Jump to 0541	
00550	4604	Shift Left 1 the content of Loc. 0554	A=2525
	6576	If A ≠ 0 Jump to 0453	
	0446	Load A with 0046	
	0000	Error Stop	
	5252	2525	
	4306		
	0427		
	0530		
00560	0450		
	0563		
	0566		
	2301	Load A with content of 0562	A=0566
	4324	Store content of A at Loc. 0540	A=0566
	6524	If A ≠ 0 Jump to 0541	
	2305	Load A with content of 0561	A=0563
	4327	Store content of A at Loc. 0540	
00570	2312	Load A with content of 0556	A=0427
	4136	Store content of A in Loc. stored at Loc. 0036	
	2036	Load A with the content of Loc. 0036	A=0530
	0704	Subtract 0004 from A	A=0524
	4036	Store content of A in Loc. 0036	
	1715	Logical sum of A and content of Loc. 0560	A=0174
	6506	If A ≠ 0 Jump to Loc. 0570	
	2320	Load A with content of Loc. 0557	A=0530

00600	4036	Store A at Loc. 0036	A=0530
	2725	Load Compl. of content of Loc. 0554	A=5252
	4326	Store A at Loc. 0554	
	6103	If A ≠ 0 Jump to 0606	
	2525	Load Compl. of content of Loc. stored at 0025	A=7325
	7777	Stop	
	0460	Load A with 0060	A=0060
	5345	Add to content of Loc. 0542	A=4366
00610	2303	Load content of 0605	A=7777
	3705	Subtr. content of Loc. 0604 from A	A=5252
	6303	If A is neg. Jump to 0615	
	0437	Load A with 0037 (1234)	
	0000	Error Stop	
	0102	Left Shift 1	A=2525
	6203	If A is pos. Jump to 0621	
	0437	Load A with 0037	
00620	0000	Error Stop	
	0102	Left shift 1	A5252
	6303	If A is neg. Jump to 0625	
	0437	Load A with 0037	
	0000	Error Stop	
	0102	Left shift 1	A=2525
	6203	If A is pos. Jump to 0631	
	0437	Load A with 0037	
00630	0000	Error Stop	
	0102	Left shift 1	A=5252
	6303	If A is neg. Jump to 0635	
	0437	Load A with 0037	
	0000	Error Stop	
	0102	Left Shift 1	A=2525
	6203	If A is pos. Jump to 0641	
	0437	Load A with 0037	
00640	0000	Error Stop	
	0102	Left Shift 1	A=5225
	6303	If A is neg. Jump to 0645	
	0437	Load A with 0037	
	0000	Error Stop	
	0102	Left shift 1	A=2525
	6203	If A is pos. Jump to 0651	
	0437	Load A with 0037	
00650	0000	Error Stop	
	0102	Left shift 1	A=5252
	6303	If A is neg. Jump to 0655	
	0437	Load A with 0037	
	0000	Error Stop	
	0102	Left Shift 1	A=2525
	6203	If A is pos. Jump to 0661	
	0437	Load A with 0037	

00660	0000	Error Stop	
	0102	Left Shift 1	A=5252
	6303	If A is neg. Jump to 0665	
	0437	Load A with 0037	
	0000	Error Stop	
	0102	Left shift 1	A=2525
	6203	If A is pos. Jump to 0671	
	0437	Load A with 0037	
00670	0000	Error Stop	
	7101	Jump to Loc. stored in 0672	
	0721	0724	
	2217	Load A with content of Loc. 0712	A=0432
	4361	Store contents of A in 0613 (0617)	A=0432
	2301	Load A with the contents of Loc. 0674	A=4361
	0704	Subtr 0004 from contents of A	A=4355
	4303	Store contents of A in Loc. 0674	
00700	3613	Subtr. from A the contents of Loc. 0713	A=0054
	6506	If A \neq 0 Jump to 0673	
	2205	Load A with contents of Loc. 0707	A=4016
	3205	Add to A contents of Loc. 0710	A=5252
	6572	If A \neq 0 Jump to 0612	
	0432	Load A with 0032	
	0000	Error Stop	
	4016		
00710	1234		
	0437		
	0432		
	4301		
	4361		
	0607		
	0667		
	0721		
00720	0724		
	2301	Load A with contents of Loc. 0720	A=0724
	4330	Store Contents of A at Loc. 0672	
	6530	If A \neq 0 Jump to 0673	
	2310	Load A with contents of Loc. 0714	A=4361
	4331	Store contents of A at Loc. 0674	
	2307	Load A with contents of Loc. 0717	A=0721
	4335	Store contents of A at Loc. 0672	
00730	2317	Load A with contents of Loc. 0711	A=0437
	4137	Store A at Loc. stored in 0037 (0667)	
	2037	Load A with contents of Loc. 0037	A=0667
	0704	Subtr. 0004 from A	A=0663
	4037	Store A at Loc. 0037	
	3720	Subtr. 0607 from A	
	6506	If A \neq 0 Jump to 0730	
	2321	Load A with contents of Loc. 0716	A=0667

00740	4037	Store A at Loc. 0037	
	0425	Load A with 0025	A=0025
	0252	Logical prod. of 0052 and A	A=0000
	0652	Add 0052 to A	A=0052
	0225	Logical prod. of 0025 and A	A=0000
	6002	If A = 0 Jump to 0747	
	0000	Error Stop	
	2452	Load A with compl. of contents of 0052	A=0707
00750	1052	Logical prod. of content of 0052 and A	A=0000
	6003	If A = 0 Jump to 0754	
	0410	Load A with 0010	A=0010
	0000	Error Stop	
	2233	Load A with contents of 1007	A=2304
	1111	Logical prod. of A and contents of loc. stored at 0011 (5473)	A=0000
	6107	If A ≠ 0 Jump to 0765	
	2302	Load A with 1111	A=1111
00760	1206	Logical prod. of A and contents of Loc. 0766 (6666)	A=0000
	6104	If A ≠ 0 Jump to 0765	
	2204	Load A with 6666	A=6666
	1306	Log. prod. of A and contents of Loc. 0755 (1111)	A=0000
	6003	If A = 0 Jump to 0767	
	0000	Error Stop	
	6666		
	0452	Load A with 0052	A=0052
00770	0352	Log. sum of A and 0052	A=0000
	0625	Add 0025 to A	A=0025
	0325	Log. sum of A and 0025	A=0000
	6002	If A = 0 Jump to 0775	
	0000	Error Stop	
	2714	Load compl. of contents of Loc. 0761	A=1673
	1467	Log. sum of A and contents of 0067 (1673)	A=0000
	6003	If A = 0 Jump to 1002	
01000	0414	Load A with 0014	
	0000	Error Stop	
	2371	Load A with contents of Loc. 0711	A=0437
	1537	Log. sum of A and cont. of Loc. stored at 0037 (0437)(0664)	A=0000
	6003	If A = 0 Jump to 1007	
	0415	Load A with 0015	
	0000	Error Stop	
	2304	Load A with contents of Loc. 1003	A=1537
01010	1604	Log. sum of A and contents of 1014 (1537)	A=0000
	6004	If A = 0 Jump to 1015	
	0416	Load A with 0016	
	0000	Error Stop	
	1537		
	2041	Load A with contents of Loc. 0041	A=5473
	3604	Subtr. contents of Loc. 1022 from A (5473)	A=0000
	6004	If A = 0 Jump to 1023	

01020	0420	Load A with 0020	
	0000	Error Stop	
	5473		
	2137	Load A with cont. of Loc. stored at 0037	A=0437
	3604	Subtr. cont. of Loc. 1030 from 1030 (0437)	A=0000
	6004	If A = 0 Jump to 1031	
	0421	Load A with 0021	
	0000	Error Stop	
01030	0437		
	2205	Load A with contents of Loc. 1036	A=5473
	3710	Subtr. from A cont. of Loc. 1022 (5473)	A=0000
	6004	If A = 0 Jump to 1037	
	0422	Load A with 0022	
	0000	Error Stop	
	5473		
	0552	Load A with compl. of 0052	A=7725
01040	3604	Subtr. from A cont. of Loc. 1044 (7725)	A=0000
	6004	If A = 0 Jump to 1045	
	0405	Load A with 0005	
	0000	Error Stop	
	7725		
	2441	Load A with compl. of cont. of Loc. 0041 (5473)	A=2304
	3310	Add to A cont. of Loc. 1036 (5473)	A=0000
	6003	If A = 0 Jump to 1052	
01050	0424	Load A with 0024	
	0000	Error Stop	
	2537	Load A with compl. of cont. of Loc. stored at 0037 (0437	A=7340
	3323	Add to A cont. of Loc. 1030 (0437) 0667)	A=0000
	6003	If A = 0 Jump to 1057	
	0425	Load A with 0025	
	0000	Error Stop	
	2605	Load A with compl. of cont. of Loc. 1064 (3323)	A=4454
01060	3305	Add to A cont. of Loc. 1053 (3323)	A=0000
	6004	If A = 0 Jump to 1065	
	0426	Load A with 0026	
	0000	Error Stop	
	3323		
	2305	Load A with cont. of Loc. 1060	A=3305
	0616	Add to A 0016	A=3323
	3703	Subtr. from A cont. of Loc. 1064 (3323)	A=0000
01070	6003	If A = 0 Jump to 1073	
	0406	Load A with 0006	
	0000	Error Stop	
	2735	Load A with compl. of cont. of Loc. 1036 (5473)	A=2304
	3041	Add to A cont. of Loc. 0041 (5473)	A=0000
	6003	If A = 0 Jump to 1100	
	0430	Load A with 0030	
	0000	Error Stop	

01100	2750	Load A with compl. of cont. of Loc. 1030 (0437)	A=7340
	3137	Add to A cont. of Loc. stored at 0037 (0667)	A=0000
	6003	If A = 0 Jump to 1105	
	0431	Load A with 0031	
	0000	Error Stop	
	2705	Load A with compl. of cont. of Loc. 1100	A=5027
	3204	Add to A the cont. of Loc. 1112 (2750)	A=0000
	6004	If A = 0 Jump to 1113	
01110	0432	Load A with 0032	
	0000	Error Stop	
	2750		
	2313	Load A with cont. of Loc. 1100	A=2750
	0743	Subtr. from A 0043	A=2705
	3710	Subtr. from A cont. of Loc. 1105 (2705)	A=0000
	6003	If A = 0 Jump to 1121	
	0407	Load A with 0007	
01120	0000	Error Stop	
	2363	Load A with cont. of Loc. 1036	A=5473
	3441	Subtr. from A cont. of Loc. 0041 (5473)	A=0000
	6003	If A = 0 Jump to 1126	
	0434	Load A with 0034	
	0000	Error Stop	
	2376	Load A with cont. of Loc. 1030	A=0437
	3537	Subtr. from A the cont. of Loc. stored at 0037 (0667)	A=0000
01130	6003	If A = 0 Jump to 1133	
	0435	Load A with 0035	
	0000	Error Stop	
	2304	Load A with cont. of Loc. 1127 (3537)	A=3537
	3604	Subtr. from A cont. of Loc. 1140 (3537)	A=0000
	6004	If A = 0 Jump to 1141	
	0436	Load A with 0036	
	0000	Error Stop	
01140	3537		
	2041	Load A with cont. of 0041	A=5473
	4042	Store A at 0042	
	2041	Load A with cont. of 0041	A=5473
	3442	Subtr. from A cont. of Loc. 0042	A=0000
	6003	If A = 0 Jump to 1150	
	0440	Load A with 0040	
	0000	Error Stop	
01150	2312	Load A with cont. of Loc. 1136	A=0436
	0601	Add 0001 to A	A=0437
	4137	Store A at Loc. 0667 (ind)	
	2137	Load A with cont. of Loc. stored at 0037 (0667)	A=0437
	3604	Subtr. from A cont. of Loc. 1160 (0437)	A=0000
	6004	If A = 0 Jump to 1161	
	0441	Load A with 0041	
	0000	Error Stop	

01160	0437	Load A with cont. of Loc. 1154	A=3604
	2305	Store A at Loc. 1170	
	4206	Load A with compl. of cont. of Loc. 1154 (3604)	A=4173
	2707	Add to A the cont. of Loc. 1170 (3604)	A=0000
	3204		
	6007	If A = 0 Jump to 1174	
	0442	Load A with 0042	
	0000	Error Stop	
01170	0000		
	7507		
	2470		
	7507		
	4443	Shift 1 cont. of Loc. 0043 (7643)	A=7507
	3702	Subtr. from A cont. of Loc. 1173 (7507)	A=0000
	6003	If A = 0 Jump to 1201	
	0444	Load A with 0044	
01200	0000	Error Stop	
	2306	Load A with cont. of Loc. 1173 (7507)	A=7507
	0102	Left shift 1	A=7217
	4310	Store A at Loc. 1173	A=7217
	4544	Shift 1 left cont. of Loc. stored at 0044 (1171)	A=7217
	3712	Subtr. from A cont. of Loc. 1173 (7207)	A=0000
	6004	If A = 0 Jump to 1212	
	0445	Load A with 0045	
01210	0000	Error Stop	
	4321	0643	
	2320	Load A with cont. of Loc. 1172	A=2470
	0102	Left shift 1	A=5160
	4322	Store A at Loc. 1172	
	2304	Load A with cont. of Loc. 1211	A=4321
	0102	Left shift 1	A=0643
	4206	Store A at Loc. 1225	
01220	4707	Shift left 1 cont. of Loc. 1211	A=0643
	3604	Subtr. from A cont. of Loc. 1225 (0643)	A=0000
	6007	If A = 0 Jump to 1231	
	0447	Load A with 0047	
	0000	Error Stop	
	0643		
	5624	5643	
	0435		
01230	0435	526	
	2303	Load A with cont. of Loc. 1226	A=5624
	0617	Add to A 0017	A=5643
	4305	Store A at Loc. 1226	
	0417	Load A with 0017	A=0017
	5045	Add to A cont. of Loc. 0045 and store at 0045	A=5643
	3710	Subtr. from A cont. of Loc. 1226 (5643)	A=0000
	6003	If A = 0 Jump to 1242	

01240	0450	Load A with 0050	
	0000	Error Stop	
	2211	Load A with cont. of Loc. 1253	A=0435
	0671	Add 0071 to A	A=0526
	4207	Store A at Loc. 1253	
	0471	Load A with 0071	A=0071
	5146	Add A to cont. of Loc. 1230 (stored at 0046)	A=0526
	3604	Subtr. cont. of Loc. 1253 from A	A=0000
01250	6004	If A = 0 Jump to 1254	
	0451	Load A with 0051	
	0000	Error Stop	
	0435	0526	
	2211	Load A with cont. of 1265	A=0451
	0644	Add 0044 to A	A=0515
	4207	Store A at Loc. 1265	
	0444	Load A with 0044	A=0044
01260	5206	Add A to cont. of Loc. 1266 (0451)	A=0515
	3604	Subtr. cont. of Loc. 1265 from A (0516)	A=0000
	6007	If A = 0 Jump to 1271	
	0452	Load A with 0052	
	0000	Error Stop	
	0451	0515	
	0451	0515	
	2431	2456	
01270	2431	2456	
	2301	Load A with cont. of 1270	A=2431
	0625	Add 0025 to A	A=2456
	4303	Store A at Loc. 1270	
	0425	Load A with 0025	A=0025
	5306	Add A to cont. of Loc. 1267	A=2456
	3706	Subtr. cont. of Loc. 1270 from A	A=0000
	6010	If A = 0 Jump to 1307	
01300	0453	Load A with 0053	
	0000	Error Stop	
	0000	0001	
	0772	0773	
	0772	0773	
	4101	4102	
	4101	4102	
	2305	Load A with cont. of 1302	A=0000
01310	0601	Add 0001 to A	A=0001
	4307	Store A at Loc. 1302	
	5447	Add one to content of Loc. 0047	A=0001
	3711	Subtr. cont. of 1302 from A	A=0000
	6003	If A = 0 Jump to 1317	
	0454	Load A with 0054	
	0000	Error Stop	
	2313	Load A with cont. of 1304	A=0772

01320	0601	Add 0001 to A	A=0773
	4315	Store A at Loc. 1304	
	5550	Add 1 to cont. of Loc. (1303) stored at 0055	A=0773
	3717	Subtr. cont. of Loc. 1304 from A (0773)	A=0000
	6003	If A = 0 Jump to 1327	
	0455	Load A with 0055	
	0000	Error Stop	
	2212	Load A with cont. of Loc. 1341	A=3720
01330	4210	Store A at Loc. 1340	
	0601	Add 0001 to A	A=3721
	4207	Store A at Loc. 1341	
	5605	Add 1 to cont. of Loc. 1340	A=3721
	3605	Subtr. cont. of Loc. 1341 from A	A=0000
	6005	If A = 0 Jump to 1342	
	0456	Load A with 0056	
	0000	Error Stop	
01340	3720	3721	
	3720	3721	
	2335	Load A with cont. of Loc. 1305	A=4101
	0601	Add 1 to A	A=4102
	4337	Store A at Loc. 1305	
	5737	Add 1 to cont. of Loc. 1306	A=4102
	3741	Subtr. cont. of Loc. 1305 from A	A=0000
	6003	If A = 0 Jump to 1352	
01350	0457	Load A with 0057	
	0000	Error Stop	
	7051	Jump to Loc. stored at 0051 (1355)	
	0470	Load A with 0070	
	0000	Error Stop	
	7101	Jump to Loc. 1361	
	1361		
	0471	Load A with 0071	
01360	0000	Error Stop	
	5611	Add 1 to cont. of Loc. 1372	
	6303	If A is neg. Jump to 1365	
	0400	Load A with 0000	A=0000
	7112	Jump to Loc. 0100	
	2212	Load A with cont. of Loc. 1377	A=0314
	4204	Store A at Loc. 1372	
	0400	Load A with 0000	
01370	7101	Jump to 1400	
	1400		
	1000		
	7101	Jump to 1400	
	1400		
	0000		
	0100		
	1000		

01400	2200	Load A with constant stored at 1401	A=7643
	7643	7505	
	3701	Subtr. cont. of Loc. 1401 from A (7643)	A=0000
	6002	If A = 0 Jump to 1405	
	0000	Error Stop	
	2304	Load A with cont. of Loc. 1401	A=7643
	4203	Store A at Loc. 1411	
	4706	Shift left 1 cont. of Loc. 1401 (7643)	A=7507
01410	4600	Shift left 1 cont. of Loc. 1411 (7643)	A=7507
	7507	7643 - 7507	
	2311	Load A with cont. of Loc. 1401	A=7507
	3702	Subtr. cont. of Loc. 1411 (7507)	A=0000
	6002	If A = 0 Jump to 1416	
	0000	Error Stop	
	2305	Load A with cont. of Loc. 1411	A=7507
	4200	Store A at Loc. 1420	
01420	7507		
	1710	Logical sum of A and cont. of Loc. 1411 (7507)	A=0000
	6002	If A = 0 Jump to 1424	
	0000	Error Stop	
	2704	Load A with compl. of cont. of Loc. 1420 (7507)	A=0270
	4202	Store A at Loc. 1427	
	5600	Add 1 to constant at 1427	A=0271
	0270	0271	
01430	0701	Subtr. 0001 from A	A=0270
	3311	Add cont. of Loc. 1420 (7507)	A=0000
	6003	If A = 0 Jump to 1435	
	0000	Error Stop	
	7643	7507	
	5200	Add A to constant at 1436	A=7643
	7643	7507	
	3703	Subtr. from A cont. of Loc. 1434 (7643)	A=0000
01440	6002	If A = 0 Jump to 1442	
	0000	Error Stop	
	4706	Shift left 1 cont. of Loc. 1434 (7643)	A=7507
	4305	Store A at Loc. 1436	
	2706	Load A with compl. of Loc. 1436 (7507)	A=0270
	4203	Store A at Loc. 1450	
	2312	Load A with cont. of Loc. 1434	A=7507
	1200	Log. prod. of A and const. at 1450 (0270)	A=0000
01450	0560	0270	
	6002	If A = 0 Jump to 1453	
	0000	Error Stop	
	2303	Load A with cont. of Loc. 1450	A=0270
	4202	Store A at 1456	
	1600	Log. sum of A and constant at 1456 (0270)	A=0000
	0506	0270	
	6002	If A = 0 Jump to 1461	

01460	0000	Error Stop	
	2303	Load A with cont. of Loc. 1456	A=0270
	4202	Store A at Loc. 1464	
	2600	Load A with compl. of const. at 1464	A=7570
	0506	0270	
	3307	Add cont. of Loc. 1456 to A (0270)	A=0000
	6002	If A = 0 Jump to 1470	
	0000	Error Stop	
01470	2304	Load A with cont. of Loc. 1464	A=0270
	4202	Store A at Loc. 1473	
	3600	Subtr. const. at 1473 (0270) from A	A=0000
	0506	0270	
	6002	If A = 0 Jump to 1476	
	0000	Error Stop	
	2703	Load A with compl. of cont. of Loc. 1473 (0270)	A=7507
	4203	Store A at Loc. 1502	
01500	2305	Load A with cont. of Loc. 1473	A=0270
	3200	Add to A constant stored at 1502	A=0000
	7271	7507	
	6002	If A = 0 Jump to 1505	
	0000	Error Stop	
	0101	Transfer P to A	A=1505
	0603	Add 0003 to A	A=1510
	4205	Store A at Loc. 1514	
01510	0101	Transfer P to A	A=1510
	3603	Subtr. cont. of Loc. 1514 (1510) from A	A=0000
	6003	If A = 0 Jump to 1515	
	0000	Error Stop	
	1510	1511 - 1523 - 1527	
	5701	Add 1 to cont. of Loc. 1514	A=1511
	0101	Transfer P to A	A=1516
	0705	Subtr. 0005 from A	A=1511
01520	3704	Subtr. cont. of Loc. 1514 from A	A=0000
	6002	If A = 0 Jump to 1523	
	0000	Error Stop	
	0101	Transfer P to A	A=1523
	4310	Store A at 1514	
	0404	Load A with 0004	A=0004
	5312	Add A to cont. of Loc. 1514 (1523)	A=1527
	0101	Transfer P to A	A=1527
01530	3714	Subtr. cont. of Loc. 1514 (1527) from A	A=0000
	6002	If A = 0 Jump to 1533	
	0000	Error Stop	
	0101	Transfer P to A	A=1533
	4212	Store A at Loc. 1546	
	0103	Left shift 2	A=6554
	4211	Store A at Loc. 1547	
	2207	Load A with cont. of Loc. 1546	A=1533

01540	3206	Add cont. of Loc. 1546 (1533) to A	A=3266
	3205	Add cont. of Loc. 1546 (1533) to A	A=5021
	3204	Add cont. of Loc. 1546 (1533) to A	A=6554
	3604	Subtr. cont. of Loc. 1547 (6554) from A	A=0000
	6004	If A = 0 Jump to 1550	
	0000	Error Stop	
	1533		
	6154	6554	
01550	0101	Transfer P to A	A=1550
	4213	Store A at Loc. 1564	
	0111	Left shift 6	A=5015
	4212	Store A at Loc. 1565	
	4610	Shift Left 1 cont. of Loc. 1564 (1550)	A=3320
	4607	Shift Left 1 cont. of Loc. 1564 (3320)	A=6640
	4606	Shift Left 1 cont. of Loc. 1564 (6640)	A=5501
	0103	Shift Left 2	A=6406
01560	0102	Shift left 1	A=5015
	3604	Subtr. cont. of Loc. 1565 from A (5015)	A=0000
	6005	If A = 0 Jump to 1567	
	0000	Error Stop	
	1550	3320 - 6640 - 5501	
	5300	5015	
	0000		
	0113	Multiply A by 100 ₁₀ (144 ₈)	A=0000
01570	6003	If A = 0 Jump to 1573	
	0000	Error Stop	
	0001	0002	
	2301	Load A with content of Loc. 1572	A=0001
	0113	Multiply A by 100 ₁₀ (144 ₈)	A=0144
	4225	Store A at Loc. 1622	
	2304	Load A with cont. of Loc. 1572	A=0001
	0103	Left shift 2	A=0004
01600	0102	Left shift 1	A=0010
	4222	Store A at Loc. 1623	
	2310	Load A with cont. of Loc. 1572	A=0001
	0102	Left shift 1	A=0002
	5217	Add A to cont. of Loc. 1623	A=0012
	0103	Left shift 2	A=0050
	0102	Left shift 1	A=0120
	4215	Store A at Loc. 1624	
01610	4613	Shift left 1 cont. of Loc. 1623	A=0024
	3213	Add content of Loc. 1624 to A	A=0144
	3610	Subtr. cont. of Loc. 1622 from A	A=0000
	6002	If A = 0 Jump to 1615	
	0000	Error Stop	
	5723	Add 1 to cont. of Loc. 1572	A=0002
	3607	Subtr. cont. of Loc. 1625 from A (0623)	A=7156
	6114	If A ≠ 0 Jump to 1633	

01620	6006	If A = 0 Jump to 1626	
	0000	Error Stop	
	0000	0114	
	0000	0010 - 0012	
	0000	0120	
	0623		
	0401	Load A with 0001	A=0001
	4335	Store A at Loc. 1572	
01630	6103	If A ≠ 0 Jump to 1633	
	1632		
	7643	7507 - 7510 - 7533	
	2100	Load A with cont. of Loc. 1632	A=7643
	1632		
	3703	Subtr. cont. of Loc. 1632 from A	A=0000
	6002	If A = 0 Jump to 1640	
	0000	Error Stop	
01640	2706	Load compl. of cont of Loc. 1632	A=0134
	1100	Log. prod. of A and cont. of Loc. 1632	A=0000
	1632		
	6002	If A = 0 Jump to 1645	
	0000	Error Stop	
	2313	Load A with cont. of 1632	A=7643
	1500	Log. sum of A and cont. of Loc. 1632	A=0000
	1632		
01650	6002	If A = 0 Jump to 1652	
	0000	Error Stop	
	2500	Load A with compl. of cont. of Loc. 1632	A=0134
	1632		
	3322	Add cont. of Loc. 1632 to A	A=0000
	6002	If A = 0 Jump to 1657	
	0000	Error Stop	
	2725	Load compl. of cont. of 1632	A=0134
01660	3100	Add cont. of Loc. 1632 to A	A=0000
	1632		
	6002	If A = 0 Jump to 1664	
	0000	Error Stop	
	2332	Load A with cont. of Loc. 1632	A=7643
	3500	Subtr. cont. of Loc. 1632 from A	A=0000
	1632		
	6002	If A = 0 Jump to 1671	
01670	0000	Error Stop	
	2337	Load A with cont. of Loc. 1632	A=7643
	4206	Store A at Loc. 1700	A=7643
	4100	Store A at Loc. 1632	A=7643
	1632		
	3603	Subtr. cont. of Loc. 1700 from A	A=0000
	6003	If A = 0 Jump to 1701	
	0000	Error Stop	

01700	7643	7507 - 7510 - 7533	
	4701	Shift left 1 cont. of Loc. 1700	A=7507
	4500	Shift left 1 cont. of Loc. 1632	A=7507
	1632		
	3704	Subtr. cont. of Loc. 1700 from A	A=0000
	6002	If A = 0 Jump to 1707	
	0000	Error Stop	
	5707	Add 1 to cont. of Loc. 1700	A=7510
01710	5500	Add 1 to cont. of Loc. 1632	A=7510
	1632		
	3712	Subtr. cont. of Loc. 1700 from A	A=0000
	6002	If A = 0 Jump to 1715	
	0000	Error Stop	
	0423	Load A with 0023	A=0023
	5316	Add A to cont. of Loc. 1700	A=7533
	0423	Load A with 0023	A=0023
01720	5100	Add A to cont. of Loc. 1632	A=7533
	1632		
	1722	Log. sum of cont. of Loc. 1700 and A	A=0000
	6002	If A = 0 Jump to 1725	
	0000	Error Stop	
	5604	Add one to cont. of Loc. 1731	A=0001
	6006	If A = 0 Jump to 1734	
	7101	Jump to 1740	
01730	1740		
	0000		
	0000		
	0000		
	7101	Jump to 3500	
	3500		
	0000		
	0000		
01740	2200		
	4000	"A" "variable"	
	3600		
	3000	"B" "variable"	
	3600		
	0700		
	0770		
	0707		
01750	0701		
	6004		
	0000	Error Pyramid	
	7770	Count	
	0000	"D" variable.	
	5714	Increase A	
	5713	Increase B	
	2200		

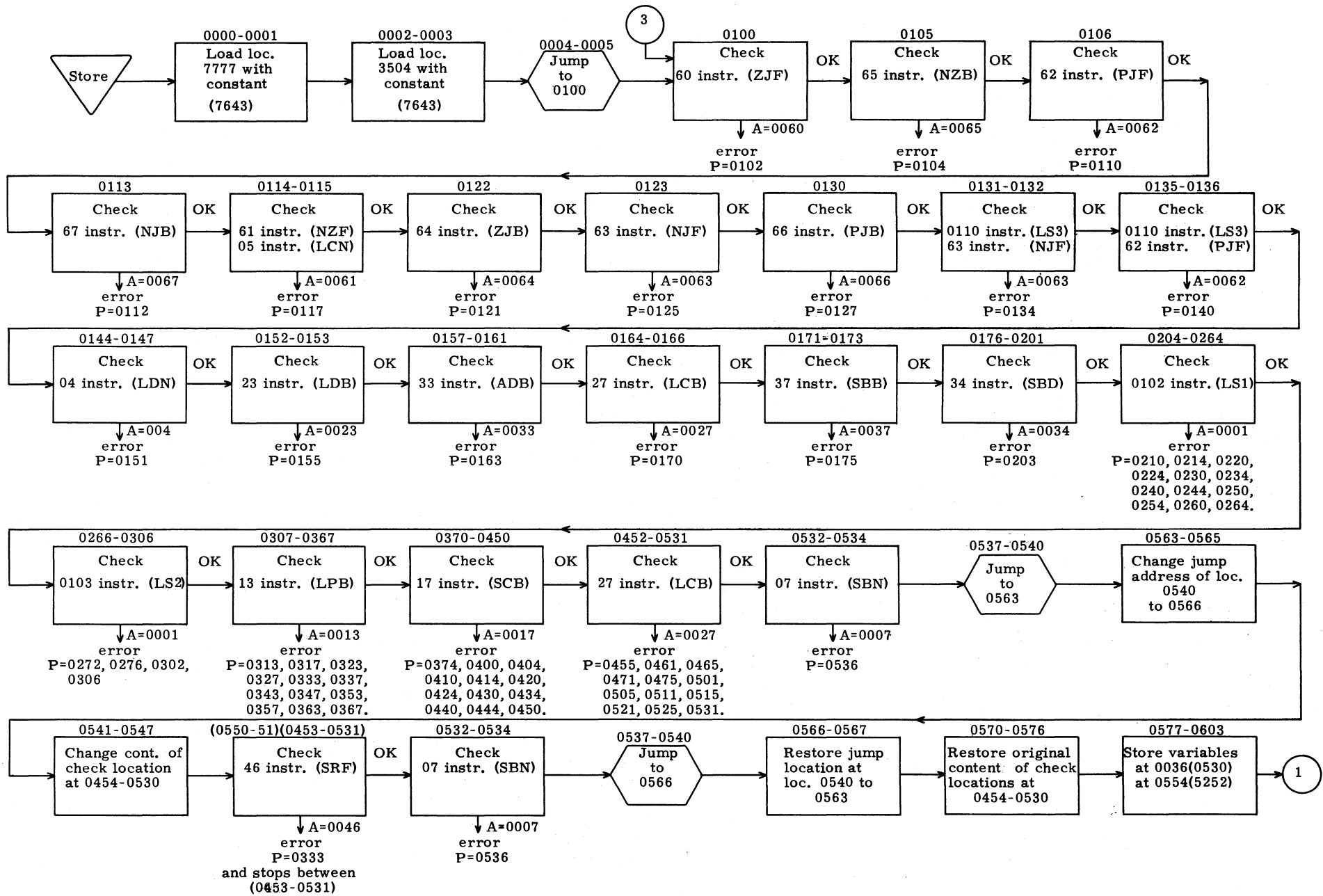
01760	0000	"C" variable
	5305	Increase D
	5707	Increase Count
	6504	
	2310	Load Data
	6002	
	0000	Error Pyramid
	0507	Load Count
01770	4315	Reset Count
	2200	
	1111	
	5313	"C" + 1111
	3200	Add Neg. Zero
	7777	
	3716	
	6002	
02000	0000	
	7101	
	1400	

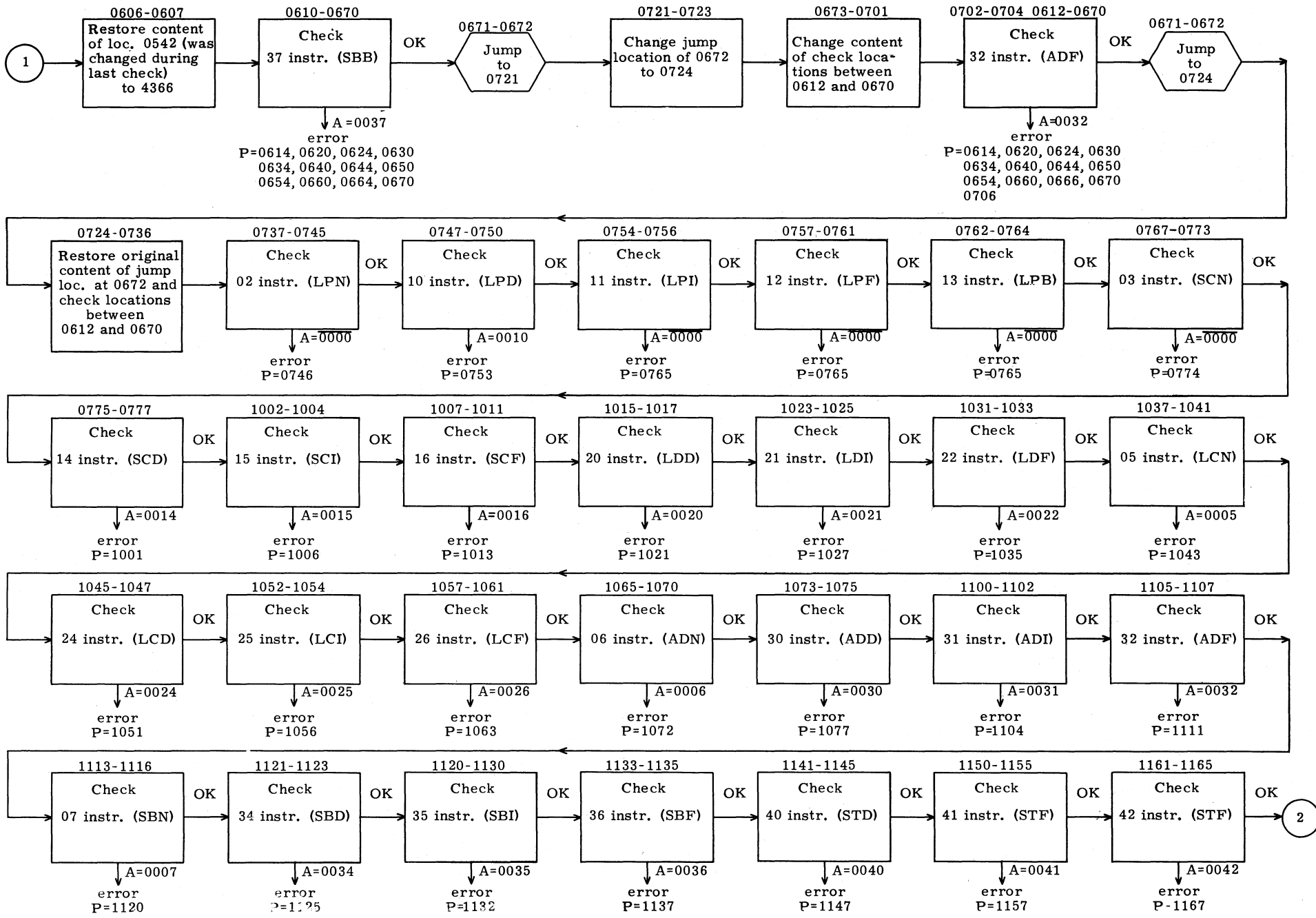
03500	2300	Load A with cont. of Loc. 7777	A=7643
	1603	Log. sum of A and cont. of Loc. 3504	A=0000
	6003	If A = 0 Jump to 3505	
	0000	Error Stop	
	7643	7507 - 7217 - 7244 = 7245	
	4701	Shift left 1 cont. of Loc. 3504	A=7507
	4560	Shift left 1 cont. of Loc. stored at Loc. 60 (7643)	A=7507
	2303	Load A with cont. of Loc. 3504	A=7507
03510	1700	Log. sum of A and cont. of Loc. 7777 (7507)	A=0000
	6002	If A = 0 Jump to 3513	
	0000	Error Stop	
	2700	Load A with compl. of cont. of Loc. 7777	A=0270
	3310	Add to A cont. of Loc. 3504	A=0000
	6002	If A = 0 Jump to 3517	
	0000	Error Stop	
	2713	Load A with compl. of cont. of Loc. 3504	A=0270
03520	1300	Log. prod. of A and cont. of Loc. 7777	A=0000
	6002	If A = 0 Jump to 3523	
	0000	Error Stop	
	2717	Load A with compl. of cont. of Loc. 3504	A=0270
	3300	Add cont. of Loc. 7777 to A	A=0000
	6002	If A = 0 Jump to 3527	
	0000	Error Stop	
	2323	Load A with cont. of Loc. 3504	A=7507
03530	3700	Subtr. cont. of Loc. 7777 from A	A=0000
	6002	If A = 0 Jump to 3533	
	0000	Error Stop	
	2327	Load A with cont. of Loc. 3504	A=7507
	4300	Store A at Loc. 7777	
	3731	Subtr. cont. of Loc 3504 from A	A=0000
	6002	If A = 0 Jump to 3540	
	0000	Error Stop	
03540	4734	Shift left 1 cont. of Loc. 3504	A=7217
	4700	Shift left 1 cont. of Loc. 7777	A=7217
	3736	Subtr. from A cont. of Loc. 3504	A=0000
	6002	If A = 0 Jump to 3545	
	0000	Error Stop	
	0425	Load A with 0025	A=0025
	5342	Add A to cont. of Loc. 3504	A=7244
	0425	Load A with 0025	A=0025
03550	5300	Add A to cont. of Loc. 7777	A=7244
	3745	Subtr. from A cont. of Loc. 3504	A=0000
	6002	If A = 0 Jump to 3554	
	0000	Error Stop	
	5750	Add 1 to cont. of Loc. 3504	A=7245
	5700	Add 1 to cont. of Loc. 7777	A=7245
	3752	Subtr. from A cont. of Loc. 3504	A=0000
	6004	If A = 0 Jump to 3563	

03560	0000	Error Stop	
	5461	6306 - 0663	
	5461	3143 - 6306 - 0663	
	4701	Shift left 1 cont. of Loc. 3562	A=3143
	4702	Shift left 1 cont. of Loc. 3562	A=5306
	2304	Load A with cont. of Loc. 3561	A=5461
	0103	Left shift A 2 places	A=6306
	4306	Store A at Loc. 3561	
03570	3706	Subtr. from A cont. of Loc. 3562	A=0000
	6003	If A = 0 Jump to 3574	
	0401	Load A with 0001	
	0000	Error Stop	
	2312	Load A with cont. of Loc. 3562	A=6306
	0110	Left shift A 3 places	A=3066
	0110	Left shift A 3 places	A=0663
	4315	Store A at Loc. 3562	
03600	2317	Load A with cont. of Loc. 3561	A=6306
	0111	Left shift A 6 places	A=0663
	4321	Store A at Loc. 3561	
	3721	Subtr. from A cont. of Loc. 3562	A=0000
	6003	If A = 0 Jump to 3607	
	0401	Load A with 0001	
	0000	Error Stop	
	0412	Load A with 0012	A=0012
03610	0112	A times 10 (128)	A=0144
	3604	Subtr. from A cont. of Loc. 3615	A=0000
	6004	If A = 0 Jump to 3616	
	0401	Load A with 0001	
	0000	Error Stop	
	0144		
	2206	Load A with cont. of Loc. 3624	A=2525
	0114	Right shift A 1 place	A=1252
03620	3605	Subtr. from A cont. of Loc. 3625	A=0000
	6005	If A = 0 Jump to 3626	
	0401	Load A with 0001	
	0000	Error Stop	
	2525		
	1252		
	2212	Load A with cont. of Loc. 3640	A=5252
	0114	Right shift A 1 place.	A=6525
03630	0114	Right shift A 1 place	A=7252
	4207	Store A at Loc. 3640	
	2207	Load A with cont. of Loc. 3641	A=5252
	0115	Right shift A 2 places	A=7252
	4205	Store A at Loc. 3641	
	3603	Subtr. from A cont. of Loc. 3640	A=0000
	6004	If A = 0 Jump to 3642	
	0000	Error Stop	

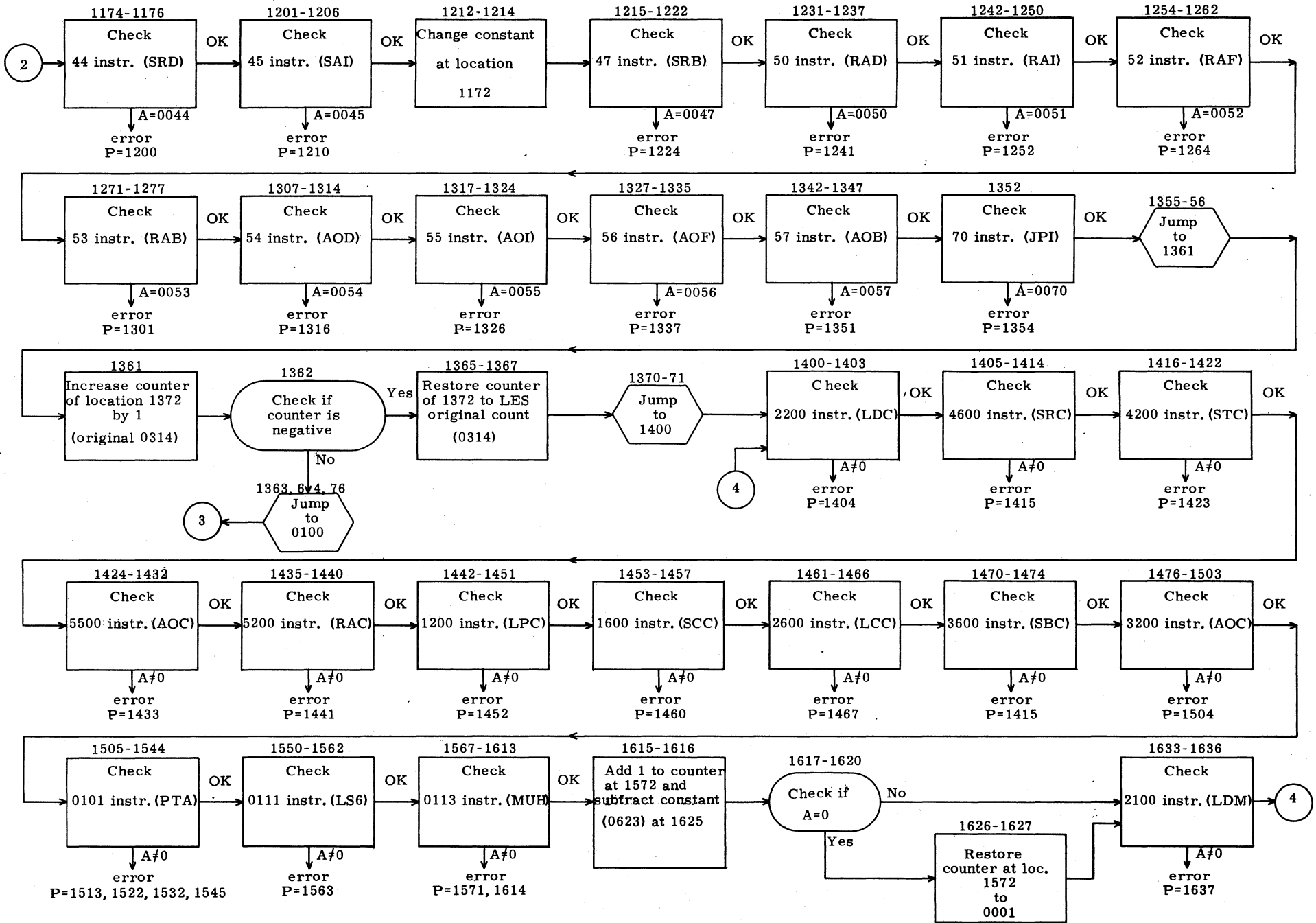
03640	5252		
	5252		
	5604	Add 1 to cont. of Loc. 3646	A=7771
	6113	If A \neq 0 Jump to 3656	
	6026	If A = 0 Jump to 3672	
	5252		
	7770	7771	
	2702	Load A with compl. of Loc. 3645	A=2525
03650	4303	Store A at Loc. 3645	
	4311	Store A at Loc. 3640	
	4311	Store A at Loc. 3641	
	7100	3655 to Loc. 3663 and Jump to	
	3663	Loc. 3664	
	7121	Jump to 3714	
	7101	Jump to 3626	
	3626		
03360	0000	Error Stop 7100 instruction failed	
	0000		
	7101	Jump to Loc. 3655	
	3660	3655	
	5603	Add 1 to cont. of Loc. 3667	
	7101	Jump to 3662	
	3662		
	0000	0001	
03670	7101	Jump to 3500	
	3500		
	0507	Load A with compl. of 0007	A=7770
	4325	Store A at loc. 3646	
	7101	Jump to 3647	
	3647		
	3714		
	7701	Stop when Sel. Stop 1 is up, otherwise P + 1	
03700	7702	Stop when Sel. Stop 2 is up, otherwise P + 1	
	7704	Stop when Sel. Stop 4 is up, otherwise P + 1	
	7707	Recheck Stop 1, 2, and 4	
	5553	Add 1 to cont. of Loc. stored at 0053 (1375)	
	6104	If A \neq 0 Jump to 3710	
	7777	Halt	
	7101	Jump to 0100	
	0100		
03710	0425	Load A with 0025	A=0025
	6111	If A \neq 0 Jump to 3722	
	7101	Jump to 6431	
	6431		
	2205	Load A with cont. of Loc. 3721	A=3660
	4332	Store A at Loc. 3663	
	2327	Load A with cont. of Loc. 3667	
	6527	If A \neq 0 Jump to 3670	

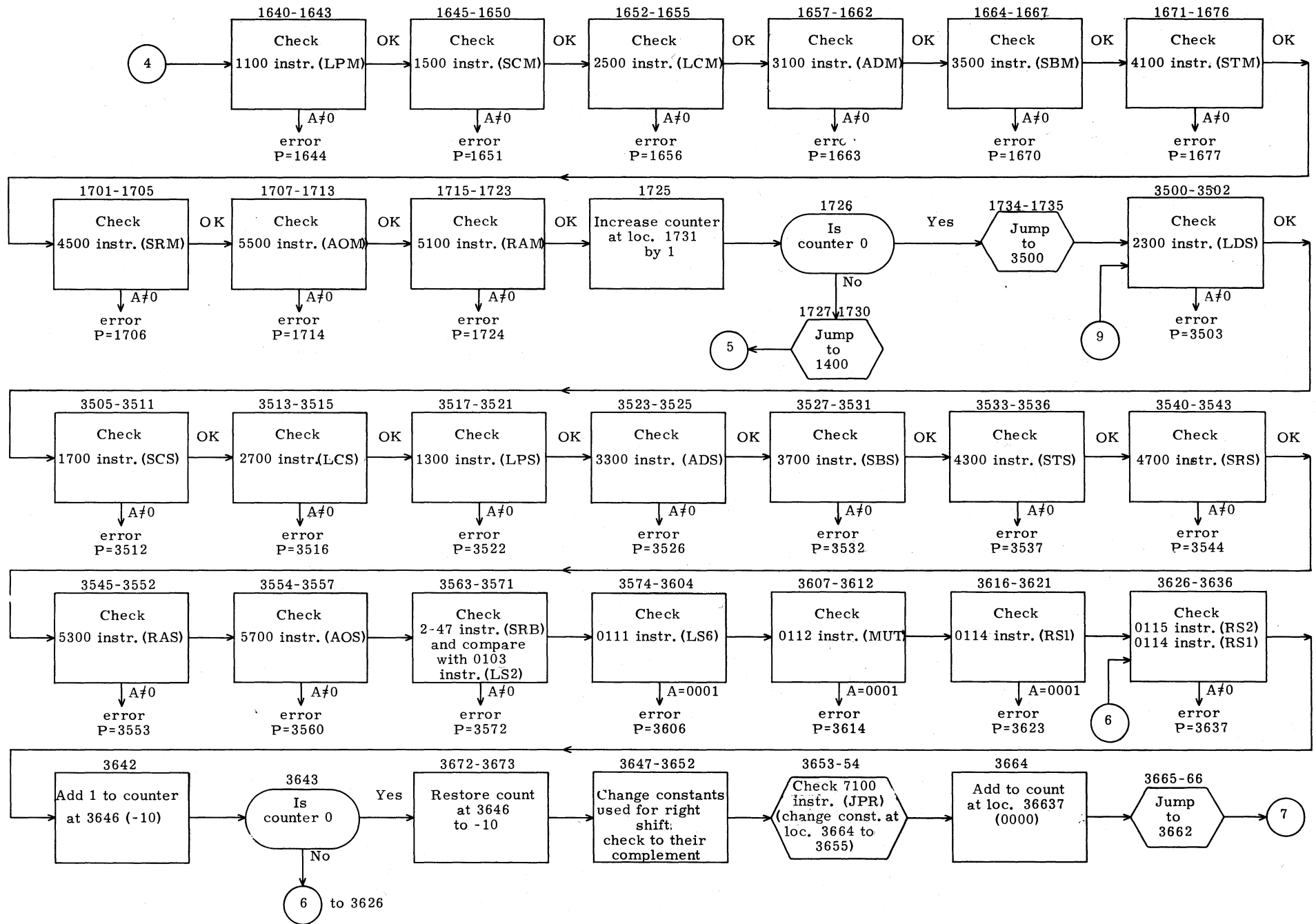
03720	6421	If A = 0 Jump to 3662	A=3725
	3660		
	7625	Replace E part of Loc. 3724 (stored at 0025) with 25	
	7101	Jump to 3725	
	3752	3725	
	0452	Load A with 0052	A=0052
	7625	Replace E part of Loc. 3724 (stored at 0025) with 52	A=3752
	7710	If Sel. Jump 1 set jump to 3742 (If not jump to 3731)	
03730	3742		
	7720	If Sel. Jump 2 set Jump to 3756	
	3756	If not jump to 3733	
	7740	If Sel. Jump 4 set jump to 3764	
	3764	If not jump to 3735	
	0400	Load A with 0000	A=0000
	6430	If A=0 Jump to 3706	
	7775	Counter for Sel. Jump 1	
03740	7773	Counter for Sel. Jump 2	
	7767	Counter for Sel. Jump 4	
	5703	Add 1 to cont. of Loc. 3737	A=7776 - 0000
	6506	If A ≠ 0 Jump to 3735	
	0502	Load A with compl. of 0002	A=7775
	4306	Store A at Loc. 3737	
	0400	Load A with 0000	
	6442	If A = 0 Jump to 3705	
03750	7033	Check sum constant	
	0000		
	0476	Load A with 0076 HWI Error	
	0000	Error Stop	
	0400	Load A with 0000	
	6447	If A = 0 Jump to 3705	
	5716	Add 1 to cont. of Loc. 3740	A=7774 - 0000
	6522	If A ≠ 0 Jump to 3735	
03760	0504	Load A with compl. of 0004	A=7773
	4321	Store A at Loc. 3740	
	0400	Load A with 0000	
	6456	If A = 0 Jump to 3705	
	5723	Add 1 to cont. of loc. 3741	A=7767 - 0000
	6530	If A ≠ 0 Jump to 3735	A=7767
	0510	Load A with compl. of 0010	
	4326	Store A at Loc. 3741	
03770	0400	Load A with 0000	
	6464	If A = 0 Jump to 3705	
	5275	Check sum constant	

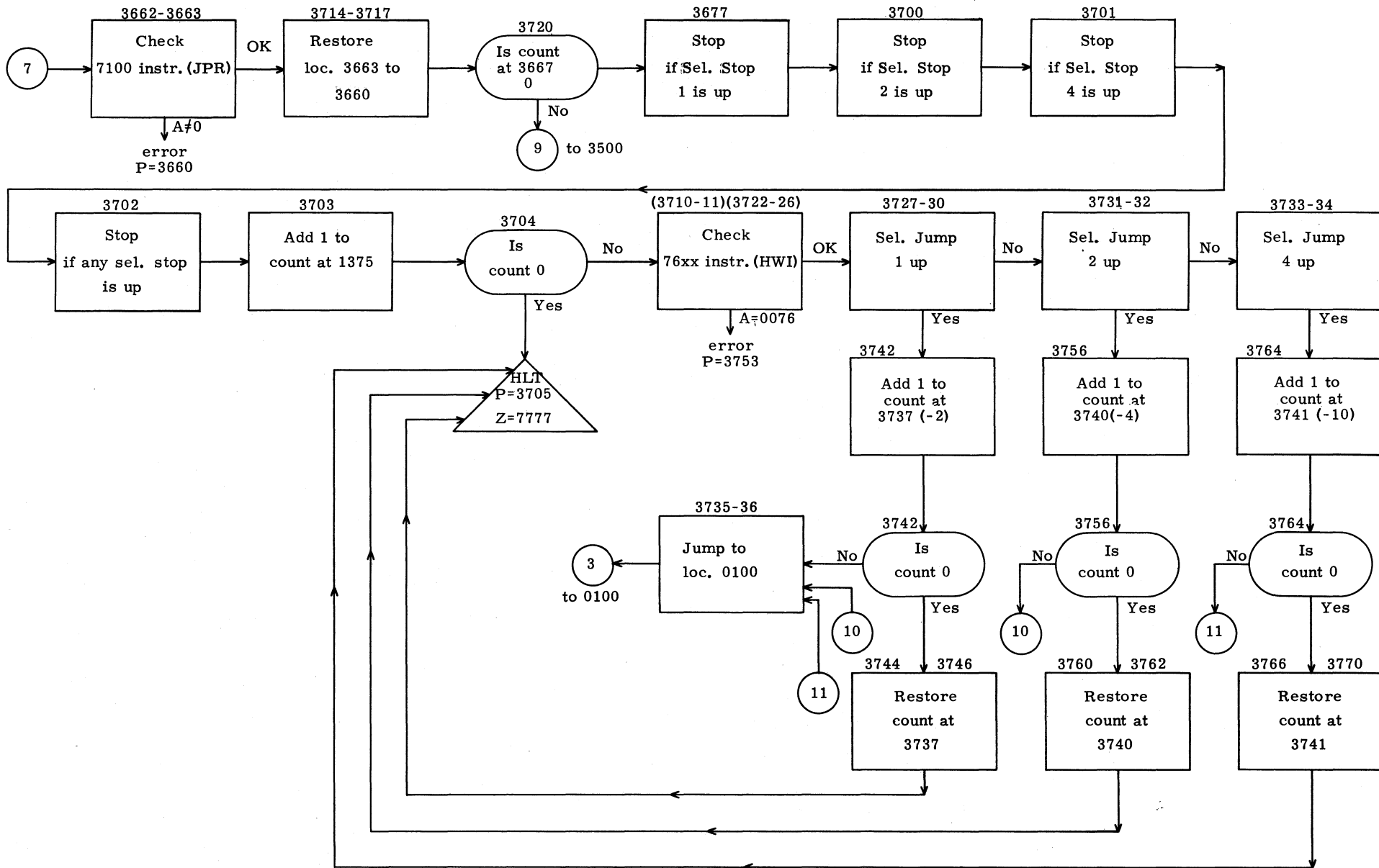




160-A:38







160-A:41

NUMBER: T035

TITLE: Punch Power Supply Test

CATEGORY: 160-A

MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

This program will test the punch power supply load down and punch residual magnetism.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0142

STARTING ADDRESS: Turn on the punch and start at P=0000

ADDITIONAL INSTRUCTIONS: To change this program from 8 level to 7 level enter 0101 in memory location 0063 and enter 0177 in memory location 0066.

HALTS

EXPLANATION

P=0055, Z=7777

After punch out of leader then allow leader insert into reader. Insert the tape so that the first frame read will be a binary 0. Do not master clear.

Put the computer in run. The program will run continuously until the end of tape or until an error occurs.

P=0107, Z=0000

Error halt, error data in "A".

Put the computer in run.

P=0111, Z=7700

Halt with correct data in "A".

Put the computer in run.

T-035
PUNCH POWER SUPPLY LOAD DOWN & PUNCH RESIDUAL MAGNETISM TEST

0000	0577
0001	4075
0002	7565
0003	7400
0004	5475
0005	6502
0006	0507
0007	4074
0010	0401
0011	4077
0012	0524
0013	4075
0014	7351
0015	0100
0016	5475
0017	6503
0020	2302
0021	0601
0022	6501
0023	7400
0024	4477
0025	1241
0026	4077
0027	6515
0030	0524
0031	4075
0032	7332
0033	0067
0034	5475
0035	6503
0036	2320
0037	0601
0040	6501
0041	7400
0042	5477
0043	2074
0044	6072
0045	5474
0046	6534
0047	6006
0050	0524
0051	4075
0052	7600
0053	6401
0054	6127
0055	7777
0056	7503
0057	6707

0060	6610
0061	4102
0062	0000
0063	0201
0064	0066
0065	0077
0066	0377
0067	4104
0070	0000
0071	0000
0072	0000
0073	0000
0074	0101
0075	0001
0076	0142
0077	0077
0100	0524
0101	4075
0102	7600
0103	4076
0104	3477
0105	6005
0106	2076
0107	0000
0110	2077
0111	7700
0112	5475
0113	6511
0114	7600
0115	6002
0116	0000
0117	4477
0120	1066
0121	4077
0122	6005
0123	3463
0124	6724
0125	7101
0126	0132
0127	2066
0130	4077
0131	6531
0132	7503
0133	7101
0134	0010
0135	4104
0136	7503
0137	7101

0140
0141
0142

0100
4102
4554

NUMBER: T036

TITLE: Punch and Reader Test

CATEGORY: 160-A

MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

The program checks the reliability of the punch and reader under variable speed operations.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0303

CHECK SUM: 0160

STARTING ADDRESS:

Part 1 0001

Turn the punch ON and punch out a small amount of leader. Master clear, set P=0001, and put the computer in run. The punch will run out enough tape to reach the reader and stop with P-0041.

Part 2 0000

Insert the tape into the reader so that the first frame read will be a 0.

Start P=0000. The program will continue to punch and read until an error occurs. A pattern of the binary count is punched from 0000 to 0177, followed by a binary count from 0000 to 0177 with two frames of each count punched. This is followed by 3 then 4 frames of each count.

HALTS

EXPLANATION

770x

x = error frame of a particular count. Error stops are coded to tell which frame of a particular count was read or punched wrong. Observation of the tape by the operator will determine a punch or reader error.

T036
TEST PROGRAM # 1- PUNCH & READER

0000	7102
0001	7102
0002	0100
0003	0004
0004	0501
0005	4250
0006	0400
0007	4234
0010	4234
0011	4234
0012	4234
0013	7536
0014	7333
0015	0044
0016	6204
0017	5627
0020	5625
0021	5623
0022	5621
0023	1627
0024	6511
0025	5710
0026	2310
0027	0701
0030	4312
0031	1622
0032	6524
0033	2221
0034	4316
0035	2213
0036	4321
0037	5616
0040	6532
0041	7700
0042	6436
0043	0200
0044	0200
0045	0200
0046	0200
0047	0043
0050	0044
0051	4104
0052	0200
0053	6200
0054	6204
0055	0100
0056	0000
0057	0100

0060	0270
0061	0062
0062	5606
0063	5606
0064	5606
0065	5606
0066	7060
0067	0200
0070	0040
0071	0040
0072	0040
0073	0200
0074	2121
0075	0021
0076	0303
0077	0077
0100	0400
0101	4070
0102	7504
0103	7204
0104	0075
0105	6103
0106	4102
0107	0074
0110	2074
0111	1470
0112	6113
0113	7504
0114	7304
0115	0071
0116	6103
0117	4104
0120	0070
0121	5470
0122	1467
0123	6521
0124	6003
0125	2074
0126	7701
0127	0400
0130	4070
0131	4071
0132	7504
0133	7204
0134	0076
0135	6103
0136	4102
0137	0074

0140	2074
0141	1470
0142	6117
0143	2075
0144	1471
0145	6116
0146	7504
0147	7304
0150	0072
0151	6103
0152	4104
0153	0070
0154	5470
0155	5471
0156	1467
0157	6525
0160	6005
0161	2074
0162	7702
0163	2075
0164	7702
0165	0400
0166	4070
0167	4071
0170	4072
0171	7504
0172	7204
0173	0077
0174	6103
0175	4102
0176	0074
0177	2074
0200	1470
0201	6123
0202	2075
0203	1471
0204	6122
0205	2076
0206	1472
0207	6121
0210	7504
0211	7304
0212	0073
0213	6103
0214	4104
0215	0070
0216	5470
0217	5471

0220	5472
0221	1467
0222	6531
0223	6007
0224	2074
0225	7701
0226	2075
0227	7702
0230	2076
0231	7703
0232	0400
0233	4070
0234	4071
0235	4072
0236	4073
0237	7504
0240	7204
0241	0100
0242	6103
0243	4102
0244	0074
0245	2074
0246	1470
0247	6124
0250	2075
0251	1471
0252	6123
0253	2076
0254	1472
0255	6122
0256	2077
0257	1473
0260	6121
0261	7504
0262	7304
0263	0074
0264	6103
0265	4104
0266	0070
0267	7061
0270	1467
0271	6532
0272	7057
0273	2074
0274	7701
0275	2075
0276	7702
0277	2076

0300
0301
0302
0303

7703
2077
7704
2750

NUMBER: T037

TITLE: Q.A. Variable Speed Reader - "76" Instruction Test

CATEGORY: 160-A

MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

This test will check the reader at variable speeds.

DESCRIPTION

1. See flow chart.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0077

STARTING ADDRESS: 0000

ADDITIONAL INSTRUCTIONS: Insert a binary count loop into the reader and put the computer in run.

Memory location 0060 contains the reader level mask. If the reader mask is changed to read less than 8 level, then 0000 should be entered in memory location 0057.

HALTS

EXPLANATION

7700

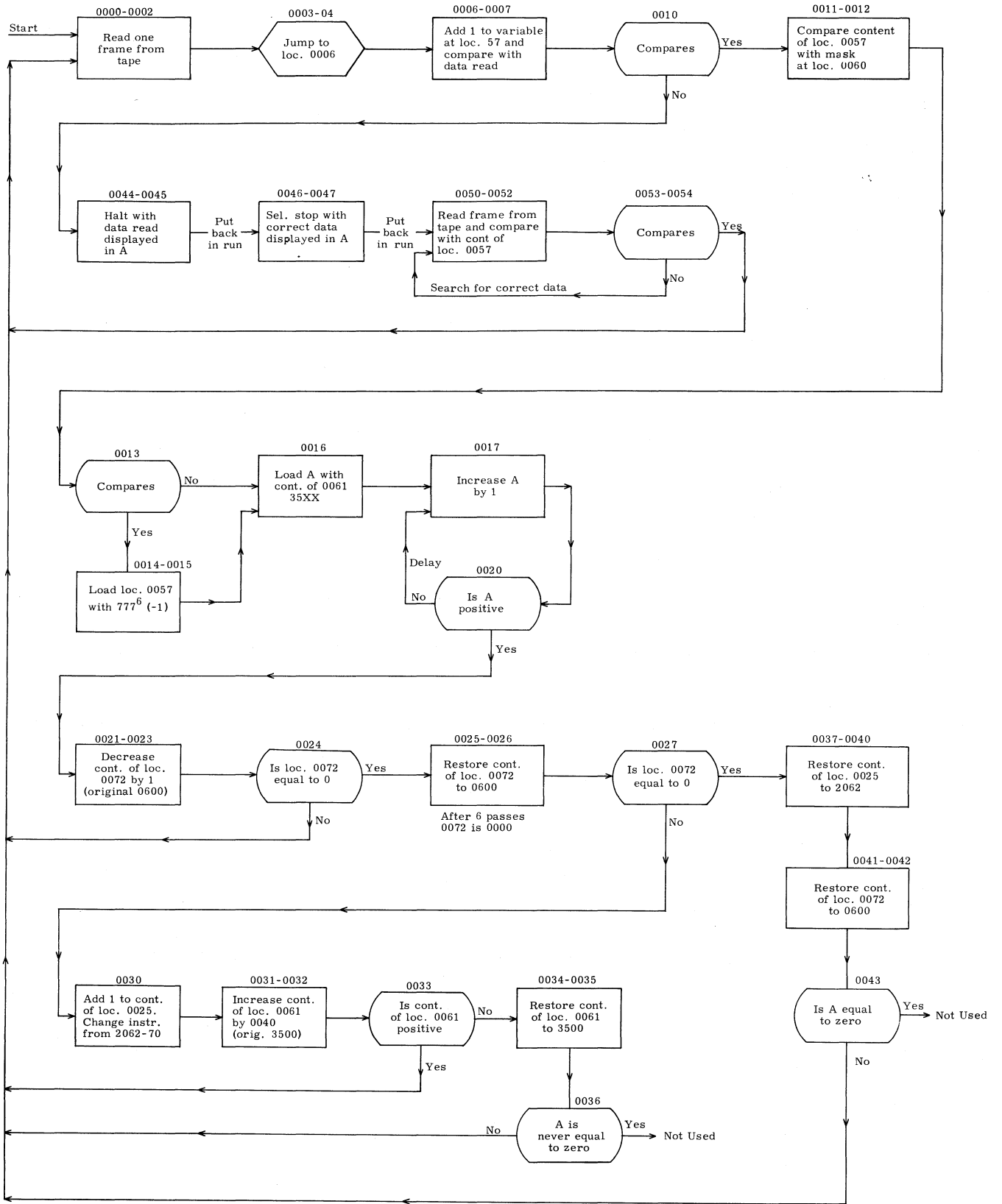
A = error data.

Put the computer in run.

7701

A = correct data.

Put the computer in run. The reader will search for the correct information and then continue to read at a variable rate until an error occurs.



This test reads 11 binary counts at different speeds

T-037
QUALITY ASSURANCE VARIABLE SPEED READER

0000	7505
0001	7600
0002	4056
0003	7004
0004	0006
0005	4102
0006	5457
0007	3456

0010	6134
0011	2057
0012	3460
0013	6103
0014	0501
0015	4057
0016	2061
0017	0601

0020	6601
0021	2072
0022	0701
0023	4072
0024	6524
0025	2062
0026	4072
0027	6010

0030	5425
0031	2075
0032	5061
0033	6633
0034	2074
0035	4061
0036	6536
0037	2073

0040	4025
0041	2071
0042	4072
0043	6512
0044	2056
0045	7700
0046	2057
0047	7701

0050	7505
0051	7600
0052	3457
0053	6503
0054	6454
0055	4102
0056	0000
0057	0000

0060	0377
0061	3500
0062	0600
0063	0600
0064	0600
0065	0600
0066	0600
0067	0600

0070	0000
0071	0600
0072	0600
0073	2062
0074	3500
0075	0040
0076	0074
0077	2224

NUMBER: T050

TITLE: Manual Variable Speed Reader Test

CATEGORY: 160-A

MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

This test will check the clutch, brake adjustments, feed hole and information bias settings.

DESCRIPTION

This program is a manual control of the delay between picking the clutch on the reader. By moving the SLJ switches while the program is running causes various delays to be inserted between frames at random.

Any number is put into Register A. This number is the basic delay. A 0001 in Register A is equivalent to a 12.8 us delay. The number in Register A is now effectively multiplied by the SLJ switches. If SLJ4 and SLJ2 are down the delay between 76 instructions is 6 times the basic delay in Register A.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0077

CHECK SUM: 6755

STARTING ADDRESS: 0000

ADDITIONAL INSTRUCTIONS: 125-52 loop is required

HALTS	EXPLANATION
0016	Number read is in Register A. A "52" should have been read.
0027	Number read is in Register A. A "125" should have been read.

LOC		
0000	4070	Store delay
0001	7500	} Select reader
0002	4102	
0003	2200	} Insures that frame counter is correct
0004	5252	
0005	4072	} Insures first frame read is 52
0006	7600	
0007	0752	
0010	6011	
0011	6503	
0012	7600	
0013	0752	Check if frame is 52
0014	6016	Frame is 52 go to delay*
0015	0652	Error stop
0016	0000	Frame read is in RA
0017	7101	} Insures proper start after an error stop
0020	0003	
0021	7600	} Check if frame is a 125
0022	3600	
0023	0125	
0024	6006	
0025	3200	125 read go to delay*
0026	0125	
0027	0000	Error stop 125 should have been number
0030	7101	} Recover after error
0031	0003	
0032	0400	*
0033	7710	
0034	0036	
0035	0701	Delay X 1
0036	7720	
0037	0041	
0040	0702	Delay X 2
0041	7740	
0042	0044	
0043	0704	Delay X 4
0044	6007	
0045	4071	Store delay multiplier
0046	2070	Load delay
0047	0701	
0050	6501	
0051	5471	
0052	6504	Do delay again
0053	2072	Load frame checker
0054	6304	NFJ if last frame was 125
0055	4472	Shift frame checker
0056	7101	Jump to input for 125
0057	0021	
0060	4472	Shift frame checker
0061	7101	
0062	0012	Jump to 52 frame

0063
0064
0065
0066
0067
0070
0071
0072
0073
0074
0075
0076
0077

5252

Delay
Delay multiplier

NUMBER: T074

TITLE: Q. A. Block Store Test

CATEGORY: 160-A

MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

This program tests the block store (BLS) instruction in various memory locations.

DESCRIPTION

1. See flow chart.
2. The program stores 12 different constants in blocks of 525₈ then checks the pattern and with no selective stops in the up position it is self-looping. After the test pattern has been stored and checked the complete pattern is destroyed by storing 4264 throughout the buffer bank. A check of this number is then accomplished.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0175

CHECK SUM: 0160

ADDITIONAL INSTRUCTIONS: SLS switch 1 up, sweeps memory bank under test.
This will cause the program to stop after the pattern has been block stored in memory.

HALTS

EXPLANATION

0140

Error, A equal to error data.
Sweep 0055 Dir bank for failure.
Put computer in Run.
A equal to correct data.
Restart at 0000.

0024

Error after storing 4264.
Sweep 0021 for memory location of failure.
If no error occurs, the original test pattern will be restored and checked.

Test No. 1 will test the BLS instruction in Memory Bank.

LOAD INSTRUCTION: 0000 in Rel bank 0

ADDITIONAL INSTRUCTIONS:

- 1) Set Rel and Dir bank to 0.
- 2) Set Bfr and Ind bank to 1.
- 3) 0000 Run from Rel bank 0.
- 4) If error occurs master clear Run 0000.
- 5) For halt see 0140 above.

Test No. 2 will test the BLS instruction in Memory Bank 0.

LOAD INSTRUCTION: 0000 in Rel bank 1

ADDITIONAL INSTRUCTIONS:

- 1) Set Rel and Dir bank to 1.
- 2) Set Bfr and Ind bank to 0.
- 3) 0000 Run from Rel bank 1.
- 4) If error occurs master clear Run 0000.
- 5) For halt see 0140 above.

Test No. 3 will test the BLS instruction in External Memory.

LOAD INSTRUCTION: 0000 in bank X

ADDITIONAL INSTRUCTIONS:

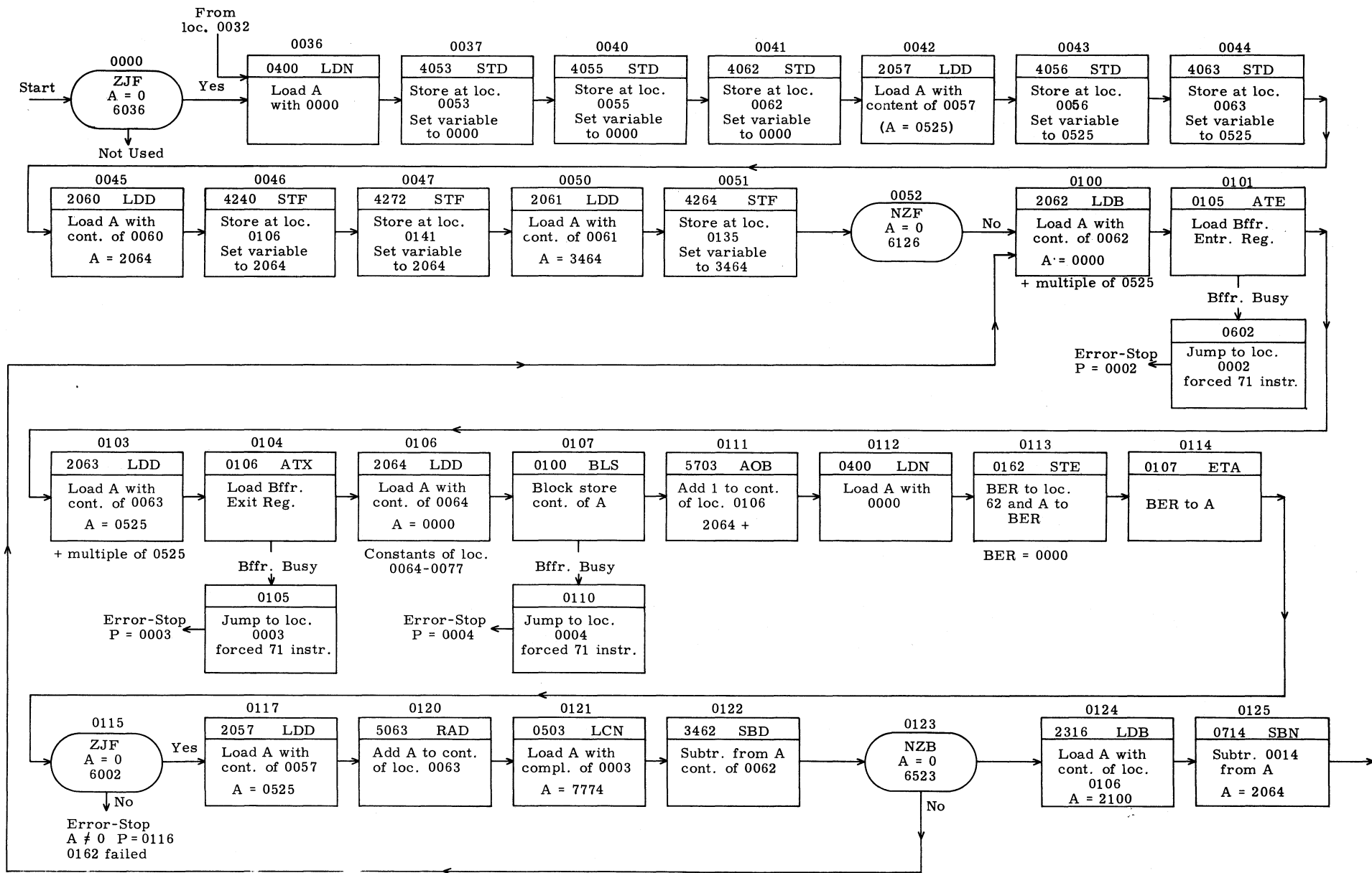
- 1) Set Dir = Rel.
- 2) Set Bfr \neq Dir and Rel.
- 3) Set Ind = Bfr.
- 4) 0000 Run from Rel bank.
- 5) If error occurs master clear Run 0000.
- 6) For halt see 0140 above.

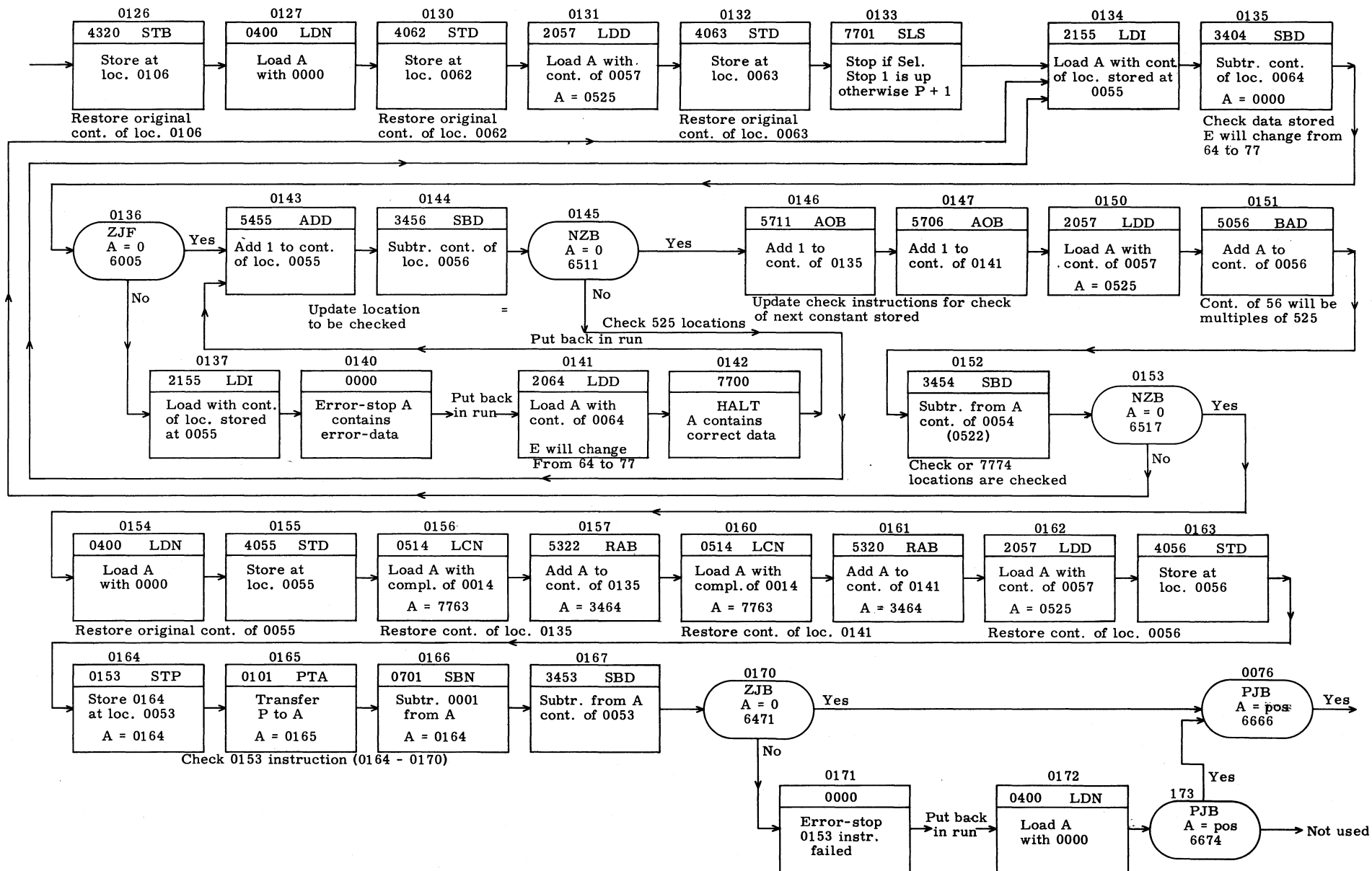
BLOCK STORE TEST

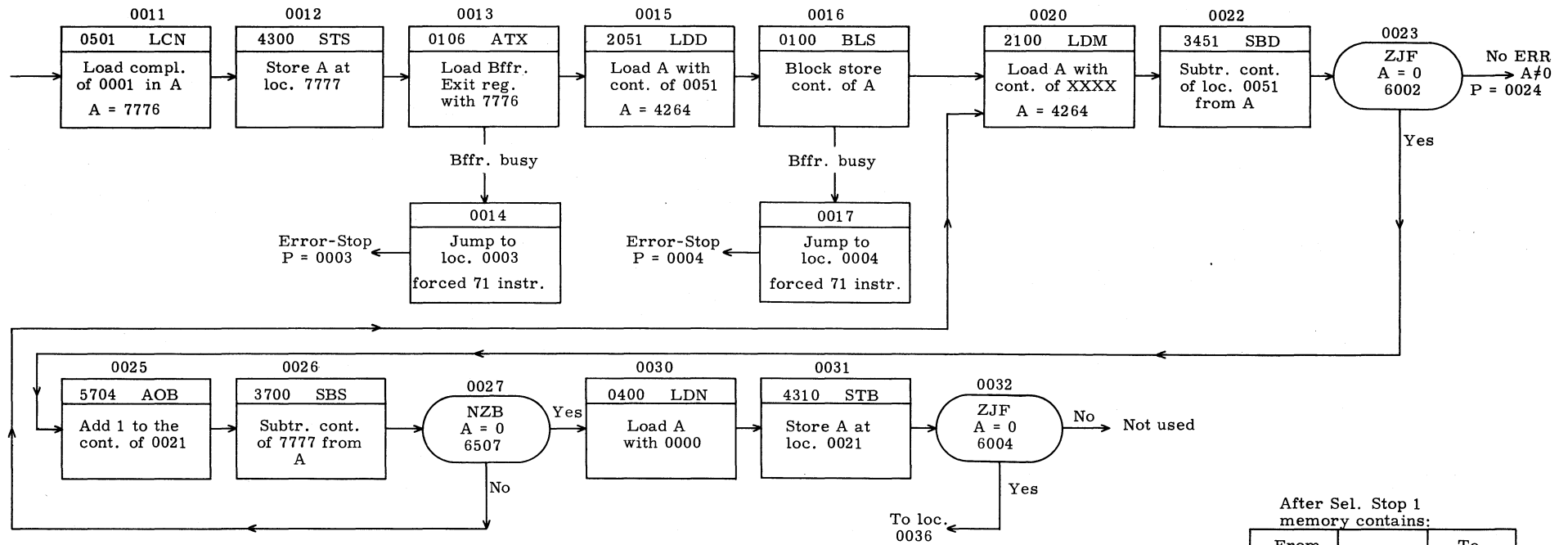
00000	6036	
	0000	Oper. error
	0000	Error 0105 B. busy
	0000	Error 0106 B. busy
	0000	Error 0100 B. busy
	0000	
	0000	
	0000	
00010	0000	
	0501	Set test bank to 4264
	4300	
	0106	Set Buffer Exit
	0003	Jump adr.
	2051	(M.L. 0051)
	0100	Block Store
	0004	Jump adr.
00020	2100	Check Pattern
	0000	
	3451	
	6002	
	0000	Error-Halt
	5704	Increase test (1) count
	3700	
	6507	
00030	0400	Restore test (1) addr.
	4310	
	6004	
	7575	Check sum correction
	0000	
	0000	
	0400	
	4053	Reset variables
00040	4055	
	4062	
	2057	
	4056	
	4063	
	2060	
	4240	
	4272	
00050	2061	
	4264	
	6126	
	0000	Check 0153 instruction
	0522	Constant
	0000	Variable
	0525	Variable
	0525	Constant

00060	2064	Constant	
	3464	Constant	
	0000	Variable BER.	
	0525	Variable BXR.	
	0000	}	
	7777		
	1111		
	2222		
00070	4444		} Constants, Buffer Data.
	5252		
	2525		
	3131		
	1313		
	1234		
	7650		
	6666		
00100	2062		
	0105	Load BER.	
	0002	Jump adr. B. busy	
	2063		
	0106	Load BXR.	
	0003	Jump adr. B. busy	
	2064		
	0100	BLS.	
00110	0004	Jump adr. B. busy	
	5703		
	0400		
	0162		
	0107		
	6002		
	0000	Error Halt (0162)	
	2057		
00120	5063		
	0503	Check BER. limit 7774	
	3462		
	6523		
	2316		
	0714		
	4320	Reset variable instruction to orig.	
	0400		
00130	4062	Reset BER. to orig.	
	2057		
	4063	Reset BXR. to orig.	
	7701	Stop Pattern completed.	
	2155		
	3464		
	6005		
	2155		

00140	0000	Error Halt, Error Data in "A"
	2064	
	7700	Correct Data in "A"
	5455	
	3456	
	6511	
	5711	Change variable instruction.
	5706	Change variable instruction.
00150	2057	
	5056	
	3454	
	6517	Check BER limit
	0400	
	4055	Reset variable
	0514	
	5322	Reset variable instruction.
00160	0514	
	5320	Reset variable instruction.
	2057	
	4056	Reset variable
	0153	
	0101	
	0701	
	3453	
00170	6471	
	0000	Error Halt (0153 Inst.)
	0400	
	6674	Jump back to resume test.
	0000	
	2010	







160-A:68

After Sel. Stop 1 memory contains:

From loc.	Data	To loc.
0000	0000	0524
0525	7777	1251
1252	1111	1776
1777	2222	2523
2524	4444	3250
3251	5252	3775
3776	2525	4522
4523	3131	5247
5250	1313	5774
5775	1234	6521
6522	7650	7246
7247	6666	7773

NUMBER: T075
 TITLE: Memory Bank Selection Test No. 1
 CATEGORY: 160-A
 MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

This program will check 160-A computer execution of memory bank selections for banks 0 and 1 only.

DESCRIPTION

The program will follow a binary count of bank selection as follows:

<u>Buffer</u>	<u>Direct</u>	<u>Indirect</u>	<u>Relative</u>
0	0	0	1
0	0	1	0
0	0	1	1
0	1	0	0

continuing to 17. Constants used for arithmetic operations are stored in Memory Location 0 through 7 in bank 0, and 10 through 17 in bank 1.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION:	Paper Tape	
	<u>First Routine</u>	<u>Second Routine</u>
LOADING ADDRESS:	0000 in bank 0	0000 in bank 1
TERMINAL ADDRESS:	0450	0350
CHECK SUM:	0160	0160
STARTING ADDRESS:	0000	
ADDITIONAL INSTRUCTIONS:	1) Master clear set "A" to 0100	
	2) Put the computer in Run	

HALTS

EXPLANATION

P = 0441 Z = 7700	No SLS switches up program will loop 4096 times
P = 0220 Z = 7701	SLS 1 switch up program will check bank selection instructions 0 through 7 (see description)

HALTS

P = 0422 Z = 7702

EXPLANATION (Cont'd)

SLS 2 switch up bank selection instructions 10 through 17 will be checked

Each error halt is preceded by a bank selection to "A" instruction

Program annotation shows the correct "A" register display (bank selection) for each error halt

MEMORY BANK SELECTION TEST

BANK 0

00000 0070 Set Rel & Jump to ML 0100
2552
5225
0000
0000
0240
0001
0002

00010 0011
0120
0010
0000
0000
0000
0000
0000

00020 0000
0000
0000
0000
0000
0000
0000
0000

00030 0000
0000
0000
0000
0000
0000
0000
0000

00040 0000
0000
0000
0000
0000
0000
0000
0000

00050 0000
0000
0000
0000
0000
0000
0000
0000

```

00060 0000
      0000
      0000
      0000
      0000
      0000
      0000
      0000
      0000

00070 0000
      0000
      0000
      0000
      0000
      0000
      0000
      0000
      0000

00100 2776 LDC (Rel) 2552
      3002 Add Dir ML 0002
      6003 Zero Jump
      0130 Correct Data 0000
      0000 Error Halt
      2107          5225
      0105 ATE
      0075 Buf Busy Adr.

00110 0400 clr. A
      0107 ETA 5225
      3106 Add Ind to ML 0001
      6004 Zero Jump
      0130 Correct Data 0000
      0000 Error Halt
      0100 Constant
      2301

00120 0011 Set Rel to 1 and Jump to ML 0100
      0130
      0000 Error Halt No Jump Correct Data 0001
      0000
      0000
      0000
      0000
      2552

00130 2301
      3002 ML 0002 Bank 0
      6003
      0130 Correct Data 0010
      0000 Error Halt
      0107 ETA 5225
      3110 Add Ind Bank 1 MLO011 2552
      6003 Zero Jump

```

00140	0130	Correct Data 0010
	0000	Error Halt
	2011	Load Dir Bank 0 Jump adr. 0120
	0031	Set Ind & Rel & Jump
	0130	
	0000	Error Halt. No Jump. Correct Data 0011
	0140	
	2552	Constant
00150	2002	Load Dir Bank 0
	3302	Adb - Bank 0
	6003	Zero Jump
	0130	Correct Data 0000
	0000	Error Halt
	0107	ETA. 5225
	3106	Add Ind ML 0001 - 2552
	6003	Zero Jump
00160	0130	Correct Data 0000
	0000	Error Halt
	2314	Load Jump Adr. 0140
	0051	Set Rel & Dir & Jump
	0000	Error Halt. No Jump
	0170	
	2552	
	0061	Set Dir & Ind to 1
00170	2103	Ld. Bank 1. (5225)
	3303	Adb.
	6003	Zero Jump
	0130	Correct Data - 0110
	0000	Error Halt
	2010	(5225)
	3011	
	6504	Non Zero Back to Error Halt
00200	2010	5225
	0105	ATE
	0075	Buf Busy Adv.
	0500	LCN 00
	0167	ST. E. in ML 0067 A to BER
	2067	(5225)
	3011	Add Dir Bank 1.
	6003	Zero Jump
00210	0130	Correct Data 0110
	0000	Error Halt - (0167)
	2325	Load Jump Adr (0170)
	0071	Set Rel Ind, Dir to 1 & Jump
	0000	Error Halt. No Jump
	0000	
	0000	
	0000	

00220 7701 Stop - 0-7 completed.
7101
0300 Jump to resume test.
0000
0000
0000
3106
0000

00230 2552
5225
0000
0000
0000
0000
0000
0000

00240 0000
0000
0000
0000
0000
0000
0000
0000

00250 0000
0000
0000
0000
0000
0000
0000
0000

00260 0000
0000
0000
0000
0000
0000
0000
0000

00270 0000
0000
0000
0000
0000
0000
0000
0000

00300	0141	Set Buf to 1.
	2350	5225
	3001	2552 Bank 0
	6003	
	0130	Correct Data 1000
	0000	Error Halt
	2107	LDI Bank 0 5225
	0105	ATE
00310	0075	Buf Busy Adr.
	0400	CIR - A
	0107	ETA
	3106	ADI Bank 1
	6004	Zero Jump
	0130	Correct Data 1000
	0000	Error Halt
	0220	Jump Adr.
00320	2301	Load Jump Adr.
	0011	Set Rel & Jump
	0130	Correct Data 1001
	0000	Error Halt - No Jump
	0000	
	0000	
	0000	
	2552	
00330	2301	2552
	3002	Add Bank 0
	6003	Zero Jump
	0130	Correct Data 1010
	0000	Error Halt
	0107	ETA - 5225
	3110	Bank 1
	6003	Zero Jump
00340	0130	Correct Data 1010
	0000	Error Halt
	2005	Load Jump Adr. 0240
	0031	Set Rel & Ind & Jump
	0130	Correct Data 1011
	0000	Error Halt. No Jump
	0260	Jump Adr.
	2552	Constant
00350	2002	(5225)
	3302	Adb
	6003	Zero Jump
	0130	Correct Data - 1000
	0000	Error Halt
	0107	ETA 5225
	3106	Bank 0 - ML 0001
	6003	Zero Jump

00360 0130 Correct Data 1000
 0000
 2314 Load Jump Adr - 0260
 0051 Set Rel & Dir & Jump
 0000 Error Halt - No Jump - Correct Data - 1101
 0310
 2552
 0061 Set Dir & Ind to 1. 1110

00370 2103 5225 (Bank 1)
 3303
 6003 Zero Jump
 0130 Correct Data 1110
 0000 Error Halt
 2010 5225
 3011
 6504 Jump Back to Error Halt

00400 2010 5225
 0105 ATE
 0075 BFR Busy Adr.
 0400 0167
 0167 0400
 2067 5225
 3011 2552 Bank 1
 6003 Zero Jump

00410 0130 Correct Data 1110
 0000 Error Halt
 2325 Load Jump Adr
 0071 Set Rel, Dir, Ind & Jump
 0000 Error Halt - No Jump
 0000
 0000
 0000

00420 7710 Set Stop to Test Banks 2 & 3
 0430
 7702 Set Stop - Pass through completed
 0140 Set Efr = 0
 0130
 6011 All Bank Controls = 0
 0000 Error Halt
 0100

00430 2301
 0072 Continue test - Banks 2 & 3
 0000
 0000
 0000
 6011
 5703
 6002

00440	7102
	7700
	0100
	0000
	0000
	0000
	0000
	4537
00450	0000

MEMORY BANK SELECTION TEST

BANK1

10000	0000
10000	0000
	0147
	0002
	0010
	0011
	0000
	0000
	0000
10010	5225
	2552
	0000
	5220
	5225
	0000
	0000
	0000
10020	0000
	0000
	0000
	0000
	0000
	0000
	0000
	0000
10030	0000
	0000
	0000
	0000
	0000
	0000
	0000
	0000
10040	0000
	0000
	0000
	0000
	0000
	0000
	0000
	0000
10050	0000
	0000
	0000
	0000
	0000
	0000
	0000
	0000
	0000

10060	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
10070	0000		
	0000		
	0000		
	0000		
	0000		
	0130		
	0000		
	0000		
10100	2001	LDD Bank 0 - 2552	
	3371	Adf B - ML 0010 Bank 1	
	6003	Zero Jump	
	0130	Correct Data - - 0001	
	0000	Error Halt	
	0107	ETA 5225	
	3106	Ad Ind to Bank 0 ML 0001	
	6003	Zero Jump	
10110	0130	Correct Data - 0001	(also Jump Adr.)
	0000	Error Halt.	
	2302	Load Back Jump Adr.	
	0021	Set Ind to 1	
	0010	Set Rel to 0 & Jump	
	0000	Error Halt. No Jump	
	0150	Constant	
	2552	Constant	
10120	2301		
	3112	Add to Bank 1 ML 0010	
	6003	Zero Jump	
	0130	Correct Data 0011	
	0000	Error Halt	
	0107	ETA 5225	
	3307	ML 0117 Bank 1	
	6003	Zero Jump	
10130	0130	Correct Data 0011	
	0000	Error Halt	
	0040	Set Dir = 0	
	2315	Load Jump Adr. 0150	
	0030	Set Ind & Rel and Jump	
	0167	Constant	
	5225	Constant	
	5220	Constant	

10140	2411	LCD - Bank 1 (5225)
	3322	Add Back - Bank 1
	6003	Zero Jump
	0130	Correct Data 0101
	0000	Error Halt
	2102	Bank 0 5225
	0106	ATX
	0075	BFR Busy Adr.
10150	2311	LPB 5220
	0105	ATE
	0075	0075 Jump Adr Bfr Busy
	2315	(5225)
	0100	Bls
	0075	BFR Busy Jump
	2513	LCI - Bank 0
	3240	ADF
10160	6003	Zero Jump
	0130	Correct Data 0101
	0000	Error Halt
	2326	Load Jump adr (0167)
	0050	Set Dir - Rel & Jump
	0000	Error Halt. No Jump. Correct Data 0000
	0220	
	2552	
10170	2011	(2552)
	3333	5225 (ML 0136)
	6003	Zero Jump
	0130	Correct Data 0111
	0000	Error Halt
	2010	5225
	0105	ATE
	0075	BFR Busy Adr.
10200	0400	CLR A
	0107	ETA 5225
	3313	2552
	6003	Zero Jump
	0130	Correct Data 0111
	0000	Error Halt
	2320	Load Jump Adr. 0220
	0070	Set Rel, Ind, Dir & Jump
10210	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0330	
	5225	

10220	2001	2552
	3302	5225
	6003	Zero Jump
	0130	Correct Data 1.001
	0000	Error Halt
	0107	ETA 5225
	3106	Bank 0 - 2552
	6003	Zero Jump
10230	0130	Correct Data - 1001
	0000	Error Halt
	2314	Load Jump Adr.
	0021	Set Ind to 1
	0010	Set Rel to 0 & Jump. ML 0330 Bank 0
	0000	Error Halt. No Jump. Correct Data 1010
	0350	
	2552	
10240	2301	
	3112	5225 (ML 10 Bank 1)
	6003	Zero Jump
	0130	Correct Data - 1011
	0000	Error Halt
	0107	ETA - 5225
	3307	
	6003	Zero Jump
10250	0130	Correct Data - 1011
	0000	Error Halt
	0040	Set Dir 0
	2315	Load Jump Adr (0350)
	0030	Set Rel & Ind & Jump
	0000	Error Halt - No Jump - Correct Data 1000
	0367	
	5220	
10260	2411	Bank 1 (5225)
	3322	
	6003	Zero Jump
	0130	Correct Data - 1101
	0000	Error Halt
	2102	
	0105	
	0075	
10270	0400	
	0107	
	3333	
	6002	
	0000	
	2102	
	0106	
	0075	

10300	2322	(0367)
	0050	Set Dir & Rel & Jump
	0000	Correct Data 1000
	0000	Error Halt
	0000	
	0000	
	0420	
	2552	
10310	2010	5225
	3302	
	6003	
	0130	Correct Data - 1111
	0000	Error Halt
	2010	5225
	0105	
	0075	
10320	0400	
	0107	
	3313	
	6003	
	0130	Correct Data - 1111
	0000	
	2320	Load Jump Adr
	0070	Set R, I, D, & Jump
10330	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
10340	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
10350	0000	

NUMBER: T076
TITLE: Memory Bank Selection Test No. 2
CATEGORY: 160-A
MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

The program will check 160-A computer execution of bank selections for any memory bank available.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape
LOADING ADDRESS: 0000 In Rel Bank X
TERMINAL ADDRESS: 0300
CHECK SUM: 0160
STARTING ADDRESS: 0000
ADDITIONAL INSTRUCTIONS: Master clear Set A to the Indirect Bank desired to test.
Put the computer in Run.

HALTS	EXPLANATION
P = 0002 A = 0000	Set the "A" register to Rel and Dir bank desired to test. Ind bank setting \neq Rel or Dir bank setting. Put the computer in Run. SLS 4 switch up, pattern will be laid down and the computer will stop prior to checking the pattern.
P = 0160	SLS 1 or 2 switch up pattern will be checked. Approximate test time is 12 seconds. At any of the above stops the computer may be put back into run to continue test. With no SLS up the program is self looping.
0257	Error in testing the pattern. Put the computer in Run.

HALTS	EXPLANATION (Cont'd.)
0263	005X error in A. Put the computer in Run.
0266	005X correction in A. Put the computer in Run.
0273	Error data displayed in A. Put the computer in Run.
0275	Correct data display in A. Put the computer in Run. Resume test.

Memory Bank Selection Test #2

00000	4070	Indirect Bank Setting
	0400	
	7700	
	4071	Relative and Direct Bank Setting
	0400	
	4061	Clear "P" Test Adr.
	2070	
	0620	
00010	4201	
	0020	Set Indirect Bank
	2200] Store 2300 in ML. X7775
	2300	
	4100	
	7775	
	2071] Store 001X in ML. X7776
	0610	
00020	4100	
	7776	
	2071	
	0650	
	4202	
	2062	
	0050	Set Rel. and Ind. and Jump to Test.
	0000	Error Halt. No Jump.
00030	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	7550	Check Sum Correction.
00040	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00050	0000] Test Area
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	

00060	0004	Jump Adr.		
	0000	Variable "P" Adr.		
	0100]		
	0160			
	0170			
	2300			
	0010			
	0040		Constants	
00070	0000]		
	0000			
	4060			
	0150			
	0157			
	0150		Variable (5X Test Cell)	
	4050]		
	4057		Constants	
00100	0400]		
	4050			
	5701		Clear Test Area	
	3472			
	6504			
	2076]		
	4305		Restore Test Area Clear	
	0400			
00110	4203]		
	2075			
	4100		Store 015X in Ind. Bank.	
	0000			
	0403			
	5302			
	6505			
	5603			
00120	2065]		
	4100		Store 2300 in Ind. Bank	
	0000			
	0403			
	5302			
	0602			
	6506			
	4305			
00130	2071]		
	4215			
	2066]	
	5213			Store Set Rel. and Jump in Ind. Bank.
	0402			
	4203			
	2210			
	4100			

00140	0000	}	Store Set Rel. and Jump in Ind. Bank
	0403		
	5302		
	0601		
	6506		
	6004		
	0000	}	Spares
	0000		
00150	0000	}	Set ML. 7777 to 0170
	2064		
	4300	}	Form Set Rel. and Jump Instruction
	2066		
	4205		
	2070		
	5203		
	2061		
00160	7704		
	0000		Set Rel. and Jump to Test
	0000		Error Halt - No Jump
	0000		
	2060	}	Constants
	2050		
	0000		
	0000		
00170	2071	}	Set Ind.
	0620		
	4201		
	0020		
	2100	}	
	0050		
	6106		
	5702		
00200	5411	}	Test 005X ML
	0760		
	6506		
	6015		
	2075		
	0277		
	3711		
	6150		
00210	2100	}	
	0050		
	3461		
	6144		
	5717		
	5704		
	0760		
	6523		

00220	0450	
	4324	
	4311	
	0403	
	5061	Up Date "P" Test Cell
	6006	
	2070	
	0630	
00230	4202	
	2061	
	0030	
	2070	
	0620	
	4201	
	0020	
	5475	Up Date 005X Test Cell
00240	0277	
	0760	
	6104	
	2073	} Restore 005X
	4075	} Selective Stop Test Completed
	7707	
	2071	
	0630	} Return to Test
00250	4202	
	2060	
	0030	
	0000	
	0000	
	0000	
	0000	
	0000	Error Halt
00260	2363	
	0277	
	4210	
	0000	Display 5X error
	2075	
	0277	
	7700	Display Correct 5X
	0001	
00270	0001	} Spare
	2100	
	0050	} Display Error Data
	0000	
	2061	
	7700	} Display Correct Data
	0400	
	7101	
00300	0004	} Return to Test

NUMBER: T999

TITLE: Quality Assurance Fortran Test

CATEGORY: 160-A, 161

MINIMUM EQUIPMENT NEEDED: 160-A, 161

PURPOSE

The program check the ability of the 160-A computer to run a known Fortran problem.

DESCRIPTION

See section (1. Explanation of answer).

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

1. Compiler I (AC1.00 - 1E)
2. Compiler II (AC1.00 - 2D)
3. Compiler III (AC1.00 - 3D)
4. Little Lilley Source (program "LATE")
5. Little Lilley Input (MOD XX)

EXECUTION

1. LOADING ADDRESS: Load Compiler I from (P) = 0000.
CHECK SUM: (A) = 0000, (P) = 7776.
2. Master clear. Turn punch and read on and eject some tape from the punch by pressing the "Tape Leader" button.
3. Return all jump and stop keys to neutral.
4. Insert the Little Lilley source paper tape into the reader.
5. Run from (P) = 0000.

Execution (Cont'd)

6. If no errors have occurred, a stop will occur at (P) = 3775 and (A) = 0000.

DO NOT CLEAR!

If a stop other than (P) = 3775 occurs, consult publication BF01 section III.A.3. to determine the type of error that occurred.

7. Insert Compiler II in the reader and run from (P) = 3775.
8. A stop will occur at (P) = 0252 when Compiler II has finished.
9. Master Clear. Remove the Binary object tape from the punch.
10. Load Compiler III from (P) = 0000.
 - a. Check sum: (A) = 0000, (P) = 4747.
11. Master Clear. Insert the binary object tape into the reader.
12. Run from (P) = 0000.
13. A stop will occur at (P) = 0151.

DO NOT CLEAR!

If a stop occurs at (P) = 0051 a parity error was detected. Refer to publication BF01 section III.B.2.

14. Insert the Little Lilley input tape into the reader.
15. Run from (P) = 0151.
16. If no errors have been detected; a stop will occur at (P) = 1142 and (A) = 4444.
 - a. A stop at (P) = 0576 is a Compiler error. Recompile.

Execution (Cont'd)

17. Remove the answer tape from the punch.
18. The answer data tape can now be typed out and compared with the true answer. (See note 1)

NOTE 1. Typical Typeout Program

<u>M.L.</u>	<u>INSTR.</u>	<u>COMMENT</u>
0000	7500	EXF.
0001	4102	SEL. Reader
0002	7600	INA
0003	6401	ZJB Wait for Data
0004	4017	STD Store Data
0005	7500	EXF.
0006	4210	SEL. Type
0007	2017	LDD Load Data
0010	7677	OTA Output Data
0011	7500	EXF
0012	4102	SEL. Reader
0013	7600	INA
0014	4017	STD STORE DATA
0015	6510	NZB Continue Until Data=0
0016	7700	End
0017	XXXX	Data Storage

LITTLE LILLEY ANSWER (mod. 01)

1. Explanation of answer.

A. A HISTOGRAM is plotted under the following conditions:

1. Range of numbers

a. minimum : 001.00

b. maximum ; 400.00

2. Steps (for ranges)

a. intervals of 020.00

3. Horizontal position

a. 1% to 60%

4. Results

a. The HISTOGRAM gives the percent of numbers (from the Little Lilley input tape) that fall within a specific range set.

b. Mean

The mean of all numbers on the input tape.

c. Sigma

The maximum variance from the mean.

LITTLE LILLEY Mod. 01

Answer

q. a. 160-a fortran test
program little lilley mod.01

	1	10	20	30	40	50	60
1.00- 20.00							
21.00- 40.00	x						
41.00- 60.00	xx						
61.00- 80.00	xxx						
81.00- 100.00	xxxx						
101.00- 120.00	xxxxx						
121.00- 140.00	xxxxxx						
141.00- 160.00	xxxxxxx						
161.00- 180.00	xxxxxxxx						
181.00- 200.00	xxxxxxxxx						
201.00- 220.00	xxxxxxxxxx						
221.00- 240.00	xxxxxxxxxx						
241.00- 260.00	xxxxxxxxxx						
261.00- 280.00	xxxxxxx						
281.00- 300.00	xxxxxx						
301.00- 320.00	xxxxx						
321.00- 340.00	xxx						
341.00- 360.00	xx						
361.00- 380.00	x						
381.00- 400.00							

mean 203.919
sigma 84.295

LITTLE LILLEY INPUT SOURCE

Page 1

```

c 1 *****160 HISTOGRAM*****
c           p.r.deichelbohrer
c
1 format (30habcdefghijklmnopqrstuvwxyz1234)
7 format (f5.2)
6 format (f7.2,1h-,f7.2,2x,50a1,50a1)
66 format (f7.2,1h-,f7.2)
5 format (30x,4hmean,f9.3)
4 format (30x,5hsigma,f8.3)
2 format (1x)
77 format (15a2)
79 format (17x,1h1,8x,2h10,8x,2h20,8x,2h30,8x,2h40,8x,2h50,8x,
12h60)
      dimension dig(50),a1(50),a2(50),iprcnt(100),ixray(100),icl(15)
60 do 11 i=1,50
      a1(i)=0
      a2(i)=0
11 dig(i)=0
      sum=0
      suma=0
      ip=0
      sums=0
3 read 1
      punch 1
      read 1
      punch 1
      punch 2
      punch 2
      read 7, alpha
      read 7, omega
      read 7, enc
      read 7, div
      d=(omega-alpha)
      do 100 n=1,100
100 ixray(n)=23
      ck=1.-enc
      if(ck) 40,40,30
30 stinc=.01
      go to 8
40 stinc=1.
8 read 7, data
      if (div) 200, 201, 201
201 data=div/data
200 if(ck) 203,203,204

```

LITTLE LILLEY INPUT SOURCE

Page 2

```
203 data= (data/1)
204 if (data) 15, 17, 17
  17 i=((data-alpha)/enc)
      i=i+1
      dig(i)=dig(i)+1.
      sum=sum+1.
      suma=suma+data
      dats=data*data
      sums=sums+dats
15 dmean=suma/sum
      dsigm=sqrtf (sums/sum-dmean*dmean)
      ip=d/enc
      ip=ip+1
      punch 79
      do 18 i=1,ip
18 iprent(i)=dig(i)/sum*100.
      alf=alpha
      do 23 i=1,ip
      al(i)=alf
      a2(i)=alf+enc-stinc
      alf=a2(i)+stinc
      jprent=iprent(i)
      if (jprent) 20,21,20
20 punch 6, al(i), a2(i),(ixray(n), n=1, jprent)
      go to 23
21 punch 66, al(i), a2(i)
23 continue
      punch 2
      punch 2
      punch 5, dmean
      punch 4, dsigm
      do 28 i=1,15
28 icl (i)=0
      punch 77, (icl(i), i=1,15)
      pause 4444
      go to 60
      step 1111
      end
      end
```

go to 8

PAPER TAPE DUPLICATOR

for

LITTLE LILLEY DATA

Procedure:

- A. Clear memory banks 0 and 1.
- B. Clear memory bank selections.
- C. Load duplicator at (P) = 0000.
 1. Check sum: (A) = 0160; (P) = 0066
- D. Master Clear.
- E. Set all stop keys.
- F. Put "Little Lilley" data tape in reader and RUN from (P) = 0000. The data will be stored in memory banks 0 and 1.
- G. When the input is completed, a stop will occur at (P) = 0020 and (Z) = 7701. DO NOT CLEAR!
- H. Turn on the punch and eject some leader.
- I. RUN from (P) = 0020. The data will now be punched out of banks 0 and 1.
- J. When the output is completed, a stop will occur at (P) = 0037 and (Z) = 7702. DO NOT CLEAR!
- K. Insert the new paper tape into the reader. RUN from (P) = 0037.
- L. A stop will occur at (P) = 0065 and (Z) = 7704 at the end of the verification.
- M. ERRORS
 1. (P) = 0017, (Z) = 7700
Not enough storage space available.
(more than 2 banks required).
 2. (P) = 0051 or (P) = 0061 and (Z) = 7777
Verification error.

NUMBER: T038

TITLE: Quality Assurance Typewriter Speed Test

CATEGORY: 160-A, 161

MINIMUM EQUIPMENT NEEDED: 160-A, 161

PURPOSE

The test will insure typing of 10 characters per second.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0777

TERMINAL ADDRESS: 2130

CHECK SUM: 4453

STARTING ADDRESS: 0777

ADDITIONAL INSTRUCTIONS: The "73" instruction is used for typewriter output.

T-038
QUALITY ASSURANCE TYPEWRITER SPEED TEST

0777	7504
1000	7304
1001	2130
1002	7103
1003	4210
1004	1006
1005	0777
1006	0045
1007	0047
1010	0001
1011	0057
1012	0005
1013	0014
1014	0024
1015	0004
1016	0014
1017	0024
1020	0004
1021	0030
1022	0004
1023	0047
1024	0016
1025	0057
1026	0003
1027	0006
1030	0001
1031	0012
1032	0003
1033	0011
1034	0004
1035	0047
1036	0022
1037	0057
1040	0030
1041	0001
1042	0030
1043	0004
1044	0047
1045	0016
1046	0057
1047	0003

1050	0012
1051	0015
1052	0003
1053	0012
1054	0030
1055	0001
1056	0014
1057	0003
1060	0006
1061	0004
1062	0001
1063	0025
1064	0015
1065	0020
1066	0031
1067	0012
1070	0014
1071	0001
1072	0020
1073	0012
1074	0004
1075	0024
1076	0015
1077	0020
1100	0020
1101	0022
1102	0004
1103	0001
1104	0020
1105	0024
1106	0001
1107	0042
1110	0004
1111	0004
1112	0047
1113	0001
1114	0057
1115	0005
1116	0020
1117	0012
1120	0020
1121	0045
1122	0030
1123	0012
1124	0020
1125	0004
1126	0030
1127	0015

1130	0015
1131	0012
1132	0003
1133	0027
1134	0042
1135	0004
1136	0060
1137	0056
1140	0004
1141	0022
1142	0020
1143	0016
1144	0014
1145	0007
1146	0030
1147	0011
1150	0004
1151	0016
1152	0005
1153	0030
1154	0012
1155	0030
1156	0016
1157	0001
1160	0020
1161	0012
1162	0024
1163	0004
1164	0015
1165	0020
1166	0012
1167	0004
1170	0011
1171	0014
1172	0006
1173	0020
1174	0042
1175	0004
1176	0004
1177	0047
1200	0001
1201	0057
1202	0005
1203	0020
1204	0004
1205	0024
1206	0015
1207	0020

1210	0020
1211	0022
1212	0004
1213	0024
1214	0005
1215	0003
1216	0034
1217	0011
1220	0022
1221	0004
1222	0023
1223	0020
1224	0045
1225	0023
1226	0020
1227	0001
1230	0031
1231	0020
1232	0020
1233	0006
1234	0004
1235	0074
1236	0056
1237	0004
1240	0030
1241	0006
1242	0022
1243	0004
1244	0074
1245	0070
1246	0004
1247	0016
1250	0005
1251	0030
1252	0012
1253	0030
1254	0016
1255	0001
1256	0020
1257	0012
1260	0024
1261	0004
1262	0015
1263	0020
1264	0012
1265	0004
1266	0024
1267	0020

1270	0016
1271	0003
1272	0006
1273	0022
1274	0042
1275	0004
1276	0004
1277	0047

1300	0011
1301	0057
1302	0003
1303	0031
1304	0020
1305	0012
1306	0004
1307	0016

1310	0030
1311	0024
1312	0020
1313	0050
1314	0004
1315	0030
1316	0023
1317	0016

1320	0022
1321	0020
1322	0026
1323	0013
1324	0005
1325	0014
1326	0032
1327	0036

1330	0011
1331	0007
1332	0006
1333	0045
1334	0003
1335	0015
1336	0035
1337	0012

1340	0024
1341	0001
1342	0034
1343	0017
1344	0031
1345	0027
1346	0025
1347	0021

1350	0056
1351	0074
1352	0070
1353	0064
1354	0062
1355	0066
1356	0072
1357	0060

1360	0033
1361	0037
1362	0052
1363	0044
1364	0054
1365	0046
1366	0042
1367	0050

1370	0040
1371	0002
1372	0004
1373	0047
1374	0034
1375	0015
1376	0015
1377	0020

1400	0012
1401	0004
1402	0016
1403	0030
1404	0024
1405	0020
1406	0050
1407	0004

1410	0030
1411	0023
1412	0016
1413	0022
1414	0020
1415	0026
1416	0013
1417	0005

1420	0014
1421	0032
1422	0036
1423	0011
1424	0007
1425	0006
1426	0003
1427	0015

1430	0035
1431	0012
1432	0024
1433	0001
1434	0034
1435	0017
1436	0031
1437	0027

1440	0025
1441	0021
1442	0045
1443	0056
1444	0074
1445	0070
1446	0064
1447	0062

1450	0066
1451	0072
1452	0060
1453	0033
1454	0037
1455	0052
1456	0044
1457	0054

1460	0046
1461	0042
1462	0050
1463	0040
1464	0002
1465	0004
1466	0004
1467	0030

1470	0057
1471	0011
1472	0011
1473	0004
1474	0036
1475	0020
1476	0025
1477	0024

1500	0004
1501	0024
1502	0005
1503	0003
1504	0034
1505	0011
1506	0022
1507	0004

1510	0024
1511	0001
1512	0012
1513	0014
1514	0036
1515	0020
1516	0004
1517	0031
1520	0014
1521	0001
1522	0005
1523	0004
1524	0034
1525	0006
1526	0014
1527	0026
1530	0003
1531	0012
1532	0007
1533	0004
1534	0026
1535	0003
1536	0012
1537	0016
1540	0020
1541	0042
1542	0004
1543	0004
1544	0047
1545	0030
1546	0057
1547	0011
1550	0011
1551	0045
1552	0016
1553	0005
1554	0030
1555	0012
1556	0030
1557	0016
1560	0001
1561	0020
1562	0012
1563	0024
1564	0004
1565	0024
1566	0005
1567	0003

1570	0034
1571	0011
1572	0022
1573	0004
1574	0023
1575	0020
1576	0004
1577	0011
1600	0020
1601	0013
1602	0014
1603	0023
1604	0011
1605	0020
1606	0004
1607	0031
1610	0014
1611	0001
1612	0005
1613	0004
1614	0001
1615	0005
1616	0020
1617	0004
1620	0036
1621	0020
1622	0025
1623	0004
1624	0015
1625	0012
1626	0020
1627	0024
1630	0024
1631	0034
1632	0012
1633	0020
1634	0004
1635	0016
1636	0003
1637	0006
1640	0001
1641	0012
1642	0003
1643	0011
1644	0004
1645	0024
1646	0020
1647	0001

1650	0004
1651	0030
1652	0001
1653	0004
1654	0021
1655	0020
1656	0012
1657	0003
1660	0042
1661	0045
1662	0047
1663	0023
1664	0057
1665	0030
1666	0004
1667	0004
1670	0061
1671	0061
1672	0016
1673	0036
1674	0024
1675	0015
1676	0004
1677	0016
1700	0020
1701	0004
1702	0061
1703	0061
1704	0061
1705	0061
1706	0030
1707	0016
1710	0020
1711	0004
1712	0003
1713	0015
1714	0020
1715	0012
1716	0030
1717	0004
1720	0061
1721	0001
1722	0014
1723	0003
1724	0006
1725	0004
1726	0014
1727	0024

1730	0004
1731	0006
1732	0004
1733	0004
1734	0004
1735	0004
1736	0004
1737	0061
1740	0061
1741	0061
1742	0061
1743	0061
1744	0003
1745	0031
1746	0004
1747	0023
1750	0047
1751	0004
1752	0004
1753	0004
1754	0004
1755	0061
1756	0061
1757	0061
1760	0061
1761	0057
1762	0020
1763	0014
1764	0006
1765	0013
1766	0004
1767	0061
1770	0045
1771	0016
1772	0004
1773	0004
1774	0004
1775	0004
1776	0004
1777	0004
2000	0004
2001	0004
2002	0004
2003	0004
2004	0061
2005	0061
2006	0061
2007	0061

2010	0061
2011	0061
2012	0061
2013	0061
2014	0061
2015	0061
2016	0005
2017	0047
2020	0004
2021	0004
2022	0004
2023	0004
2024	0004
2025	0004
2026	0004
2027	0004
2030	0004
2031	0004
2032	0061
2033	0061
2034	0061
2035	0061
2036	0061
2037	0061
2040	0061
2041	0061
2042	0061
2043	0061
2044	0057
2045	0020
2046	0004
2047	0036
2050	0004
2051	0004
2052	0004
2053	0061
2054	0061
2055	0061
2056	0020
2057	0004
2060	0061
2061	0022
2062	0061
2063	0061
2064	0061
2065	0061
2066	0016
2067	0004

2070	0004
2071	0004
2072	0042
2073	0045
2074	0045
2075	0045
2076	0047
2077	0006

2100	0003
2101	0004
2102	0015
2103	0012
2104	0003
2105	0023
2106	0011
2107	0020

2110	0007
2111	0004
2112	0050
2113	0004
2114	0024
2115	0005
2116	0014
2117	0015

2120	0004
2121	0007
2122	0020
2123	0004
2124	0042
2125	0045
2126	0051
2127	0045

2130	0000
.	

NUMBER: T009

TITLE: Typewriter Test

CATEGORY: 160-A, 161

MINIMUM EQUIPMENT NEEDED: 160-A, 161

PURPOSE

This is an inclusive typewriter test consisting of three routines:

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

CHECK SUM: 1045

TEN CHARACTER TEST

STARTING ADDRESS: 0300

The routine accepts ten characters typed in from the program and then types out a carriage return followed by the ten characters.

DISCONNECT TEST

STARTING ADDRESS: 0320

This test accepts information until an input disconnect is set either automatically or manually. The program then types out a carriage return followed by the information up to the disconnect.

TYPING TEST

STARTING ADDRESS: 0340

Information for this test is accepted until a carriage return is typed. The same information is then typed out.

0300	7511	type in
	7207	10 char
	2012	
	7507	type out
	7445	CR
	7303	to char
	2012	
	6507	
0310	2000	
	4220	type in code
	4210	type out code
	0000	
	0000	
	0000	
	0000	
		disconnect test
0320	7515	type in
	7213	
	2200	
	3611	
	6404	
	3207	
	4204	
	7507	type out
0330	7445	cr
	7303	
	2000	
	6513	
	2000	start bffr.
	4220	type in code
	4210	type out code
	0000	

0340	2304	preset
	4070	input
	7507	type in
	7600	.
	4170	store
	0745	
	6004	CR
	5470	no
0350	6505	
	4220	in code
	5470	
	4203	
	7504	out
	7304	
	2000	
	6517	
0360	4210	out code
	2000	

NUMBER: T039-A
TITLE: Quality Assurance I/O Reliability Test
CATEGORY: 160-A, 161, 163, 164
MINIMUM EQUIPMENT NEEDED: 160-A, 161, 163, 164 or 162

PURPOSE

This program checks the following:

- 1) Reader is checked for proper operation with the 72 and 7600 instructions at normal reader speed and also start, stop operation.
- 2) Punch is checked for proper operation with the 74, 73 and 7677 instructions, at normal speed and also at various lower speeds down to approximately one-fifth normal speed.
- 3) The typewriter is checked for output with 73 and 74 instructions.
- 4) Keyboard input is checked with 72 and 7600 instructions.
- 5) A logic instruction check is made each cycle of the program.
- 6) Buffer can also be completely checked if it is desired to run the 162, 163 or 164 Magnetic Tape Units. The typewriter should be connected to the "Normal" I/O channel and the Magnetic Tape to the "Buffer" channel.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape
LOADING ADDRESS: 0000 in bank 0
TERMINAL ADDRESS: 6500
CHECK SUM: 0160
STARTING ADDRESS: 0000 (6300 if Magnetic Tape is to be used)
Set the punch level selection in "A" register
0377 for 8 level,
0177 for 7 level,
0037 for 5 level paper tape
Put the computer in run.

The punch will run sufficient tape to reach the reader and stop with P = 2030. Insert the tape leader into the reader and put the computer back into run (do not master clear after punch stop).

The program will read and punch 50 groups of binary count then jump into a typewriter output routine.

If Magnetic Tape is used on the buffer channel with this program the tape unit will cause asynchronous buffer interruptions.

The Magnetic Tape will write and read an inverse binary count from bank 1. Following the typewriter output, the punch and reader will operate at a variable speed.

At the end of this test, the computer will halt with input in the Status Mode. Type in 10 characters and those 10 characters should be typed back out.

Type in, to a maximum, 127 characters followed by manual disconnect. The same characters should be typed back.

Type in, to a maximum, 127 characters followed by a carriage return. The same characters should be typed back.

The typewriter will then output the entire typewriter repertoire with a 74 instruction and jump into a punch reader test using the 7600 and 7677 instructions. Following this test, the computer will jump into the logic test.

From the logic test the computer programs will jump to the initial punch-reader test.

At the termination of all tests except typewriter tests, the typewriter will type out the status of the test.

HALT	EXPLANATION
2046	Error data displayed in "A" register. Is indicated if an error occurs in (test 2), the first reader-punch program. Put the computer into run (do not master clear).
2050	Correct data displayed in "A" register. Observation of the paper tape frame immediately behind the read station will determine if the error was due to punch or reader error. The operator may re-synchronize the program by moving the correct data plus 1 count under the read station.

HALT	EXPLANATION (Cont'd.)
4600 or 4633	<p>Error data displayed in "A" register. Is indicated if an error occurs in (test 4) the second reader-punch program.</p> <p>Put the computer back into run.</p>
4602 or 4635	<p>Correct data displayed in "A" register. Observation of the paper tape immediately behind the read station will determine whether it was a punch or reader error.</p> <p>Put the computer back into run (do not master clear). The program will search for synchronization and continue to read and punch at a variable speed.</p>
4154	<p>Error data displayed in "A" register. Is indicated if an error occurs in (test 6) the third reader-punch test.</p> <p>Put the computer back into run (do not master clear).</p>
4156	<p>Correct data displayed in "A" register. Observation of the tape immediately behind the read station will determine whether it was a punch or reader error.</p> <p>The program may be re-synchronized by putting the correct data plus 1 count under the read station and putting the computer back into run.</p> <p>If a parity error occurs on the Magnetic Tape program, the tape unit will backspace a maximum of 3 times to rewrite or re-read the data.</p> <p>If a parity error still exists after 3 trials the computer will stop.</p>
6011	Parity error write.
6226	Parity error read.
6160	<p>If a comparison error occurs, "A" register will contain the address in bank 1 of error data.</p> <p>Correct data should be the complement of the address. The computer may be put into run to continue the test after any of the above stops.</p>

HALT

1760

EXPLANATION (Cont'd.)

Indicates a paper tape level selection different than those described under Operating Instruction.

If an error occurs in the typewriter tests (test 3 or test 5) the operator may determine the error by observing the data that was typed out.

M.L. 0000	Initial start without 163 or 164 Magnetic Tape.
6300	Initial start with 163 or 164 Magnetic Tape.
2040	Entrance to Test #2 (Punch and Reader)
2106	Exit from Test #2
2301	Entrance to Test #3 (Typewriter Output)
2351	Exit from Test #3
4570	Entrance to Test #4 (Punch and Reader Var. Speed)
4667	Exit from Test #4
5363	Entrance to Test #5 (Typewriter Input-Output)
5626	Exit from Test #5
4100	Entrance to Test #6 (Punch and Reader)
4151	Exit from Test #6
4200	Entrance to Test #1 (Logic Test)
3715	Exit from Test #1
6431	Entrance to Type Out Status from Test #1
6436	Entrance to Type Out Status from Test #2
6443	Entrance to Type Out Status from Test #4
6454	Entrance to Type Out Status from Test #6

00000	4033	Store Reader-Punch Mask
	0601	
	4032	Store Limit
	7101	Ind. Jump
	1750	
	0000	
	0000	
	0000	
00010	0000	
	0000	
	0000	
	0000	
	0000	
	4225	Ind. Address for Half Write
	7101	
	1750	
00020	0000	
	4024	
	7101	
	5734	Variable Address (6052) (6130) (5751) (6250) (6100)
	0000	Data Stored at Interrupt
	3724	
	0000	
	0000	
00030	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0530	Ind. Address
	0667	Ind. Address
00040	4062	
	5473	
	5473	
	7643	Variable
	1171	Ind. Address
	5624	
	1230	Ind. Address
	0000	Variable
00050	1303	Ind. Address
	1355	Ind. Address
	7070	
	1375	
	4160	Set Memory Location 7777 to Initial Variable
	4166	Set Memory Location 3504 to Initial Variable
	0400	
	6011	

00060	7777 0400 0200 0040 2011 7643 3504 2066	Ind. Address
00070	4030 4174 7101 2000 2066 0000 0000 0000	Set Punch Output Data to Zero Set Punch Output Data to Zero Ind. Jump to Start Test #2
00100	6005 0460 0000 0465 0000 6502 6205 0462	Test Zero Jump Forward Error Error Test Non-Zero Jump Back Test Pos. Jump Forward
00110	0000 0467 0000 6702 0577 6105 0461 0000	Error Error Test Neg. Jump Back Test Non-Zero Jump Forward Error
00120	0464 0000 6402 6305 0463 0000 0466 0000	Error Test Zero Jump Back Test Neg. Jump Forward Error Error
00130	6602 0110 6303 0463 0000 0110 6205 0462	Test Pos. Jump Back Left Shift "A" 3 Bit Positions Test Neg. Jump Forward Error Left Shift "A" 3 Bit Positions Test Pos. Jump Forward

00140	0000	Error
	0467	
	0000	Error
	6702	Test Neg. Jump Back
	0400	Test LDN Instruction
	6005	
	0400	
	6001	Pass
00150	0404	
	0000	Error
	2307	Test LDB Instruction
	6304	
	0423	
	0000	Error
	1075	
	2301	Test ADB Instruction
00160	3315	
	6003	
	0433	
	0000	Error
	2706	Test LCB Instruction
	3307	
	6003	
	0427	
00170	0000	Error
	2313	Test SBB Instruction
	3714	
	6003	
	0437	
	0000	Error
	2320	Test SBD Instruction
	4035	
00200	3435	
	6003	
	0434	
	0000	Error
	2313	Test Left Shift "A" 1 Bit Position
	0102	
	6303	
	0401	
00210	0000	Error
	0102	
	6203	
	0401	
	0000	Error
	0102	
	6203	
	0401	

00220	0000	Error
	0102	
	6303	
	0401	
	0000	Error
	0102	
	6303	
	0401	
00230	0000	Error
	0102	
	6203	
	0401	
	0000	Error
	0102	
	6203	
	0401	
00240	0000	Error
	0102	
	6303	
	0401	
	0000	Error
	0102	
	6203	
	0401	
00250	0000	Error
	0102	
	6303	
	0401	
	0000	Error
	0102	
	6303	
	0401	
00260	0000	Error
	0102	
	6204	
	0401	
	0000	Error
	0404	
	2301	Test Left Shift "A" 3 Bit Positions
	0110	
00270	6303	
	0401	
	0000	Error
	0110	
	6203	
	0401	
	0000	Error
	0110	

00300	6303	
	0401	
	0000	Error
	0110	
	6203	
	0401	
	0000	Error
	2303	Test Logical Product Backward
00310	1301	
	6203	
	0413	
	0000	Error
	0102	
	6303	
	0413	
	0000	Error
00320	0102	
	6203	
	0413	
	0000	Error
	0102	
	6203	
	0413	
	0000	Error
00330	0102	
	6303	
	0413	
	0000	Error
	0102	
	6203	
	0413	
	0000	Error
00340	0102	
	6203	
	0413	
	0000	Error
	0102	
	6203	
	0413	
	0000	Error
00350	0102	
	6203	
	0413	
	0000	Error
	0102	
	6203	
	0413	
	0000	Error

00360	0102	
	6303	
	0413	
	0000	Error
	0102	
	6303	
	0413	
	0000	Error
00370	2307	Test Selective Complement Backward
	1764	
	6303	
	0417	
	0000	Error
	0102	
	6303	
	0417	
00400	0000	Error
	0102	
	6203	
	0417	
	0000	Error
	0102	
	6303	
	0417	
00410	0000	Error
	0102	
	6303	
	0417	
	0000	Error
	0102	
	6303	
	0417	
00420	0000	Error
	0102	
	6203	
	0417	
	0000	Error
	0102	
	6203	
	0417	
00430	0000	Error
	0102	
	6203	
	0417	
	0000	Error
	0102	
	6203	
	0417	

00440	0000	Error
	0102	
	6303	
	0417	
	0000	Error
	0102	
	6204	
	0417	
00450	0000	Error
	5252	
	2701	Test Load Complement Backward or Shift Replace Forwa
	6203	
	0427	
	0000	Error
	0102	
	6303	
00460	0427	
	0000	Error
	0102	
	6203	
	0427	
	0000	Error
	0102	
	6303	
00470	0427	
	0000	Error
	0102	
	6203	
	0427	
	0000	Error
	0102	
	6303	
00500	0427	
	0000	Error
	0102	
	6203	
	0427	
	0000	Error
	0102	
	6303	
00510	0427	
	0000	Error
	0102	
	6203	
	0427	
	0000	Error
	0102	
	6303	

00520	0427	
	0000	Error
	0102	
	6203	
	0427	
	0000	Error
	0102	
	6303	
00530	0427	
	0000	Error
	0404	
	0704	
	6003	
	0407	
	0000	Error
	7101	
00540	0563	Variable Jump Address (0566)
	2211	Change Error Stop Codes from 0027 to 0046
	4366	
	2301	
	0704	
	4303	
	3607	
	6506	
00550	4604	Start Shift Replace Forward Test
	6576	Jump Back to Bit Test
	0446	
	0000	
	5252	
	4306	
	0427	
	0530	
00560	0450	
	0563	
	0566	
	2301	Change Jump Address from 0563 to 0566
	4324	
	6524	
	2305	Change Jump Address from 0566 to 0563
	4327	
00570	2312	Change Error Stop Codes from 0046 to 0027
	4136	
	2036	
	0704	
	4036	
	1715	
	6506	
	2320	

00600	4036	
	2725	Reset Variable
	4326	
	6103	Jump Forward
	2525	
	7777	
	0460	
	5345	Reset Relative Store
00610	2303	Test Subtract Back Instruction
	3705	
	6303	
	0437	
	0000	Error
	0102	
	6203	
	0437	
00620	0000	Error
	0102	
	6303	
	0437	
	0000	Error
	0102	
	6203	
	0437	
00630	0000	Error
	0102	
	6303	
	0437	
	0000	Error
	0102	
	6203	
	0437	
00640	0000	Error
	0102	
	6303	
	0437	
	0000	Error
	0102	
	6203	
	0437	
00650	0000	Error
	0102	
	6303	
	0437	
	0000	Error
	0102	
	6203	
	0437	

00660	0000	Error
	0102	
	6303	
	0437	
	0000	Error
	0102	
	6203	
	0437	
00670	0000	Error
	7101	
	0721	Variable Jump Address (0724)
	2217	Change Error Stop Code from 0037 to 0032
	4361	
	2301	
	0704	
	4303	
00700	3613	
	6506	
	2205	Start Add Forward Test
	3205	
	6572	Jump Back to Bit Test
	0432	
	0000	
	4016	
00710	1234	
	0437	
	0432	
	4301	
	4361	
	0607	
	0667	
	0721	
00720	0724	
	2301	Change Variable Jump Address from 0721 to 0724
	4330	
	6530	Jump Back
	2310	Reset Relative Store Back
	4331	
	2307	Change Jump Address from 0724 to 0721
	4335	
00730	2317	Change Error Stop Code from 0032 to 0037
	4137	
	2037	
	0704	
	4037	
	3720	
	6506	
	2321	Set Ind. Address

00740	4037	
	2311	Test Logical Product NO Address Instruction
	0207	
	0707	
	6003	
	0402	
	0000	Error
	2304	Test Logical Product Direct Instruction
00750	1052	
	6003	
	0410	
	0000	Error
	2305	Test Logical Product Indirect Instruction
	1111	
	6003	
	0411	
00760	0000	Error
	2304	Test Logical Product Forward Instruction
	1204	
	6004	
	0412	
	0000	Error
	6666	
	2326	Test Selective Complement NO Address
00770	0315	
	3710	
	6003	
	0403	
	0000	Error
	2714	Test Selective Complement Forward
	1442	
	6003	
01000	0414	
	0000	Error
	2371	Test Selective Complement Indirect
	1537	
	6003	
	0415	
	0000	Error
	2304	Test Selective Complement Forward
01010	1604	
	6004	
	0416	
	0000	Error
	1537	
	2041	Test Load Direct Instruction
	3604	
	6004	

01020	0420	
	0000	Error
	5473	
	2137	Test Load Indirect Instruction
	3604	
	6004	
	0421	
	0000	Error
01030	0437	
	2205	Test Load Forward Instruction
	3710	
	6004	
	0422	
	0000	Error
	5473	
	0552	Test Load Complement No Address Instruction
01040	3604	
	6004	
	0405	
	0000	Error
	7725	
	2441	Test Load Complement Direct Instruction
	3310	
	6003	
01050	0424	
	0000	Error
	2537	Test Load Complement Indirect Instruction
	3323	
	6003	
	0425	
	0000	Error
	2605	Test Load Complement Forward Instruction
01060	3305	
	6004	
	0426	
	0000	Error
	3323	
	2305	Test Add No Address Instruction
	0616	
	3703	
01070	6003	
	0406	
	0000	Error
	2735	Test Add Direct Instruction
	3041	
	6003	
	0430	
	0000	Error

01100	2750	Test Add Indirect Instruction
	3137	
	6003	
	0431	
	0000	Error
	2705	Test Add Forward Instruction
	3204	
	6004	
01110	0432	
	0000	Error
	2750	
	2313	Test Subtract No address Instruction
	0743	
	3710	
	6003	
	0407	
01120	0000	Error
	2363	Test Subtract Direct Instruction
	3441	
	6003	
	0434	
	0000	Error
	2376	Test Subtract Indirect Instruction
	3537	
01130	6003	
	0435	
	0000	Error
	2304	Test Subtract Forward Instruction
	3604	
	6004	
	0436	
	0000	Error
01140	3537	
	2041	Test Store Direct Instruction
	4042	
	2041	
	3442	
	6003	
	0440	
	0000	Error
01150	2312	Test Store Indirect Instruction
	0601	
	4137	
	2137	
	3604	
	6004	
	0441	
	0000	Error

01160	0437	
	2305	Test Store Forward Instruction
	4206	
	2707	
	3204	
	6007	
	0442	
	0000	Error
01170	0000	Stored Data
	7507	Variable
	2470	Variable
	7507	Variable
	4443	Test Shift Replace Direct Instruction
	3702	
	6003	
	0444	
01200	0000	Error
	2306	Shift Variable
	0102	
	4310	
	4544	Test Shift Replace Indirect Instruction (44 contains 1171)
	3712	
	6004	
	0445	
01210	0000	Error
	4321	Variable
	2320	Test Shift Replace Backward Instruction
	0102	
	4322	
	2304	
	0102	
	4206	
01220	4707	
	3604	
	6007	
	0447	
	0000	Error
	0643	
	5624	Variable
	0435	
01230	0435	
	2303	Test Replace Add Direct Instruction
	0617	
	4305	
	0417	
	5045	
	3710	
	6003	

01240	0450	
	0000	Error
	2211	Test Replace Add Indirect Instruction
	0671	
	4207	
	0471	
	5146	(M.L.46 contains 1230)
	3604	
01250	6004	
	0451	
	0000	Error
	0435	Variable
	2211	Test Replace Add Forward Instruction
	0644	
	4207	
	0444	
01260	5206	
	3604	
	6007	
	0452	
	0000	Error
	0451	Variable
	0451	Variable
	2431	Variable
01270	2431	Variable
	2301	Test Replace Add Backward Instruction
	0625	
	4303	
	0425	
	5306	
	3706	
	6010	
01300	0453	
	0000	Error
	0000	Variable
	0772	Variable
	0772	Variable
	4101	Variable
	4101	Variable
	2305	Test Replace Add One Direct Instruction
01310	0601	
	4307	
	5447	
	3711	
	6003	
	0454	
	0000	Error
	2313	Test Replace Add One Indirect Instruction

01320	0601	
	4315	
	5550	(M.L.50 contains 1303)
	3717	
	6003	
	0455	
	0000	Error
	2212	Test Replace Add One Forward Instruction
01330	4210	
	0601	
	4207	
	5605	
	3605	
	6005	
	0456	
	0000	Error
01340	3720	Variable
	3720	Variable
	2335	Test Replace Add One Backward Instruction
	0601	
	4337	
	5737	
	3741	
	6003	
01350	0457	
	0000	Error
	7051	Test Jump Instruction
	0470	
	0000	Error
	7101	Test Jump Instruction
	1361	
	0471	
01360	0000	Error
	5611	Incr. Test Count
	6303	
	0400	
	7112	Jump Ind. to 0100
	2212	Reset Test Count
	4204	
	0400	
01370	7101	
	1400	
	0314	Test Count
	7101	Jump to Expanded Capabilities
	1400	
	0000	
	0100	
	0314	

01400	2200	Test Load Constant Instruction
	7643	Variable
	3701	
	6002	
	0000	Error
	2304	Set Variable
	4203	
	4706	
01410	4600	Test Shift Replace Constant Instruction
	7507	Variable
	2311	
	3702	
	6002	
	0000	Error
	2305	Test Store Constant Instruction
	4200	
01420	7507	
	1710	
	6002	
	0000	Error
	2704	Set Variable
	4202	
	5600	Test Replace Add One Constant Instruction
	0270	
01430	0701	
	3311	
	6003	
	0000	Error
	7643	Variable
	5200	Test Replace Add Constant (add zero) Instruction
	7643	
	3703	
01440	6002	
	0000	Error
	4706	Set Variables
	4305	
	2706	Set Variable
	4203	
	2312	Test Logical Product Constant Instruction
	1200	
01450	0560	
	6002	
	0000	Error
	2303	Set Variable
	4202	
	1600	Test Selective Complement Constant Instruction
	0506	
	6002	

01460	0000	Error
	2303	Set Variable
	4202	
	2600	Test Load Complement Constant Instruction
	0506	Variable
	3307	
	6002	
	0000	Error
01470	2304	Set Variable
	4202	
	3600	Test Subtract Constant Instruction
	0506	Variable
	6002	
	0000	Error
	2703	Set Variable
	4203	
01500	2305	Test Add Constant Instruction
	3200	
	7271	Variable
	6002	
	0000	Error
	0101	Test P → A Instruction
	0603	
	4205	
01510	0101	
	3603	
	6003	
	0000	Error
	1510	Variable
	5701	
	0101	
	0705	
01520	3704	
	6002	
	0000	Error
	0101	
	4310	
	0404	
	5312	
	0101	
01530	3714	
	6002	
	0000	Error
	0101	
	4212	
	0103	Test Left Shift Two
	4211	
	2207	

01540	3206	
	3205	
	3204	
	3604	
	6004	
	0000	Error
	1533	Variable
	6154	Variable
01550	0101	
	4213	
	0111	Test Left Shift Six
	4212	
	4610	
	4607	
	4606	
	0103	
01560	0102	
	3604	
	6005	
	0000	Error
	1550	Variable
	5300	Constant
	0000	
	0113	Test Multiply by 100 (X zero)
01570	6003	
	0000	Error
	0001	Variable
	2301	
	0113	Test Multiply by 100 (X)
	4225	
	2304	
	0103	
01600	0102	
	4222	
	2310	
	0102	
	5217	
	0103	
	0102	
	4215	
01610	4613	
	3213	
	3610	
	6002	
	0000	Error
	5723	
	3607	Check Limit of Variable
	6114	

01620	6006	Jump Forward to Reset Variable
	0000	
	0000	
	0000	
	0000	
	0623	Constant Limit
	0401	Reset Variable
	4335	
01630	6103	
	1632	
	7643	Variable
	2100	Test Load Memory Instruction
	1632	
	3703	
	6002	
	0000	Error
01640	2706	
	1100	Test Logical Product Memory Instruction
	1632	
	6002	
	0000	Error
	2313	
	1500	Test Selective Complement Memory Instruction
	1632	
01650	6002	
	0000	Error
	2500	Test Load Complement Memory Instruction
	1632	
	3322	
	6002	
	0000	Error
	2725	
01660	3100	Test Add Memory Instruction
	1632	
	6002	
	0000	Error
	2332	
	3500	Test Subtract Memory Instruction
	1632	
	6002	
01670	0000	Error
	2337	
	4206	
	4100	Test Store Memory Instruction
	1632	
	3603	
	6003	
	0000	Error

01700	7643	Variable
	4701	Change Variable
	4500	Test Shift Replace Memory Instruction
	1632	
	3704	
	6002	
	0000	Error
	5707	Change Variable
01710	5500	Test Replace Add One Memory Instruction
	1632	
	3712	
	6002	
	0000	Error
	0423	Set Variable
	5316	
	0423	
01720	5100	Test Replace Add Memory Instruction
	1632	
	1722	
	6002	
	0000	Error
	5604	Incr. Test Count
	6006	
	7101	Jump Back to Expanded Capabilities Test
01730	1400	
	0000	Test Count
	0000	
	0000	
	7101	Jump to 160-A Logic
	3500	
	0000	
	0000	
01740	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	7736	
01750	1461	Check Reader Punch Level Selection
	6010	
	2032	
	1462	
	6006	
	2032	
	1463	
	6004	

01760	0000	Error - Illegal Level Selection Made
	0707	Set Initial Paper Tape Length
	0716	
	0604	
	3036	
	4164	
	2065	Load Initial Variable (7643)
	7101	Ind. Jump
01770	0054	
	0016	
	0004	
	0004	
	0004	
	0004	
	0577	
	4270	
02000	0577	Set Initial Tape Leader Length
	4200	
	7700	
	0120	
	7564	Punch Out Leader
	7400	
	0120	Clear Interrupt Lockout
	5705	Incr. Leader Count
02010	6505	
	0507	Initial Tape Length (0507 for 8 level selection)
	4200	
	7770	
	0001	
	7553	Punch Output from M.L. 2066
	7353	
	2067	
02020	0120	Clear Interrupt Lockout
	5645	Incr. Punch Data
	1033	Logical Product with Mask
	4243	
	6507	
	5712	Incr. Initial Block Count
	6511	
	5637	
02030	7777	Halt to Load Paper into Reader
	0120	
	7535	Leader Search
	7600	
	6403	
	6104	
	0120	
	7530	

02040	7600	Reader Input to "A"
	0120	Clear Interrupt Lockout
	4223	
	3623	Compare Data
	6005	
	2220	Load Error Data
	0000	Error Halt
	2217	Load Correct Data
02050	7700	Halt
	5615	Incr. Data
	1033	Logical Product Mask
	4213	
	6516	
	0120	
	7512	Punch Out from M.L. 2066
	7312	
02060	2067	
	0120	Clear Interrupt Lockout
	7101	Ind. Jump
	2073	
	0000	
	0000	
	0000	Punch Output Data
	4102	Exf. Code - Reader
02070	4104	Exf. Code - Punch
	2066	Starting Address
	7720	
	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
	5707	Incr. Data
	1033	
	4311	
02100	6523	
	5707	Incr. -5 ₇ Block Count
	6544	
	0557	Reset Block Count
	4312	
	7101	Ind. Jump to Type Out Test Status
	6436	
	0011	
02110	0000	
	0000	
	0000	
	0000	
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02120 0000
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02130 0000
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02140 0000
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02150 0000
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02160 0000
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02170 0000
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02200 0000
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02210 0000
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02220 0000
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02230 0000
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02240 0000
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02250 0000
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02260	0000	
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02270	0000	
	0000	
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	0000	
	0000	
	0000	
02300	3476	
	7500	Entrance for Test #3
	4210	Exf. Code for Type Out
	7317	
	2364	Term. Address (Variable)
	0120	Clear Interrupt Lockout
	2302	
	3707	Check Limit
02310	6030	Jump to 2340 at end of Paragraph
	2211	
	0610	Add +10 to Starting Address
	4207	
	2310	
	0610	Add +10 to Term. Address
	4312	
	3604	Check Limit
02320	6105	
	6007	
	2354	Starting Address (Variable)
	3474	
	3476	
	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
	6426	Jump Back to 2301
02330	2304	Complete Block by setting final Term. Address
	4325	
	6505	
	0000	
	0000	
	0000	
	2354	
	2364	

02340	2301	Reset Term. Address
	4335	
	2304	Reset Starting Address
	4321	
	5606	Incr. Paragraph Count
	6544	NZB to Type Another Paragra
	0502	Reset Paragraph Count
	4203	
02350	7101	Exit to Test #4
	4566	
	7775	Paragraph count
	0000	
	0045	C.R.
	0047	U.C.
	0001	T
	0057	L.C.
02360	0005	h
	0014	i
	0024	S
	0004	SP.
	0014	i
	0024	S
	0004	SP.
	0030	a
02370	0004	SP.
	0047	U.C.
	0016	C
	0057	L.C.
	0003	o
	0006	n
	0001	t
	0012	r
02400	0003	o
	0011	l
	0004	SP.
	0047	U.C.
	0022	D
	0057	L.C.
	0030	a
	0001	t
02410	0030	a
	0004	SP.
	0047	U.C.
	0016	C
	0057	L.C.
	0003	o
	0012	r
	0015	p

02420 0003 o
0012 r
0030 a
0001 t
0014 i
0003 o
0006 n
0004 sp.

02430 0001 t
0025 y
0015 p
0020 e
0031 w
0012 r
0014 i
0001 t

02440 0020 e
0012 r
0004 sp.
0024 s
0015 p
0020 e
0020 e
0022 d

02450 0004 sp.
0001 t
0020 e
0024 s
0001 t
0042 .
0004 sp.
0004 sp.

02460 0047 U.C.
0001 T
0057 L.C.
0005 h
0020 e
0012 r
0020 e
0045 CR.

02470 0030 a
0012 r
0020 e
0004 sp.
0030 a
0015 p
0015 p
0012 r

02500	0003	o
	0027	x
	0042	.
	0004	sp.
	0060	7
	0056	o
	0004	sp.
	0022	d
02510	0020	e
	0016	c
	0014	i
	0007	m
	0030	a
	0011	l
	0004	sp.
	0016	c
02520	0005	h
	0030	a
	0012	r
	0030	a
	0016	c
	0001	t
	0020	c
	0012	r
02530	0024	s
	0004	sp.
	0015	P
	0020	e
	0012	r
	0004	sp.
	0011	l
	0014	i
02540	0006	n
	0020	e
	0042	.
	0004	sp.
	0004	sp.
	0047	U.C.
	0001	T
	0057	L.C.
02550	0005	h
	0020	e
	0004	sp.
	0024	s
	0015	p
	0020	e
	0020	e
	0022	d

02560 0004 sp.
0024 s
0005 h
0003 o
0034 u
0011 l
0022 d
0004 sp.

02570 0023 b
0020 e
0045 CR.
0023 b
0020 e
0001 t
0031 w
0020 e

02600 0020 e
0006 n
0004 sp.
0074 l
0056 O
0004 sp.
0030 a
0006 n

02610 0022 d
0004 sp.
0074 l
0070 2
0004 sp.
0016 C
0005 h
0030 a

02620 0012 r
0030 a
0016 c
0001 t
0020 e
0012 r
0024 s
0004 Sp.

02630 0015 P
0020 e
0012 r
0004 sp.
0024 s
0020 e
0016 c
0003 o

02640 0006 n
0022 d
0042 •
0004 sp.
0004 sp.
0047 U.C.
0011 L
0057 L.C.

02650 0003 o
0031 w
0020 e
0012 r
0004 sp.
0016 c
0030 a
0024 s

02660 0020 e
0050 ;
0004 sp.
0030 a
0023 b
0016 c
0022 d
0020 e

02670 0026 f
0013 g
0005 h
0014 i
0032 j
0036 k
0011 l
0007 m

02700 0006 n
0045 CR.
0003 o
0015 p
0035 q
0012 r
0024 s
0001 t

02710 0034 u
0017 v
0031 w
0027 x
0025 y
0021 z
0056 O
0074 l

02720	0070	2
	0064	3
	0062	4
	0066	5
	0072	6
	0060	7
	0033	8
	0037	9
02730	0052	-
	0044	/
	0054	'
	0046	+
	0042	.
	0050	;
	0040	,
	0002	=
02740	0004	sp.
	0047	U.C.
	0034	U
	0015	P
	0015	P
	0020	E
	0012	R
	0004	sp.
02750	0016	C
	0030	A
	0024	S
	0020	E
	0050	:
	0004	sp.
	0030	A
	0023	B
02760	0016	C
	0022	D
	0020	E
	0026	F
	0013	G
	0005	H
	0014	I
	0032	J
02770	0036	K
	0011	L
	0007	M
	0006	N
	0003	O
	0015	P
	0035	Q
	0012	R

03000	0024	S
	0001	T
	0034	U
	0017	V
	0031	W
	0027	X
	0025	Y
	0021	Z
03010	0045	CR.
	0056)
	0074	*
	0070	@
	0064	#
	0062	\$
	0066	%
	0072	¢
03020	0060	&
	0033	$\frac{1}{2}$
	0037	(
	0052	?
	0044	n
	0054	o
	0046	.
	0042	.
03030	0050	:
	0040	,
	0002	+
	0004	sp.
	0004	sp.
	0030	A
	0057	L.C.
	0011	l
03040	0011	l
	0004	sp.
	0036	k
	0020	e
	0025	y
	0024	s
	0004	sp.
	0024	s
03050	0005	h
	0003	o
	0034	u
	0011	l
	0022	d
	0004	sp.
	0024	S
	0001	t

03060	0012	r
	0014	i
	0036	k
	0020	e
	0004	sp.
	0031	w
	0014	i
	0001	t
03070	0005	h
	0004	sp.
	0034	u
	0006	n
	0014	i
	0026	f
	0003	o
	0012	r
03100	0007	m
	0004	sp.
	0026	f
	0003	o
	0012	r
	0016	c
	0020	e
	0042	.
03110	0004	sp.
	0004	sp.
	0047	U.C.
	0030	A
	0057	L.C.
	0011	l
	0011	l
	0045	CR.
03120	0016	C
	0005	h
	0030	a
	0012	r
	0030	a
	0016	c
	0001	t
	0020	e
03130	0012	r
	0024	s
	0004	sp.
	0024	s
	0005	h
	0003	o
	0034	u
	0011	l

03140	0022	d
	0004	sp.
	0023	b
	0020	e
	0004	sp.
	0011	l
	0020	e
	0013	g
03150	0014	i
	0023	b
	0011	l
	0020	e
	0004	sp.
	0031	w
	0014	i
	0001	t
03160	0005	h
	0004	sp.
	0001	t
	0005	h
	0020	e
	0004	sp.
	0036	k
	0020	e
03170	0025	y
	0004	sp.
	0015	p
	0012	r
	0020	e
	0024	s
	0024	s
	0034	u
03200	0012	r
	0020	e
	0004	sp.
	0016	c
	0003	o
	0006	n
	0001	t
	0012	r
03210	0003	o
	0011	l
	0004	sp.
	0024	s
	0020	e
	0001	t
	0004	sp.
	0030	a

03220	0001	t
	0004	sp.
	0021	z
	0020	e
	0012	r
	0003	o
	0042	.
	0045	CR.
03230	0047	U.C.
	0023	B
	0057	L.C.
	0030	a
	0004	sp.
	0004	sp.
	0061	BS.
	0061	BS.
03240	0016	C
	0036	K
	0024	S
	0015	P
	0004	sp.
	0016	C
	0020	E
	0004	sp.
03250	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
	0030	a
	0016	c
	0020	e
	0004	sp.
03260	0003	O
	0015	p
	0020	e
	0012	r
	0030	a
	0004	sp.
	0061	BS.
	0001	t
03270	0014	i
	0003	o
	0006	n
	0004	sp.
	0014	i
	0024	s
	0004	sp.
	0006	n

03300	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
	0061	BS.
	0061	BS.
03310	0061	BS.
	0061	BS.
	0003	o
	0031	w
	0004	sp.
	0023	b
	0047	U.C.
03320	0004	sp.
	0004	sp.
	0004	sp.
	0061	BS.
	0061	BS.
	0061	BS.
	0057	L.C.
03330	0020	e
	0014	i
	0006	n
	0013	g
	0004	sp.
	0061	BS.
	0045	CR.
03340	0016	C
	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
03350	0004	sp.
	0004	sp.
	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.

03360	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
	0005	h
	0047	U.C.
	0004	sp.
	0004	sp.
03370	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
	0004	sp.
03400	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
03410	0061	BS.
	0061	Bs.
	0057	L.C.
	0020	e
	0004	sp.
	0036	k
	0004	sp.
	0004	sp.
03420	0004	sp.
	0061	BS.
	0061	BS.
	0061	BS.
	0020	e
	0004	sp.
	0061	BS.
	0022	d
03430	0061	BS.
	0061	BS.
	0061	BS.
	0061	BS.
	0016	C
	0004	sp.
	0004	sp.
	0004	sp.

03440	0042	•
	0045	CR.
	0045	CR.
	0045	CR.
	0047	U.C.
	0006	N
	0003	O
	0004	sp.
03450	0015	P
	0012	R
	0003	O
	0023	B
	0011	L
	0020	E
	0007	M
	0004	sp.
03460	0050	:
	0004	sp.
	0024	S
	0005	H
	0014	I
	0015	P
	0004	sp.
	0007	M
03470	0020	E
	0004	sp.
	0042	•
	0045	CR.
	0051	Tab.
	0045	CR.
	0000	
	0004	
03500	2300	Test Load Specific Instruction
	1603	
	6003	
	0000	Error
	7643	Variable
	4701	Set Variables
	4560	
	2303	
03510	1700	Test Selective Complement Specific Instruction
	6002	
	0000	Error
	2700	Test Load Complement Specific Instruction
	3310	
	6002	
	0000	Error
	2713	

03520	1300	Test Logical Product Specific Instruction
	6002	
	0000	Error
	2717	
	3300	Test Add Specific Instruction
	6002	
	0000	Error
	2323	
03530	3700	Test Subtract Specific Instruction
	6002	
	0000	Error
	2327	
	4300	Test Store Specific Instruction
	3731	
	6002	
	0000	Error
03540	4734	
	4700	Test Shift Replace Specific Instruction
	3736	
	6002	
	0000	Error
	0425	Set Variable
	5342	
	0425	Test Replace Add Specific Instruction
03550	5300	
	3745	
	6002	
	0000	Error
	5750	
	5700	Test Replace Add One Specific Instruction
	3752	
	6004	
03560	0000	Error
	5461	Variable
	5461	Variable
	4701	Set Variables
	4702	
	2304	Test Left Shift Two
	0103	
	4306	
03570	3706	
	6003	
	0401	
	0000	Error
	2312	Set Variable
	0110	
	0110	
	4315	

03600	2317	Test Left Shift Six
	0111	
	4321	
	3721	
	6003	
	0401	
	0000	Error
	0412	Test Multiply by Ten
03610	0112	
	3604	
	6004	
	0401	
	0000	Error
	0144	Constant
	2206	Test Right Shift One
	0114	
03620	3605	
	6005	
	0401	
	0000	Error
	2525	
	1252	Constant
	2212	Set Variable
	0114	
03630	0114	
	4207	
	2207	Test Right Shift Two
	0115	
	4205	
	3603	
	6004	
	0000	Error
03640	5252	Variable
	5252	Variable
	5604	Incr. Shift Count
	6113	Continue Shift Test
	6026	Jump Out of Shift Test
	5252	Variable
	7770	Shift Count
	2702	Complement Variable
03650	4303	Reset Variables
	4311	
	4311	
	7100	Test Return Jump
	3663	
	7121	
	7101	Jump Back to Test Right Shift
	3626	

03660	0000	Error Ret. Jump
	0000	
	7101	
	3660	Jump Address (Variable) (3655)
	5603	
	6103	
	6404	
	0000	
03670	7101	
	3700	
	0507	Reset Shift Count
	4325	
	7101	Jump Back to Complement Variables
	3650	
	3677	
	7117	
03700	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
	7101	
	3500	
	6104	
	7777	
	7101	
	0100	
03710	0425	
	6111	
	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
	7101	Exit to Type Status for Test #1
	6431	
	3712	
	0000	
03720	0000	
	0000	
	7625	
	7101	
	3752	
	0452	
	7625	
	0400	
03730	6416	
	0000	
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03740 0000
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03750 0000
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03760 0000
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03770 0000
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04000 3131
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4647

04010 5051
5253
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6263
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6667

04020 7071
7273
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7677
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04030 0000
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04040 0000
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04050 0000
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04060 0000
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04070 0000
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04100	0400	Entrance for Test #6
	4225	Reset Comparison Data
	4226	Reset Punch Data
	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
	7500	Exf. - Reader
	4102	
	7600	Input to "A"
04110	0120	Clear Interrupt Lockout
	4216	Store Reader Data
	3614	Compare with Punch Data
	6140	Jump forward on Error
	5612	Incr. Data
	7500	Exf. - Punch
	4104	
	2211	Load Punch Data
04120	7677	Output
	0120	Clear Interrupt Lockout
	5606	Incr. Punch Data
	3432	Check Limit
	6012	Jump Forward at End of Block
	6522	Jump Back to Read - Punch
	0000	Comparison Data
	0000	Reader Data
04130	0000	Punch Data
	0000	
	0000	
	0000	
	7720	Constant
	7720	Variable Block Count
	0400	
	4311	Reset Comparison Data
04140	4310	Reset Punch Data
	5704	Incr. Block Count
	6004	Jump Forward when Block Count = 0
	6540	Jump back if Block Count < 578
	0000	
	0000	
	2312	Reset Block Count
	4312	
04150	7101	Exit to Type Test #6 Status
	6454	
	0000	
	2324	Load Reader Data
	7701	Halt
	2327	Load Comparison Data
	7702	Halt
	6443	Jump Back to Resume Test #6

04160	6544	Jump Back to Resume Test #6
	0000	
	0000	
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	0000	
04170	0000	
	0000	
	0000	
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	0000	
	0000	
	0000	
04200	2200	Entrance for Test #1
	0000	Comparison Data
	7615	Half Write Indirect (ML. 15 contains 4225)
	0400	Clear "A"
	2303	Load Comparison Data
	3620	Compare Data
	6005	
	2216	Load "A" with Error Data
04210	0000	Error Halt
	2310	Load Comparison Data
	7700	Halt
	5712	Incr. Comparison Data
	0277	Save Lower 6 Bits
	4314	
	5616	Incr. Test Count
	3614	Check Test Count Limit
04220	6006	
	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
	7101	Jump back to continue H.W.I.
	4200	
	0000	H.W.I. Data
	0400	Reset H.W.I. Data
	4302	
04230	4327	Reset Comparison Data
	4203	Reset Test Count
	7101	Jump to Continue Test #1
	0100	
	0000	Test Count
	0000	
	0000	
	0000	

04240 0000
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04250 0000
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04260 0000
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04270 0000
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04300 0000
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04310 0000
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04320 0000
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04330 0000
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04340 0000
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04360 0000
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04370 0000
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04400 0000
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04470 0000
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04500 0000
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04510 0000
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04520 0000
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04530 0000
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04540	0000	
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04550	0000	
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04560	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
04570	7564	
	7272	Reader Input - one frame
	0030	
	0120	Clear Interrupt Lockout
	2027	Compare Data
	3430	
	6012	
	2027	Load Error Data
04600	0000	Error Stop
	2030	Load Correct Data
	7777	Halt
	7551	
	7600	Search for Sync.
	0120	Clear Interrupt Lockout
	3430	
	6504	
04610	2030	
	1246	Mask Off Lower 6 Bits
	6156	
	2240	Load 7400
	3030	Add Punch Data
	4202	Set "OTN"
	7537	Output xxx00
	7477	

04620	0120	Clear Interrupt Lockout
	5637	Incr. Frame Count
	6154	Jump to Delays
	5430	Incr. Data
	7530	Read and Punch to End of Block
	7600	
	0120	Clear Interrupt Lockout
	4027	
04630	3430	Compare Data
	6012	
	2027	Load Error Data
	0000	Error Stop
	2030	Load Correct Data
	7777	Halt
	7516	
	7600	Search for Sync.
04640	0120	Clear Interrupt Lockout
	3430	
	6504	
	7512	Punch out from M.L. 30
	7335	
	0031	
	0120	Clear Interrupt Lockout
	2030	
04650	3433	Check Level Limit
	6013	
	6527	
	7400	Constant
	4102	Exf. Reader Code
	4104	Exf. Punch Code
	0377	Spare
	7700	Mask
04660	0000	Frame Count
	0000	Delay #2
	7627	Count for Delay #2
	0027	
	0400	Reset Data to zero
	4030	
	7101	Ind. Jump to Type Out Test Status
	6443	
04670	7512	Output 01XX, 02XX, 03XX
	7310	
	0031	
	0120	Clear Interrupt Lockout
	5714	Incr. Frame Count
	6452	
	7101	Ind. Jump
	5003	Variable Address (4705) (4731) (4746)

04700	0027	Starting Address - Read
	0030	Starting Address - Punch
	4104	Exf. Code - Punch
	7627	Constant
	4731	Constant
	5724	Incr. Delay #2
	6601	
	0400	Reset Delay #2
04710	4327	
	5430	Incr. Data
	3432	Check Limit
	6103	
	0400	Set Data to Zero
	4030	
	5734	Incr. Count for Delay #2
	6002	
04720	7106	Ind. Jump to Start of Punch - Read
	2316	Reset Count for Delay #2
	4340	
	2317	Change Variable Address at M.L. 4677
	4325	
	7101	Ind. Jump to Start of Punch - Read
	4566	
	7101	Count for Delay #3
04730	4746	Constant
	5430	Incr. Data
	3432	Check Limit
	6103	
	0400	Reset Data to Zero
	4030	
	5707	Incr. Count for Delay #3
	6002	
		I
04740	7127	Ind. Jump to Start Punch - Read
	2314	Reset Count for Delay #3
	4313	
	2313	Change Variable Address at M.L. 4677
	4345	
	7122	Ind. Jump to Start Punch - Read
	5622	Incr. Delay #4
	6501	
04750	2221	Reset Delay #4
	4217	
	5430	Incr. Data
	3432	Check Limit
	6103	
	0400	Reset Data to Zero.
	4030	
	5614	Incr. Count for Delay #4

04760	6002	
	7106	Ind. Jump to Start Read - Punch
	2212	Reset Count for Delay #4
	4210	
	2211	Change Variable Address at M.L. 4677
	4366	
	7101	Ind. Jump to Start Read-Punch
	4566	
04770	6007	Delay #4
	6007	Constant
	0377	Spare
	7477	Count for Delay #4
	7477	Constant
	5003	
	7007	Variable
	7007	Constant
05000	7427	Variable
	7327	Constant
	4677	
	2301	Set Ind. Address
	4026	
	5707	Delay #1
	6501	
	2310	Reset Delay
05010	4312	
	5430	Incr. Data
	3432	Check Limit
	6103	
	0400	Reset Output Data
	4030	
	5716	Incr. Count for Delay #1
	6003	
05020	7107	Ind. Jump to Start of Read - Punch
	4705	
	2321	Reset Count #1
	4323	
	2303	Change Variable Address at M.L. 4677
	4126	
	7101	Ind. Jump to Start of Read - Punch
	4566	
05030	0000	
	0000	
	0000	
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05040 0000
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05050 0000
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05060 0000
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05070 0000
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05100 0000
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05110 0000
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05120 0000
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05130 0000
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05140 0000
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05150 0000
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05160 0000
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05170 0000
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05200 0000
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05210 0000
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05220 0000
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05230 0000
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05240 0000
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05250 0000
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05260 0000
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05270 0000
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05300 0000
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05310 0000
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05320 0000
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05330 0000
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05340	0000	
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05350	0000	
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	0000	
	0000	
05360	0000	
	0000	
	0000	
	7515	Entrance for Test #5 - Type in 10 characters
	7213	
	6512	Term. Address
	0120	Clear Interrupt Lockout
	7512	Output 10 Characters
05370	7445	
	7306	
	6512	
	0120	Clear Interrupt Lockout
	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
	6011	Jump Forward to 5407
	6500	Starting Address
05400	4220	Exf. Code - Typewriter Input
	4210	Exf. Code - Typewriter Output
	0000	
	0000	
	0000	
	0000	
	0000	
	7521	Input up to Max. 127 Characters - followed by manual disconnect.
05410	7217	
	6700	
	0120	Clear Interrupt Lockout
	3614	
	6405	
	3212	Set Term. Address for Output
	4204	
	7512	Type Out

05420	7445	
	7306	
	6500	Variable Address
	0120	Clear Interrupt Lockout
	7100	
	6031	
	6005	
	6500	
05430	4220	Exf. Code - Typewriter Input
	4210	Exf. Code - Typewriter Output
	0000	
	2304	
	4025	
	7510	Typewriter Input
	7600	
	0120	
05440	4125	
	0745	
	6004	
	5425	
	6507	
	4220	
	5425	
	4203	
05450	7505	Typewriter Output
	7305	
	6700	
	0120	
	6103	
	4210	
	6500	
	7100	
05460	6031	
	7505	
	7445	
	0001	
	7101	Jump to 74XX Typewriter Output
	5470	
	4210	
	0000	
05470	7447	UC
	7401	T
	7457	LC
	7405	h
	7420	e
	7404	sp
	7411	l
	7430	a

05500	7421	z
	7425	y
	7404	sp
	7422	d
	7403	o
	7413	g
	7404	sp
	7432	j
05510	7434	u
	7407	m
	7415	p
	7424	s
	7404	sp
	7403	o
	7417	v
	7420	e
05520	7412	r
	7404	sp
	7401	t
	7405	h
	7420	e
	7404	sp
	7435	q
	7434	u
05530	7414	i
	7416	c
	7436	k
	7404	sp
	7423	b
	7412	r
	7403	o
	7431	w
05540	7406	n
	7404	sp
	7426	f
	7403	o
	7427	x
	7442	.
	7404	sp
	7404	sp
05550	7456	0
	7474	1
	7470	2
	7464	3
	7462	4
	7466	5
	7470	6
	7460	7

05560	7433	8
	7437	9
	7452	-
	7444	/
	7454	'
	7446	+
	7420	.
	7450	;
05570	7440	,
	7402	=
	7445	CR
	7447	UC
	7456)
	7474	*
	7470	@
	7464	#
05600	7462	\$
	7466	%
	7472	¢
	7460	&c
	7433	$\frac{1}{2}$
	7437	(
	7452	?
	7444	?
05610	7454	"
	7446	o
	7442	.
	7450	:
	7440	,
	7402	+
	7442	.
	7461	BS
05620	7442	.
	7451	Tab
	7445	CR
	0120	Clear Interrupt Lockout
	0400	Clear "A"
	7101	Exit to Test #6
	4100	
	0000	
05630	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	

05640	0000	
	0000	
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05650	0000	
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05660	0000	
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	0000	
05670	0000	
	0000	
	0000	
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	0000	
	0000	
	0000	
	0000	
05700	0001	Store Data in Bank 1
	0400	
	0021	Set Ind. Bank to 1
	4211	Reset Data
	2610	Complement Data
	4100	
	0000	Variable Address (0000 - 7776)
	5605	Incr. Data
05710	5702	Incr. Address
	6505	
	0020	Set Ind. Bank to Zero
	6004	
	0000	
	0000	
	0000	
	7500	Sel. Mag. Tape - Binary Mode

05720	1171	
	7500	Rewind Load
	1161	
	7500	Check for Load Point
	1141	
	7600	
	0120	
	0740	
05730	6505	
	6020	Load Point Jump Forward
	0000	
	6403	
	2301	Change Instruction from 7500 to 6403
	4100	
	6033	
	0400	
05740	0601	
	6501	
	7500	Check for Parity Error
	1141	
	7600	
	0120	
	0704	
	6102	
05750	6035	
	0400	Set Buffer Entrance
	0105	
	5753	
	0501	Set Buffer Exit
	0106	
	5755	
	7500	Write A/D
05760	2111	
	0120	Clear Interrupt Lockout
	7300	Initiate Buffer Output
	5762	
	5605	Incr. Block Count
	6102	
	6006	
	7101	Jump
05770	6070	
	7700	Block Count
	7700	
	6052	
	2301	Set Jump Address
	4023	
	2304	Reset Block Count
	4306	

06000	2024	Load Data in "A" at Buffer Interrupt
	7020	Jump to Address in ML.20
	0000	
	7774	
	7774	
	5701	
	6104	
	2304	Reset Trial Count
06010	4304	
	7777	
	2321	
	0701	
	4323	
	7500	Backspace for Re-write
	1121	
	7600	
06020	0120	
	5603	
	6501	
	6452	
	0000	
	0000	
	6403	
	0400	
06030	7101	
	0000	
	0400	
	6403	Changed to 7500 while Tape is Rewinding
	1141	
	7600	
	0740	Check for Load Point
	6510	
06040	2307	Change Jump Address
	4020	
	2314	Change Instruction from 7500 to 6403
	4310	
	0601	Delay
	6501	
	4024	
	7101	Jump to Read or Write
06050	6100	Variable Address (5734)
	6100	
	2301	Change Variable Address
	4023	
	0400	
	0601	
	6501	
	7500	Rewind Load

06060	1161	
	0120	
	2303	Change Instruction from 6403 to 7500
	4330	
	2313	Reset Variable Address
	4315	
	2024	Load Data
	7020	Jump to Address in ML.20
06070	2204	Set Jump Address
	4023	
	2024	Load Data Stored at Time of Interrupt (initial data=level selection)
	7020	Jump to Address Determined by Buffer Interrupt (initial address 0000)
	5734	Address
	0000	
	0000	
	0000	
06100	0400	Start Read of Mag. Tape
	0601	
	6501	
	0400	Set Buffer Entrance
	0105	
	6104	
	0501	Set Buffer Exit
	0106	
06110	6107	
	7500	Read A/D
	2131	
	0120	Clear Interrupt Lockout
	7200	Initiate Buffer Input
	6114	
	2207	Change Jump Address
	4023	
06120	2206	Change 7500 Instruction to 6403
	4100	
	6033	
	2024	Load Data
	7020	Jump to Address in ML.20
	6130	Constant
	6403	Constant
	0000	
06130	0400	
	6501	
	7500	Check for Parity Error
	1141	
	7600	
	0120	
	0704	
	6102	

06140	6062	Comparison Test
	0400	Set. Ind. Bank to One
	0021	Set Ind. Address
	4204	Set Comparison Data
	4212	Load Comparison Data
	2611	Compare
	3500	
	0000	
06150	6002	OK
	6106	Jump to Error Stop
	5703	Incr. Ind. Address
	5603	Incr. Data
	6507	
	6007	
	0000	Comparison Data
	2310	Load Error Address (Data should be Complement of Address)
06160	7777	Error Halt
	6507	
	6410	
	0000	
	0020	Set Ind. Bank to Zero
	0400	
	6501	
	0105	Set Buffer Entrance
06170	6167	
	0501	Set Buffer Exit
	0106	
	6172	
	7500	Read A/D
	2131	
	0120	
	7200	Initiate Buffer Input
06200	6177	
	5613	Incr. Block Count
	6003	
	2024	Load Data
	7020	Jump to Address in ML.20
	2206	Set Variable Address
	4023	
	2206	Reset Block Count
06210	4204	
	2024	Load Data
	7020	Jump to Address in ML. 20
	6250	Constant
	7702	Block Count
	7702	
	0000	
	0000	

06220	7774	
	7774	Backspace Count
	5701	Incr. Backspace Count
	6104	
	2304	Reset Trial Count
	4304	
	7777	Stop after 3 Trial Re-reads after Parity Error
	2313	
06230	0701	
	4313	
	0400	
	0601	
	6501	
	7500	Backspace One Record
	1121	
	7600	
06240	0120	Clear Interrupt Lockout
	0400	
	6501	
	7101	Jump to Read Mag. Tape
	6100	
	0000	
	0000	
	0000	
06250	0400	
	0601	
	6501	
	7500	Rewind Load
	1161	
	0120	
	2213	Change Jump Address
	4023	
06260	2210	Change Jump Address
	4100	
	6050	
	2310	Change Instruction from 6403 to 7500
	4100	
	6033	
	2024	Load Data
	7020	Jump to Address in ML.20
06270	5734	Constant
	5751	Constant
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	

06300	4024	Start of Map. Tape Test
	2210	Set Jump Address
	4023	
	2207	Set Block Count
	4100	
	5771	
	0141	Set Buffer Bank to 1
	7101	Jump to Write

06310	5700	
	5734	
	7700	
	0000	
	0000	
	0000	
	0000	
	0071	

06320	0060	
	0000	
	0000	
	0000	
	0000	
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06330	0000	
	0000	
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	0000	
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06340	0000	
	0000	
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06350	0000	
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06360	0000	
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	0000	
	0000	
	0000	
06370	0000	
	0000	
	0000	
	0000	
	0000	
	7100	Return Jump - Check for Mag. Tape Rewind Condition
	6031	
	7506	Type Out Test Status
06400	7306	
	6431	
	0120	Clear Interrupt Lockout
	7101	Ind. Jump
	5363	Variable Address (2335) (4200) (2036)
	4210	Exf. Code - Typewriter
	6407	Starting Address
	0045	
06410	0047	
	0001	
	0020	
	0024	
	0001	
	0004	
	0064	
	0004	
06420	0057	
	0062	Variable Character (70) (72) (74)
	0004	
	0047	
	0003	
	0042	
	0036	
	0042	
06430	0045	
	0474	Entrance From Test #1
	4311	
	2215	
	4330	
	6540	
	0470	Entrance from Test #2
	4316	

06440 2211
4335
6545
0462 Entrance from Test #4
4323
2205
4342
6552

06450 2036 Address
2301 Address
5363 Address
4200 Address
0472 Entrance From Test #6
4334
2303
4353

06460 6563
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06470 0000
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06500 2562

NUMBER: T040

TITLE: Buffer and Interrupt Test

CATEGORY: 160-A, 161

MINIMUM EQUIPMENT NEEDED:

PURPOSE

The buffer and interrupt test employs the typewriter on the buffer input/output channel to test the buffer as well as manual and buffer interrupts.

DESCRIPTION

The routine starts with an initial type-out, establishes an input buffer of 100_8 characters, then goes into a non-terminating subtract routine to keep the computer running while buffering takes place. Buffer input will terminate when 100_8 characters have been received by the computer or when the typewriter delivers a disconnect signal.

At completion of the buffer input the computer will continue to run the non-terminating routine until it receives a manual interrupt. The manual interrupt causes the computer to set up a buffer output of the same characters that were received by the input buffer previously. Visual check of the type-out will show any errors.

The buffer interrupt which occurs following the buffer input is ignored. The buffer interrupt following the buffer output causes the computer to again establish an input buffer of 100_8 characters and the entire routine is repeated.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0147

CHECK SUM: 7670

STARTING ADDRESS: 0000

Master clear and run. After the initial type-out, IBA should appear in the status display.

OPERATING INSTRUCTIONS (Cont'd)

The computer is now ready for the typewriter input.

Upon termination of the buffer input IBA will disappear from the status display.

The computer will continue to run awaiting a manual interrupt. Depress any selective jump switch with any selective stop switch to give a manual interrupt. This should cause OBA to appear in the status display and the typewriter will type out the same characters that were typed into the computer.

T 040

T 040 BUFFER AND INTERRUPT TEST

0000	7101	
0001	0100	Jump to program
0002	0120	
0003	2200	
0004	7776	
0005	0701	
0006	6501	
0007	6404	
0010		
0011	0120	
0012	7101	
0013	0064	Jump to buffer output
0014		
0015		
0016		
0017		
0020		
0021	0107	
0022	4043	
0023	0120	
0024	7101	(7020) Jump following
0025	0050	buffer interrupt
0026		
0027		
0030	2044	
0031	4024	
0032	7104	
0033	2045	
0034	4024	
0035	7101	
0036	0002	
0037		
0040	1000	Buffer input starting address
0041	1000	Buffer output starting address
0042	1100	Buffer input terminating address
0043	2000	Buffer output terminating address
0044	7020	
0045	7101	
0046		
0047		

0050	7500	Select typewriter input
0051	4220	
0052	2040	Set up input buffer
0053	0105	
0054	0050	
0055	2042	
0056	0106	
0057	0050	
0060	7200	Initiate input buffer
0061	0050	
0062	7101	
0063	0030	
0064	7500	Select typewriter output
0065	4210	
0066	2041	
0067	0105	
0070	0064	
0071	2043	
0072	0106	
0073	0064	
0074	7300	Initiate output buffer
0075	0064	
0076	7101	
0077	0033	
0100	7500	Select typewriter output
0101	4210	
0102	7305	Initial type-out
0103	0143	
0104	7101	
0105	0050	Jump to buffer input
0106		
0107	0110	
0110	0045	
0111	0047	
0112	0023	
0113	0057	
0114	0020	
0115	0013	
0116	0014	
0117	0006	

0120	0004
0121	0001
0122	0025
0123	0015
0124	0020
0125	0031
0126	0012
0127	0014

0130	0001
0131	0020
0132	0012
0133	0004
0134	0014
0135	0006
0136	0015
0137	0034

0140	0001
0141	0045
0142	0045
0143	
0144	
0145	
0146	
0147	

NUMBER: T-6MT
TITLE: Quality Assurance Magnetic Tape Test
CATEGORY: 160-A, 162, 163 and 164
MINIMUM EQUIPMENT NEEDED: 160-A, 162 or 163, or 164, 161 optional

PURPOSE

Comprehensive test of tape transports as well as thorough test of logic circuits.

DESCRIPTION

1. See flow chart.
2. When SLJ1 is dropped, the program will complete 1 pass and do a rewind unload. Another tape transport may be manually selected as Unit No. 1 and the program re-run from P = 0000. After the second rewind unload, the reels of tape from each unit may be changed and checked for compatability by starting at P = 0444.
3. SLJ4 will keep the program in the servo test. When jump 4 is dropped, the program will advance to the creep test.
4. SLJ2 will keep the program in the creep test. During this test the reels should have a slight forward movement. Dropping jump 2 will allow the program to advance.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape
LOADING ADDRESS: 1st sect. 0000 2nd sect. 7000
TERMINAL ADDRESS: 1471 7722
CHECK SUM: 0162 0162
STARTING ADDRESS: 0000

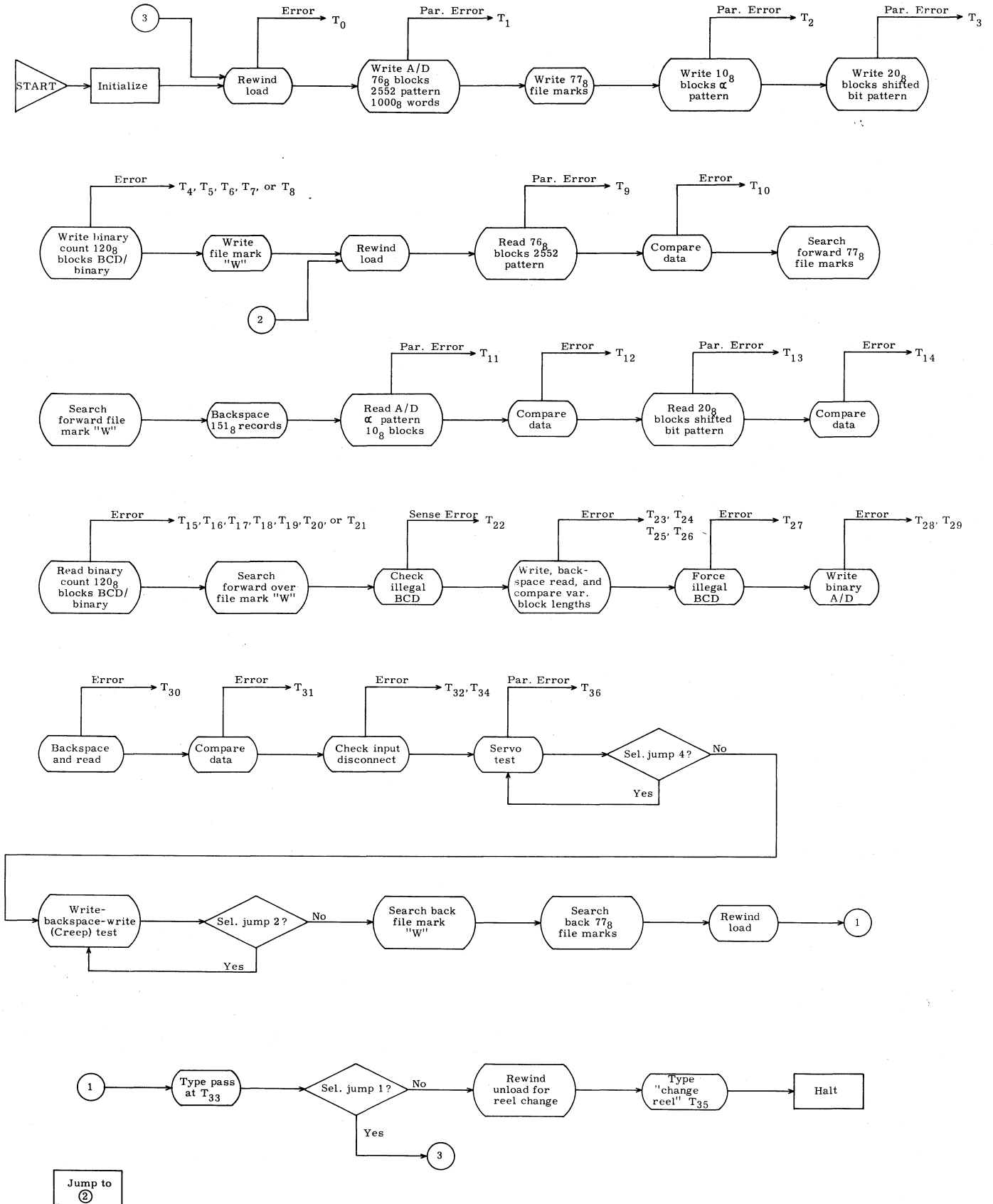
ADDITIONAL INSTRUCTIONS: 1) SLJ1, 2 and 4 on (up).
2) Use typewriter (161) to monitor errors.
3) Program may be run in any available memory bank by manually setting the desired banks.

HALTS EXPLANATION

SLS 1 "A" = Error data address.

NOTE: For operation without the use of a 161 typewriter, the operator should enter stops in the program at each exit from the main program to the typewriter program. These exits are circled in the program annotation.

Q. A. MAGNETIC TAPE TEST



Q. A. MAGNETIC TAPE TEST

00000	7110	Jump to 0100 Ind.
	2552	Constant
	2000	Variable Adr.
	3000	Constant
	2000	Constant
	7701	76 Block count #1
	7700	77 File mark count
	0000	delay count
00010	0100	
	3000	Variable Adr.
	4000	Constant
	7770	Consecutive 1's or 0's count
	0000	↳ information
	7767	-10 Block Count
	4000	Variable Adr.
	4014	Constant
00020	0000	
	0000	
	0000	
	0000	
	0001	Variable #2
	7757	-20 Block count Var. #3
	0000	Binary count Var. #4
	4015	Variable
00030	4115	Constant
	4015	Constant
	4114	Constant
	7720	Variable #6
	5000	Variable
	6000	Constant
	5000	Constant
	7626	Backspace count Var. #8
00040	2111	Constant
	2511	Constant
	0601	Constant Ind. Ad r.
	5015	Variable #9
	5015	Constant
	4114	Constant
	6000	Variable #10
	7000	Constant
00050	0000	Variable #11
	6700	Constant
	7750	Pass count #12
	7626	Constant
	1101	Ind. Adr.
	1076	Ind. Adr.
	7635	
	7773	Shift count (Var)

00060	0000	Reserved for Inp. disconnect test
	7655	Ind. address - Constant
	0000	Exit exit
	7534	Conversion jump address
	0000	Correct data
	0000	Data address
	0505	exit for T10
	0606	exit for T12
00070	0650	exit for T14
	0724	exit for T18
	0761	exit for T21
	1110	exit for T26
	1235	exit for T31
	1335	
	0076	
	4654	Random number
00100	2004	Reset Var. to 2000
	4002	
	0576	Reset - 76 Block count
	4005	
	0577	Reset file mark count
	4006	
	0409	Reset delay
	4007	
00110	4014	Reset α
	4026	Reset binary count
	4050	Reset Var. #11
	2003	Reset Var. to 3000
	4011	
	0507	Reset 1 $\frac{1}{2}$ or 0 $\frac{1}{2}$ count
	4013	
	0510	Reset -10 Block count
00120	4015	
	2012	Reset Var. to 4000
	4016	
	0401	Reset Var. #2
	4024	
	0520	Reset -20 Block count
	4025	
	2031	Reset Var. to 4015
00130	4027	
	0550	Reset Var. #6
	4033	
	2036	Reset Var. #7
	4034	
	2053	Reset backspace count
	4037	
	2044	Reset Var. #9

00140	4043	
	2035	Reset Var. #10 to 6000
	4046	
	0527	Reset pass count #12
	4052	
	2041	Reset instruction
	4142	
	2036	Reset Var. Start Adr. (read)
00150	4154	
	2035	Reset Var. Start Adr. (write)
	4155	
	7161	Jump to start test
	0200	
	0000	
	0000	
	0000	
00160	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00170	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00200	7554	Sel. Odd parity
	7554	Check for binary mode
	7600	
	0301	
	6103	
	7161	
	7157	To $\text{\textcircled{T}}$ error select
	2001	Set data to 2552 from ML 2000 to 3000
00210	4102	
	5402	
	3403	
	6504	
	2004	Reset Adr. Variable
	4002	
	7540	Exf. Rewind load
	7536	Check for load point

00220	7600 0340 6503 5407 6501 7532 7332 3000	Prog. delay Exf. write A/D Output 2000 to 3000
00230	7525 7600 0204 6003 7101 7013 5405 6512	Check for Par. error write To (T ₁) Par. error write Increase Block count
00240	0576 4005 7517 5407 6501 5407 6501 5406	Reset -76 Block count Exf - write file mark Increase file mark count
00250	6506 0577 4006 6107 1171 1141 1161 2111	Reset file mark count Odd parity Status Rewind load Write A/D
00260	2000 1111 2414 4111 5411 3412 6012 5413	Starting Adr. write Load Compl. α Store pattern from 3000 thru 3777
00270	6506 2014 4111 0507 4013 5411 3412 6515	

00300	0507	Reset Consecutive 1's or 0's count
	4013	
	2003	Reset Var. Adr. to 3000
	4011	
	2414	Compl. α
	4014	
	7553	EXF - write A/D
	7353	Output 3000 thru 3777
00310	4000	
	7553	Status - Check for parity error
	7600	
	6003	
	7101	
	7016	To (P ₂) Parity error write
	5415	Increase Block count
	6535	
00320	0510	Reset Block count to -10
	4015	
	2024	Store one bit left shifted from 4000 thru 4013
	4116	
	4424	
	5416	
	3417	
	6505	
00330	2012	Reset Var. Ind. Adr.
	4016	
	7527	EXF write A/D
	7330	Output 4000 thru 4013
	4014	
	7527	Status - Check for parity error write
	7600	
	0204	
00340	6003	
	7101	
	7021	To (P ₃) Parity error write
	5425	
	6512	
	0520	Reset Block count to -20
	4025	
	5426	Store binary count 1 to 77 from 4015 thru 4113
00350	4127	
	5427	
	3432	
	6504	
	0400	Reset Variable #4
	4026	
	2031	Reset Variable Adr. to 4015
	4027	

00360	6106	
	2111	Write A/D
	3000	Starting Adr. write
	4000	Starting adr. write
	1141	Status
	0000	
	7575	EXF - even parity
	7575	Check for BCD Mode
00370	7600	
	0301	
	6003	
	7101	
	7220	to (T4) error BCD Status
	7570	EXF write 6 bits
	7370	Output 4015 thru 4113
	4114	
00400	7564	EXF Status
	7600	
	4205	Store status response
	0204	Check for parity error
	6004	
	7101	
	7024	To (T5) parity error write
	0001	Response data
00410	2301	
	0210	Check for Illegal BCD
	6003	
	7101	
	7257	To (T6) error Ill. BCD
	7552	EXF Odd parity
	7546	Check for binary mode
	7600	
00420	6003	
	7101	
	7162	To (T7) error binary status
	7542	Write 6 bit
	7342	Output from 4015 thru 4113
	4114	
	7536	Check for parity error
	7600	
00430	6003	
	7101	
	7027	To (B) parity error write
	5433	Increase -50 Block count
	6546	
	0550	Reset Block count to -50
	4033	
	7526	EXF file mark "W"

00440	5407	
	6501	
	5407	
	6501	
	7524	Rewind load
	7517	Check for load point
	7600	
	0740	
00450	6503	
	5407	
	6505	
	7516	EXF - Read A/D
	7216	Input 5000 thru 5777
	6000	
	7506	Check for parity error
	7600	
00460	6020	
	7101	
	7073	To (T ₉) parity error read
	1172	BCD mode
	1141	Status
	1111	
	4015	Starting Adr.
	1171	Binary mode
00470	1161	Rewind load
	2131	Read A/D
	5000	Starting Adr.
	0000	
	0000	
	0000	
	0000	
	0000	
00500	2102	Compare 2xxx with 5xxx
	3534	
	6003	
	7101	
	7610	To (T ₁₀) comparison error
	5402	
	5434	
	3435	
00510	6510	
	2004	Reset Var. Adr. to 2000
	4002	
	2036	Reset Var. Adr. to 5000
	4034	
	5405	Incr. -76 Block count
	6543	
	0576	Reset -76 Block count

00520	4005	
	7553	Search forward for 77 file marks
	5407	
	6501	
	5407	
	6501	
	7547	Check for file mark
	7600	
00530	0720	
	6503	
	5406	Incr. file mark count
	6512	
	0577	Reset file mark count
	4006	
	7536	Search forward for file mark "W"
	5407	
00540	6501	
	5407	
	6501	
	7532	Check for file mark
	7600	
	0720	
	6503	
	5407	
00550	6501	
	7525	Backspace (151) ₈ records
	7600	
	5407	
	6501	
	5437	
	6505	
	2053	Reset backspace count
00560	4037	
	5407	
	6501	
	7514	Read A/D beginning at α information
	7214	Input from 5000 thru 5777
	6000	
	7507	Check for parity error read
	7600	
00570	0204	
	6010	
	7101	
	7076	To (T ₁₁) parity error read
	1131	
	1141	
	1121	
	2131	

00600	5000 2511 3534 6003 7101 7621 5411 5434	Compare "α" information (Instruction changes to 2111) To T ₁₂ comparison error
00610	3435 6510 2003 4011 2036 4034 2315 3441	Reset Var. Adr. to 3000 Reset Var. Adr. to 5000 Check instruction
00620	6104 2040 4321 6103 2041 4324 5415 6544	Change Instruction from 2511 to 2111 Change Instruction from 2111 to 2511 Incr. -10 Block count
00630	0510 4015 7541 7241 5014 7541 7600 0204	Reset Block count to -10 EXF - Read A/D Check for parity error
00640	6003 7101 7101 2116 3534 6003 7101 7632	To T ₁₃ Par. error Read Compare Data To T ₁₄ Comp. Error
00650	5434 5416 3417 6510 2012 4016 2036 4034	Incr. Ind. Adr. Incr. Ind. Adr. Reset Ind. Addresses

00660	5425	Incr. Block count
	6527	
	0520	Reset -20 Block count
	4025	
	7511	Select BCD Mode
	7511	Check for BCD Mode
	7600	
	0301	
00670	6010	
	7101	
	7223	To (T ₁₅) Error BCD Status
	2131	
	5000	
	1172	
	1141	
	0000	
00700	7566	EXF - Read 6 bit
	7266	
	5114	
	7565	Check for parity error
	7600	
	0204	
	6003	
	7101	
00710	7104	To (T ₁₆) Par. Error Read
	7557	Check for Ill. BCD
	7600	
	0210	
	6003	
	7101	
	7262	To (T ₁₇) Error Ill. BCD
	2127	Compare Data
00720	3543	
	6003	
	7101	
	7643	To (T ₁₈) Comp. Error
	5443	Incr. Ind. Addresses
	5427	
	3445	Check 4114 limit
	6510	
00730	2044	Reset Ind. Addresses
	4043	
	2031	
	4027	
	7535	Select Bin. Mode
	7533	Check for Bin. Mode
	7600	
	0201	

00740	6003	
	7101	
	7165	To (T ₁₉) Error Bin Status
	7523	EXP - Read 6 bit
	7223	
	5114	
	7522	Check for parity error
	7600	
00750	0204	
	6003	
	7101	
	7107	To (T ₂₀) par. error read
	2143	Compare Data
	3527	
	6003	
	7101	
00760	7654	To (T ₂₁) Comp. Error
	5443	Incr. Ind. Addresses
	5427	
	3445	Check limit 4114
	6510	
	6007	
	1131	
	5015	
00770	1141	
	1171	
	0000	
	0000	
	2044	Reset Ind. Addresses
	4043	
	2031	
	4027	
01000	5433	Incr. Block count
	6003	
	7101	Loop back on test
	0664	
	0550	Reset Block count
	4033	
	2050	Store Number Pattern from 6000 through 6777
	3077	
01010	4050	
	4146	
	5446	
	3447	
	6506	
	0400	Reset Variable #11
	4050	
	2035	Reset Ind. Adr.

01020	4046	
	7557	Space over file mark 'W'
	5407	
	6501	
	5407	
	6501	
	7545	Select BCD Mode
	7545	Check for BCD Mode
01030	7600	
	0201	
	6103	
	7101	
	7226	To F_{22} Error BCD Status
	7540	Write A/D
	7340	
	7000	
01040	7534	Check for parity error
	7600	
	0204	
	6003	
	7101	
	7032	To F_{23} par. error write
	7526	Check for Ill. BCD
	7600	
01050	0210	
	6003	
	7101	
	7265	To F_{24} error Ill. BCD
	7523	Backspace 1 record
	7600	Delay for backspace
	0600	
	0103	
01060	0701	
	6501	
	7516	EXF - READ A/D
	7216	
	6000	Term. Address
	7507	Check for Parity Error
	7600	
	0204	
01070	6013	
	7101	
	7112	To F_{25} par. error read
	1172	EXF - Codes
	1141	
	2111	
	6000	
	1121	

01100	2131 5000 1131 2134 3546 6003 7101 7665	Compare Data To T_{26} Comp. Error
01110	5434 5446 3447 6510 2316 3217 4320 2036	Incr. Ind. Addresses Shorten Block length by $(0010)_8$ Reset Var. Adr.
01120	4034 2035 4046 2322 3210 4324 3435 6006	Shorten Block length by $(0010)_8$ Check Limit
01130	0600 0600 7101 1026 0010 2035 4340 4046	Reset Block lengths to $(1000)_8$
01140	2036 4340 4034 7511 7311 1162 7510 7600	EXF - Write 6 bit Write Ill. BCD Check for Ill. BCD
01150	0715 6013 7101 7333 1111 1157 1141 0077	To T_{27} Error Ill. BCD not detected

01160	0000	
	0010	
	0000	
	0000	
	7560	Select Bin Mode
	7560	Check for bin mode
	7600	
	6003	
01170	7101	
	7170	To (T₂₈) Error Bin Status
	7556	EXF = Write A/D
	7354	
	3000	
	7550	Check for Par. Error
	7600	
	0204	
01200	6003	
	7101	
	7035	To (T₂₉) Par. Error Write
	5407	
	6501	
	7541	Backspace 1 record
	7600	
	5407	
01210	6501	
	0525	Condition Disconnect Adr.
	4135	
	7536	Check Input Disconnect
	7236	
	6500	
	4060	Store Term. +1
	0600	
01220	0600	
	0600	
	7523	Check for Par. Error
	7600	
	0204	
	6003	
	7101	
	7115	To (T₃₀) Par. Error Read
01230	2134	Compare Data
	3401	
	6003	
	7101	
	7666	To (T₃₁) Comp. Error
	5434	Incr. Ind. Adr.
	3435	Check Limit
	6507	

01240	2134 6012 7101 7320 11 1 1141 1121 2000	Check for zero's stored at disconnect To (T32) Error Inp. disconnect
01250	2111 2131 5000 2036 4034 7101 1335 0600	Reset Var. Adr. Jump to continue Input disconnect check
01260	7551 5407 6501 7545 7600 0320 6503 7542	Backspace 1 file mark Check for file mark Backspace 77 ₈ file marks
01270	5407 6501 7536 7600 0320 6503 5406 6510	
01300	0577 4006 7530 7525 7600 0340 6503 7101	Reset file mark count Rewind load Check for load point
01310	7710 7710 0200 7520 7514 7600 0342 6503	To (T33) type pass count Optional jump Rewind unload Check for not ready

01320	0600	
	0600	
	7101	
	7367	To T ₃₅ type out reel change
	7777	
	7101	Jump to beginning of read
	0444	
	1171	
01330	1141	
	1121	
	1161	
	1151	
	0000	
	2060	Check input disconnect
	0701	
	3435	Check terminal
01340	6103	
	7101	Jump to servo test
	1400	
	7101	Jump to T ₃₄ error Inp. Disc
	7323	
	7101	Jump to continue program
	1260	
	0271	
01350	7110	
	2552	
	2000	
	3000	
	2000	
	0000	
	0000	
	2102	
01360	4103	
	5403	
	5402	
	3404	
	6505	
	2315	
	4000	
	2316	
01370	4001	
	2317	
	4002	
	2320	
	4003	
	2321	
	4004	
	7020	

01400	0507	Set loop count
	4221	
	0507	Set block count
	4206	
	7540	Sel. odd parity
	7540	Write - A/D
	7335	
	7000	
01410	5600	Incr. Block count
	0000	
	6505	
	0507	Reset block count
	4303	
	7531	Backspace
	7600	
	5706	Incr. Backspace count
01420	6503	
	5600	Incr. loop count
	0000	
	7145	
	7521	Write - A/D
	7316	
	3000	
	7520	Status
01430	7600	
	0204	
	6003	
	7101	Jump to T_{36}
	7040	
	7511	Backspace
	7600	
	7720	Sel. jump 2 for creep test (should have small net forward creep)
01440	1424	
	7101	Continue test
	1260	
	2000	Starting Adr.
	1171	Odd parity
	2111	Write
	2121	Backspace
	1141	Status
01450	0501	Shorten backspace count
	5336	
	0501	Shorten block count
	5351	
	3600	Check limit
	0500	
	6554	
	2200	Reset instructions

01460	0507	
	4357	
	4347	
	7740	Sel. Jump 4 (up keeps program in servo test)
	1400	
	7101	Jump to creep test
	1424	
	0000	
01470	1450	
	5077	

07000	7555	EXF - Type
	7445	CR
	7415	P
	7442	.
	7420	E
	7442	.
	7431	W
	7442	.
07010	7445	CR
	7101	
	0236	Var. Address
	2233	Ent. for T ₁
	4302	
	6515	
	2231	Ent. for T ₂
	4305	
07020	6520	
	2227	Ent. for T ₃
	4310	
	6523	
	2225	Ent. for T ₅
	4313	
	6526	
	2223	Ent. for T ₈
07030	4316	
	6531	
	2221	Ent. for T ₂₃
	4321	
	6534	
	2217	Ent. for T ₂₉
	4324	
	6537	
07040	2217	T ₃₆
	4327	
	6542	
	0000	
	0000	
	0000	
	0236	Ret. for T ₁
	0316	Ret. for T ₂
07050	0343	Ret. for T ₃
	0410	Ret. for T ₅
	0433	Ret. for T ₈
	1046	Ret. for T ₂₃
	1203	Ret. for T ₂₉
	4210	EXF - Code
	0000	Spare
	1435	

07060	7555	EXF - Type
	7445	CR
	7415	P
	7442	.
	7420	E
	7442	.
	7412	R
07070	7442	.
	7445	CR
	7101	
	0500	Var. address
	2233	Ent. for T ₉
	4302	
	6515	
07100	2231	Ent. for T ₁₁
	4305	
	6520	
	2227	Ent. for T ₁₃
	4310	
	6523	
	2225	Ent. for T ₁₆
07110	4313	
	6526	
	2223	Ent. for T ₂₀
	4316	
	6531	
	2221	Ent. for T ₂₅
	4321	
07120	6534	
	2217	Ent. for T ₃₀
	4324	
	6537	
	0000	Spares
	0000	
	0000	
07130	0000	
	0000	
	0500	Ret. for T ₉
	0601	Ret. for T ₁₁
07130	0643	Ret. for T ₁₃
	0711	Ret. for T ₁₆
	0754	Ret. for T ₂₀
	1103	Ret. for T ₂₅
	1230	Ret. for T ₃₀
	4210	EXF - Code
	0000	Spare
	0000	Spare
	0000	Spare

07140	7540	EXF - Type
	7445	CR
	7420	E
	7442	°
	7424	S
	7420	E
	7411	L
	7404	SP
07150	7423	B
	7414	l
	7406	N
	7442	.
	7445	CR
	7101	
	0207	Var. Address
	2215	Ent. for T ₀
07160	4302	
	6521	
	2213	Ent. for T ₇
	4305	
	6524	
	2211	Ent. for T ₁₉
	4310	
	6527	
07170	2207	Ent. for T ₂₈
	4313	
	6532	
	4210	EXF - Code
	0207	Ret. for T ₀
	0423	Ret. for T ₇
	0743	Ret. for T ₁₉
	1172	Ret. for T ₂₈
07200	4210	EXF - Code
	7533	EXF - Type
	7445	CR
	7420	E
	7442	°
	7424	S
	7420	E
	7411	L
07210	7404	SP
	7423	B
	7416	C
	7422	D
	7442	.
	7445	CR
	7101	
	0375	Var. Address

07220	2211	Ent. for T4
	4302	
	6521	
	2207	Ent. for T15
	4305	
	6524	
	2205	Ent. for T22
	4310	
07230	6527	
	0375	Ret. for T4
	0700	Ret. for T15
	1035	Ret. for T22
	4210	EXF - Code
	0000	
	0000	
	0000	
07240	7533	EXF - Type
	7445	CR
	7420	B
	7442	.
	7414	I
	7411	L
	7411	L
	7442	.
07250	7423	B
	7416	C
	7422	D
	7442	.
	7445	CR
	7101	
	0415	Var. Address
	2211	Ent. for T6
07260	4302	
	6521	
	2207	Ent. for T17
	4305	
	6524	
	2205	Ent. for T24
	4310	
	6527	
07270	0415	Ret. for T6
	0717	Ret. for T17
	1054	Ret. for T24
	4210	EXF - Code
	0000	
	0000	
	0000	
	0000	

07300	7530	EXF - Type
	7445	CR
	7420	E
	7442	.
	7414	I
	7406	N
	7415	P
	7442	.
07310	7422	D
	7414	l
	7424	S
	7416	C
	7442	.
	7445	CR
	7101	
	1253	Var. Address
07320	2206	Ent. for T ₃₂
	4302	
	6522	
	2204	Ent. for T ₃₄
	4305	
	6525	
	1253	Ret. for T ₃₂
	1345	Ret. for T ₃₄
07330	4210	EXF - Code
	0000	Spare
	0000	Spare
	7531	Ent. for T ₂₇
	7445	CR
	7414	I
	7411	L
	7411	L
07340	7442	.
	7423	B
	7416	C
	7422	D
	7442	.
	7406	N
	7403	O
	7401	T
07350	7404	SP
	7422	D
	7420	E
	7401	T
	7420	E
	7416	C
	7401	T
	7420	E

07360	7422	D
	7445	CR
	7101	
	1164	Exit for T ₂₇
	4210	EXF -Code
	0000	Spare
	0000	Spare
	7520	EXF - Type Ent. for T ₃₅
07370	7445	CR
	7416	C
	7405	H
	7430	A
	7406	N
	7413	G
	7420	E
	7404	SP
07400	7422	R
	7420	E
	7420	E
	7411	L
	7445	CR
	7101	
	1324	Exit for T ₃₅
	4210	EXF - Code
07410	7574	
	7445	CR
	7416	C
	7403	O
	7407	M
	7415	P
	7442	.
	7445	CR
07420	7416	C
	7403	O
	7412	R
	7412	R
	7420	E
	7416	C
	7401	T
	7404	SP
07430	0504	Set Shift Count
	4057	
	4464	Shift correct Data
	4464	
	4464	
	0207	Save lower 3 bits
	6103	Conversion
	0456	Zero

07440	6132	
	0701	
	6103	
	0474	one
	6125	
	0701	
	6103	
	0470	two
07450	6122	
	0701	
	6103	
	0464	three
	6116	
	0701	
	6103	
	0462	four
07460	6112	
	0701	
	6103	
	0466	five
	6106	
	0701	
	6103	
	0472	six
07470	6102	
	0460	seven
	0600	spare
	0600	spare
	3211	
	4202	
	7306	
	7400	74xx
07500	5457	Incr. shift count
	6007	
	7101	
	7432	back to conversion
	4210	EXF - Code
	7400	Constant
	0000	spare
	0000	spare
07510	0504	Reset Shift Count
	4057	
	7564	EXF - Type
	7445	CR
	7420	e
	7412	r
	7412	r
	7403	o

07520	7412	r
	7404	SP
	7404	SP
	7404	SP
	4476	Shift error data
	4476	
	4476	
	0207	Save lower 3 bits
07530	6103	
	0456	Zero
	6132	
	0701	
	6103	
	0474	one
	6126	
	0701	
07540	6103	
	0470	two
	6122	
	0701	
	6103	
	0464	three
	6116	
	0701	
07550	6103	
	0462	four
	6112	
	0701	
	6103	
	0466	five
	6106	
	0701	
07560	6103	
	0472	six
	6102	
	0460	seven
	0600	spare
	0600	spare
	3211	
	4202	
07570	7506	EXT - Type
	7400	74xx
	5457	Incr. shift count
	6005	
	7101	
	7524	
	4210	EXF - Code
7400	Constant	

07600	2065	Load Data Address
	7701	Sel. Stop
	7062	Exit (Txx)
	0000	
	0000	
	0000	
	7101	Jump to Conversion
	7410	
07610	2102	Ent. for T10
	4064	
	2002	Load Address
	4065	
	2134	Load (Ind.) error data
	4076	
	2066	Set exit
	4062	
07620	6512	
	2111	Ent. for T12
	4064	
	2011	
	4065	
	2134	Load (Ind.) error data
	4076	
	2067	Set exit
07630	4062	
	6523	
	2116	Ent. for T14
	4064	
	2016	
	4065	
	2134	
	4076	
07640	2070	
	4062	
	6534	
	2127	Ent. for T18
	4064	
	2027	
	4065	
	2143	
07650	4076	
	2071	
	4062	
	6545	
	2127	Ent. for T21
	4064	
	2027	
	4065	

07660	2143	
	4076	
	2072	
	4062	
	6556	
	2146	Ent. for T26
	4064	
	2046	
07670	4065	
	2134	
	4076	
	2073	
	4062	
	6567	
	2001	Ent. for T31
	4064	
07700	2034	
	4065	
	2134	
	4076	
	2074	
	4062	
	6511	
	0000	
07710	7511	Ent. for "Pass" Type
	7445	
	7415	
	7430	
	7424	
	7424	
	7445	
	7101	
07720	1311	
	4210	

NUMBER: T071
TITLE: Magnetic Tape Test
CATEGORY: 160-A and/or 162, 163, 164
MINIMUM EQUIPMENT NEEDED: 160-A and/or 162, 163, 164

PURPOSE

This test is a six bit test of the tape handler that uses a bit by bit comparison.

DESCRIPTION

1. See flow chart.
2. The sequence of numbers written are of a random sort being generated by starting with 0000 in the first address and octal 0011 being added to the contents of each sequential address for 1777 octal address.
3. The initial block written is 10_8 words in length and each following block is increased by 10_8 words with a filemark being written after each 10_8 blocks. The maximum number of blocks that can be written is 200_8 .

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000 In P register

TERMINAL ADDRESS: 0445

CHECK SUM: 4037

STARTING ADDRESS: 0000

- ADDITIONAL INSTRUCTIONS:
- 1) Tape units at load point.
 - 2) Select switches in sequential order.
 - 3) Binary/Coded switch in binary position.
 - 4) SLS switches 1, 2 and 3 in up position.
 - 5) Place in A number of units to be operated.
 - 6) Run.

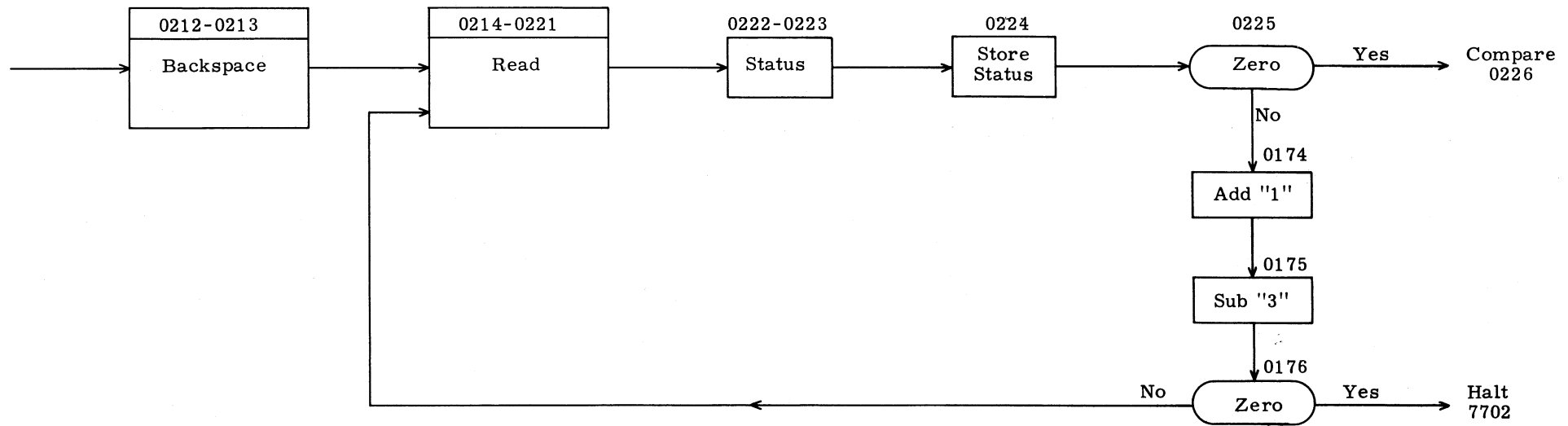
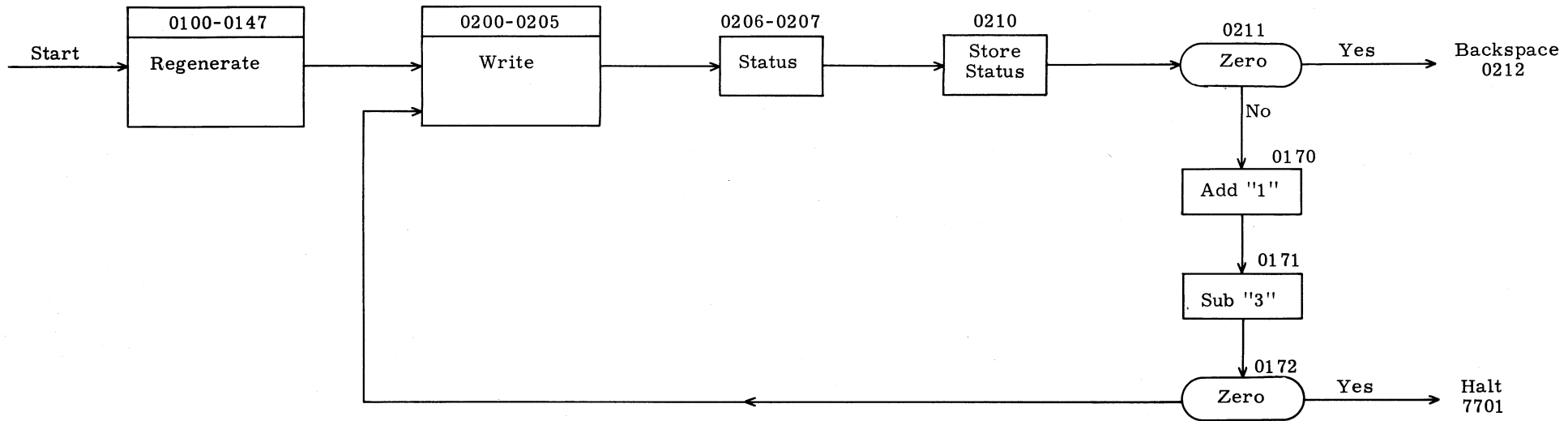
- RESTART ADDRESS: 0200 in P
- 1) After parity error
 - 2) Clear computer
 - 3) Manually load 0000 into locations 0005 and 0006

RESTART ADDRESS: 0000 in P 1) After compare error
2) Clear computer

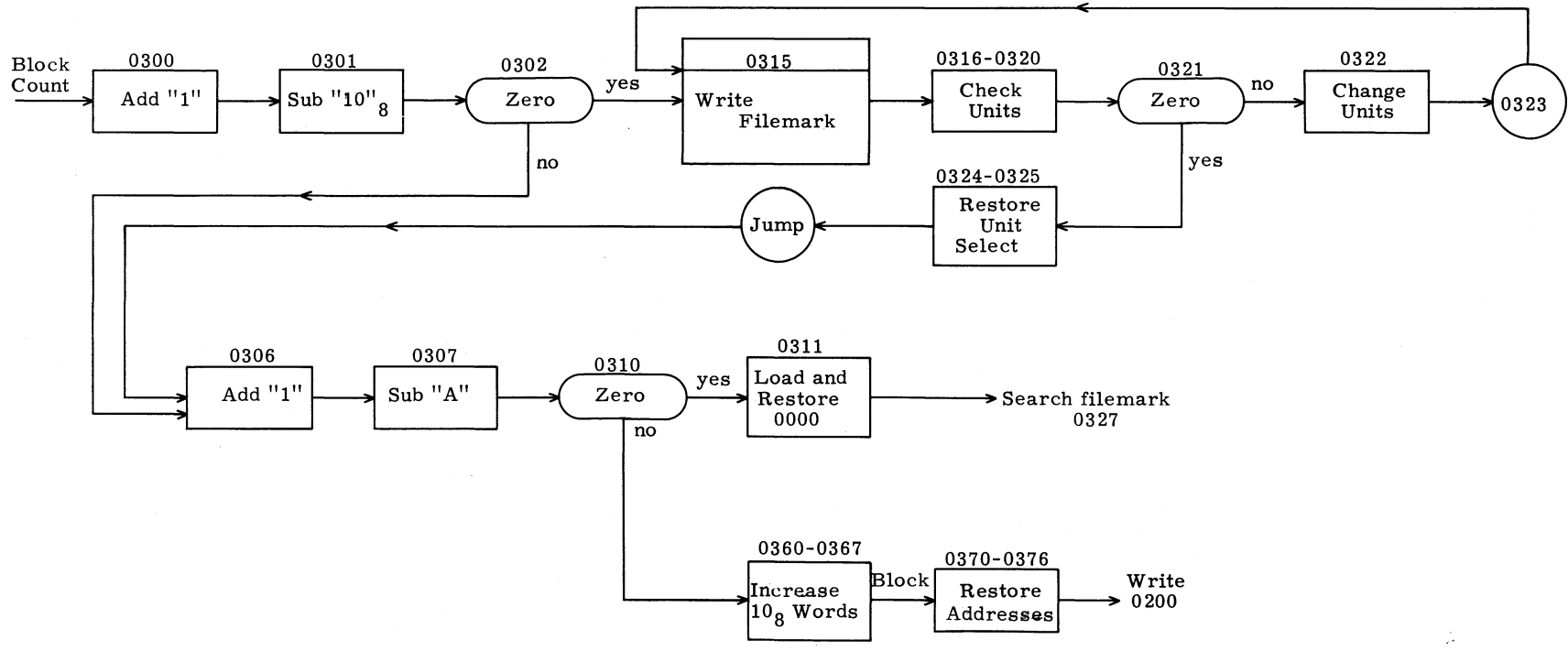
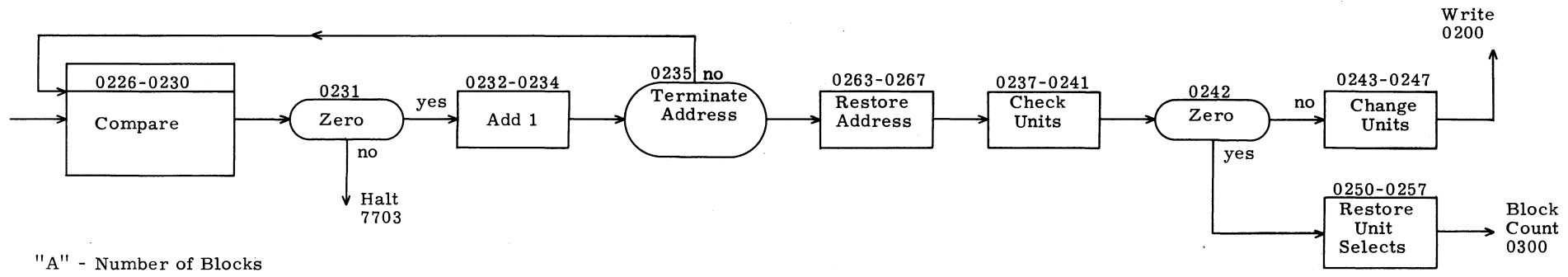
HALTS	EXPLANATION
	In the event a parity error occurs the test will rewrite or reread, in either case, three times and then halt. If a rewrite or reread is successful before three operations the test will continue its normal sequence.
7701	Parity error on write
7702	Parity error on read
7703	Comparison error
7705	Parity on write non-stop

PROGRAM FLOW CHART

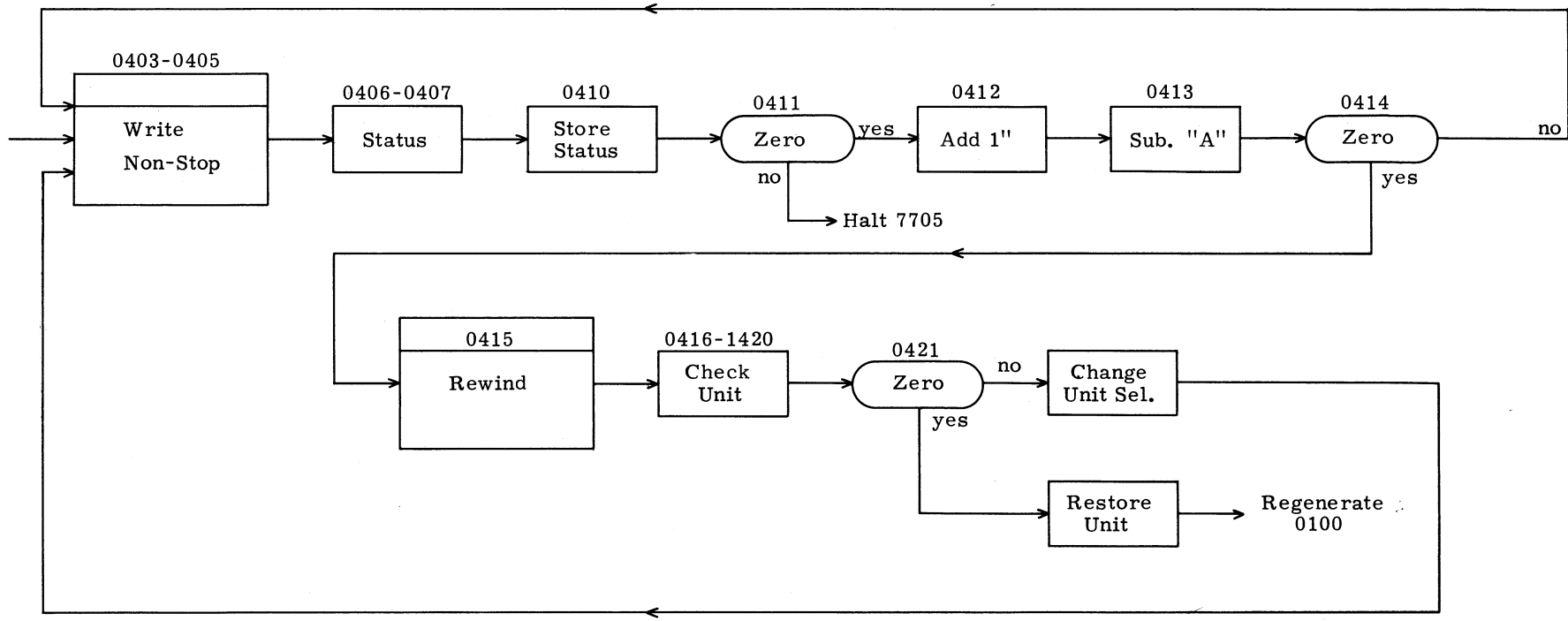
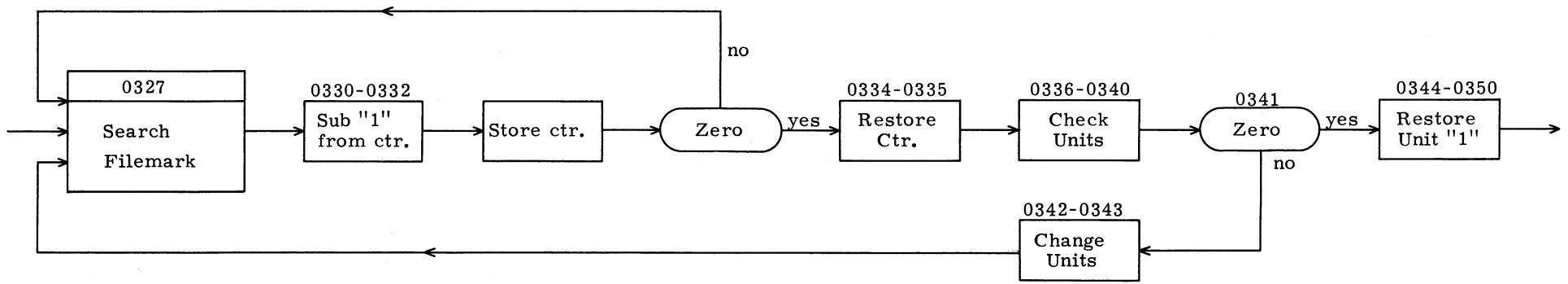
- 0007 - Number of Units
 - 0013 - Number of Blocks Maximum 200
 - 0014 - Number of filemarks counter
 - 0015 - Number of filemarks constant
 - 0016 - Status for Write
 - 0017 - Status for Read
 - 0021 - Address for Compare error - write
 - 0022 - Address for Compare error - read
 - 0023 -)
 - ↓
 - 0053 -)
- } Constant Storage



162:34



162:35



162:36

TAPE TEST "X" UNITS

Place number of units in "A" register -- Run

0000	6002		
0001	4007	Store Number of Units	
0002	7101		
0003	0100	Starting Address	
0004	0000		
0005	0000	Number of Times Rewrite	
0006	0000	Number of Times Reread	
0007	0000		
0010	0000		
0011	0000		
0012	0000		
0013	0200	Number of Blocks	
0014	0020	Search Filemarks Counter	
0015	0020	Search Filemarks Constant	
0016	0000	Store Status Wrote	
0017	0000	Store Status Read	
0020	0000		
0021	2000	Output address	
0022	4000	Input address	comparison error
0023	2010		
0024	4010		
0025	2010		
0026	4010		
0027	2000		
0030	4000		
0031	1111	2111	Change for A/D
0032	1121	2121	Change for A/D
0033	1131	2131	Change for A/D
0034	1141	2141	Change for A/D
0035	1161	2161	Change for A/D
0036	0000		
0037	0000		
0040	0270		
0041	0271		CONSTANTS
0042	0272		
0043	0273		
0044	0202		
0045	0216		
0046	0401		
0047	0402		
0050	0443		
0051	0444		
0052	3777		
0053	0445		
0054	0000		
0055	0000		
0056	0000		
0057	0000		

0060 0000
0061 0000
0062 0000
0063 0000
0064 0000
0065 0000
0066 0000
0067 0000

0070 0000
0071 0000
0072 0000
0073 0000
0074 0000
0075 0000
0076 0000
0077 0000

0100 0400
0101 4010
0102 4011
0103 4012
0104 4016
0105 4017
0106 4020
0107 2025

0110 4023
0111 4144
0112 2026
0113 4024
0114 4145
0115 2027
0116 4021
0117 2020

0120 4121
0121 2021
0122 3750
0123 6006
0124 2020
0125 0611
0126 4020
0127 5421

0130 6511
0131 2027
0132 4021
0133 2030
0134 4022
0135 2031
0136 4140
0137 2032

Initialize Test

0140	4141	Initilization
0141	2033	(Continued)
0142	4142	
0143	2034	
0144	4143	
0145	0400	
0146	7101	
0147	0200	
<hr/>		
0150	2205	
0151	0701	
0152	6501	
0153	7101	Delay Write
0154	0206	
0155	7000	
0156	0000	
0157	0000	
<hr/>		
0160	2205	
0161	0701	
0162	6501	
0163	7101	Delay Read
0164	0222	
0165	7000	
0166	0000	
0167	0000	
<hr/>		
0170	5405	
0171	0703	Rewrite Parity
0172	6106	
0173	7701	Write Parity Stop
0174	5406	
0175	0703	Reread Parity
0176	6114	
0177	7702	Read Parity Stop
<hr/>		
0200	7570	
0201	7304	
0202	2010	
0203	7101	
0204	0150	
0205	2000	Write
0206	7565	Write Status Select
0207	7600	
<hr/>		
0210	4016	
0211	6521	
0212	7557	Backspace
0213	7600	
0214	7556	
0215	7204	
0216	4010	Read
0217	7101	

0220	0160		
0221	4000		
0222	7551	Read Status Select	Read (continued)
0223	7600		
0224	4017		
0225	6531		
0226	2121		
0227	0277	0600	
			Change for A/D
0230	3522		
0231	6146		
0232	5421		
0233	5422		COMPARE
0234	3716		
0235	6507		
0236	6025		
0237	2231		
0240	0207		
0241	3407		
0242	6006		
0243	5625		Change unit
0244	5625		select
0245	5625		
0246	5625		
0247	6547		
0250	2031		
0251	4140		
0252	2032		
0253	4141		Restore Unit
0254	2033		Select Codes
0255	4142		
0256	2034		
0257	4143		
0260	0400		
0261	7101		
0262	0300		
0263	2027		Restore
0264	4021		Compare
0265	2030		Addresses
0266	4022		
0267	6530		
0270	1111		
0271	1121		
0272	1131		
0273	1141		
0274	0000		
0275	0000		
0276	0000		
0277	7703	Compare Stop	

0300	5410	
0301	0710	
0302	6104	
0303	0400	
0304	4010	BLOCK
0305	6010	COUNT
0306	5411	
0307	3413	
<hr/>		
0310	6150	
0311	0400	
0312	4011	
0313	0400	
0314	6013	
0315	7564	Write File Mark
0316	2263	
0317	0207	
<hr/>		
0320	3407	
0321	6003	Change Unit Select
0322	5657	
0323	6506	
0324	2031	Restore Unit
0325	4146	Select Code
0326	6520	
0327	7553	
<hr/>		
0330	2014	SEARCH
0331	0701	
0332	4014	
0333	6504	
0334	2015	
0335	4014	Filemark
0336	2244	
0337	0207	
<hr/>		
0340	3407	Change Unit
0341	6003	SELECT
0342	5640	
0343	6514	
0344	2032	Restore Unit Select
0345	4147	Code
0346	0400	
0347	4020	
<hr/>		
0350	7101	
0351	0403	
0352	0000	
0353	0000	
0354	0000	
0355	0000	
0356	0000	
0357	0000	

0360	2023		
0361	0610		
0362	4023		
0363	4144		
0364	2024		
0365	0610		Generate
0366	4024		Block
0367	4145		Length
<hr/>			
0370	2027		
0371	4021		
0372	2030		
0373	4022		Restore Compare
0374	0400		And Parity Counters
0375	4005		
0376	4006		
0377	7101		
<hr/>			
0400	0200		
0401	1111	Write F.M. Select Code	
0402	1121	Search F.M. Select Code	
0403	7540		
0404	7335		
0405	2100		
0406	7537	Non-Stop Status Select	WRITE NON-STOP
0407	7600		
<hr/>			
0410	4016		
0411	6131		
0412	5420		
0413	3413		
0414	6511		
0415	7527		REWIND
0416	2225		
0417	0207		
<hr/>			
0420	3407		
0421	6007		
0422	5621		CHANGE UNIT
0423	5621		SELECT
0424	5621		
0425	0400		
0426	4020		
0427	6424		
<hr/>			
0430	2031		
0431	4150		
0432	2035		
0433	4151		
0434	2034		
0435	4153		RESTORE UNIT
0436	0400		SELECT CODE
0437	7101		

0440	0100	
0441	2000	
0442	7705	Stop On Status
0443	1111	
0444	1161	
0445	1141	

NUMBER: T630

TITLE: Binary-Coded Magnetic Tape Test

CATEGORY: 160-A, 162, 163, 164

MINIMUM EQUIPMENT NEEDED: 160-A, 162 or 163 or 164

PURPOSE

This program provides a comprehensive test of Magnetic Tape units. The program cannot be used on 606 type transports in high density.

DESCRIPTION

1. See flow chart.
2. This program writes information in both coded and binary format, varying the information and the block length. After each block is written the tape is back-spaced and the block is read and compared in the computer.
3. The block length is increased for the first 200_g blocks, decreased for the next 200_g blocks and then increased for 200_g more blocks. This results in a total of 600_g blocks written on tape. Every 10_g blocks there is a file mark written on tape for a total of 60_g file marks. After writing 600_g blocks, units are searched back for the number of file marks written. Next, each unit writes non-stop 400_g blocks; rewinds and starts complete test over.
4. Parity is checked on both Read and Write and if an error occurs the unit with the error will try three times to correct itself and then halt. One error in non-stop will give a halt. Complete test is in A/D or 12 bit format.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0777

CHECK SUM: 6727

STARTING ADDRESS: 0000

- ADDITIONAL INSTRUCTIONS:
1. Enter in 0013 number of blocks to be written.
 2. Place in A the number of units to be run.
 3. Run.

HALTS

EXPLANATION

7701* Parity error in binary on write

7702* Parity error in binary on read

7703* Comparison error binary

7704* Parity error in coded on write

7705* Parity error in coded on read

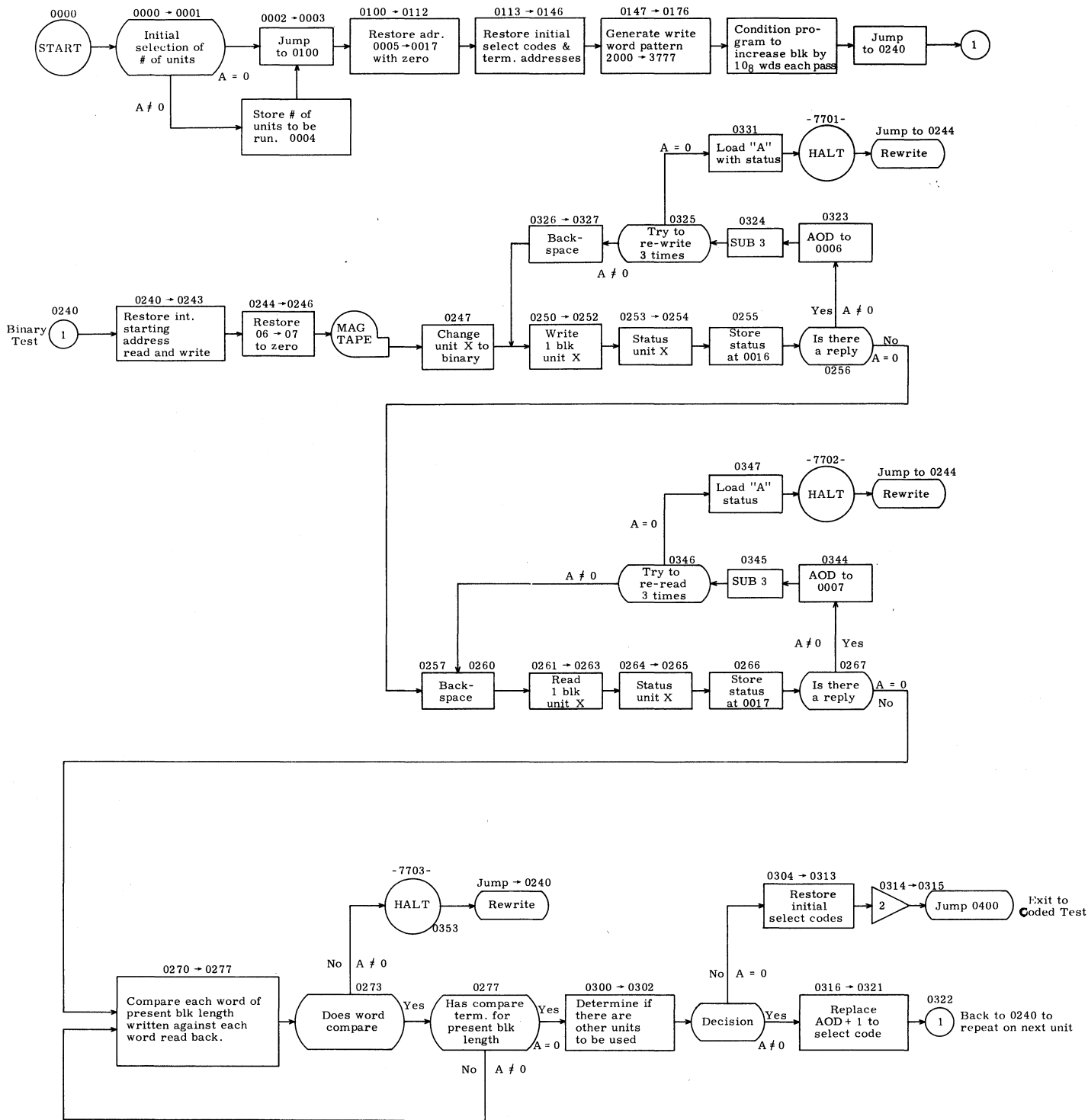
7706* Comparison error in coded

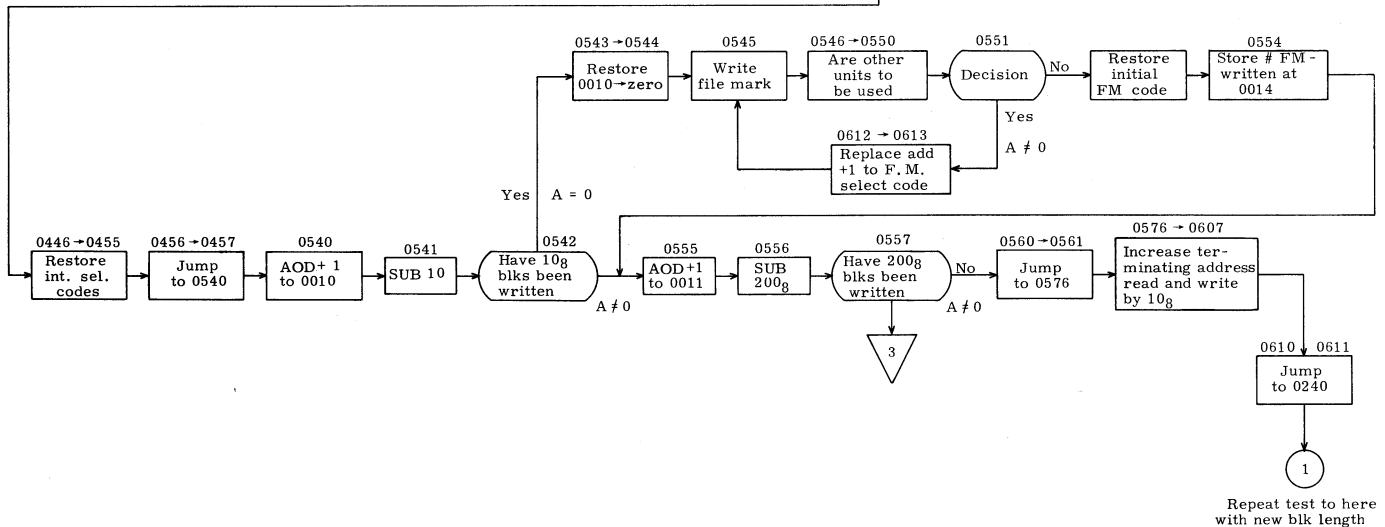
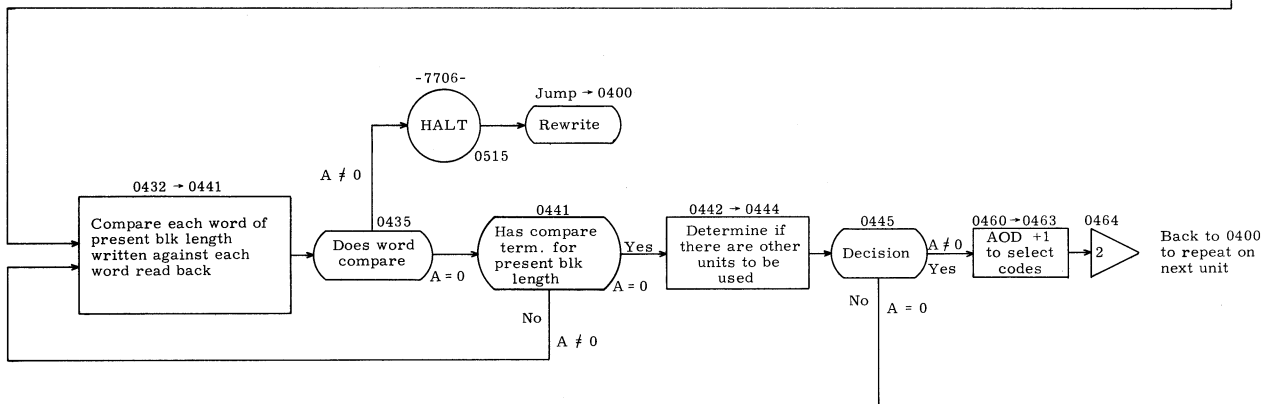
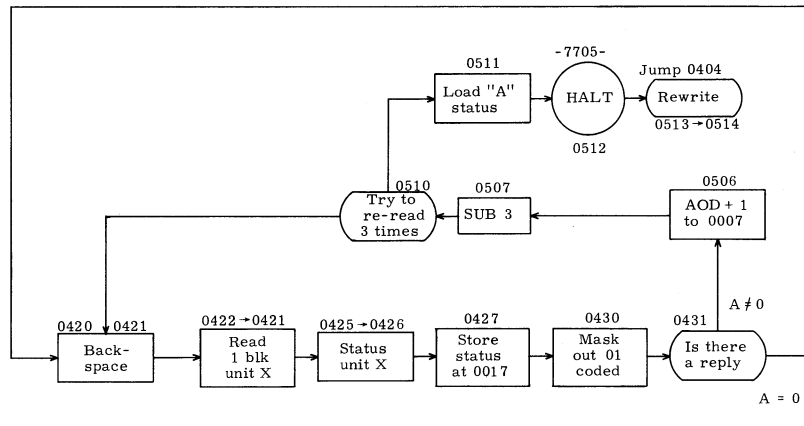
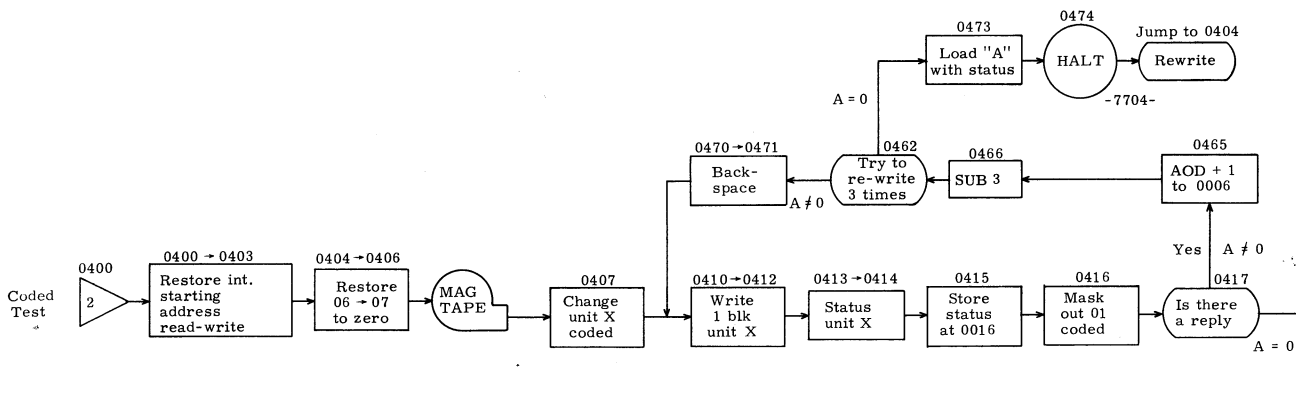
* Running again without clearing will rewrite the block with the error and continue the program

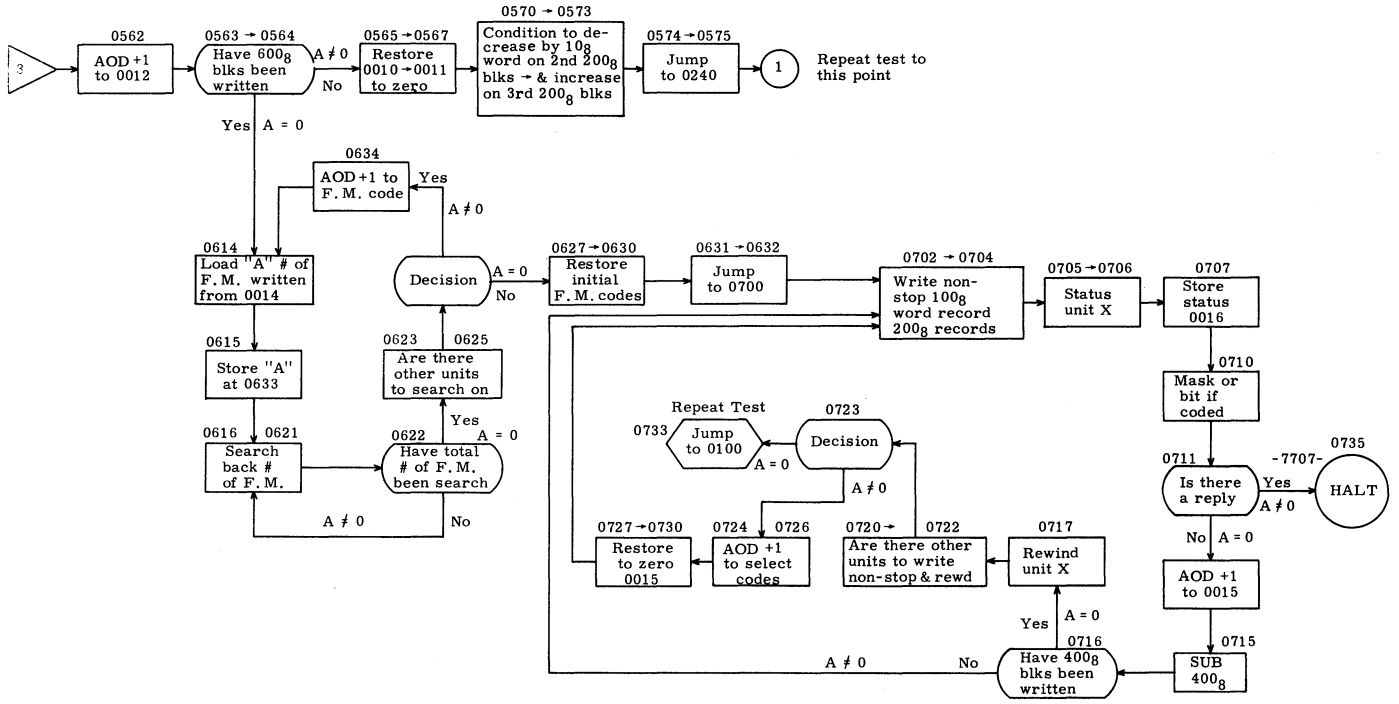
7707 Parity error in non-stop

If halt is 7703 or 7706 the word which does not compare may be found in the following manner:

1. Address 0020 contains the address of the valid word written.
2. Address 0021 contains the address of the invalid word read back to the computer.
3. Address 0022 contains the terminating address of the block written during failure.
4. Address 0023 contains the terminating address of the area read into during failure.







00000 6002
4004
7101
0100
0002
1771
0000
0000

00010 0000
0000
0000
0200
0000
0000
0000
0000

00020 3777
4000
2010
4010
2000
4000
2010
4010

00030 2111
2121
2131
2141
1161
0000
0000
0000

00040 0100
0252
0412
0263
0424
0335
0477
0636

00050 0741
0336
0500
0637
0337
0501
0340
0502

00060 0742
0743
0610
0577
0604
7777
7700
3777

00070 0070
1001
0000
0000
0000
0000
0000
0000

00100 0400
4005
4006
4007
4010
4011
4012
4014

00110 4015
4016
4017
2026
4022
4141
4142
2027

00120 4023
4143
4144
2030
4145
4146
4147
4150

00130 2031
4151
4152
4153
2032
4154
4155
2033

00140 4156
4157
4160
2034
4161
2024
4020
2005

00150 6016
1066
6011
2005
0277
6003
2005
6110

00160 2005
0610
6105
2005
3040
6102
2065
4120

00170 2020
3467
6006
2005
0611
4005
5420
6530

00200 2062
4163
4164
0400
7101
0240
4007
7572

00210 7565
7371
4000
7565
7600
4016
6145
7557

00220 7600
7556
7261
6000
7554
7600
4017
6155

00230 2120
0277
3521
6160
5420
5421
3713
6507

00240 2024
4020
2025
4021
0400
4006
4007
7572

00250 7565
7371
2010
7565
7600
4016
6145
7557

00260 7600
7556
7261
4010
7554
7600
4017
6155

00270 2120
0600
3521
6160
5420
5421
3713
6507

00300 2235
0207
3404
6113
2030
4145
2031
4151

00310 2032
4154
2033
4156
7101
0400
5617
5617

00320 5617
5617
6562
5406
0703
6004
7510
7600

00330 6560
2016
7701
7101
0244
2111
2121
2131

00340 2141
1171
2000
4000
5407
0703
6567
2017

00350 7702
7101
0244
7703
7101
0240
0000
0000

00360 0000
0000
0000
0000
0000
0000
0000
0000

00370 0000
0000
0000
0000
0000
0000
0000
0000

00400 2024
4020
2025
4021
0400
4006
4007
7574

00410 7567
7373
2010
7567
7600
4016
0301
6146

00420 7560
7600
7557
7262
4010
7555
7600
4017

00430 0301
6155
2120
0600
3521
6160
5420
5421

00440 3714
6507
2235
0207
3404
6113
2030
4146

00450 2031
4152
2032
4155
2033
4157
7101
0540

00460 5617
5617
5617
5617
6564
5406
0703
6004

00470 7510
7600
6562
2016
7704
7101
0404
2111

00500 2121
2131
2141
1172
2000
4000
5407
0703

00510 6570
2017
7705
7101
0404
7706
7101
0400

00520 0000
0000
0000
0000
0000
0000
0000
0000

00530 7720
7101
0540
0000
0000
0000
0000
0000

00540 5410
0710
6113
0400
4010
7571
2270
0207

00550 3404
6141
2030
4147
5414
5411
3413
6003

00560 7101
0576
5412
0703
6030
0400
4010
4011

00570 2207
1440
4205
4211
7101
0240
2022
0610

00600 4022
4141
4142
2023
0610
4023
4143
4144

00610 7101
0240
5624
6546
2014
4216
7521
2214

00620 0701
4212
6504
2214
0207
3404
6106
2031

00630 4153
7101
0700
0000
5603
6521
2111
2121

00640 0000
0000
0000
0000
0000
0000
0000
0000

00650 0000
0000
0000
0000
0000
0000
0000
0000

00660 0000
0000
0000
0000
0000
0000
0000
0000

00670 0000
0000
0000
0000
0000
0000
0000
0000

00700 2240
0303
7537
7341
2100
7535
7600
4016

00710 0276
6003
0301
6122
5415
3413
6516
7524

00720 2221
0207
3404
6007
5615
5615
5615
0400

00730 4015
6431
0400
7101
0100
7707
7101
0700

00740 1172
2111
2141
1161
2000
0000
0000
0000

00750 0000
0000
0000
0000
0000
0000
0000
0000

00760 0000
0000
0000
0000
0000
0000
0000
0000

00770 0000
0000
0000
0000
0000
0000
0000
0000

01000 0000

NUMBER: T-650

TITLE: Plotter Test

CATEGORY: 160-A

MINIMUM EQUIPMENT NEEDED: 160-A, 165

PURPOSE

This test program will check the ability of the plotter, while using all functions, to produce repetitious patterns and will check the input switches.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 3000

TERMINAL ADDRESS: 3150

CHECK SUM: 3205

STARTING ADDRESS: Set all Jumps and Stops, Run from 3060

ADDITIONAL INSTRUCTIONS: Switches 0 thru 12 on the plotter may now be set one at a time for alternating the number of boxes plotted. Each switch from left to right corresponds to the number of boxes plotted. The program shall cause the plotter to home on the starting point.

D. PROGRAM REPERTOIRE

03000	2645	
	4245	
	7542	Select Plot
	0400	
	4243	
	7440	Pen up
	7405	+X+Y
	5640	
03010	1642	
	6503	
	7420	Pen down
	7405	+X+Y
	5633	
	1633	
	6503	
	7406	-X+Y
03020	5627	
	1630	
	6503	
	5623	
	6521	
	2620	
	4220	
	0400	
03030	4217	
	7412	-X-Y
	5615	
	1615	
	6503	
	7411	+X-Y
	5611	
	1612	
03040	6503	
	5605	
	6513	
	6015	Exit to Sense Sw.
	4401	
	0005	
	0000	
	0000	
03050	0100	
	0200	
	0030	
	0000	
	0000	
	0000	
	0000	

03060	7500 4440 7600 4234 2231 4071 2230 4072	Select IMP
03070	2227 4073 2073 6473 1171 6004 2172 4332	Exit to Plot
03100	6110 5471 5472 1611 6004 6313 0000 0000	To Add 3110 To Add 3110
03110	7101 3000 0000 0000 3134 3120 3134 0000	Exit to Plot
03120	0001 0002 0004 0010 0020 0040 0100 0200	
03130	0400 1000 2000 4000 0001 0002 0003 0004	

03140	0005
	0006
	0007
	0010
	0011
	0012
	0013
	0014

03150	0000
-------	------

NUMBER: T670

TITLE: Card Reader Test

CATEGORY: 160-A, 167 or 167-2

MINIMUM EQUIPMENT NEEDED: 160-A either 167 or 167-2

PURPOSE

This program will test the card reader.

DESCRIPTION

The test will check the reading ability of the reader using a constant pattern deck under normal, low, and high marginal conditions.

When applicable this will check the Hollerith to binary coded decimal conversion against a pre-stored check list.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

1. Turn on paper tape reader and MC
2. Set Load Clear switch on load
3. Set Run switch

LOADING ADDRESS: 1000

TERMINAL ADDRESS: 1247

CHECK SUM: 4607

STARTING ADDRESS: 1000 Turn on Reader switch "Row 12" (If using column 1, corner cut cards)

HALTS

EXPLANATION

1014

Single Cycle Read

One card is read as a check buffer against which all other cards are checked.

- 1) Reset Run switch or start at 1015 to compare consecutive cards with information of first card, stops indicate the following:

1067

7701 = "A" defines status halt

1034

7702 = Bit failure in "A"

1037

7703 = Column failure in "A"

HALTS

EXPLANATION (Cont'd)

- 2) The Run switch may reset after each stop except status for program continuation. All errors detected are displayed before a new card is read. Vary margin switch between tests.

1130

Free Run Read

Three cards are read without a reselection between cards. Information is stored in a 3 card length buffer and is compared with correct information before reselection.

- 1) Modify program for free run by setting P = 1045 and setting run.

A = 7566 Z = 7704

- 2) To load check buffer, reset Run switch or start at address 1000.

1117

Hollerith to Binary Coded Decimal

The 167 cannot be used for this section. In order to check conversion, cards are read and compared to the previously stored pattern. Use of a Hollerith punched deck is required according to format listed in the program.

- 1) Set P = 1104 and set run to modify program for H to BCD

A = 6012 C = 7706

- 2) Reset Run switch or start at address 1000.
- 3) Halts at 7701, 7702 and 7703 are similar to 1. a) above.
- 4) New information may be checked by manually sweeping area 1400 to 1450. Reset run to detect all errors and continue read.

1141

Single Cycle Read Modification

- 1) Set P = 1053 and set run

A = 7566 Z = 7705

- 2) Reset run switch to continue, and this will return to 1 above.

1000 7566
1001 7600
1002 6165
1003 7562
1004 7257
1005 XXXX
1006 7560
1007 7600

H to BCD = 6012

SC = 2120, FR = 2360

1010 6157
1011 7701
1012 7554
1013 7600
1014 6153
1015 7550
1016 7255
1017 XXXX

Check sum loaded

SC = 1520, FR = 1760, H to BCD = 1450 (1520 for 1617)

1020 7546
1021 7600
1022 6145
1023 2240
1024 4204
1025 2246
1026 4204
1027 2100

1030 XXXX
1031 1500
1032 XXXX
1033 6005
1034 7702
1035 2305
1036 3625
1037 7703

Check address

N.I. address

1040 5706
1041 5711
1042 3622
1043 6514
1044 6432
1045 2225
1046 4341
1047 4215

1050 2225
1051 4332
1052 6147
1053 2216
1054 4347
1055 4207
1056 2216
1057 4340

1060 6152
1061 6012
1062 7566
1063 XXXX
1064 XXXX
1065 XXXX
1066 4540
1067 7707

FWA Check
LWA+1 Check
Code SC = 4502, FR = 4501, H to BCD = 4506

1070 2000
1071 2120
1072 2360
1073 1400
1074 1520
1075 1760
1076 1200
1077 1250 (1320 for 1617)

1100 1450 (1520 for 1617)
1101 4501
1102 4502
1103 4506
1104 2304
1105 4366
1106 2310
1107 4324

1110 2311
1111 4325
1112 2307
1113 4326
1114 2333
1115 4100
1116 1000
1117 7706

1120 6122
1121 2331
1122 4337
1123 2322
1124 4337
1125 2343
1126 4100
1127 1000

1130 7704
1131 6112
1132 2342
1133 4350
1134 2332
1135 4350
1136 2354
1137 4100

1140	1000
1141	7705
1142	0400
1143	7101
1144	1000

BCD		Equivalent	to	
1200	0061	"	"	A
1201	0062	"	"	B
1202	0063	"	"	C
1203	0064	"	"	D
1204	0065	"	"	E
1205	0066	"	"	F
1206	0067	"	"	G
1207	0070	"	"	H
1210	0071	"	"	I
1211	0041	"	"	J
1212	0042	"	"	K
1213	0043	"	"	L
1214	0044	"	"	M
1215	0045	"	"	N
1216	0046	"	"	O
1217	0047	"	"	P
1220	0050	"	"	Q
1221	0051	"	"	R
1222	0022	"	"	S
1223	0023	"	"	T
1224	0024	"	"	U
1225	0025	"	"	V
1226	0026	"	"	W
1227	0027	"	"	X
1230	0030	"	"	Y
1231	0031	"	"	Z
1232	0012	"	"	0
1233	0001	"	"	1
1234	0002	"	"	2
1235	0003	"	"	3
1236	0004	"	"	4
1237	0005	"	"	5
1240	0006	"	"	6
1241	0007	"	"	7
1242	0010	"	"	8
1243	0011	"	"	9
1244	0014	"	"	-
1245	0013	"	"	=
1246	0034	"	")
1247	0033	"	"	.
1250	0054	"	"	*
1251	0053	"	"	\$
1252	0074	"	"	(
1253	0073	"	"	,

BCD (continued)

1254	0021	Equivalent	to	/
1255	0060	"	"	+
1256	0040	"	"	-
1257	0020	"	"	0
↓	↓	↓	↓	↓
1317	0020	"	"	0

HOLLERITH

1200	6162	Equivalent	to	A, B
1201	6364	"	"	C, D
1202	6566	"	"	E, F
1203	6770	"	"	G, H
1204	7141	"	"	I, J
1205	4243	"	"	K, L
1206	4445	"	"	M, N
1207	4647	"	"	O, P
1210	5051	"	"	Q, R
1211	2223	"	"	S, T
1212	2425	"	"	U, V
1213	2627	"	"	W, X
1214	3031	"	"	Y, Z
1215	1201	"	"	0, 1
1216	0203	"	"	2, 3
1217	0405	"	"	4, 5
1220	0607	"	"	6, 7
1221	1011	"	"	8, 9
1222	1413	"	"	- =
1223	3433	"	")
1224	5453	"	"	* \$
1225	7473	"	"	(,
1226	2160	"	"	/ +
1227	4020	"	"	- 0
1230	2020	"	"	0, 0
↓	↓	↓	↓	↓
1247	2020	"	"	0, 0

NUMBER: T670-1
TITLE: Comprehensive Speed and Information Test
CATEGORY: 160-A, 167
MINIMUM EQUIPMENT NEEDED: 160-A, 167 or 167-2

PURPOSE

This test checks the operation of 167 or 167-2 card reader connected to 160-A computer.

DESCRIPTION

The test has 3 sections:

1. Time check
2. Data check, single cycle read
3. Data check, free run read

Sections 2 and 3 are run in non-conversion or H → BCD and pack conversion mode, depending upon a starting parameter in A.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape
LOADING ADDRESS: 0000
TERMINAL ADDRESS: 2140 The routine continues until manually halted
CHECK SUM: 5166
STARTING ADDRESS: 0100
ADDITIONAL INSTRUCTIONS: Set bit 0 in A to omit section 1
 Set bit 1 in A to omit section 2
 Set bit 2 in A to omit section 3
 Set bit 3 in A to test H → BCD and pack mode

HALTS	EXPLANATION
0400	Status response appears in A To re-start: Correct error condition. Master clear if there was a feed failure, program error, or amplifier failure. Set P = 0400. Run.
0410	Timing error A = 0001. There is less than 79 ms of computing time available between the 80th column of one card and the 1st column of the next.

HALTS

EXPLANATION (Cont'd.)

A = 0002. There is less than 1.5 ms of computing time available between inputting of columns.

To restart: Master clear. Set P = 0410. Run.

02x0

Data error section 2.

03x0

Data error section 3.

0200

Error found in 5252 card.

0300

Bit in error appears in A. Step twice to load number of column in error into A. Clear A after loading column number to skip checking remainder of card.

To restart: Press run.

0210

Error found in 2525 card.

0310

Same description as for 5252 card.

0220

Error found in random card.

0320

A contains bit in error. A contains zero if logical check sum cannot detect the row in error.

To restart: Press run.

0230

Error found in Hollerith card.

0330

BCD code actually read appears in A 6-11.

BCD code that should have been read appears in A 0-5.

If A is zero the card is not being recognized as a Hollerith card.

Step twice to load number of column in error into A.

Clear A after loading column number to skip checking remainder of card.

To restart: Press run.

160-A: 167 AND 167-2 TEST
 CARD READER PROGRAMMED
 FOR NORMAL CHANNEL

		REM		
		REM		
		REM		
	0000	ORG	0	
	0000	CON	0	
0000	0000	STOP	0	
0001	0000	CKFLG	0	
0002	0000	CKSUP	0	
0003	0000	CKSLO	0	
0004	0000	CKS3	0	
0005	5252	CD52	5252	
0006	2525	CD25	2525	
0007	3777	LO11	3777	
0010	2260	BUFEND	BUF	790
0011	2261	BUFENT	BUF	800
0012	2141	BUFC	BUF	
0013	2141	BUFI	BUF	
0014	2141	BUFI2	BUF	
0015	0000	ACONT	0	
0016	0000	DELAY	0	
0017	0000	CONT	0	
0020	0000	COLCT	0	
0021	0000	FCNT	0	
0022	2041	TABC	TAB	
0023	2041	TABI	TAB	
0024	0000	TEMP	0	
0025	0000	COL	0	
0026	0000	CDCNT	0	
0027	0000	STATUS		0
0030	0000	SAVE		0
	0100	PRG	100	
0100	7101	START	JFI	1
0101	0500			CR167
	0176	PRG	176	
0176	7101	JFI	1	
0177	0000	ST52	0	
0200	7700	HLT		
0201	2025	LDD	COL	
0202	7101	JFI	1	
0203	0176	ST52		-1

CONTROLS SCR OR FRR ER STOP

A PARAMETER

ERROR STOPS

	0206		PRG	206	
0206	7101		JFI	I	
0207	0000	ST25		0	
0210	7700		HLT		
0211	2025		LDD	COL	
0212	7101		JFI	I	
0213	0206			ST25	-I
	0216		PRG	216	
0216	7101		JFI	I	
0217	0000	STRA		0	
0220	7700		HLT		
0221	7101		JFI	I	
0222	0216			STRA	-I
	0226		PRG	226	
0226	7101		JFI	I	
0227	0000	STH		0	
0230	7700		HLT		
0231	2025		LDD	COL	
0232	7101		JFI	I	
0233	0226			STH	-I
	0276		PRG	276	
0276	7101		JFI	I	
0277	0000	ST52F		0	
0300	7700		HLT		
0301	2025		LDD	COL	
0302	7101		JFI	I	
0303	0276			ST52F	-I
	0306		PRG	306	
0306	7101		JFI	I	
0307	0000	ST25F		0	
0310	7700		HLT		
0311	2025		LDD	COL	
0312	7101		JFI	I	
0313	0306			ST25F	-I
	0316		PRG	316	
0316	7101		JFI	I	
0317	0000	STRAF		0	
0320	7700		HLT		
0321	7101		JFI	I	
0322	0316			STRAF	-I
	0326		PRG	326	
0326	7101		JFI	I	

0327	0000	STHF		0	
0330	7700		HLT		
0331	2025		LUO	COL	
0332	7101		JFI	I	
0333	0326			STHF	-I
	0375		PRG	375	
0375	7101		JFI	I	
0376	0000	STSTAT		0	
0377	2027		LDD	STATUS	
0400	7700		HLT		
0401	7101		JFI	I	
0402	0375			STSTAT	-I
	0406		PRG	406	
0406	7101		JFI	I	
0407	0000	STTIM		0	
0410	7700		HLT		
0411	7101		JFI	I	
0412	0406			STTIM	-I
	0500		PRG	500	
0500	4017	CR167	STD	CONT	
0501	0400		LDN	0	
0502	4001		STD	CKFLG	
0503	2200		LDC	CB167A	
0504	0506				
0505	0070		ACJO		SET BANKS
0506	2017	CR167A	LDD	CONT	
0507	0201		LPN	I	
0510	6103		NZF	CR167B	
0511	7101		JFI	I	
0512	0522			CRTIME	
0513	2017	CR167B	LDD	CONT	
0514	0202		LPN	2	
0515	6103		NZF	CR167C	
0516	7101		JFI	I	
0517	0674			CRSCR	
0520	7101	CR167C	JFI	I	
0521	1043			CRFRR	
0522	7500	CRTIME	EXC	4540	CHECK COL 80-I TIME
0523	4540				
0524	7600		INA		
0525	4027		STD	STATUS	

0526	0277		LPN	77	
0527	6005		ZJF	CRTM2	
0530	7100		JPR	STSTAT	
0531	0376				
0532	7101		JFI	I	
0533	0522			CRTIME	
0534	7500	CRTM2	EXC	4502	
0535	4502				
0536	7254		INP	BUFT	
0537	2261			BUF	800
0540	7500		EXC	4540	
0541	4540				
0542	7600		INA		
0543	4027		STD	STATUS	
0544	0277		LPN	77	
0545	6005		ZJF	CRTM4	
0546	7100		JPR	STSTAT	
0547	0376				
0550	7101		JFI	I	
0551	0522			CRTIME	
0552	7500	CRTM4	EXC	4502	
0553	4502				
0554	2600		LCC	3343	75 MS. DELAY
0555	3343				
0556	4016		STD	DELAY	
0557	2124	CRTM6	LDI	TEMP	
0560	5416		AOD	DELAY	
0561	6502		NZB	CRTM6	
0562	7230		INP	BUFT	
0563	2261			BUF	800
0564	7500		EXC	4540	
0565	4540				
0566	7600		INA		
0567	4027		STD	STATUS	
0570	0210		LPN	10	
0571	6007		ZJF	CRTM10	
0572	2027		LDD	STATUS	
0573	0204		LPN	4	
0574	6112		NZF	CRTM12	
0575	0401		LDN	I	
0576	7100		JPR	STTIM	
0577	0407				

0600	7500	CRTM10	EXC	4540		CHECK INTER COL TIME
0601	4540					
0602	7600		INA			
0603	4027		STD	STATUS		
0604	0277		LPN	77		
0605	6006		ZJF	CRTM14		
0606	7100	CPTM12	JPR	STSTAT		
0607	0376					
0610	7101		JF1	1		
0611	0600			CRTM10		
0612	2141	BUFT		BUF		
0613	2600	CRTM14	LCC	800		
0614	0120					
0615	4024		STU	TEMP		
0616	7500		EXC	4502		
0617	4502					
0620	7237	CRTM16	INP	8UFD		
0621	2142			8UF	+1	
0622	2600		LCC	70		DELAY 1.5 MS.
0623	0070					
0624	4016		STD	DELAY		
0625	5416	CRTM18	AOD	DELAY		
0626	6501		NZB	CRTM18		
0627	5424		AOD	TEMP		
0630	6510		NZB	CRTM16		
0631	7500		EXC	4540		
0632	4540					
0633	7600		INA			
0634	4027		STD	STATUS		
0635	0210		LPN	10		
0636	6007		ZJF	CRTM20		
0637	2027		LDD	STATUS		
0640	0204		LPN	4		
0641	6112		NZF	CRTM22		
0642	0402		LON	2		
0643	7100		JPR	STTIM		
0644	0407					
0645	7500	CRTM20	EXC	4540		
0646	4540					
0647	7600		INA			
0650	4027		STD	STATUS		

0651	0277		LPN	77
0652	6006		ZJF	CRTM24
0653	7100	CRTM22	JPR	STSTAT
0654	0376			
0655	7101		JFI	1
0656	0645			CRTM20
0657	2141	BUFD		BUF
0660	2017	CRTM24	LDD	CONT
0661	0202		LPN	2
0662	6103		NZF	CRTM26
0663	7101		JFI	1
0664	0674			CRSCR
0665	2017	CRTM26	LDD	CONT
0666	0204		LPN	4
0667	6103		NZF	CRTM28
0670	7101		JFI	1
0671	1043			CRFRR
0672	7101	CRTM28	UFI	1
0673	0522			CRTIME
0674	2600	CRSCR	LCC	2000
0675	0310			
0676	4026		STD	CDCNT
0677	0400		LDN	0
0700	4015		STD	ACONT
0701	4001		STD	CKFLG
0702	0410	CRSCRZ	LDN	10
0703	1017		LPD	CONT
0704	6003		ZJF	CRBCK
0705	7101		JFI	1
0706	0772			CRSCR2
0707	7500	CRBCK	EXC	4540
0710	4540			
0711	7600		INA	
0712	4027		STD	STATUS
0713	0274		LPN	74
0714	6004		ZJF	CRBCK4
0715	0400		LDN	0
0716	4001		STD	CKFLG
0717	6011		ZJF	CRBCK6
0720	2001	CRBCK4	LDD	CKFLG
0721	6007		ZJF	CRBCK6
0722	7100		JPR	CK

READ CARDS SINGLE CYCLE

CHECK CARD

0723	1276				
0724	0400	LDN	0		
0725	4001	STD	CKFLG		
0726	5426	AOD	CDCNT		
0727	6024	ZJF	CRBCK8		
0730	7500	CRBCK6	EXC	4540	
0731	4540				
0732	7600	INA			
0733	4027	STD	STATUS		
0734	0277	LPN	77		
0735	6005	ZJF	CRBCK7		
0736	7100	JPR	STSTAT		
0737	0376				
0740	7101	JFI	I		
0741	0730		CRBCK6		
0742	7500	CRBCK7	EXC	4502	
0743	4502				
0744	7206	INP	BUFS		
0745	2261		BUF	800	
0746	0401	LDN	I		
0747	4001	STD	CKFLG		
0750	7101	JFI	I		
0751	0707		CRBCK		
0752	2141	BUFS	BUF		
0753	7701	CRBCK8	SLSI		END OF SECTION
0754	7710		SLJI	CRSCR	REPEAT SECTION
0755	0674				
0756	0404	CRBCK9	LDN	4	
0757	1017		LPD	CONT	
0760	6103		NZF	CRSCRX	
0761	7101		JFI	I	
0762	1043			CRFRR	
0763	0401	CRSCRX	LDN	I	
0764	1017		LPD	CONT	
0765	6103		NZF	CRSCRY	
0766	7101		JFI	I	
0767	0522			CKTIME	
0770	7101	CRSCRY	JFI	I	
0771	0674			CRSCR	
0772	7500	CRSCR2	EXC	4540	167-2 READ CARDS SINGLE CYCLE
0773	4540				

0774	7600		INA		
0775	4027		STD	STATUS	
0776	0274		LPN	74	
0777	6004		ZJF	CRHCK4	
1000	0400		LDN	0	
1001	4001		STD	CKFLG	
1002	6011		ZJF	CRHCK6	
1003	2001	CRHCK4	LDD	CKFLG	
1004	6007		ZJF	CRHCK6	
1005	7100		JPR	CKH	CHECK CARD
1006	1600				
1007	0400		LDN	0	
1010	4001		STD	CKFLG	
1011	5426		AOD	CDCNT	
1012	6024		ZJF	CRHCK8	
1013	7500	CRHCK6	EXC	4540	
1014	4540				
1015	7600		INA		
1016	4027		STD	STATUS	
1017	0277		LPN	77	
1020	6005		ZJF	CRHCK7	
1021	7100		JPR	STSTAT	
1022	0376				
1023	7101		JFI	I	
1024	1013			CRHCK6	
1025	7500	CRHCK7	EXC	4506	
1026	4506				
1027	7206		INP	BUFF	
1030	2211			BUF	400
1031	0401		LDN	I	
1032	4001		STD	CKFLG	
1033	7101		JFI	I	
1034	0772			CRSCR2	
1035	2141	BUFF		BUF	
1036	7701	CRHCK8	SLSI		END OF SECTION
1037	7710		SLJI	CRSCR	REPEAT SECTION
1040	0674				
1041	7101		JFI	I	
1042	0756			CRBCK9	
1043	2600	CRFRR	LCC	15D	READ CARDS FREE RUN
1044	0017				
1045	4026		STD	CDCNT	

1046	0400		LDN	0	
1047	4001		STD	CKFLG	
1050	2200		LDC	100	
1051	0100				
1052	4015		STD	ACONT	
1053	0410		LDN	10	
1054	1017		LPD	CONT	
1055	6003		ZJF	CRFN	
1056	7101		JFI	1	167-2
1057	1175			CBFRR2	
1060	2200	CRFN	LDC	BUF	12000
1061	4421				
1062	4100		STM	CRFN3	
1063	1146				
1064	7500	CRFN1	EXC	4540	
1065	4540				
1066	7600		INA		
1067	4027		STD	STATUS	
1070	0274		LPN	74	
1071	6004		ZJF	CRFN2	
1072	0400		LDN	0	
1073	4001		STD	CKFLG	
1074	6035		ZJF	CBFN11	
1075	2001	CRFN2	LDD	CKFLG	
1076	6033		ZJF	CRFN11	
1077	2026		LDD	CDCNT	
1100	4021		STD	FCNT	
1101	2200		LDC	BUF	800
1102	2261				
1103	4014		STD	BUF12	
1104	7100	CRFN5	JPR	CK	
1105	1276				
1106	5421		AOD	FCNT	
1107	6015		ZJF	CRFN10	
1110	2012		LDD	BUFC	
1111	4013		STD	BUF1	
1112	2600		LCC	80D	
1113	0120				
1114	4020		STD	COLCT	
1115	2114	CRFN8	LDI	BUF12	
1116	4113		STI	BUF1	

1117	5414		AOD	BUF12	
1120	5413		AOD	RUF1	
1121	5420		AOD	COLCT	
1122	6505		NZB	CRFN8	
1123	6417		ZJB	CRFN5	
1124	2600	CRFN10	LCC	80D	
1125	0120				
1126	5220		RAF	CRFN3	
1127	5426		AOD	CDCNT	
1130	6026		ZJF	CRFN12	
1131	7500	CRFN11	EXC	4540	
1132	4540				
1133	7600		INA		
1134	4027		STD	STATUS	
1135	0277		LPN	77	
1136	6005		ZJF	CRFN13	
1137	7100		JPR	STSTAT	
1140	0376				
1141	7101		JFI	I	
1142	1131			CRFN11	
1143	7500	CRFN13	EXC	4501	
1144	4501				
1145	7210		INP	BUF1	
1146	2140	CRFN3		*	
1147	7500		EXC	4500	
1150	4500				
1151	0401		LDN	I	
1152	4001		STD	CKFLG	
1153	7101		JFI	I	
1154	1064			CRFN1	
1155	2141	BUF1		BMF	
1156	7701	CRFN12	SLSI		END OF SECTION
1157	7710		SLJI	CRFRR	REPEAT SECTION
1160	1043				
1161	0401		LDN	I	
1162	1017		LPD	CONT	
1163	6103		NZF	CRFN14	
1164	7101		JFI	I	
1165	0522			CRTIME	
1166	0402	CRFN14	LDN	2	
1167	1017		LPD	CONT	
1170	6103		NZF	CRFN16	

1171	7101		JFI	I		
1172	0674			CRSCR		
1173	7101	CRFN16	JFI	I		
1174	1043			CRFRR		
1175	2200	CRFRR2	LDC	BUF	600D	167#2
1176	3271					
1177	4100		STM	CRFH3		
1200	1263					
1201	7500	CRFH1	EXC	4540		
1202	4540					
1203	7600		INA			
1204	4027		STD	STATUS		
1205	0274		LPN	79		
1206	6004		ZJF	CRFH2		
1207	0400		LDN	0		
1210	4001		STD	CKFLG		
1211	6035		ZJF	CRFH11		
1212	2001	CRFH2	LDD	CKFLG		
1213	6033		ZJF	CRFH11		
1214	2026		LDD	CDCNT		
1215	4021		STD	FCNT		
1216	2200		LDC	BUF	40D	
1217	2211					
1220	4014		STD	BUF12		
1221	7100	CRFH5	JPR	CKH		
1222	1600					
1223	5421		AOD	FCNT		
1224	6015		ZJF	CRFH10		
1225	2012		LDD	BUFC		
1226	4013		STD	HUFI		
1227	2600		LCC	40D		
1230	0050					
1231	4020		STD	COLCT		
1232	2114	CRFH8	LDI	BUF12		
1233	4113		STI	BUFI		
1234	5414		AOD	BUF12		
1235	5413		AOD	BUFI		
1236	5420		AOD	COLCT		
1237	6505		NZB	CRFH8		
1240	6417		ZJB	CRFH5		
1241	2600	CRFH10	LCC	40D		

1242	0050				
1243	5220		RAF	CRFH3	
1244	5426		AOD	CDCNT	
1245	6026		ZJF	CRFH12	
1246	7500	CRFH11	EXC	4540	
1247	4540				
1250	7600		INA		
1251	4027		STD	STATUS	
1252	0277		LPN	77	
1253	6005		ZJF	CRFH13	
1254	7100		JPR	STSTAT	
1255	0376				
1256	7101		JFI	I	
1257	1246			CRFH11	
1260	7500	CRFH13	EXC	4505	
1261	4505				
1262	7210		INP	BUF2	
1263	2140	CRFH3		*	
1264	7500		EXC	4500	
1265	4500				
1266	0401		LDN	I	
1267	4001		STD	CKFLG	
1270	7101		JFI	I	
1271	1201			CRFH1	
1272	2141	BUF2		BUF	
1273	7101	CRFH12	JFI	I	
1274	1156			CRFN12	
1275	7101		JFI	I	
1276	0000	CK		0	167 CARD CHECK
1277	2112	CK1	LDI	BUFC	
1300	3405		SBD	CD52	
1301	6103		NZF	CK3	
1302	7101		JFI	I	CARD IS 52
1303	1452			CK20	
1304	2112	CK3	LDI	BUFC	
1305	3406		SBD	CD25	
1306	6103		NZF	CK5	
1307	7101		JFI	I	CARD IS 25
1310	1525			CK30	
1311	2012	CK5	LDD	BUFC	CARD IS RANDOM
1312	4013		STD	BUF1	
1313	0400		LDN	0	

1314	4002		STD	CKSUP
1315	4003		STD	CKSLO
1316	2407	CK2	LCD	LO11
1317	1113		LPI	BUFI
1320	6202		PJF	CK4
1321	5402		AOD	CKSUP
1322	5413	CK4	AOD	RUFI
1323	3410		SBD	HUFEND
1324	6506		NZB	CK2
1325	2012		LDD	BUFC
1326	4013		STD	BUFI
1327	2113	CK6	LDI	BUFI
1330	1007		LPD	LO11
1331	5003		RAD	CKSLO
1332	6204		PJF	CK8
1333	1007		LPD	LO11
1334	4003		STD	CKSLO
1335	5402		AOD	CKSUP
1336	5413	CK8	AOD	BUFI
1337	3410		SBD	BUFEND
1340	6511		NZB	CK6
1341	2002		LDD	CKSUP
1342	0201		LPN	I
1343	4004		STD	CKS3
1344	2007		LDD	LO11
1345	0102		LS1	
1346	1002		LPD	CKSUP
1347	0103		LS2	
1350	0110		LS3	
1351	0111		LS6	
1352	5003		RAD	CKSLO
1353	6204		PJF	CK12
1354	1007		LPD	LO11
1355	4003		STD	CKSLO
1356	5404		AOD	CKS3
1357	2004	CK12	LDD	CKS3
1360	0201		LPN	I
1361	4002		STD	CKSUP
1362	2007		LDD	LO11
1363	0102		LS1	
1364	1004		LPD	CKS3

SIMULATE 924 CARD READER TEST
CHECK SUM

1365	0103		LS2	
1366	0110		LS3	
1367	0111		LS6	
1370	5003		RAD	CKSLO
1371	2002		LDD	CKSUP
1372	0201		LPN	I
1373	0103		LS2	
1374	0110		LS3	
1375	0111		LS6	
1376	1403		SCD	CKSLO
1377	4003		STD	CKSLO
1400	2012		LDD	BUFC
1401	3200		ADC	79D
1402	0117			
1403	4013		STD	BUFI
1404	2113		LDI	BUFI
1405	1403		SCD	CKSLO
1406	6302		NJF	CK15
1407	6024		ZJF	CK18
1410	2200	CK15	LDC	STRA
1411	0217			
1412	3015		ADD	ACONT
1413	4215		STF	CK17
1414	2012		LDD	BUFC
1415	4013		STD	BUFI
1416	0400		LDN	0
1417	4024		STD	TEMP
1420	2024	CK16	LDD	TEMP
1421	1513		SCI	BUFI
1422	4024		STD	TEMP
1423	5413		AOD	BUFI
1424	3410		SBD	BUFEND
1425	6505		NZB	CK16
1426	2024		LDD	TEMP
1427	7100	CK17	JBR	*
1430	2140			
1431	7101		JFI	I
1432	1275			CK
1433	2012	CK18	LDD	BUFC
1434	4013		STD	BUFI
1435	0400		LDN	0
1436	4024		STD	TEMP

1437	2024	CK19	LDD	TEMP		
1440	1513		SCI	BUFI		
1441	4024		STD	TEMP		
1442	5413		AOD	BUFI		
1443	3410		SBD	BUFEND		
1444	6505		NZB	CK19		
1445	2024		LDD	TEMP		
1446	6736		NJB	CK15		
1447	6537		NZB	CK15		
1450	7101		JFI	I		
1451	1275		CK		-1	CARD CHECK COMPLETED
1452	2200	CK20	LDC	ST52		CHECK 52 CARD
1453	0177					
1454	3015		ADD	ACONT		
1455	4220		STF	CK23Z	I	
1456	4100		STM	CK25Z	I	
1457	1514					
1460	2012		LDD	BUFC		
1461	4013		STD	BUFI		
1462	2113	CK22	LDI	BUFI		
1463	1405		SCD	CD52		
1464	6102		NZF	CK23		
1465	6013		ZJF	CK24		
1466	4024	CK23	STD	TEMP		
1467	2013		LDD	BUFI		
1470	3412		SBD	BUFC		
1471	0601		ADN	I		
1472	4025		STD	COL		
1473	2024		LDD	TEMP		
1474	7100	CK23Z	JPR	*		
1475	2140					
1476	6302		NJF	CK24		
1477	6024		ZJF	CK27		
1500	5413	CK24	AOD	BUFI		
1501	2113		LDI	BUFI		
1502	1406		SCD	CD25		
1503	6302		NJF	CK25		
1504	6013		ZJF	CK26		
1505	4024	CK25	STD	TEMP		
1506	2013		LDD	BUFI		
1507	3412		SBD	BUFC		

1510	0601		ADN	I		
1511	4025		STD	COL		
1512	2024		LDD	TEMP		
1513	7100	CK25Z	JPR	*		
1514	2140					
1515	6302		NJF	CK26		
1516	6005		ZJF	CK27		
1517	5413	CK26	AOD	BUFI		
1520	3600		SBC	BMF	800	
1521	2261					
1522	6540		NZB	CK22		
1523	7101	CK27	JFI	I		
1524	1275			CK	-1	CARD CHECK COMPLETED
1525	2200	CK30	LDC	ST25		CHECK 25 CARD
1526	0207					
1527	3015		ADD	ACONT		
1530	4217		STF	CK33Z	I	
1531	4235		STF	CK35Z	I	
1532	2012		LDD	RUFC		
1533	4013		STD	BUFI		
1534	2113	CK32	LDI	BUFI		
1535	1406		SCD	CD25		
1536	6302		NJF	CK33		
1537	6013		ZJF	CK34		
1540	4024	CK33	STD	TEMP		
1541	2013		LDD	BUFI		
1542	3412		SBD	BUFC		
1543	0601		ADN	I		
1544	4025		STD	COL		
1545	2024		LDD	TEMP		
1546	7100	CK33Z	JPR	*		
1547	2140					
1550	6302		NJF	CK34		
1551	6024		ZJF	CK37		
1552	5413	CK34	AOD	BUFI		
1553	2113		LDI	BUFI		
1554	1405		SCD	CD52		
1555	6302		NJF	CK35		
1556	6013		ZJF	CK36		
1557	4024	CK35	STD	TEMP		
1560	2013		LDD	BUFI		
1561	3412		SBD	BUFC		

1562	0601		ADN	I		
1563	4025		STD	COL		
1564	2024		LDD	TEMP		
1565	7100	CK35Z	JPR	*		
1566	2140					
1567	6302		NJF	CK36		
1570	6005		ZJF	CK37		
1571	5413	CK36	AOD	RUFI		
1572	3600		SBC	BUF	800	
1573	2261					
1574	6540		NZB	CK32		
1575	7101	CK37	JFI	I		
1576	1275			CK	-1	CARD CHECK COMPLETED
1577	7101		JFI	I		
1600	0000	CKH		O		CHECK 167-2 CARD
1601	2012		LDD	HUFC		
1602	4013		STD	BUFI		
1603	2022		LDD	TABC		
1604	4023		STD	TABI		
1605	2113	CKH2	LDI	BUFI		
1606	1200		LPC	7700		
1607	7700					
1610	0111		LS6			
1611	4024		STD	TEMP		
1612	2024	CKH3	LDD	TEMP		
1613	1523		SCI	TABI		
1614	6006		ZJF	CKH4		
1615	5423		AOD	TABI		
1616	3600		SBC	TAB	77	
1617	2140					
1620	6506		NZB	CKH3		
1621	6014		ZJF	CKH10		
1622	5423	CKH4	AOD	TABI		
1623	3600		BBC	TAB	77	
1624	2140					
1625	6104		NZF	CKH5		
1626	2200		LDC	TAB		
1627	2041					
1630	4023		STD	TABI		
1631	2113	CKH5	LDI	BUFI		
1632	0277		LPN	77		

1633	1523		SCI	TABI	
1634	6073		ZJF	CKH14	
1635	5413	CKH10	AOD	BUFI	
1636	2022		LDD	TBBC	
1637	4023		STD	TABI	
1640	2113		LDI	BUFI	
1641	1200		LPC	7700	
1642	7700				
1643	0111		LS6		
1644	4024		STD	TEMP	
1645	2024	CKH11	LDD	TEMP	
1646	1523		SCI	TABI	
1647	6017		ZJF	CKH12	
1650	5423		AOD	TABI	
1651	3600		SBC	TAB	77
1652	2140				
1653	6506		NZB	CKH11	
1654	2200	CKH8	LDC	STH	
1655	0227				
1656	3015		ADD	ACONT	
1657	4204		STF	CKH9	I
1660	0400		LDN	0	
1661	4025		STD	CBL	
1662	7100	CKH9	JPR	*	
1663	2140				
1664	7101		JFI	I	
1665	1577			CKH	-I
1666	5423	CKH12	AOD	TBBI	
1667	3600		SBC	TAB	77
1670	2140				
1671	6104		NZF	CKH13	
1672	2200		LDC	TAB	
1673	2041				
1674	4023		STD	TABI	
1675	2113	CKH13	LDI	BUFI	
1676	0277		LPN	77	
1677	1523		SCI	TABI	
1700	6524		NZB	CKH8	
1701	2023		LDD	TABI	
1702	0701		SBN	I	
1703	4023		STD	TABI	
1704	3600		SBC	TAB	-I

1705	2040				
1706	6106		NZF	CKH15	
1707	2200		LDC	TAB	74
1710	2135				
1711	4023		STD	TABI	
1712	7101		JFI	I	
1713	1740			CKH17	
1714	2023	CKH15	LDD	TABI	
1715	0701		SBN	I	
1716	4023		STD	TBBI	
1717	3600		SBC	TAB	-1
1720	2040				
1721	6106		NZF	CKH14	
1722	2200		LDC	TAB	75
1723	2136				
1724	4023		STD	TABI	
1725	7101		JFI	I	
1726	1740			CKH17	
1727	2023	CKH14	LDD	TABI	
1730	0701		SBN	I	
1731	4023		STD	TABI	
1732	3600		SBC	TAB	-1
1733	2040				
1734	6104		NZF	CKH17	
1735	2200		LDC	TAB	76
1736	2137				
1737	4023		STD	TABI	
1740	2012	CKH17	LDD	BUFC	
1741	4013		STD	BUFI	
1742	2200		LDC	STH	
1743	0227				
1744	3015		ADD	ACONT	
1745	4222		STF	CKH25	I
1746	4252		STF	CKH27	I
1747	2113	CKH20	LDI	BUFI	
1750	1200		LPC	7700	
1751	7700				
1752	0111		LS6		
1753	1523		SCI	TBBI	
1754	6020		ZJF	CKH21	
1755	2013		LDD	BUFI	

1756	3412		SBD	BUFC	
1757	0102		LSI		
1760	0601		ADN	I	
1761	4025		STD	COL	
1762	2113		LDI	BUFI	
1763	1200		LPC	7700	
1764	7700				
1765	1523		SCI	TABI	
1766	7100	CKH25	UPR	*	
1767	2140				
1770	6304		NJF	CKH21	
1771	6103		NZF	CKH21	
1772	7101		JFI	I	
1773	1577			CKH	-1
1774	5423	CKH21	AOD	TABI	
1775	3600		SBC	TAB	77
1776	2140				
1777	6103		NZF	CKH22	
2000	2022		LDD	TABC	
2001	4023		STD	TABI	
2002	2113	CKH22	LDI	BUFI	
2003	0277		LPN	77	
2004	1523		SCI	TABI	
2005	6020		ZJF	CKH23	
2006	2013		LDD	BUFI	
2007	3412		SBD	BUFC	
2010	0102		LSI		
2011	0602		ADN	2	
2012	4025		STD	COL	
2013	2113		LDI	BUFI	
2014	0277		LPN	77	
2015	0111		LS6		
2016	1523		SCI	TABI	
2017	7100	CKH27	JPR	*	
2020	2140				
2021	6304		NJF	CKH23	
2022	6103		NZF	CKH23	
2023	7101		JFI	I	
2024	1577			CKH	-1
2025	5423	CKH23	AOD	TABI	
2026	3600		SBC	TAB	77
2027	2140				

2030	6103		NZF	CKH24		
2031	2022		LDD	TABC		
2032	4023		STD	TABI		
2033	5413	CKH24	AOD	BUFI		
2034	3600		SBC	BUF	400	
2035	2211					
2036	6567		NZB	CKH20		
2037	7101		JFI	1		
2040	1577			CKH	-1	
			REM			CARD CHECK COMPLETED TABLE OF LEGAL CODES
2041	0001	TAB		1		
2042	0002			2		
2043	0003			3		
2044	0004			4		
2045	0005			5		
2046	0006			6		
2047	0007			7		
2050	0010			10		
2051	0011			11		
2052	0012			12		
2053	0013			13		
2054	0014			14		
2055	0015			15		
2056	0016			16		
2057	0017			17		
2060	0020			20		
2061	0021			21		
2062	0022			22		
2063	0023			23		
2064	0024			24		
2065	0025			25		
2066	0026			26		
2067	0027			27		
2070	0030			30		
2071	0031			31		
2072	0032			32		
2073	0033			33		
2074	0034			34		
2075	0035			35		
2076	0036			36		
2077	0037			37		

2100	0040			40
2101	0041			41
2102	0042			42
2103	0043			43
2104	0044			44
2105	0045			45
2106	0046			46
2107	0047			47
2110	0050			50
2111	0051			51
2112	0052			52
2113	0053			53
2114	0054			54
2115	0055			55
2116	0056			56
2117	0057			57
2120	0060			60
2121	0061			61
2122	0062			62
2123	0063			63
2124	0064			64
2125	0065			65
2126	0066			66
2127	0067			67
2130	0070			70
2131	0071			71
2132	0072			72
2133	0073			73
2134	0074			74
2135	0075			75
2136	0076			76
2137	0077			77
2140	0000	*	BSS	1
2141	0000	BUF	RSS	1
	0000		END	

NUMBER: T681-1
TITLE Arithmetic Test for 168-1
CATEGORY: 160-A, 168-1
MINIMUM EQUIPMENT NEEDED: 160-A, 168-1

PURPOSE

To ascertain that the arithmetic operations of the 168-1 are functioning properly.

DESCRIPTION

The 160-A generates operands and directs the 168-1. Subtraction is used to check addition and division is used to check multiplication.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION:	Paper Tape	INPUT PARAMETERS
LOADING ADDRESS:	0000	At 7777 stop with P = 0010
TERMINAL ADDRESS:	0770	set A to the number of times
CHECK SUM:	0160	to repeat selected test.
STARTING ADDRESS:	0000	Previously run test
	0001	Add/Subtract only
	0002	Short Multiply/Divide only
	0003	Long Multiply/Divide only
	0004	All tests

ADDITIONAL INSTRUCTIONS: 1) All selective stop switches up
2) All selective jump switches down

HALTS	EXPLANATION
7777	P = 0010, Load number of test runs in A and run
7700	P = 0133, Non-zero status \neq 0004 in A
7707	P = 0152, Add overflow error
7701	P = 0244, 0266, 0450, and 0647, First word error
7702	P = 0252 and 0655, Second word error
7700	P = 0255, 0326, 0526, Non-zero status in A
7700	P = 0431, and 0623, Non-zero status \neq 0010 in A
7700	P = 0440 and 0641, Divide fault error

HALTS	EXPLANATION (Cont'd.)
7702	P = 0457, Remainder \neq zero
7703	P = 0673, Remainder \neq zero
7777	P = 0754, End of test

00000	7140	Same tests		
	7140	Add/Subt		
	7140	Short Mult/Div		
	7140	Long Mult/Div		
	7140	All Tests		
	0000			
	0000			
	0000			
00010	7777	Load no. of test runs in A and run		
	6004	Restore counters, constants		
	4100			
	0752			
	0400			
	4100			
	1000		1000-1003	Operands
	4100		1004-1005	Add result
			1006-1007	Sub. result
00020	1001		1010-1011	Short Mult. result
	4100		1012-1013	Short Div. result
	1002		1014-1017	Long Mult. result
	4100		1020-1023	Long Div. result
	1003			
	4100			
	0750			
	4100			
00030	0741			
	7101			
	0100	- (0300) (0500)		
	0000			
	0000			
	0000			
	0000			
	0000			
00040	0100	(0300) (0500) (0100)		
	0160			
	0360			
	0560			
	0050			
	0000			
	0000			
	0000			
00050	2200	Establish all tests		
	0100			
	4312			
	4032			
	4100			
	0731			
	2200			
	0300			

00060 4100
0254
2200
0500
4100
0461
0400
6457

00070 0000
0000
0000
0000
0000
0000
0000

00100 7500 Add
3323
7334
1004
7101
0120
0000
0000

00110 0000
0000
0000
0000
0000
0000
0000
0000

00120 7217
1006
7500
3304
7600
6053 ZJF if zero - 0200
0704
6103

00130 6010
0000
0604
7700 Non-zero status ≠ 0004 in A
7101
0100
1000
1004

00140	2100 1001 6203 2500 1001 3600 0316 6303	
00150	7101 0253 7707 7101 0100 0000 0000 0000	Add overflow error
00160	2200 0100 4040 6001 4032 4155 2200 0700	= Establish Add/Sub only
00170	4161 0400 7101 0010 0000 0000 0000 0000	
00200	7500 3363 7303 1006 7353 1004 7101 0220	Subtract
00210	0000 0000 0000 0000 0000 0000 0000 0000	

00220	7240 1010 7500 3304 7600 6130 2100 1006	NZF - 0255 Compare
00230	6131 2100 1007 6126 2100 1000 6223 2100	
00240	1006 3100 1000 6002 7701 2100 1007 3100	First word error
00250	1001 6002 7702 7101 0700 7700 6503 1002	Second word error (0300) Non-zero status in A
00260	1006 2100 1006 3500 1000 6002 7701 2100	First word error
00270	1007 3500 1001 6420 6522 0000 0000 0000	

00300	7500	Short Multiply
	3301	
	7333	
	1001	
	7332	
	1003	
	7101	
	0320	
00310	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00320	7217	
	1012	
	7500	
	3304	
	7600	
	6053	
	7700	Non-zero status in A
	7101	
00330	0300	
	0000	
	0000	
	0000	
	0000	
	1000	
	1002	
	1010	
00340	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00350	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	

00360	2200 0300 4040 6001 4032 4155 2200 0700	Establish short multiply / Divide only
00370	4165 0400 7101 0010 0000 0000 0000 0000	
00400	7500 3300 7363 1012 7362 1003 7101 0420	Short Divide
00410	0000 0000 0000 0000 0000 0000 0000	
00420	7247 1014 7500 3304 7600 6016 0710 6003	
00430	0610 7700 2100 1002 6024 2500 1002 6021	Non-zero status ≠ 0010 in A

00440	7700	Divide fault (Divide by zero)
	7101	
	0300	
	2100	Compare
	1012	
	3500	
	1000	
	6002	
00450	7701	First word error
	2100	
	1013	
	6005	
	2500	
	1013	
	6002	
	7702	Remainder \neq zero
00460	7101	(0500)
	0700	
	0000	
	0000	
	0000	
	1010	
	1002	
	1012	
00470	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00500	7500	Long multiply
	3303	
	7334	
	1004	
	7101	
	0520	
	0000	
	0000	
00510	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	

00520	7217	Input disconnect fails if program stops here awaiting an input.
	1021	
	7500	
	3304	
	7600	
	6053	
	7700	Non-zero status in A
	7101	
00530	0500	
	0000	
	0000	
	0000	
	0000	
	1000	
	1014	
00540	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00550	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00560	2200	Establish long multiply /
	0500	Divide only
	4040	
	6001	
	4032	
	4155	
	0400	
	7101	
00570	0010	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	

00600	7500	Long Divide
	3302	
	7373	
	1020	
	7372	
	1004	
	7101	
	0612	
00610	7500	
	3310	
	7265	
	1024	
	7500	
	3304	
	7600	
	6023	
00620	0710	
	6003	
	0610	
	7700	Non-zero status ≠ 0010 in A
	2100	
	1002	
	6010	
	2500	
00630	1002	
	6110	
	2500	
	1003	
	6105	
	6043	
	2100	
	1003	
00640	6040	
	7700	Divide Fault
	2100	Compare
	1020	
	3500	
	1000	
	6002	
	7701	First word error
00650	2100	
	1021	
	3500	
	1001	
	6002	
	7702	Second word error
	2100	
	1022	

00660 6010
2500
1022
6110
2500
1023
6105
6011

00670 2100
1023
6006
7703
6104
1014
1002
1020

Remainder \neq zero

00700 2500
1000
4100
1000
2500
1001
4100
1001

Alter first operand

00710 6320
0411
5100
1000
6214
0400
4100
1000

00720 0411
5100
1001
6205
0400
4100
1001
6011

00730 7101
0100
0000
0000
0000
0000
0000
0000

(0300) (0500)

00740	2200	Alter second operand
	0000	
	0102	
	6013	
	4303	
	3621	Check for end of test
	6112	
	5600	
00750	0000	Number of tests completed
	3600	
	0000	no. of times to repeat
	6523	
	7777	End of Test
	7112	
	2210	
	4316	
00760	2317	
	4100	
	1002	
	4100	
	1003	
	6535	
	0715	
	0011	
00770	1636	Check sum constant

NUMBER: T681-2

TITLE: AU Select Test

CATEGORY: 160-A, 168-1

MINIMUM EQUIPMENT NEEDED: 160-A, 168-1

PURPOSE

This test checks, by selecting another external equipment, whether the 168-1 can be interrupted at any point and, upon reselection, resume operation without error. All of the 168-1 status replies are also checked.

DESCRIPTION

Tests all 168-1 functions by intermixing them with paper tape reader codes and I/O instructions. Errors are detected by using fixed operands.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0673

CHECK SUM: 0160

STARTING ADDRESS: 0000

ADDITIONAL INSTRUCTIONS:

1. Place a loop of tape in the paper tape reader (any loop is satisfactory since the data is not used).
2. Enter number of test runs in A.

HALTS

EXPLANATION

7777

End of test

7700

Status error

770X

Operation error X = wrong word

10060	0000 0000 0000 0000 0000 0000 0000 0000	
10070	0000 0000 0000 0000 0000 0000 0000 0000	
10100	7500 3304 7600 6002 7700 7500 3300 7414	sel start ready error sel 11 div.
10110	7400 7402 7600 0706 6002 7701 7600 6002	 error
10120	7702 7500 3301 7402 7403 7600 0706 6002	error sel 11 mult
10130	7701 7600 6002 7702 7500 3302 7414 7400	error error sel 22 div.

10140	7400 7400 7402 7400 7600 0706 6002 7701	error
10150	7600 6002 7702 7600 6002 7703 7600 6002	error error
10160	7704 7500 3303 7402 7400 7403 7400 7600	error sel 22 mult
10170	0706 6002 7701 7600 6002 7702 7600 6002	error error
10200	7703 7600 6002 7704 7500 3323 7404 7400	error error sel add
10210	7402 7400 7600 0706 6002 7701 7600 6002	error

10220	7702 7500 3363 7411 7400 7403 7400 7600	error sel sub.
10230	0706 6002 7701 7600 6004 7702 0000 0000	error error
10240	7500 3300 7500 4102 7600 7500 3310 7414	sel ll div. sel reader re sel
10250	7500 4102 7600 7500 3310 7400 7402 7500	sel reader re sel sel reader
10260	4102 7600 7500 3310 7600 0706 6002 7701	re sel error
10270	7500 4102 7600 7500 3304 7600 0720 6002	sel reader sel start unload not complete

10300	7700	error	
	7500	re sel	
	3310		
	7600		
	6002		
	7702	error	
	0477		
	0701		
10310	6501		
	7500	sel start	
	3304	ready	
	7600		
	6002		
	7700	error	
	7500	sel ll mult	
	3301		
10320	7500	sel start	
	3304	ready	
	7600		
	0700		
	6002		
	7700	error	
	7500	sel reader	
	4102		
10330	7500	re sel	
	3310		
	7402		
	7500	re sel	
	3310		
	7403		
	7500	sel reader	
	4102		
10340	7600		
	7500	re sel	
	3310		
	7600		
	0706		
	6002		
	7701	error	
	7500	sel start	unload not complete
10350	3304		
	7600		
	0720		
	6002		
	7700	error	
	7500	re sel	
	3310		
	7600		

10360	6002	
	7702	error
	7500	sel 22 div.
	3302	
	7414	
	7400	
	7400	
	7500	sel reader
10370	4102	
	7500	re sel
	3310	
	7400	
	7402	
	7400	
	7500	sel start
	3304	busy compute
10400	7600	
	0740	
	6002	
	7700	error
	7500	re sel
	3310	
	7600	
	0706	
10410	6002	
	7701	error
	7600	
	6002	
	7702	error
	7500	sel reader
	4102	
	7500	re sel
10420	3310	
	7600	
	6002	
	7703	error
	7600	
	6002	
	7704	error
	7500	sel 22 mult.
10430	3303	
	7402	
	7400	
	7403	
	7400	
	7500	sel start
	3304	
	7600	busy compute

10440	0740	
	6002	
	7700	error
	7500	re sel
	3310	
	7600	
	0706	
	6002	
10450	7701	error
	7500	sel reader
	4102	
	7600	
	7500	re sel
	3310	
	7600	
	6002	
10460	7702	error
	7600	
	6002	
	7703	error
	7600	
	6002	
	7704	error
	7500	sel add
10470	3323	
	7404	
	7500	sel reader
	4102	
	7600	
	7500	re sel
	3310	
	7400	
10500	7402	
	7400	
	7600	
	0706	
	6002	
	7701	error
	7500	sel start
	3304	unload not complete
10510	7600	
	0720	
	6002	
	7700	error
	7500	sel reader
	4102	
	7600	
	7500	re sel

10520	3310	
	7600	
	6002	
	7702	error
	7500	sel reader
	4102	
	7600	
	7500	sel start
10530	3304	
	7600	
	6002	
	7700	error
	7500	sel sub
	3363	
	7500	sel start
	3304	ready
10540	7600	
	6002	
	7700	error
	7500	re sel
	3310	
	7411	
	7400	
	7403	
10550	7400	
	7600	
	0706	
	6002	
	7701	error
	7500	sel start
	3304	
	7600	unload not complete
10560	0720	
	6002	
	7700	error
	7500	re sel
	3310	
	7600	
	6002	
	7702	error
10570	7500	sel ll div for div fault
	3300	
	7310	
	0606	
	7500	
	3304	sel start
	7600	
	0750	div fault and busy compute

10600	6006 7700 0603 1670 0001 0477 0701	error
10610	6501 7500 3304 7600 0730 6002 7700 7500	sel start div fault and unload not complete error sel add for add overflow
10620	3323 7310 0636 7500 3304 7600 0724 6007	sel start add overflow and unload not complete
10630	7700 0632 3777 3777 0001 0000 7500 3363	error sel sub for sub overflow
10640	7310 0655 7500 3304 7600 0724 6007 7700	sel start sub overflow and unload not complete error
10650	0651 3777 3777 7776 7777 5420 2021 3420	advance counter compare to count

```
10660 6005
       7500 }
       3301 } sel. clear MDU
       7101 } jump to repeat test
       0100
       7500 } sel. clear MDU
       3300 }
       0400

10670 7777 end of test
       7101 }
       0000 } jump to establish new number of tests
       2665 } sum
```

NUMBER: T682-1
TITLE: Arithmetic Test for 168-2
CATEGORY: 160-A, 168-2
MINIMUM EQUIPMENT NEEDED: 160-A, 168-2

PURPOSE

To ascertain that the arithmetic operations (including compute result operations) of the 168-2 are functioning properly.

DESCRIPTION

The test routine consists of four separate arithmetic tests. The 160-A generates operands and directs the 168-2. Subtraction is used to check addition and division is used to check multiplication.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION:	Paper Tape	INPUT PARAMETERS
LOADING ADDRESS:	0000	At 7777 stop with P = 0010
TERMINAL ADDRESS:	2500	Set A to number of times
CHECK SUM:	0160	to repeat selected test.
STARTING ADDRESS:	0000	Previously selected test
	0001	Add/Subtract only
	0002	Multiply/Divide only
	0003	Shift/Normalize only
	0004	All tests, including "compute result" operations.

ADDITIONAL INSTRUCTIONS: 1) All selective stop switches up.
2) All selective jump switches down.

HALTS	EXPLANATION
7777	P = 0010, Set A to number of repetitions for test and restart.
7700	P = 0131, 0252, 0326, 0431, 0541, 0560 and 0573, Incorrect status displayed in A.
7700	P = 0144, Incorrect overflow.
7700	P = 0443, Divide fault.

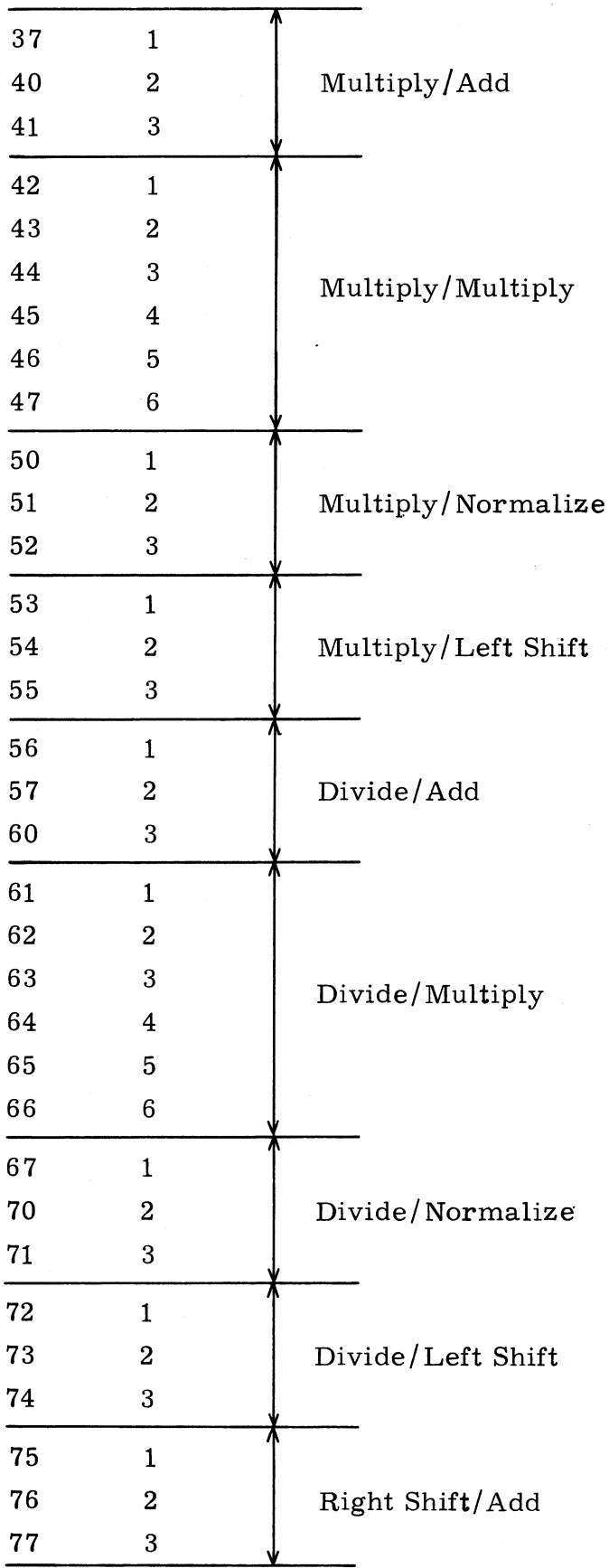
HALTS

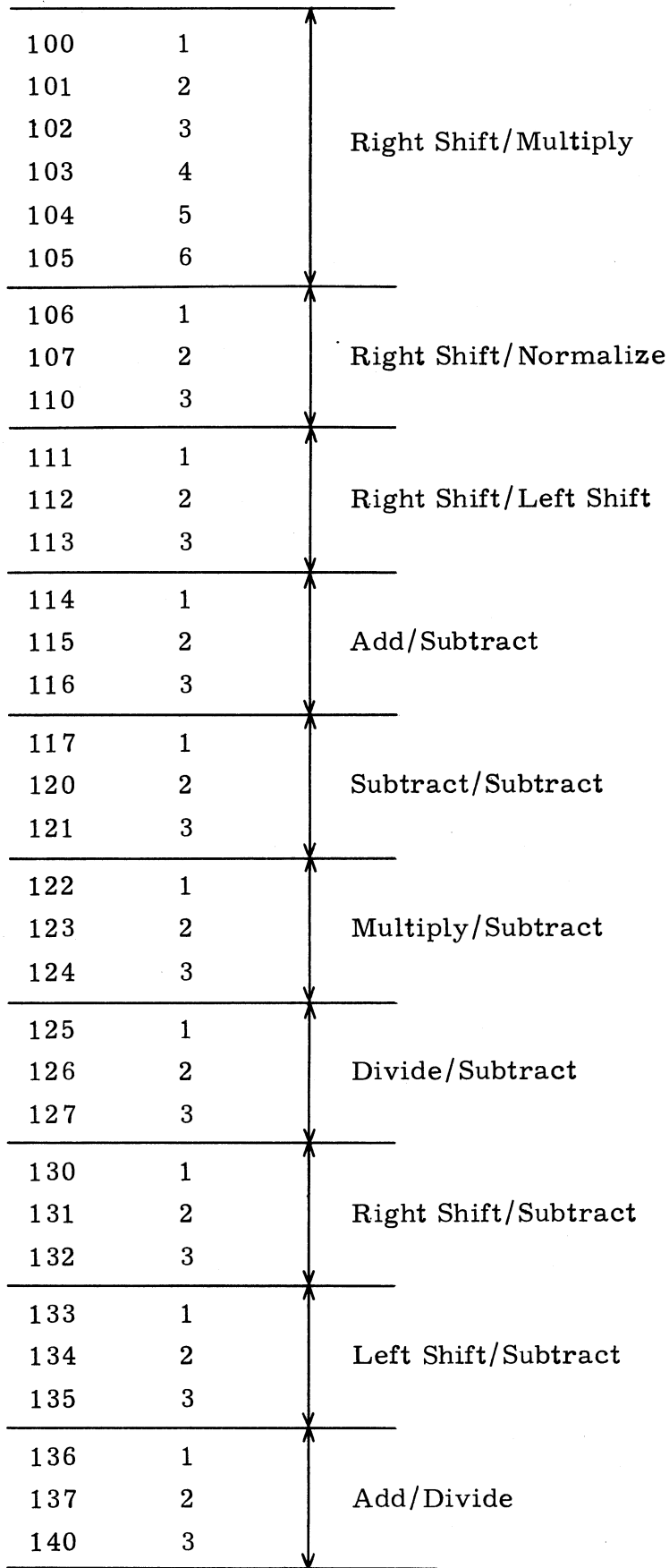
EXPLANATION (Cont'd.)

7700	P = 1164, "Compute result" error. See error stops as indicated by contents of A register.
7700	P = 1665, Multiply to normalize 28th bit error.
7701	P = 0233, 0451 and 0610, First word error.
7702	P = 0241, 0451 and 0613, Second word error.
7703	P = 0247, 0465 and 0620, Third word error.
7704	P = 0410, Multiply/Divide error: remainder \neq zero.
7704	P = 0605, Shift count error.
7777	P = 0775, End of test.

ERROR STOPS

"A"	Word No.	Condition	P = 1164 Z = 7700
1	1		
2	2	Add/Add	
3	3		
4	1		
5	2		
6	3	Add/Multiply	
7	4		
10	5		
11	6		
12	1		
13	2	Add/Normalize	
14	3		
15	1		
16	2	Add/Left Shift	
17	3		
20	1		
21	2	Subtract/Add	
22	3		
23	1		
24	2		
25	3	Subtract/Multiply	
26	4		
27	5		
30	6		
31	1		
32	2	Subtract/Normalize	
33	3		
34	1		
35	2	Subtract/Left Shift	
36	3		





141	1	↑	Subtract/Divide
142	2		
143	3		
144	1	↓	Multiply/Divide
145	2		
146	3		
147	1	↑	Divide/Divide
150	2		
151	3		
152	1	↓	Right Shift/Divide
153	2		
154	3		
155	1	↑	Left Shift/Divide
156	2		
157	3		

168-2 TEST ROUTINES

00000	7140	Repeat same test as before
	7140	Add-subtract only: 10 min.
	7140	Multiply-divide only: 16 min.
	7140	Shift-normalize only: 30 millisecc.
	7161	All tests, including compute result op.: 34 min.
	0000	
	0676	
	0000	
00010	7777	HLT: Enter in "A" number of times test is to run
	6004	
	4100	
	0752	
	0400	
	4100	
	0750	
	4100	
00020	0741	
	4100	
	1005	
	4100	
	1004	
	4100	
	1003	
	0400	
00030	4100	
	1000	
	4100	
	1001	
	4100	
	1002	
	6001	
	7101	
00040	0100	
	0160	
	0340	
	0260	
	0050	
	1030	
	1031	
	1032	
00050	2200	Establish all tests
	0100	
	4040	
	6001	
	6001	
	4100	
	0706	
	2200	

00060 0300
4100
0251
4100
0142
2221
4100
0732

00070 0427
4100
0770
2214
4106
0400
6466
0000

00100 7500 Add
3321
7315
1006
7101
0120
0500
0707

00110 0000
0000
0000
0000
0000
0000
0000
1000

00120 7236
1011
7500 Status
3304
7600
6053
1200
7767

00130 6003
7700 Error (status in "A")
0300
2122 Check if overflow was legal
0207
4077
2535
3477

00140 6203
7101
0700
6004
7700 **Overflow error**
7101
0100
2533

00150 3524
6605
6711
0000
0000
0000
1006
0707 **Establish Add/Subtract only**

00160 2200
0100
4040
4100
0706
4100
0770
2200

00170 0700
4260
4330
2314
4167
0400
7101
0010

00200 7500 **Subtract**
3361
7303
1011
7313
1006
7101
0220

00210 0000
0000
0000
0000
0000
0000
0000
1003

00300	7500	Multiply
	3301	
	7315	
	1006	
	7101	
	0320	
	0000	
	0000	
00310	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	1000	
00320	7211	
	1022	
	7500	Status
	3304	
	7600	
	6053	
	7700	Error (status in "A")
	7101	
00330	0400	
	1014	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00340	2200	Establish Multiply-Divide only
	0300	
	4040	
	4100	
	0706	
	4100	
	0770	
	2200	
00350	0707	
	4100	
	0732	
	0400	
	7101	
	2420	
	0000	
	0000	

00360	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00370	0000	
	0000	
	0000	
	0000	
	0000	
	7101	
	1700	Jump to compute result operations
	0000	
00400	7500	Divide
	3300	
	7315	
	1022	
	7312	
	1006	
	7101	
	0420	
00410	7704	Error (remainder \neq 0)
	7101	
	0700	
	0000	
	0000	
	4000	
	1003	
	1014	
00420	7225	
	1031	
	7500	Status
	3304	
	7600	
	6430	
	3711	
	6003	
00430	3313	
	7700	Error (status in "A")
	2100	
	1003	
	6107	
	2100	
	1004	
	6104	

00440	2100	
	1005	
	6431	
	7700	Divide fault
	2100	Compare answers from multiplication and division
	1022	
	3500	
	1000	
00450	6002	
	7701	1st word error
	2100	
	1023	
	3500	
	1001	
	6002	
	7702	2nd word error
00460	2100	
	1024	
	3500	
	1002	
	6002	
	7703	3rd word error
	2100	
	1025	
00470	6560	
	2100	
	1026	
	6563	
	2100	
	1027	
	6566	
	6466	
00500	0404	
	4100	
	1032	
	0400	
	4145	
	4146	
	4203	
	0410	
00510	5200	
	0000	
	3600	
	0160	
	6103	
	7101	
	0624	
	2306	

00520	0102 4200 0000 2147 0207 3303 4147 7500	Right shift
00530	3303 7372 1033 7270 1003 7500 3304 7600	Status
00540	6002 7700 2147 0207 3333 4147 7500 3302	Error (status in "A") Left shift
00550	7353 1033 7251 1003 7500 3304 7600 6002	Status
00560	7700 7500 3342 7340 1033 7236 1003 7500	Error (status in "A") Normalize and count Status
00570	3304 7600 6002 7700 2325 3642 6142 2147	Error (status in "A")

00600	0110 0111 1234 3772 6002 7704 2145 6002	Shift count error
00610	7701 2146 6002 7702 2147 0207 0704 6002	1st word error 2nd word error
00620	7703 7101 0507 1030 2355 4375 0601 4360	3rd word error Exchange Right and Left shift EXF codes
00630	2200 0660 4100 0516 7101 0500 0370 3302	
00640	2200 0330 3500 0511 4210 2147 0110 0111	
00650	1312 3603 7101 0604 0000 0000 0000 0000	

00660 2200 Exchange Right and Left EXF codes
0624
4100
0516
2100
0530
4100
0547

00670 5500
0530
0400
6002
0000
7101
0707
0000

00700 2200 Alter 1st operand
0055
5100
1000
6025
7101
0100
2200

00710 0055
5100
1001
6506
0407
1100
1002
0707

00720 6005
5500
1002
6416
6517
0400
4100
1002

00730 6010
7101
0500
0000
0000
0000
0000
0000

00740	2200	Alter 2nd operand
	0000	
	0102	
	6013	
	4303	
	3624	Check for end of test
	6112	
	5600	
00750	0000	
	3600	
	0000	Number of times test is to repeat
	6114	
	7101	
	0775	
	2213	
	4316	
00760	2317	
	4100	
	1003	
	4100	
	1004	
	4100	
	1005	
	7101	
00770	0027	
	0715	
	0000	
	0000	
	0000	
	7777	End of test
	7101	
	0011	
01000	0040	} 1st operand
	0000	
	0000	} 2nd operand
	0000	
	0000	} Sum
	0000	
01010	0000	} Difference
	0000	
	0000	} Product
	0000	
	0000	
	0000	

01020	0000	}	Quotient
	0000		
	0000		
	0000		
	0000		
	0000	}	Remainder
	0000		
	0000		
01030	0000	}	Shift/Normalize and count
	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
01040	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
	0000		
01050	0000		
	0000		
	0000		
	0001		
	0000		
	0000	}	Normalized 1st operand
	0000		
	0000		
	0000		
01060	0000	}	Sum
	0000		
	0000	}	Product
	0000		
	0000		
	0000		
01070	0000	}	Normalize and count
	0000		
	0000		
	0000	}	Left shift
	0000		
	0000		
		}	Divide

01100	0000	
	0000	
	2200	Check result (loc. 1002-1277)
	1006	Check Add result
	4205	
	2200	
	1061	
	4204	
01110	2100	
	1006	
	3500	
	1061	
	6004	
	0101	
	7101	
	1160	
01120	5643	
	5710	
	5707	
	3600	
	1064	
	6515	
	2200	Check Multiply result
	1014	
01130	4205	
	2200	
	1064	
	4204	
	2100	
	1014	
	3500	
	1064	
01140	6004	
	0101	
	7101	
	1160	
	5617	
	5710	
	5707	
	3600	
01150	1072	
	6515	
	7101	
	1200	
	0000	
	0000	
	0000	
	0000	

01160	0603	
	4205	
	2200	
	0001	Error indicator counter
	7700	Error. Check "A" register for type of error
	7101	
	0000	
	0000	
01170	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
01200	7500	Check Normalize result
	3342	
	7356	
	1003	
	7255	
	1061	
	2200	
	1056	
01210	4205	
	2200	
	1072	
	4204	
	2100	
	1056	
	3500	
	1072	
01220	6004	
	0101	
	7101	
	1160	
	5741	
	5710	
	5707	
	3600	
01230	1075	
	6515	
	2200	Check left shift result
	1056	
	4205	
	2200	
	1075	
	4204	

01240 2100
1056
3500
1075
6004
0101
7101
1160

01250 5765
5710
5707
3600
1100
6515
7101
1440

01260 1000
1056
0000
0000
0000
0000
0000
0000

01270 0000
0000
0000
0000
0000
0000
0000
0000

01300 7500 Initial operation for a compute result selection
3321
7375
1003
7372
1053
7101
1310

01310 7500 Add to result
3335
7363
1006
7260
1064
2200
1330

01320 4311
7101
1300
1474
1600
0000
0000
0000

01330 7500 **Multiply result**
3315
7343
1006
7237
1072
2200
1345

01340 4331
7101
1300
0000
0000
7500 **Normalize result**
3356
7223

01350 1075
2200
1400
4344
7101
1300
0000
0000

01360 0000
0000
0000
0000
0000
0000
0000
0000
0000

01370 0000
0000
1072
1064
1061
1003
1050
1000

01400	2100	Left shift result
	1074	
	1200	
	7700	
	0111	
	0110	
	4317	
	7500	
01410	3316	
	7326	
	1370	
	7223	
	1100	
	2200	
	1440	
	4100	
01420	1257	
	2332	
	0110	
	4335	
	5100	
	1077	
	2200	
	1310	
01430	4100	
	1307	
	7101	
	1102	
	0000	
	0000	
	1075	
	1367	
01440	2200	Establish subtract as initial operation
	3361	
	4100	
	1301	
	2200	
	1460	
	4100	
	1416	
01450	7101	
	1300	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	

01460	2200	Establish multiply as initial operation
	7123	
	4100	
	1300	
	7500	
	3301	
	7351	
	1003	
01470	7346	
	1531	
	7243	
	1526	
	7500	
	3301	
	7337	
	1523	
01500	7334	
	1532	
	0300	
	0300	
	2200	
	1540	
	4100	
	1416	
01510	7101	
	1306	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
01520	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0002	
	0000	
01530	0000	
	0004	
	0000	
	0000	
	1527	
	1520	
	1526	
	1000	

01540	2200	Establish divide as initial operation
	7500	
	4100	
	1300	
	2200	
	3300	
	4100	
	1301	
01550	0401	
	4100	
	1053	
	2200	
	1056	
	4100	
	1305	
	2200	
01560	1600	
	4100	
	1416	
	7101	
	1300	
	0000	
	0000	
	0000	
01570	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
01600	2200	Establish right shift as initial operation
	7124	
	4100	
	1300	
	7500	
	3342	
	7330	
	1003	
01610	7500	
	3317	
	7325	
	1370	
	2200	
	2000	
	4100	
	1416	

01620 2200
1053
4100
1305
7101
1306
0000
0000

01630 0000
0000
0000
0000
0000
0000
1000
1367

01640 7101
0444
0000
0000
0000
0000
0000
0000

01650 7500
3301
7316
1700
7500
3356
7213
1650

01660 2100
1647
3600
3304
6002
7700
7101
1640

Error (multiply to normalize, 28th bit)

01670 1672
1645
0001
0000
0000
0000
0000
0004

01700	0401	Establish compute result test conditions
	4100	
	1163	
	2200	
	1440	
	4100	
	1257	
	2200	
01710	7500	
	4100	
	1300	
	2200	
	3321	
	4100	
	1301	
	2200	
01720	1440	
	4100	
	1416	
	2200	
	1310	
	4100	
	1307	
	2200	
01730	1053	
	4100	
	1305	
	2100	
	1002	
	0204	
	6132	
	0300	
01740	2200	
	1232	
	4100	
	2023	
	2200	
	2300	
	4100	
	2245	
01750	5622	
	3622	
	6116	
	0400	
	4216	
	2200	
	3321	
	4100	

01760 2001
2100
1010
0214
6104
7101
2060
0000

01770 7101
1640
0000
0100
0000
0000
0000
0000

02000 7500 Establish Add as initial operation
3321
7334
1011
7331
1053
7500 Subtract from result
3375

02010 7324
1006
7500
3356
7223
1100
2200
2040

02020 4100
1257
7101
1232
0000
0000
0000
0000

02030 0000
0000
0000
0000
1003
1050
1006
1075

02040	2200	Establish subtract as initial operation
	3361	
	4100	
	2001	
	2200	
	2100	
	4100	
	2017	
02050	7101	
	2000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
02060	2200	Establish initial conditions
	2040	
	4100	
	2017	
	2200	
	3375	
	4100	
	2007	
02070	2200	
	2006	
	4100	
	2127	
	5600	
	0000	
	7101	
	1300	
02100	2100	Establish multiply as initial operation
	1010	
	0214	
	6133	
	7500	
	3301	
	7371	
	1011	
02110	7354	
	1531	
	7263	
	2173	
	7500	
	3301	
	7357	
	2170	

02120	7354	
	1532	
	2200	
	2140	
	4100	
	2017	
	7101	
	2000	
02130	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	7101	
	1640	
02140	7500	Establish divide as initial operation
	3300	
	7335	
	1011	
	7327	
	1056	
	2200	
	2200	
02150	4100	
	2017	
	7101	
	2006	
	0000	
	0000	
	0000	
	0000	
02160	0000	
	0000	
	0000	
	0000	
	1526	
	0000	
	0000	
	0000	
02170	0000	
	0000	
	0000	
	1050	
	1527	
	2165	
	1527	
	1006	

02200	7500	Establish right shift as initial operation
	3303	
	7335	
	1011	
	2200	
	2240	
	4100	
	2017	
02210	7101	
	2006	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
02220	0000	
	0400	Establish Test #4 conditions
	4100	
	2075	
	4100	
	1772	
	2200	
	6430	
02230	4100	
	0425	
	7101	
	0050	
	0000	
	0000	
	0000	
	1006	
02240	7500	Establish left shift as initial operation
	3302	
	7335	
	1011	
	2200	
	2300	
	4100	
	2017	
02250	7101	
	2006	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	

02260 0000
0000
0000
0000
0000
0000
0000
0000

02270 0000
0000
0000
0000
0000
0000
0000
1006

02300 2100 Establish divide as 2nd operation
1003
6107
2100
1004
6104
2100
1005

02310 6026
2200
3314
4100
2007
2200
2340
4100

02320 2023
2200
3321
4100
2001
2200
2040
4100

02330 2017
7101
2000
0000
0000
0000
7101
1640

02340	2100	Check divide result
	2017	
	4253	
	7500	
	3300	
	7372	
	1011	
	7367	
02350	1053	
	7364	
	1006	
	7500	
	3356	
	7257	
	2336	
	2200	
02360	1075	
	4205	
	2200	
	2333	
	4204	
	2100	
	1075	
	3500	
02370	2333	
	6004	
	0101	
	7101	
	1160	
	5500	
	1163	
	5711	
02400	5710	
	3600	
	2336	
	6516	
	2200	
	1650	
	4100	
	2245	
02410	2200	
	2450	
	4100	
	2127	
	7101	
	2040	
	0000	
	0000	

02420	2200	Establish Test #3 conditions
	6017	
	4100	
	0425	
	0400	
	7101	
	0010	
	0000	
02430	0000	
	0000	
	0000	
	0000	
	2333	
	1003	
	1050	
	1006	
02440	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
02450	7500	
	3316	
	7400	
	7500	
	3315	
	7322	
	1056	
	2200	
02460	2006	
	4100	
	2127	
	7101	
	2006	
	0000	
	0000	
	0000	
02470	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	1053	
02500	6436	Check sum const.

NUMBER: T682-2

TITLE: AU Select Test

CATEGORY: 160-A, 168-2

MINIMUM EQUIPMENT NEEDED: 160-A, 168-2

PURPOSE

The test checks by selecting another external equipment, whether the 168-2 can be interrupted at any point and upon reselection, resume operation without error. All of the 168-2 status replies are also checked.

DESCRIPTION

Tests all 168-2 functions by intermixing them with paper tape reader codes and I/O instructions. Errors are detected by using fixed operands.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 1014

CHECK SUM: 0160

STARTING ADDRESS: 0000

ADDITIONAL INSTRUCTIONS:

- 1) Turn on the 350 reader.
- 2) Set A to the desired number of runs through the test.
- 3) Position all SLS switches up.
- 4) Place a loop of tape in the reader.

HALTS

EXPLANATION

7777 P=1011 End of test.

7700 Status error.

770X X = number of word on which error occurred.

168-2 SELECT TEST

00000 6104
4020 Clear Counter
7101
0100
4021 Store New Count
0400
4020 Clear Counter
7101

00010 0100
0000
0000
0000
0000
0000
0000
0000

00020 0000 Counter
0001 Count
0000
0000
0000
0000
0000
0000

00030 0000
0000
0000
0000
0000
0000
0000
0000

00040 0000
0000
0000
0000
0000
0000
0000
0000

00050 0000
0000
0000
0000
0000
0000
0000
0000

00060	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00070	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
	0000	
00100	7500	
	3304	
	7600	
	6002	
	7700	Status Error
	7500	
	3300	Select Divide
	7414	1st Word
00110	7414	2nd Word
	7400	3rd Word
	7400	4th Word
	7400	5th Word
	7400	6th Word
	7402	7th Word
	7402	8th Word
	7400	9th Word
00120	7600	
	0706	
	6002	
	7701	Error
	7600	
	6002	
	7702	Error
	7600	
00130	6002	
	7703	Error
	7600	
	6002	
	7704	Error
	7600	
	6002	
	7705	Error

00140	7600	
	6002	
	7706	Error
	7500	
	3301	Multiply
	7402	1st Word
	7402	2nd Word
	7401	3rd Word
00150	7406	4th Word
	7400	5th Word
	7400	6th Word
	7600	
	0714	
	6002	
	7701	Error
	7600	
00160	0714	
	6002	
	7702	Error
	7600	
	0706	
	6002	
	7703	Error
	7600	
00170	0700	
	6002	
	7704	Error
	7600	
	6002	
	7705	Error
		7600
	6002	
00200	7706	Error
	7500	
	3321	Add.
	7406	1st Word
	7406	2nd Word
	7401	3rd Word
	7401	4th Word
	7401	5th Word
00210	7401	6th Word
	7600	
	0707	
	6002	
	7701	Error
	7600	
	0707	
	6002	

00220	7702	Error
	7600	
	0702	
	6002	
	7703	Error
	7500	
	3361	Subtract
	7406	1st Word
00230	7406	2nd Word
	7401	3rd Word
	7401	4th Word
	7401	5th Word
	7401	6th Word
	7600	
	0705	
	6002	
00240	7701	Error
	7600	
	0705	
	6002	
	7702	Error
	7600	
	6002	
	7703	Error
00250	7500	
	3302	Left Shift
	7404	1st Word
	7404	2nd Word
	7414	3rd Word
	7600	
	0711	
	6002	
00260	7701	Error
	7600	
	0710	
	6002	
	7702	Error
	7600	
	0700	
	6002	
00270	7703	Error
	7500	
	3303	Right Shift
	7402	1st Word
	7402	2nd Word
	7412	3rd Word
	7600	
	0701	

00300	6002	Error
	7701	
	7600	
	0701	Error
	6002	
	7702	
	7600	Error
	0701	
00310	6002	
	7703	
	7500	Divide
	3300	
	7500	See Reader
	4102	
	7600	
	7500	
00320	3310	Reselect
	7414	1st Word
	7414	2nd Word
	7500	Reselect
	4102	
	7600	
	7500	
	3310	
00330	7400	3rd Word
	7400	4th Word
	7400	5th Word
	7400	6th Word
	7500	Reselect
	4102	
	7600	
	7500	
00340	3310	Reselect
	7402	7th Word
	7402	8th Word
	7400	9th Word
	7500	Reselect
	4102	
	7600	
	7500	
00350	3310	Reselect
	7600	Error
	0706	
	6002	
	7701	
	7500	
	4102	
	7600	

00360	7500	
	3310	Reselect
	7600	
	6002	
	7702	Error
	7600	
	6002	
00370	7703	Error
	7500	
	4102	
	7600	
	7500	
	3310	Reselect
	7600	
00400	6002	
	7705	Error
	7500	
	3304	
	7600	
	0720	
	6002	
00410	7700	Status Error
	7500	
	3310	Reselect
	7600	
00420	6002	
	7706	Error
	7500	
	3301	Multiply
	7500	
	4102	
	7600	
00430	7500	
	3310	Reselect
	7402	1st Word
	7402	2nd Word
	7401	3rd Word
	7500	
	4102	
00430	7600	
	7500	
	3310	Reselect
	7406	4th Word
	7400	5th Word
	7400	6th Word
	7500	
00430	3304	
	7600	
	7500	

00440	0740 6002 7700 7500 3310 7600 0714 6002	Status
00450	7701 7500 4102 7600 7500 3310 7600 0714	Error Reselect
00460	6002 7702 7500 3304 7600 0720 6002 7700	Error Status Error
00470	7500 3310 7600 0706 6002 7003 7600 0700	Reselect Error
00500	6002 7704 7500 4102 7600 7500 3310 7600	Error Fourth Word Reselect
00510	6002 7705 7600 6002 7706 7500 3321 7500	Error 5th Word Error 6th Word Add

00520	4102 7600 7500 3310 7406 7406 7500 4102	Reselect 1st Word 2nd Word
00530	7600 7500 3310 7401 7401 7500 4102 7600	Reselect 3rd Word 4th Word
00540	7500 3310 7401 7401 7500 3304 7600 0720	5th Word 6th Word
00550	6002 7700 7500 3310 7600 0707 6002 7701	Status Error Error
00560	7500 4102 7600 7500 3310 7600 0707 6002	Reselect
00570	7702 7600 0702 6002 7703 7500 3361 7500	Error Error Subtract

00600	4102	
	7600	
	7500	
	3310	
	7406	1st Word
	7406	2nd Word
	7401	3rd Word
	7500	
00610	4102	
	7600	
	7500	
	3310	
	7401	4th Word
	7401	5th Word
	7401	6th Word
	7500	
00620	3304	
	7600	
	0720	
	6002	
	7700	Status Error
	7500	
	3310	
	7600	
00630	0705	
	6002	
	7701	Error
	7600	
	0705	
	6002	
	7702	Error
	7500	
00640	4102	
	7600	
	7500	
	3310	Reselect
	7600	
	6002	
	7703	Error
	7500	
00650	3302	Left Shift
	7500	
	4102	
	7600	
	7500	
	3310	Reselect
	7404	1st Word
	7404	2nd Word

00660	7414	3rd Word
	7500	
	4102	Reselect
	7600	
	7500	
	3310	
	7600	
0711		
00670	6002	Error
	7701	
	7500	
	4102	
	7600	Reselect
	7500	
	3310	
7600		
00700	0710	Error
	6002	
	7702	
	7600	
	0700	Error
	6002	
	7703	
7500		
00710	3303	Reselect 1st Word 2nd Word
	7500	
	4102	
	7600	
	7500	
	3310	
	7402	
7402		
00720	7412	3rd Word
	7500	
	4102	
	7600	
	7500	Reselect
	3310	
	7600	
0701		
00730	6002	Error
	7701	
	7500	
	4102	
	7600	Reselect
	7500	
	3310	
7600		

00740	0701	
	6002	
	7702	Error
	7500	
	4102	
	7600	
	7500	
	3310	Reselect
00750	7600	
	0701	
	6002	
	7703	Error
	7500	
	3300	
	7414	1st Word
	7414	2nd Word
00760	7414	3rd Word
	7414	4th Word
	7414	5th Word
	7404	6th Word
	7400	7th Word
	7400	8th Word
	7400	9th Word
	7500	
00770	3304	
	7600	
	3600	
	4040	
	6002	
	7700	
	5420	Advance Counter
	2021	
01000	3420	Compare to Count
	6005	
	7500	
	3301	
	7101	
	0100	
	7500	
	3300	
01010	0400	
	7777	End of Test
	7101	
	0000	
	5262	Check Sum

NUMBER: T002-B
TITLE: Memory Test for 169 Memory Unit
CATEGORY: 160-A, 169
MINIMUM EQUIPMENT NEEDED: 160-A, 169

PURPOSE

Tests any arbitrary number of bank, up to the maximum number present in the 160-A computer or a 160-A, 169 system.

DESCRIPTION

The program may be located in any bank. The next bank in sequence will be tested by, having the worst pattern stored in it, checking the pattern, then storing and checking the compliment worst pattern. The program then transfers itself to the bank which has been tested, and the test progresses through the memory.

The program checks itself, via a checksum subroutine upon starting a new bank, and prior to transferring itself to the next bank in sequence. If the checksum is not correct an error stop will occur. This condition is indicated by:

P = 1073 A = bits failing in program Z = 0000 (green background)

The MCS mode indicator shows which bank the program is in. The program will stop if any error occurs while checking worst pattern or its compliment with:

P = 0101 A = bits failing in worst pattern Z = 7700 (green background)

If the computer is placed in run again it will stop with:

P = 0103 A = address failing in worst pattern Z = 7777 (green background)

The bank being tested will be indicated by the MCS mode indicator when the IND button is pressed.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape
LOADING ADDRESS: r0000
TERMINAL ADDRESS: r0175

INPUT PARAMETERS

r = Relative bank selected. When starting the program it is necessary to set the relative bank selection only.

CHECK SUM: 0002

The direct and indirect bank selections are set automatically by the program.

STARTING ADDRESS: 0000

ADDITIONAL INSTRUCTIONS: When starting the program the first time after it has been loaded from the paper tape, the highest bank number present must be entered in the A register. The next time the program is started, the A register may be clear, and the highest bank number used previously will be saved.

HALTS

EXPLANATION

0051 7701

Selective Stop 1. The computer will stop every time a new pattern is stored in the bank being tested.

0050 7702

Selective Stop 2. Computer will stop when worst pattern (not the compliment pattern) is stored in the bank being tested.

0045 7704

Selective Stop 4. Computer will stop when worst pattern (not the compliment pattern) is stored in bank 1. At this time the program is located in bank 0.

NOTE: Selective stops may be selected in any desired combination.

T002 B
 MEMORY TEST FOR 160-A COMPUTER AND 169 AUXILIARY MEMORY

0000	0207		
0001	6003	Get Number of Highest Bank	
0002	0601		
0003	4271		
0004	7100	Enter Check Sum Subroutine	
0005	0143		
0006	0130		
0007	0207		
0010	0601		
0011	1474	Set IND to Next Bank in Sequence	
0012	6002		
0013	1474		
0014	0320		
0015	4201		
0016	(0000)	(Locations in parentheses are normally modified by the	
0017	0400	computer during execution of the program)	
0020	4076		
0021	0400		
0022	4077		
0023	2076		
0024	4177	Write Pattern in Bank	
0025	5477	Locations 0000 through 7776	
0026	6011		
0027	0277		
0030	6003		
0031	0207		
0032	6407		
0033	2476		
0034	4076		
0035	7101		
0036	0023		
0037	2476		
0040	4172	Store Pattern at Location 7777	
0041	6310		
0042	0130	Determine Stop Options	
0043	0207		
0044	6104		
0045	7704	Selective Stop 4	Stop on Full Cycle thru Max. No. of bank
0046	0001		
0047	0001		
0050	7702	Selective Stop 2	Stop on Every Bank
0051	7701	Selective Stop 1	Stop on Every Pattern
0052	0400		
0053	4077		
0054	2076		
0055	1577		

0056	6122	
0057	5477	
0060	6026	
0061	0277	Check Pattern
0062	6003	
0063	0207	
0064	6410	
0065	2476	
0066	4076	
0067	7101	
0070	0054	
0071	0000	
0072	7777	Constant = 7777
0073	0170	Check Sum Adjustment
0074	(0000)	Highest Bank Number Allowable + 1
0075	0176	Constant = Number of Words in Program
0076	(0000)	Test Word
0077	(0077)	Test Address
0100	2177	
0101	7700	Error Stop - Indicate Bits Which Failed
0102	2077	
0103	7777	Stop - Indicate Location of Failure
0104	7101	Check Next Word
0105	0057	
0106	2476	
0107	6567	Repeat Program for Both Patterns
0110	7100	Enter Check Sum Subroutine
0111	0143	When Both Patterns are Checked
0112	4077	
0113	7710	Test Selective Jump for Bank Change
0114	0006	
0115	0130	
0116	0207	
0117	0320	
0120	4212	
0121	0320	
0122	0601	
0123	1474	
0124	6002	Set Bank Change Instructions
0125	1474	
0126	0320	
0127	4205	
0130	0330	
0131	4210	
0132	(0000)	
0133	2177	Transfer Program to Next Bank
0134	(0000)	
0135	4177	
0136	5477	
0137	1475	
0140	6506	

0141	(0000)	Jump to Next Bank
0142	7101	Exit Check Sum Subroutine
0143	(0000)	Entrance Check Sum Subroutine
0144	0130	
0145	0207	
0146	0360	
0147	4201	
0150	(0000)	Set All Bank Selections Same as Relative
0151	0400	
0152	4016	Clear All Locations Modified by Program
0153	4321	
0154	4320	
0155	4314	
0156	4306	
0157	4300	Clear Previous Check Sum
0160	4077	Set Initial Address
0161	2177	
0162	5300	Form Check Sum in Location 07777
0163	5477	
0164	1475	
0165	6504	
0166	2723	Subtract Exit Address from Check Sum
0167	3474	Subtract Maximum Bank Number +1 from Check Sum
0170	5300	
0171	0702	
0172	6430	Exit if Check Sum is OK
0173	0000	Check Sum Error
0174	6501	Hang up on Check Sum Error
0175	6433	Unless A Register is Cleared

NUMBER: T690
TITLE: Auxiliary Memory Buffer Interrupt Test
CATEGORY: 169, 160-A
MINIMUM EQUIPMENT NEEDED: 169, 160-A, 161

PURPOSE

This test is used to check the 169 I/O Buffer operation.

DESCRIPTION

The test uses the T033 memory worst pattern to check the ability of the memory to hold alternate ones and zeros. Checks for a buffer complete interrupt (line 30), and reads the buffer entrance register (BER) during the buffer operation. Program and output in X odd, pattern in Y even.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION:	Paper Tape	INPUT PARAMETERS (Register Settings, etc.)
LOADING ADDRESS:	0000	1st portion of program is loaded in bank 0:
TERMINAL ADDRESS:	0027	Sets up all initial conditions and bank selections.
CHECK SUM:	2704	2nd portion is loaded in any odd bank of Module X (X = 1, 2, 3). Before running the program, enter in "A" register the number of the odd bank used.

STARTING ADDRESS: 0000

ADDITIONAL INSTRUCTIONS: 1) The 169 is connected to the normal or buffer channel of the 160-A with the 161 typewriter connected to the External Buffer Channel. 2) If Selective Jump (SLJ1) is used the Output Buffer area will be the same length as the Input Buffer area. If SLJ1 is not used the Output Buffer length will be determined by the program and will repeat.

HALTS	EXPLANATION
SLS1	Computer will stop every time a new pattern is stored in the even bank of Module X.
SLS2	Computer will stop after an Input Buffer has been set up in the 169.

NOTE: If an interrupt is received by the computer with any of the Selective Stops used, the computer will stop.

PART 1

00000	0206	Make bank selection even	}	BK 0
	0361			
	4201	Set DIR and IND to odd bank		
	0000			
	0341			
	4174	Preset even bank selections		
	4177			
	0301			
		Preset odd bank selections		
00010	4173			
	1600			
	4020	Preset output area bank		
	4176			
	0310			
	4175	Preset input area bank		
	1600			
	4000			
		Preset bank jump		
00020	4210			
	0400			
	4030	Preset counts to zero		
	4067			
	7500			
	4702	Master Clear external BFR		
	2200			
	0200	Set bank jump address		

Start 0000 BKX

PART 2

00000	4056	Set initial data	
	2054		
	4057	Set start address	
	2056		
	4157		
	5457		
	6011	Finished setting pattern	
	0277		
00010	6003		
	0207		
	6407		
	2456		
	4056		
	7101		
	0003		
	2456		
00020	4155		
	7701	Optional stop	
	2054		
	4057		
	2056		
	1557		
	7101		
	0060		
00030	0200	INT	
	7101		
	0100		
	0207		
	6410		
	2456		
	4056		
	7101		
00040	0024		
	2456		
	7101		
	0000		
	0010		
	7700	Error stop	
	2157		Non-comparing bits in "A"
	7701		
00050	2057	Data in "A"	
	7702	Address in "A"	
	7101		
	0061		
	0000	Starting address	
	7777		
	0000	Data	
	0000	Current address	

00060	6513	Error detection
	5457	
	6421	
	0277	
	6427	to 0035
	7101	
	0033	
	0000	"A" Worst pattern INT
00070	0000	"A" Input or Output INT
	0230	
	0231	
	0111	} Later change
	0207	
	0213	
	0227	
	0235	
00100	7707	
	4067	
	7500	
	4740	
	7600	
	1200	
	4000	
	6102	
00110	7700	
	0023	→ 002X X = odd bank
	2070	
	0220	
	3200	
	0130	
	4202	
	7710	
00120	0000	
	7101	
	0217	
	0000	
	0000	
	0000	
	0000	
	0000	
00130	7500	
	4704	
	7600	
	1571	
	6044	
	1571	
	4172	
	7101	

00140 0217
0000
0000
0000
0000
0000
0000
0000

00150 7101
0200
0000
0000
0000
0000
0000
0000

00160 0000
0000
0000
0000
0000
0000
0000
0000

00170 0000
0000
0000
0000
0000
0000
0000
0000

00200 7500
4701
7310
0217
7702
4070
2067
0022

→ ZY Y = even bank

00210 0120
7030
0213
4013
0300
1423
4220
7500

401X X = odd bank }

input

00220

4701
7305
0233
7101
0233
0000
0227

4003 → 400X X = odd bank

00230

0300
1500
4210
4070
2067
0022 → ZY
0120
7030

Y = even bank



Output

NUMBER: T170
TITLE: Punch Test
CATEGORY: 160-A
MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

This program checks the punch controller and the control unit.

DESCRIPTION

Section 1, checks all status conditions. This is a looping status test in which the operator can manually cause a NOT READY to determine if the proper response for a specific condition will occur. The manual status errors can be caused by the following:

1. Depress the stacker full switch
2. No cards in hopper
3. 523 power off
4. M.S. switch in 1604 position

Section 2, punches all columns of a card with a pattern that can be visually checked. The program will punch one card pattern for all cards. The program will continue to run until a NOT READY is detected.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape
LOADING ADDRESS: 0000
TERMINAL ADDRESS: 0224
CHECK SUM: 0170
STARTING ADDRESS: Sec. 1, P = 0000 A = 0001, Sec. 2, P = 0000 A = 0000

HALTS

EXPLANATION

7700

Sec. 1 Status Test: When a NOT READY occurs the computer will stop and (A) will hold the status response that caused the stop.

7701

Sec. 2 Status Stop: (A) will contain the status that caused the stop. After the error condition has been removed, return the computer to "RUN" to continue.

0000	3203	ADF	(A) + J	0060	0005	
	4201	STF	set jump address		0000	
	7101	JFI	jump address		0000	
	7102		J		0000	
	0014		M.L. of punch data		0000	
	0006		M.L. of status		0000	
	7505	EXF	status S		0000	
	7600	INA	set (A) = status		0000	
0010	6402	ZJB	wait for not ready	0070	0000	
	7700	SLS	display status		0000	
	6504	NZB	continue status test		0000	
	3040		S (status)		0000	
	7536	EXF	status		0000	
	7600	INA	set (A) = status		0000	
	6003	ZJF	jump on ready		0000	
	7701	SLS	display not ready		0000	
0020	6504	NZB	check status again	0100	0001	Row 9
	7532	EXF	select punch		6000	
	7332	OUT	output punch data		0000	
	0224		terminal address		0000	
	7526	EXF	status		0000	
	7600	INA	set (A) = status		0007	
	6502	NZB	wait for ready		2520	
	2055	LDD	delay count (D)		0002	Row 8
0030	0601	ADN		0110	1400	
	6501	NZB	delay if (A) = 0		0000	
	2055	LDD	(D)		0000	
	0601	ADN			0000	
	6501	NZB	delay until (A) = 0		0070	
	2055	LDD	(D)		5240	
	0601	ADN			0004	Row 7
	6501	NZB	delay until (A) = 0		0300	
0040	2055	LDD	(D)	0120	0000	
	0601	ADN			0000	
	6501	NZB	delay until (A) = 0		0000	
	2055	LDD	(D)		0700	
	0601	ADN			2520	
	6501	NZB	delay until (A) = 0		0010	Row 6
	2056	LDD	(CDC)		0060	
	5055	RAD	decrease delay		0000	
0050	7101	JFI		0130	0000	
	0015		punch again		0000	
	3040		status code		7000	
	3002		punch code		5240	
	0100		start M.L. of output block		0020	Row 5
	0000		(D)		0014	
	0100		constant delay change		0000	
	5565		check sum equalizer		0000	

0140	0007		0220	7000
	0000			0000
	2520			0000
	0040	Row 4		5240
	0003			
	0000			
	0000			
	0070			
0150	0000			
	5240			
	0100	Row 3		
	0000			
	6000			
	0000			
	0700			
	0000			
0160	2520			
	0200	Row 2		
	0000			
	1400			
	0000			
	7000			
	0000			
	5240			
0170	0400	Row 1		
	0000			
	0300			
	0007			
	0000			
	0000			
	2520			
	1000	Row 0		
0200	0000			
	0060			
	0070			
	0000			
	0000			
	5240			
	2000	Row 11		
	0000			
0210	0014			
	0700			
	0000			
	0000			
	2520			
	4000	Row 12		
	0000			
	0003			

NUMBER: T072

TITLE: Reader Test (1610)

CATEGORY: 160-A, 1610 (IBM 533, 521, 088)

MINIMUM EQUIPMENT NEEDED: 160-A, 1610 (IBM 533, 521, 088)

PURPOSE

This test will check the capability of the card reader.

DESCRIPTION

1. The test will cause a simultaneous reading from the first and second stations.
2. The status of the card reader is checked before each reading cycle is initiated.
3. All information read is compared with a block of known information in storage.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0066

CHECK SUM: 6706

STARTING ADDRESS: 0060

- ADDITIONAL INSTRUCTIONS:
- 1) Loads the information from two cards into storage.
 - 2) Start program.
 - 3) Information following will be compared with the first two cards read in.

HALTS

EXPLANATION

7701	Correct information to be compared in A
7702	Actual information read in A
7703	First and second card read in stop
7704	Punch status - not ready
7705	Reader status - not ready

160/160-A READER TEST (IBM 533)

0000	7541	Select input status
0001	7600	Input to A
0002	1047	
0003	6002	
0004	7705	Stop if not ready
0005	7532	Select read
0006	7232	Input
0007	0450	
0010	2450	Load comp of 0224
0011	4051	Store word counter
0012	2040	0100 to A
0013	4052	Store 0100
0014	0400	Load A with 0's
0015	2053	7100 to A
0016	4054	Store at 0054
0017	2152	Put info at 0100 in A
0020	1554	Logical sum of 0100 and 7100
0021	6002	
0022	6107	
0023	5452	Add 1 to new info word
0024	5454	Add 1 to old info word
0025	5451	Add 1 to words compared counter
0026	4051	
0027	6427	Exit to status check
0030	6511	Exit to compare next word
0031	2154	
0032	7701	Stop - Old info in A
0033	2152	
0034	7702	Stop - New info in A
0035	0401	Load A with 1
0036	6536	Exit to status check
0037	0303	Read 1st and 2nd select code
0040	0200	Start Store
0041	0340	Status select code
0042	0000	
0043	0000	
0044	0000	
0045	0000	
0046	0000	
0047	0021	

0050	0250	Number words to be compared
0051	0000	Counter for words compared
0052	0000	New info add
0053	7100	Old info start address
0054	0000	Old info address
0055	0000	
0056	0000	
0057	0000	
0060	7506	Select input
0061	7204	Input
0062	7350	
0063	7703	Stop
0064	6564	Exit to status check
0065	7100	
0066	0303	Read 1st and 2nd select code

NOTE: When running this program in the 160-A all stop switches must be up.

NUMBER: T072

TITLE: Punch Test (1610)

CATEGORY: 160-A, 1610, (IBM 533, 521, 088)

MINIMUM EQUIPMENT NEEDED: 160-A, 1610, (IBM 533 or 521 or 088)

PURPOSE

This test will check the capability of the punch.

DESCRIPTION

1. This test will cause the punch to pattern the information contained within the block of address from 7100 through 7223.
2. After punching the card information may be verified by the Card Test.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0100

TERMINAL ADDRESS 0114

CHECK SUM: 6706

STARTING ADDRESS: 0100

ADDITIONAL INSTRUCTIONS: All stop and jump switches must be up.

HALT	EXPLANATION
------	-------------

7704	Punch status - not ready.
------	---------------------------

160/160-A PUNCH TEST (IBM 533)

0100	7514	Select output status
0101	7600	Input status to A
0102	1211	
0103	6002	
0104	7704	Stop if punch not ready
0105	7505	Select punch
0106	7303	Output
0107	7224	
0110	6510	Exit to status check
0111	7100	Starting address
0112	3002	Punch select
0113	2200	
0114	3040	Punch status

NUMBER: T1610

TITLE: 1610 Two Station Read Test

CATEGORY: 160-A

MINIMUM EQUIPMENT NEEDED: 160-A

PURPOSE

A test of the card reader to insure that it will read a constant pattern simultaneously at two read stations.

DESCRIPTION

The program reads two read stations, and will compare information with the known pattern loaded at address 7100 through 7347. The loaded information will be used to check all subsequent information.

Information is stored at address 0200 through 0447.

The program may be modified to read and check only one station as follows:

0007	0324
0037	0301 for read A
	or 0302 for read B
0050	0124
0062	7224
0066	or 0301 for read A
	0302 for read B

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0066

CHECK SUM: 2574

STARTING ADDRESS: 0060

ADDITIONAL INSTRUCTIONS: 1. Manual scan the pattern to verify that program information agrees with the card information.
2. Reset Run switch.

HALTS

EXPLANATION

7701

Error, correct information in A

7702

New information in A

7703

Reading known pattern and storing between 7100 and 7347

Reset Run switch

7705

Status in A

NOTE: In case of an error stop, 0052 will contain the
address of the information which failed.

Check Reader

0000	7541	0060	7506
0001	7600	0061	7204
0002	6154	0062	7350
0003	7534	0063	7703
0004	6104	0064	6114
0005	7233	0065	7100
0006	0450	0066	0303
0007	6507	0067	
		thru	0000
		0077	
0010	2450	0100	7500
0011	4051	0101	0303
0012	2040	0102	7203
0013	4052	0103	0450
0014	0400	0104	7102
0015	2053	0105	0200
0016	4054	0106	0000
0017	2152		
0020	1554		
0021	6002		
0022	6107		
0023	5452		
0024	5454		
0025	5451		
0026	4051		
0027	6422		
0030	6511		
0031	2154		
0032	7701		
0033	2152		
0034	7702		
0035	0401		
0036	6112		
0037	0303		
0040	0200		
0041	0340		
0042	0000		
0043	0000		
0044	0000		
0045	0000		
0046	0000		
0047	0021		
0050	0250		
0051	0000		
0052	0000		
0053	7100		
0054	0000		
0055	0000		
0056	7707		
0057	6121		

NUMBER: T073

TITLE: 1612 Printer Test Routines

CATEGORY: 160-A, 1612

MINIMUM EQUIPMENT NEEDED: 160-A, 1612

PURPOSE

These routines are designed to test the 1612 line printer under a variety of conditions.

OPERATING INSTRUCTIONS

LOAD INSTRUCTION: Paper Tape

LOADING ADDRESS: 0000

TERMINAL ADDRESS: 0534

CHECK SUM: 1612

STARTING ADDRESS: 0000

ADDITIONAL INSTRUCTIONS: Using one of the routine numbers listed below, an entry is made in the A register. If a number is not entered in A the routine will come to a halt. The desired number can then be entered and the program will proceed.

DESCRIPTION

The test routines are listed by numbers as follows:

1. 48 CHARACTER DIAGONAL

This routine uses the first 48 characters of the print wheels. The characters on any one line are in biocatal order. Each character in a column is advanced by one from the corresponding character in the preceding line.

2. 64 CHARACTER DIAGONAL

This routine is the same as above, except that all 64 characters of each print wheel are used.

3. FULL PAGE EACH CHARACTER

This routine prints a full page of each character, in biocatal order.

4. CONTINUE CURRENT CHARACTER

If this routine is selected after Routine 3 has been run, the printer will continue printing the character Routine 3 was printing until manually stopped.

DESCRIPTION (Cont'd)

5. PRINT CHARACTER FROM A

This routine stops, with a cleared accumulator (A register), immediately after starting. A bioctal entry is made in "A", and the routine prints the equivalent of that character.

6. SMEAR TEST

This routine prints alternate rows of colons and zeros.

7. ALTERNATE COLUMNS

This routine prints ten rows of alternate blanks and M's, reversing the M's and blanks every ten rows.

10. MAXIMUM PAPER SPEED TEST

In this routine, the paper is advanced at the maximum speed for a page, and a row of G's is printed.

11. VARYING PAPER SPEED TEST

In this routine, four rows of a character from the first 48 characters on the print wheel are printed, then one row of a character from the last 16 characters on the print wheel is printed.

12. CHARACTERS IN ORDER

In this routine, a complete row of each character is printed. The columns progress in bioctal order.

			con	00		
0000	7101	za	jfi	01		jump out of constants page
0001	0101			zb		
0002	0400	ja	ldn	00		characters in order
0003	4070		std	tem0		
0004	2025		ldd	z1		
0005	4071		std	tem1		
0006	2070		ldd	tem0		load buffer
0007	4171		sti	tem1		
0010	5471	jb	aod	tem1		
0011	1426		lsd	z1	1	
0012	6504		nzb	jb		
0013	7516	jc	exf	z1	4	
0014	7600		ina	00		
0015	6602		pjb	jc		see if printer is free
0016	7307		out	z1		print line
0017	7170			7170		
0020	7512		exf	z1	5	
0021	5470		aod	tem0		
0022	0277		lpn	77		
0023	6517		nzb	ja	2	recycle
0024	6422		zjb	ja		
0025	7000	z1		7000		constants
0026	7170			7170		
0027	7360			7360		
0030	0434			ya		
0031	0600			600		
0032	0605			605		
			prg	100		
0100	7700			7700		stop for insertion into a
0101	6401	zb	zjb	zb	-1	
0102	3215		adf	z2		
0103	4201		stf	zb	3	
0104	7100		jfi	00		
0105	0120			aa	1	48 character diagonal
0106	0171			ba	2	60 character diagonal
0107	0175			ca	3	full page each character
0110	0221			ce	4	continue current character
0111	0234			da	5	print character from a
0112	0250			ea	6	smear test
0113	0310			fa	7	alternate columns
0114	0353			ga	10	maximum paper speed test
0115	0376			ha	11	varying paper speed
0116	0002			ja	12	characters in order
0117	7100	z2	jfi	00		

0120	2245	aa	ldf	al		48 character diagonal
0121	4073		std	tem3		
0122	2025		ldd	zl		set addresses
0123	4070		std	tem0		
0124	2030	ab	ldd	zl	3	
0125	4071		std	tem1		
0126	2171		ldi	tem1		
0127	4170		sti	tem0		store character
0130	5471		aod	tem1		
0131	1473		lsd	tem3		
0132	6102		nzf	ac		
0133	6407		zjb	ab		
0134	5470	ac	aod	tem0		advance buffer address
0135	1427		lsd	zl	2	
0136	6510		nzb	ab	2	
0137	2025		ldd	zl		
0140	4226		stf	al	1	
0141	2026		ldd	zl	1	
0142	4205		stf	ae		
0143	7524	ad	exf	al	2	
0144	7600		ina			
0145	6602		pjb	ad		
0146	7320		out	al	1	output
0147	0000	ae				end address
0150	7520		exf	al	3	print
0151	5702		aob	ae		
0152	5614		aof	al	1	
0153	1426		lsd	zl	1	
0154	6511		nzb	ad		
0155	2030		ldd	zl	3	reset addresses
0156	3473		sbd	tem3		
0157	0601		adn	01		
0160	4077		std	tem7		
0161	5312		rab	ae		
0162	2077		ldd	tem7		
0163	5203		raf	al	1	
0164	6521		nzb	ad		
0165	0515	al		ya	61	beginning address
0166	0000					
0167	0600			600		
0170	0605			605		
0171	2203	ba	ldf	ba	3	60 character diagonal
0172	7101		jfi	01		
0173	0121			aa	1	
0174	0535			ya	101	
0175	2030	ca	ldd	zl	3	full page each character
0176	4077		std	tem7		set up
0177	2025		ldd	zl		

0200	4071		std	tem1		
0201	2177	cb	ldi	tem7		load buffer
0202	4171		sti	tem1		
0203	5471		aod	tem1		
0204	1426		lsd	zl	1	
0205	6504		nzb	cb		
0206	0574		lcn	74		
0207	4074		std	tem4		set counter
0210	7520	cc	exf	cl		see if printer is ready
0211	7600		ina			
0212	6602		pjb	cc		
0213	7320		out	cl	3	output
0214	7170			7170		
0215	7515		exf	cl	2	print
0216	5474		aod	tem4		
0217	6707		njb	cc		recycle
0220	6003		zjf	cd		
0221	0420	ce	ldn	20		
0222	6513		nzb	cc	-1	
0223	7506	cd	exf	cl	1	space paper
0224	5477		aod	tem7		
0225	1262		lpf	el	6	
0226	6527		nzb	ca	2	
0227	6432		zjb	ca		
0230	0600	cl		600		
0231	0604			604		
0232	0605			605		
0233	7000			7000		
0234	0400	da	ldn	00		print character from a
0235	7700		77	00		stop for character
0236	4070		std	tem0		
0237	2025		ldd	zl		
0240	4071		std	tem1		
0241	2070	db	ldd	tem0		
0242	4171		sti	tem1		
0243	5471		aod	tem1		
0244	1426		lsd	zl	1	
0245	6504		nzb	db		
0246	7101		jfi	01		
0247	0221			ce		
0250	2025	ea	ldd	zl		smear test
0251	4070		std	tem0		
0252	0400	eb	ldn	00		load first buffer
0253	4170		sti	tem0		
0254	5470		aod	tem0		
0255	1426		lsd	zl	1	
0256	6504		nzb	eb		
0257	0412	ec	ldn	12		load second buffer

0260	4170		sti	tem0		
0261	5470		aod	tem0		
0262	1427		lsd	z1	2	
0263	6504		nzb	ec		
0264	7515	ed	exf	el		
0265	7600		ina			
0266	6602		pjb	ed		continue if printer is free
0267	7316		out	el	4	output
0270	7170			7170		
0271	7512		exf	el	2	print first line
0272	7507	ee	exf	el		
0273	7600		ina			
0274	6702		njb	ee		continue if printer is free
0275	7311		out	el	5	
0276	7360			7360		
0277	7504		exf	el	2	
0300	6514		nzb	ed		
0301	0600	el		600		
0302	0604			604		
0303	0605			605		
0304	0601			601		
0305	7000			7000		
0306	7170			7170		
0307	0534			ya	100	
0310	2025	fa	ldd	z1		alternate columns
0311	4070		std	tem0		
0312	0420	fb	ldn	20		fill buffer
0303	4170		sti	tem0		
0314	5470		aod	tem0		
0315	0444		ldn	44		
0316	4170		sti	tem0		
0317	5470		aod	tem0		advance address
0320	1426		lsd	z1	1	
0321	6507		nzb	fb		continue when buffer is full
0322	0512		lcn	l2		
0323	4071		std	tem1		set counter
0324	7523	fd	exf	fl		
0325	7600		ina			see if printer is free
0326	6602		pjb	fd		
0327	7322		out	fl	2	output
0330	7170			7170		
0331	7517		exf	fl	1	print
0332	5471		aod	tem1		
0333	6507		nzb	fd		continue after 10 lines
0334	0512		lcn	l2		
0335	4071		std	tem1		reset counter
0336	7511	fe	exf	fl		
0337	7600		ina			see if printer is free

0340	6702		njb	fe		
0341	7311		out	fl	3	output
0342	7171			7171		
0343	7505		exf	fl	1	print
0344	5471		aod	teml		
0345	6507		nzb	fe		continue after 10 lines
0346	6424		zjb	fd	-2	
0347	0600	fl		600		
0350	0605			605		
0351	7000			7000		
0352	7001			7001		
0353	2025	ga	ldd	zl		maximum paper speed test
0354	4071		std	teml		
0355	0467	gb	ldn	67		load buffer
0356	4171		sti	teml		
0357	5471		aod	teml		
0360	1426		lsd	zl	1	
0361	6504		nzb	gb		
0362	7510	gc	exf	gl		
0363	7600		ina			see if printer is free
0364	6602		pjb	gc		
0365	7310		out	gl	3	output
0366	7170			7170		
0367	7504		exf	gl	1	advance paper
0370	7504		exf	gl	2	print
0371	6507		nzb	gc		recycle
0372	0600	gl		600		
0373	0604			604		
0374	0605			605		
0375	7000			7000		
0376	2025	ha	ldd	zl		varying paper speed
0377	4070		std	tem0		
0400	0405	hb	ldn	05		
0401	4170		sti	tem0		load first buffer
0402	5470		aod	tem0		
0403	1426		lsd	zl	1	
0404	6504		nzb	hb		continue when buffer is full
0405	0435	hc	ldn	35		
0406	4170		sti	tem0		
0407	5470		aod	tem0		load second buffer
0410	1427		lsd	zl	2	
0411	6504		nzb	hc		continue when buffer is full
0412	0504	hd	lcn	04		
0413	4077		std	tem7		set counter
0414	7514		exf	hl		
0415	7600		ina			see if printer is free
0416	6602		pjb	hd	2	
0417	7313		out	hl	2	output

0420	7170		7170		
0421	7510	exf	hl	1	print
0422	5477	aod	tem7		
0423	6707	njb	hd	2	continue after 4 lines
0424	7307	out	hl	3	
0425	7360		7360		output
0426	7503	exf	hl	1	print
0427	6515	nzb	hd		recycle
0430	0600	hl	600		
0431	0605		605		
0432	7000		7000		
0433	7170		7170		
0434	0012	ya	12		
0435	0001		1		
0436	0002		2		
0437	0003		3		
0440	0004		4		
0441	0005		5		
0442	0006		6		
0443	0007		7		
0444	0010		10		
0445	0011		11		
0446	0061		61		
0447	0062		62		
0450	0063		63		
0451	0064		64		
0452	0065		65		
0453	0066		66		
0454	0067		67		
0455	0070		70		
0456	0071		71		
0457	0041		41		
0460	0042		42		
0461	0043		43		
0462	0044		44		
0463	0045		45		
0464	0046		46		
0465	0047		47		
0466	0050		50		
0467	0051		51		
0470	0022		22		
0471	0023		23		
0472	0024		24		
0473	0025		25		
0474	0026		26		
0475	0027		27		
0476	0030		30		
0477	0031		31		

0500	0073	73
0501	0040	40
0502	0060	60
0503	0013	13
0504	0034	34
0505	0074	74
0506	0021	21
0507	0054	54
0510	0033	33
0511	0014	14
0512	0053	53
0513	0000	00
0514	0020	20
0515	0015	15
0516	0075	75
0517	0072	72
0520	0057	57
0521	0037	37
0522	0052	52
0523	0076	76
0524	0035	35
0525	0055	55
0526	0056	56
0527	0036	36
0530	0016	16
0531	0017	17
0532	0032	32
0533	0077	77

CONTROL DATA

CORPORATION

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