

VENT = { 147x86w → CH = 1
- 3wu 6774 → CH = 0

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Code 3162
X 821

Test Routine #1

The purpose of this rewrite of Test Routine #1 is to make it easier to follow through the routine when using "Breakpoint" or "i" key. Also, the Block Selection Routine and Loader have been included. There are times when it is difficult to determine whether input troubles or transfer troubles are being encountered. Proper use of the Block Selection Routine can determine this. Example: The first two blocks of the test routine are loaded into the computer. When the "Compute" switch is put to "GO", the lights flash but nothing intelligible happens. In this case the type of trouble being encountered may be determined as follows:

1. Read the first two blocks of the test routine into the computer again.
2. Instead of putting the "Compute" switch to "Go", hit i. The Source and Destination lights should indicate 19 to 0.
3. Hit i again. The Source and Destination lights should indicate 21 to 31. The Command Line lights should indicate Line 0.
4. Hit 6 to change command to Line 19. Then hit i again. The Source and Destination lights should indicate 19 to 0. Continue to hit i, checking the Source and Destination lights against the Block Selection Routine Commands to be sure the sources and destinations are correct. If these commands are correct, the trouble should not be input trouble. Hit f to start back at the beginning of the routine.
5. Hit i and check that Source and Destination are 19 to 0.
6. Hit i again and check that Source and Destination are 21 to 31. Commands will now be taken from Line 0.
7. Hit i again. Source and Destination should be 19 to 0. If this command is correct, continue to hit i and check the source and destination against the Block Selection Routine. If these commands from Line 0 are not as they should be, the trouble is probably either in transferring from Line 19 to 0 or in Line 0 itself.

Abbreviations used in these write-ups are:

1. BP - Break Point
2. Def - Deferred Command
3. dp - Double Precision
4. Numbers to the right of some of the command explanations indicate the numbers which should be in AR or the short line at that point.

Test Routine 1 and 2

Block Selection Routine

L	T	N	Ch	S	D	
00	01	01	0	19	00	line 19 to line 00
01	02	02	0	21	31	next command from line 0
02	03	03	0	19	00	BP line 19 to line 00
03	04	16	0	19	00	line 19 to line 00
16	18	17	0	29	31	test overflow
17	19	18	0	29	31	test overflow
18	20	19	0	29	31	test overflow
19	00	21	1	19	31	stop DA-1
20	43	20	0	07	31	photo tape reverse (phase 2)
21	04	22	0	00	20	def dp 0000000 0000000 to 20-0,1 (AR format)
22	06	23	0	00	20	def dp 8000000 8000004 to 20-2,3 (")
23	00	24	0	20	03	def dp 20-0,1 to 03-0,1 (")
24	02	25	0	20	03	def dp 20-2,3 to 03-2,3 (")
25	08	26	0	00	20	def dp 0000110 00000x0 to 20-0,1 (line 19 format)
26	10	27	0	00	20	def dp 0000034 800000x to 20-2,3 "
27	00	28	0	20	02	def dp 20-0,1 to 02-0,1 "
28	02	29	0	20	02	def dp 20-2,3 to 02-2,3 "
29	15	30	0	00	28	def 0000001 to AR
30	32	30	0	28	31	test ready
31	33	32	0	08	31	type AR
32	34	32	0	28	31	test ready
33	34	34	1	00	29	sum line 0 in AR (AR is 0000000)
34	36	35	0	28	27	test AR for non-zero
35	37	37	0	00	00	do nothing
36	13	30	0	00	28	def w000zzy to AR
37	39	37	0	28	31	test ready
38	40	39	0	12	31	gate type
39	41	39	0	28	31	test ready
40	00	41	0	23	28	def 23-0 to AR (typed in number)
41	15	42	3	00	29	def subtract "1" from AR
42	44	43	0	15	31	read photo tape
43	45	43	0	28	31	test ready
44	15	45	3	00	29	def subtract "1" from AR
45	47	46	0	28	27	test AR for non-zero
46	48	00	2	21	31	dp next command from line 19
47	49	42	0	00	00	return to photo tape read (42)

Test Routine 1 and 2

Test #1 Loader

00	01	01	0	19	00	line 19 to line 00
01	02	02	0	21	31	next command from line 0
02	03	03	0	19	00	BP line 19 to line 00
03	04	16	0	19	00	BP line 19 to line 00
16	18	17	0	29	31	test overflow
17	19	18	0	29	31	test overflow

Test Routine 1 and 2

Test #1 Loader (continued)

18	20	19	0	29	31	test overflow
19	00	20	1	19	31	stop DA-1
20	00	21	1	19	31	stop DA-1
21	04	22	0	00	20	def dp
						0000000 0000000 to 20-0,1 (AR format)
22	06	23	0	00	20	def dp
						8000000 8000004 to 20-2,3 "
23	00	24	0	20	03	def dp
						20-0,1 to 03-0,1 "
24	02	25	0	20	03	def dp
						20-2,3 to 03-2,3 "
25	08	26	0	00	20	def dp
						0000110 00000x0 to 20-0,1 (line 19 format)
26	10	27	0	00	20	def dp
						0000034 800000x to 20-2,3 "
27	00	28	0	20	02	def dp
						20-0,1 to 02-0,1 "
28	02	29	0	20	02	def dp
						20-2,3 to 02-2,3 "
29	12	30	0	00	28	def
						xxxxxxx to AR
30	32	30	0	28	31	test ready
31	33	32	0	08	31	BP
						type AR
32	34	32	0	28	31	test ready
33	35	34	0	15	31	read photo tape
34	36	34	0	28	31	test ready
35	36	36	1	19	29	sum line 19 in AR
36	38	37	0	28	28	do nothing
37	38	39	0	19	18	line 19 to line 18
39	41	40	0	15	31	read photo tape
40	42	40	0	28	31	test ready
41	42	42	1	19	29	sum line 19 in AR
42	44	43	0	28	28	do nothing
43	44	45	0	19	01	line 19 to line 01
45	46	00	0	18	00	line 18 to line 00

Test Routine 1 and 2

Test Routine #1 - Line 00

00	02	00	0	28	31	test ready
01	03	03	0	00	28	"4" to AR
03	04	04	1	00	29	sum line 0 in AR (AR is 4xvxx16)
04	09	09	1	28	20	AR to 20-0,1,2,3
09	11	11	0	00	28	"4" to AR
11	12	12	1	00	29	sum line 0 in AR (AR is 4xvxx16)
12	17	17	1	28	21	AR to 21-0,1,2,3
17	19	19	3	20	29	subtract 20-2 from AR
19	21	21	0	28	27	BP
						test AR for non-zero
22	19	u0	0	00	28	def
						159539v to AR
u0	u2	u0	0	28	31	test ready
u1	u3	00	0	08	31	type AR
21	26	26	1	20	29	sum line 20 in AR (-36z7458)
26	31	31	3	21	29	subtract line 21 from AR (0000000)
31	33	33	0	28	27	BP
						test AR for non-zero
34	31	u0	0	00	28	def
						21u139v to AR
u0	u2	u0	0	28	31	test ready
u1	u3	00	0	08	31	type AR
33	35	35	0	20	28	20-2 to AR (4xvxx16)
35	38	38	1	28	26	AR to PN-0,1
38	41	41	1	28	25	AR to ID-0,1

41	44	44	1	28	24		AR to MQ-0,1
44	46	47	1	26	28		PN odd to AR (4xvxx16)
47	49	49	3	26	29		subtract PN even from AR (0000000)
49	51	51	0	28	27	BP	test AR for non-zero
52	49	u0	0	00	28	def	33v339v to AR
u0	u2	u0	0	28	31		test ready
u1	u3	00	0	08	31		type AR
51	54	54	1	25	26	dp	ID-0,1 to PN-0,1
54	56	58	3	24	30	def dp subtract.	MQ from PN
58	61	61	1	26	27	BP	test PN for non-zero
62	58	u0	0	00	28	def	3xvx75v to AR
u0	u2	u0	0	28	31		test ready
u1	u3	00	0	08	31		type AR
61	62	63	1	00	30	dp	sum line 0 in PN
63	66	66	1	26	21	def	PN to 21-0,1 (1zyo7z8 38xv339)
66	68	71	0	00	21		-6466w7y to line 21-3
71	74	76	0	00	21	def	5656003 to 21-2 (line selection command)
76	78	79	0	21	28	def	21-2 to AR
79	81	81	0	00	29		add "1" to AR (5656004 plus increments)
81	83	83	0	28	21		AR to 21-2 (new line selection command)
83	85	85	0	31	31		next command from AR
AR(85)	86	86	0	00	nn		line 0 to line nn
86	88	90	1	21	26	def dp	21-0,1 to PN
90	92	92	0	21	28		21-3 to AR (-6466w7y plus increments)
92	94	94	0	00	29		add "20" to AR
94	96	96	0	28	21		AR to 21-3
96	98	99	0	31	31		next command from AR
AR(99)	u0	u2	3	nn	30	dp	subtract line nn from PN
u2	u4	05	1	26	27	def dpBP	test PN for non-zero
06	08	06	0	28	31		test ready
07	09	15	0	08	31		type AR (line selection command)
15	17	15	0	28	31		test ready
16	18	05	0	28	28		continue line test
05	07	08	1	21	28		21-2 to AR (line selection command)
08	13	14	3	00	29	def	subtract 5656012 from AR
14	16	75	0	22	31		test AR sign
75	76	77	0	17	31		ring bell
77	79	81	1	21	31		next command from line 1

Test Routine 1 and 2

Test Routine #1 - Line 01

81	83	83	0	29	31		test overflow (should have been set)
83	81	56	0	01	28	def	53533vz to AR (to type 53000)
56	58	58	0	28	21		AR to 21-1
58	61	62	0	01	20	def	007z000 to 20-1
62	65	66	0	31	28	def	20-21 to AR (53000)
66	69	70	0	28	21	def	AR to 21-1
70	01	70	0	28	31	def	test ready
71	73	72	0	08	31		type AR
72	01	72	0	28	31	def	test ready
73	75	75	0	01	28		5400z9x to AR
75	77	80	0	21	29	def	add 21-1 to AR

Test Routine 1 and 2

Test Routine #1 - Line 01 (continued)

80	82	82	0	31	31	next command from AR
AR(82)	84	83	3	28	29	subtract AR from AR
83	81	56	0	01	28	def 53533vz to AR
84	86	86	0	29	31	BP test overflow
87	84	56	0	01	28	def 56x63vz to AR (to type 56000)
86	91	92	0	01	20	def dp 9999999 to 20-3
92	95	96	0	01	21	def 3w3w3w3 to 21-3
96	99	u0	0	31	28	def 20·21-03 to AR (1818181)
u0	u3	u4	0	30	29	def add 20·21-3 to AR (3w3w3w3)
u4	u7	04	3	21	29	def subtract 21-3 from AR (0000000)
04	06	06	0	28	27	BP test AR for non-zero
07	04	56	0	01	28	def 068639v to AR (to type 6000)
06	08	08	0	21	28	21-3 to AR (3w3w3w3)
08	11	12	0	27	28	def 20·21+20·AR to AR (3w3w3w3)
12	15	16	3	21	29	def subtract 3w3w3w3 from AR (0000000)
16	18	18	0	28	27	BP test AR for non-zero
19	16	56	0	01	28	def 129239v to AR (to type 12000)
18	21	21	0	23	31	clear MQ, ID, PN
21	23	23	0	01	20	-zyxwvul to 20-2
23	25	25	0	01	20	9876543 to 20-0
25	28	28	2	20	25	dp 20-2,3 to ID
28	32	35	2	20	24	def dp 20-0,1 to MQ
35	56	93	0	24	31	multiply
93	96	97	0	26	22	dp PN to 22-2,3 (-yz3u046 97w8xw0)
97	u0	u2	2	20	25	def dp 20-0,1 to ID
u2	u6	05	0	22	26	def dp 22-2,3 to PN
05	v6	14	1	25	31	dp divide
14	16	17	0	24	22	MQ odd to 22-3 (-zyxwvul)
17	19	20	1	22	28	def 22-3 to AR
20	22	26	3	20	29	def subtract 20-2 from AR
26	28	29	0	28	27	BP test AR for non-zero
30	26	56	0	01	28	def 1w9x39v to AR (to type 1x000)
29	32	32	0	23	31	clear MQ, ID, PN
32	34	37	0	20	24	def 20-2 to MQ even
37	66	u5	0	27	31	normalize (AR is 000001x)
u5	u7	09	3	28	28	def subtract AR from AR (AR is -zzzzzy3)
09	11	15	1	24	25	def MQ odd to ID odd
15	66	78	0	26	31	shift
78	80	82	0	25	20	def ID-0 to 20-0 (-zyxwvul)
82	84	85	1	20	28	def 20-0 to AR (-012345z)
85	87	88	3	20	29	def subtract 20-2 from AR (0000000)
88	90	98	0	28	27	BP test AR for non-zero
99	85	56	0	01	28	def 5758y9x to AR (to type 58000)
98	99	55	0	17	31	ring bell
55	57	00	0	20	31	return command to line 0

Test Routine 1 and 2

Test Routine #1 Error Indications

159539v	Inverting Gates, Line 0, Line 20, AR
21u139v	Inverting Gates, Line 20, Line 21, AR
33v339v	Inverting Gates, Line 20, AR, PN
3xvx75v	Inverting Gates, PN, ID, MQ
-6466w9y	Inverting Gates, Line 4, PN, Line 21
-6466wvy	Inverting Gates, Line 5, PN, Line 21
-6466wxy	Inverting Gates, Line 6, PN, Line 21
-6466wzy	Inverting gates, Line 7, PN, Line 21
-6466x1y	Inverting Gates, Line 8, PN, Line 21
-6466x3y	Inverting Gates, Line 9, PN, Line 21
-6466x5y	Inverting Gates, Line 10, PN, Line 21
-6466x7y	Inverting Gates, Line 11, PN, Line 21
-6466x9y	Inverting Gates, Line 12, PN, Line 21
-6466xvy	Inverting Gates, Line 13, PN, Line 21
-6466xxy	Inverting Gates, Line 14, PN, Line 21
-6466xzy	Inverting Gates, Line 15, PN, Line 21
-6466y1y	Inverting Gates, Line 16, PN, Line 21
-6466y3y	Inverting Gates, Line 17, PN, Line 21
-6466y5y	Inverting Gates, Line 18, PN, Line 21
53000	Overflow flip-flop did not sense overflow. Test overflow did not work.
56000	Overflow flip-flop not turned off by test overflow.
6000	Source 30 or source 31, Line 20, Line 21, AR
12000	Source 27, Line 21, AR
1x000	Multiply, Divide, Line 20, Line 22, PN, ID, MQ
58000	Shift, Normalize, Line 20, MQ, ID

SPARE PACKAGE "ACID TEST" LOCATIONS

<u>Package</u>	<u>Location</u>	<u>Circuit</u>
Flip Flops	C50	PC, PN
Buffer Inverter	A3	EB, \overline{CS} ·CX
Read Amplifier	B27	M21
# Write Amplifier	H3 [#]	M21, M20
# Cathode Follower 1	D53 [#]	DS, DS*, DS**, SV
# Cathode Follower 2	E1 [#]	EB
# Cathode Follower 3	C5 [#]	S4, S6, SU, SW
# Read Clock Amplifier	J54 [#]	read clock
## HC Buffer	C31 ^{##}	HC, DS·S1

All diode boards are checked out on the diode tester.

Turn off DC before removing or inserting: packages at above locations, all diode clamp boards, all clock clamp boards, and K43 (ref. tech. memo 105-14).

→ OR THESE TYPES OF PACKAGES

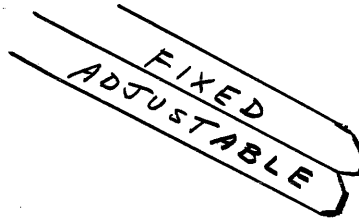
All other packages can be tested with test routine one margins. However, C31 is only used on input-output and should be checked with test routine two margins.

HEAD POSITIONS ON MEMORY G-15D



Spare

(LONG ODD ADJ)
(WRITE HEADS)



(Short Lines)



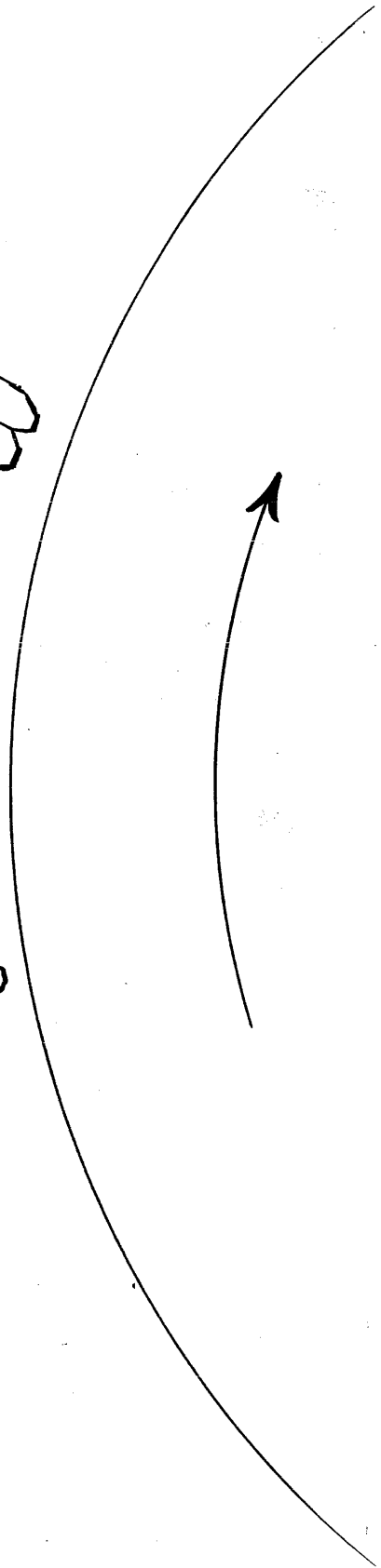
(SHORT ADJ READ)



(LONG EVEN ADJ)
(READ HEADS)

ADJUSTABLE (SHORT LINE READ)
(LONG ODD WRITE)
(LONG EVEN READ)

NO ADJUSTMENTS TO BE MADE ON SHORT LINES WITH DRUM ROTATING-PERIOD.



ACCESSORY MTA-2 TECHNICAL BULLETIN - MAINTENANCE SUPPLEMENT

The test point of each channel (pin R on circuit diagram 3C147) should be checked with an oscilloscope at least once a week. With the tape running at low speed the signal should go down to at least -80 volts and the flat top at 0 volts should be at least 20 micro-seconds wide. With the tape stopped and the oscilloscope set for a vertical sensitivity of approximately 1 volt per centimeter, the test points should be checked for noise. If a channel is found to be noisy, the 12AY7 should be replaced. If this fails to reduce the noise, the two 5965's should be replaced, one at a time. If this fails, the package should be replaced.

The tape and tape-handling mechanism should be dusted carefully at least once a week.

The blower filter should be inspected regularly and replaced when dirty.

The heads and the other surfaces over which the tape passes should be cleaned with isopropyl alcohol at least once every eight hours of operation.

A brief physical description for use in maintenance follows.

Power Supply Chassis

The power supply chassis is located immediately underneath the magnetic tape handler. It is shown on Schematic Diagram 3C177. It supplies filament voltage and all d.c. voltages, except the -20 clamp voltage and the +160 relay voltage to the amplifier chassis (3C178) and the amplifier packages (3C147).

Relay RY21 inhibits writing in channels 1 through 5 when the magnetic tape unit is stopped. It is energized by the stop thyatron of the magnetic tape handler.

Relay RY20 controls the speed of the capstan drive motor on the drive chassis of the magnetic tape handler. It is controlled through the relay driver tube V20, either by the computer or by the Hi-Lo switch on the drive chassis of the magnetic tape handler, depending on whether or not the rotary selector switch (marked A-S-F-S-R) is in the "A" position.

Amplifier
Chassis

The amplifier chassis is located at the bottom of the front panel space of the magnetic tape unit. It is shown in Schematic Diagram 3C178.

Plugs 11 through 16 are for the "read" and "write" amplifiers (3C147) of channels 1 through 6, respectively.

The tape unit switch, SW1, selects the line to tape units 1, 2, 3, or 4. Each of these four lines corresponds to a different number in the "C" position of a magnetic tape command. Tape units 1, 2, or 3 are selected by a 1, 2, or 3, respectively, in the "C" position. Tape unit 4 is selected by a "0" in the "C" position of the command. The output of SW1 goes to the three "And" gates, CR1-CR2, CR3-CR4 and CR5-CR6, that control "Write 6," "Forward" and "Reverse", respectively. When a command calling for one of these operations is given, it will affect only those machines in which the number in the "C" position corresponds to the setting of SW1. "Stop" and "Fast" are sent to all connected magnetic tape units.

C1, C2 and C3 are power supply filter condensers. C4 and C5 are transient-suppressing condensers.

Amplifier
Package

The amplifier package consists of a "write" amplifier and a high gain "read" amplifier for one tape channel. It is shown in Schematic Diagram 3C147.

V1 is the "write" amplifier. Input C is the "write" signal from the computer. Input B is the inhibiting signal from the stop relay RY21 (3C177). When input B is held at +15 volts, V1-B is cut off. When input B is held at -5 volts, V1-B is cut off if input C is between -10 and -20 volts. V1-B conducts through the write head when input C is at 0 volts or higher.

V2-A and V2-B are the first two stages of the read amplifier. Both stages are class A.

V3-A is a combination amplifier and rectifier. Its plate is normally held at about -100 volts so that any positive signals on the grid cannot drive the plate any further negative. A negative signal on the grid allows the plate to rise until it reaches 0 volts, at which point it is clamped by CR1.

V3-B is a cathode follower with its output returned to -20 volts by R17. When two or more magnetic tape units are used, the outputs of corresponding channels are connected in parallel and the second section of V3 becomes part of a cathode follower "Or" gate.