

FACTORY
CALIBRATION AND INSPECTION PROCEDURE

This procedure is company confidential

DC 503

This procedure is the guide for calibration and inspection of the finished instrument. Pre-calibration and extensive troubleshooting information, if required, will be supplied separately.

For all serial numbers.



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Calibration and Inspection Procedure

CHANGE INFORMATION:

For information on changes made to this procedure, to make suggestions for changes, or to order additional copies, please contact the TM500 Instrument Line secretary.

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EQUIPMENT SPECIFIED

All TEKTRONIX test equipment must be calibrated to Factory Test Limits using methods specified in the applicable TEKTRONIX Factory Calibration Procedure. Other test equipment should be calibrated to its manufacturer's specifications. Any exceptions to test equipment accuracies are noted on this Equipment Specified List.

Equivalent test equipment may be used. A Staff Engineer must approve any substitutions.

a. *TEKTRONIX Instruments*

- *1 DM 501 DIGITAL MULTIMETER (Calibration only)
- 1 TYPE 106 SQUAREWAVE GENERATOR
- 1 PS 5011 POWER SUPPLY (Calibration only)
- *1 SG 503 LEVELED SINEWAVE GENERATOR
- *1 TG 501 TIME MARK GENERATOR
- 1 TM 501 950B POWER MODULE (Modified) See Standards Engineer for modification
- 1 TM 503 POWER MODULE
- 1 7704A OSCILLOSCOPE
- 2 7A16A AMPLIFIER
- 1 7B50 TIME BASE
- 1 7T11 SAMPLING SWEEP UNIT
- 1 7S11 SAMPLING UNIT
- 1 S-6 SAMPLING HEAD

b. *Calibration Fixtures and Accessories*

- *1 LOW FREQUENCY SINEWAVE GENERATOR (LFSWG) (067-0542-99)
- 2 50-ohm feedthrough terminations (011-0049-01)
- 1 50-ohm termination (for S-6 Loop-Thru) (015-1022-00)
- 2 50-ohm BNC cables (012-0057-01)
- 1 50-ohm BNC cable (precision) (012-0482-00)
- 1 Dual input connector (067-0525-00)
- 2 10X attenuator (011-0059-01)
- 1 20 pf RC NORMALIZER (067-0538-00)
- 1 BNC "T" connector (103-0030-00)
- 1 BNC to banana plug cable (012-0091-00)
- 1 P6028 1X probe (Calibration only) (010-0075-00)

- 1 P6057 100X probe (Calibration only) (010-6057-03)
- 1 Banana plug to banana plug, 18-inch, red (012-0031-00)
(Calibration only)
- 1 Banana plug to banana plug, 18-inch, black (012-0039-00)
(Calibration only)
- 1 SMA male to GR adapter (015-1007-00)
- 1 GR to BNC female adapter (017-0063-00)
- 1 SMA male to BNC female adapter (015-1018-00)
- 1 Flexible extender (Calibration only) (067-0645-01)

*This equipment must be traceable to NBS for certification of measurement characteristics.

EQUIPMENT SPECIFIED (Cont.)

c. *Other Manufacturers' Equipment*

1 VARIAC

1 1 MHz frequency standard

WWV

SHORT FORM CALIBRATION PROCEDURE

The Short Form Procedure has the same calibration sequence, and limits on initial checks or adjustments, as the complete procedure. Circuit numbers of internal adjustments and test points are provided.

The Factory Test Limits for this instrument are contained in the Short Form Inspection Procedure and in the complete Inspection Procedure.

1. PRELIMINARY INSPECTION

2. POWER SUPPLY

- b. Power supply resistance checks (see TABLE 1)

TABLE 1

<u>DC503 TEST POINT</u>	<u>TEST POINT LOCATION</u>	<u>DM 501 READOUT</u>
+5V	Top of R522	Approx. 350 ohms
+15V	Front end R502	Approx. 1.3K ohms
-22V	Back end R542	Approx. 300 ohms

- c. Check +5V overvoltage protection circuit: ≤ 7.5 volts
d. Adjust +15V supply: no error
e. Check +15V supply line regulation: ≤ 15 mV change with a + and - 10% line voltage change
f. Check +5V supply accuracy: +5V $\pm 5\%$ (4.750 to 5.250)
g. Check +5V supply line regulation: ≤ 5 mV change with a + and - 10% line voltage change
h. Check -22V supply accuracy: -22V $\pm 5\%$ (20.90 to 23.10)
i. Check -22V supply line regulation: ≤ 220 mV change with a + and - 10% line voltage change
j. Check +15V supply current limit: ≤ 200 mA
k. Check +5V supply current limit: ≤ 2000 mA

3. FUNCTION and CLOCK RATE

- b. Check FUNCTION switch (see TABLE 2)

TABLE 2 on next page.

SHORT FORM CALIBRATION PROCEDURE (Cont.)

3. FUNCTION and CLOCK RATE (cont.)

TABLE 2

<u>FUNCTION Switch</u>	<u>DC 503 Display</u>	<u>MHz/μs Light</u>	<u>kHz/ms Light</u>	<u>S Light</u>	<u>GATE Light</u>
.01	.0000	ON	OFF	OFF	Rapid blinking
.1	.00000	ON	OFF	OFF	Blinking
1	.000	OFF	ON	OFF	Blinking
10	.0000	OFF	ON	OFF	Slow blinking
RATIO A/B	.000000	OFF	OFF	OFF	OFF
Period B	.000000	ON	OFF	OFF	OFF
Time A \rightarrow B	0	OFF	OFF	ON	OFF
TIME MANUAL	0	OFF	OFF	ON	OFF
TOTALIZE A	0	OFF	OFF	OFF	OFF

c. Check CLOCK RATE switch (see TABLE 3)

TABLE 3

<u>CLOCK RATE Switch</u>	<u>DC 503 Display</u>
10^6 - 1S	.000000
10^5 - .1S	.00000
10^4 - 10 ms	.0000
10^3 - 1 ms	.000
10^2 - .1 ms	.00
10 - 10 μ s	.0
1 - 1 μ s	0

d. Check DISPLAY TIME interval

4. TIME MANUAL and READOUTS

b. Check decade counters and readout display digits (see TABLE 4)

TABLE 4 on next page.

SHORT FORM CALIBRATION PROCEDURE (Cont.)

4. TIME MANUAL and READOUTS (cont.)

TABLE 4

<u>CLOCK RATE switch</u>	<u>Display digit</u>
1S	1st
.1S	2nd
10 ms	3rd
1 ms	4th
.1 ms	5th
10 μ s	6th
1 μ s	7th

5. TOTALIZE A

- b. Check TOTALIZE A

6. TRIGGERING

- b. Check CH A transient response: $\leq 20\%$ P-P aberration
- c. Check AC/DC COUPL
- d. Check CH A and CH B ATTENUATORS: $\leq 20\%$ rolloff or overshoot at X10 and X100
- e. Check CH A and CH B SLOPE and LEVEL

7. CLOCK

- b. Adjust clock: 10000.000 kHz, no error

7a. CLOCK (OPTION 1)

- b. Adjust clock (Option 1): 10000.000 kHz, no error

8. FREQUENCY A

- b. Check CH A INPUT sensitivity: 1-100 MHz with at least 300 mV P-P signal (see TABLE 5)

TABLE 5 on next page.

SHORT FORM CALIBRATION PROCEDURE (Cont.)

8. FREQUENCY A (cont.)

TABLE 5

<u>SG 503 FREQUENCY RANGE (MHz)</u>	<u>SG 503 FREQUENCY VARIABLE</u>	<u>DC 503 READOUT DISPLAY</u>
50-100	100	Approx. 100.0000
25-50	50.0	Approx. 50.0000
10-25	25.0	Approx. 25.0000
5-10	10.0	Approx. 10.0000
2.5-5	5.00	Approx. 5.0000
1-2.5	2.50	Approx. 2.5000
.5-1	1.00	Approx. 1.0000

- c. Check CH A INPUT sensitivity: 10 Hz to 100 kHz with at least a 300 mV P-P signal (see TABLE 6)

TABLE 6

<u>LFSWG FREQUENCY MULTIPLIER</u>	<u>DC 503 FUNCTION</u>	<u>DC 503 READOUT DISPLAY</u>
100 kHz	1S	Approx. 100.000 kHz
10 kHz	1S	Approx. 10.000 kHz
1 kHz	1S	Approx. 1.000 kHz
100 Hz	1S	Approx. .100 kHz
10 Hz	1S	Approx. .010 kHz

- d. Check CH A ATTENUATORS: X10 and X100

9. PERIOD B

- b. Check CH B PERIOD range (see TABLE 7)

TABLE 7

<u>DC 503 CLOCK RATE</u>	<u>TG 501 MARKER (SEC)</u>	<u>DC 503 READOUT DISPLAY</u>
1S	.1 μ	.100000 \pm 2 counts
.1S	1 μ	1.00000 \pm 2 counts
10 ms	10 μ	10.0000 \pm 2 counts
1 ms	.1m	100.000 \pm 2 counts
.1 ms	1m	1.00000 \pm 2 counts
10 μ s	10m	10.0000 \pm 2 counts
1 μ s	.1	100.000 \pm 2 counts
1 μ s	1	1000.000 \pm 20 counts

SHORT FORM CALIBRATION PROCEDURE (Cont.)

9. PERIOD B (cont.)
 - d. Check CH B PERIOD INPUT sensitivity: 10 MHz, 1 kHz, 10 Hz at 300 mV P-P signal
 - d. Check CH B ATTENUATORS: X10 and X100

10. RATIO A/B
 - b. Check RATIO A/B

11. TIME A → B
 - b. Check TIME A → B

12. GATE OUTPUT
 - b. Check GATE OUTPUT: +5V pulse

13. LINE REGULATION
 - b. Check line regulation: readout display will remain constant with a + and - 10% line voltage change

14. INTERNAL SOURCE
 - b. Check CH A and CH B INT SOURCE: CH A, 100 MHz; CH B, 10 MHz, CH A/CH B, 100 kHz, 10 Hz

SHORT FORM INSPECTION PROCEDURE

The Factory Test Limits in this Short Form Procedure are repeated in the complete procedure. Instruments may not meet Factory Test Limits if inspection methods, or test equipment, differ substantially from those given.

1. PRELIMINARY INSPECTION

3. FUNCTION and CLOCK RATE

b. Check FUNCTION switch (see TABLE 2)

TABLE 2

<u>FUNCTION Switch</u>	<u>DC 503 Display</u>	<u>MHz/μs Light</u>	<u>kHz/ms Light</u>	<u>S Light</u>	<u>GATE Light</u>
.01	.0000	ON	OFF	OFF	Rapid blinking
.1	.00000	ON	OFF	OFF	Blinking
1	.000	OFF	ON	OFF	Blinking
10	.0000	OFF	ON	OFF	Slow blinking
RATIO A/B	.000000	OFF	OFF	OFF	OFF
Period B	.000000	ON	OFF	OFF	OFF
Time A \rightarrow B	0	OFF	OFF	ON	OFF
TIME MANUAL	0	OFF	OFF	ON	OFF
TOTALIZE A	0	OFF	OFF	OFF	OFF

c. Check CLOCK RATE switch (see TABLE 3)

TABLE 3

<u>CLOCK RATE Switch</u>	<u>DC 503 Display</u>
10^6 - 1S	.000000
10^5 - .1S	.00000
10^4 - 10 ms	.0000
10^3 - 1 ms	.000
10^2 - .1 ms	.00
10 - 10 s	.0
1 - 1 s	0

d. Check DISPLAY TIME interval

SHORT FORM INSPECTION PROCEDURE (Cont.)

4. TIME MANUAL and READOUTS

- b. Check decade counters and readout display digits (see TABLE 4)

TABLE 4

<u>CLOCK RATE switch</u>	<u>Display digit</u>
1S	1st
.1S	2nd
10 ms	3rd
1 ms	4th
.1 ms	5th
10 μ s	6th
1 μ s	7th

5. TOTALIZE A

- b. Check TOTALIZE A

7. CLOCK

- b. Check clock accuracy: 1000.000 kHz, within 1 part in 10^5

7a. CLOCK (OPTION 1)

- b. Check clock accuracy: 1000.000 kHz, within 5 parts in 10^7

8. FREQUENCY A

- b. Check CH A INPUT sensitivity: 1-100 MHz with at least a 300 mV P-P signal (see TABLE 5)

TABLE 5

<u>SG 503 FREQUENCY RANGE (MHz)</u>	<u>SG 503 FREQUENCY VARIABLE</u>	<u>DC 503 READOUT DISPLAY</u>
50-100	100	Approx. 100.0000
25-50	50.0	Approx. 50.0000
10-25	25.0	Approx. 25.0000
5-10	10.0	Approx. 10.0000
2.5-5	5.00	Approx. 5.0000
1-2.5	2.50	Approx. 2.5000
.5-1	1.00	Approx. 1.0000

SHORT FORM INSPECTION PROCEDURE (Cont.)

8. FREQUENCY A (Cont.)

- c. Check CH A INPUT sensitivity: 10Hz-100 kHz with at least a 300 mV P-P signal (see TABLE 6)

TABLE 6

<u>LFSWG FREQUENCY MULTIPLIER</u>	<u>DC 503 FUNCTION</u>	<u>DC 503 READOUT DISPLAY</u>
100 kHz	1S	Approx. 100.000 kHz
10 kHz	1S	Approx. 10.000 kHz
1 kHz	1S	Approx. 1.000 kHz
100 Hz	1S	Approx. .100 kHz
10 Hz	1S	Approx. .010 kHz

- d. Check CH A ATTENUATORS: X10 and X100

9. PERIOD B

- b. Check CH B PERIOD range (see TABLE 7)

TABLE 7

<u>DC 503 CLOCK RATE</u>	<u>TG 501 MARKER (SEC)</u>	<u>DC 503 READOUT DISPLAY</u>
1S	.1 μ	.100000 \pm 2 counts
.1S	1 μ	1.00000 \pm 2 counts
10 ms	10 μ	10.0000 \pm 2 counts
1 ms	.1m	100.000 \pm 2 counts
.1 ms	1m	1.00000 \pm 2 counts
10 μ s	10m	10.0000 \pm 2 counts
1 μ s	.1	100.000 \pm 2 counts
1 μ s	1	1000.000 \pm 20 counts

- c. Check CH B PERIOD INPUT sensitivity: 10 MHz, 1 kHz, 10 Hz at 300 mV P-P signal
 d. Check CH B ATTENUATORS: X10 and X100

SHORT FORM INSPECTION PROCEDURE (Cont.)

10. RATIO A/B
 - b. Check RATIO A/B

11. TIME A → B
 - b. Check TIME A → B

12. GATE OUTPUT
 - b. Check GATE OUTPUT: +5V pulse,

13. LINE REGULATION
 - b. Check line regulation: readout display will remain constant with a + and - 10% line voltage change

14. INTERNAL SOURCE
 - b. Check CH A and CH B INT SOURCE: CH A, 100 MHz; CH B, 10 MHz; CHA/CH B, 100 kHz, 10 Hz

15. CLOCK OUT
 - b. Check 1 MHz clock output (approx. 4 major div)

1. PRELIMINARY INSPECTION

CHECK: For unsoldered or rosin joints.

CHECK: For long leads and lead dress.

CHECK: For loose hardware and protruding parts.

CHECK: Controls for smooth mechanical operation, proper indexing and knob spacing from front panel.

CHECK: Front panel for scratches and proper markings.

CHECK: White tag for assembly and test signatures.

2. POWER SUPPLY

a. Set upTM 501

POWER switch	in
LINE SELECTOR	HI

VARIAC

ON-OFF switch	ON
RANGE switch	300W
AC VOLT meter	120

CONNECT: TM 501 power cord to VARIAC output.

DM 501

RANGE/FUNCTION	2K OHMS
INPUT button	out

PS 5011

10-20V button	out
VOLTS	6.20
OUTPUT button	out
CURRENT LIMIT	midrange

INSTALL: DM 501 into TM 503.

INSTALL: SG 503 into TM 503.

INSTALL PS 5011 into TM 503.

CONNECT: Test lead set to DM 501 HI and LO INPUTS.

DC 503

FUNCTION	.01S
CLOCK RATE	10^6 -1S
DISPLAY TIME	ccw
CH A LEVEL	midrange/in
CH B LEVEL	midrange/in
Front panel pushbuttons	all out

b. Power supply resistance checks

CONNECT: DM 501 LO test lead to DC 503 chassis ground.

CONNECT: DM 501 HI test lead to the following DC 503 test points and check DM 501 readout display indicates approximate resistances using TABLE 1.

2. POWER SUPPLY (Cont.)

b. Power supply resistance checks (cont.)

TABLE 1

DC503 TEST POINT	TEST POINT LOCATION	DM 501 READOUT
+5V	Top of R522	Approx. 350 ohms
+15V	Front end R502	Approx. 1.3K ohms
-22V	Back end R542	Approx. 300 ohms

DISCONNECT: DM 501 HI and LO test leads from DC 503.

c. Check +5 volt overvoltage protection circuit: <7.5 volts

SET: DM 501 RANGE/FUNCTION to 20 DC VOLTS.

CONNECT: Black 18" banana plug to banana plug cable from PS 5011 0-20V - jack to DM 501 LO INPUT. Arrange hookup so black test lead is also connected to DM 501 LO INPUT.

CONNECT: Red 18" banana plug to banana plug cable from PS 5011 0-20V + jack to DM 501 HI INPUT. Arrange hookup so red test lead is also connected to DM 501 HI INPUT.

SET: PS 5011 ON button in.

CHECK: DM 501 readout display indicates between 6.100 and 6.300.

CONNECT: DM 501 HI test lead to rear end of fuse (F320).

ADJUST: PS 5011 VOLTS slowly cw.

CHECK: DM 501 readout display does not exceed +7.500 before dropping back below 2.000.

SET: PS 5011 OUTPUT button out.

DISCONNECT: All leads from DC 503.

2. POWER SUPPLY (Cont.)

c. Check +5V overvoltage protection circuit (cont.)

DISCONNECT: All leads from PS 5011.

SOLDER: 9-1 wire to pad at left of
9-2 wire on overvoltage protection
circuit board on DC 503.

d. Adjust +15V supply: no error

CONNECT: DC 503 to TM 501 with a
flexible extender.

SET: TM 501 POWER switch out (on).

SET: DM 501 RANGE/FUNCTION to 20 DC
VOLTS.

CONNECT: DM 501 LO test lead to DC 503
chassis ground.

CONNECT: DM 501 HI test lead to DC 503
+15V T.P. (front end R502).

ADJUST: DC 503 R505 (+15V adjust) for
exactly +15.000 on DM 501 readout.

e. Check +15V supply line regulation: ≤ 15 mV
change with a + and - 10% line voltage
change

ADJUST: VARIAC AC VOLTS from 108 to 132.

CHECK: DM 501 readout display changes
less than 15 mV (.015) from original
reading.

ADJUST: VARIAC AC VOLTS to 120.

f. Check +5V supply accuracy: +5V $\pm 5\%$

CONNECT: DM 501 HI test lead to DC 503
+5V T.P. (pin 3, U520).

CHECK: DM 501 readout indicates +5V
 ± 250 mV (4.750 to 5.250).

2. POWER SUPPLY (Cont.)

g. Check +5V supply line regulation: <5 mV change with a + and - 10% line voltage change

ADJUST: VARIAC AC VOLTS from 108 to 132.

CHECK: DM 501 readout display changes less than 5 mV (.005) from original reading.

ADJUST: VARIAC AC VOLTS to 120.

h. Check -22V supply accuracy: $-22V \pm 5\%$

SET: DM 501 RANGE/FUNCTION to 200 DC VOLTS.

CONNECT: DM 501 HI test lead to DC 502 -22V TP.P (back end R542).

CHECK: DM 501 readout indicates -22.00 $\pm 1.1V$ (20.90 to 23.10).

i. Check -22V supply line regulation: <220 mV change with a + and - 10% line voltage change

ADJUST: VARIAC AC VOLTS from 108 to 132.

CHECK: DM 501 readout display changes less than 220 mV (.220) from original reading.

ADJUST: VARIAC AC VOLTS to 120.

DISCONNECT: DM 501 HI test lead from DC 503.

j. Check +15V supply current limit: <200 mA

SET: DM 501 RANGE/FUNCTION to 2000 DC mA.

CONNECT: DM 501 HI test lead to DC 503 +15V T.P. (front end R502).

CHECK: DM 501 readout display does not exceed 200.0.

2. POWER SUPPLY (Cont.)

k. *Check +5V supply current limit: < 2000 mA*

CONNECT: DM 501 HI test lead to DC 503
+5V T.P. (top end R522).

CHECK: DM 501 readout display does not
exceed 2000.0.

3. FUNCTION and CLOCK RATE

a. Set upDC 503

FUNCTION	.01s
CLOCK RATE	1S
DISPLAY TIME	ccw
Front panel pushbuttons	all out

b. Check FUNCTION switch

CHECK: FUNCTION switch and readout display using TABLE 2.

TABLE 2

<u>FUNCTION Switch</u>	<u>DC 503 Display</u>	<u>MHz/μs Light</u>	<u>kHz/ms Light</u>	<u>S Light</u>	<u>GATE Light</u>
.01	.0000	ON	OFF	OFF	Rapid blinking
.1	.00000	ON	OFF	OFF	Blinking
1	.000	OFF	ON	OFF	Blinking
10	.0000	OFF	ON	OFF	Slow blinking
RATIO A/B	.000000	OFF	OFF	OFF	OFF
Period B	.000000	ON	OFF	OFF	OFF
Time A \rightarrow B	0	OFF	OFF	ON	OFF
TIME MANUAL	0	OFF	OFF	ON	OFF
TOTALIZE A	0	OFF	OFF	OFF	OFF

c. Check CLOCK RATE switch

CHECK: CLOCK RATE switch and readout display using TABLE 3.

SET: DC 503 FUNCTION to RATIO A/B.

TABLE 3

<u>CLOCK RATE Switch</u>	<u>DC 503 Display</u>
10^6 - 1S	.000000
10^5 - .1S	.00000
10^4 - 10 ms	.0000
10^3 - 1 ms	.000

3. FUNCTION and CLOCK RATE (Cont.)

c. Check CLOCK RATE switch (cont.)

TABLE 3 (cont)

<u>CLOCK RATE Switch</u>	<u>DC 503 Display</u>
10 ² - .1 ms	.00
10 - 10 μs	.0
1 - 1 μs	0

d. Check DISPLAY TIME interval

SET: DC 503 FUNCTION switch to .01s.

ADJUST: DC 503 DISPLAY TIME full ccw.

CHECK: DC 503 GATE light blinks rapidly.

ADJUST: DC 503 DISPLAY TIME full cw, but not in detent.

CHECK: DC 503 GATE light blinking interval in approximately 10 seconds.

SET: DC 503 DISPLAY TIME into detent position.

CHECK: DC 503 GATE light does not blink.

4. TIME MANUAL and READOUTS

a. Set up

<u>DC 503</u>		
FUNCTION		TIME MANUAL
CLOCK RATE		1S
Front panel pushbuttons		all out

b. Check decade counters and readout display digits

PUSH: DC 503 RESET button in and hold it in.

CHECK: For a display of 8888888.

CHECK: All segments in each digit are lighted evenly.

RELEASE: RESET button.

SET: DC 503 START button in.

CHECK: First right-hand digit counts from 0 to 9 and carries to the next digit.

CHECK: The remaining digits using settings in TABLE 4.

TABLE 4

<u>CLOCK RATE switch</u>	<u>Display digit</u>
1S	1st
.1S	2nd
10 ms	3rd
1 ms	4th
.1 ms	5th
10 μ s	6th
1 μ s	7th

PUSH: DC 503 RESET button in, then release.

CHECK: That 6th digit starts counting and display flashes (overflow) when 7th digit reaches 0.

SET: DC 503 START button out.

SET: DC 503 RESET button in, then release.

5. TOTALIZE A

a. Set upTG 501

MARKER (SEC)	1
VARIABLE TIMING	in
Front panel pushbuttons	all out

DC 503

FUNCTION	TOTALIZE A
CLOCK RATE	1 μ s
CH A + SLOPE button	in
All other pushbuttons	out

b. Check TOTALIZE A

CONNECT: TG 501 MARKER OUT to DC 503 CH A INPUT through a 50-ohm BNC cable and a 50-ohm terminator.

CHECK: DC 503 GATE OUTPUT light is out.

SET: DC 503 START button in.

CHECK: DC 503 GATE OUTPUT light is on and stays on.

ADJUST: CH A trigger level until DC 503 starts counting.

PUSH: RESET button in, then release.

CHECK: DC 503 starts counting again.

SET: START button out.

CHECK: DC 503 count stops and holds.

SET: START button in.

CHECK: DC 503 count continues.

SET: TG 501 MARKER (SEC) to 1 μ s.

CHECK: Last digit on left counts to 9 and then overflows (display flashes).

SET: START button out.

SET: RESET button in, then release.

DISCONNECT: 50-ohm BNC cable and 50-ohm terminator from TG 501 and DC 503.

6. TRIGGERING

a. Set up7704A OSCILLOSCOPE

VERTICAL MODE	RIGHT
HORIZONTAL MODE	A

INSTALL: 7A16A AMPLIFIER into 7704A LEFT
VERT compartment.

INSTALL: 7S11 SAMPLING UNIT into 7704A
RIGHT VERT compartment.

INSTALL: TYPE S-6 SAMPLING HEAD into 7S11.

INSTALL: 7T11 SAMPLING SWEEP UNIT into
7704A A HORIZ compartment.

INSTALL: 7B50 TIME BASE into 7704A B
HORIZ compartment.

7S11 SAMPLING UNIT

mVOLTS/DIV	5
VARIABLE	in
DELAY	midrange
DOT RESPONSE	midrange
SMOOTH	in
DC OFFSET	midrange
+ UP	in

S-6 SAMPLING HEAD

CONNECT: 50-ohm termination (015-1022-
00) to lower LOOP THRU connector.

CONNECT: SMA male to GR adapter (015-
1007-00) to upper LOOP THRU
connector.

CONNECT: GR to BNC female adapter
(017-0063-00) to SMA male to GR
adapter (015-1007-00).

7T11 SAMPLING SWEEP UNIT

TIME POS RNG	.5 μ s
TIME/DIV	20 ns
SLOPE	+
SEQUENTIAL	in
TRIG AMP	X1
TRIG INPUT	EXT 50 Ω 2V MAX
SCAN	midrange
REP	in

6. TRIGGERING (Cont.)

a. Set up (cont.)

7A16A AMPLIFIER (1st)

VOLTS/DIV	50 mV
VARIABLE	in
AC-GND-DC	GND
POLARITY	+ UP
BANDWIDTH	20 MHz

7A16A AMPLIFIER (2nd)

VOLTS/DIV	1V
VARIABLE	in
AC-GND-DC	GND
POLARITY	+ UP
BANDWIDTH	20 MHz

7B50 TIME BASE

TIME/DIV	.2 ms
VARIABLE	in
MODE	AUTO
COUPLING	AC
SOURCE	INT
DISPLAY MODE	TIME BASE
MAGNIFIER	1
B TRIGGER SOURCE	VERT MODE

TYPE 106

REPETITION RATE RANGE	100 kHz
MULTIPLIER	cw
SYMMETRY	midrange
+ TRANSITION AMPLITUDE	midrange
HIGH AMPLITUDE/FAST RISE switch	FAST RISE

LFSWG

0-10 FREQUENCY control	1
FREQUENCY MULTIPLIER	10 kHz
0-1 FREQUENCY control	0
FREQUENCY VARIABLE	CAL (cw)
AMPLITUDE	5
AMPLITUDE MULTIPLIER	1

DC 503

FUNCTION	.1S
CLOCK RATE	1 μ s
DISPLAY TIME	ccw
Front panel pushbuttons	all out

6. TRIGGERING (Cont.)

b. Check CH A transient response; <20% P-P aberration

SET: DC 503 CH A + SLOPE button in.

CONNECT: 50-ohm BNC cable and 50-ohm terminator from TYPE 106 FAST RISE + OUTPUT to DC 503 CH A INPUT.

CONNECT: 50-ohm BNC cable from TYPE 106 TRIGGER OUTPUT to 7T11 TRIG INPUT through a SMA male to BNC female connector (015-1018-00).

ADJUST: DC 503 CH A LEVEL for a stable readout display of approximately 1.00000 with MHz light on.

CONNECT: 100X probe (P6057) to S-6 input.

CONNECT: 100X probe ground lead to DC 503 chassis ground.

CONNECT: 100X probe to emitter of Q95 on DC 503 trigger circuit board.

ADJUST: 7T11 TRIG LEVEL for a triggered display.

ADJUST: 7S11 DC OFFSET to center display on screen.

ADJUST: 7T11 TIME POSITION to center leading edge of waveform on screen.

ADJUST: TYPE 106 + TRANSITION AMPLITUDE for a 5 major div display on test scope.

ADJUST: DC 503 C54 for best front corner with less than 1 div of P-P aberration.

DISCONNECT: 100X probe from S6 and DC 503.

DISCONNECT: All cables from TYPE 106, 7T11, and DC 503.

c. Check AC/DC COUPL

SET: 7704A VERTICAL MODE LEFT button in.

6. TRIGGERING (Cont.)

c. Check AC/DC COUPL (cont.)

SET: 7704A HORIZONTAL MODE B button in.

SET: TYPE 106 REPETITION RATE RANGE to 1 kHz.

ADJUST: TYPE 106 MULTIPLIER fully ccw.

SET: TYPE 106 HIGH AMPLITUDE/FAST RISE switch to HIGH AMPLITUDE.

ADJUST: 7A16A POSITION to center trace on screen.

CONNECT: TYPE 106 HIGH AMPLITUDE OUTPUT to DC 503 CH A INPUT through a 10X attenuator and 50-ohm terminator.

SET: DC 503 FUNCTION to 1S.

ADJUST: DC 503 CH A LEVEL for a readout display of approximately 1.000.

CONNECT: 1X probe to 7A16A INPUT.

CONNECT: 1X probe ground lead to DC 503 chassis ground.

CONNECT: 1X probe to front end of R27 (1 megohm) on DC 503 triggering circuit board.

SET: 7A16A AC-GND-DC.

ADJUST: TYPE 106 HIGH AMPLITUDE AMPLITUDE for a 2 div display on test scope.

SET: DC 503 CH A AC COUPL button in.

CHECK: Display on test scope shifts up 1 div.

CHECK: That squarewave on screen is approximately 1 cycle in 5 major div.

SET: DC 503 AC COUPL button out.

DISCONNECT: 50-ohm terminator from DC 503 CH A INPUT and connect it to DC 503 CH B INPUT.

6. TRIGGERING (Cont.)

c. Check AC/DC COUPL (cont.)

DISCONNECT: 1X probe from CH A R27.

CONNECT: 1X probe to rear end of R127 in DC 503 CH B.

ADJUST: TYPE 106 HIGH AMPLITUDE AMPLITUDE for a 2 div display on test scope.

SET: DC 503 CH B AC COUPL button in.

CHECK: Display on test scope shifts up 1 div.

SET: DC 503 AC COUPL button out.

DISCONNECT: 50-ohm BNC cable hook-up and 1X probe from TYPE 106, 7A16A, and DC 503.

d. Check CH A and CH B ATTENUATORS: <20% rolloff or overshoot at X10 and X100

CONNECT: TYPE 106 HIGH AMPLITUDE OUTPUT to DC 503 CH A INPUT through a 50-ohm BNC cable, two (2) 10X attenuators, and a 50-ohm terminator.

CONNECT: 1X probe to 7A16A INPUT.

CONNECT: 1X probe ground lead to DC 503 chassis ground (use as short a lead as possible).

CONNECT: 1X probe to front end of R38 (510Ω) on DC 503 triggering circuit board.

SET: 7A16A VOLTS/DIV to 10 mV.

SET: 7A16A AC-GND-DC to AC.

ADJUST: TYPE 106 HIGH AMPLITUDE AMPLITUDE for a 5 major div display on test scope.

CHECK: Display on test scope for less than 1 major div (20%) of rolloff or overshoot.

6. TRIGGERING (Cont.)

d. Check CH A and CH B ATTENUATORS (cont.)

SET: DC 503 CH A x 10 ATTEN button in.

REMOVE: One 10X attenuator from CH A INPUT.

ADJUST: TYPE 106 HIGH AMPLITUDE AMPLITUDE for a 5 major div display on test scope.

CHECK: Display on test scope for less than 1 major div (20%) of rolloff or overshoot.

SET: DC 503 CH A X100 ATTEN button in.

REMOVE: Remaining 10X attenuator from DC 503 CH A INPUT.

ADJUST: TYPE 106 HIGH AMPLITUDE AMPLITUDE for a 5 major div display on test scope.

CHECK: Display on test scope for less than 1 major div (20%) rolloff or overshoot.

DISCONNECT: 50-ohm BNC cable and 50-ohm terminator from DC 503 CH A INPUT.

RELEASE: DC 503 CH A X100 ATTEN button.

CONNECT: TYPE 106 HIGH AMPLITUDE OUTPUT to DC 503 CH B INPUT through a 50-ohm BNC cable, two 10X attenuators, and a 50-ohm terminator.

CHECK: DC 503 CH B ATTENUATORS using the above procedure of CH A.

CONNECT: 1X probe to front end of R138 (10K) on DC 503 triggering circuit board.

DISCONNECT: 50-ohm BNC cable and 1X probe from TYPE 106, 7A16A, and DC 503.

e. Check CH A and CH B SLOPE and LEVEL

REMOVE: 7S11 and 7T11 from 7704A.

INSTALL: 7A16A (2nd) into RIGHT VERT of 7704A.

6. TRIGGERING (Cont.)

e. Check CH A and CH B SLOPE and LEVEL (cont.)

SET: 7704A VERTICAL MODE to ALT.

SET: 7704A B TRIGGER SOURCE to RIGHT VERT.

CONNECT: BNC "T" to LFSWG OUTPUT.

CONNECT: 50-ohm BNC cable from one end
of BNC "T" to 7A16A INPUT (RIGHT VERT).

CONNECT: 50-ohm BNC cable from other end
of BNC "T" to DC 503 CH A INPUT.

SET: 7A16A VOLTS/DIV (LEFT VERT) to 1V.

CONNECT: 1X probe from 7A16A INPUT (LEFT
VERT) to pin 1 of U200 on DC 503 trigger
board.

CONNECT: 1X probe ground lead to DC 503
chassis ground.

SET: All DC 503 front panel pushbuttons
out.

SET: 7B50 TIME/DIV to 10 μ s.

SET: Both 7A16A AD-GND-DC to GND.

ADJUST: Both 7A16A POSITION to center
trace on screen.

SET: Both 7A16A AC-GND-DC to DC.

NOTE: Negative-going part of displayed
squarewave represents triggering
point.

ADJUST: 7B50 POSITION so sweep starts on
first graticule line.

ADJUST: 7B50 LEVEL/SLOPE so sweep starts
at 50% point of positive slope of
sinewave.

ADJUST: DC 503 CH A LEVEL to its mechani-
cal center.

6. TRIGGERING (Cont.)

e. CHECK CH A and CH B SLOPE and LEVEL (cont.)

ADJUST: DC 503 CH A R42 (trigger level balance) so negative portion of square-wave crosses the graticule center line at the same place the negative portion of the sinewave begins.

ADJUST: DC 503 CH A LEVEL cw and ccw, watching the test scope display.

CHECK: Negative transition of squarewave will move one major div or more in each direction.

SET: DC 503 CH A + SLOPE button in.

CHECK: Negative portion of squarewave occurs on positive portion of sinewave.

SET: DC 503 CH A + SLOPE button out.

DISCONNECT: 50-ohm BNC cable from DC 503 CH A INPUT and connect it to CH B INPUT.

DISCONNECT: LX probe from U200 and connect it to pin 1 of U220.

REPEAT: CH A procedure above for CH B, adjust R142 (CH B trigger level balance).

DISCONNECT: All cables and probes from DC 503, 7A16A, and LFSWG.

SET: 7704A VERTICAL MODE LEFT button in.

7. CLOCK (Standard Instruments Only)

a. Set up7A16A

VOLTS/DIV	1V
VARIABLE	in
AC-GND-DC	DC
POLARITY	+ UP
BANDWIDTH	FULL

7B50

TIME/DIV	.1 μ s
VARIABLE	in
MODE	AUTO
COUPLING	AC
SOURCE	EXT
MAGNIFIER	X1
DISPLAY MODE	TIME BASE

DC 503

FUNCTION	.1S
CH A LEVEL	midrange
DISPLAY TIME	ccw
CH A AC COUPL pushbutton	in
All other pushbuttons	out

b. Adjust clock: 1000.000 kHz, no error

CONNECT: 50-ohm BNC cable from TM 501 (modified) 1 MHz output interface BNC to 7A16A INPUT.

CONNECT: BNC "T" to DC 503 CH A INPUT.

CONNECT: 1 MHz frequency standard (WWV) to one end of BNC "T" at DC 503 CH A INPUT.

CONNECT: 50-ohm BNC cable from other end of BNC "T" to 7B50 EXT TRIG IN.

ADJUST: DC 503 CH A LEVEL control for a stable readout display.

SET: DC 503 FUNCTION to 1S.

ADJUST: DC 503 air cap (C255) for minimum pulse drift on test scope.

CHECK: Display for ≤ 1 div/sec pulse drift on test scope.

b. Check clock accuracy: 1000.000 kHz within 1 part in 10^5

CONNECT: 1 MHz frequency standard to DC 503 CH A INPUT through a 50-ohm BNC cable.

ADJUST: DC 503 CH A LEVEL control for a stable display.

SET: DC 503 FUNCTION to 1S.

CHECK: DC 503 readout display for 1000.000 ± 10 counts (999.990 to 1000.010).

SET: DC 503 MEASUREMENT INTERVAL to 10 SEC.

CHECK: DC 503 readout display for 000.0000 ± 100 counts (999.9900 to 000.0100).

DISCONNECT: 1 MHz frequency standard from DC 503.

7. CLOCK (Standard Instruments Only)(Cont.)

b. Adjust clock (cont.)

SET: DC 503 MEASUREMENT INTERVAL to
10 SEC.

CHECK: DC 503 readout display for
000.0000 \pm 100 counts (999.9900 to
000.0100)

DISCONNECT: All 50-ohm BNC cables.

7A. CLOCK (OPTION 1)

a. Set up7A16A

VOLTS/DIV	1V
VARIABLE	in
AC-GND-DC	DC
POLARITY	+ UP
BANDWIDTH	FULL

7B50

TIME/DIV	.1 μ s
VARIABLE	in
MODE	AUTO
COUPLING	AC
SOURCE	EXT
MAGNIFIER	X1
DISPLAY MODE	TIME BASE

DC 503

FUNCTION	.1S
CH A LEVEL	midrange
DISPLAY TIME	ccw
CH A AC COUPL pushbutton	in
All other pushbuttons	out

b. Adjust clock (Option 1): 1000.000 kHz,
no error

CONNECT: 50-ohm BNC cable from TM 501
(modified) 1 MHz output interface
BNC to 7A16A INPUT.

CONNECT: BNC "T" to DC 503 CH A INPUT.

CONNECT: 1 MHz frequency standard (WVW)
to one end of BNC "T" at DC 503 CH A
INPUT.

CONNECT: 50-ohm BNC cable from other end
of BNC "T" to 7B50 EXT TRIG IN.

ADJUST: DC 503 CH A LEVEL control for a
stable readout display.

SET: DC 503 FUNCTION to 10S.

REMOVE: Slotted cover from crystal oven.

b. Check clock accuracy: 1000.000 kHz
within 5 parts in 10^7

CONNECT: 1 MHz frequency standard to
DC 503 CH A INPUT through a 50-ohm BNC
cable.

ADJUST: DC 503 CH A LEVEL control for a
stable display.

SET: DC 503 FUNCTION to 10S.

CHECK: DC 503 readout display for
000.0000 (display flashing) 5 counts
(999.9995 to 000.0005).

7A. CLOCK (OPTION 1) (Cont.)

b. Adjust clock (Option 1) (cont.)

ADJUST: Slug inside oven for minimum pulse drift on test scope.

REPLACE: Slotted cover on crystal oven.

SET: 7B50 X10 MAGNIFIER button in.

DISCONNECT: All BNC cables.

8. FREQUENCY A

a. Set upSG 503

FREQUENCY RANGE (MHz)	50-100
FREQUENCY VARIABLE	100
OUTPUT AMPLITUDE	3.0
AMPLITUDE MULTIPLIER	X.1

LFSWG

0-10 FREQUENCY control	1
FREQUENCY MULTIPLIER	100 kHz
0-1 FREQUENCY control	0
FREQUENCY VARIABLE	CAL
AMPLITUDE	.5
AMPLITUDE MULTIPLIER	.6

DC 503

FUNCTION	.01S
DISPLAY TIME	ccw
CH A LEVEL	midrange
CH A AC COUPL pushbutton	in
All other pushbuttons	out

b. Check CH A INPUT sensitivity: 1-100 MHz with at least a 300 mV P-P signal

CONNECT: SG 503 OUTPUT to DC 503 CH A INPUT through a precision 50-ohm BNC cable and 50-ohm terminator.

ADJUST: DC 503 CH A LEVEL control for a stable readout display of approximately 100.0000 MHz.

SET: DC 503 CH A + SLOPE button in.

ADJUST: DC 503 CH A LEVEL control for a stable readout display of approximately 100.0000 MHz.

REPEAT: Above procedure using TABLE 5.

TABLE 5

<u>SG 503 FREQUENCY RANGE (MHz)</u>	<u>SG 503 FREQUENCY VARIABLE</u>	<u>DC 503 READOUT DISPLAY</u>
50-100	100	Approx. 100.0000
25-50	50.0	Approx. 50.0000
10-25	25.0	Approx. 25.0000
5-10	10.0	Approx. 10.0000
2.5-5	5.00	Approx. 5.0000
1-2.5	2.50	Approx. 2.5000
.5-1	1.00	Approx. 1.0000

DISCONNECT: 50-ohm BNC cable and 50-ohm terminator from SG 503 and DC 503.

DC 503

Step 8

8. FREQUENCY A (Cont.)

c. Check CH A INPUT sensitivity: 10 Hz-100 kHz with at least a 300 mV P-P signal

CONNECT: LFSWG OUTPUT to DC 503 CH A INPUT through a 50-ohm BNC cable.

SET: DC 503 FUNCTION to 1S.

SET: DC 503 CH A + SLOPE button out.

ADJUST: DC 503 CH A LEVEL for a readout display of approximately 100.000 kHz.

CHECK: DC 503 CH A INPUT sensitivity from 10 Hz to 100 kHz using procedure in Step 8b and settings in TABLE 6 (display should be within + and - 1 count of generator frequency).

TABLE 6

<u>LFSWG FREQUENCY MULTIPLIER</u>	<u>DC 503 FUNCTION</u>	<u>DC 503 READOUT DISPLAY</u>
100 kHz	1S	Approx. 100.000 kHz
10 kHz	1S	Approx. 10.000 kHz
1 kHz	1S	Approx. 1.000 kHz
100 Hz	1S	Approx. .100 kHz
10 Hz	1S	Approx. .010 kHz

SET: DC 503 CH A AC COUPL pushbutton out.

d. Check CH A ATTENUATORS

SET: DC 503 FUNCTION to 1S.

SET: LFSWG FREQUENCY MULTIPLIER to 1 kHz.

ADJUST: DC 503 CH A LEVEL for a stable display of approximately 1.000 kHz.

SET: DC 503 CH A X10 ATTEN button in (should have reading of .000).

SET: LFSWG AMPLITUDE to 5.

ADJUST: DC 503 CH A LEVEL for a stable display of approximately 1.000.

SET: DC 503 CH A X100 ATTEN button in (should have reading of .000).

SET: LFSWG AMPLITUDE to 50.

ADJUST: DC 503 CH A LEVEL for a stable display of approximately 1.000.

SET: LFSWG AMPLITUDE to .5.

RELEASE: DC 503 CH A X100 ATTEN button.

DISCONNECT: 50-ohm BNC cable from LFSWG and DC 503.

9. PERIOD B

a. Set upTG 501

MARKER (SEC)	.1 μ s
VARIABLE TIMING	in
Front panel pushbuttons	all out

SG 503

FREQUENCY RANGE (MHz)	5-10
FREQUENCY VARIABLE	10.0
OUTPUT AMPLITUDE	3.0
AMPLITUDE MULTIPLIER	X.1

LFSWG

0-10 FREQUENCY control	1
FREQUENCY MULTIPLIER	1 kHz
0-1 FREQUENCY control	0
FREQUENCY VARIABLE	CAL
AMPLITUDE	.5
AMPLITUDE MULTIPLIER	.6

DC 503

FUNCTION	PERIOD B
CLOCK RATE	.1S
DISPLAY TIME	ccw
CH B LEVEL	midrange
CH B + SLOPE	in
All other pushbuttons	out

b. Check CH B PERIOD range

CONNECT: TG 501 MARKER OUT to DC 503 CH B INPUT through a 50-ohm BNC cable and a 50-ohm terminator.

ADJUST: DC 503 CH B LEVEL so the GATE light starts blinking and the readout stabilizes.

CHECK: DC 503 readout display for .10000.

CHECK: DC 503 CLOCK RATE positions using settings in TABLE 7.

TABLE 7

(See next page)

9. PERIOD B (Cont.)

b. Check CH B PERIOD range (cont.)

TABLE 7

<u>DC 503 CLOCK RATE</u>	<u>TG 501 MARKER (SEC)</u>	<u>DC 503 READOUT DISPLAY</u>
1S	.1 μ	.100000 \pm 2 counts
.1S	1 μ	1.00000 \pm 2 counts
10 ms	10 μ	10.0000 \pm 2 counts
1 ms	.1m	100.000 \pm 2 counts
.1 ms	1m	1.00000 \pm 2 counts
10 μ s	10m	10.0000 \pm 2 counts
1 μ s	.1	100.000 \pm 2 counts
1 μ s	1	1000.000 \pm 20 counts

c. Check CH B PERIOD INPUT sensitivity: 10 MHz, 1 kHz, 10 Hz at 300 mV P-P signal

DISCONNECT: 50-ohm BNC cable from TG 501 MARKER OUT.

CONNECT: SG 503 OUTPUT to DC 503 CH B INPUT through a precision 50-ohm BNC cable and 50-ohm terminator.

SET: DC 503 CLOCK RATE to 10 ms.

ADJUST: DC 503 CH B LEVEL for a blinking GATE light.

CHECK: DC 503 for a display of approximately .1000 with μ s light on.

SET: DC 503 CH B + SLOPE button out.

ADJUST: DC 503 CH B LEVEL for a blinking GATE light.

CHECK: DC 503 readout display for approximately .1000 with μ s light on.

DISCONNECT: 50-ohm BNC cable and 50-ohm terminator from SG 503 and DC 503.

CONNECT: LFSWG OUTPUT to DC 503 CH B INPUT through a 50-ohm BNC cable.

SET: DC 503 CLOCK RATE to .1 ms.

ADJUST: DC 503 CH B LEVEL for a stable readout display of approximately 1.00000 with ms light on.

SET: DC 503 CLOCK RATE to 1 μ s.

SET: CH B AC COUPL button in.

SET: LFSWG MULTIPLIER to 10 Hz.

9. PERIOD B (Cont.)

c. Check CH B PERIOD INPUT sensitivity (cont.)

ADJUST: DC 503 CH B LEVEL for a stable readout display of approximately 100.000 with ms light on.

d. Check CH B ATTENUATORS: X10 and X100

SET: DC 503 CLOCK RATE to .1 ms.

SET: LFSWG FREQUENCY MULTIPLIER to 1 kHz.

SET: DC 503 CH B X10 ATTEN button in.

SET: LFSWG AMPLITUDE to 5.

ADJUST: DC 503 CH B LEVEL for a stable readout display of approximately 1.00000 with ms light on.

SET: DC 503 CH B X100 ATTEN button in.

SET: LFSWG AMPLITUDE to 50.

ADJUST: DC 503 CH B LEVEL for a stable readout display of approximately 1.00000 with ms light on.

SET: LFSWG AMPLITUDE to .5.

RELEASE: DC 503 X100 ATTEN button.

DISCONNECT: 50-ohm BNC cable from LFSWG and DC 503.

10. RATIO A/B

a. Set upSG 503

FREQUENCY RANGE (MHz)	5-10
FREQUENCY VARIABLE	10
OUTPUT AMPLITUDE	3.0
AMPLITUDE MULTIPLIER	X.1

DC 503

FUNCTION	RATIO A/B
CLOCK RATE	.1S
CH A LEVEL	midrange
CH B LEVEL	midrange
DISPLAY TIME	ccw
Front panel pushbuttons	all out

b. Check RATIO A/B

CONNECT: SG 503 OUTPUT to DC 503 CH A and CH B INPUTS through a precision 50-ohm BNC cable and 50-ohm terminator and dual input connector.

ADJUST: DC 503 CH B LEVEL for a blinking GATE light.

SET: DC 503 CLOCK RATE to 1S.

ADJUST: DC 503 CH A LEVEL for a readout display of 1.000000; FUNCTION lights should be off.

NOTE: Re-adjustment of CH A and CH B LEVEL controls may be necessary to keep display triggered.

DISCONNECT: 50-ohm BNC cable, 50-ohm terminator and dual input connector from SG 503 and DC 503.

11. TIME A → B

a. Set upDC 503

FUNCTION	TIME A → B
CLOCK RATE	1 ms
CH A LEVEL	midrange
CH B LEVEL	midrange
DISPLAY TIME	ccw
Front panel pushbuttons	all out

b. Check TIME A → B

ADJUST: CH A LEVEL ccw.

CHECK: GATE light does not come on.

ADJUST: CH A LEVEL cw.

CHECK: GATE light comes on and stays on.

CHECK: Readout display is .000 with s light on.

ADJUST: CH B LEVEL ccw.

CHECK: GATE light stays on.

ADJUST: CH B LEVEL cw.

CHECK: GATE light goes off and a number is displayed.

SET: RESET button in, then release.

CHECK: Display returns to .000 with s light on.

APPLY: .4V, 1 kHz squarewave from 7704A OSCILLOSCOPE MAINFRAME CALIBRATOR to DC 503 CH A and CH B INPUTs through a 50-ohm BNC cable and dual input connector.

SET: DC 503 FUNCTION to .1s.

ADJUST: DC 503 CH A LEVEL for a readout display of approximately .00100 with MHz light on.

SET: DC 503 CLOCK RATE to 1 μ s.

SET: DC 503 FUNCTION to PERIOD B.

ADJUST: DC 503 CH B LEVEL for a readout display of approximately 1.000 with ms light on.

SET: DC 503 FUNCTION to TIME A → B.

11. TIME A → B (Cont.)

b. Check TIME A → B (cont.)

ADJUST: DC 503 CH A LEVEL for a readout display of approximately 1.000 with kHz light on.

SET: DC 503 CH A + SLOPE button in.

ADJUST: DC 503 CH A LEVEL for a readout display of approximately .500 with kHz light on and GATE light blinking.

SET: DC 503 CH B + SLOPE button in.

CHECK: DC 503 display for a reading of approximately .000.

SET: DC 503 CH A + SLOPE button out.

CHECK: DC 503 display for a reading of approximately .500.

SET: DC 503 CH B + SLOPE button out.

CHECK: DC 503 display for a reading of approximately 1.000.

DISCONNECT: 50-ohm BNC cable and dual input connector from 7704A CALIBRATOR and DC 503.

12. GATE OUTPUT

a. Set up7A16A

VOLTS/DIV	2V
AC-GND-DC	GND
POLARITY	+ UP
BANDWIDTH	FULL

7B50

TIME/DIV	10 ms
MODE	AUTO
COUPLING	AC
SOURCE	INT

DC 503

FUNCTION	.01S
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b. Check GATE OUTPUT: +5 volt pulse

CONNECT: 1X probe to 7A16A INPUT.

ADJUST: 7A16A POSITION to center trace on screen.

SET: 7A16A AC-GND-DC to DC.

SET: 7B50 MODE to NORM.

CONNECT: 1X probe ground lead to DC 503 chassis ground.

CONNECT: 1X probe to DC 503 GATE OUTPUT jack.

ADJUST: 7B50 LEVEL/SLOPE for a triggered display.

CHECK: 7704A screen for a positive-going pulse 2.5 major div up from graticule center (0 to +5V).

DISCONNECT: 1X probe from 7A16A and DC 503.

SET: TM 501 POWER switch in.

13. LINE REGULATION

a. Set upSG 503

FREQUENCY RANGE (MHz)	50 - 100
FREQUENCY VARIABLE	100
OUTPUT AMPLITUDE	3.0
AMPLITUDE MULTIPLIER	X.1

DC 503

FUNCTION	.01S
DISPLAY TIME	ccw
CH A TRIGGER LEVEL	midrange
Front panel pushbuttons	all out

b. Check line regulation: readout display will remain constant with a + and - 10% line voltage change

CONNECT: SG 503 OUTPUT to DC 503 CH A INPUT through a precision 50-ohm BNC cable and 50-ohm terminator.

ADJUST: DC 503 TRIGGER LEVEL for a stable display of approximately 100.0000 MHz. (NOTE: Last digit may not be stable).

ADJUST: VARIAC AC VOLTS from 108 to 132.

CHECK: DC 503 readout display remains constant while adjusting line voltage (exclude last digit).

NOTE: While varying line voltage from 108 VAC to 132 VAC, DC 503 CH A TRIGGER LEVEL may require slight adjustment to maintain a triggered display. DC 503 readout display must indicate a constant reading over entire range of line voltage change.

DISCONNECT: 50-ohm precision BNC cable and 50-ohm terminator from SG 503 and DC 503.

14. INTERNAL SOURCE

a. Set up

SG 503

FREQUENCY RANGE (MHz)	50-100
FREQUENCY VARIABLE	100
OUTPUT AMPLITUDE	3.0
AMPLITUDE MULTIPLIER	X.1

LFSWG

0-10 FREQUENCY control	1
FREQUENCY MULTIPLIER	100 kHz
0-1 FREQUENCY control	0
AMPLITUDE	1
AMPLITUDE MULTIPLIER	.6

DC 503

FUNCTION	.01 S
CLOCK RATE	.1 S
Front panel pushbuttons	all out

b. Check CH A and CH B INT SOURCE: CH A
100 mHz; CH B 10 MHz; CH A/CH B 100 kHz,
10 Hz

SET: TM 501 950B (modified) POWER off.

DISCONNECT: Flexible extender from
TM 501 and DC 503.

INSTALL: DC 503 into TM 501.

SET: TM 501 POWER on.

CONNECT: SG 503 OUTPUT to TM 501 CH A
INT SIG INPUT BNC through a precision
50-ohm BNC cable.

NOTE: 50-ohm terminator not to be
used on this step.

SET: DC 503 CH A INT SOURCE (LEVEL)
switch out.

ADJUST: DC 503 CH A LEVEL for a readout
display of approximately 100.0000 with
MHz light on.

DISCONNECT: 50-ohm BNC cable from TM 501
CH A INT SIG INPUT BNC and connect it
to TM 501 CH B INT SIG INPUT BNC.

b. Check CH A and CH B INT SOURCE: CH A
100 MHz; CH B 10 MHz; CH A/CH B 100 kHz,
10 Hz

SET: A-B control knob on side of TM 500
POWER MODULE to "A" of corresponding
compartment being checked.

CONNECT: 50-ohm BNC cable from SG 503
OUTPUT to TRIG IN BNC at side of
POWER MODULE.

SET: DC 503 CH A INT SOURCE (LEVEL)
switch out.

ADJUST: DC 503 CH A LEVEL for a readout
display of approximately 100.0000 with
MHz light on.

SET: A-B control knob on side of TM 500
POWER MODULE to "B" of corresponding
compartment being checked.

SET: DC 503 FUNCTION to PERIOD B.

SET: DC 503 CH B INT SOURCE (LEVEL)
switch out.

SET: SG 503 FREQUENCY RANGE to 5-10.

14. INTERNAL SOURCE (Cont.)

b. Check CH A and CH B INT SOURCE (cont.)

SET: DC 503 FUNCTION to PERIOD B.

SET: DC 503 CH B INT SOURCE (LEVEL) switch out.

SET: SG 503 FREQUENCY RANGE to 5-10.

ADJUST: SG 503 FREQUENCY VARIABLE to 10.0.

ADJUST: DC 503 CH B LEVEL for a blinking GATE light.

CHECK: DC 503 readout display for approx. .10000 with μ s light on.

DISCONNECT: 50-ohm BNC cable from SG 503 OUTPUT.

CONNECT: Above 50-ohm BNC cable to LFSWG OUTPUT.

SET: DC 503 CLOCK RATE to 10 ms.

ADJUST: DC 503 CH B LEVEL for a blinking GATE light.

CHECK: DC 503 readout display for approx. 10.0000 with μ s light on.

SET: LFSWG FREQUENCY MULTIPLIER to 10 Hz.

SET: DC 503 CLOCK RATE to 1 μ s.

ADJUST: DC 503 CH B LEVEL for a blinking GATE light.

CHECK: DC 503 readout for approx. 100.000 with ms light on.

DISCONNECT: 50-ohm BNC cable from TM 501 CH B INT SIG INPUT BNC and connect it to TM 501 CH A INT SIG INPUT BNC.

SET: DC 503 FUNCTION to .1S.

ADJUST: DC 503 CH A LEVEL for a readout display of approx. .00001 with MHz light on.

b. Check CH A and CH B INT SOURCE (cont.)

ADJUST: SG 503 FREQUENCY VARIABLE to 10.0.

ADJUST: DC 503 LEVEL for a blinking GATE light.

CHECK: DC 503 readout display for approx. .10000 with μ s light on.

DISCONNECT: 50-ohm BNC cable from SG 503 OUTPUT and connect it to LFSWG OUTPUT.

SET: DC 503 CLOCK RATE to 10 ms.

ADJUST: DC 503 CH B LEVEL for a blinking GATE light.

CHECK: DC 503 readout display for approx. 10.0000 with μ s light on.

SET: LFSWG FREQUENCY MULTIPLIER to 10 Hz.

SET: DC 503 CLOCK RATE to 1 μ s.

ADJUST: DC 503 CH B LEVEL for a blinking GATE light.

CHECK: DC 503 readout for approx. 100.000 with ms light on.

SET: A-B control knob on side of TM 500 POWER MODULE to "A" of corresponding compartment being checked.

SET: DC 503 FUNCTION to 10 S.

ADJUST: DC 503 CH A LEVEL for a readout display of approx. .0100 with kHz light on.

NOTE: It will take about 10 seconds to get a count for each adjustment of LEVEL control.

SET: DC 503 FUNCTION to .1S.

SET: LFSWG FREQUENCY MULTIPLIER to 100 kHz.

14. INTERNAL SOURCE (Cont.)

b. Check CH A and CH B INT SOURCE (cont.)

SET: DC 503 FUNCTION to 10 S.

ADJUST: DC 503 CH A LEVEL for a display of approx. .0100 with kHz light on.

SET: DC 503 FUNCTION to .1 S.

SET: LFSWG FREQUENCY MULTIPLIER to 100 kHz.

ADJUST: DC 503 CH A LEVEL for a readout display of approx. .10000 with MHz light on.

SET: DC 503 CH A and CH B INT SOURCE switches in.

DISCONNECT: 50-ohm BNC cable from TM 501 and LFSWG.

SET: TM 501 POWER switch in.

b. Check CH A and CH B INT SOURCE (cont.)

ADJUST: DC 503 CH A LEVEL for a readout display of approx. .10000 with MHz light on.

SET: DC 503 CH A and CH B INT SOURCE switches in.

DISCONNECT: 50-ohm BNC cable from LFSWG and TM 500 POWER MODULE.

15. CLOCK OUT

a. Set up7A16A

VOLTS/DIV	1V
VARIABLE	in
AC-GND-DC	GND
POLARITY	+ UP
BANDWIDTH	FULL

7B50

TIME/DIV	1 μ s
VARIABLE	in
MODE	AUTO
COUPLING	AC
SOURCE	INT
MAGNIFIER	X1

DC 503

FUNCTION	.01 S
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b. Check 1 MHz clock output

ADJUST: 7A16A POSITION to place trace at second graticule line from bottom.

SET: 7A16A AC-GND-DC to DC.

CONNECT: 50-ohm BNC cable from CLOCK OUT BNC on side of TM 500 POWER MODULE to 7A16A INPUT.

SET: 1, 2, 3, 4, 5, 6, knob to number of compartment being checked.

CHECK: Display for one squarewave per div.

CHECK: Display is approx. 4 major div in amplitude.

DISCONNECT: 50-ohm BNC cable from TM 500 POWER MODULE and 7A16A.