

FACTORY CALIBRATION PROCEDURE

CONTENTS:

General	1
Equipment required	2
Factory test limits	3
Factory calibration procedure	5

INTRODUCTION:

This is the guide for calibrating brand-new instruments, it therefore, calls out many procedures and adjustments that are rarely required for subsequent recalibration. *This procedure is company confidential.* In this procedure, all front panel control labels or Tektronix equipment names are in capital letters (VOLTS/DIV, etc.) internal adjustment labels are capitalized only (Gain Adj, etc.).

Tek form number:

0-425

August 1967

For all serial numbers.



FACTORY TEST LIMITS:

We initially calibrate the instrument to Factory Test Limits. These limits are often more stringent than advertised performance requirements. This helps insure that the instrument will meet advertised requirements after shipment, allows for inaccuracies of test equipment used, and may allow for changes in environmental conditions.

QUALIFICATION:

Factory test limits are qualified by the conditions specified in the main body of the calibration procedure. The numbers and letters to the left of the limits correspond to the factory calibration procedure steps where the check or adjustment is made. Instruments may not meet factory test limits if calibration or check-out methods and test equipment differ substantially from those in this procedure.

ABBREVIATIONS:

Abbreviations in this procedure will be found listed in TEKTRONIX STANDARD A-100.

CHANGE INFORMATION:

This procedure has been prepared by Product Manufacturing Staff Engineering. For information on changes that have been made to this procedure, to make suggestions for changing this procedure, or to order additional copies: please contact PMSE, 47-261. (MC)



PMSE

COMPANY CONFIDENTIAL

EQUIPMENT REQUIRED:

The following equipment is necessary to complete this procedure:

- a. TEKTRONIX Instruments
 - 1 TYPE 544, 546, or 547 OSCILLOSCOPE (test scope) with
 - 1 TYPE W PLUG-IN UNIT,
 - 1 TYPE P6006 10X PASSIVE PROBE and
 - 1 TYPE P6028 1X PASSIVE PROBE
 - 1 TYPE 567 OSCILLOSCOPE (plug-in scope) with
 - 1 TYPE 6R1A DIGITAL UNIT and
 - 1 TYPE 3S1 DUAL-TRACE SAMPLING UNIT
 - 1 TYPE 564 STORAGE OSCILLOSCOPE (plug-in scope)
 - 1 TYPE 111 PRETRIGGER PULSE GENERATOR
 - * 1 TYPE 184 TIME-MARK GENERATOR
 - 1 TYPE 191 CONSTANT AMPLITUDE SIGNAL GENERATOR
 - 1 TYPE 76TU LINE-VOLTAGE CONTROL UNIT
- b. Test Fixtures and Accessories
 - 1 50 Ω AMPLITUDE CALIBRATOR (067-0508-00)
 - 2 50 Ω coax cables, BNC (012-0057-00)
 - 2 50 Ω 10ns RG-58A/U coax cables, GR (017-0501-00)
 - 2 50 Ω 2ns RG-58A/U coax cables, GR (017-0505-00)
 - 2 50 Ω 10X Attenuators, GR (017-0078-00)
 - 1 50 Ω 5X Attenuator, GR (017-0079-00)
 - 1 50 Ω 2X Attenuator, GR (017-0080-00)
 - 1 50 Ω 5X Attenuator, BNC (011-0060-00)
 - 1 50 Ω GR 874-T (017-0069-00)
 - 1 50 Ω GR 874-TPD (017-0082-00)
 - 1 GR to BNC female adapter (017-0063-00)
 - 2 GR to BNC male adapters (017-0064-00)
 - 1 Variable Attenuator (067-0511-00)
 - 1 Flexible Extension (012-0066-00)
 - 2 Plug-In Extensions (013-0034-00)
 - 1 50 Ω Termination, BNC (011-0049-00)
 - 1 Mixer-rectifier (067-0081-00)
- c. Other Equipment
 - 1 20,000 Ω /VDC multimeter
 - 1 UHF Oscillator (capable of 500 MHz and 1 GHz)

* This equipment must be traceable to the NBS for instrument certification.

Substitute test equipment may be used. The Plant Staff Engineer must determine that the substitute equipment is equivalent and must determine proper control settings, etc. It is assumed that all equipment listed is within its manufacturer's specifications, unless otherwise stated.

© , 1967 TEKTRONIX, INC., P. O. Box 500
BEAVERTON, OREGON. All rights reserved.

FACTORY TEST LIMITS

QUALIFICATION

Factory test limits are qualified by the conditions specified in the main body of the calibration procedure. The numbers and letters to the left of the limits correspond to the factory calibration procedure steps where the check or adjustment is made. Instruments may not meet factory test limits if calibration or checkout methods and test equipment differ substantially from those in this procedure.

1. PRELIMINARY INSPECTION

2. TYPE 3T2 PRESETS

3. RESISTANCE CHECKS

4. POWER SUPPLIES

- b. Adjust and check -19V and +19V supplies value: $\pm 1\%$; Ripple: 3mV, max from 104 to 126 VAC
- c. Check -27V supply: $\pm 5\%$

5. TRIGGER AND HOLDOFF

- b. Adjust Output TD Bias and Trig Sens Bal: trigger circuit must freerun with TRIG SENSITIVITY at midr $\pm 10^\circ$, max
- c. Check trigger holdoff:

<u>TIME POSITION RANGE</u>	<u>min holdoff</u>
1ms	4ms
100 μ s	400 μ s
10 μ s	40 μ s
1 μ s	20 μ s
100ns	20 μ s

- d. Check RECOVERY TIME range: ≥ 1.25 to 1
- e. Check PULSE OUT amplitude: ≥ 150 mV into 50 Ω

6. READOUT SWITCHING AND DIGITAL SWITCHING

7. CRT DRIVER

- b. Check EXT HORIZ deflection factor: 1.5V/div, $\pm 2\%$
- c. Check HORIZ GAIN range: (see graph page 11)
- e. Check horizontal position neons: correct one on, other one off when spot is one division or more from CRT horizontal electrical center
- f. Check HORIZ POSITION range: ≥ 10 divisions
- g. Check sweep length: 10 to 10.3 divisions
- h. Check A VERT-B HORIZ operation: 1V/div sensitivity, $\pm 2\%$

8. START WITH TRIGGER TIMING ADJUSTMENTS

9. DC ZERO

10. HORIZ OUTPUT ZERO

11. SERVO LOOP BAL

12. BEFORE TRIG TIMING GAIN

13. SLEWRAMP ADJUSTMENTS

14. TIME POSITION ZERO

15. LEADTIME: trigger producing event at graticule center ± 0.1 div

16. 1ms CORRECTION

17. STAIRCASE GENERATOR OPERATION

- b. Check output waveforms
Clock pulse to digital unit:
0V \pm 0.2V to \geq 1.5V
Sweep gate to digital unit:
 \geq -0.8V to \geq +5.5V
Staircase out to digital unit:
0V \pm 0.5V to +52.5V \pm 2V
SWP OUT: 1V/div \pm 5%
- d. Check SAMPLES/DIV: from \leq 5 samples/
div to \geq 1000 samples/div
- * e. Set Samples Cal: 100 samples/div \pm 0.5%
at 100 kHz rep rate
- f. Check samples/div change with rep rate
change: \pm 3%, max

18. START BEFORE TRIGGER MINIMUM TRIGGER REP RATE

TIME POSITION	minimum trigger	minimum length of
RANGE	rep rate	linear rate
100ns	10kHz	100 μ s
1 μ s	1kHz	1ms
10 μ s	100 Hz	10ms
100 μ s	10 Hz	100ms
1ms	10 Hz	100ms

19. TIMING CHECKS

- b. Check TIME MAGNIFIER VARIABLE:
2.7 to 1, min
- * c. Check DISPLAY MAG error: \pm 2%, max
- * d. Check timing error: 2.5%, max except
 \pm 5%, max on 100ns range with TIME MAG-
NIFIER at X5 through X50

20. TIME POSITION Range

- b. Check TIME POSITION range: TIME
POSITION RANGE setting \pm 5%, max

21. SINEWAVE TRIGGERING

- b. Check INT Trigger Jitter: 200ps, max
- c. Check 50 Ω TRIGGER INPUT trigger
jitter: 200ps, max

21. (cont'd)

- d. Check 1M Ω TRIGGER INPUT trigger
jitter: 50ps, max

22. PULSE TRIGGERING

- b. Check EXT WITH TRIGGER trigger
jitter: 30ps, max
- c. Check EXT BEFORE TRIGGER trigger
jitter: 50ps, max
- d. Check INT BEFORE TRIGGER trigger
jitter: 50ps, max
- e. Check INT WITH TRIGGER trigger
jitter: 30ps, max
- f. Check INT trigger maximum ampli-
tude: 1V, min
- g. Check 50 Ω TRIGGER INPUT maximum
amplitude: 125mV, min
- h. Check 1M Ω TRIGGER INPUT maximum
amplitude: 250mV, max
- i. Check 1M Ω TRIGGER INPUT minimum
amplitude: 10mV, max
- j. Check 50 Ω TRIGGER INPUT minimum
amplitude: 5mV, max
- k. Check INT trigger minimum
amplitude: 80mV, max

23. DISPLAY JITTER

TIME POSITION	RANGE	max jitter
	1 μ s	200ps
	10 μ s	2ns
	100 μ s	20ns
	1ms	200ns

24. STROBE KICKBACK

- b. Check strobe kickback into trigger:
 \pm 5mV, max

25. TRIGGER KICKOUT

- b. Check trigger kickout: \pm 20mV, max
into 50 Ω

* Indicates measurement characteristic;
test equipment used must be traceable to
the NBS for instrument certification.

THE END

1. PRELIMINARY INSPECTION

Check for unsoldered joints, rosin joints, improper lead dress and long ends. Check for loose hardware and protruding parts. Check controls for smooth mechanical operation, proper indexing and knob spacing from front panel.

2. TYPE 3T2 PRESETS

TIME POSITION	midr
FINE	midr
HORIZ POSITION	midr
SAMPLES/DIV	midr
RANGE	10 μ s
START POINT	WITH TRIGGER
DISPLAY MAG	X1
TIME MAGNIFIER	X1
VARIABLE	CAL
HORIZ GAIN	midr
DISPLAY MODE	NORMAL
MANUAL SCAN	midr
TRIG SENSITIVITY	midr
POLARITY	+
SOURCE	EXT
RECOVERY TIME	midr
SW450 *	100
all internal adjustments	midr

Leave controls and adjustments for any step as they were in the preceding step unless instructed to do otherwise.

* SW450 is the Samples/Div cal-variable switch and is located on the bulkhead behind the front panel.

3. RESISTANCE CHECKS*a. Check P21*

Connect the negative lead of the ohmmeter to ground and check the resistance of P21 to ground using the following table:

3a. (cont'd)

<u>Amphenol Pin</u>	<u>Ohmmeter Scale</u>	<u>Approx Resistance</u>
1	X100k	∞
2	X100k	∞
3	X1	0.2Ω
4	X1	0Ω
5	X100k	∞
6	X1k	$25k\Omega$
7	X100k	∞
8	X100k	∞
9	X1	0Ω
10	X1k	$20k\Omega$
11	X100k	$100k\Omega$
12	X1k	$4k\Omega$
13	X1k	$20k\Omega$
14	X100k	∞
15	X1k	$10k\Omega$
16	X10	80Ω
17	X10k	$75k\Omega$
18	X100k	∞
19	X100	100Ω
20	X1k	$10k\Omega$
21	X10k	$75k\Omega$
22	X1k	$4k\Omega$
23	X1k	$10k\Omega$
24	X100k	∞

b. Check TYPE 3T2 internal power supplies

Measure the resistance of the -19V supply to ground, approx 260Ω on the X100 scale.

Measure the resistance of the +19V supply to ground, approx 360Ω on the X100 scale.

Measure the resistance of the -27V supply to ground, approx 530Ω on the X100 scale.

4. POWER SUPPLIES

a. Setup

Install the TYPE 3S1 and TYPE 6R1A in the TYPE 567 plug-in scope. Using the two solid extensions, install the TYPE 3T2 in the plug-in scope. Connect the plug-in scope to the TYPE 76TU and turn the power on.

4. (cont'd)

- b. *Adjust and check -19V and +19V supplies*
accuracy: $\pm 1\%$
ripple: 3mV, max from 104 to 126 VAC

Connect the 1X probe from the test scope to the -19V supply and adjust R841 (-19V Adjust) for -19V. Connect the probe to the +19V supply and adjust R821 (+19V Adjust) for +19V. Check ripple and regulation of both 19 volt supplies over the specified line voltage range.

- c. *Check -27V supply $\pm 5\%$*

Connect the 1X probe to the -27V supply and check for -27V $\pm 1.35V$.

- b. Internal supplies

Use the TYPE W COMPARISON VOLTAGE to check the value of the supplies.

5. TRIGGER AND HOLDOFF

- a. *Preset Test scope*

TRIGGERING	-INT
TIME/CM	.1 μ SEC
INPUT	DC
INPUT ATTEN	10
MILLIVOLTS/CM	5

- b. *Adjust Output TD Bias and Trig Sens Bal: trigger circuit must free run with TRIG SENSITIVITY at midr $\pm 10^\circ$, max*

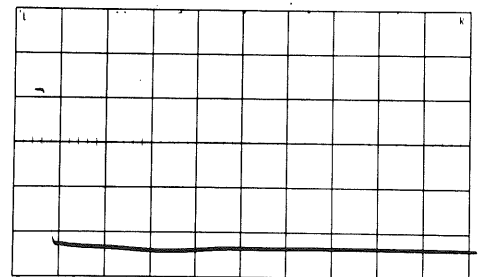
Connect the TYPE 3T2 PULSE OUT to the test scope vertical input with a 50 Ω coax cable and a 50 Ω Termination. With the TYPE 3T2 TRIG SENSITIVITY full ccw, adjust the Output TD Bias (R82) to obtain a negative going step on the test scope. Adjust the Output TD Bias ccw about 20 $^\circ$ past the point where the negative step disappears.

Set the TYPE 3T2 TRIG SENSITIVITY to 12 o'clock and adjust the TRIG Sens Bal (R72) to the point where the negative step reappears with no oscillations just ahead of the step.

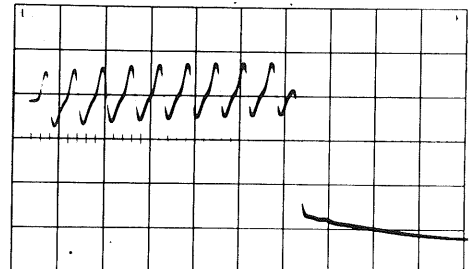
Set the TYPE 3T2 TRIG SENSITIVITY full cw and check for 8 to 12 cycles of oscillation just ahead of the negative step.

- b. Proper adjustment of Output TD Bias and Trig Sens Bal.

TRIG SENSITIVITY at 12 o'clock



TRIG SENSITIVITY full cw



5. (cont'd)

c. Check trigger holdoff

With the TYPE 3T2 TRIG SENSITIVITY and RECOVERY TIME controls full cw, check trigger holdoff using the following table:

<u>TIME POSITION RANGE</u>	<u>min holdoff</u>
1ms	4ms
100μs	400μs
10μs	40μs
1μs	20μs
100ns	20μs

d. Check RECOVERY TIME range: ≥ 1.25 to 1

Set RECOVERY TIME full ccw. Set the test scope TIME/CM and VARIABLE controls to obtain 1 cycle in 10cm. Set RECOVERY TIME full cw and check for 1 cycle in 8cm or less.

e. Check PULSE OUT amplitude: $\geq 150\text{mV}$ into 50Ω

Check the amplitude of the PULSE OUT as observed on the test scope: 150mV, min.

Remove the connections from the TYPE 3T2 PULSE OUT and the test scope vertical input.

c. Holdoff

Trigger holdoff time is equal to the time between the negative going leading edges of the pulses displayed on the test scope.

Use RECOVERY TIME as necessary throughout the remainder of this procedure to obtain stable triggering.

6. READOUT SWITCHING AND DIGITAL SWITCHING

a. Setup

TYPE 3T2

RANGE	10μs
START POINT	WITH TRIGGER
DISPLAY MAG	X1
TIME MAG	X1
VARIABLE	CAL
DISPLAY MODE	NORMAL
TRIG SENSITIVITY	cw

TYPE 6R1A

MODE	TIME
RESOLUTION	ONE SWEEP LO
DISPLAY TIME	cw
CRT INTENSIFICATION	
MEMORY ZONES	OFF
START TO STOP	ON
START SLOPE	FIRST +
STOP SLOPE	FIRST +
TIMING START	MANUAL
TIMING STOP	MANUAL

6a. (cont'd)

Set the TYPE 6R1A MANUAL START and STOP controls for a readout of 01.00 μ s with the intensified zone in the center of the sweep. Set the TYPE 3T2 RANGE to 1ms.

b. Check readout

Using the following table, check for correct TYPE 3T2 TIME/DIV readout and TYPE 6R1A digital readout.

TYPE 3T2 RANGE	DISPLAY MAG	TIME MAG	TYPE 3T2 Readout	TYPE 6R1A Readout
1ms	X1	X1	100 μ s	0.100ms
100 μ s	X1	X1	10 μ s	010.0 μ s
10 μ s	X1	X1	1 μ s	01.00 μ s
1 μ s	X1	X1	100ns	0.100 μ s
100ns	X1	X1	10ns	010.0ns
100ns	X1	X2	5ns	005.0ns
100ns	X1	X5	2ns	002.0ns
100ns	X1	X10	1ns	01.00ns
100ns	X1	X20	500ps	00.50ns
100ns	X1	X50	200ps	00.20ns
100ns	X10	X50	20ps	00.20ns
100ns	X10	X20	50ps	00.50ns
100ns	X10	X10	100ps	01.00ns
100ns	X10	X5	200ps	002.0ns
100ns	X10	X2	500ps	005.0ns
100ns	X10	X1	1ns	010.0ns
1 μ s	X10	X1	10ns	0.100 μ s
10 μ s	X10	X1	100ns	01.00 μ s
100 μ s	X10	X1	1 μ s	010.0 μ s
1ms	X10	X1	10 μ s	0.100ms
1ms	X1	X2	50 μ s	0.050ms
1ms	X1	X5	20 μ s	0.020ms
1ms	X1	X10	10 μ s	010.0 μ s
1ms	X10	X20	500ns	005.0 μ s
100 μ s	X10	X20	50ns	00.50 μ s
100 μ s	X1	X20	500ns	00.50 μ s
10 μ s	X1	X20	50ns	0.050 μ s
1 μ s	X10	X20	500ps	005.0ns

a. No display

The TYPE 3T2 staircase generator must be operating properly to permit this check. If a display cannot be obtained, perform step 7a of this procedure to determine if the problem is in the CRT driver or the blanking circuitry or in the staircase generator itself. If step 7a can be performed, do step 17a, b, and c to check out the staircase generator.

b. TYPE 6R1A DIGITAL READOUT

The numerical readout of the TYPE 6R1A may vary slightly, e.g., 0.100ms may be 0.102ms. This depends on the accuracy of the MANUAL START and STOP settings and on the samples/div change with rep rate change in the TYPE 3T2. The amount of samples/div change with rep rate change will be checked later in this procedure.

6. (cont'd)

c. Check readout ground return switching

Turn the TIME MAGNIFIER VARIABLE cw. Check that the TYPE 6R1A decimal neon and units of measure nixie and TYPE 3T2 units of measure light are lit only when the VARIABLE is in the CAL position (detent). Return the VARIABLE to the CAL position.

Rotate the TYPE 3T2 DISPLAY MODE through all four positions and check that the TYPE 6R1A decimal neon and units of measure nixie are lit in the NORMAL and SINGLE SWP positions and not lit in the MANUAL and EXT HORIZ positions. Return the DISPLAY MODE to NORMAL.

Switch SW450 to the Variable position and check that the TYPE 6R1A decimal neon and units of measure nixie go out. Switch the TYPE 6R1A CRT INTENSIFICATION START TO STOP to OFF. Return the TYPE 3T2 DISPLAY MAG and TIME MAGNIFIER to X1.

7. CRT DRIVER*a. Set HORIZ GAIN*

Switch the TYPE 3T2 DISPLAY MODE to MANUAL. Set MANUAL SCAN full ccw and position the spot to the left edge of the graticule with the HORIZ POSITION control. Set MANUAL SCAN full cw and adjust the HORIZ GAIN to position the spot to the right edge of the graticule. Repeat this procedure until the MANUAL SCAN moves the spot exactly 10 division.

*b. Check EXT HORIZ deflection factor:
1.5V/DIV, $\pm 2\%$*

Switch the DISPLAY MODE to EXT HORIZ and apply 20 volts from the test scope calibrator to the TYPE 3T2 EXT HORIZ INPUT. Connect a 1X probe from the test scope plug-in INPUT A to the center tap of the EXT HORIZ ATTEN pot. Set the test scope TIME/CM to 1mSEC, INPUT ATTEN to 10, V_C RANGE to +11. Adjust the TYPE 3T2 EXT HORIZ ATTEN for exactly 8 divisions of deflection on the plug-in scope CRT.

a. HORIZ GAIN adjustment

HORIZ GAIN must be set at this point in order to make an accurate check of the EXT HORIZ deflection factor and so that the 8 division signal, used in part c of this step, will provide an accurate voltage source with which to check gain range.

b. No display

If unable to obtain a display and the CRT appears to be blanked with the plug-in scope INTENSITY control at a normal setting, turn the INTENSITY control cw. If there still is no light output from the CRT, the TYPE 3T2 blanking circuit (or one of its three inputs) is not operating properly.

7b. (cont'd)

Using the TYPE W COMPARISON VOLTAGE, check for a 12V (± 0.24 V) signal as indicated on the test scope.

c. Check HORIZ GAIN range

Without moving the EXT HORIZ ATTEN from the position set in part b of this step, set the TYPE 3T2 HORIZ GAIN full cw and check the plug-in scope display for an amplitude equal to or greater than the amplitude indicated by the CRT sensitivity graph. Set the HORIZ GAIN full ccw and check for a display amplitude equal to or less than the amplitude indicated by the graph. Remove the 1X probe and the calibrator signal.

d. Reset HORIZ GAIN

Repeat part a of this step.

e. Check horizontal position
neons: correct one on,
other one off when spot is
1 division or more from CRT
horizontal electrical center

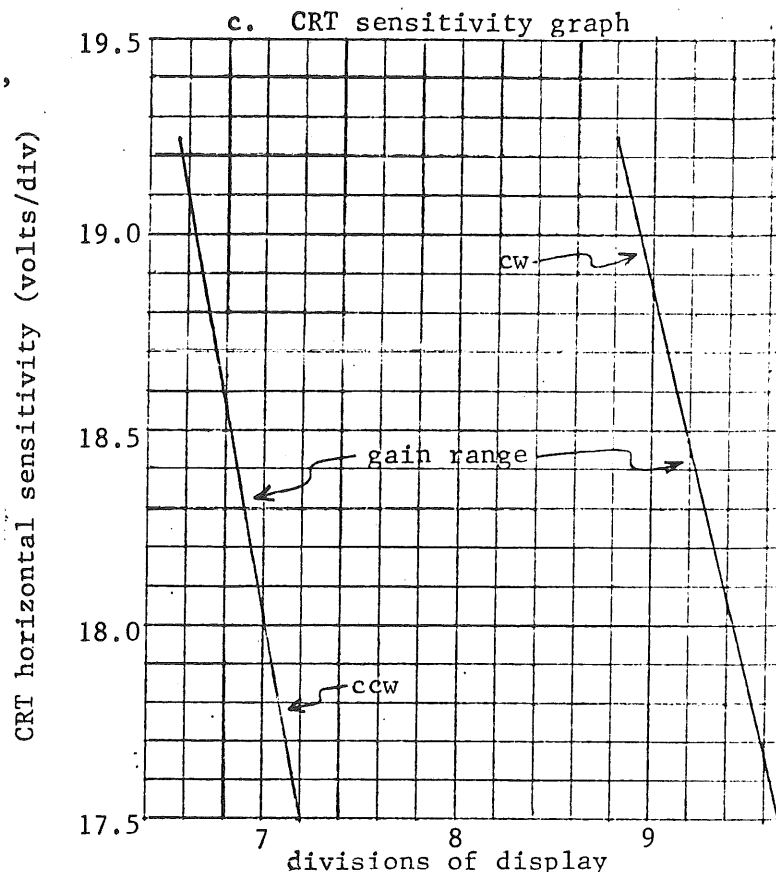
Using the TYPE 3T2 MANUAL SCAN and HORIZ POSITION controls, move the spot back and forth across the graticule and check for proper operation of the horizontal position indicating neons.

f. Check HORIZ POSITION range:
>10 divisions

Set the TYPE 3T2 MANUAL SCAN full ccw and HORIZ POSITION full cw. Check that the spot is to the right of the CRT horizontal electrical center. Set the MANUAL SCAN full cw and HORIZ POSITION full ccw. Check that the spot is to the left of the CRT horizontal electrical center.

g. Check sweep length: 10 to 10.3
divisions

Switch the TYPE 3T2 DISPLAY MODE to NORMAL. Check that the length of the sweep is at least 10 divisions and no more than 10.3 divisions.



e. CRT horizontal electrical center

Short the CRT horizontal deflection plate pins together momentarily and note the horizontal position of the spot. This is the CRT horizontal electrical center.

7. (cont'd)

h. Check A VERT-B HORIZ operation:
1V/div sensitivity, $\pm 3\%$

Setup

50 Ω AMPLITUDE CALIBRATOR OUTPUT--
5 ns cable--TYPE 3S1 B INPUT

50 Ω AMPLITUDE CALIBRATOR TRIGGER OUTPUT--
50 Ω coax--TYPE 3T2 50 Ω TRIGGER INPUT

Presets

50 Ω AMPLITUDE CALIBRATOR VOLTS 1.2

TYPE 3S1

mode	CHAN B
B mVOLTS/DIV	200

TYPE 3T2 RANGE 10 μ s

Adjust the TYPE 3T2 TRIG SENSITIVITY and TIME POSITION controls for a stable display with the rising portion of the calibrator waveform in the center of the graticule. Change the TYPE 3S1 mode switch to A VERT-B HORIZ and check for 6 ± 0.18 divisions between the two dots.

Remove the 50 Ω AMPLITUDE CALIBRATOR connections and set the TYPE 3S1 mode switch to CHAN A.

h. The TYPE 3S1 B Digital Gain must be set to provide exactly 1V/div at pin 3 of P12 in the TYPE 3S1.

8. START WITH TRIGGER TIMING ADJUSTMENTS

a. Setup

TYPE 184 MARKER OUTPUT -- 50 Ω cable --
BNC to GR adapter -- Variable Atten --
TYPE 3S1 A INPUT

TYPE 184 TRIGGER OUTPUT -- 50 Ω cable --
5X Atten -- TYPE 3T2 50 Ω TRIGGER INPUT

Set the TYPE 184 MARKER and TRIGGER SELECTORS to 1 μ S.

8a. (cont'd)

TYPE 3T2 presets

TIME POSITION	near midr
FINE	near midr
RANGE	10 μ s
DISPLAY MAG	X1
TIME MAGNIFIER	X1
VARIABLE	CAL
TRIG	
POLARITY	+
SOURCE	EXT
SENSITIVITY	set for stable display

b. *Adjust Timing Current*

Adjust Timing Current (R336) for one marker/division.

c. *Adjust 100ns Ramp Timing*

Switch the TYPE 184 MARKER SELECTOR to 10nS \sim and the TYPE 3T2 RANGE to 100ns. Adjust 100ns Ramp Timing (C329) for 1 cycle/division.

Check the remainder of the TIME POSITION RANGES for proper operation. Remove the TYPE 184 connections.

b. Timing checks and adjustments. All timing checks and adjustments (with the exception of the 200ps/div check in step 18c) should be made between the #1 and #9 graticule lines.

c. All timing accuracy checks are made in step 19.

9. DC ZEROa. *Presets*TYPE 3T2

TIME POSITION	midr
FINE	midr
RANGE	10 μ s
START POINT	BEFORE TRIGGER
TRIG SENSITIVITY	cw
RECOVERY TIME	midr
DISPLAY MODE	MANUAL
MANUAL SCAN	midr

Test scope

TIME/CM	20 μ SEC
INPUT	DC
INPUT ATTEN	10
MILLIVOLTS/CM	20

a. The base of Q371 is connected to post AZ on the logic board in the TYPE 3T2.

Connect a 1X probe from INPUT A of the test scope plug-in to the base of Q371 in the TYPE 3T2.

9. (cont'd)

b. Adjust DC Zero

Set the bottom of the waveform displayed on the test scope to zero volts with the TYPE 3T2 DC ZERO (R376).

b. Proper adjustment of DC Zero.10. HORIZ OUTPUT ZERO

Set the test scope INPUT ATTEN to 100 and MILLIVOLTS/CM to 10.

Connect the 1X probe from INPUT A of the test scope plug-in to the emitter of Q520. Note the DC level. Move the probe to the base of Q501 and adjust Horiz Output Zero (R516) to set the top of the waveform about 0.3 volts less positive than the DC level at the emitter of Q520.

10. The emitter of Q520 is connected to post BL on the logic board.

The base of Q501 is connected to post BF on the logic board.

11. SERVO LOOP BAL

Connect the 1X probe to the base of Q533 and note the DC level on the test scope. Move the probe to the base of Q531 and adjust the TYPE 3T2 Servo Loop Bal (R536) to set the DC level at this base equal to the DC level at the base of Q533.

11. Q533 base and Q531 base are connected to logic board posts M and BL respectively.

12. BEFORE TRIG TIMING GAIN*a. Setup*

TYPE 184 MARKER OUTPUT -- 50 Ω cable --
BNC to GR adapter -- Variable Atten --
TYPE 3S1 A INPUT

12a. (cont'd)

TYPE 184 TRIGGER OUTPUT -- 50 Ω cable --
5X Atten -- TYPE 3T2 50 Ω TRIGGER INPUT

Switch TYPE 3T2 DISPLAY MODE to NORMAL.
Set the TYPE 184 MARKER and TRIGGER
SELECTORS to 1 μ S. Adjust the TYPE 3T2
TRIG SENSITIVITY for a stable display.

b. Adjust Before Trig Timing Gain

Using the TYPE 3T2 FINE TIME POSITION control to align the markers with the graticule lines, adjust the Before Trig Timing Gain (R348) for one marker per division.

Check all other TIME POSITION RANGES for proper operation. Remove the TYPE 184 connections.

b. TIME POSITION

The TYPE 3T2 coarse TIME POSITION control should remain centered during this step.

13. SLEWRAMP ADJUSTMENTS*a. Setup*

Set the TYPE 3T2 TIME POSITION RANGE to 10 μ s and center the SAMPLES/DIV control. Connect the 1X probe to the base of Q533. Set the test scope TIME/CM to 1mSEC and set the MILLI-VOLTS/CM and VARIABLE controls to obtain a 6cm display.

b. Adjust Slewrate Current

Move the 1X probe to the base of Q531 and adjust the TYPE 3T2 Slewrate Current (R269) for a linear staircase equal in amplitude to the staircase at the base of Q533.

c. Adjust 100ns slewing ramp

Switch the TYPE 3T2 RANGE to 100ns and the test scope TIME/CM to .5mSEC. Move the 1X probe to the base of Q533 and check the amplitude of the display. Return the probe to the base of Q531 and adjust C265 for a linear staircase equal in amplitude to the staircase at the base of Q533. Remove the 1X probe.

14. TIME POSITION ZERO

a. Presets

TYPE 3T2

TIME POSITION	full cw
FINE	full cw
RANGE	100 μ s
TRIG SENSITIVITY	full cw
DISPLAY MODE	MANUAL
MANUAL SCAN	full ccw

Test scope

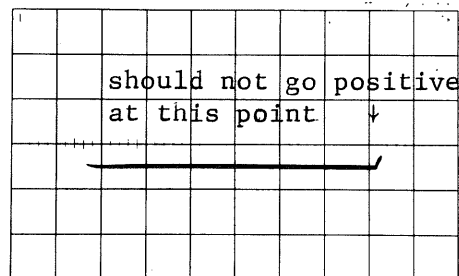
TIME/CM	50 μ SEC
INPUT	DC
INPUT ATTEN	1
MILLIVOLTS/CM	10

Connect a 1X probe from INPUT A of the test scope plug-in to the emitter of Q344 in the TYPE 3T2.

b. Adjust Time Position Zero

Adjust the test scope plug-in POSITION control to display the top of the timing ramp waveform. Adjust the Time Position Zero as far ccw as possible without allowing the timing ramp waveform to go positive at the end of the clamped level. Remove the 10X probe.

b. Top of timing ramp waveform.

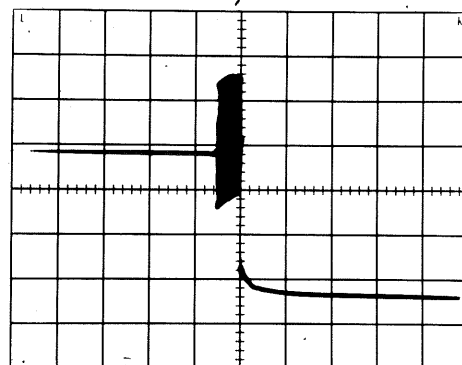


15. LEAD TIME: trigger producing event at graticule center ± 0.1 div

Connect the TYPE 3T2 PULSE OUT to the TYPE 3S1 A INPUT with a 50 Ω coax cable. Set the TYPE 3S1 A mVOLTS/DIV to 50 and the TYPE 3T2 DISPLAY MODE to NORMAL and the TIME POSITION RANGE to 10 μ s.

Set the falling edge of the waveform displayed on the plug-in scope to the center of the graticule with the TYPE 3T2 Lead Time (R231). Remove the 50 Ω coax cable.

15. Proper adjustment of Lead Time.



16. 1ms CORRECTION

Switch the TYPE 3T2 DISPLAY MODE to MANUAL and center the MANUAL SCAN and TIME POSITION controls. Adjust the 1ms Correction (R622) to eliminate the slow drift of the spot when the TYPE 3T2 RANGE is switched from 100 μ s to 1ms.

17. STAIRCASE GENERATOR OPERATION

a. Setup

Remove the TYPE 6R1A from its compartment.

TYPE 3T2 presets

START POINT	WITH TRIGGER
TIME POSITION RANGE	1 μ s
DISPLAY MODE	NORMAL
SAMPLES/DIV	cw
TRIG SENSITIVITY	cw

b. Check output waveforms

Clock pulse to digital unit:

0V \pm 0.2V to \geq +1.5V

Sweep gate to digital unit:

\geq -0.8V to \geq +5.5V

Staircase out to digital unit:

0V \pm 0.5V to +52.5V \pm 2V

SWP OUT: 1V/div \pm 5%

Connect a 10X probe from INPUT A of the test scope plug-in to pin 13 of P22 on the TYPE 3T2. Check for the proper amplitude clock pulses.

Move the probe tip to Pin 20 of P22 and check for the proper amplitude staircase.

Move the probe tip to Pin 21 of P22 and check for the proper amplitude sweep gate waveform.

Set the TYPE 3T2 DISPLAY MODE to MANUAL and MANUAL SCAN full ccw. Connect the probe tip to the SWP OUT jack on the TYPE 3T2 front panel and note the DC level. Set MANUAL SCAN full cw and check the change in DC level: 10V \pm 0.5V. Re-install the TYPE 6R1A and remove the 10X probe.

17. (cont'd)

c. Check SINGLE SWP

TYPE 184 MARKER OUTPUT -- 50 Ω cable -- BNC
to GR adapter -- Variable Attenuator -- TYPE
3S1 A INPUT

TYPE 184 TRIGGER OUTPUT -- 50 Ω cable -- 5X
Atten -- TYPE 3T2 50 Ω TRIGGER INPUT

Set the TYPE 184 MARKER and TRIGGER SELECTORS
to 1 μ S. Set the TYPE 3T2 RANGE to 10 μ s and
adjust the TRIG SENSITIVITY and SAMPLES/DIV
for a stable display of one marker per division.
Position the start of the sweep to the left
edge of the graticule.

Set the TYPE 3S1 INVERT-NORM switch halfway
between the detents and the TYPE 3T2 DISPLAY
MODE to SINGLE SWP. Remove the trigger sig-
nal from the TYPE 3T2. Set the plug-in
scope INTENSITY cw and note that the display
is completely blanked. Return the INTENSITY
control to a normal setting and depress the
TYPE 3T2 SINGLE SWP START button. Note a
single dot at the left edge of the graticule.

Reconnect the trigger signal to the TYPE 3T2
and note that a single sweep is generated.
Depress the START button several times and
note that a single sweep is generated each
time.

*d. Check SAMPLES/DIV: from <5 samples/div
to >1000 samples/div*

Switch the TYPE 3T2 DISPLAY MODE to NORMAL
and set the SAMPLES/DIV control full cw.
Check that there are 5 dots or less per
major division.

Turn the SAMPLES/DIV full ccw and check that
it takes the spot at least one second to cross
the graticule.

17. (cont'd)

- e. *Set Samples Cal: 100 samples/div
±0.5% at 100 kHz rep rate*

Return the TYPE 3S1 INVERT-NORM switch to NORM. With the TYPE 3T2 RANGE at 10 μ s, switch SW450 to the up position. Change the TYPE 184 MARKER SELECTOR to 10nS \sim .

Adjust the Samples Cal (C452) for the minimum number of cycles. Remove the TYPE 184 connections.

- f. *Check samples/div change with rep rate change: ±3%, max*

Connect two 10X Attenuators and a 50 Ω coax cable from the TYPE 111 PULSE OUTPUT to the TYPE 3T2 50 Ω TRIGGER INPUT. Set the TYPE 111 REPETITION RATE controls for a pulse rep rate of 30 Hz. Switch the TYPE 3T2 RANGE to 1 μ s and set the TRIG SENSITIVITY full cw. Turn on the TYPE 6R1A CRT INTENSIFICATION START TO STOP and set the MANUAL START and STOP controls for a readout of 0.800 μ s with the intensified zone in the center 8 divisions of the sweep.

Adjust the TYPE 3T2 TRIG SENSITIVITY for a triggered sweep and check the TYPE 6R1A for a readout of 0.800 μ s ±3%.

- e. Samples/div accuracy

Each cycle represents 0.1%.

- f. The rest of the TYPE 6R1A controls should remain as set in step 6a.

 18. START BEFORE TRIGGER MINIMUM TRIGGER REP RATE

- a. *Setup*

Test scope presets

TIME/CM	20 μ SEC
INPUT ATTEN	100
MILLIVOLTS/CM	5

Connect a 10X probe from INPUT A of the test scope plug-in to the emitter of Q573 in the TYPE 3T2. Switch the TYPE 3T2 START POINT to BEFORE TRIGGER and the TIME POSITION RANGE to 100ns.

- a. The emitter of Q573 is connected to post AE on the logic board.

18. (cont'd)

b. Check minimum rep rate

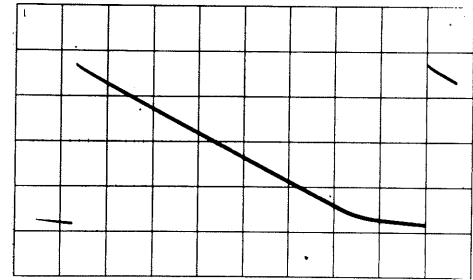
Adjust the TYPE 111 REPETITION RATE controls so that the rate meter ramp displayed on the test scope runs down to the point where it just starts to become nonlinear. Check for at least 100 μ s of linear ramp. Check that the LOW REP RATE light comes on at the point where the ramp becomes nonlinear.

Using the following table, check the rate meter ramp in each setting of the TIME POSITION RANGE for at least the minimum length of linear run down and for correct operation of the LOW REP RATE light.

TIME POSITION RANGE	test scope TIME/CM	minimum length of linear rate meter ramp	max TYPE 111 rep rate for turn on of LOW REP RATE light
100ns	20 μ SEC	100 μ s	10kHz
1 μ s	.2mSEC	1ms	1kHz
10 μ s	2mSEC	10ms	100 Hz
100 μ s	20mSEC	100ms	10 Hz
1ms	20mSEC	100ms	10 Hz

Remove the TYPE 111 connections and turn off the TYPE 6R1A CRT INTENSIFICATION and the TYPE 567 power. Switch the TYPE 3T2 SW450 to the Variable position.

b. Rate meter ramp



b. The TYPE 111 must be capable of running at a rep rate of 10Hz or less in order to check the 100 μ s and 1ms TIME POSITION RANGES.

19. TIMING CHECKS

a. Setup

Remove the TYPE 3S1 and TYPE 3T2 from the TYPE 567 plug-in scope and install them in the TYPE 564 plug-in scope.

TYPE 564 presets

DISPLAY - UPPER and LOWER	NON STORE
CALIBRATOR	OFF
INTENSITY	ccw

TYPE 3S1 presets

A POSITION	midr
mVOLTS/DIV	100
VARIABLE	CAL
DC OFFSET	midr
INVERT-NORM	NORM
mode	A ONLY
INTERNAL TRIGGER	OFF

19a. (cont'd)

TYPE 3T2 presets

TIME POSITION	midr
FINE	midr
RANGE	10 μ s
START POINT	WITH TRIGGER
TRIG SENSITIVITY	cw
POLARITY	+
SOURCE	EXT
RECOVERY TIME	midr
DISPLAY MODE	MANUAL
MANUAL SCAN	ccw
DISPLAY MAG	X1
TIME MAGNIFIER	X1
VARIABLE	CAL
SAMPLES/DIV	midr

Turn the TYPE 564 on. Allow a few minutes for the TYPE 564 to warm-up and then set the INTENSITY to a normal level.

With the TYPE 3T2 MANUAL SCAN ccw, set the spot to the left edge of the graticule with the HORIZ POSITION control. Set MANUAL SCAN cw and adjust the HORIZ GAIN to position the spot to the right edge of the graticule. Repeat until MANUAL SCAN moves the spot exactly 10 divisions. Switch the TYPE 3T2 DISPLAY MODE to NORMAL.

TYPE 184 MARKER OUTPUT -- 50 Ω cable --
BNC to GR adapter -- Variable Attenuator --
TYPE 3S1(A) INPUT

TYPE 184 TRIGGER OUTPUT -- 50 Ω cable -- 5X
Atten -- TYPE 3T2 50 Ω TRIGGER INPUT

Set the TYPE 184 MARKER and TRIGGER SELECTORS to 1 μ S.

b. Check TIME MAGNIFIER VARIABLE:
2.7 to 1, min

Adjust the TYPE 3T2 TRIG SENSITIVITY and SAMPLES/DIV controls for a stable display and check for one marker/division. Set the TIME MAGNIFIER VARIABLE full cw and check for at least 2.7 divisions between markers. Repeat this check with the START POINT at BEFORE TRIGGER. Return the VARIABLE to the CAL position.

b. One marker/division.

If display is not one marker/division and the HORIZ GAIN is properly set, recheck step 8, if the error is observed in START WITH TRIGGER or step 13, if the error is observed in START BEFORE TRIGGER.

19. (cont'd)

c. Check DISPLAY MAG error: $\pm 2\%$, max

Switch the TYPE 3T2 DISPLAY MAG to X10
and the TYPE 184 MARKER SELECTOR to $.1\mu\text{S}$.
Check for 1 marker/division ± 0.16 div,
max. Return the TYPE 3T2 DISPLAY MAG to X1.

d. Check timing error: $\pm 2.5\%$, max except
 $\pm 5\%$ on 100ns range with TIME MAGNIFIER
at X5 through X50

Using the following table, check timing over
the entire range of the TIME POSITION con-
trols with the exclusions shown in the table.
Make each check in both positions of the
START POINT switch.

d. I can't see it!?

The accuracies of the sweep rates
produced by some combinations of
TIME POSITION RANGE and TIME MAG-
NIFIER (especially in START BEFORE
TRIGGER) are difficult to check
because of the low persistence of
normal CRT phosphors. The TYPE
564 should be operated in the stor-
age mode for those checks.

It may be necessary to remove the
5X Attenuator from the TYPE 3T2
TRIGGER INPUT when checking the
100ns range in order to obtain
stable triggering.

TIME POSITION RANGE	TYPE 3T2	TYPE 184		markers or cycles per division	first portion of sweep excluded
	TIME MAGNIFIER	MARKER SELECTOR	TRIGGER SELECTOR		
1ms	X1	.1mS	.1mS	1 ± 0.2 div	15 μS
	X2	50 μS	.1mS	1 "	
	X5	10 μS	10 μS	2 "	
	X10	10 μS	10 μS	1 "	
	X20	5 μS	10 μS	1 "	
	X50	1 μS	1 μS	2 "	
100 μS	X1	10 μS	10 μS	1 "	1.5 μS
	X2	5 μS	10 μS	1 "	
	X5	1 μS	1 μS	2 "	
	X10	1 μS		1 "	
	X20	.5 μS		1 "	
	X50	.1 μS		2 "	
10 μS	X1	1 μS	1 μS	1	150ns
	X2	.5 μS		1	
	X5	.1 μS		2	
	X10	.1 μS		1	
	X20	50nS~		1	
	X50	20nS~		1	
1 μS	X1	.1 μS ~		1	15ns
	X2	50nS~		1	
	X5	20nS~		1	
	X10	10nS~		1	
	X20	5nS~		1	
	X50	2nS~		1	

19d. (cont'd)

100ns	X1	10nS~	1 ±0.2 div	10ns
	X2	5nS~	1 ±0.2 div	
	X5	2nS~	1 ±0.4 div	
	X10	2nS~	1/2 div "	
	X20	2nS~	1/4 div "	

Remove the TYPE 184 connections. Set the 3T2 TIME MAGNIFIER to X50.

Connect UHF Oscillator:

UHF Osc -- 10ns cable -- 2X Atten --
 -- GR TPD -- TYPE 3S1 A INPUT
 -- 2ns cable --
 GR to BNC adapter -- TYPE 3T2 1MΩ
 TRIGGER INPUT

With the UHF Oscillator frequency set to 1GHz, adjust the TYPE 3T2 TRIG SENSITIVITY for a stable display. Check for 5 ±0.25 divisions between cycles. Make this check in both positions of the START POINT switch over the entire range of the TIME POSITION controls excluding the first 10ns. Remove the UHF Oscillator connections.

UHF Oscillator frequency.

The UHF Oscillator frequency must be verified before using it to make timing checks.

Connect a Mixer-rectifier to the test scope input. Connect 2nS~ from the TYPE 184 to the known input of the Mixer-rectifier and the UHF Oscillator signal to the unknown input with a 10ns cable and a 2X Attenuator. Set the UHF Oscillator frequency control for a dial reading of 1GHz. Then adjust it carefully back and forth until a beat frequency is observed on the test scope.

20. TIME POSITION Range

a. Setup

TYPE 184 MARKER OUTPUT -- 50Ω cable -- BNC
 to GR adapter -- Variable Attenuator --
 TYPE 3S1 A INPUT

TYPE 184 TRIGGER OUTPUT -- 50Ω coax cable --
 5X Atten -- TYPE 3T2 50Ω TRIGGER INPUT

Set the TYPE 184 MARKER SELECTOR to .1μS and the TRIGGER SELECTOR to 1μS. Set the TYPE 3T2 TIME POSITION controls full cw and the TIME MAGNIFIER to X1.

b. Check TIME POSITION range: TIME POSITION RANGE setting ±5%, max

Adjust the TYPE 3T2 TRIG SENSITIVITY for a stable display and set the peak of the displayed marker to a vertical graticule line with the HORIZ POSITION control. Rotate the TIME POSITION controls full ccw and check that the second marker is within 0.5 div of the reference graticule line.

20b. (cont'd)

Check each setting of the TIME POSITION RANGE switch in both positions of the START POINT switch using the following table:

<u>TYPE 3T2</u>	<u>TYPE 184</u>	
<u>TIME POSITION RANGE</u>	<u>MARKER SELECTOR</u>	<u>TRIGGER SELECTOR</u>
100ns	.1 μ S	1 μ S
1 μ S	1 μ S	1 μ S
10 μ S	10 μ S	10 μ S
100 μ S	.1mS	.1mS
1mS	1mS	1mS

Remove the TYPE 184 connections.

21. SINEWAVE TRIGGERING

a. Setup

TYPE 191 -- 10ns cable --
 GR TPD -- 2ns cable -- TYPE 3S1 A INPUT
 -- 2ns cable -- 5X Atten
 GR to BNC male adapter -- TYPE 3T2 50 Ω
 TRIGGER INPUT.

Set the TYPE 3S1 A mVOLTS/DIV to 100 and the INTERNAL TRIGGER to ON. Set the TYPE 3T2 TIME POSITION RANGE to 100ns and the START POINT to WITH TRIGGER.

b. Check INT trigger jitter 200ps, max

Set the TYPE 191 controls for 8 divisions of 30MHz as displayed on the plug-in scope. Adjust the TYPE 3T2 TRIG SENSITIVITY and RECOVERY TIME controls for the best display. Switch the TIME MAGNIFIER to X50 and center the display with the TIME POSITION controls. Switch the TYPE 3S1 A mVOLTS/DIV to 2 and recenter the display with the DC OFFSET control. Check jitter with the TYPE 3T2 TRIG POLARITY in both positions: 1 div, max.

c. Check 50 Ω TRIGGER INPUT trigger jitter: 200ps, max

Return the TYPE 3S1 mVOLTS/DIV to 100 and the TYPE 3T2 TIME MAGNIFIER to X1. Adjust the TYPE 191 AMPLITUDE controls for a 5 division display. Switch the TYPE 3T2 TRIGGER SOURCE to EXT and the TYPE 3S1 INTERNAL TRIGGER to OFF. Check jitter as in part b of this step in both positions of the POLARITY switch: 1 div, max.

b. Jitter

Jitter is defined as the horizontal width of the trace when 5% of the dots on each side of the trace are ignored.

The DOT RESPONSE of the TYPE 3S1 must be set for unity loop gain at the mVOLTS/DIV setting being used when making any jitter checks on the TYPE 3T2. In START BEFORE TRIGGER, any loop gain error in the TYPE 3S1 will cause the jitter to appear greater than it is. In START WITH TRIGGER, less than unity loop gain will decrease the apparent jitter and a loop gain greater than unity will increase it.

21. (cont'd)

- d. *Check 1M Ω TRIGGER INPUT trigger jitter:*
50ps, max

Remove the 10ns cable from the TYPE 191 OUTPUT and connect it to the UHF Oscillator output. Disconnect the signal from the 50 Ω TRIGGER INPUT and connect it to the 1M Ω TRIGGER INPUT through a 50 Ω Termination. Set the TYPE 3S1 A mVOLTS/DIV to 100 and adjust the UHF Oscillator for a display of 5 divisions of 1GHz. Check jitter in both positions of the polarity switch: 0.25 div, max. Remove the UHF Oscillator connections.

22. PULSE TRIGGERING

- a. *Setup*

TYPE 111 -- 10ns cable -- 10X Atten -- Variable
Atten -- GR T -- 2ns cable -- TYPE 3S1 A INPUT
-- 2ns cable -- 5X Atten --
GR to BNC female adapter -- TYPE 3T2 50 Ω
TRIGGER INPUT

- b. *Check EXT WITH TRIGGER trigger jitter:*
30ps, max

Set the TYPE 3S1 A mVOLTS/DIV to 50. Adjust the TYPE 3T2 TRIG SENSITIVITY for a triggered sweep and the TIME POSITION to display the leading edge of the pulse. Adjust the Variable Attenuator for a 5 division display. Adjust the TRIG SENSITIVITY and RECOVERY TIME controls for the best display. Check jitter with the TYPE 111 OUTPUT POLARITY and TYPE 3T2 TRIG POLARITY at + and with the TYPE 111 OUTPUT POLARITY and TYPE 3T2 TRIG POLARITY at -: 30ps, max.

- c. *Check EXT BEFORE TRIGGER trigger jitter:*
50ps, max

Switch the TYPE 3T2 START POINT to BEFORE TRIGGER and check jitter as in part b of this step: 50ps, max.

22. (cont'd)

- d. *Check INT BEFORE TRIGGER trigger jitter*
50ps, max

Switch the TYPE 3T2 TRIG SOURCE to INTERNAL and the TYPE 3S1 INTERNAL TRIGGER to A. Adjust the Variable Attenuator for an 8 division display. Check jitter as in part b of this step: 50ps, max.

- e. *Check INT WITH TRIGGER trigger jitter:*
30ps, max

Switch the TYPE 3T2 START POINT to WITH TRIGGER and check jitter as in part b of this step: 30ps, max.

- f. *Check INT trigger maximum amplitude:*
1V, min

Switch the TYPE 3T2 TIME MAGNIFIER to X10 and the TYPE 3S1 A mVOLTS/DIV to 200. Adjust the Variable Attenuator for 5 divisions of display. Set the TYPE 3T2 TRIG SENSITIVITY full ccw and check that triggering stops.

- g. *Check 50 Ω TRIGGER INPUT maximum amplitude: 125mV, min*

Switch the TYPE 3T2 TRIG SOURCE to EXT, the TYPE 3S1 INTERNAL TRIGGER to OFF and the A mVOLTS/DIV to 100. Adjust the TYPE 3T2 TRIG SENSITIVITY for a triggered sweep and the Variable Attenuator for 6.25 divisions of display. Set the TRIG SENSITIVITY full ccw and check that triggering stops.

- h. *Check 1M Ω TRIGGER INPUT maximum amplitude: 250mV, min*

Disconnect the signal from the 50 Ω TRIGGER INPUT and connect it to the 1M Ω TRIGGER INPUT through a 50 Ω Termination. Set the TYPE 3S1 A mVOLTS/DIV to 50 and adjust the Variable Attenuator for 5 divisions of display. Check for no triggering with TRIG SENSITIVITY full ccw.

22. (cont'd)

- i. Check $1M\Omega$ TRIGGER INPUT minimum amplitude: 10mV, max

Install two 10X Attenuators between the 10ns cable and the Variable Attenuator. Set the TYPE 3S1 A mVOLTS/DIV to 10. Adjust the Variable Attenuator and TYPE 3T2 TRIG SENSITIVITY for a stable 5 division display.

- j. Check 50Ω TRIGGER INPUT minimum amplitude: 5mV, max

Disconnect the GR to BNC adapter from the 50Ω Termination and connect it to the 50Ω TRIGGER INPUT. Install a 2X Attenuator between the 5X Attenuator and the GR to BNC adapter. Adjust the TYPE 3T2 TRIG SENSITIVITY for a stable display.

- k. Check INT trigger minimum amplitude: 80mV, max

Switch the TYPE 3T2 SOURCE to INT and the TYPE 3S1 INTERNAL TRIGGER to A. Adjust the Variable Attenuator for an 8 division display. Adjust the TYPE 3T2 TRIG SENSITIVITY for a stable display. Remove TYPE 111 connections.

23. DISPLAY JITTER

- a. Setup

TYPE 191 -- 10ns cable -- 2X Atten --

GR T -- 2ns cable -- TYPE 3S1 A INPUT
 -- 2ns cable -- 5X Atten -- GR to BNC
 adapter -- 50Ω Term -- TYPE 3T2 $1M\Omega$
 TRIGGER INPUT

Set the TYPE 3S1 A mVOLTS/DIV to 100 and the INTERNAL TRIGGER to OFF. Set the TYPE 3T2 TIME POSITION RANGE to $1\mu s$, the TRIG POLARITY to + and SOURCE to EXT. Adjust the TYPE 191 controls to display 5 divisions at 30MHz.

23. (cont'd)

b. Check display jitter:

<u>TIME POSITION</u> <u>RANGE</u>	<u>max display</u> <u>jitter</u>
1 μ s	200ps
10 μ s	2ns
100 μ s	20ns
1ms	200ns

Adjust the TYPE 3T2 TRIG SENSITIVITY and RECOVERY TIME controls for the best display. Center the display vertically with the TYPE 3S1 A POSITION. Set the TIME MAGNIFIER to X50 and set a rising portion of the waveform to the intersection of the graticule vertical and horizontal center lines with the TIME POSITION controls. Switch the TYPE 3S1 A mVOLTS/DIV to 10 and recenter the display with the DC OFFSET if necessary. Switch the TYPE 3T2 DISPLAY MAG to X10. Re-adjust the TRIG SENSITIVITY and RECOVERY TIME controls for best display and recenter the display with the TIME POSITION controls. Check jitter.

Check display jitter in this manner for each of the TIME POSITION RANGE settings listed in the following table.

<u>TIME POSITION</u> <u>RANGE</u>	<u>TYPE 191</u> <u>frequency</u>	<u>max display</u> <u>jitter</u>
1 μ s	30 MHz	200ps
10 μ s	10 MHz	2ns
100 μ s	1 MHz	20ns
1ms	50 kHz	200ns

b. Operate the TYPE 564 in the storage mode and set TYPE 3T2 SAMPLES/DIV near the ccw end when checking jitter with TIME POSITION RANGE at 100 μ s and at 1ms.

24. STROBE KICKBACK

a. Setup

TYPE 191 -- 10ns cable -- 2X Atten --

GR T -- 2ns cable -- 10X Atten -- TYPE 3S1 A INPUT
 -- 2ns cable -- 10X Atten -- GR to BNC Adapter --
 TYPE 3T2 50 Ω TRIGGER INPUT

24a. (cont'd)

TYPE 3T2 presets

TIME POSITION	cw
FINE	cw
RANGE	100ns
START POINT	BEFORE TRIGGER
DISPLAY MAG	X1
TIME MAGNIFIER	X1

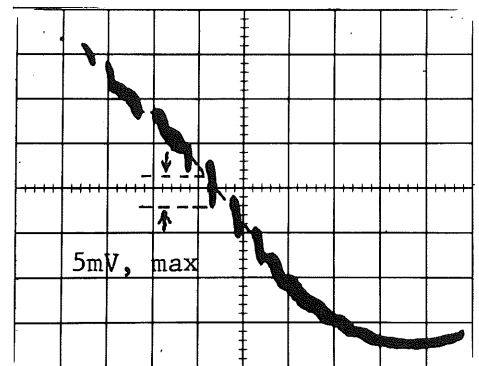
Set the TYPE 3S1 mVOLTS/DIV to 5. Adjust the TYPE 191 controls to display 7.2 divisions at 50 MHz.

b. Check strobe kickback into trigger:
 $\pm 5\text{mV}$, max

Switch the TYPE 3T2 TIME MAGNIFIER to X10 and adjust the TRIG SENSITIVITY control for the best display of the negative going slope of the sinewave. Measure the vertical amplitude of the largest discontinuity: $\pm 5\text{mV}$, max

Switch the TRIG POLARITY to -. Adjust the TRIG SENSITIVITY for the best display of the positive going slope of the sinewave. Measure the vertical amplitude of the largest discontinuity: $\pm 5\text{mV}$, max. Remove the TYPE 191 connections.

b. Strobe kickback.
The loop gain of the TYPE 3S1 must be set to unity.

25. TRIGGER KICKOUT

a. Setup

TYPE 3S1 A INPUT -- 2ns cable -- GR to
BNC adapter -- TYPE 3T2 50 Ω TRIGGER INPUT

Set the TYPE 3S1 mVOLTS/DIV to 10. Set the TYPE 3T2 START POINT to WITH TRIGGER and the TIME MAGNIFIER to X1.

b. Check trigger kickout: $\pm 20\text{mV}$, max
into 50 Ω

Set the TYPE 3T2 TRIG SENSITIVITY full cw and check trigger kickout amplitude: 2 div, max

THE END

