

ADJUSTMENT PROCEDURE

INTRODUCTION

PURPOSE

The Adjustment Procedure is used to return the instrument to conformance with the Performance Requirement statements listed in Table 1-1. Adjustments contained in this procedure should only be performed after checks from the Performance Check Procedure (Section 4) have indicated a need for readjustment or after repairs have been made to the instrument.

STRUCTURE

This procedure is structured into subsections, each of which can be performed independently to permit adjustment of individual sections of the instrument. For example, if only the Vertical section fails to meet the Performance Requirements or has been repaired, it can be readjusted with little or no effect on other sections of the instrument.

The Power Supply section, however, affects all other sections of the instrument. Therefore, if repairs or readjustments have been made that change the absolute value of any of the supply voltages, the entire Adjustment Procedure should be performed.

At the beginning of each subsection is a list of all the front-panel control settings required to prepare the instrument for performing Step 1 in that subsection. Each succeeding step within a subsection should be performed in sequence and in its entirety to ensure that control settings will be correct for ensuing steps. All steps within a subsection should be completed.

TEST EQUIPMENT REQUIRED

Table 4-1 is a complete list of the test equipment required to accomplish both the Performance Check Procedure in Section 4 and the Adjustment Procedure in this section. To assure accurate measurements, it is important that test equipment used for making these checks meet or exceed the specifications described in Table 4-1. When considering

use of equipment other than that recommended, utilize the Minimum Specification column to determine whether available test equipment will suffice.

Detailed operating instructions for test equipment are not given in this procedure. If more operating information is required, refer to the appropriate test equipment instruction manual.

LIMITS AND TOLERANCES

The limits and tolerances stated in this procedure are instrument specifications only if they are listed in the Performance Requirements column of Table 1-1. Tolerances given are applicable only to the instrument undergoing adjustment and do not include test equipment error. Adjustment of the instrument must be accomplished at an ambient temperature between +20°C and +30°C, and the instrument must have had a warm-up period of at least 20 minutes.

ADJUSTMENTS AFFECTED BY REPAIRS

Repairs to a circuit may affect one or more adjustment settings of the instrument. Table 5-1 identifies the adjustment(s) affected due to repairs or replacement of components on a circuit board. Refer to Table 5-1 if a partial procedure is performed or if a circuit requires readjustment due to repairs to a circuit. To use this table, first find, in the leftmost column, the circuit that was repaired. Then move to the right, across that row, until you come to a darkened square, move up the column and check the accuracy of the adjustment found at the heading of that column. Readjust if necessary.

PREPARATION FOR ADJUSTMENT

The instrument cabinet must be removed to perform the Adjustment Procedure. See the Cabinet remove and replace instructions located in the Maintenance section of the manual.

All test equipment items listed in Table 4-1 in the Performance Check section are required to

Adjustment Procedure—2225 Service

accomplish a complete Adjustment Procedure. At the beginning of each subsection there is an equipment-required list showing only the test equipment necessary for performing the steps in that subsection. In this list, the item number following each piece of equipment corresponds to the item number listed in Table 4-1.

Before performing this procedure, do not preset any internal adjustments and do not change the -8.6 V power-supply adjustment. Altering this adjustment may necessitate a complete readjustment of the instrument, whereas only a partial adjustment might

otherwise be required. Only change an internal adjustment setting if a Performance Characteristic cannot be met with the original setting.

Before performing any procedure in this section, set the POWER switch to ON and allow a 20-minute warm-up period.

The most accurate display adjustments are made with a stable, well-focused, low-intensity display. Unless otherwise noted, adjust the INTENSITY, FOCUS, and Trigger LEVEL controls as needed to view the display.

Table 5-1
Adjustments Affected by Repairs

REPAIRS MADE	INTERNAL ADJUSTMENTS AFFECTED																		
	-8.6 V ADJ	GRID BIAS, ASTIG, & GEOM	STEP ATTN BAL	VAR BAL & INVERT BAL	CH 1 & CH 2 GAIN	X1/X10 BALANCE	ATTENUATOR COMP	HF COMP	1 ms TIMING	MAGNIFIER GAIN	MAGNIFIER REGISTRATION	10 μ s, 5 μ s TIMING	HIGH SPEED TIMING	X-Y GAIN AND OFFSET	TRIGGER BALANCE OFFSET	TRIGGER HYSTERESIS	SLOPE BALANCE - P-P OFFSET	TRIGGER SENSITIVITY	
POWER SUPPLIES																			
VERTICAL ATTENUATORS																			
PREAMPS & CHANNEL SW																			
VERTICAL OUTPUT																			
TRIGGER CIRCUIT																			
SWEEP GENERATOR																			
HORIZONTAL AMPLIFIER																			
CRT																			

INDEX TO ADJUSTMENT PROCEDURE STEPS

Power Supply and CRT Display Page

1. Check/Adjust Power Supply DC Levels ... 5-4
2. Adjust CRT Grid Bias 5-5
3. Adjust Astigmatism 5-5
4. Adjust Trace Alignment 5-5
5. Adjust Geometry 5-5

Vertical

1. Adjust Channel 1 Variable Balance 5-6
2. Adjust Channel 2 Variable Balance 5-6
3. Adjust Channel 2 Invert Balance 5-7
4. Adjust Vertical Gain 5-7
5. Check Deflection Accuracy and
VOLTS/DIV Variable Range 5-7
6. Check Input Coupling 5-8
7. Check Position Range 5-8
8. Adjust X1/X10 Balance 5-8
9. Adjust Attenuator Compensation 5-9
10. Check Vertical ALT Operation 5-10
11. Check CHOP Operation 5-10
12. Check TRACE SEP Range 5-10
13. Check ADD MODE Operation 5-10
14. Adjust High-Frequency Compensation .. 5-10
15. Check Bandwidth 5-11
16. Check Channel Isolation 5-12
17. Check Common-Mode Rejection
Ratio 5-12

Horizontal

1. Adjust 1-ms Timing 5-13
2. Adjust Magnifier Gain 5-13
3. Adjust Magnifier Registration 5-13
4. Check Sweep Length 5-14
5. Check Position Range 5-14
6. Check Variable Range 5-14
7. Adjust 10- μ s and 5- μ s Timing 5-14
8. Adjust High-Speed Timing 5-14
9. Check Timing Accuracy and Linearity .. 5-14
10. Adjust X-Y Gain and Offset 5-16
11. Check X Bandwidth 5-17
12. Check Sweep Holdoff 5-17

Trigger

1. Adjust Trigger Offset Channel Balance . 5-18
2. Adjust Trigger Sensitivity, Slope Balance,
and P-P Offset 5-18
3. Check Trigger Sensitivity 5-19
4. Check LF P-P Auto Trigger 5-20
5. Adjust External Trigger Offset
and Range 5-20
6. Check Single Sweep Operation 5-20

External Z-Axis and Probe Adjust

1. Check External Z-Axis Operation 5-22
2. Check Probe Adjust Operation 5-22

POWER SUPPLY AND CRT DISPLAY

Equipment Required (See Table 4-1):

Leveled Sine-Wave Generator (Item 2)
Time-Mark Generator (Item 3)
Screwdriver (Item 5)

Digital Voltmeter (Item 7)
50- Ω BNC Coaxial Cable (Item 8)
50- Ω BNC Termination (Item 10)

See **ADJUSTMENT LOCATIONS** at the back of this manual for adjustment locations.

INITIAL CONTROL SETTINGS

PROCEDURE STEPS

INTENSITY

Visible display

1. Check/Adjust Power Supply DC Levels (R933)

Vertical

POSITION (both)
MODE
VOLTS/DIV (both)
VOLTS/DIV Variable (both)
Magnification (both)

AC-GND-DC (both)

Midrange
CH 1, NORM
10 mV
Cal detent
X1 (CAL
knobs in)
GND

NOTE

Review the information at the beginning of the Adjustment Procedure before starting this step.

a. Connect the digital voltmeter low lead to chassis ground and connect the volts lead to the -8.6 V supply (W989).

b. CHECK—Voltmeter reading is -8.56 to -8.64 V. If the reading is within these limits, skip to part d.

c. ADJUST—The -8.6 V Adj potentiometer (R933) for a voltmeter reading of -8.60 V.

d. CHECK—Voltage levels of the remaining power supplies listed in Table 5-2 are within the specified limits.

e. Disconnect the test equipment from the instrument.

Horizontal

POSITION
MODE
SEC/DIV

SEC/DIV Variable
MAG

Midrange
X1
(X-Y fully
ccw)
CAL detent
X5

Trigger

SLOPE
LEVEL
MODE
HOLD OFF
SOURCE
COUPLING

Positive (\neg)
Midrange
P-P AUTO
MIN
EXT, EXT
AC

Table 5-2
Power Supply Limits

Power Supply	Test Point	Reading (Volts)
-8.6 V	W989	-8.56 to -8.64
+5.2 V	W991	+5.05 to +5.35
+8.7 V	W987	+8.53 to +8.87
+38 V	W972	+36.8 to +39.1
+99 V	W984	+96.0 to +101.0

2. Adjust CRT Grid Bias (R851)

- Adjust the front-panel FOCUS control to produce a well-defined dot.
- Rotate the INTENSITY control fully counterclockwise.
- ADJUST—Grid Bias (R851) for a visible dot, then back off the Grid Bias potentiometer until the dot just disappears.

3. Adjust Astigmatism (R874)

- SET:

Vertical MODE	CH 1
Channel 1 AC-GND-DC	DC
SEC/DIV	5 μ s
Trigger SOURCE	CH 1
- Connect the leveled sine-wave generator output via a 50- Ω BNC coaxial cable and a 50- Ω BNC termination to the CH 1 OR X input connector.
- Set the generator to produce a 50-kHz, four-division display.
- ADJUST—Astig (R874) and the front-panel FOCUS control for the best defined waveform.
- Disconnect the test equipment from the instrument.

4. Adjust Trace Alignment

- Position the trace to the center horizontal graticule line.
- ADJUST—The front-panel TRACE ROTATION control for optimum alignment of the trace with the center horizontal graticule line.

5. Adjust Geometry (R870)

- SET:

CH 1 VOLTS/DIV	50 mV
SEC/DIV	0.1 ms

- Connect 50- μ s time markers from the time-mark generator via a 50- Ω BNC coaxial cable and a 50- Ω BNC termination to the CH 1 OR X input connector.
- Position the baseline part of the display below the bottom horizontal graticule line using the CH 1 POSITION control.
- Adjust the SEC/DIV Variable control for five markers per division.
- ADJUST—Geom (R870) for minimum curvature of the time markers at the left and right edges of the graticule.
- Set Channel 1 AC-GND-DC switch to GND.
- ADJUST—Geom (R870) for minimum curvature of the baseline trace when positioned at the top and bottom horizontal graticule lines using the CH 1 POSITION control.
- Set the Channel 1 AC-GND-DC switch to DC.
- Repeat Parts e through h for optimum compromise between the vertical and horizontal displays.
- Disconnect the test equipment from the instrument.

VERTICAL

Equipment Required (See Table 4-1):

Calibration Generator (Item 1)	50- Ω BNC Termination (Item 10)
Leveled Sine-Wave Generator (Item 2)	10X Attenuator (Item 12)
Screwdriver (Item 5)	BNC Male-to-Miniature-Probe Tip (Item 13)
50- Ω BNC Coaxial Cable (Item 8)	Low-Reactance Alignment Tool (Item 15)
Dual-Input Coupler (Item 9)	10X Probe (Provided with instrument)

See **ADJUSTMENT LOCATIONS** at the back of this manual for adjustment locations.

INITIAL CONTROL SETTINGS

Vertical

POSITION (both)	Midrange
MODE	CH 1, NORM
VOLTS/DIV (both)	5 mV
VOLTS/DIV Variable(both)	CAL detent
Magnification (both)	X1 (CAL knobs in)
AC-GND-DC (both)	GND

Horizontal

POSITION (COARSE and FINE)	Midrange
MODE	X1
SEC/DIV	0.5 ms
SEC/DIV Variable	CAL detent
MAG	X5

Trigger

SLOPE	Positive (\neg)
LEVEL	Midrange
MODE	P-P AUTO
HOLD OFF	MIN
SOURCE	EXT, EXT
COUPLING	AC

PROCEDURE STEPS

1. Adjust Channel 1 Variable Balance (R33)

a. Rotate the CH 1 VOLTS/DIV Variable control fully counterclockwise.

b. Position the trace on the center horizontal graticule line using the CH 1 POSITION control.

c. Rotate the CH 1 VOLTS/DIV Variable control clockwise to the CAL detent.

d. ADJUST—Var Bal (R33) to set the trace to the center horizontal graticule line.

e. Repeat Parts a through d until there is no trace shift between the fully clockwise and the fully counterclockwise positions of the CH 1 VOLTS/DIV Variable control.

f. Return the CH 1 VOLTS/DIV Variable control to the CAL detent.

2. Adjust Channel 2 Variable Balance (R84) (SN 202908 and above)

a. Set Vertical Mode to Ch 2.

b. Rotate the CH 2 VOLTS/DIV Variable control fully counterclockwise.

c. Position the trace on the center horizontal graticule line using the CH 2 POSITION control.

d. Rotate the CH 2 VOLTS/DIV Variable control clockwise to the CAL detent.

e. ADJUST—Var Bal (R84), on the front-panel board to set the trace to the center horizontal graticule line.

f. Repeat Parts b through e until there is no trace shift between the fully clockwise and the fully counterclockwise positions of the CH 2 VOLTS/DIV Variable control.

g. Return the CH 2 VOLTS/DIV Variable control to the CAL detent.

3. Adjust Channel 2 Invert Balance (R83)

a. Position the trace on the center horizontal graticule line using the Channel 2 POSITION control.

b. Set Vertical MODE switch to CH 2 INVERT.

c. ADJUST—Invert Bal (R83) to set the trace to the center horizontal graticule line.

d. Set Vertical MODE switch to NORM.

e. Repeat Parts a through d until there is no trace shift when switching from NORM to CH 2 INVERT.

4. Adjust Vertical Gain (R145, R195, R112, and R162)

a. SET:

Vertical MODE	CH 1, NORM
AC-GND-DC (both)	DC
Trigger SOURCE	VERT MODE
Trigger COUPLING	DC

b. Connect a 20-mV, standard-amplitude signal from the calibration generator via a 50- Ω BNC cable to the CH 1 OR X input connector.

c. Center the display within the graticule using the CH 1 POSITION control.

d. ADJUST—CH 1 Gain (R145) for an exact four-division display.

e. Move the test-signal cable from the CH 1 OR X input connector to the CH 2 OR Y input connector.

f. Set the Vertical MODE switch to CH 2.

g. Center the display within the graticule using the CH 2 POSITION control.

h. ADJUST—CH 2 Gain (R195) for an exact four-division display.

i. Repeat Parts b through h until the gain of the two channels is identical. (You must switch the Vertical MODE between CH 1 and CH 2 as needed to view the display.)

j. Change the generator output to 2 mV, and set the CH 1 and CH 2 vertical magnification to X10 (pull CAL knobs out).

k. ADJUST—CH 2 X10 Gain (R162) for an exact four-division display.

l. Move the test-signal cable from the CH 2 OR Y input connector to the CH 1 OR X input connector.

m. Set the Vertical MODE switch to CH 1.

n. ADJUST—CH 1 X10 Gain (R112) for an exact four-division display.

5. Check Deflection Accuracy and VOLTS/DIV Variable Range

a. SET:

VOLTS/DIV Variable (both)	CAL detent
Vertical Magnification (both)	X1 (CAL knobs in)

b. CHECK—Deflection accuracy is within the limits given in Table 5-3 for each CH 1 VOLTS/DIV switch setting and corresponding standard-amplitude signal. When at the 20-mV VOLTS/DIV switch setting, rotate the CH 1 VOLTS/DIV Variable control fully counterclockwise and CHECK that the display decreases to two divisions or less. Then return the CH 1 VOLTS/DIV Variable control to the CAL detent and continue with the 50-mV check.

c. Move the cable from the CH 1 OR X input connector to the CH 2 OR Y input connector. Set the Vertical MODE switch to CH 2.

d. Repeat Part b using the Channel 2 controls.

Table 5-3
Deflection Accuracy Limits

VOLTS/DIV Switch Setting	STANDARD Amplitude Signal	ACCURACY Limits (Divisions)
5 mV	20 mV	3.88 to 4.12
10 mV	50 mV	4.85 to 5.15
20 mV	0.1 V	4.85 to 5.15
50 mV	0.2 V	3.88 to 4.12
0.1 V	0.5 V	4.85 to 5.15
0.2 V	1 V	4.85 to 5.15
0.5 V	2 V	3.88 to 4.12
1 V	5 V	4.85 to 5.15
2 V	10 V	4.85 to 5.15
5 V	20 V	3.88 to 4.12

6. Check Input Coupling

a. Set the AC-GND-DC switches (both channels) to GND.

b. Position the trace on the center horizontal graticule line using the CH 2 POSITION control.

c. Change the generator output to 50 mV.

d. Set the CH 2 AC-GND-DC switch to AC.

e. CHECK—That the display is centered about the center horizontal graticule line.

f. Set the CH 2 AC-GND-DC switch to DC.

g. CHECK—That the display is ground referenced on the center horizontal graticule line.

h. Move the test-signal cable from the CH 2 OR Y input connector to the CH 1 OR X input connector.

i. Set the Vertical MODE switch to CH 1.

j. Repeat Parts b through g using the Channel 1 controls.

7. Check Position Range

a. SET:

VOLTS/DIV (both)	10 mV
AC-GND-DC (both)	AC
SEC/DIV	0.2 ms Trigger
COUPLING	AC

b. Set the calibration generator for 0.1 V.

c. Adjust the CH 1 VOLTS/DIV Variable control to produce a 5.25-division display.

d. Set the CH 1 VOLTS/DIV to 5 mV.

e. Set the calibration generator to produce a 0.2 V signal.

f. CHECK—The bottom and top of the trace may be positioned above and below the center horizontal graticule line by rotating the CH 1 POSITION control fully clockwise and counterclockwise respectively.

g. Move the cable from the CH 1 OR X input connector to the CH 2 OR Y input connector.

h. Set the Vertical MODE switch to CH 2.

i. Repeat Parts b through f using the Channel 2 controls.

j. Disconnect the test equipment from the instrument.

8. Adjust X1/X10 Balance

a. SET:

Vertical MODE	CH 1
AC-GND-DC (both)	GND
VOLTS/DIV Variable (both)	CAL detent

b. Position the trace on the center horizontal graticule line using the CH 1 POSITION control.

c. Set CH 1 VOLTS/DIV Variable knob to X10 (pull CAL knob out).

d. ADJUST—X10 BAL (R107) to position the trace on the center horizontal graticule line.

e. Set CH 1 VOLTS/DIV Variable knob to X1 (push CAL knob in).

f. Repeat Parts b through e until there is no trace shift between X1 and X10 positions.

g. Set Vertical MODE to CH 2.

h. Repeat Parts b through f for CH 2, using the Channel 2 X10 BAL adjust (R157) instead of R107 in Part d.

i. Return both VOLTS/DIV Variable controls to their CAL and X1 positions.

9. Adjust Attenuator Compensation

a. SET:

VOLTS/DIV (both)	10 mV
Vertical Magnification (both)	X1 (CAL knobs in DC
AC-GND-DC (both)	DC

b. Connect the high-amplitude, square-wave output from the calibration generator via a 50- Ω BNC termination, a probe-tip-to-BNC adapter, and the 10X probe to the CH 2 OR Y input connector.

c. Set the generator to produce a 1-kHz, five-division display and compensate the probe using the probe compensation adjustment (see the probe instruction manual).

d. Replace the probe and probe-tip-to-BNC adapter with a 50- Ω BNC coaxial cable and 50- Ω BNC termination.

e. Set the generator to produce a five-division display.

f. ADJUST—Trimmer 1 for flattest response on the square wave signal. See figure 5-1 for location of the trimmers.

g. Replace the 50- Ω BNC coaxial cable and 50- Ω BNC termination with the probe and probe-tip-to-BNC adapter.

h. Set the generator to produce a five-division square wave.

i. ADJUST—Trimmer 1N for flattest response on square wave.

j. Set the CH 2 VOLTS/DIV switch to 20 mV.

k. Repeat Parts d through i except adjust the "2" and "2N" trimmers in Parts f and i respectively.

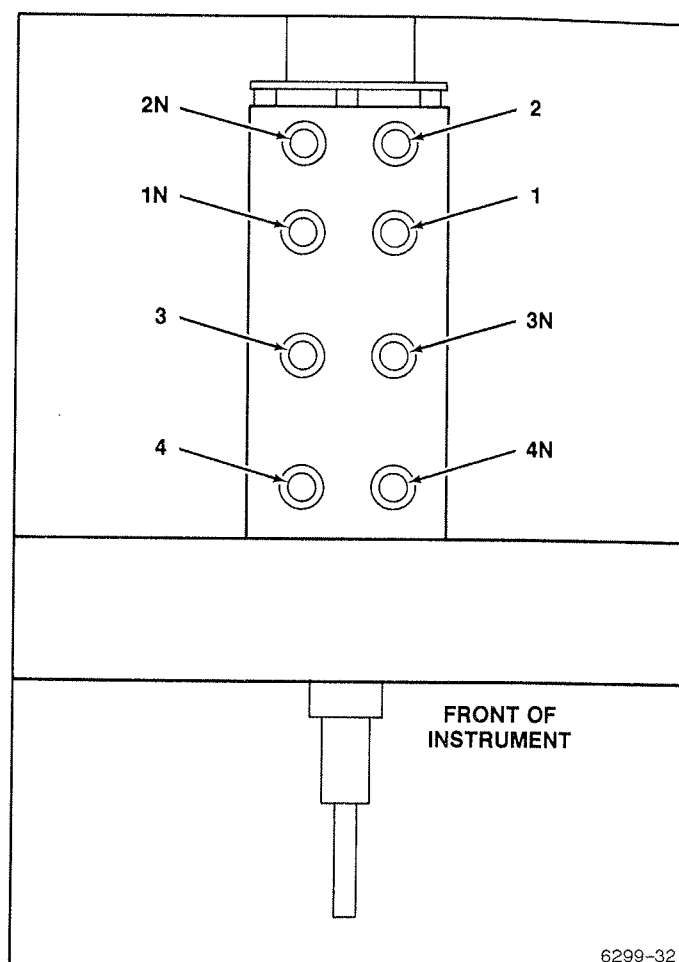


Figure 5-1. Attenuator trimmer adjustments.

m. Set the CH 2 VOLTS/DIV switch to 50 mV.

n. Repeat Parts d through i except adjust the "3" and "3N" trimmers in Parts f and i respectively.

o. Set the CH 2 VOLTS/DIV switch to .5 V.

p. Repeat Parts d through i except adjust the "4" and "4N" trimmers in Parts f and i respectively.

q. Set the Vertical MODE switch to CH 1.

r. Repeat Parts b through p for the Channel 1 Attenuators.

s. Disconnect the test equipment from the instrument.

10. Check Vertical ALT Operation**a. SET:**

AC-GND-DC (both)	GND
Vertical MODE	BOTH, NORM, and ALT
SEC/DIV	0.1 s
Trigger SOURCE	CH 1

b. Position the Channel 1 and Channel 2 traces about two divisions apart using the CH 1 and CH 2 POSITION controls.

c. CHECK—Channel 1 and Channel 2 traces move across the screen alternately.

11. Check CHOP Operation**a. SET:**

Vertical MODE	BOTH, NORM, and CHOP
SEC/DIV	1 μ s
Trigger MODE	NORM
Trigger SOURCE	VERT MODE

b. (SN 202908 and above only) ADJUST—Chop Switch Balance (R140) for no triggering on chop segments when rotating the Trigger LEVEL control.

12. Check TRACE SEP Range**a. SET:**

VOLTS/DIV (both)	5 mV
Vertical MODE	CH 1
SEC/DIV	10 μ s
Horizontal MODE	ALT
Trigger MODE	P-P AUTO
Trigger SOURCE	EXT, EXT
TRACE SEP	Fully ccw

b. Position the trace on the center horizontal graticule line using the CH 1 POSITION control.

c. CHECK—That the MAG trace can be positioned three divisions or more ABOVE the unmagnified trace using the TRACE SEP control. SN 202908 and above—check for positioning three divisions above and below the unmagnified trace.

13. Check ADD MODE Operation**a. SET:**

VOLTS/DIV (both)	20 mV
AC-GND-DC (both)	DC
Vertical MODE	BOTH, NORM, and ALT
SEC/DIV	0.5 ms
Horizontal MODE	X1
Trigger SOURCE	CH 1

b. Position both traces on the center horizontal graticule line using the CH 1 and CH 2 POSITION controls.

c. Set the calibration generator to produce a 50-mV signal.

d. Connect the output of the calibration generator to both the CH 1 OR X input and the CH 2 OR Y input with dual-input coupler.

e. Check that both channels show a 2.5-division display.

f. SET:

Vertical MODE	ADD
AC-GND-DC (both)	DC

g. CHECK—That the resultant display is five divisions $\pm 3\%$ (4.85 to 5.15 divisions).

h. Disconnect the test equipment from the instrument.

14. Adjust High-Frequency Compensation**a. SET:**

VOLTS/DIV (both)	10 mV Vertical
MODE	CH 1
SEC/DIV	0.2 μ s

b. Connect the positive-going, fast-rise, square-wave output from the calibration generator via a 50- Ω BNC coaxial cable, a 10X BNC attenuator, and a 50- Ω BNC termination to the CH 1 OR X input connector.

c. Set the generator to produce a 1-MHz, five-division display.

d. Set the top of the display to the center horizontal graticule line using the CH 1 POSITION control.

e. ADJUST—Compensation (R241, R240, C256, C237 and C257) for flattest response. Repeat adjustments until no further improvements are noted.

NOTE

Check your instrument to see if C180 on the A1 is adjustable. If it is, perform Parts f, g, and h. If it is not, proceed with part i.

f. Move the test signal to CH 2 and set the Vertical MODE to CH 2.

g. ADJUST—CH 2 compensation capacitor C180 to match the CH 2, 10 mV compensation to the CH 1 10 mV compensation.

h. Move the test signal cable back to CH 1 and set the Vertical MODE to CH 1.

i. Set the CH 1 VOLTS/DIV switch to 5 mV.

j. Set the generator for a five-division signal.

k. Check for aberrations of $\pm 6\%$ (0.3 division) or less.

l. Set the CH 1 VOLTS/DIV switch to 10 mV.

m. Set the generator for a five-division signal.

n. Check for aberrations of $\pm 4\%$ (0.2 division) or less.

o. Repeat Part n for each CH 1 VOLTS/DIV switch settings from 20 mV through 0.2 V. Adjust the generator output and add or remove the 10X attenuator as necessary to maintain a five-division display at each VOLTS/DIV switch setting.

NOTE

Some generators do not produce enough signal amplitude to do parts p through t.

p. Set the CH 1 VOLTS/DIV switch to 0.5 V.

q. Check for aberrations of $\pm 6\%$ (0.3 division) or less.

r. Set the CH 1 VOLTS/DIV switch to 1 V.

s. Check for aberrations of $\pm 12\%$ (0.6 division) or less.

t. Repeat Part s for the 2 V and 5 V CH 1 VOLTS/DIV switch settings. Adjust the generator output and add or remove the 10X attenuator as necessary to maintain a five-division display at each VOLTS/DIV switch setting.

u. Move the cable from the CH 1 OR X input connector to the CH 2 OR Y input connector. Set the Vertical MODE switch to CH 2.

v. Repeat Parts f through t for Channel 2.

w. Disconnect the test equipment from the instrument.

15. Check Bandwidth

a. SET:

VOLTS/DIV (both)	5 mV
Vertical MODE	CH 1
SEC/DIV	10 μ s
Trigger SOURCE	VERT MODE

b. Connect the leveled sine-wave generator output via a 50- Ω BNC coaxial cable and a 50- Ω BNC termination to the CH 1 OR X input connector.

c. Set the generator to produce a 50-kHz, six-division display.

d. Increase the sine-wave frequency until a 4.2-division display is obtained.

e. CHECK—the frequency is greater than 50 MHz.

f. Repeat Parts c through e for all ranges from 10 mV to .2 V.

g. SET:

CH 1 VOLTS/DIV	5 mV
CH 1 VOLTS/DIV Variable	X10 (CAL knob out)

h. Set the generator to produce a 50-kHz, six-division display.

i. Increase the signal frequency until a 4.2-division display is obtained.

Adjustment Procedure—2225 Service

j. CHECK—The frequency is greater than 5 MHz.

k. Repeat Parts h through j for all ranges from 10 mV to .2 V.

l. Set the CH 1 VOLTS/DIV Variable to X1 (push CAL knob in).

m. Set Vertical MODE to CH 2.

n. Repeat Parts b through l for Channel 2.

16. Check Channel Isolation

a. SET:

VOLTS/DIV (both)	0.5 V
AC-GND-DC (CH 1)	DC
AC-GND-DC (CH 2)	GND
Vertical MODE	CH 1
SEC/DIV	0.05 μ s

b. Connect the leveled sine-wave generator output via a 50- Ω BNC coaxial cable and a 50- Ω BNC termination to the CH 1 OR X input connector.

c. Set the generator to produce a 20-MHz, 5 V peak-to-peak output.

d. Set Vertical MODE to CH 2 and ALT.

e. CHECK—That the display amplitude is less than 0.1 division.

f. Move the test-signal cable from the CH 1 OR X input connector to the CH 2 OR Y input connector.

g. SET:

Vertical MODE	CH 1
CH 1 AC-GND-DC	GND
CH 2 AC-GND-DC	DC

h. CHECK—That the display amplitude is less than 0.1 division.

i. Disconnect the test equipment from the instrument.

17. Check Common-Mode Rejection Ratio

a. SET:

VOLTS/DIV (both)	10 mV
AC-GND-DC (both)	DC
Vertical MODE	BOTH, NORM, and ALT

b. Connect the leveled sine-wave generator output via a 50- Ω BNC coaxial cable, a 50- Ω BNC termination, and a dual-input coupler to the CH 1 OR X and CH 2 OR Y input connectors.

c. Set the generator to produce a 20-MHz, six-division display.

d. Set Vertical MODE to INV and ADD.

e. CHECK—That the ADD display is less than 0.6 division.

f. Disconnect the test equipment from the instrument.

HORIZONTAL

Equipment Required (See Table 4-1):

Calibration Generator (Item 1)	Test Oscilloscope (Item 6)
Leveled Sine-Wave Generator (Item 2)	50- Ω BNC Termination (Item 10)
Time-Mark Generator (Item 3)	Low-Capacitance Alignment tool (Item 15)
Screwdriver (Item 5)	50- Ω Coaxial Cable (Item 8)

See **ADJUSTMENT LOCATIONS** at the back of this manual for adjustment locations.

INITIAL CONTROL SETTINGS

Vertical

POSITION (both)	Midrange
MODE	CH 1
VOLTS/DIV (both)	0.5 V
VOLTS/DIV Variable (both)	CAL detent
Magnification (both)	X1 (CAL knobs in)
AC-GND-DC (both)	DC

Horizontal

POSITION	Midrange
MODE	X1
SEC/DIV	1 ms
SEC/DIV Variable	CAL detent

Trigger

SLOPE	Positive (\neg)
LEVEL	Midrange
MODE	P-P AUTO
HOLD OFF	MIN
SOURCE	CH 1
COUPLING	AC

PROCEDURE STEPS

1. Adjust 1-ms Timing (R775)

a. Connect 1-ms time markers from the time-mark generator via a 50- Ω BNC coaxial cable and a 50- Ω BNC termination to the CH 1 OR X input connector.

b. Align the first time marker with the first (extreme left) vertical graticule line using the Horizontal POSITION control.

NOTE

When making timing measurements, use the tips of the time markers positioned at the center horizontal graticule line as the measurement reference points.

c. ADJUST—X1 Gain (R775) for one marker per division over the center eight divisions.

2. Adjust Magnifier Gain (R731, R777)

a. SET:

Horizontal MODE	MAG
Horizontal MAG	X5

b. Align the first time marker with the first (extreme left) vertical graticule line using the Horizontal POSITION control.

c. ADJUST—X5 Mag Gain (R731) for five divisions between magnified markers.

d. Set Horizontal MAG to X10.

e. ADJUST—X10 Mag Gain (R777) for 10 divisions between magnified markers.

3. Adjust Magnifier Registration (R782, R730)

a. Set the Horizontal MODE switch to ALT.

b. Position the magnified sweep vertically over the unmagnified sweep using the TRACE SEP control.

c. Adjust the Horizontal POSITION controls so that the first magnified marker overlays the first unmagnified marker.

d. ADJUST—X10 Mag Reg (R782) to bring first magnified marker to the center vertical graticule line.

e. Set the Horizontal MAG control to X50.

f. ADJUST—X5 Mag Reg (R730) to overlay the first magnified marker onto the first unmagnified marker.

4. Check Sweep Length

a. SET:

SEC/DIV	0.1 ms
Horizontal MODE	X1

b. Select .1-ms time markers from the time-mark generator.

c. Position the start of the sweep at the first vertical graticule line using the Horizontal POSITION control.

d. CHECK—That the sweep length is between 10.2 and 12 divisions.

5. Check Position Range

a. CHECK—That the start of the sweep can be positioned to the right of the center vertical graticule line by rotating the COARSE Horizontal POSITION control fully clockwise.

b. CHECK—That the tenth time marker can be positioned to the left of the center vertical graticule line by rotating the COARSE Horizontal POSITION control fully counterclockwise.

c. CHECK—That the FINE Horizontal POSITION control can move the trace more than 0.4 divisions.

6. Check Variable Range

a. Select 0.5-ms time markers from the time-mark generator.

b. Set the SEC/DIV Variable control knob fully counterclockwise

c. CHECK—That the spacing between time markers is two divisions or less.

d. Return the SEC/DIV Variable knob to the CAL detent.

7. Adjust 10- μ s and 5- μ s timing (R722, C703)

a. Set the SEC/DIV switch to 10 μ s.

b. Select 10- μ s time markers from the time-mark generator.

c. ADJUST—10- μ s Timing (R722) for one marker per division.

d. Set the SEC/DIV switch to 5 μ s.

e. Select 5- μ s time markers from the time-mark generator.

f. ADJUST—5- μ s Timing (C703) for one marker per division.

8. Adjust High-Speed Timing (C784, C794)

a. SET:

CH 1 VOLTS/DIV	0.1 V
CH 1 AC-GND-DC	AC
SEC/DIV	0.05 μ s
Horizontal MODE	MAG
Horizontal MAG	X10
Trigger SOURCE	EXT, EXT

b. Select 10-ns time markers from the time-mark generator.

c. Connect the time-mark generator trigger output via a 50- Ω BNC coaxial cable and a 50- Ω BNC termination to the EXT INPUT OR Z input connector.

d. Adjust the Trigger LEVEL control so that the markers are stably triggered.

e. ADJUST—5-ns Linearity (C784) and 5-ns Timing (C794) for two divisions between each marker.

9. Check Timing Accuracy and Linearity

a. SET:

CH VOLTS/DIV	0.5 V
SEC/DIV	0.05 μ s
Horizontal MODE	X1

b. Select 50-ns time markers from the time-mark generator.

c. Adjust the Trigger LEVEL control for a stable, triggered display.

d. Use the Horizontal POSITION control to align the second time marker with the second vertical graticule line.

e. CHECK—Timing accuracy is within 3% (0.24 division at the tenth vertical graticule line), and linearity is within 5% (0.10 division over any two of the center eight divisions).

NOTE

When checking the timing accuracy for SEC/DIV switch settings from 50 ms to 0.5 s, watch the time marker tips only at the second and tenth vertical graticule lines while adjusting the Horizontal POSITION control.

f. Repeat Parts c through e for the remaining SEC/DIV and time-mark-generator setting combinations shown in Table 5-4 under the Normal column.

Table 5-4
Settings for Timing Accuracy Checks

SEC/DIV Switch Setting	Time-Mark Generator Setting			
	Normal	X5 Mag	X10 Mag	X50 Mag
0.05 μ s	50 ns	10 ns		
0.1 μ s	0.1 μ s	20 ns	10 ns	
0.2 μ s	0.2 μ s	0.1 μ s	20 ns	10 ns
0.5 μ s	0.5 μ s	0.1 μ s	50 ns	10 ns
1 μ s	1 μ s	0.2 μ s	0.1 μ s	20 ns
2 μ s	2 μ s	1 μ s	0.2 μ s	0.1 μ s
5 μ s	5 μ s	1 μ s	0.5 μ s	0.1 μ s
10 μ s	10 μ s	2 μ s	1 μ s	0.2 μ s
20 μ s	20 μ s	10 μ s	2 μ s	1 μ s
50 μ s	50 μ s	10 μ s	5 μ s	1 μ s
0.1 ms	0.1 ms	20 μ s	10 μ s	2 μ s
0.2 ms	0.2 ms	0.1 ms	20 μ s	10 μ s
0.5 ms	0.5 ms	0.1 ms	50 μ s	10 μ s
1 ms	1 ms	0.2 ms	0.1 ms	20 μ s
2 ms	2 ms	1 ms	0.2 ms	0.1 ms
5 ms	5 ms	1 ms	0.5 ms	0.1 ms
10 ms	10 ms	2 ms	1 ms	0.2 ms
20 ms	20 ms	10 ms	2 ms	1 ms
50 ms	50 ms	10 ms	5 ms	1 ms
0.1 s	0.1 s	20 ms	10 ms	2 ms
0.2 s	0.2 s	0.1 s	20 ms	10 ms
0.5 s	0.5 s	0.1 s	50 ms	10 ms

NOTE

In X5 and X50 magnification in all "2" decade switch settings, the associated time marker settings give only five markers per 10 divisions instead of the customary 10. When checking these ranges, position the markers on the second and ninth vertical graticule lines.

g. Disconnect the test signal from the EXT INPUT OR Z connector.

h. SET:

SEC/DIV	0.05 μ s
Horizontal MODE	MAG
Horizontal MAG	X5
Trigger Source	CH 1

i. Select 10-ns time markers from the time-mark generator. Adjust the Trigger LEVEL control to obtain a stable display.

j. Use the Horizontal POSITION control to align the first time marker that is 50 ns beyond the start of the sweep with the second vertical graticule line.

k. CHECK—Timing accuracy is within 4% (0.32 division at the tenth vertical graticule line), and linearity is within 7% (0.14 division over any two of the center eight divisions). Exclude any portion of the sweep past the 50th magnified division.

l. Repeat Parts j and k for the remaining SEC/DIV and time-mark-generator setting combinations shown in Table 5-4 under the X5 Magnified column.

m. SET:

SEC/DIV	0.1 μ s
Horizontal MAG	X10

n. Select 10-ns time markers from the time-mark generator.

o. Use the Horizontal POSITION control to align the first time marker that is 50 ns beyond the start of the sweep with the second vertical graticule line.

p. CHECK—Timing accuracy is within 4% (0.32 division at the tenth vertical graticule line), and linearity is within 7% (0.14 division over any two of the center eight divisions). Exclude any portion of the sweep past the 50th magnified division.

q. Repeat Parts o and p for the remaining SEC/DIV and time-mark generator setting

combinations shown in Table 5-4 under the X10 Magnified column.

r. SET:

SEC/DIV	0.5 μ s
Horizontal MAG	X50

s. Select 10-ns time markers from the time-mark generator.

t. Use the Horizontal POSITION control to align the first time marker that is 100 ns beyond the start of the sweep with the second vertical graticule line.

u. CHECK—Timing accuracy is within 5% (0.40 division at the tenth vertical graticule line), and linearity is within 9% (0.18 division over any two of the center eight divisions). Exclude any portion of the sweep past the 100th magnified division.

v. Repeat Parts t and u for the remaining SEC/DIV and time-mark-generator setting combinations shown in Table 5-4 under the X50 Magnified column.

w. Disconnect the test equipment from the instrument.

10. Adjust X-Y Gain and Offset (R395, R736)

a. SET:

VOLTS/DIV (both)	10 mV
SEC/DIV	X-Y (fully ccw)
Horizontal MODE	X1

b. Connect a 50-mV, standard-amplitude signal from the calibration generator via a 50- Ω BNC coaxial cable to the CH 1 OR X input connector.

c. ADJUST—X Gain (R395) for exactly a five-division display.

d. Center the display within the graticule using the CH 1 POSITION control.

e. SET:

CH 1 AC-GND-DC	GND
SEC/DIV	1 ms

f. Align the start of the trace with the first (extreme left) vertical graticule line using the Horizontal POSITION control.

g. Set the SEC/DIV switch to X-Y (fully counterclockwise).

h. ADJUST—X Centering (R736) to position the spot at the center vertical graticule line.

i. Disconnect the test equipment from the instrument.

11. Check X Bandwidth

a. SET:

VOLTS/DIV (both)	50 mV
AC-GND-DC (both)	DC
Vertical MODE	BOTH, NORM, and ALT
Trigger SOURCE	CH 1

b. Connect the leveled sine-wave generator output via a 50- Ω BNC coaxial cable and a 50- Ω BNC termination to the CH 1 OR X input connector.

c. Set the generator to produce an eight-division horizontal display at an output frequency of 50 kHz.

d. Increase the signal frequency until the horizontal deflection (X-axis) is equal to 5.7 divisions in length.

e. CHECK—That the frequency is greater than 2 MHz.

f. Disconnect the test equipment from the instrument.

12. Check Sweep Holdoff

a. SET:

VOLTS/DIV (both)	1 V
AC-GND-DC (both)	GND
Vertical MODE	CH 1
SEC/DIV	1 ms
Trigger SOURCE	EXT, EXT

b. Connect the test oscilloscope's 10X probe tip to the front end of R704 (toward the front panel). R704 is on the Timing circuit board.

c. Set HOLDOFF control fully counterclockwise (MIN setting).

d. Measure the HOLDOFF time.

e. Rotate the HOLDOFF control to the fully clockwise position

f. CHECK—Sweep holdoff time has increased by at least a factor of eight.

g. Repeat Parts c through f for SEC/DIV settings of 0.5 ms and 5 μ s.

h. Disconnect the 10X probe from R704.

TRIGGER

Equipment Required (See Table 4-1):

Leveled Sine-Wave Generator (Item 2)	Dual-Input Coupler (Item 9)
Low-Frequency Sine-Wave Generator (Item 4)	50- Ω BNC Termination (Item 10)
Screwdriver (Item 5)	600- Ω BNC Termination (Item 11)
50- Ω BNC Coaxial Cable (Item 8)	

See **ADJUSTMENT LOCATIONS** at the back of this manual for adjustment locations.

INITIAL CONTROL SETTINGS

Vertical

POSITION (both)	Midrange
MODE	BOTH, NORM, and ALT
VOLTS/DIV (both)	50 mV
VOLTS/DIV Variable (both)	CAL detent
Magnification (both)	X1 (CAL knobs in)
AC-GND-DC (both)	DC

Horizontal

POSITION (COARSE and FINE)	Midrange
MODE	X1
SEC/DIV	2 μ s
SEC/DIV Variable	CAL detent

Trigger

SLOPE	Positive (\neg)
LEVEL	Midrange
MODE	P-P AUTO
HOLD OFF	MIN
SOURCE	VERT MODE
COUPLING	DC

b. Set the generator to produce a four-division display at an output frequency of 50 kHz.

c. Center the CH 1 and CH 2 traces vertically.

d. Adjust the SEC/DIV Variable control to give one and a half sine-wave periods across the graticule.

e. ADJUST—CH 1/CH 2 Balance (R338) (found under the attenuator board) until the sine waves coincide.

f. Return the SEC/DIV variable control to the detent (CAL) position.

2. Adjust Trigger Sensitivity, Slope Balance, and P-P Offset (R489, R481, and R478)

a. SET:

CH 1 VOLTS/DIV	0.1 V
Vertical MODE	CH 1
SEC/DIV	20 μ s
Trigger SOURCE	CH 1

b. Connect the leveled sine-wave generator output via a 50 Ω BNC coaxial cable and a 50 Ω BNC termination to the CH 1 OR X input connector.

c. Set the generator to produce a 2.2-division display at an output frequency of 50 kHz.

d. SET:

CH 1 VOLTS/DIV	1 V
Trigger MODE	NORM

PROCEDURE STEPS

1. Adjust Trigger Offset Channel Balance (R338)

a. Connect the leveled sine-wave generator output via a 50- Ω BNC coaxial cable, a 50- Ω BNC termination, and a dual-input coupler to the CH 1 OR X and the CH 2 OR Y input connectors.

e. ADJUST—Trigger Sensitivity (R489) and Trigger LEVEL control for minimum sensitivity with a stable trigger.

NOTE

Adjusting Trigger Sensitivity (R489) clockwise decreases trigger sensitivity.

f. ADJUST—Slope Bal (R481) and the Trigger LEVEL control so that a reliable trigger can be maintained when switching the Trigger SLOPE between positive (↗) and negative (↘).

g. Adjust the Trigger LEVEL control for a stable trigger.

h. Set the Trigger MODE to P-P AUTO.

i. ADJUST—P-P Offset (R478) until a stable trigger can be obtained when switching the Trigger SLOPE between positive (↗) and negative (↘).

3. Check Trigger Sensitivity

a. SET:

Channel 1 VOLTS/DIV	0.1 V
Channel 2 VOLTS/DIV	1 V
AC-GND-DC (both)	DC
Vertical MODE	BOTH, NORM, and ALT
SEC/DIV	0.2 μ s

b. Set the generator to produce a three-division display at an output frequency of 5 MHz.

c. Set the CH 1 VOLTS/DIV switch to 1 V.

d. CHECK—A stable display can be obtained by adjusting the Trigger LEVEL control for each switch combination given in Table 5-5. Ensure that the TRIG'D light comes on when triggered.

Table 5-5

Switch Combinations for Triggering Checks

Trigger MODE	Trigger SLOPE
NORM	Positive ↗
NORM	Negative ↘
P-P AUTO	Positive ↗
P-P AUTO	Negative ↘

e. Move the test-signal cable from the CH 1 OR X input connector to the CH 2 OR Y input connector. Set the Vertical MODE switch to CH 2.

f. Repeat part d.

g. SET:

SEC/DIV	0.05 μ s
Horizontal MODE	MAG
Horizontal MAG	X5

h. Set the generator to produce a 50-MHz, one-division display.

i. Repeat Part d.

j. Move the test-signal cable from the CH 1 OR X input connector to the CH 2 OR Y input connector. Set the Vertical MODE switch to CH 1.

k. Repeat Part d.

l. Disconnect the test equipment from the instrument.

m. SET:

CH 1 VOLTS/DIV	20 mV
Vertical MODE	CH 1
SEC/DIV	0.2 μ s
Horizontal MODE	X1
Trigger MODE	P-P AUTO
Trigger SOURCE	EXT, EXT

n. Connect the leveled sine-wave generator output via a 50- Ω BNC termination, and a dual-input coupler to the CH 1 OR X input connector and EXT INPUT OR Z input connectors.

Adjustment Procedure—2225 Service

o. Set the generator to produce a four-division (80 mV) display at an output frequency of 5 MHz.

p. Repeat Part d.

q. SET:

CH 1 VOLT/DIV	50 mV
SEC/DIV	0.05 μ s
Horizontal MODE	MAG
Horizontal MAG	X5

r. Set the generator to produce a five-division (250 mV) display at an output frequency of 50 MHz.

s. Repeat Part d.

t. Disconnect the test equipment from the instrument.

4. Check LF P-P AUTO Trigger

a. SET:

CH 1 VOLTS/DIV	0.1 V SEC/DIV
	20 ms
Trigger MODE	P-P AUTO
Trigger SOURCE	CH 1
Trigger SLOPE	Positive (—)

b. Connect the low-frequency sine-wave generator output via a 50- Ω BNC coaxial cable and a 600- Ω BNC termination to the CH 1 OR X input connector.

c. Set the low-frequency sine-wave generator output to produce a 20-Hz, one-division display.

d. CHECK—For stable triggering in both positive (—) and negative (↘) slope. Ensure that the TRIG'D light comes on when triggered.

5. Adjust External Trigger Offset and Range

a. SET:

CH 1 VOLTS/DIV	0.5 V
CH 1 AC-GND-DC	DC
Vertical MODE	CH 1
SEC/DIV	20 μ s
Trigger MODE	P-P AUTO
Trigger SOURCE	CH 1

Trigger COUPLING

Trigger SLOPE

AC

Positive (—)

b. Connect the leveled sine-wave generator output via a 50- Ω BNC coaxial cable, a 50- Ω BNC termination, and a dual-input coupler to the CH 1 OR X and the EXT INPUT OR Z input connectors.

c. Set the leveled sine-wave generator to produce a 50-kHz, five-division display.

d. Position the waveform equally about the center horizontal graticule line.

e. SET:

Trigger MODE	NORM
Trigger SOURCE	EXT, EXT

f. ADJUST—Ext Trig Offset (R360) so that the trace is untriggered at either end of the Trigger LEVEL control.

g. Set the Trigger COUPLING switch to DC.

h. CHECK—That the display can be untriggered at either end of the Trigger LEVEL control.

i. Set the Trigger SOURCE switch to $\frac{\text{EXT}}{10}$

j. CHECK—That the display can be triggered about the midrange of the Trigger LEVEL control.

k. Set the Trigger SLOPE switch to negative (↘) and repeat Part j.

l. Disconnect the test equipment from the instrument.

6. Check Single Sweep Operation

a. SET:

CH 1 VOLTS/DIV	10 mV
CH 1 AC-GND-DC	DC
Vertical MODE	CH 1
SEC/DIV	0.5 ms
Horizontal MODE	X1
Trigger MODE	NORM
Trigger SOURCE	CH 1
Trigger COUPLING	AC
Trigger SLOPE	Positive (—)

b. Connect 50-mV standard-amplitude signal from the calibration generator via a 50- Ω BNC coaxial cable to the CH 1 OR X input connector.

c. Adjust the Trigger LEVEL control to obtain a stable display.

d. SET:

CH 1 AC-GND-DC	GND
Trigger MODE	SGL SWP

e. Press in the SGL SWP button. The READY light should turn on and remain lit.

f. Set the Channel 1 AC-GND-DC switch to DC.

NOTE

The INTENSITY control may require adjustment to observe the single-sweep trace.

g. CHECK—READY light goes out and a single sweep occurs.

h. Press the SGL SWP button several times.

i. CHECK—A single-sweep trace occurs and the READY light turns on briefly each time the SGL SWP button is pressed.

j. Disconnect the test equipment from the instrument.

EXTERNAL Z-AXIS AND PROBE ADJUST

Equipment Required (See Table 4-1):

Leveled Sine-Wave Generator (Item 2)
Screwdriver (Item 5)
50- Ω BNC Coaxial Cable (Item 8)

Dual-Input Coupler (Item 9)
50- Ω BNC Termination (Item 10)
10X Probe (Provided with instrument)

INITIAL CONTROL SETTINGS

Vertical

Channel 1 POSITION	Midrange
MODE	CH 1
CH 1 VOLTS/DIV	1 V
CH 1 VOLTS/DIV Variable	CAL detent
Magnification	X1 (CAL knob in)
Channel 1 AC-GND-DC	DC

Horizontal

POSITION	Midrange
HORIZONTAL MODE	X1
SEC/DIV	20 ms
SEC/DIV Variable	CAL detent

Trigger

SLOPE	Positive (\neg)
LEVEL	Midrange
MODE	P-P AUTO
HOLD OFF	MIN
SOURCE	VERT MODE
COUPLING	DC

termination, and a dual-input coupler to the CH 1 OR X and the EXT INPUT OR Z input connectors.

b. Set the generator to produce a five-division, 50-kHz signal.

c. CHECK—For noticeable intensity modulation. The positive part of the sine wave should be of lower intensity than the negative part.

d. Disconnect the test equipment from the instrument.

2. Check Probe Adjust Operation

a. SET:

CH 1 VOLTS/DIV	10 mV
SEC/DIV	0.5 ms
Trigger SOURCE	CH 1

b. Connect the 10X Probe to the CH 1 OR X input connector and clip the probe tip to the PROBE ADJUST terminal on the instrument front panel. If necessary, adjust the probe compensation for a flat-topped square-wave display (see Probe instruction manual).

c. CHECK—Display amplitude is 4.75 to 5.25 divisions.

d. Disconnect the probe from the instrument.

PROCEDURE STEPS

1. Check External Z-Axis Operation

a. Connect the leveled sine-wave generator output via a 50- Ω BNC coaxial cable, a 50- Ω BNC