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WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATION INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

PLEASE CHECK FOR CHANGE INFORMATION AT THE REAR OF THIS MANUAL.

067-0587-02
CALIBRATION FIXTURE
SIGNAL STANDARDIZER

SERVICE

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077

070-2427-00
Product Group 42

Serial Number _____

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INSTRUMENT SERIAL NUMBERS

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first number or letter designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B000000	Tektronix, Inc., Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Islands
200000	Tektronix United Kingdom, Ltd., London
300000	Sony/Tektronix, Japan
700000	Tektronix Holland, NV, Heerenveen, The Netherlands

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OPERATORS SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

In This Manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

As Marked on Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SYMBOLS

In This Manual


This symbol indicates where applicable cautionary or other information is to be found.

As Marked on Equipment

DANGER—High voltage.


Protective ground (earth) terminal.


ATTENTION—refer to manual.

Do Not Remove Covers or Panels

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

SERVICING SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

Refer also to the preceding Operators Safety Summary.

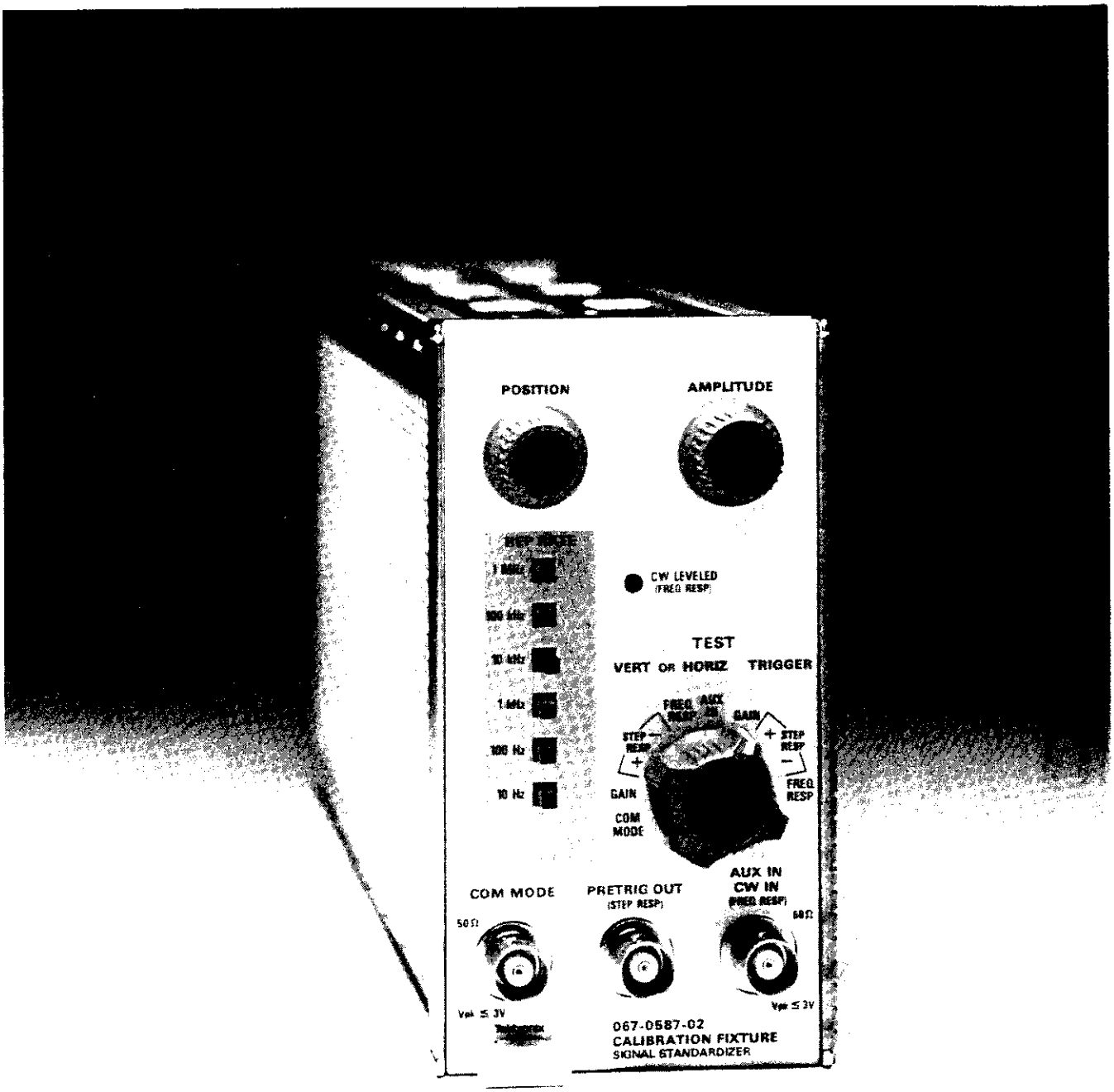
Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

Use Care When Servicing With Power On

Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.



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SIGNAL STANDARDIZER FEATURES

The Signal Standardizer is a calibration aid for all 7000-series oscilloscope mainframes. It can be used to check the gain, + and - step response, and frequency response of the display and trigger channels of the oscilloscope. It will also permit common-mode rejection checks of the display channels, and has an AUX IN feature that is useful as an aid in checking horizontal timing and linearity of the oscilloscope.

GENERAL INFORMATION

INTRODUCTION

The Instruction Manual has eight sections that provide operating and servicing information for the Signal Standardizer, 067-0587-02. Sections 1 and 2 contain information about operating the instrument, and sections 3 through 8 contain servicing information for use by qualified service personnel. Schematic diagrams are located at the rear of the manual and can be unfolded for reference while reading other parts of the manual. The reference designators and symbols used on the schematics are defined on the first page of the Diagrams and Circuit Board Illustrations section. Abbreviations used in the manual, except those in the parts lists and schematics, comply with the American National Standards Institute Y1.1-1972 publication. The parts lists are computer printouts and use computer-supplied abbreviations.

DESCRIPTION OF INSTRUMENT

The 067-0587-02 Signal Standardizer is a calibration aid for all 7000-series mainframes. It will standardize all mainframes to all 7-series plug-in units, both vertical and horizontal. Test functions permit calibration of deflection factor, transient response, and gain of trigger channels. Bandwidth measurements of mainframes alone can be made by connecting a frequency standard to the AUX IN-CW IN connector. The gain of the horizontal channel can be calibrated by applying a signal from a time-mark generator to the AUX IN-CW IN connector with the TEST selector set to AUX IN.

SPECIFICATIONS

The electrical specifications listed in Table 1-1 apply when the following conditions are met: (1) The instrument must have been adjusted in an ambient temperature between +20° and +30°C (+60° and +86°F). (2) The instrument must be operating in an ambient temperature between +20° and +30°C (+68° and +86°F) and (3) The instrument must have been operating for at least 20 minutes.

TABLE 1-1

Electrical Characteristics

Characteristic	Performance Requirement
SIGNAL SOURCES	
GAIN Staircase	
Accuracy	
6 Div (-3 to+3)	±0.3%.
8 Div (-4 to +4)	±0.5%.
Linearity	±0.2% of full range (10 div).
Position Range	±1 div minimum.
Output Impedance	50 Ω ±0.5% per side.
STEP RESPonse Generator	
AMPLITUDE Range	At least 2 to 10 div.
POSITION Range	Flat top can be positioned at least ±5 div from center screen.
Risetime (5 Div step)	150 ps max.
Aberrations (5 Div step)	2% peak.

TABLE 1-1 (CONT)
Electrical Characteristics

Characteristic	Performance Requirement
SIGNAL SOURCES (CONT)	
REP RATE	Selectable in decade steps from 10 Hz to 1 MHz (accurate to 0.1%).
Output Impedance	50 Ω per side.
FREQ RESP (CW Leveled)	
Input Impedance (CW IN)	50 Ω ±3% at dc.
Input Range (6 Div Displayed)	0.4 to 1 V p-p.
Amplitude Range	At least 4 to 10 div.
Position Range	At least ±4 div.
Flatness (6 Div Displayed)	±3% (3 MHz to 1 GHz).
Freq Sweep Rate	10 Hz max.
Output Impedance	50 Ω per side.
AUX IN	
Maximum Safe Input	±3 V pk.
Input Impedance (Aux In)	50 Ω ±3% at dc.
Sensitivity (AMPLITUDE Set to Maximum)	50 mV/div ±10%.
Bandwidth (AMPLITUDE Set to Maximum)	5.0 kHz to 1 GHz.
POSITION Range	At least ± 4 div.
COMMON MODE	
Input Impedance	50 Ω ±1%.
Input Requirement for Com Mode Test	400 mV p-p.
Output Impedance	50 Ω ±1% per side differentially.
TRIGGER OUTPUTS	
Internal	
GAIN and STEP RESP Modes	At least 250 mV differential at selected REP RATE.
FREQ RESP and AUX IN Modes	At least 50 V/div differential.
External	
PRETRIG OUT (STEP RESP)	
Impedance	50 Ω ± 5%.
Amplitude (Into 50 Ω)	0.5 V ±10%.
Lead Time	Internally variable from less than 55 ns to greater than 95 ns.
Rise Time	Less than 2.5 ns.

TABLE 1-2
Environmental Characteristics

Characteristic	Performance Requirement
Temperature	
Operating	-20° to +30° C mainframe ambient.
Storage	-55° to -75° C.

TABLE 1-3
Physical Characteristics

Characteristic	Performance Requirement
Net Weight	About 0.85 kg (1 lb 14 oz).
Dimensions	See Figure 1-1.

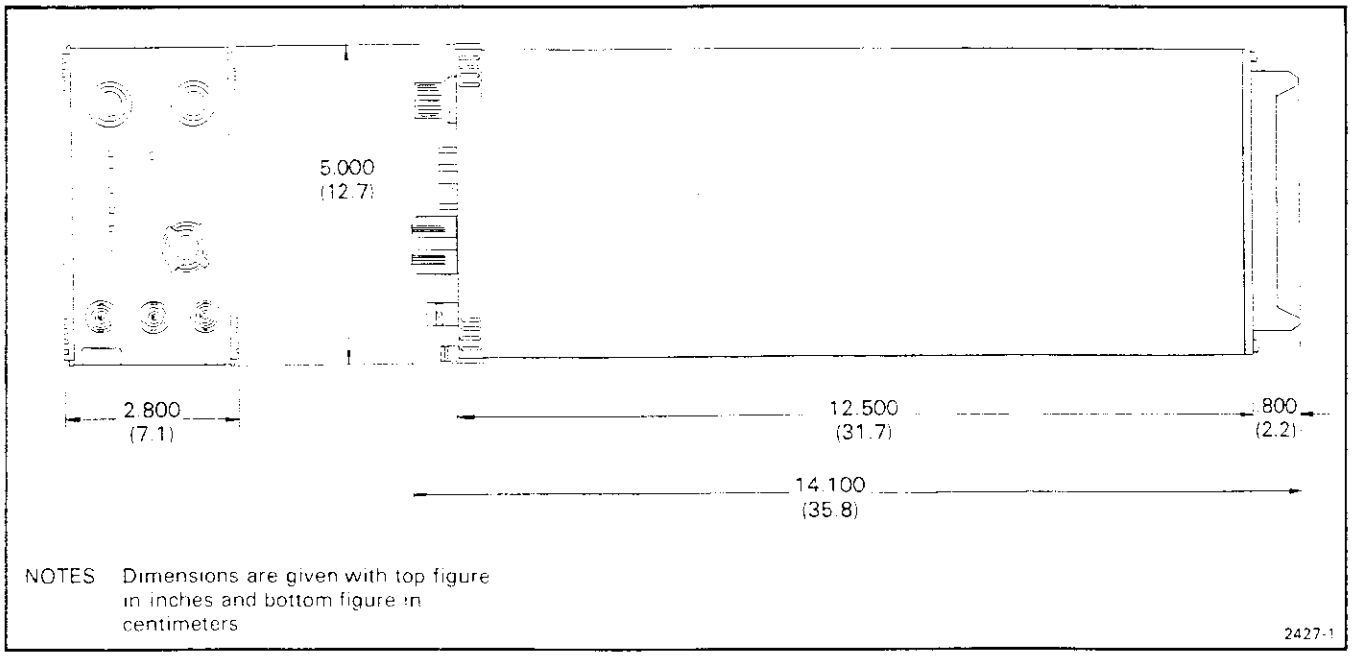

Figure 1-1. Dimensions of Signal Standardizer.

STANDARD ACCESSORIES

1 ea.....Instruction Manual

INSTRUMENT PACKAGING

If the instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing the following: Owner (with address) and the name of an individual at your firm who can describe the service required.

Save and re-use the package in which your Signal Standardizer was shipped to you. If the original packaging is unfit for use or is not available, repackage the instrument as follows:

1. Obtain a corrugated-cardboard carton with a 200 pound test strength, and having inside dimensions of no less than six inches more than the instrument dimensions; this allows for cushioning.

2. Surround the instrument with polyethylene sheeting to protect the finish.

3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the instrument, allowing three inches on all sides.

4. Seal the carton with shipping tape or with an industrial stapler.

OPERATING INSTRUCTIONS

This section describes the basic functions of the 067-0587-02 Signal Standardizer when operated in a 7000-series oscilloscope. The Signal Standardizer operates in one of the vertical or horizontal plug-in compartments of the oscilloscope. Detailed information for calibrating or testing the oscilloscope appears in its Instruction Manual.

The Signal Standardizer can be used to check the gain, + and - step response, and frequency response of the display and trigger channels of the oscilloscope. It will also permit common-mode rejection checks of the display channels, and has an AUX IN feature that is useful as an aid in checking horizontal timing and linearity of the oscilloscope.

AMBIENT TEMPERATURE CONSIDERATIONS

For specified accuracy, the Signal Standardizer should operate in mainframes where the ambient air temperature is between +20 ° and +30° C (+68 to +86° F).

The Signal Standardizer can be stored in ambient temperatures between -55° and 75° C (-67 to +167° F). After being stored at temperatures above +30° C, allow the chassis temperature to cool to within the operating limits before applying power. Operating the Signal Standardizer at ambient temperatures either above or below its specified operating limits may result in reduced accuracy.

CONTROLS AND CONNECTORS

To make full use of the capabilities of the Signal Standardizer, the operator should be familiar with the function and use of each external control and connector. Figure 2-1 shows and describes the front-panel controls, connectors, and indicator.

DETAILED OPERATING INFORMATION

TEST EQUIPMENT REQUIRED

The following test equipment was used as a basis to write the Detailed Operating Information. Other test equipment, which meets these requirements, may be substituted. When other equipment is substituted, the control settings or setup may need alteration.

1. Tektronix 7000-Series Oscilloscope

   Description: Wide-bandwidth, general-purpose oscilloscope.

   Type Used: TEKTRONIX 7704A Oscilloscope System.

2. Test Oscilloscope (Sampling)

   Description: Wide-bandwidth, general-purpose oscilloscope.

   Type Used: TEKTRONIX 7704A Oscilloscope System, with appropriate plug-in units (see below).

3. Dual-Trace Amplifier

   Description: Tektronix dual-trace plug-in amplifier unit for 7000-series oscilloscopes.

   Type Used: TEKTRONIX 7A24 Dual Trace Amplifier. (Used with Test Oscilloscope described above.)

4. Time Base for 7000-Series Oscilloscope

   Description: Horizontal time base for 7000-series oscilloscopes.

   Type Used: TEKTRONIX 7B80 Time Base.

5. Tektronix Sampling Plug-In Units

   Description: Bandwidth, dc to 4 GHz Deflection factor, 10 mV/div. Input impedance, 50 Ω. Sweep speed, 10 ps/div to 5 ms/div.

   Type Used: TEKTRONIX 7S11 Sampling Unit (2 required). TEKTRONIX S-2 Sampling Head (2 required). TEKTRONIX 7T11 Sampling Sweep Unit.

6. Sine-Wave Generator with Leveled Output

   Description: Frequency range appropriate for the oscilloscope to be tested. Output amplitude; 0.5 V to 4.0 V p-p into 50 Ω.

   Type Used: TEKTRONIX SG 504 Leveled Sine Wave Generator.

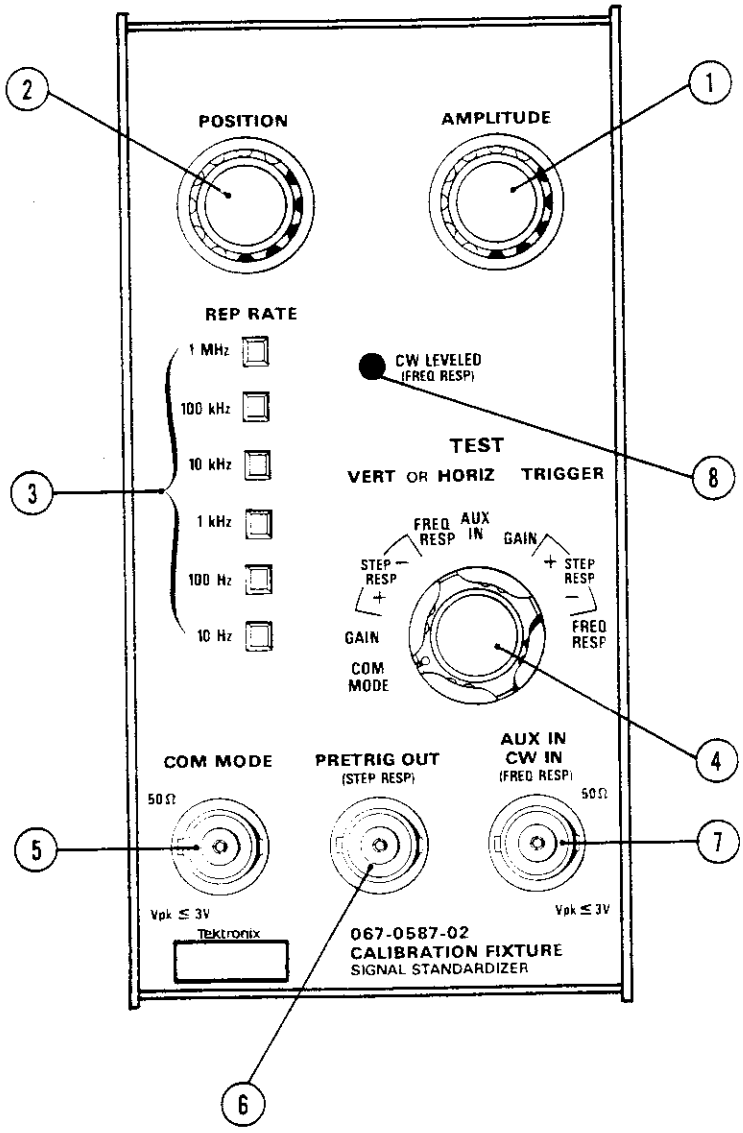

Figure 2-1. Front-panel controls, connectors, and indicator.

(1) **AMPLITUDE Control**
Adjusts amplitude of the output signal in the AUX IN, STEP RESP and FREQ RESP modes.

(2) **POSITION Control**
Positions the display vertically when placed in a vertical compartment, or horizontally when placed in a horizontal compartment.

(3) **REP RATE Pushbuttons**
Select repetition rate for STEP RESP mode and clocking rate for the GAIN staircase generator, and the trigger signal rate in + and - STEP RESP and GAIN.

(4) **TEST Selector**

VERTical OR HORIZontal (Selects a signal source for connection to pins A11 and B11 of the output connector.)

AUX IN
Selects the AUX IN—CW IN connector as signal source.

FREQ RESP
Selects the AUX IN—CW IN connector as signal source for bandwidth check. Sine-wave signal is leveled when the CW LEVELED indicator is lit.

-STEP RESP
Selects negative-going pulse from STEP RESP generator for transient-response check.

+STEP RESP
Selects positive-going pulse from STEP RESP generator for transient-response check.

GAIN
Selects staircase-waveform generator for GAIN check.

COM MODE
Selects signal from COM MODE conector for common-mode check.

TRIGGERing (Selects a signal source for connection to pins A13 and B13 of the output connector.)

GAIN
Selects staircase-waveform generator for trigger Gain check.

+STEP RESP
Selects positive-going pulse from STEP RESP generator for trigger transient-response check.

-STEP RESP
Selects negative-going pulse from STEP RESP generator for trigger transient-response check.

FREQ RESP
Selects the AUX IN—CW IN connector as signal source for trigger bandwidth check. The CW IN signal is leveled when the indicator is lit.

(5) **COM MODE Connector**
When the TEST selector is in the COM MODE position, signals applied to this connector reach the mainframe as common-mode signals.

(6) **PRETRIG OUT Connector**
The PRETRIG OUT connector furnishes a signal that precedes, by a preset lead time, the pulse used for checking step response.

(7) **AUX IN—CW IN Connector**
Input connector for signals used in checking frequency response and checking horizontal timing and linearity.

(8) **CW LEVELED Indicator**
When lit, indicates that the output of the FREQ RESP signal source is leveled.

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Figure 2-1. Front-panel controls, connectors, and indicator (continued).

7. Time-Mark Generator

Description: Provides marker outputs at 1 ns to 5 s intervals. Output impedance 50 Ω. Output amplitude at least 1 V peak into 50 Ω.

Type Used: TEKTRONIX SG 501 Time Mark Generator.

8. Plug-In Extender for Tektronix 7000-Series oscilloscopes

Description: Provides a means of accessing the oscilloscope's trigger signals.

Type Used: Tektronix Part 067-0589-00.

9. Power Module

Description: Tektronix TM 500-series power module with one or more plug-in compartments.

Type Used: TEKTRONIX TM 501 Power Module (used for the SG 504 Leveled Sine Wave Generator and the TG 501 Time Mark Generator).

10. Cables

Description: Coaxial; length, 42 inches, male bnc connectors on each end; impedance, 50 Ω.

Type Used: Tektronix Part 012-0057-01.

HOW TO CHECK THE GAIN OF A DISPLAY CHANNEL

1. Install the 067-0587-02 Signal Standardizer in a vertical or horizontal plug-in compartment of the oscilloscope.

2. Install a time base in a plug-in compartment of the opposite axis. (e.g., if you put the Signal Standardizer in a vertical plug-in compartment, put a time base in a horizontal plug-in compartment.)

3. Turn on the oscilloscope.

4. Set the TEST selector to the VERT or HORIZ GAIN position.

5. Set the time base to a fast sweep speed (e.g., 1 μs/div), auto trigger, and do not trigger the sweep. In this condition, the staircase waveform from the Signal Standardizer will appear as solid lines across the display.

6. Check the gain of the oscilloscope's deflection amplifier. There should be one line (trace) per major division of the graticule. (The deflection sensitivities of the vertical and horizontal channels of 7000-series mainframes are the same.)

The lines can also be used to check or set the vertical and horizontal linearity and geometry; the REP RATE is selectable, but the 1 kHz rate is optimum for most applications.

Using REP RATE settings higher than 1 kHz when setting gain will cause errors because the semiconductors in the mainframe amplifier cannot stabilize thermally at those rates.

HOW TO CHECK THE STEP RESPONSE OF A DISPLAY CHANNEL

1. Install the Signal Standardizer in a plug-in compartment of the oscilloscope.

2. Install a time base in a plug-in compartment of the opposite axis. (e.g., if you put the Signal Standardizer in a vertical plug-in compartment, put a time base in a horizontal plug-in compartment.)

3. Turn the oscilloscope on.

4. Set the Signal Standardizer TEST selector to the VERT or HORIZ STEP RESP position, + or - polarity. In this mode of operation, a pulser circuit in the Signal Standardizer generates a series of fast-rise pulses for checking the rise time of the selected amplifier in the mainframe.

NOTE

If the TEST selector is set to —STEP RESP and a signal is applied to the AUX IN-CW IN input connector, the CW LEVELED indicator may illuminate. This is a normal condition and can be ignored.

5. Use the AMPLITUDE control and REP RATE pushbuttons to adjust the size and repetition rate of the test pulses.

6. Observe the step response on the crt display.

HOW TO CHECK THE FREQUENCY RESPONSE OF A DISPLAY CHANNEL

1. Install the Signal Standardizer in a vertical or horizontal plug-in compartment of the oscilloscope.

2. Install a time base in a plug-in compartment of the opposite axis. (e.g., if you installed the Signal Standardizer in a horizontal plug-in compartment, put a time base in a vertical plug-in compartment.)

3. Preset the time base as follows:

Triggering Mode ..... Auto
Level ..... Fully cw or ccw
Time/Div ..... 1 μs or faster

4. Turn on the oscilloscope.

5. Preset the Signal Standardizer as follows:

TEST selector ..... VERT or HORIZ FREQ RESP
AMPLITUDE control ..... Midrange

6. Connect the output of a leveled sine-wave generator to the AUX IN connector with a 50 Ω coaxial cable.

7. Set the output frequency of the sine-wave generator to the reference frequency specified in the oscilloscope manual.

8. Vary the output level of the sine-wave generator to find the point where the CW LEVELED indicator comes on.

9. Set the AMPLITUDE control to present a 6-division display on the crt.

10. Manually advance the frequency output of the sine-wave generator to the upper limit to be checked. Watch the CW LEVELED indicator while changing the frequency.

a. If the CW LEVELED indicator goes out, increase the output of the sine-wave generator until the indicator comes on again. Then return the sine-wave generator to the reference frequency and check that the display is still 6 divisions in amplitude. Adjust the AMPLITUDE control if necessary.

NOTE

Input signals that are either too great or too small may cause the CW LEVELED indicator to go out. The useful range of inputs is 0.4 to 1.0 V, p-p.

b. Verify that the sine-wave generator frequency can be changed from the reference frequency to the upper limit with the CW LEVELED indicator staying on.

11. With the sine-wave generator at the upper frequency limit, check that the display meets the specification of the oscilloscope being tested.

TESTING COMMON-MODE REJECTION OF A DISPLAY CHANNEL

When the TEST selector is in the COM MODE position, the Signal Standardizer connects the signal from the COM MODE connector to the + and - signal output lines via 50 Ω resistors.

To test the common-mode rejection of a display channel, proceed as follows:

1. Install the Signal Standardizer in a vertical or horizontal plug-in compartment of the oscilloscope.

2. Install a time base in a plug-in compartment of the opposite axis. (e.g., if you put the Signal Standardizer in a horizontal plug-in compartment, put a time base in a vertical plug-in compartment.)

3. From a leveled sine-wave generator, apply a 400 mV p-p signal of the desired frequency to the COM MODE connector with a 50 Ω coaxial cable.

One convenient way to measure the amplitude of the input signal follows:

a. Apply sine wave to AUX IN connector.

b. Set TEST selector to VERT or HORIZ AUX IN.

c. Turn AMPLITUDE control fully cw.

d. Vary the output amplitude of the sine-wave generator to cause a display of 8 divisions amplitude (400 mV at 50 mV/div).

You can now apply the 400 mV to the COM MODE connector. Set TEST selector to COM MODE.

4. For the common-mode rejection specification of the particular oscilloscope, refer to its instruction manual.

USE OF THE AUX IN FEATURE

When the TEST Selector is in the AUX IN position, the Signal Standardizer can be used as an aid in checking horizontal timing and linearity of the oscilloscope. The Signal Standardizer should be installed in a vertical plug-in compartment, and a time base installed in a horizontal plug-in compartment of the oscilloscope. Connect a time-mark generator to the AUX IN connector.

HOW TO CHECK THE GAIN OF A TRIGGER CHANNEL

Checking the gain of a trigger channel requires a test oscilloscope to permit viewing the trigger signal. Use a plug-in extender to make the trigger signals accessible outside the oscilloscope being tested. To check the gain of a trigger channel, proceed as follows:

1. Install the Signal Standardizer in the desired vertical plug-in compartment of the oscilloscope being tested.

2. Disconnect the two bnc connectors from the jacks marked A-20 and B-20 in the plug-in extender. Be sure the two connectors do not touch the circuit board and cause short circuits.

3. Use two coaxial cables with bnc connectors to connect the A-20 and B-20 female connectors in the plug-in extender to the input connectors of the test oscilloscope. Use 50 Ω terminators only if the test oscilloscope does not have an input impedance of 50 Ω.

4. Install the plug-in extender in a horizontal plug-in compartment.

5. Turn both oscilloscopes on.

6. Set the Signal Standardizer TEST selector to TRIGGER GAIN.

7 Set the test oscilloscope as follows:

Volts/Div, CH1 and CH2 ..... 50 mV
Time/Div ..... 1 μs or any other "fast" sweep speed
Vertical Mode ..... Add

8. Invert one of the channels of the test oscillocope. The test oscilloscope should display a series of horizontal lines. There should be one line per major division.

HOW TO CHECK THE STEP RESPONSE OF A TRIGGER CHANNEL

Checking the step response of a trigger channel requires a test oscilloscope to permit viewing the trigger signal. Because of the speed of the trigger signal, a sampling oscilloscope may be required. Use a Tektronix 7000-series oscilloscope with two 7S11 Sampling Units and a 7T11 Sampling Sweep Unit, or an equivalent system, to view the trigger signal. Use a plug-in extender to make the trigger signals accessible outside the oscilloscope being tested.

To measure the step response of a trigger channel, proceed as follows:

1. Install the Signal Standardizer in the desired vertical plug-in compartment of the oscilloscope being tested.

2. Disconnect the two bnc connectors from the jacks marked A-20 and B-20 in the plug-in extender. Be sure the two plugs do not contact the circuit board and cause short circuits.

3. Use two short, equal-length coaxial cables with bnc connectors to connect the A-20 and B-20 female connectors in the plug-in extender to the S-2 Sampling Heads in the 7S11 Sampling Units (A-20 to the left 7S11). Use GR-to-bnc adapters to connect the cable to the S-2 heads. Connect the PRETRIG OUT signal from the Signal Standardizer to the Trig Input connector of the 7T11 Sampling Unit. Figure 2-2 shows the connections.

4. Install the plug-in extender in a horizontal plug-in compartment.

5. Set the Trigger Source switch on the oscilloscope being tested to select the vertical plug-in compartment that contains the Signal Standardizer.

6. Turn both oscilloscopes on.

7. Set the Signal Standardizer TEST selector to TRIGGER STEP RESP, either polarity.

NOTE

If the TEST selector is set to – STEP RESP and a signal is applied to the AUX IN-CW IN input connector, the CW LEVELED indicator may illuminate. This is a normal condition and can be ignored.

8. Set the test scope controls as follows:

Horizontal Mode ..... A
Vert Mode ..... Add

7S11s, both
mVolts/Div 50
Variable (Cal In) ..... In
Smooth ..... In
Invert ..... In on right 7S11
+ Up ..... In on left 7S11

7T11
Time Pos Rng ..... 5 μs
Time/Div ..... 1 ns
Variable (Cal In) ..... In
SEQUENTIAL ..... In
Scan ..... Fully cw
Rep ..... In
Trigger Slope ..... +
Trig Input
Ext 50 Ω 2 V Max ..... In

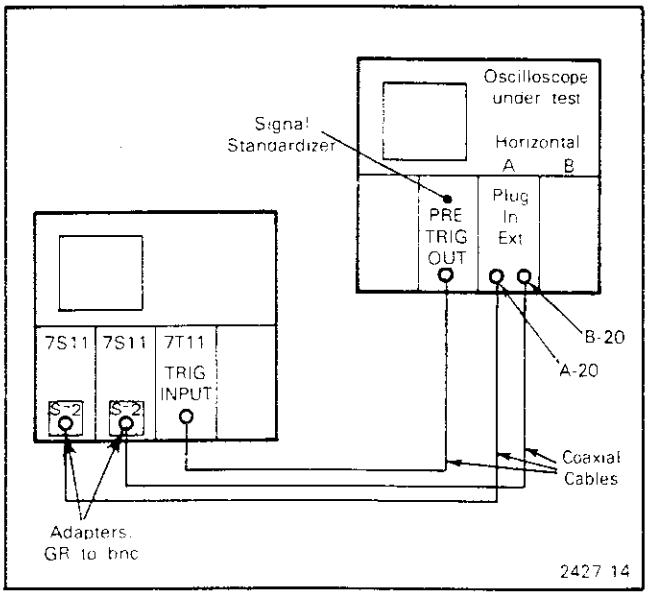

Figure 2-2. Test setup to measure step response of trigger channel.

Set the Trig Level and Stability controls on the 7T11 to present a stable display.

9. Set the REP RATE, POSITION, and AMPLITUDE controls on the Signal Standardizer to present a display of the desired speed and size, positioned in the center of the crt. Usually, the faster sweep speeds and repetition rates will provide sufficient horizontal expansion to facilitate measuring the rise time of the pulse.

10. Center the Delay control on the left 7S11.

11. Adjust the Delay control on the right 7S11 for the fastest displayed rise time.

12. Measure the rise time. Rise time is the time required for the pulse to change from its 10% to 90% amplitude point.

NOTE

Because of high-frequency losses in the coaxial cables, the rise time at the test oscilloscope may be longer than it is at the interface connector in the oscilloscope being tested.

This procedure can be repeated for all the trigger channels to be tested.

HOW TO CHECK THE FREQUENCY RESPONSE OF A TRIGGER CHANNEL

Checking the frequency response of a trigger channel requires another oscilloscope to permit viewing the test signal and its amplitude. Because of the frequencies involved, a sampling oscilloscope may be needed. Use a Tektronix 7000-series oscilloscope with two 7S11 Sampling Units and a 7T11 Sampling Sweep Unit, or an equivalent system, to view the test signal from the trigger channel. Use a leveled sine-wave generator with a frequency range adequate for the oscilloscope being tested, such as the Tektronix SG 504.

To check the frequency response of a trigger channel, proceed as follows:

1. Install the Signal Standardizer in the desired vertical plug-in compartment of the oscilloscope being tested.

2. Disconnect the two plugs from the jacks marked A-20 and B-20 on the plug-in extender. Be sure the two plugs do not contact the circuit board and cause short circuits.

3. Use two short, equal-length coaxial cables to connect the A-20 and B-20 female connectors in the plug-in extender to the S-2 Sampling Heads in the 7S11 Sampling Units. Use GR-to-bnc adapters to connect the cables to the S-2 heads.

NOTE

When using Tektronix 7S11s and a 7T11 in a four-hole oscilloscope, put the 7T11 in the left (A) horizontal plug-in compartment.

4. Install the plug-in extender in the desired horizontal plug-in compartment of the oscilloscope under test.

5. Turn both oscilloscopes on.

6. Set the Signal Standardizer TEST selector to TRIGGER FREQ RESP.

7. Connect the output of the leveled sine-wave generator to the AUX IN connector on the Signal Standardizer with a 50 Ω coaxial cable. Figure 2-3 shows the connections.

8. Set the Signal Standardizer AMPLITUDE control to mid-range.

9. If you are using a 7S11-7T11 sampling system, preset its controls as follows:

7S11s

- mVolts/Div 50
  - Variable (Cal In) ..... In
- Dot Response
  - Smooth ..... In
- + Up ..... In, on left 7S11
- Invert ..... In, on right 7S11

7T11

- Slope ..... +
- Time Pos Rng
- Time/Div ..... Set to display 5-20 cycles at the frequency being measured
- Scan ..... Fully clockwise
  - Rep ..... In
- Sequential ..... In
- Trig Input
  - Ext 50 Ω 2 V Max ..... In

Mainframe

- Vertical Mode ..... Add
- Horizontal Mode ..... A

10. Connect the Sig Out connector of the oscilloscope being tested to the Trig Input connector of the 7T11 with a 50 Ω coaxial cable. Figure 2-3 shows this connection.

(Set the Trigger Source switch, on the oscilloscope being tested, to select the vertical plug-in compartment that contains the Signal Standardizer.)

11. Set the Trig Level and Stability controls on the 7T11 to present a stable display.

12. Set the sine-wave generator to the reference frequency specified in the oscilloscope manual.

13. Change the output level of the sine-wave generator to the point where the CW LEVELED indicator comes on.

14. Set the AMPLITUDE control to provide a 6-division (300 mV at 50 mV/div) display on the test oscilloscope.

15. Manually advance the frequency output of the sine-wave generator to the upper limit to be checked. Watch the CW LEVELED indicator while changing the frequency.

a. If the CW LEVELED indicator goes out, increase the output of the sine-wave generator until the indicator comes on again. Then return the sine-wave generator to the reference frequency and check that the display on the test oscilloscope is still 6 divisions in amplitude. Adjust the AMPLITUDE control on the Signal Standardizer if necessary.

NOTE

Input signals that are either too great or too small may cause the CW LEVELED indicator to go out.

b. Verify that the sine-wave generator frequency can be changed from the reference frequency to the upper limit with the CW LEVELED indicator staying on.

16. With the sine-wave generator at the upper frequency limit, check that the display on the test scope meets the specification of the instrument under test.

NOTE

Because of high-frequency losses in the coaxial cables, the bandwidth at the test oscilloscope may be lower than it is at the interface connector in the oscilloscope being tested.

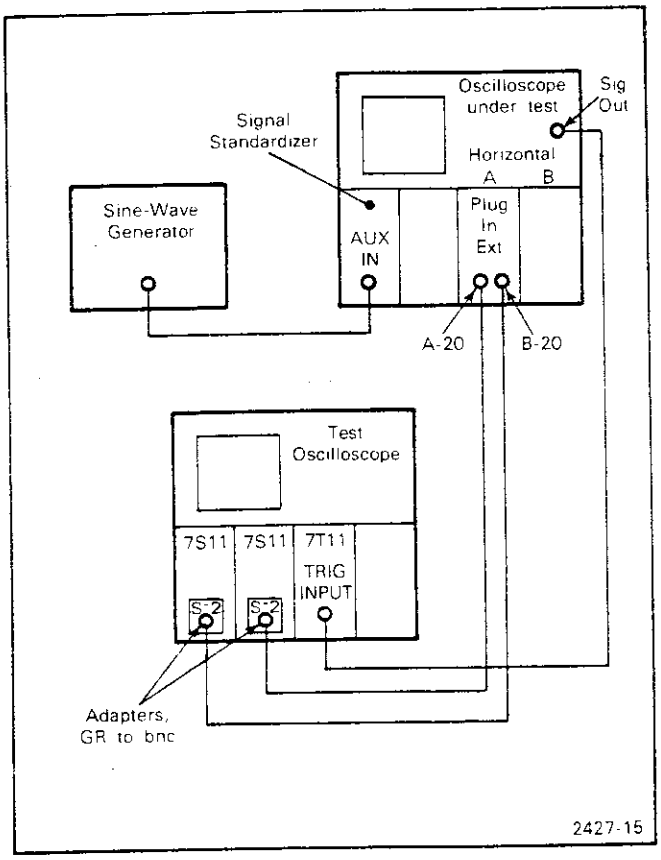

Figure 2-3. Test setup to check frequency response of trigger channel.