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Dave Miller (AA4DF) and Jill Bryant
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-Dave Miller and Jill Bryant
<http://www.aa4df.com>

TEKTRONIX®

067-0587-01

**SIGNAL STANDARDIZER
CALIBRATION FIXTURE**

INSTRUCTION MANUAL

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

070-1914-00

Serial Number _____

First Printing NOV. 1974

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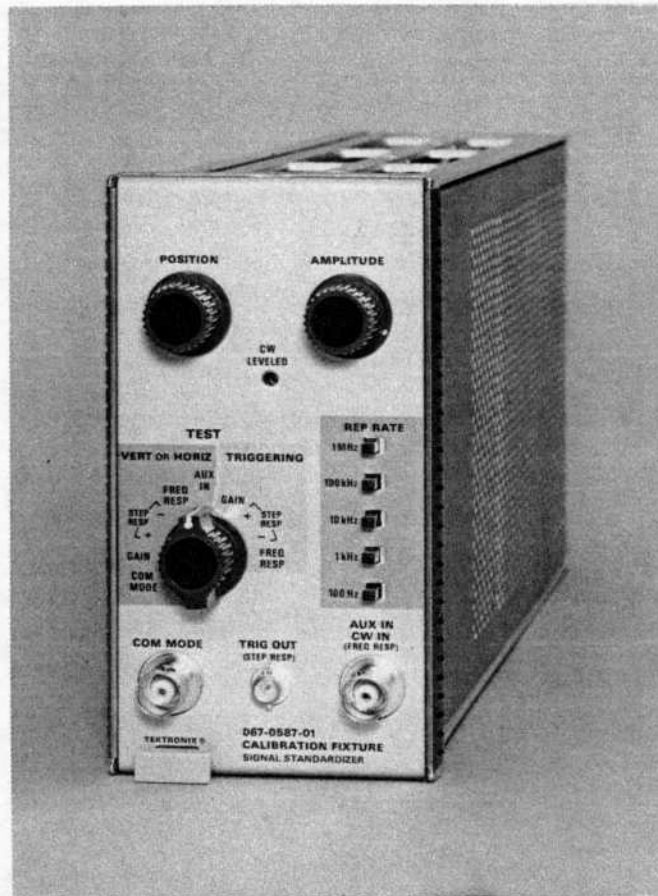
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067-0587-01 CALIBRATION FIXTURE

Signal Standardizer



The 067-0587-01 Calibration Fixture is a calibration aid for all 7000-series mainframes. The unit is designed to standardize all mainframes to all 7-series plug-in units both vertical and horizontal. Test Functions permit calibration of deflection factor, step response, DC shift of display channels, and trigger channels. Bandwidth measurements of mainframe alone can be made by applying a frequency standard to the CW IN connector. Calibration of time base units is accomplished by applying signal from time-mark generator to the AUX IN connector.

CHARACTERISTICS

Characteristics	Performance Requirement
ELECTRICAL	
VERT or HORIZ Mode	
STEP RESPONSE	
Risetime	300 ps or less into display channel
Amplitude	At least 8 div of display with AMPLITUDE control fully cw
GAIN Steps	
Accuracy	Within 0.3% with no ± 50 V, supply error
FREQUENCY RESPONSE (CW IN)	
Response	Levelled from 3 MHz to 500 MHz sinewave input
Input Impedance	$\approx 50 \Omega$
Auxiliary Input (AUX IN)	
Input Impedance	$\approx 50 \Omega$
REPETITION RATE	
Accuracy	Within 20% of rate selected
TRIGGERING Mode	
STEP PRSPONSE	
Risetime	300 ps or less into trigger channel
Amplitude	At least 8 div of display with AMPLITUDE control fully cw
GAIN Steps	
Accuracy	Within 0.3%

ELECTRICAL (cont)

FREQUENCY RESPONSE (CW IN)

Response

Leveled 3 MHz to 500 MHz sine-wave input

Input Impedance

$\approx 50 \Omega$

REPETITION RATE

Accuracy

within 20% of rate selected

MECHANICAL

Characteristics	Requirement	Supplemental Information
Overall Dimensions		
Height	≈ 5 inches	
Width	≈ 2-5/8 inches	
Depth	≈ 14-1/8 inches	
Weight	≈ 1 pound	

ENVIRONMENTAL

Characteristics	Requirement	Supplemental Information
Temperature		
Operating Range		Calibrated at 20°C 30°C
Warmup Time	5 minutes at 25°C	

FRONT PANEL CONTROLS AND CONNECTORS

AMPLITUDE

Adjusts amplitude of signal applied to AUX IN and CW IN connector as well as the amplitude of the VERT or HORZ Step Response and TRIGGERING Step Response.

POSITION Control

Positions display vertically or horizontally.

CW LEVELED Indicator

When lit, indicates that a constant amplitude signal is applied to the signal out or trigger out while in FREQ RESP mode.

TEST Switch

VERT OR HORIZ

AUX IN

Displays signal applied to AUX IN connector.

FREQ RESP

Displays signal applied to CW IN connector.

- STEP RESP

Displays negative-going step.

+ STEP RESP

Displays positive-going step.

GAIN

Applies staircase waveform to signal channel.

COM MODE

Applies the signal from the COM MODE connector to both the + signal out and - signal out.

TRIGGERING

GAIN

Applies staircase waveform to trigger channel.

+ STEP RESP

Applies a positive-going step to trigger channel.

FRONT PANEL CONTROLS AND CONNECTORS (cont)

-STEP RESP

Applies a negative-going step to trigger channel.

FREQ RESP

Applies signal from CW IN connector to trigger channel.

REP RATE

Selects repetition rate for VERT or HORZ and TRIGGERING Step Response, also selects the repetition rate for the staircase waveform produced in the GAIN position.

TRIG OUT Connector

Provides a trigger signal that is matched to the VERT or HORZ and TRIGGERING Step Response.

OPERATING INSTRUCTIONS

The following procedure describes the basic functions of the Signal Standardizer when operated in a 7000-Series Oscilloscope. Detailed information for calibrating or testing the oscilloscope is described in the Instruction Manual supplied with the Instrument.

The Signal Standardizer is installed in one of the vertical or horizontal compartments of the oscilloscope. To measure the step response of the display channel or trigger channel, the TEST switch is set at the appropriate STEP RESP position, + or - polarity. In this mode of operation, a pulser circuit contained within the Signal Standardizer provides a series of fast-rise pulses for checking the risetime of the selected compartment. An AMPLITUDE control adjusts the display size and pushbuttons select the REP RATE desired.

When the TEST switch is in one of the GAIN positions, the Signal Standardizer generates a series of amplitude steps for checking the gain of the display channels or trigger channel. At slow sweep speeds, with the time-base triggering set to free-run, the gain steps appear as solid lines across the screen. The position of these lines, in relationship to the graticule lines, is used to denote the gain. The lines are also used to check or set either vertical or horizontal linearity and geometry. The REP RATE of the gain-step signal can be selected, however the fastest rate is used for most applications.

The FREQ RESP positions of the TEST switch are used to measure the frequency response of the display channels or trigger channel. In this mode of operation, external sinewaves are applied at the CW IN connector.

An internal amplifier limits the CW IN signal to provide a constant amplitude output. This circuit is operating properly when the CW LEVELED indicator is lit.

To check frequency response procede as follows:

1. Rotate AMPLITUDE control fully clockwise.
2. Connect a sinewave generator to the CW IN connector and set it to the reference frequency specified in the oscilloscope mainframe manual.
3. Set TEST switch to FREQ RESP and adjust sinewave generator for a CRT display of approximately 10 divisions (approximately 0.5 V, P-P)
4. Rotate the AMPLITUDE control counterclockwise to obtain the desired display amplitude. The CW LEVELED indicator should be lit.
5. Proceed with frequency response check. If CW LEVELED indicator goes off, increase amplitude of the sinewave generator until light just comes on.

The AUX IN position of the TEST switch is used to check horizontal timing and linearity of the oscilloscope. The Signal Standardizer is installed in a vertical compartment, and a time-base unit installed in a horizontal compartment, of the oscilloscope. A Time-Mark Generator such as a Tektronix Type 184 or 2901 is connected to the AUX IN connector.

The COM MODE switch position connects the signal applied to the COM MODE connector to the + signal and - signal lines through 50 Ω resistors.

CIRCUIT DESCRIPTION

Clock Generator

The clock generator consists of an astable multivibrator, two buffers and switchable timing capacitors. The frequency of the multivibrator, Q134 and Q140, is selected by switching one of five emitter coupled timing capacitors into the circuit. This is done by the REP RATE switch, S150.

External TRIG OUT is coupled directly from the multivibrator to the front panel connector.

Buffer Q118 provides a clock signal to the Trigger Amplifier and Staircase Generator

The output of buffer Q122 passes thru a differentiating circuit consisting of R124 and C125. The output of the differentiator is used as a trigger for the Pulse Generator.

Trigger Amplifier

The Trigger Amplifier provides the oscilloscope mainframe with a triggering signal which in turn is used in the horizontal time base amplifier. The circuit consists of the Clock Generator signal and two transistor switches, Q164 and Q170. A positive transition at the base of Q164 causes a negative transition at the collector of Q164 and a positive transition at the collector of Q170. The switching level of Q170 and Q164 is controlled by R176. R176, therefore, is effectively a delaying control which is used to match the trigger output signal with the fast rise pulse from the Pulse Generator.

Pulse Generator

The pulse generator consists of a number of current switches that are controlled by the tunnel diode CR280. A positive pulse from the Clock Generator causes CR280 to turn on. This causes Q282 to turn on shutting Q292 off. This turns the complementary transistor switches Q296 and Q298 on which reverse biases the disconnect diodes CR300, CR301, CR305 and CR306. The complementary transistor switches Q310 and Q312, turn off the disconnect diodes CR318, CR320, CR323, and CR325 therefore, removing the minus voltage from R326 and the positive voltage from R321. The amplitude of this voltage is set by the AMPLITUDE control. R314 is a balance control used mainly to correct for tracking errors in the AMPLITUDE control.

Pulse Generator (cont)

R314 is normally adjusted to obtain equal amplitude plus and minus output pulses (with each pulse set to approximately 2.5 div). A negative going pulse from the Clock Generator turns the tunnel diode off again returning the transistor switches to their original states. C319 and C324 are both adjusted to obtain a square front corner on the rising portion of the output pulse.

Stair Case Generator

The Stair Case Generator consists of a series of logic switched current generators, decoding logic, and a sequencing generator.

Sequencing Generator

The Sequencing Generator is a Binary Coded decimal decoder (U185) driven by a 4 bit counter, V180. A continuous train of pulses is supplied from the Clock Generator to the input of U180. These pulses allow the counter to cycle through a count of 0 to 15 at a rate determined by the REP RATE switch setting. The BCD 4 line output of U180 is connected to the input of the 4 line to 16 line decoder, U185. The logic levels of the 16 output lines are therefore sequenced in order from 0 to 15.

Decoding Logic

Ten of the sixteen output lines are connected to the decoding logic circuitry, U190A,B and U195A,B,C,D. The decoding logic provides logic levels for switching a pair of current generators or several pairs of current generators. Six of the sixteen output lines are not connected to provide spaces between the positive going staircase and negative going staircase.

Logic Switched Current Generator

There are basically two types of logic switched current generators used in this instrument. These are the positive current generator and negative current generator. An example of a positive current generator is CR200, CR202, CR204, R201 and R203. By applying a logical low to CR200, CR202 will be forward biased and CR204 will be reversed biased, therefore turning the current generator off. By applying a logical high to CR200, CR202 will be clamped off allowing current to flow through CR204. The amount of current is limited by precision resistor R203.

Logic Switched Current Generator (cont)

An example of a negative current generator is U200E, CR266, CR268, CR270 and R296. A logical low applied to U200E causes CR266 and CR268 to turn on forcing CR270 off which effectively turns the current generator off. A logical high into U200E causes the cathode of CR266 to drop thus clamping CR268 off which in turn allows current to flow through CR270. With the TEST switch in the GAIN position, the current generators are connected to the oscilloscope's trigger or signal input. These inputs have an input resistance of 50 ohms to ground, therefore, the voltage produced across the 50 ohm resistor is directly related to the current through it.

CW Leveled

The single ended signal applied to the AUX IN, CW IN connector is connected to a high frequency push-pull amplifier U30. Minimum gain is set by R31. R31 is set so that a 10 division input signal will produce approximately a 2 division display when the AMPLITUDE control is fully counterclockwise.

The signal from U30 is connected through T60 to the differential amplifier Q64 and Q74. The output of this amplifier is connected to the TEST switch to await mode selection. The relative DC level (position) of this signal is controlled by the voltage dividers formed by R335A, and R335B.

In the FREQ RESP mode the gain of U30 is controlled by the automatic leveling circuit. CR80, C81, CR84 and C83 form a peak to peak detector giving a DC representation of the output signal amplitude. The output of the peak to peak detector is connected to a comparator amplifier, U94, through the balanced to single ended converter, U90. A DC level corresponding to the desired signal output is set at the input of the comparator amplifier by the Amplitude Control, R330B. The resultant output of the comparator amplifier is connected to U30 to control the gain. This output is also connected to the leveling light circuit Q98 and Q102. R25 provides DC balance and is adjusted for minimum trace shift while varying the input signal from approximately 0.3 volts peak to peak to approximately 0.7 volts peak to peak (CW LEVELED light should be lit).

Trigger Pickoff

Triggering for the mainframe is provided by the differential amplifier, Q42 and Q52. The relative DC level position of the trigger signal is controlled by the voltage dividers R335A and R335B.

CHECK-OUT AND
CALIBRATION PROCEDURE

Introduction

This procedure is intended to be used as a basic operational check for the Tektronix 067-0587-01 Calibration Fixture.

The test equipment required for this procedure would normally be found on a test bench where this instrument would be used.

Preliminary Instructions

Insert the 067-0587-01 into a vertical compartment of a Tektronix 7000-series oscilloscope that is known to be working properly.

Insert a 7B-series time-base plug-in into a horizontal compartment and set the time-base for 0.2 microsecond/division, autotriggered.

Set the oscilloscope to display the outputs of the 067-0587-01 and the time-base plug-in.

Common Mode

1. Connect a 3 to 5 MHz. signal¹ to the AUX IN, CW IN connector and set the TEST switch to AUX IN.
2. Set the AMPLITUDE control fully clockwise and adjust the signal-generator amplitude for eight divisions of display amplitude (approximately 400 millivolts, peak-to-peak).

¹Any sine-wave generator capable of producing a 300 to 500 millivolt variable signal output 3 to 5 MHz. is suitable for use with this procedure.

3. Remove the signal from the AUX IN connector and connect it to the COM MODE connector.
4. Set the TEST switch to COM MODE.
5. Check for less than 0.4 division of display amplitude.
6. Remove the signal from the COM MODE connector.

Gain

1. Set the REP RATE switch to 1 MHz.
2. Set the TEST switch to GAIN.
3. Check that nine lines are displayed on the crt, approximately one division apart.

Step Response

1. Set the TEST switch to + STEP RESP.
2. Set the AMPLITUDE control fully counterclockwise.
3. Position the trace to the center of the graticule line with the POSITION control.
4. Set the AMPLITUDE control for three divisions of display amplitude.
5. Set the TEST switch to - STEP RESP and check for approximately three divisions of display amplitude.
6. Set the POSITION control to position the bottom of the display to the bottom graticule line.
7. Check that at least eight divisions of display amplitude can be obtained with the AMPLITUDE control.

8. Check that the frequency, as selected by the REP RATE switch, is within 20%.

9. Connect a cable (or X1 probe) from the TRIG OUT connector to the time-base Ext Trig In connector.

10. Set the time-base triggering to Ext Source.

11. Check that the time-base can be triggered from the TRIG OUT signal.

12. Set the time-base triggering to Int Source.

13. Remove the cable from the TRIG OUT connector.

Frequency Response

1. Connect a 3 to 5 MHz. signal to the AUX IN, CW IN connector.

2. Set the AMPLITUDE control fully clockwise and adjust the signal-generator amplitude for 10 divisions of display amplitude (approximately 500 millivolts, peak-to-peak).

3. Set the AMPLITUDE control for eight divisions of display amplitude and check that the CW LEVELED light is on.

4. Set the AMPLITUDE control for five divisions of display amplitude and check that the CW LEVELED light is on.

Auxiliary Input

1. Set the TEST switch to AUX IN.

2. With the signal still applied to the AUX IN, CW IN connector, check that approximately eight divisions of display amplitude can be obtained with the AMPLITUDE control fully clockwise.

Triggering

1. Set the time-base triggering for Norm Mode.

2. With the signal still applied to the AUX IN, CW IN connector, check that the time-base can be triggered (trace displayed on the crt) in all TRIGGERING positions of the TEST switch.

Remove the signal connection from the 067-0587-01.

EQUIPMENT REQUIRED

1. Calibration Oscilloscope (Tektronix 7704A or equivalent)
2. Time-Base Plug-in (Tektronix 7B70 or equivalent)
3. Dual trace General Purpose and Synchronized Sampling System consisting of: 7S12, TDR/Sampler; 7S11, Sampling Unit; S-2, Sampling Heads; S-53, Trigger Recognizer; S-54, Pulse Generator.
4. Constant Amplitude Signal Generator (Tektronix 067-0650-00)
5. DVM. resolution to 10 μ V (Darcy 440 or equivalent)
6. Flexible Plug-in Extender (Tektronix 067-0616-00)
7. Signal Pickoff Device (Tektronix 067-0655-00)
8. Three Tektronix to GR Adapters (Tektronix 017-0093-00) Note: two of these are supplied with the Signal Pickoff.
9. Tektronix Cable (Tektronix 175-1401-00)
10. Precision 50 Ω Terminators, feedthrough 0.1% (Tektronix 067-0515-00)

PRELIMINARY SETUP

Signal Standardizer Plug-in

POSITION control	Midrange
AMPLITUDE control	Midrange
REP RATE pushbuttons	1 MHz
TEST switch	VERT or HORIZ --
	+ Step Response

Insert the Signal Standardizer Plug-in into the Right Vertical Compartment and the Time Base Plug-in into the B HORIZ compartment of the Calibration Oscilloscope. Adjust all controls for a triggered, centered, well defined display. Set the AMPLITUDE control to obtain a 5 division display.

PROCEDURE

1. REP RATE -- Check

a. Check that the frequency of the displayed waveform is 1 megahertz ± 200 kilogertz (period of $1\mu\text{S} \pm 0.2\mu\text{S}$).

b. Check that the frequency of all REP RATE switch positions are within the tolerances listed below.

TABLE 1

REP RATE	TOLERANCE
1 MHz	± 200 kHz ($1\mu\text{S} \pm 2\mu\text{S}$)
100 kHz	± 20 kHz ($10\mu\text{S} \pm 2\mu\text{S}$)
10 kHz	± 2 kHz ($100\mu\text{S} \pm 20\mu\text{S}$)
1 kHz	± 200 Hz ($1\text{ms} \pm 200\mu\text{S}$)
100 hZ	± 20 Hz ($10\text{ms} \pm 2\text{ms}$)

c. Return REP RATE switch to 1 MHz.

2. Amplitude DC Balance

a. Place the Signal Standardizer on the Flexible Extender and remove the plug-in right side cover.

b. Set the Signal Standardizer VERT or HORIZ switch to AUX IN.

c. Adjust R25 for minimum trace shift while rotating the AMPLITUDE control throughout its range.

3. Gain Accuracy (Check)

Theory: The 067-0587-01 gain circuitry uses precision dividers to develop the desired voltages across the oscilloscope mainframe $50\ \Omega$ resistor. By substituting precision $50\ \Omega$ resistors and by stepping through

the individual gain ranges, these voltages can be measured accurately. These precision dividers are, however, entirely dependent upon the +50 volt and -50 volt power supplies generated by the oscilloscope mainframe. Errors in these power supplies must, therefore, be taken into account before arriving at a final answer. The following formula is used to correct the reading obtained in Step 9. For power supply errors:

$$\text{Corrected Reading} = \text{Reading} - \frac{\text{Range} \times (\text{E} + \text{ps} + \text{E} - \text{ps})}{200}$$

Where: Range is the staircase step being checked (50 mV, 100 mV.....)
 E+ps is the error of the + 50 volt power supply stated in per cent,
 E-ps is the error of the - 50 volts power supply stated in per cent.

Example: A reading of +100.35 mV is obtained on the 100 mV range. A +0.4% error is noted for the +50 volt supply and a -0.1% error is noted for the -50 volt supply. The corrected reading would be:

$$100.35 \text{ mV} - \frac{100 \text{ mV} (+0.4 - 0.1)}{200} = 100.35 \text{ mV} - 0.15 \text{ mV} = 100.20 \text{ mV}$$

Procedure

- a. Plug the signal pickoff device into the Signal Standardizer. Place the Signal Pickoff/Signal Standardizer on the Flexible Extender.
- b. Set the Signal Standardizer VERT or HORIZ switch to GAIN.
- c. Measure and calculate the % error of the +50 volt power supply and -50 volt power supply. Record these errors for future use. A convenient point to place the DVM probe for measuring the +50 volt power supply is on a pin A-19 of the plug-in rear connector. The -50 volt supply is located at the pin B-19.

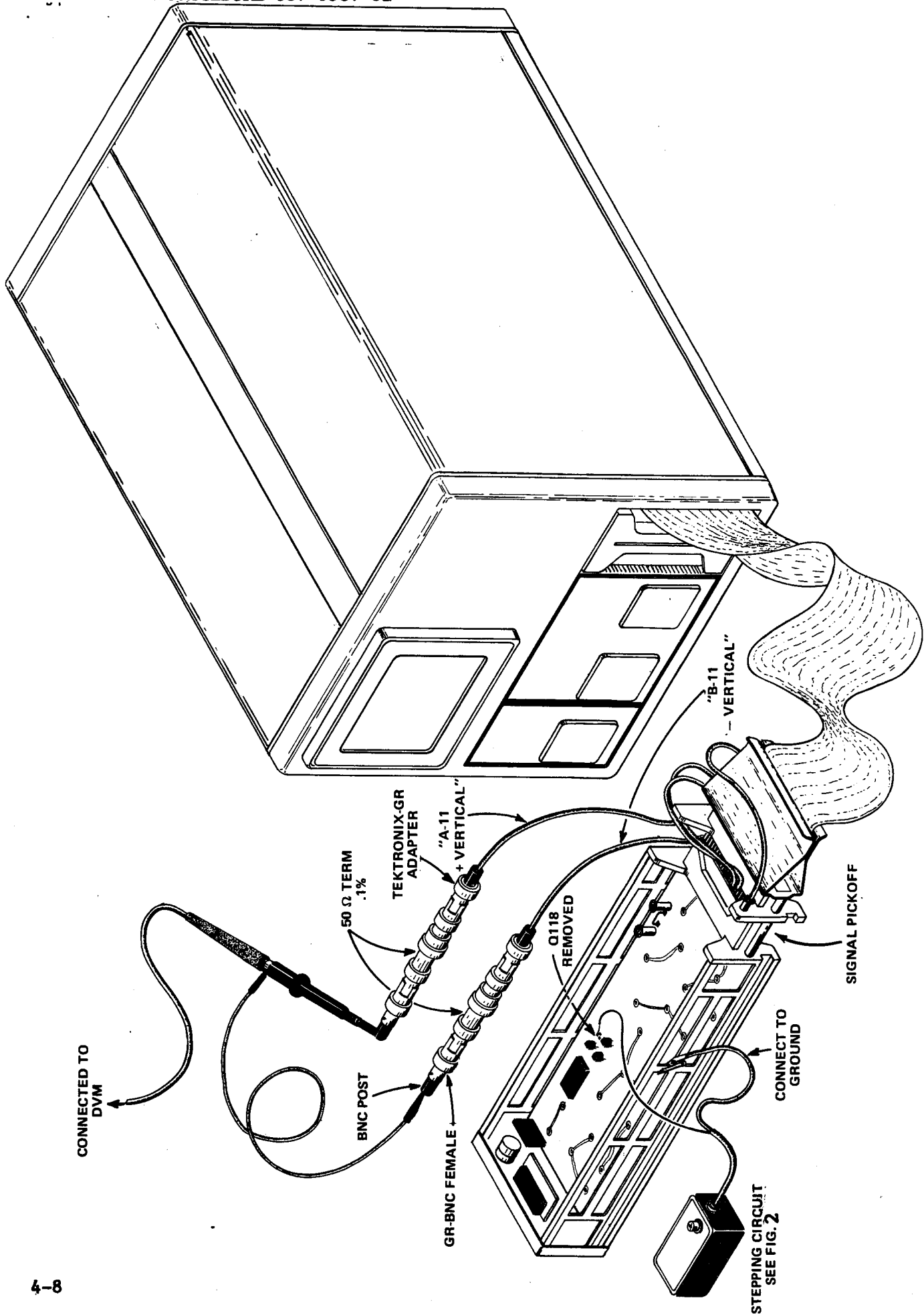


Fig. 1. Primary set-up for checking gain.

d. Connect the Precision 50 Ω Terminators to the "A-11 VERTICAL" and "B-11 VERTICAL" lines of the Signal Pickoff device using Tektronix to GR adapters. Connect the free end of the "A-11 +VERTICAL" Precision 50 Ω Terminator to the +DVM input using GR to BNC adapters and BNC to post adapter. Connect the free end of the "B-11 VERTICAL" Precision 50 Ω Terminator to the -DVM input in the same manner. Refer to Fig. 1 for setup information.

e. Remove transistor Q118 and connect the Stepper Circuit shown in Fig. 2 between the collector pin of Q118 socket and ground. This allows the gain staircase to be stepped manually.

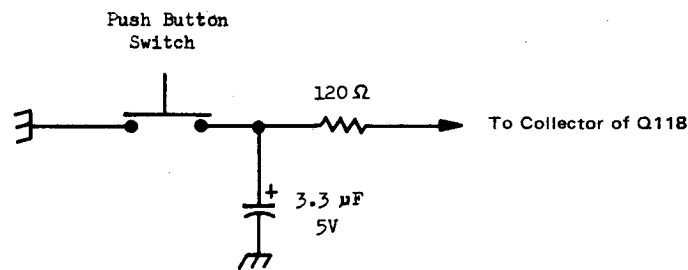


Fig. 2 Stepper Circuit

f. Mechanically center the Signal Standardizer control. Press and release the Stepping Circuit switch and note that the DVM reading changes. Continue tapping the switch until a DVM reading of approximately 0.00 mV is obtained. Adjust the POSITION control for a DVM reading of 0.00 mV + ± 0.05 mV.

g. Tap the Stepping Circuit switch until the 50 mV range is obtained. Record the DVM reading and correct it for power supply errors. Check that the corrected reading is within 0.3% of the range.

h. Repeat step g for the 100 mV, 150 mV, 200 mV, 250 mV, -50 mV, -100 mV, -150 mV, -200 mV, and -250 mV ranges.

1. Remove the Stepping Circuit and replace transistor Q118. Remove the Precision 50 Ω Terminators from the Signal Pickoff device.

Preliminary Setup for Sampling.

a. Remove the Time Base Plug-in and move the Flexible Extender to the Oscilloscope B horizontal compartment.

b. Insert the 7S12 and 7S11 sampling equipment into the oscilloscope Left and Right vertical and A horizontal compartments. Insert the two (2) S-2 sampling heads into the 7S11 and the vertical section of the 7S12. Insert the S-54 pulse generator head into the pulse generator section of the 7S12. Set the controls as follows:

Control Settings

	7S11	
+UP/INVERT		INVERT
Sensitivity		50 mV
VARIABLE		CAL-IN
DCT RESPONSE		SMOOTH
	7S12	
Sensitivity		50 mV
VARIABLE		CAL-IN
PRESET		Off
HIGH RESOLUTION		Off
SCAN		REP, set control as desired
TIME/DIV		X.1 0.1 ns

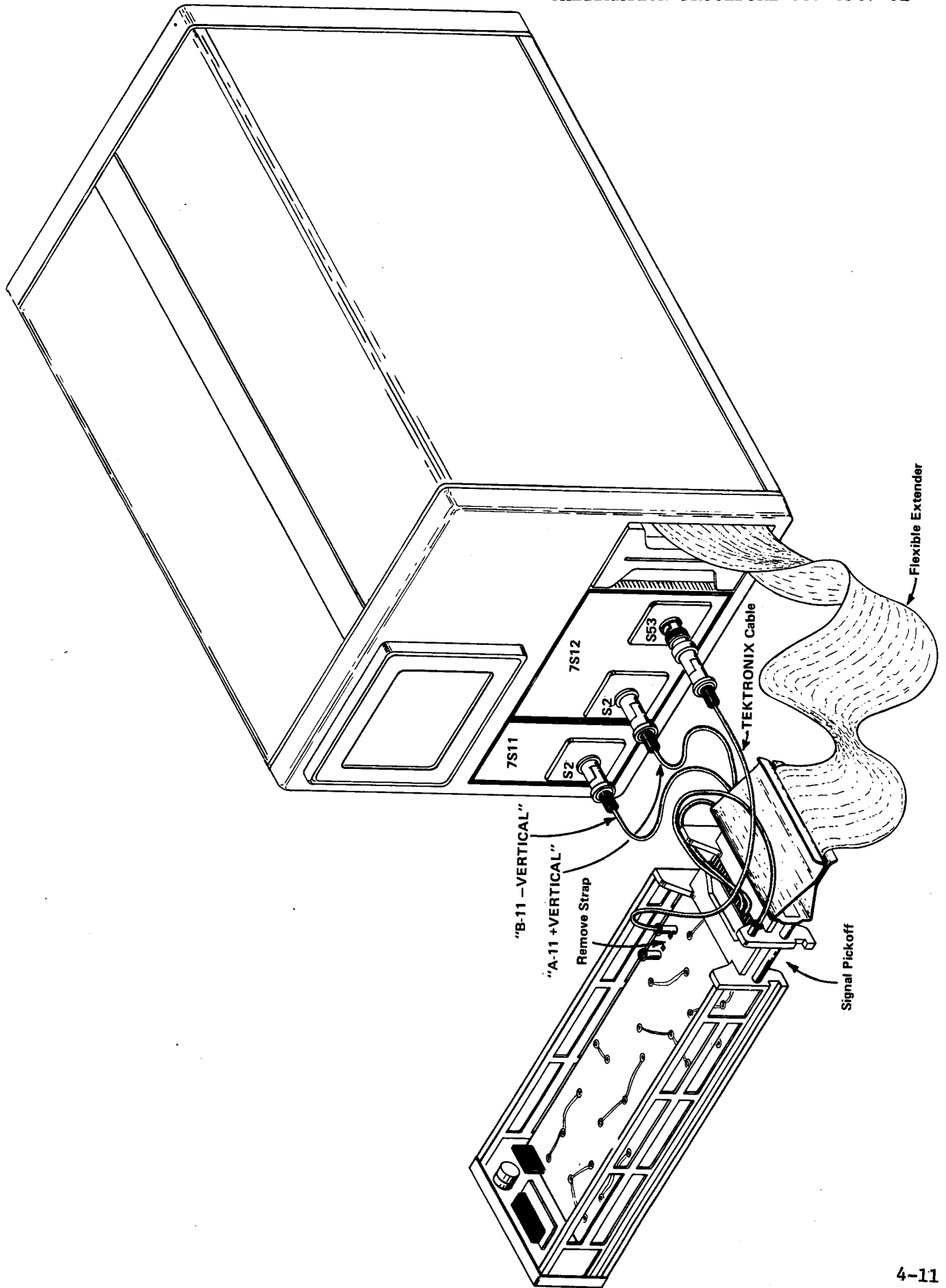


Fig. 3. Preliminary set-up for Sampling

Oscilloscope

Vertical Mode	Chop
Horizontal Mode	A
A Trigger Source	Vert Mode

c. Connect the signal Pickoff "A-11 VERTICAL" cable to the 7S12/S-2 Sampling Head via a Tektronix to GR adapter. Connect the "B-11 -VERTICAL" cable to the 7S11/S-2 sampling head via a Tektronix to GR adapter. Terminate the Signal Pickoff trigger cables with the internal 50 Ω Terminators.

d. Remove the shorting strap located between the two (2) empty connectors on the Signal Standardizer plug-in. See Fig. 3 for exact location. Connect a Tektronix cable between the connector closest to the rear of the plug-in and the S-54 Pulse Generator output using a Tektronix to GR adapter and a GR to BNC adapter. Refer to Fig. 3 for setup.

4. Step Response

a. Set all controls as given in Preliminary set-up for Sampling, page 4-8. Set the Signal Standardizer VERT or HORIZ switch to + Step.

Step Response + Amplitude Balance

b. Set the sampling system Time-Distance control to display the positive going portion of the right vertical display.

c. Adjust the Signal Standardizer AMPLITUDE control to display a 2.5 division step.

d. Align the rising portions of both traces by using the 7S11 Delay control.

e. Set the sampling system Time/Div to 0.5 ns.

f. Adjust R314 for equal amplitude pulses.

g. Set the sampling sweep to 0.1 ns/div. Set the oscilloscope Vertical Mode to Add.

h. Adjust C319 and C324 for best square front corner.

NOTE

C319 and C324 should be set for approximately equal capacitance. The physical position of R321 and R326 may also effect this adjustment.

i. Check that the risetime of the displayed pulses is 300 ps or less.

j. Set the Signal Standardizer VERT or HORIZ switch to - STEP and check that the display inverts and that the risetime is 300 ps or less.

5. Trigger Occurrence Time

a. Remove the Tektronix cable (connected between the S54 Pulse Generator head and the Signal Standardizer). Replace the shorting strap that was removed in step d of the Preliminary Setup for Sampling.

b. Replace the S-54 Pulse Generator head with the S-53 Trigger recognizer head. This converts the system from a synchronized sampling system to an externally triggered sampling system.

c. Move the Signal Pickoff "B-11 VERTICAL" cable from the 7S11/S52 sampling head to the S-53 Trigger Recognizer head.

d. Set the Oscilloscope Vertical Mode to Right. Set the sampling Time/Division to X1 and 1 ns.

e. Use the Trigger, Stability, Time-Distance, and Position controls to horizontally and vertically center the rising portion of the pulse to the graticule center.

f. Without moving any controls, replace the Signal Pickoff "A-11 VERTICAL" cable with the "A-13 TRIGGER" cable. Terminate the "A-11 VERTICAL" cable with the Signal Pickoff terminator.

g. Vertically center the display by using the sampling system Offset control.

h. Horizontally center the display by adjusting R176.

i. Disconnect all cables from the sampling system.

6. Amplitude Range and CW Leveled

a. Connect the Signal Pickoff "A-11 VERTICAL" cable to the 7S12/S-2 head. Connect the "B-11 VERTICAL" cable to the 7S11/S-2 head. Connect the "A-13 TRIGGER" cable to the S-53 Trigger Recognizer head.

b. Set the oscilloscope Vertical Mode to Add.

c. Set the sampling sweep to 10 ns/div. Set the Signal Standardizer VERT or HORIZ switch to FREQ RESP.

d. Set the Constant amplitude Signal Generator range to 0.5 volts and the frequency to 70 MHz. Connect the output to the Signal Standardizer CW IN connector through a 2X attenuator.

e. Set the Signal Standardizer AMPLITUDE control fully clockwise.

f. Obtain an 8 division display by adjusting the Constant Amplitude Signal Generator variable amplitude control. Then, position the top of the display down one division from the top of the graticule and increase the amplitude of the Constant Amplitude Signal Generator to bring the top of the graticule. This represents a 10 division display.

g. Set the Signal Standardizer AMPLITUDE control to obtain a 4-division display.

h. Adjust R31 to just turn CW LEVELED light on. If CW LEVELED light doesn't go off, mechanically center R31 and check that the light remains on while rotating the AMPLITUDE control to obtain from four (4) to eight (8) divisions.

CW Leveled Check

i. Set the Signal Standardizer AMPLITUDE control to obtain a 6-division display.

j. Increase the Constant Amplitude Signal Generator amplitude to 1 volt p-p. Check that the display maintains approximately 6 divisions and that the CW LEVELED light remains on.

k. Increase the Constant Amplitude Signal Generator to 3 volts p-p. Check that the display is distorted and the CW LEVELED light extinguishes.

7. Frequency Response Check

a. Set the constant amplitude generator to 0.5 volts and adjust the Signal Standardizer AMPLITUDE control to obtain a 6-division display.

b. Set the sampling sweep unit to 2 ns/division.

c. Check that the display amplitude remains within 5.82 divisions to 6.18 divisions (+3%) while varying the frequency of the constant amplitude signal generator from 70 MHz to 500 MHz.

d. Remove all cables and test equipment.

This completes the calibration procedure for the 067-0587-01 Signal Standardizer.

ELECTRICAL PARTS LIST

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description
BULBS				
DS102	150-0048-00			Incandescent, #683
DS150	150-0048-01			Incandescent, aged & selected
RESISTORS				
R330	311-0948-00			3 x 1 k Ω , Var
R335	311-0389-00			2 x 10 k Ω , Var
SWITCH				
S150 ¹	670-1178-01			Push button--REP RATE
ASSEMBLY				
	670-1930-00	B010100	B039999	PULSER Circuit Board Assembly
	670-1930-02	B040000		PULSER Circuit Board Assembly
CAPACITORS				
C4 ²				
C6 ²				
C44	281-0618-00			4.7 pF, Cer, 200 V, ± 0.5 pF
C51	281-0618-00			4.7 pF, Cer, 200 V, ± 0.5 pF
C71	283-0069-00	B010100	B040734	15 pF, Cer, 50 V, 20%
C71	283-0260-00	B040735		5.6 pF, Cer, 200 V, 5%, (nom value), sel
C76	283-0253-00			.01 μ F, Cer, 50 V, 10%
C79	283-0523-00			.01 μ F, Cer, 50 V, 10%
C81	283-0523-00			.01 μ F, Cer, 50 V, 10%
C83	283-0523-00			.01 μ F, Cer, 50 V, 10%
C86	283-0523-00			.01 μ F, Cer, 50 V, 10%
C87	283-0348-00	XB040000		0.5 pF, Cer, 100 V, ± 0.1 pF
C90	281-0651-00			47 pF, Cer, 200 V, 5%
C94	283-0051-01			0.0033 μ F, Cer, 100 V, 5%
C125	283-0213-00			300 pF, Cer, 100 V, 5%
C150	290-0616-00			10 μ F, Elect., 20 V, 10%
C152	285-0576-00			1 μ F, PTM, 100 V, 10%
C154	285-0703-00			0.1 μ F, Cer, 100 V, 5%
C156	285-0598-00			0.01 μ F, PTM, 100 V, 5%
C158	281-0633-00			910 pF, Cer, 500 V, 5%
C283	283-0213-00			300 pF, Cer, 100 V, 5%
C286	281-0612-00			5.6 pF, Cer, 200 V, ± 0.5 %

¹For replacement parts see Mechanical Parts List.²Furnished as a unit with the pulser board.

ELECTRICAL PARTS LIST 067-0587-01

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description
CAPACITORS (cont)				
C289	283-0213-00			300 pF, Cer, 100 V, 5%
C290	283-0003-00			0.01 μ F, Cer, 150 V, +80%-20%
C293	283-0213-00			300 pF, Cer, 100 V, 5%
C300	283-0213-00			300 pF, Cer, 100 V, 5%
C305	283-0213-00			300 pF, Cer, 100 V, 5%
C315	281-0661-00			0.8 pF, Cer, 500 V, 0.1 pF
C316	281-0627-00			1 pF, Cer, 600 V
C319	281-0064-00			0.25-1.5 pF, Var, Tubular
C324	281-0064-00			0.25-1.5 pF, Var, Tubular
C362	283-0178-00			0.1 μ F, Cer, 100 V, +80%-20%
C364	283-0178-00			0.1 μ F, Cer, 100 V, +80%-20%
C367	283-0110-00			0.005 μ F, Cer, 150 V
C368	283-0178-00			0.1 μ F, Cer, 100 V, +80%-20%
C370	283-0178-00			0.1 μ F, Cer, 100 V, +80%-20%
C371	283-0178-00			0.1 μ F, Cer, 100 V, +80%-20%
C372	290-0527-00			15 μ F, Elect., 20 V, +20%
C376	283-0178-00			0.1 μ F, Cer, 100 V, +80%-20%
C378	283-0178-00			0.1 μ F, Cer, 100 V, +80%-20%
DIODES				
CR35	152-0141-02	XB050000		Silicon, replaceable by 1N4152
CR75	152-0442-01			Schottky Barrier, matched pair
CR77	152-0141-02			Silicon, replaceable by 1N4152
CR78	152-0141-02			Silicon, replaceable by 1N4152
CR79	152-0141-02			Silicon, replaceable by 1N4152
CR80	152-0442-01			Silicon, replaceable by 1N4152
CR84	152-0442-01			Silicon, replaceable by 1N4152
CR85	152-0442-01			Silicon, replaceable by 1N4152
CR96	152-0141-02			Silicon, replaceable by 1N4152
CR99	152-0141-02			Silicon, replaceable by 1N4152
CR100	152-0141-02			Silicon, replaceable by 1N4152
CR200	152-0141-02			Silicon, replaceable by 1N4152
CR202	152-0141-02			Silicon, replaceable by 1N4152
CR204	152-0141-02			Silicon, replaceable by 1N4152
CR206	152-0141-02			Silicon, replaceable by 1N4152
CR208	152-0141-02			Silicon, replaceable by 1N4152
CR210	152-0141-02			Silicon, replaceable by 1N4152
CR212	152-0141-02			Silicon, replaceable by 1N4152
CR214	152-0141-02			Silicon, replaceable by 1N4152
CR216	152-0141-02			Silicon, replaceable by 1N4152
CR218	152-0141-02			Silicon, replaceable by 1N4152

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description
DIODES (cont)				
CR220	152-0141-02			Silicon, replaceable by 1N4152
CR222	152-0141-02			Silicon, replaceable by 1N4152
CR224	152-0141-02			Silicon, replaceable by 1N4152
CR226	152-0141-02			Silicon, replaceable by 1N4152
CR228	152-0141-02			Silicon, replaceable by 1N4152
CR230	152-0141-02			Silicon, replaceable by 1N4152
CR232	152-0141-02			Silicon, replaceable by 1N4152
CR234	152-0141-02			Silicon, replaceable by 1N4152
CR236	152-0141-02			Silicon, replaceable by 1N4152
CR238	152-0141-02			Silicon, replaceable by 1N4152
CR240	152-0141-02			Silicon, replaceable by 1N4152
CR242	152-0141-02			Silicon, replaceable by 1N4152
CR244	152-0141-02			Silicon, replaceable by 1N4152
CR246	152-0141-02			Silicon, replaceable by 1N4152
CR248	152-0141-02			Silicon, replaceable by 1N4152
CR250	152-0141-02			Silicon, replaceable by 1N4152
CR252	152-0141-02			Silicon, replaceable by 1N4152
CR254	152-0141-02			Silicon, replaceable by 1N4152
CR256	152-0141-02			Silicon, replaceable by 1N4152
CR258	152-0141-02			Silicon, replaceable by 1N4152
CR260	152-0141-02			Silicon, replaceable by 1N4152
CR262	152-0141-02			Silicon, replaceable by 1N4152
CR264	152-0141-02			Silicon, replaceable by 1N4152
CR266	152-0141-02			Silicon, replaceable by 1N4152
CR268	152-0141-02			Silicon, replaceable by 1N4152
CR270	152-0141-02			Silicon, replaceable by 1N4152
CR280	152-0177-00			Tunnel, 10 mA, 4 pF, replaceable by GESMTD708
CR300	152-0442-01			Schottky Barrier, selected & matched
CR301	152-0442-00			Schottky Barrier, matched pair
CR305	152-0442-01			Schottky Barrier, selected & matched
CR306	152-0442-00			Schottky Barrier, matched pair
CR318	152-0442-00			Schottky Barrier, matched pair
CR320	152-0442-00			Schottky Barrier, matched pair
CR323	152-0442-00			Schottky Barrier, matched pair
CR325	152-0442-00			Schottky Barrier, matched pair
VR96	152-0217-00			Zener, selected from 1N756A, 8.2 V, 0.4 W, 5%
VR133	152-0195-00			Zener, selected from 1N751A, 5.1 V, 0.4 W, 5%

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Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description
DIODES (cont)				
VR135	152-0195-00			Zener, selected from 1N751A, 5.1 V, 0.4 W, 5%
VR145	152-0243-00			Zener, replaceable by 1N965B, 15 V, 0.4 W, 5%
VR147	152-0243-00			Zener, replaceable by 1N965B, 15 V, 0.4 W, 5%
VR283	152-0395-00			Zener, replaceable by 1N749A, 3 V, 0.4 W, 5%
VR293	152-0278-00			Zener, replaceable by 1N4372A, 3 V, 0.4 W, 5%
CONNECTORS				
J1	131-0818-00			Connector, receptacle, electrical, BNC, female
J110	131-0282-00			Connector, receptacle, coaxial
J340	131-0818-00			Connector, receptacle, electrical, BNC, female
INDUCTORS				
L87	108-0733-00		XB040000	130 NH (nominal value), selected
L146	276-0507-00			Core ferramic suppressor
L149	276-0507-00			Core ferramic suppressor
L159	276-0507-00			Core ferramic suppressor
L320	108-0724-00			12.6 μ H
L322	108-0723-00			1.07 μ H
L372	108-0395-00			64 μ H
LR362	108-0183-00			1.4 μ H (wound on a 43 Ω , 1/2 W, 5% resistor)
LR364	108-0183-00			1.4 μ H (wound on a 43 Ω , 1/2 W, 5% resistor)
LR368	108-0183-00			1.4 μ H (wound on a 43 Ω , 1/2 W, 5% resistor)
LR370	108-0183-00			1.4 μ H (wound on a 43 Ω , 1/2 W, 5% resistor)
LR376	108-0183-00			1.4 μ H (wound on a 43 Ω , 1/2 W, 5% resistor)
LR378	108-0183-00			1.4 μ H (wound on a 43 Ω , 1/2 W, 5% resistor)
TRANSISTORS				
Q42	151-0362-00			Silicon, PNP, replaceable by SMT1105
Q52	151-0362-00			Silicon, PNP, replaceable by SMT1105
Q64	151-0362-00			Silicon, PNP, replaceable by SMT1105
Q74	151-0362-00			Silicon, PNP, replaceable by SMT1105
Q98	151-0190-01			Silicon, NPN, replaceable by 2N3904 or TE3904
Q102	151-0190-01			Silicon, NPN, replaceable by 2N3904 or TE3904

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description
TRANSISTORS (cont)				
Q118	151-0223-00			Silicon, NPN, replaceable by 2N4275
Q122	151-0223-00			Silicon, NPN, replaceable by 2N4275
Q134	151-0223-00			Silicon, NPN, replaceable by 2N4275
Q140	151-0223-00			Silicon, NPN, replaceable by 2N4275
Q164	151-0325-00			Silicon, PNP, replaceable by 2N4258
Q170	151-0325-00			Silicon, PNP, replaceable by 2N4258
Q282	151-0293-00			Silicon, NPN, replaceable by MMT3960A
Q292	151-0293-00			Silicon, NPN, replaceable by MMT3960A
Q296	151-0362-00			Silicon, PNP, replaceable by SMT1105
Q298	151-0293-00			Silicon, NPN, replaceable by MMT3960A
Q310	151-0293-00			Silicon, NPN, replaceable by MMT3960A
Q312	151-0362-00			Silicon, PNP, replaceable by SMT1105
RESISTORS				
R2	321-0097-00			100 Ω , 1/8 W, 1%
R9	321-0097-00			100 Ω , 1/8 W, 1%
R15	315-0221-00			220 Ω , 1/4 W, 5%
R16	315-0181-00			180 Ω , 1/4 W, 5%
R17	315-0103-00			10 k Ω , 1/4 W, 5%
R19	321-0191-00			953 Ω , 1/8 W, 1%
R20	317-0101-00			100 Ω , 1/8 W, 5%
R21	321-0191-00			953 Ω , 1/8 W, 1%
R23	315-0472-00			4.7 k Ω , 1/4 W, 5%
R25	311-1228-00			10 k Ω , Var
R26	315-0103-00			10 k Ω , 1/4 W, 5%
R31	311-1228-00			10 k Ω , Var
R32	315-0103-00			10 k Ω , 1/4 W, 5%
R35	315-0202-00			2 k Ω , 1/4 W, 5%
R39	317-0101-00			100 Ω , 1/8 W, 5%
R41	321-0212-00			1.58 k Ω , 1/8 W, 1%
R42	321-0070-00			52.3 Ω , 1/8 W, 1%
R44	317-0151-00			150 Ω , 1/8 W, 5%
R46	321-0193-00			1 k Ω , 1/8 W, 1%
R48	315-0510-00			51 Ω , 1/4 W, 5%
R49	321-0193-00			1 k Ω , 1/8 W, 1%
R51	317-0151-00			150 Ω , 1/8 W, 5%
R54	321-0212-00			1.58 k Ω , 1/8 W, 1%
R55	321-0070-00			52.3 Ω , 1/8 W, 1%
R57	315-0152-00			1.5 k Ω , 1/4 W, 5%
R59	315-0152-00			1.5 k Ω , 1/4 W, 5%

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Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	No. Disc	Description
RESISTORS (cont)				
R60	315-0510-00			51 Ω , 1/4 W, 5%
R62	315-0510-00			51 Ω , 1/4 W, 5%
R64	321-0212-00			1.58 k Ω , 1/8 W, 1%
R65	321-0068-00			59.9 Ω , 1/8 W, 1%
R67	317-0160-00			16 Ω , 1/8 W, 5%
R68	321-0163-00			487 Ω , 1/8 W, 1%
R69	317-0160-00			16 Ω , 1/8 W, 5%
R71	317-0180-00	B010100	B040734	18 Ω , 1/8 W, 5%
R71	317-0300-00	B040735		18 Ω , 1/8 W, 5%, (nom value), sel
R73	321-0212-00			1.58 k Ω , 1/8 W, 1%
R74	321-0068-00			49.9 Ω , 1/8 W, 1%
R76	321-0139-00	B010100	B039999	274 Ω , 1/8 W, 1%
R76	321-0122-00	B040000		182 Ω , 1/8 W, 1%
R78	312-0397-00			133 k Ω , 1/8 W, 1%
R82	315-0153-00			15 k Ω , 1/4 W, 5%
R83	315-0512-00			5.1 k Ω , 1/4 W, 5%
R86	321-0139-00	B010100	B039999	274 Ω , 1/8 W, 1%
R86	321-0122-00	B040000		182 Ω , 1/8 W, 1%
R87	317-0302-00	XB040000		3k Ω , 1/8 W, 5%
R88	312-0417-00			215 k Ω , 1/8 W, 1%
R90	315-0154-00	B010100	B039999	150 k Ω , 1/4 W, 5%
R90	315-0104-00	B040000		100 k Ω , 1/4 W, 5%
R93	315-0222-00			2.2 k Ω , 1/8 W, 5%
R96	315-0202-00			2 k Ω , 1/4 W, 5%
R98	315-0472-00			4.7 k Ω , 1/4 W, 5%
R99	315-0202-00			2 k Ω , 1/4 W, 5%
R104	312-0068-00			49.9 Ω , 1/8 W, 1%
R105	315-0202-00			2 k Ω , 1/4 W, 5%
R108	321-0068-00			49.9 Ω , 1/8 W, 1%
R109	315-0202-00			2 k Ω , 1/4 W, 5%
R112	315-0510-00			51 Ω , 1/4 W, 5%
R113	315-0102-00			1 k Ω , 1/4 W, 5%
R114	315-0510-00			51 Ω , 1/4 W, 5%
R116	315-0101-00			100 Ω , 1/4 W, 5%
R120	315-0152-00			1.5 k Ω , 1/4 W, 5%
R123	315-0511-00			510 Ω , 1/4 W, 5%
R124	315-0151-00			150 Ω , 1/4 W, 5%
R126	315-0101-00			100 Ω , 1/4 W, 5%
R128	315-0102-00			1 k Ω , 1/4 W, 5%
R129	315-0510-00			51 Ω , 1/4 W, 5%
R130	315-0101-00			100 Ω , 1/4 W, 5%
R132	315-0161-00			160 Ω , 1/4 W, 5%
R137	315-0101-00			100 Ω , 1/4 W, 5%
R139	315-0161-00			160 Ω , 1/4 W, 5%
R142	315-0223-00			22 k Ω , 1/4 W, 5%

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	No. Disc	Description
RESISTORS (cont)				
R144	315-0223-00			22 k Ω , 1/4 W, 5%
R148	301-0682-00			6.8 k Ω , 1/2 W, 5%
R158	301-0682-00			6.8 Ω , 1/2 W, 5%
R161	315-0751-00			750 Ω , 1/4 W, 5%
R163	315-0391-00			390 Ω , 1/4 W, 5%
R165	315-0752-00			7.5 k Ω , 1/4 W, 5%
R166	315-0510-00			51 Ω , 1/4 W, 5%
R168	315-0220-00			22 Ω , 1/4 W, 5%
R169	315-0123-00			12 k Ω , 1/4 W, 5%
R170	315-0220-00			22 Ω , 1/4 W, 5%
R172	315-0752-00			7.5 k Ω , 1/4 W, 5%
R173	315-0510-00			51 Ω , 1/4 W, 5%
R175	315-0391-00			390 Ω , 1/4 W, 5%
R176	311-1225-00			1 k Ω , Var
R177	315-0332-00			3.3 k Ω , 1/4 W, 5%
R201	315-0473-00			47 k Ω , 1/4 W, 5%
R203	321-0963-07			98.73 k Ω , 1/8 W, 1/10%
R207	315-0333-00			33 k Ω , 1/4 W, 5%
R209	321-0964-07			49.31 k Ω , 1/8 W, 1/10%
R213	315-0183-00			18 k Ω , 1/4 W, 5%
R215	321-0965-07			24.61 k Ω , 1/8 W, 1/10%
R219	315-0154-00			150 k Ω , 1/4 W, 5%
R221	321-0965-07			24.61 k Ω , 1/8 W, 1/10%
R225	315-0154-00			150 k Ω , 1/4 W, 5%
R227	321-0964-07			49.31 k Ω , 1/8 W, 1/10%
R231	315-0154-00			150 k Ω , 1/4 W, 5%
R233	321-0963-07			98.73 k Ω , 1/8 W, 1/10%
R237	315-0473-00			47 k Ω , 1/4 W, 5%
R239	321-0963-07			98.73 k Ω , 1/8 W, 1/10%
R243	315-0333-00			33 k Ω , 1/4 W, 5%
R245	321-0964-07			49.31 k Ω , 1/8 W, 1/10%
R249	315-0183-00			18 k Ω , 1/4 W, 5%
R251	321-0965-07			24.61 Ω , 1/8 W, 1/10%
R255	315-0154-00			150 k Ω , 1/8 W, 5%
R257	321-0965-07			24.61 k Ω , 1/8 W, 1/10%
R261	315-0154-00			150 k Ω , 1/4 W, 5%
R263	321-0964-07			49.31 k Ω , 1/8 W, 1/10%
R267	315-0154-00			150 k Ω , 1/4 W, 5%
R269	321-0963-07			98.73 k Ω , 1/8 W, 1%
R276	315-0683-00			68 k Ω , 1/4 W, 5%

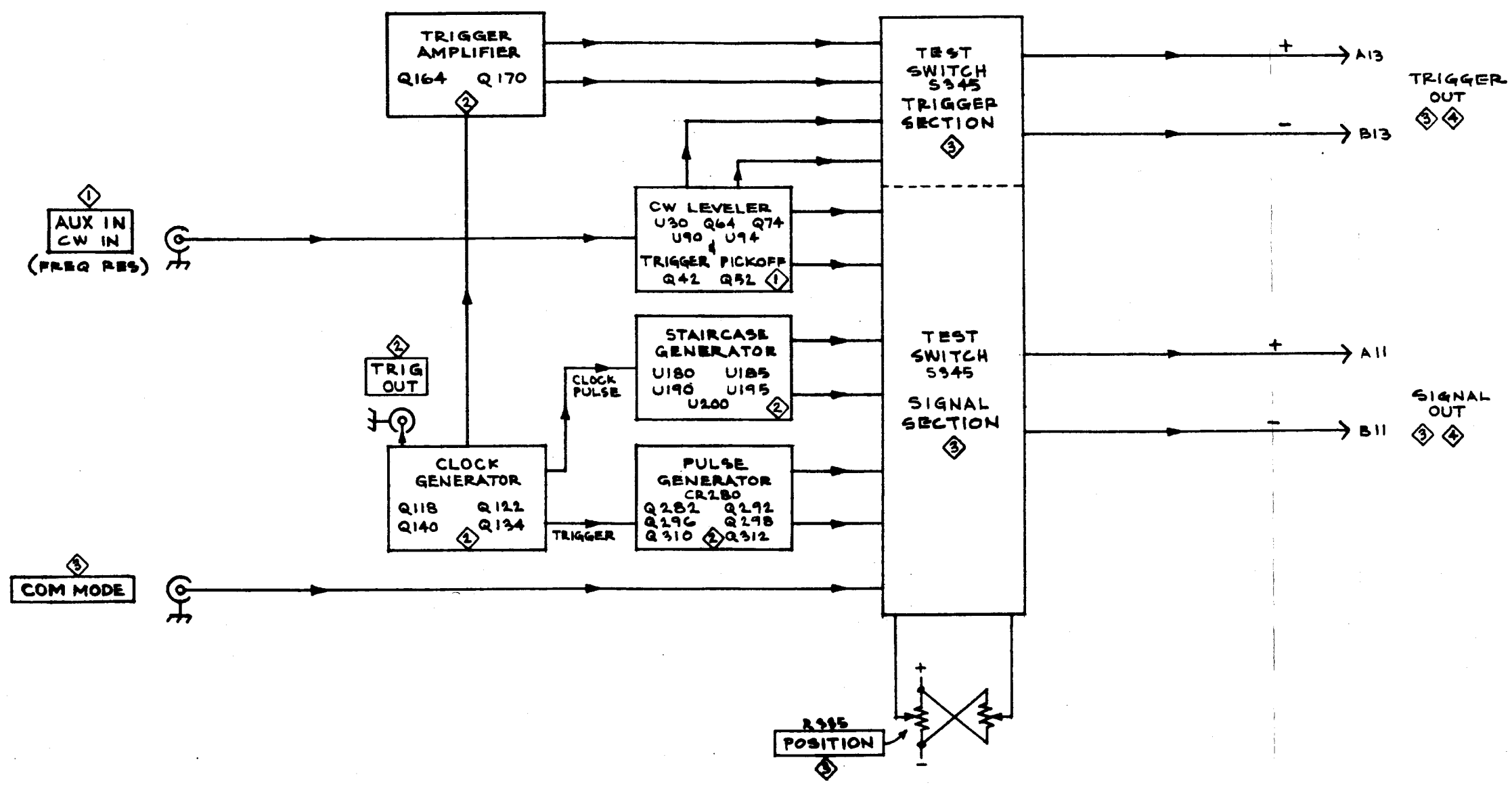
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Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description
RESISTORS (cont)				
R278	315-0683-00			68 k Ω , 1/4 W, 5%
R280	321-0231-00			2.49 k Ω , 1/8 W, 1%
R282	317-0101-00			100 Ω , 1/8 W, 5%
R284	315-0182-00			1.8 k Ω , 1/4 W, 5%
R286	317-0510-00			51 Ω , 1/8 W, 5%
R287	322-0193-09			1 k Ω , 1/4 W, 1%
R288	317-0153-00			15 k Ω , 1/8 W, 5%
R289	317-0431-00			430 Ω , 1/8 W, 5%
R290	322-0145-00			316 Ω , 1/4 W, 1%
R292	317-0101-00			100 Ω , 1/8 W, 5%
R294	315-0182-00			1.8 k Ω , 1/4 W, 5%
R296	301-0821-00			820 Ω , 1/2 W, 5%
R299	301-0821-00			820 Ω , 1/2 W, 5%
R300	317-0101-00			100 Ω , 1/8 W, 5%
R302	301-0821-00			820 Ω , 1/2 W, 5%
R303	315-0131-00			130 Ω , 1/4 W, 5%
R305	317-0101-00			100 Ω , 1/8 W, 5%
R307	315-0131-00			130 Ω , 1/4 W, 5%
R308	301-0821-00			820 Ω , 1/2 W, 5%
R310	301-0132-00			1.3 k Ω , 1/2 W, 5%
R313	301-0821-00			820 Ω , 1/2 W, 5%
R314	311-1225-00			1 k Ω , Var
R319	317-0510-00			51 Ω , 1/4 W, 5%
R320	317-0751-00			750 Ω , 1/8 W, 5%
R321	321-1068-01			50.5 Ω , 1/8 W, 1/2%
R322	317-0301-00			300 Ω , 1/8 W, 5%
R324	317-0510-00			51 Ω , 1/8 W, 5%
R325	317-0751-00			750 Ω , 1/8 W, 5%
R326	321-1068-01			50.5 Ω , 1/8 W, 5%
R327	317-0301-00			300 Ω , 1/8 W, 5%
R328	315-0162-00			1.6 k Ω , 1/4 W, 5%
R329	315-0162-00			1.6 k Ω , 1/4 W, 5%
R343	321-0771-03			50 Ω , 1/8 W, 1/4%
R344	321-0771-03			50 Ω , 1/8 W, 1/4%
R361	301-0510-00			51 Ω , 1/2 W, 5%
R366	315-0470-00			47 Ω , 1/4 W, 5%
R374	301-0510-00			51 Ω , 1/2 W, 5%

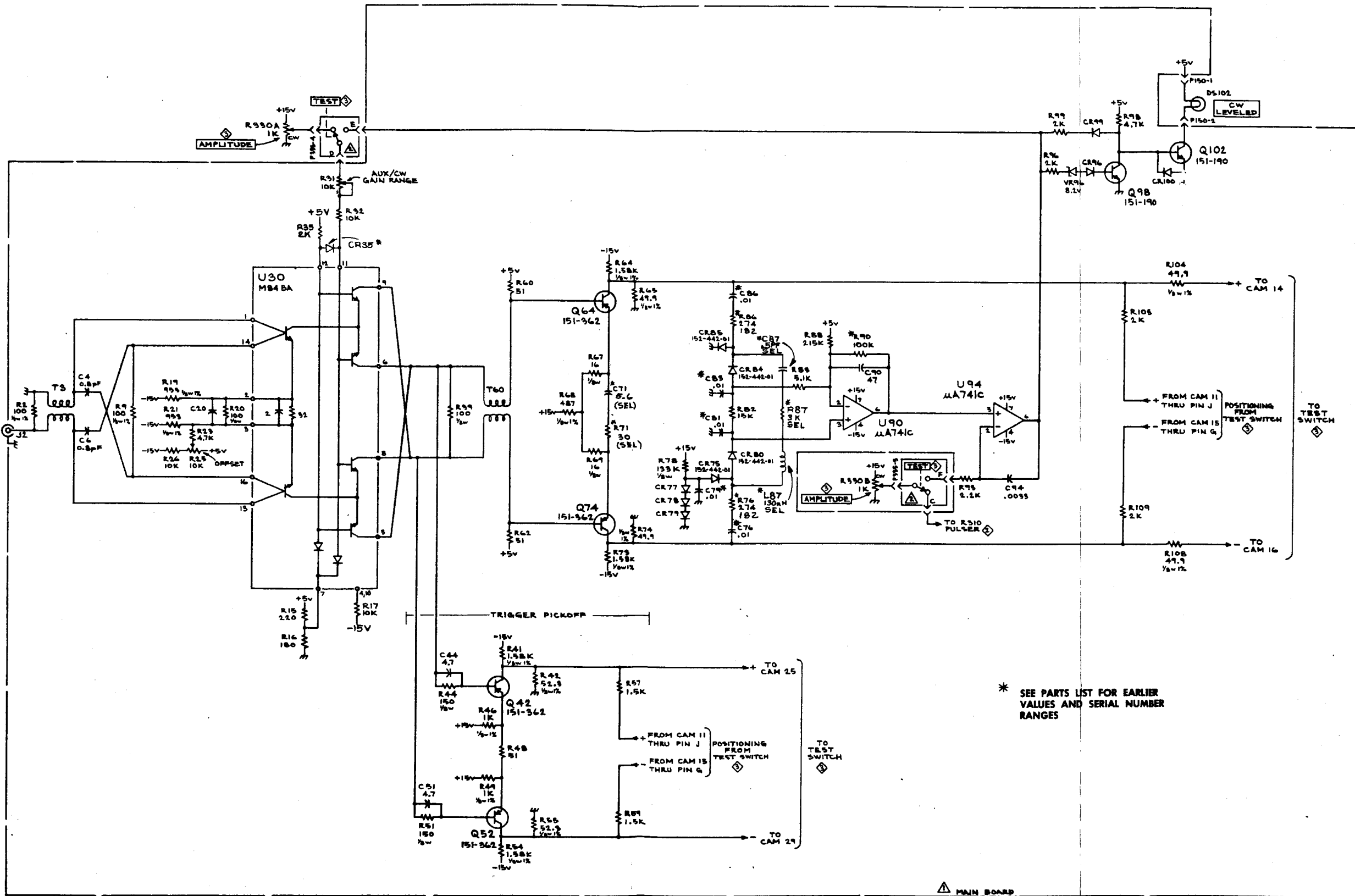
Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff Disc	Description
TRANSFORMERS			
T3	120-0444-00		5 turns
T60	120-0444-00		5 turns
T178	120-0444-00		5 turns
INTEGRATED CIRCUITS			
U30	155-0078-00		Monolithic
U90	156-0067-00		Operational amplifier, replaceable by UA741C
U94	156-0067-00		Operational amplifier, replaceable by UA741C
U180	156-0032-00		Single 10 MHz 1- & 3-bit binary ripple counter, replaceable by SN7493N
U185	156-0078-00		Single 1- out-of-16-line decoder/demultiplexer, replaceable by SN74154
U190	156-0047-00		Triple 3-input positive nand gate, replaceable by SN7410N
U195	156-0030-00		Quad 2-input positive nand gate, replaceable by SN7400N
U200	156-0058-00		Hex inverter, replaceable by SN7404N



.067-0587-01

BLOCK DIAGRAM



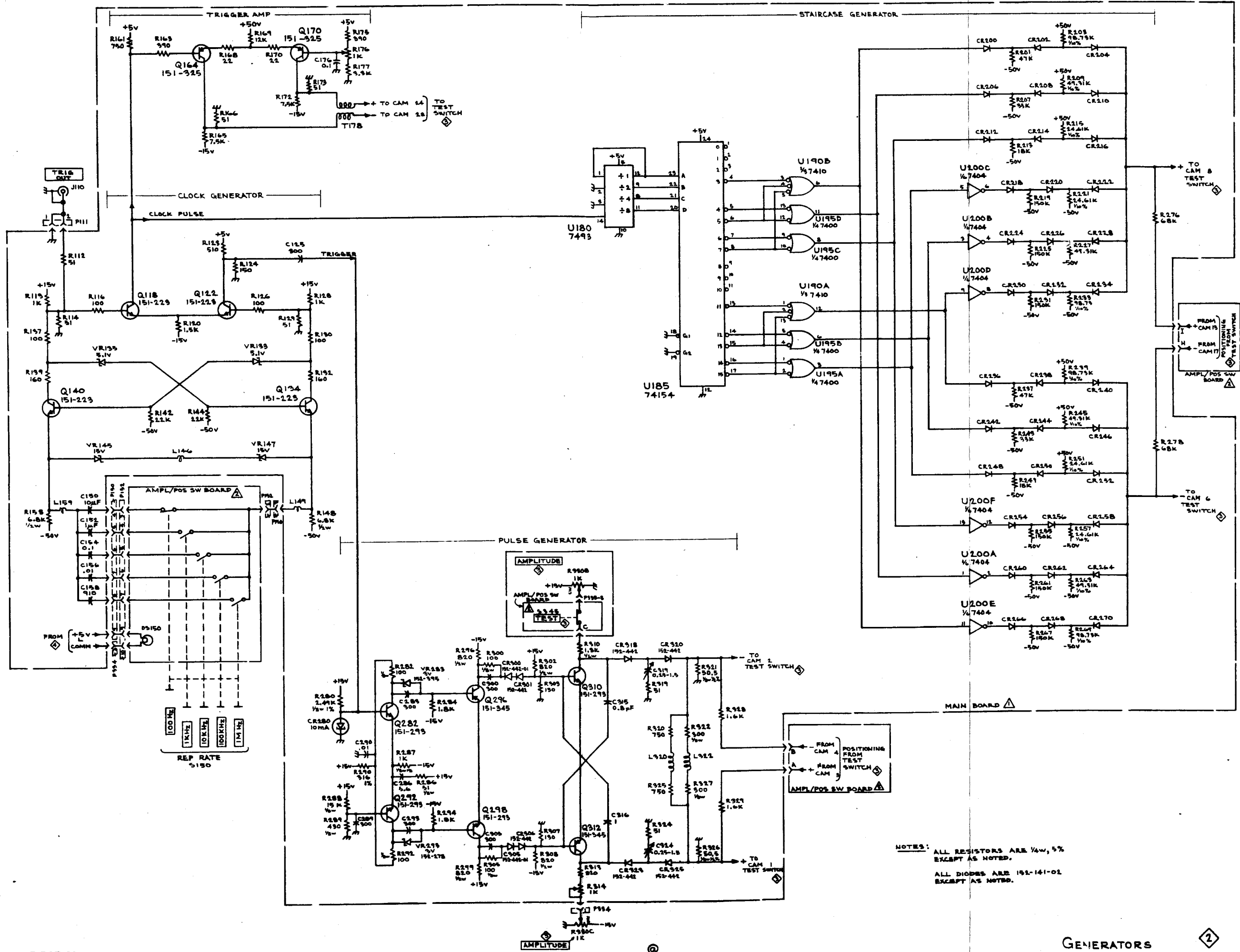
* SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES

▲ MAIN BOARD

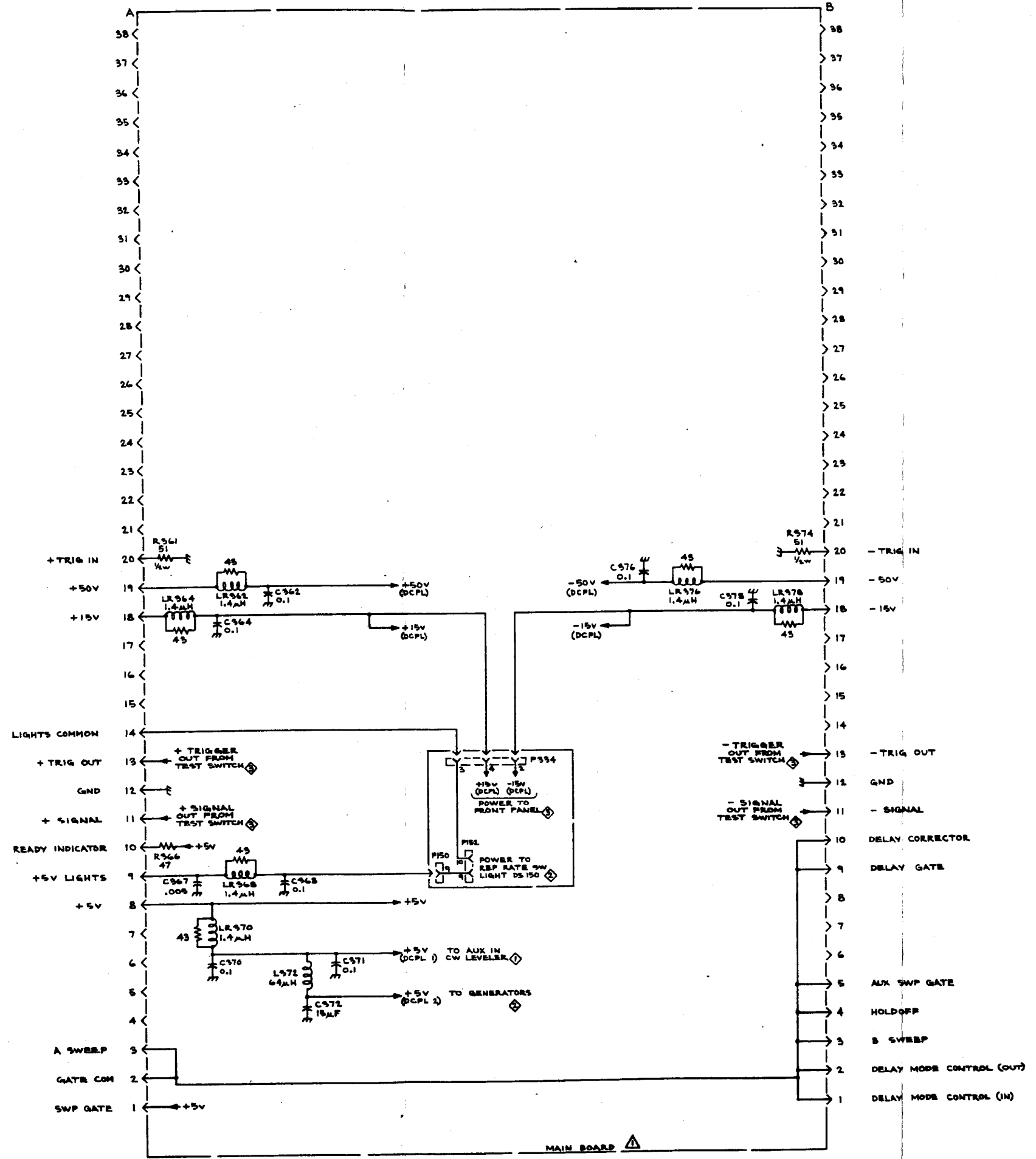
REV. A, JAN. 1975

NOTES:
 ▲ AMPL/PDS SW BOARD
 ALL RESISTORS ARE 1/4W, 5% EXCEPT AS NOTED.
 ALL DIODES ARE 151-141-02 EXCEPT AS NOTED.

AUX IN CW LEVELER



NOTES: ALL RESISTORS ARE 1/4W, 5% EXCEPT AS NOTED.
ALL DIODES ARE 1N1-141-02 EXCEPT AS NOTED.



MECHANICAL PARTS LIST

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Disc	Q					Description
				y	1	2	3	4	
1	366-0497-00			1					1 KNOB, gray -- POSITION
	- - - - -			-					knob includes:
	213-0153-00			1					1 SETSCREW, 5-40 x 0.125 inch, HSS
2	366-1028-00			1					1 KNOB, gray -- TEST
	- - - - -			-					knob includes:
	213-0153-00			2					2 SETSCREW, 5-40 x 0.125 inch, HSS
3	366-1024-00			1					1 KNOB, gray -- AMPLITUDE
	- - - - -			-					knob includes:
	213-0153-00			1					1 SETSCREW, 5-40 x 0.125 inch, HSS
4	- - - - -			1					1 RESISTOR, variable
	- - - - -			-					mounting hardware: (not included w/
	- - - - -			-					resistor)
5	210-0583-00			1					1 NUT, hex., 0.25-32 x 0.312 inch
6	- - - - -			1					1 RESISTOR, variable
	- - - - -			-					mounting hardware: (not included w/
	- - - - -			-					resistor)
7	210-0590-00			1					1 NUT, hex., 0.375-32 x 0.437 inch
8	210-0012-00			1					1 WASHER, lock, internal, 0.375 ID x 0.50
	- - - - -			-					inch OD
9	210-0207-00			1					1 LUG, solder, 0.375 inch
10	333-1286-01			1					1 PANEL, front
11	131-0818-00			2					2 CONNECTOR, receptacle, electrical, BNC,
	- - - - -			-					female w/hardware
12	131-0282-00			1					1 CONNECTOR, receptacle, electrical, w/
	- - - - -			-					hardware
	- - - - -			-					mounting hardware: (not included w/
	- - - - -			-					connector)
13	210-0223-00			1					1 TERMINAL, lug, 0.25 inch
14	358-0216-00			1					1 BUSHING, front panel
15	352-0157-00			1					1 HOLDER, lamp
16	378-0602-00			1					1 LENS, indicator light, green
17	200-0935-00			1					1 CAP, lamp holder
18	348-0235-00			2					2 SHIELDING GASKET, electrical
19	386-1447-61			1					1 SUBPANEL, front
20	366-1058-00			1					1 KNOB, latch
	- - - - -			-					mounting hardware: (not included w/knob)
21	214-1095-00			1					1 PIN, spring

MECHANICAL PARTS LIST 067-0587-01

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Disc	Q					Description
				y	1	2	3	4	
22	105-0076-00			1					RELEASE BAR, latch
23	214-1280-00			1					SPRING, helical, extension
24	214-1054-00			1					SPRING, flat, latch detent
25	105-0075-00			1					BOLT, latch
26	214-1061-00			1					SPRING, flat, sliding ground
27	426-0505-07			1					FRAME SECTION, top
	- - - - -			-					mounting hardware: (not included w/frame section)
28	213-0192-00			2					SCREW, thread forming, 6-32 x 0.50 inch, Fil HS
	- - - - -			-					
29	426-0499-07			1					FRAME SECTION, bottom
	- - - - -			-					mounting hardware: (not included w/frame section)
	- - - - -								
	213-0192-00			2					SCREW, thread forming, 6-32 x 0.50 inch, Fil HS
	- - - - -			-					
30	386-1402-00			1					PANEL, rear
	- - - - -			-					mounting hardware: (not included w/panel)
31	213-0192-00			4					SCREW, thread forming, 6-32 x 0.50 inch Fil HS
	- - - - -								
	361-0326-00			1					SPACER, sleeve, 0.10 inch long
32	670-1178-01			1					CKT BOARD ASSEMBLY, switch-REP RATE
	- - - - -			-					circuit board assembly includes:
33	131-0589-00			9					TERMINAL, pin, 0.50 inch long
	380-0156-02			1					HOUSING, light
	- - - - -			-					mounting hardware: (not included w/switch)
34	211-0156-00			2					SCREW, 1-72 x 0.25 inch, 80 deg csk, FHS
35	337-1064-04			2					SHIELD, electrical
	672-0053-00	B010100	B039999	1					CKT BOARD ASSEMBLY--PULSER/POSITION SWITCH
	672-0053-01	B040000		1					CKT BOARD ASSEMBLY--PULSER/POSITION SWITCH
	- - - - -			-					circuit board assembly includes:
36	670-1931-00			1					CKT BOARD ASSEMBLY--POSITION SWITCH
	- - - - -			-					circuit board assembly includes:
37	131-0589-00			4					TERMINAL, pin, 0.46 inch long
38	131-1031-00			8					CONTACT ASSEMBLY, top, cam switch
39	131-1030-00			8					CONTACT ASSEMBLY, bottom, cam switch
40	136-0327-01			10					SOCKET, pin terminal
	- - - - -			-					mounting hardware: (not included w/ckt board assy)
	- - - - -								
41	211-0116-00			7					SCREW, sems 4-40 x 0.312 inch, PHB
42	210-0406-00			7					NUT, hex., 4-40 x 0.188 inch

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Disc	Q † y	1 2 3 4 5					Description
					1	2	3	4	5	
43	200-1416-00	XB010120		1						COVER, contacts
44	352-0336-00	XB010120		1						HOLDER, cover
45	200-1362-00			2						COVER, cam switch
	- - - - -			-						mounting hardware for each:(not included w/cover)
46	211-0116-00			3						SCREW, sems, 4-40 x 0.312 inch, PHB
47	210-0406-00			3						NUT, hex., 4-40 x 0.188 inch
48	214-1127-00			2						ROLLER, detent
49	214-1139-00		1	-						SPRING, flat, gold
	214-1139-02		1	-						SPRING, flat, green
	214-1139-03		1	-						SPRING, flat, red
50	401-0115-00			1						BEARING, center
	- - - - -			-						mounting hardware: (not included w/bearing)
51	211-0116-00			2						SCREW, sems, 4-40 x 0.312 inch, PHB
52	210-0406-00			2						NUT, hex., 4-40 x 0.187 inch
53	354-0391-00			1						RING, retaining
54	401-0081-00			1						BEARING, front
	- - - - -			-						mounting hardware: (not included w/bearing)
55	211-0116-00			2						SCREW, sems, 4-40 x 0.312 inch, PHB
56	210-0406-00			2						NUT, hex., 4-40 x 0.187 inch
57	105-0337-00			1						ACTUATOR, cam switch
58	376-0084-00			1						COUPLING, shaft, flexible
	- - - - -			-						coupling includes:
	213-0154-00			4						SETSCREW, 4-40 x 0.125 inch, HSS
59	384-0181-00			1						SHAFT, extension, 0.25 dia x 6.50" long
60	670-1930-00	B010100	B039999	1						CIRCUIT BOARD ASSEMBLY--PULSER
	670-1930-02	B040000		1						CIRCUIT BOARD ASSEMBLY--PULSER
	- - - - -			-						circuit board assembly includes:
61	131-0589-0000			9						TERMINAL, pin, 0.46 inch long
62	131-0593-00			10						TERMINAL, pin, feedthru, 1.15" long
63	352-0274-00			2						HOLDER, terminal (strip of 8)
64	131-1003-00			4						CONNECTOR, receptacle, coaxial cable
65	136-0252-04	B010100	B040859	142						SOCKET, pin connector
	136-0252-04	B040860		68						SOCKET, pin connector
	136-0220-00	B040860		6						SOCKET, plug-in, 3-pin
	136-0269-02	B040860		4						SOCKET, plug-in, 4-pin

¹Replace only with part bearing the same color as the original part in instrument.

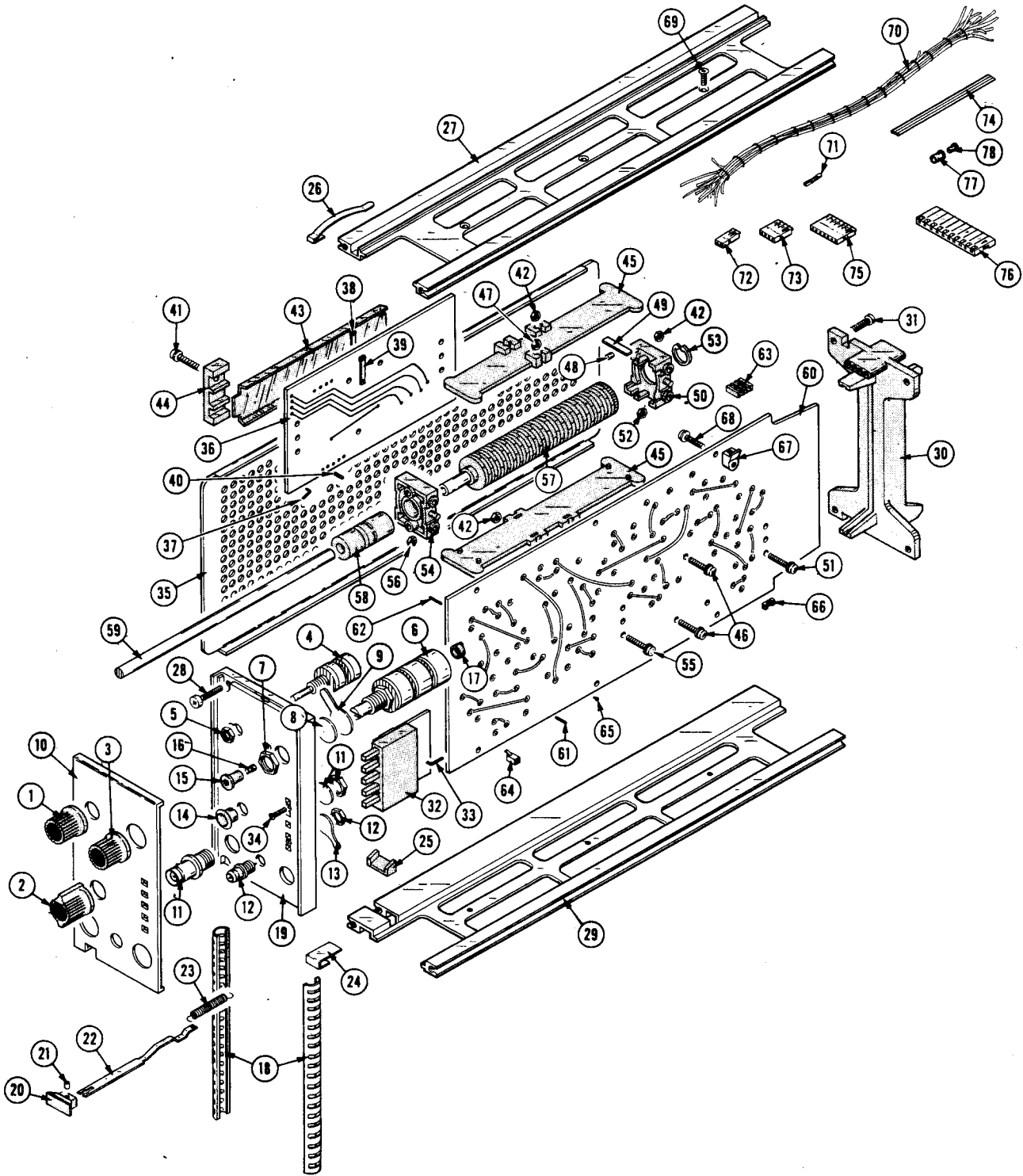
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Disc	Q					Description	
			†	Y	1	2	3		4
66	344-0061-00		12						CLIP, diode
	- - - - -		-						mounting hardware: (not included w/ckt board assembly)
67	220-0547-01		6						NUT, block
68	211-0116-00		6						SCREW, sems, 4-40 x 0.312", PHB
69	211-0105-00		6						SCREW, 2-56 x 0.188", 100 deg csk, FHS
70	179-1774-00		1						WIRING HARNESS, calibration
	- - - - -		-						wiring harness includes:
71	131-0621-00		3						CONNECTOR, terminal
	131-0707-00		11						CONNECTOR, terminal
	131-0708-00		1						CONNECTOR, terminal
72	352-0169-00		1						HOLDER, terminal conn, 2 wire (black)
73	352-0162-00		1						HOLDER, terminal conn, 4 wire (black)
74	175-0859-00		ft						WIRE, elec., 6 wire ribbon, 4.50 inches
75	352-0165-00		1						HOLDER, terminal, conn, 7 wire (black)
76	352-0205-00		1						HOLDER, terminal, conn, 9 wire (black)
77	210-0774-00		2						EYELET, 0.152 inch diameter barrel
78	210-0775-00		2						EYELET, 0.126 inch diameter barrel

STANDARD ACCESSORIES

070-1914-00

1 MANUAL, instruction (not shown)

EXPLODED



MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Sections of the manual are often printed at different times, so some of the information on the change pages may already be in your manual. Since the change information sheets are carried in the manual until ALL changes are permanently entered, some duplication may occur. If no such change pages appear in this section, your manual is correct as printed.



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technical excellence

MANUAL CHANGE INFORMATION

PRODUCT 067-0587-01

CHANGE REFERENCE M23,328

EFF SN B060000-up

DATE 1-7-75

CHANGE:

DESCRIPTION

070-1914-00

ELECTRICAL PARTS LIST CHANGE

CHANGE TO:

C76	283-0238-00	0.01 μ F, Cer, 50 V, 10%
C79	283-0238-00	0.01 μ F, Cer, 50 V, 10%
C81	283-0238-00	0.01 μ F, Cer, 50 V, 10%
C83	283-0238-00	0.01 μ F, Cer, 50 V, 10%
C86	283-0238-00	0.01 μ F, Cer, 50 V, 10%



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