TEK INSTRUCTION MANUAL

Part No. 070-4650-00
Product Group 48

067-0599-00 CALIBRATION FIXTURE

(576 Calibration Unit)

Please Check for CHANGE INFORMATION at the Rear of This Manual

First Printing DEC 1983
Revised JUN 1985

Tektronix®
COMMITTED TO EXCELLENCE

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	Tektronix Sony/Tektronix, Japan
700000	Tektronix Holland, NV, Heerenveen, The Netherlands

TABLE OF CONTENTS

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 OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

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.

Terms 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.

Symbols As Marked on Equipment

ϟ DANGER—High voltage.

⏚ Protective ground (earth) terminal.

⚠ ATTENTION—refer to manual.

Grounding the Product

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

Danger Arising From Loss of Ground

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electric shock.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

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.

SERVICE 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.

4650-06

Fig. 1-1. 067-0599-00 Calibration Fixture (576 Calibration Unit).

GENERAL INFORMATION

The 067-0599-00 Calibration Fixture was designed specifically for calibrating and testing the performance of the 576 Curve Tracer.

Installed in place of the Standard Test Fixture plug-in, the 067-0599-00 provides accurate calibration voltages and currents for the horizontal and vertical deflection circuits and accurate loads for the collector supply and step generator circuits through the external input and output lines at the test fixture interface. External monitoring of the step generator output is available through an EXTERNAL MONITOR BNC jack, providing a 1 V/STEP (into 10,000 MΩ) output.

The Vertical, Display Offset, Horizontal and Step Generator switches of the 576 have matching switches on the 067-0599-00 for easy, direct-reading, comparison-style adjusting and checking, using the 576's own display.

The 067-0599-00 is totally dependent on the 576 for regulated low voltage power supplies and AC line voltage.

SPECIFICATIONS

The electrical specifications are valid only if (1) the instrument has been calibrated at an ambient temperature between +20°C and +30°C; (2) the instrument is operating at an ambient temperature between 20°C and +30°C, unless otherwise noted; (3) the instrument must be operating (fully installed) in a calibrated system.

Any conditions that are unique to a particular specification are stated as part of that specification.

Table 1-1
ELECTRICAL

Characteristics	Performance Limits
Voltage Accuracies	
CALIBRATOR RANGEs	25 mV, 50 mV, 100 mV, 125 mV, 200 mV, all within 0.04%.
50 mV VARIABLE Range	At least −4% to at least +4%.
HORIZONTAL VOLTS	
COLLECTOR	Within 0.5%
BASE	Within 0.5%
STEP GENERATOR	Within 0.5%
Current Accuracies	
VERTICAL	
COLLECTOR	Within 0.5%
EMITTER	Within 0.5% Except 10 nA, 20 nA, and 50 nA, within 1%
STEP GENERATOR	Within 0.5%
Resistance Ratios	
DISPLAY OFFSET MULTIPLIER	Within 0.04%
Resistive Loads	
1 K COLLECTOR SHORT	1 kΩ, within 0.5%
1 K + 18 K	19 kΩ, within 5%
.1 Ω	0.1 Ω, within 3%
40 V LOAD	3.88 K, within 1%
Camera Power	75 Ω, within 1%
EXTERNAL MONITOR Output (With STEP GENERATOR LOADS Switch in EXT ONLY or STEP GEN)	1 V/STEP (into 10,000 MΩ), within 0.5%

Table 1-2
POWER REQUIREMENTS

Characteristics	Performance Requirements
Power derived through test fixture interface of the 576.	

Table 1-3
ENVIRONMENTAL

Characteristics	Performance Requirements
Temperature	
Operating Range	Performance requirements listed apply over the range of 20°C to 30°C
Storage Range	−40°C to +65°C
Warm-up Time	10 minutes at 25°C

Table 1-4
PHYSICAL

Characteristics	Information
Construction	
Chassis	Aluminum alloy
Cabinet	Aluminum alloy with blue-vinyl finish
Panel	Anodized aluminum alloy
Circuit boards	Glass-epoxy

Table 1-5
PHYSICAL

Characteristics	Information
Overall Dimensions	
Main Unit	
Height	9.50 inches
Width	6.75 inches
Depth	10.50 inches
Plug-In Unit	
Height	4 inches
Width	8 inches
Depth	6.25 inches
Weight (Total)	≈11 lbs.
Connectors	
Main Unit Front Panel	BNC
Plug-In Unit	
Front Panel	3-pin plug on coax
Rear Panel	Amphenol-type

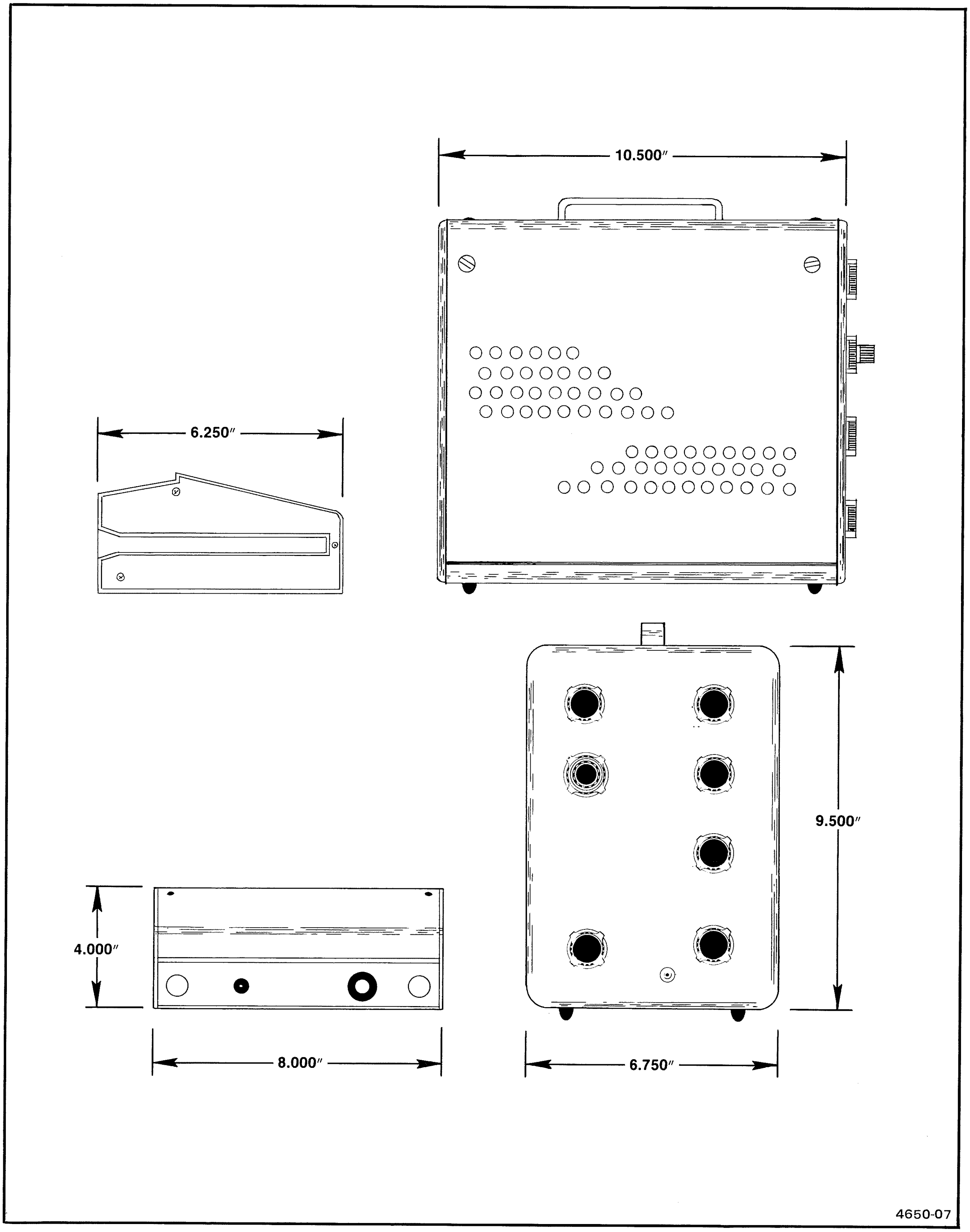


Fig. 1-2. Dimensions.

OPERATING INFORMATION

This section describes front-panel control functions, giving first-time and general operating information.

CONTROLS AND CONNECTORS
(See Fig. 1-1)

FUNCTION

Selects the function to be checked or calibrated.

HORIZ AMPL CAL

Applies selected CALIBRATOR RANGE voltage to the 576 Horizontal Amplifier External Input.

HORIZ ATTEN CHECK

Applies output of the HORIZONTAL VOLTS switch to the 576 Horizontal attenuator.

VERT AMPL CAL

Applies selected CALIBRATOR RANGE voltage to the 576 Vertical Amplifier External Input.

VERT CURRENT CHECK

Applies a precision load to the 576 Collector Supply.

VERT RISETIME CHECK

Applies a 0.5 V amplitude pulse to the 576's External Vertical input and a 0.5 V, 200 μs sweep to the External Horizontal input.

HORIZONTAL RISETIME CHECK

Applies a 0.5 V pulse to the 576's External Horizontal input and a 0.5 V, 200 μs sweep to the External Vertical Input.

HORIZ COMPENSATION

Applies a 25 V pulse to the Collector Sensing circuit in the 576.

STEP GEN

Connects the STEP GENERATOR swich and STEP GENERATOR LOADS switch to the 576's base sensing, collector sensing and collector supply circuits.

CALIBRATOR RANGE

Selects one of five voltages for Horizontal or Vertical Ampl basic gain calibration.

50 mV VARIABLE

Varies output of the 50 mV CALIBRATOR RANGE position only.

VERTICAL

Selects calibrated deflection factors in 20 steps from 10 A to 10 μA Collector current, or 10 μA to 10 nA Emitter current. Collector or Emitter current output selected by setting of 576 MODE switch.

DISPLAY OFFSET MULTIPLIER

Provides offset voltage, in 20 calibrated steps, to either the Horizontal or Vertical Amplifier External inputs as selected by the FUNCTION switch.

HORIZONTAL

BASE VOLTS

Selects six calibrated deflection factors, from 20 V to 0.5 V.

COLLECTOR VOLTS

Selects twelve calibrated deflection factors, from two 1 k (1000 V) positions to 0.5 V.

STEP GENERATOR

Selects six calibrated voltage deflection factors and twenty-one calibrated current deflection factors.

STEP GENERATOR LOADS

OFF

Grounds Base Sensing input to the 576 and opens the Calibration Fixture's EXTERNAL MONITOR output circuit.

1K COLLECTOR SHORT

Provides a 1 kΩ load for the 576's Step Generator output circuit and a ground to the Collector supply and sensing circuits.

1 K +18 K

Provides a 19 kΩ load for the 576's Step Generator output circuit and a 1 kΩ load for the 576's base sensing circuits.

EXT ONLY

Routes the 576's Step Generator output to the Calibration Fixture's EXTERNAL MONITOR output via its STEP GENERATOR switch. The 576's base sensing circuit is grounded. The 067-0599-00 sees only external loads in this position.

STEP GEN

Routes the 576's Step Generator output to the Calibration Fixture's EXTERNAL MONITOR output via its STEP GENERATOR switch, loading the 576's base sensing circuit.

.1 Ω

Provides a 0.1 Ω load for the 576's Step Generator output for checking short circuit current limiting.

40 V LOAD

Provides a 3.88 kΩ load for the 576's Step Generator output to test maximum voltage output in the voltage mode.

COLL VOLTAGE ÷ 10 INTO 1 MΩ

Not Used.

EXTERNAL MONITOR, 1 V/STEP (INTO 10,000 MΩ)

BNC connector providing output of the STEP GENERATOR LOADS switch for external monitoring.

P819

3-pin plug connected to 75 Ω load for the 576's CAMERA POWER output.

OPERATING CONDITIONS

There are certain conditions that must be met before the performance limits specified are valid.

The instrument must be calibrated at an ambient temperature between +20°C and +30°C.

Remove the Standard Test Fixture from the Type 576 and install the 067-0599-00 Calibration Fixture plug-in module. The 067-0599-00 is totally dependent on the Type 576 for AC line voltage and regulated low voltage power supplies.

Turn the Type 576 on and allow at least 10 minutes warm-up time before making any checks or adjustments.

Because of the multiplicity and complexity of controls on the 576 and 067-0599-00 Calibration Fixture, checking and/or adjusting the 576 should be done sequentially according to the Performance Check/Calibration Procedure in the manual furnished with this calibration fixture (Tektronix part number 070-1207-00).

Using the EXTERNAL MONITOR Output

When checking or adjusting the 576's Step Genertor output, always monitor with a very high input impedance. The 067-0599-00 EXTERNAL MONITOR STEP GEN and EXT ONLY outputs are 1 V/STEP into at least 10,000 MΩ when the STEP GENERATOR switch on the 067-0599-00 and the STEP GENERATOR AMPLITUDE on the 576 are in matching positions. Outputs from the rest of the STEP GENERATOR LOADS switch are the results of the indicated loads to the 576's circuits.

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 OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

CIRCUIT DESCRIPTION

This section of the manual describes the circuitry in the 067-0599-00 Calibration Fixture. The description shows the relationships between the stages in each major circuit. Circuits commonly used in the industry are not described in detail. Schematics of all the major circuits are given in Section 8, Diagrams and Circuit Board Illustrations.

Schematic ⟨1⟩, Connectors to Indicator

Resistors R1 through R14 provide the maximum load the 576 power supplies might encounter with Standard Test Fixtures. R13 and R14 simulate a load that might be encountered if a camera were used on the 576.

Schematic ⟨2⟩, Function Switching

The DISPLAY OFFSET MULTIPLIER, S105, is a precision voltage divider from an +11.7 V source. R102, 25 kΩ, sets the voltage precisely at the top of the divider. R105 consists of twenty 1 kΩ resistors, matched to 0.02%. S105 allows selection of 21 different voltage levels to check the display offset in the 576. S107, CALIBRATOR RANGE, selects precise voltages for comparison with the calibrator voltages within the 576. R109, R112, R115, and R118 allow the adjustment of the 067-0599-00 calibrator voltages. For the 50 mV CALIBRATOR RANGE position, a variable feature is provided with R121 being the variable pot in a divider string consisting of R120, R121, and R122.

+1500 V from the Collector Supply in the 576 is applied through S100, the FUNCTION switch. This +1000 V supply is divided on S165, the HORIZONTAL VOLTS switch, into +10 V. This +10 V is compared to a +10 V reference, derived from the +11.7 V in the calibration fixture, and maintained through a regulator consisting of Q147 and the integrated circuit U149. VR146 and VR147, tied from the collector of Q147 to the 25 V supply, provide over-voltage protection for Q147. The current from the +1500 V supply passes through zener diodes VR138 through VR145 to the collector of Q147, through R148, and finally, is referenced to the chassis through U149. The output voltage of U149 is maintained as a constant depending upon the differential input voltage. This in turn changes the current through the grounded base stage Q147 to maintain 10 volts at the junction of R165 and R167. The current through R167 must pass through the other resistors in the voltage divider. This maintains the selected voltage, at the junction selected, as a precision voltage. There will, however, be additional current through the remainder of the voltage divider. This current is due to the attenuator resistors in the 576. The voltage at pin "A" of the circuit may get as high as approximately 1100 volts at some positions of the switch. The .5, 1, 2, and 5 volt base position get their voltages from the voltage divider on the vertical switch schematic ⟨4⟩.

Schematic ⟨3⟩, Step Generator Switch and Pulse Generator

The Steps In signal to S210, the STEP GENERATOR switch, is the Step Generator output from the 576 via the STEP GENERATOR LOADS switch of the 067-0599-00. The purpose of this switch is to provide a current load for the current steps and a voltage divider in the voltage step mode. Integrated circuit U230 is part of an operational amplifier whose purpose is to keep the voltage change of the Steps Out constant when the voltage of the Steps In is changed.

Q234 drives the Step Polarity Invert relay in the 576. Q234 is turned on and off by contact 32 of the STEP GENERATOR SWITCH, S210.

Q241 and Q251 make up a free-running multivibrator whose period is set to 200 μs by R244. The output of the multivibrator is applied through R255 to the base of Q256 and amplified to produce a +25 V pulse. This +25 V pulse is then divided by R258, R259, and R260, producing a +0.5 V pulse. R259 allows exact adjustment of +0.5 V pulse amplitude. The output of the multivibrator is also ac coupled via C262 to Q264 and Q268, a ramp generator whose time constant is controlled by R268 and C270. The ramp is output through source follower, Q271. R275 provides adjustment to an exact +0.5 V sweep amplitude.

Schematic ⟨4⟩, Vertical Switch

The 115 V ac line voltage is applied through the interconnecting box of the 067-0599-00 to the primary of T301, rectified, and filtered by CR302, CR303, and CR304. Q305 is a series regulator for the +25 V supply. Q308 and Q307 form a comparator circuit, using the +25 V regulated supply.

VR310 provides a reference for the +11.7 V supply, from which a +10 V supply is derived, adjustable by R311 and R312. An operational amplifier, formed by Q320, Q322, Q324, and U327, controls an error amplifier formed by Q332, Q335, Q337, and Q340. From the emitter of Q340 an error signal is fed back to the gate of Q320 in the operational amplifier to keep a constant +10 V across the resistors selected by the VERTICAL switch, S360. Seven voltages are developed from the +10 V supply through the resistor divider string, R313 through R320. Three voltages, +6.25 V, +2.5 V, and +1.25 V are applied to the VERTICAL switch and divided to provide accurate voltages for the 576's vertical sensing circuits. Four voltages, .5 V, 1 V, 2 V and 5 V are applied to the horizontal to check the base sense circuit.

Q347 and Q348 amplify the 300 μs pulses coming in from the 576.

CALIBRATION

PRELIMINARY INFORMATION

Adjustment Interval

To maintain instrument accuracy, check the performance of the 067-0599-00 every 1000 hours of operation, or every six months, if used infrequently. Before complete adjustment, thoroughly clean and inspect this instrument as outlined in Section 5, Maintenance.

Tektronix Field Service

Tektronix Field Service Centers and the Factory Service centers provide instrument repair and adjustment services. Contact your Tektronix Field Office or representative for further information.

Using This Procedure

Adjustment. Completion of each step in the adjustment procedure ensures that the instrument is correctly adjusted and performing within specified limits. For best overall performance, when performing the complete adjustment procedure, make each adjustment to the exact setting indicated.

NOTE

Titles for external controls of the 067-0599-00 are capitalized in this procedure, whereas internal adjustments are initial capitalized only (e.g., CALIBRATOR RANGE switch vs. Vert. Bal. adjustment).

TEST EQUIPMENT REQUIRED

The test equipment listed in Table 4-1 is required for a complete performance adjustment of this instrument. The specifications given in Table 4-1 for test equipment are the minimum required to meet the Performance Requirements listed in Section 1, Specification. Detailed operating instructions for test equipment are omitted in this procedure. Refer to the test equipment instruction manual if more information is needed.

Special Fixtures

Special fixtures are used only where they facilitate instrument adjustment. These fixtures are available from Tektronix, Inc.; order by part number from Tektronix Field Offices or representatives.

Test Equipment Alternatives

The test equipment listed in the Examples of applicable test equipment column, Table 4-1, is required to check and adjust this instrument. The Calibration Procedure is based on the first item of equipment given as an example. If other equipment is substituted, control settings or setups may need to be altered. If the exact item of equipment given as an example is not available, refer to the Performance Requirements column to determine if other equipment may be substituted. Then check the Application column. If you determine that your measurement requirements will not be affected, the item and corresponding step(s) can be deleted.

Signal Connections

Detailed signal-connection information is not provided except when critical for a particular test.

When simultaneously connecting a signal to two inputs, use a bnc T connector. For test equipment signal-connection and termination information, refer to the test equipment instruction manual.

Table 4-1
LIST OF TEST EQUIPMENT REQUIREMENTS

Description	Performance Requirements	Application	Examples
Oscilloscope	Bandwidth, dc to 1 MHz; minimum deflection factor, 1 mV/div; sweep rate, 1 ms/div.	Pulse adjustments.	TEKTRONIX 5110, Oscilloscope with 5A13N Amplifier, and 5B10N Time Base
Digital Multimeter (DMM)	Range, zero to 1000 V DC and 100 MΩ; accuracy, within 0.01%. DC input impedance ⩾10,000 MΩ	Used throughout Calibration Procedure.	FLUKE 8500A w/Option 02
576 Curve Tracer (with std. test fixture)	Produces voltages and currents for checking 067-0599-00.	Used throughout Calibration Procedure.	TEKTRONIX 576 Curve Tracer
Variable Autotransformer	Provides constant voltage for stable readings. Output voltage range to 130 V, current range to 3.2 A, and power to 305 W.	Used as line supply for 576 Curve Tracer.	General Radio W20MT3W
Connector (test fixture)	32 pin, female connector.	Used for resistance check of Step Generator Resistors and Loads.	Tektronix Part No. 131-0097-00
BNC-to-Dual Banana Cable		External Monitor output.	Tektronix Part No. 103-0090-00
1X Passive Probe	Compatible with 5A-Series amplifiers used in the oscilloscope.	Pulse adjustments.	TEKTRONIX P6101 Probe
Screwdriver	3-inch shaft, 3/32 inch bit.	Used throughout procedure to adjust variable resistors.	Xcelite R3323

Index To Procedure:

1. Preset Calibration Fixture.
2. Check DISPLAY OFFSET MULTIPLIER Resistance Within 0.04%
3. Check Emitter Current resistor accuracies
4. Check Vertical Current resistor accuracies
5. Check Step Generator resistor accuracies
6. Check Step Generator Loads:

   1 K: 1 kΩ, w;ithin 0.5%
   40 V LOAD: 3.88 k, within 1%
   .1 Ω: 0.1 Ω, within 3%.
   1 K + 18 K: 19 kΩ, within 5%

7. Check Power Supplies:

   a. Presets
   b. Setup
   c. +25 V, within 3.5%
   d. +11.7 V, within 5%
   e. Preadjust +10 V

8. Check 10 V Reference:

   a. Setup
   b. +10 V, within 0.04%

9. Check Vertical Balance accuracy:

   Within 0.04%

10. Check Emitter Current Supplies:

    a. Setup
    b. +1.25 V, within 0.5%
    c. +2.5 V, within 0.5%
    d. +6.25 V, within 0.5%

11. Check Calibrator Voltage:
    a. Setup
    b. +200 mV, within 0.04%
    c. +125 mV, within 0.04%
    d. +100 mV, within 0.04%
    e. +50 mV, within 0.04%
    f. +25 mV, within 0.04%

12. Check Horizontal Volts accuracies:
    a. Setup
    b. HORIZONTAL COLLECTOR VOLTS, within 0.5%
    c. HORIZONTAL BASE VOLTS, within 0.5%

13. Check Step Generator
    a. Setup
    b. Amplifier Balance, within 2 mV
    c. Amplifier Gain, within 1%

14. Check Pulse Duration and Amplitude
    a. 0.5 V Sweep Time, 200 μs, within 3%
    b. 0.5 V Sweep Amplitude: 50 V, within 2%
    c. 0.5 V Pulse Amplitude: 50 V, within 2%
    d. 25 V Pulse Amplitude: 25 V, within 1 V

CALIBRATION PROCEDURE

1. a. PRESET CAL FIXTURE

FUNCTION	VERT CURRENT CHECK
VERTICAL	10 A
CALIBRATOR RANGE	200 mV, CAL
DISPLAY OFFSET	
MULTIPLIER	10
HORIZONTAL VOLTS	1 k COLLECTOR
STEP GENERATOR	
LOADS	OFF
STEP GENERATOR	200 mA

b. Preset

576 Curve Tracer:

POWER	ON
MAX PEAK VOLTS	15
PEAK POWER WATTS	220
VARIABLE COLLECTOR	
SUPPLY	0
POLARITY	(+ NPN)
MODE	(DC Anti Loop)
INTENSITY	Fully ccw
VERTICAL	
CURRENT/DIV	2 mA
DISPLAY OFFSET	Norm (off)
CENTERLINE VALUE	5 div
DISPLAY	Non Invert
HORIZONTAL	
VOLTS/DIV	200
NUMBER OF STEPS	10
CURRENT LIMIT	2 A
STEP/OFFSET	
AMPLITUDE	1 V
OFFSET MULT	10 (cw)
OFFSET	AID Pressed
STEPS	In
STEP FAMILY	Off Single
RATE	Norm
STEP/OFFSET	
POLARITY	Non Invert

Install standard test fixture in 576.

2. DISPLAY OFFSET MULTIPLIER

a. Check resistance ratio within 0.04%. Set the DMM for voltage measurement auto range.

Remove 9-0-5 wire from pin "J" of circuit board. Connect right base terminal of standard test fixture and red (+) lead of DMM to the 9-0-5 wire removed from pin "J". Connect right emitter terminal of standard test fixture and black (−) lead of DMM to ground lug on main chassis beside function switch. Set 576 LEFT-RIGHT switch to RIGHT. Adjust 576 OFFSET MULT for a DMM reading as close to +10 V as possible. Record this reading. Move DMM + lead to the strap between wafers 5 and 6 of FUNCTION Switch, where 9-0-7 wire connects. Move DISLAY OFFSET MULTIPLIER Clockwise one position at a time. Divide reading recorded above by reading obtained at each switch position. This will give the ratio reading which must be within the limits in the following table.

Table 4-2
Display Offset Multiplier Resistance Ratios

Offset	Limits
10.0	.9996 — 1.0004
9.5	1.05220 — 1.05306
9.u	1.11065 — 1.11155
8.5	1.17642 — 1.17694
8.0	1.24950 — 1.25050
7.5	1.33297 — 1.33386
7.0	1.42800 — 1.42914
6.5	1.53784 — 1.53907
6.0	1.66599 — 1.66732
5.5	1.81745 — 1.81890
5.0	1.99920 — 2.00080
4.5	2.22133 — 2.22310
4.0	2.49900 — 2.50100
3.5	2.85599 — 2.85828
3.0	3.33199 — 3.33466
2.5	3.99840 — 4.00160
2.0	4.99800 — 4.00200
1.5	6.66399 — 6.66932
1.0	9.99600 — 10.00400
0.5	19.99200 — 20.00800

Disconnect the 576 from the CAL FIXTURE and replace 9-0-5 wire on pin "J" of the circuit board.

3. EMITTER CURRENT RESISTORS

a. Setup.

Set the CAL FIXTURE VERTICAL switch to 50 mA. Connect the DMM red (+) lead to the 9-4 wire on the 4th wafer of the VERTICAL switch. Connect the black (−) lead to the 5th wafer at the junction of the 100 k resistor. Remove the 9-4 wire from pin "V" of the circuit board.

b. Check EMITTER resistors within 0.5%, except for 100M, 1%.

Set up the DMM for a resistance measurement, Auto range.

Measure the resistance in the following positions of the VERTICAL switch.

Vertical	Nominal Resistance	Resistance Limits	
		Minimum	Maximum
50 mA	100 kΩ	99.5	100.5
5 mA	1 MΩ	.995	1.005
500 μA	10 MΩ	9.950	10.05
50 μA	100 MΩ	99.0	101.0

Replace the 9-4 wire on pin "V" of the circuit board.

4. VERTICAL CURRENT RESISTORS

a. Setup.

Remove the following five wires from the circuit board: B, D, N, O, and P.

b. Check resistance within 0.5%.

Remove the shorting straps from the source and sense terminals of the DMM.

Connect four leads from the DMM to the cal fixture as follows:

Hi Source	9-2 wire from Pin P
Lo Source	Ground
Hi Sense	9-2-4 from Pin D
Lo Sense	9-0-7 from Pin B

Vertical	Nominal Resistance	Resistance Limits	
		Minimum	Maximum
10 A	1 Ω	0.9950 Ω	1.005
5 A	2 Ω	1.990 Ω	2.010
2 A	5 Ω	4.975 Ω	5.025
1 A	10 Ω	9.950 Ω	10.05
500 mA	20 Ω	19.90 Ω	20.10 Ω
200 mA	50 Ω	49.75 Ω	50.25 Ω
100 mA	100 Ω	99.50 Ω	100.5 Ω
50 mA	200 Ω	199.0 Ω	201.0 Ω
20 mA	500 Ω	497.5 Ω	502.5 Ω
10 mA	1 k	0.9950 k	1.005 k
5 mA	2 k	1.990 k	2.010 k
2 mA	5 k	4.975 k	5.025 k
1 mA	10 k	9.950 k	10.05 k
500 μA	20 k	19.90 k	20.10 k
200 μA	50 k	49.75 k	50.25 k
100 μA	100 k	99.50 k	100.5 k
50 μA	200 k	199.00 k	201.0 k
20 μA	500 k	497.5 k	502.5 k
10 μA	1 M	995.0 k	1005.0 k

Remove DMM.

Reconnect the 5 wires to the circuit board.
Pin B—white, black, violet
D—white, red, yellow
N—white, brown, green
O—white, white
P—white, red

5. STEP GENERATOR RESISTORS

a. Setup.

Connect the DMM low-source to pin 23 of J360 on the plug-in head. Connect the low-sense terminal to pin 25, and the high-sense terminal to pin 17. Then connect the high-source terminal to pin 1.

NOTE

A 32-pin female connector is provided to aid in connecting the DMM to the pins on J360.

Set STEP GENERATOR switch to 200 mA, the function switch to Step Gen, and the STEP GEN LOADS switch to Step Gen.

b. Check resistance within 0.5%.

Step Generator	Nominal Resistance	Resistance Limits	
		Minimum	Maximum
200.0 mA	5 Ω	4.975 Ω	5.025 Ω
100.0 mA	10	9.950	10.05
50.0 mA	20	19.90	20.10
20.0 mA	50	49.75	50.25
10.0 mA	100	99.50	100.50
5.0 mA	200	199.0	201.0
2.0 mA	500	497.5	502.5
1.0 mA	1 k	.995 k	1.005 k
.5 mA	2 k	1.990 k	2.010 k
.2 mA	5 k	4.975 k	5.025 k
.1 mA	10 kΩ	9.950 kΩ	10.05 kΩ
50.0 μA	20 k	19.90 k	20.10 k
20.0 μA	50 k	49.75 k	50.25 k
10.0 μA	100 k	99.50 k	100.50 k
5.0 μA	200 k	199.0 k	201.0 k
2.0 μA	500 k	497.5 k	502.5 k
1.0 μA	1 M	.9950 M	1.005 M
.5 μA	2 M	1.990 M	2.010 M
.2 μA	5 M	4.975 M	5.025 M
.1 μA	10 M	9.950 M	10.05 M
.05 μA	20 M	19.90 M	20.10 M

6. STEP GENERATOR LOADS

a. Setup.

Leave DMM connected as above.

b. Check step generator loads.

Set the STEP GENERATOR LOAD switch to the position indicated and check resistance.

Step Generator Loads	Nominal Resistance	Resistance Limits	
		Minimum	Maximum
1 K COLLECTOR SHORT	1 kΩ	0.995 kΩ	1.005 kΩ
+40 LOAD For SN 111-120	3.6 k	3.420 k	3.780 k
For SN 111-121 & up	3.88 k	3.841	3.919 k
.1	0.1 kΩ	0.097 kΩ	0.103 kΩ

c. Replace shorting straps on DMM SET STEP GENERATOR load switch to 1k + 18k. Measure resistance between pin 1 and pin 23 of J360, it should be between 18.050k and 19.950k.

7. POWER SUPPLY

a. Preset:

576 Curve Tracer:

POWER	Off
MAX PEAK VOLTS	15
PEAK POWER WATTS	220
VARIABLE COLLECTOR SUPPLY	0
POLARITY	(+ NPN)
MODE	(DC Anti Loop)
INTENSITY	Fully ccw
VERTICAL CURRENT/DIV	2 mA
DISPLAY OFFSET	Norm (off)
CENTERLINE VALUE	5 div
DISPLAY	Non Invert
HORIZONTAL VOLTS/DIV	200
NUMBER OF STEPS	10
CURRENT LIMIT	2 A
STEP/OFFSET AMPLITUDE	.05 μA
OFFSET MULT	0 (fully ccw)
OFFSET	Zero
STEPS	In
STEP FAMILY	Off Single
RATE	Norm
STEP/OFFSET POLARITY	Non Invert

576 Calibration Fixture:

FUNCTION	Vertical Current Check
VERTICAL	1 mA DC
CALIBRATOR RANGE	200 mV, CAL
DISPLAY OFFSET MULTIPLIER	10
HORIZONTAL VOLTS	1 k
STEP GENERATOR LOADS	OFF
STEP GENERATOR	200 mA

b. Setup.

Connect Cal Fixture to the Type 576. Connect Type 576 to variable autotransformer and set to 115 V. Turn all power on.

c. Check +25 V within 3.5%.

With DMM, measure the voltage on pin W, of the circuit board, to be 25 V ±0.9 V.

Connect the probe from differential comparator (+) Input to terminal "W" on the Cal Fixture circuit board.

Set the test scope to measure power supply ripple.

Vary the line voltage from 103.5 V to 126.5 V and check ripple:

120 Hz component, 10 mV, maximum
10 kHz component, 140 mV, maximum

NOTE

The 10 kHz ripple is due to the 10 kHz Multivibrator in the Cal Fixture pulse generator.

Set the variable auto transformer for a 115 V line voltage.

d. Check +11.7 V within 5%.

Connect the DMM to the cathode of VR310 and measure the voltage; 11.1 V, minimum, 12.3 V, maximum.

VR310 is located on the circuit board at the upper left corner. The cathode is down.

e. Preadjust 10 V.

Set R312 to midrange. Connect the DMM test lead to TP312 and adjust R311 for +10 V. Set Type 576 VARIABLE COLLECTOR SUPPLY to 100%. Connect the DMM to TP320. Adjust R323 for +10 V. Remove the probe.

8. +10 V REFERENCE

a. Adjust +10 V REFERENCE within 0.04%.

Connect DMM black (−) lead to pin B and red (+) lead to TP312. Adjust R312 on CAL FIXTURE for 10.000 V within 0.004 V.

9. VERTICAL BALANCE WITHIN 0.04%

a. Connect DMM (+) lead to TP320.

b. Adjust R323 for 10 V within .004 V.

Set the type 576 VARIABLE COLLECTOR SUPPLY to 0%.

10. EMITTER CURRENT SUPPLIES

a. Setup.

Connect DMM black (−) lead to the common bus on the 1st wafer of the VERTICAL switch.

Connect the red (+) lead to the rear (5th) wafer on the 100k resistor.

b. Check +1.25 V within 0.5%.

Measure the voltage:

+1.2438 V, minimum; 1.2563 V, maximum

c. Check +2.5 V, within 0.5%.

Set the Cal Fixture VERTICAL switch to 2 mA.

Measure the voltage with the DMM

2.4875 V, minimum; 2.5125 V, maximum

d. Check +6.25 V, within 0.5%.

Set the Cal Fixture VERTICAL switch to 5 mA and measure the voltage.

6.225 V, minimum; 6.275 V, maximum

11. CALIBRATOR

a. Setup

Connect DMM black (−) lead to the ground lug on the main chassis beside the FUNCTION switch and red (+) lead to pin "J".

b. Adjust R102 for DMM reading of 2 V ±.04%.

c. Set Cal Fixture calibrator range switch to 125 mV. Adjust R109 for 1.25 V ±.04%.

d. Set Cal Fixture calibrator range switch to 100 mV. Adjust R112 for 1.0 V ±.04%.

e. Set Cal Fixture calibrator range switch to 50 mV. Adjust R115 for 500 mV ±.04%.

f. Set Cal Fixture calibrator range to 25 mV. Adjust R118 for 250 mV ±.04%.

12. HORIZONTAL VOLTS

a. Setup.

Set the Cal Fixture FUNCTION switch to HORIZ ATTEN CHECK.

Connect the DMM black (−) lead to ground and the red (+) lead to the 9-2 wire on 3rd wafer of function switch.

Set the Type 576 MAX PEAK VOLTS to 1500.

b. Check HORIZONTAL COLLECTOR volts, within 0.5%.

Set the Type 576 VARIABLE COLLECTOR SUPPLY to 100% and measure the voltages as in the table below:

Horizontal Volts/Div	Horizontal Volts	DMM Reading	
		Minimum	Maximum
100	1 k	995 V	1005 V
50	500	497.5 V	502.5 V
20	200	199. V	201 V
10	100	99.5 V	100.5 V
5	50	49.75 V	50.25 V
2	20	19.9 V	20.1 V
1	10	9.95 V	10.05 V
.5	5	4.975 V	5.025 V
.2	2	1.99 V	2.01 V
.1	1	0.995 V	1.005 V
5	.5	0.4975 V	.5025 V

c. Check HORIZONTAL BASE VOLTS, within 0.5%.

Move the DMM red (+) lead to the 9-6 wire on the 2nd wafer of the FUNCTION switch.

Measure the following voltages:

Horizontal Volts/Div (Base)	Horizontal Volts (Base)	DMM Reading	
		Minimum	Maximum
.05	.5	0.4975	0.5025
.1	1	0.995	1.005
.2	2	1.99	2.01
.5	5	4.975	5.025
1	10	9.95	10.05
2	20	19.9	20.1

Set the Type 576 VARIABLE COLLECTOR SUPPLY to 0%.

13. STEP GENERATOR

a. Setup

Set the Cal Fixture STEP GENERATOR switch to .05 V.

Connect a jumper wire from pin X to pin S on the Cal Fixture circuit board. Connect the DMM black (−) led to pin S and red (+) lead to pin AE.

b. Adjust Ampl Bal, within 2 mV.

Adjust R231 for 0.000 V on the DMM, within 1 mV. Remove the jumper.

c. Check Amplifier Gain, within 0.5%.

Move the DMM red lead to pin X. Set the 576 STEP OFFSET switch to .05 V.

Adjust the 576 OFFSET MULT for DMM reading as close to 500 mV as possible. Move the DMM red lead to pin AE. Check the voltage according to the following table.

Cal Fixture Step Generator Switch	DMM Reading
2 V	250 mV ± 1.25 mV
1 V	500 mV ± 2.5 mV
0.5 V	1 V ± 5.0 mV
0.2 V	2.5 V ± 12.5 mV
0.1 V	5 V ± 25 mV
0.05 V	10 V ± 50 mV

14. PULSE

a. Adjust 200 μs Cal, within 3%.

Set the test scope differential comparator Volts/Div to 100 mV, with V_c set to zero, dc coupling and the time base to 50 μs/Div.

Connect a X1 probe from the + Input of the comparator to TP278 on the Main circuit board. Adjust R244 for a 200 μs sweep time (pulse width).

b. Adjust .5 V Swp Cal, within 2%.

Leaving the probe at TP278, adjust R275 for 5 divisions of vertical deflection. Set the comparator Volts/Div to 10 mV and Comparison Voltage (V_c) to 0.250. Set V_c range to 0—1 V and − (minus).

Position the start of the ramp on screen. Switch V_c between + and −, and readjust R275 to position the start of the ramp and the end of the ramp at the same position vertically on the graticule, within 0.5 division.

c. Adjust .5 V Pulse Cal, within 2%.

Connect the probe to TP259, and with the comparator position control, position the bottom of the pulse to the graticule center.

Set the comparator Comparison Voltage to 0.500 and V_c range to +. Adjust R259 to position the top of the pulse to the graticule center, within 0.5 division.

d. Check 25 V pulse, within 1 V.

Center the trace on the test scope, and connect the probe to terminal AG on the Main circuit board. Set the comparator Volt/Div to 100 mV. Position the bottom of the pulse to graticule center. Set the Comparison Voltage to 0.00 and V_c range to +, 0—10 V.

Set V_c to 2.5 and mesure the 25 V pulse amplitude to be within ± 1 V.

Remove the probe.

This completes the calibration procedure.

MAINTENANCE

This section of the manual contains information for performing preventive maintenance, troubleshooting, and corrective maintenance for this instrument.

PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning, visual inspection, lubrication, etc. Preventive maintenance performed on a regular basis may prevent instrument breakdown and will improve the reliability of the instrument. The severity of the environment to which this instrument is subjected determines the frequency of maintenance. A convenient time to perform preventive maintenance is preceding adjustment of the instrument.

CABINET REMOVAL

WARNING

Dangerous voltages exist at several points throughout this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect power before cleaning the instrument or replacing parts.

The cabinet sides are held in place by two latches. To remove the cabinet sides, turn the latches 90° and pull the sides away from the carrying handle; then, lift the cabinet sides away from the instrument. The cabinet bottom is held in place with four screws.

The cabinet sides protect this instrument from dust in the interior, and also provide protection to personnel from the operating voltages present. They also reduce the electromagnetic radiation from this instrument.

CLEANING

This instrument should be cleaned as often as operating conditions require. Accumulation of dirt on components acts as an insulating blanket and prevents efficient heat dissipation, which can cause overheating and component breakdown.

CAUTION

Avoid the use of chemical cleaning agents that might damage the plastics used in this instrument. In particular, avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

Exterior

Loose dust accumulated on the front panel can be removed with a soft cloth or small brush. Dirt that remains can be removed with a soft cloth dampened with a mild detergent and water solution. Abrasive cleaners should not be used.

Interior

Dust in the interior of the instrument should be removed occasionally due to its electrical conductivity under high-humidity conditions. The best way to clean the interior is to blow off the accumulated dust with dry, low-pressure air. Remove any dirt that remains with a soft brush or a cloth dampened with a mild detergent and water solution. A cotton-tipped applicator is useful for cleaning in narrow spaces.

Switch Contacts

Switch contacts and pads are designed to operate dry for the life of the switch. However, as the switches are not sealed, dust attracted to the contact area may cause switch contacts to become electrically noisy. Cleaning may be accomplished by flushing the contact area with isopropyl alcohol or kelite (1 part kelite to 20 parts water). Do not use chemical cleaning agents that leave a film or that might damage plastic parts. Do not use cotton swabs or similar applicators to apply cleaning agents, as they tend to snag and leave strands of cotton on switch contacts. Should it become necessary to remove a switch for replacement or cleaning, refer to Component Removal and Replacement in this section.

VISUAL INSPECTION

This instrument should be inspected occasionally for such defects as broken connections, improperly seated semiconductors, damaged circuit boards, and heat-damaged parts.

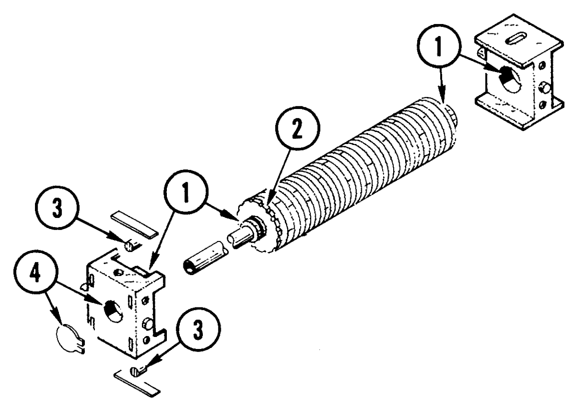
The corrective procedure for most visible defects is obvious; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates other trouble in the instrument; therefore, it is important that the cause of overheating be corrected to prevent recurrence of the damage.

LUBRICATION

Generally, there are no components in this instrument that require a regular lubrication program during the life of the instrument.

Cam Switch Lubrication

In most cases, factory lubrication should be adequate for the life of the instrument. However, if the switch has been disassembled for replacement of switch sub-parts, a lubrication kit containing the necessary lubricating materials and instructions is available through any Tektronix Field Office. General Electric Versilube® silicone grease should be applied sparingly so that the lubricant does not get on the contacts. Refer to fig. 5-1 for lubrication instructions.



(1) Apply lubricant to the drum journals and mating surface in the mounting bearings.

(2) Apply lubricant to the wear surface of the index wheel.

(3) Apply lubricant to the index roller and roller guide in the front bearing. A thin film should be applied to the inner face of the detent springs if more than one spring is replaced.

(4) Ensure that some lubricant is present at the interface between the bearing and retainer clip.

C1967-2

Fig. 5-1. Lubrication procedure for a typical cam switch.

SEMICONDUCTOR CHECKS

Periodic checks of the semiconductors in this instrument are not recommended. The best check of semiconductor performance is actual operation in the instrument. More details on checking semiconductor operation are given under Troubleshooting.

ADJUSTMENT AFTER REPAIR

After any electrical component has been replaced, the adjustment of that particular circuit should be checked, as well as the adjustment of other closely related circuits. The Adjustment procedure in this manual provides a quick and convenient means of checking instrument operation. In some cases, minor troubles may be revealed or corrected by adjustment.

TROUBLESHOOTING

The following information is provided to help troubleshoot this instrument. Information contained in other sections of this manual should be used along with the following information to aid in locating the defective component. An understanding of the circuit operation is very helpful in locating troubles.

TROUBLESHOOTING AIDS

Diagrams

Circuit diagrams are given on foldout pages in Section 8. The component number and electrical value of each component in this instrument is shown on the diagrams.

Circuit-board Illustrations

Circuit-board illustrations are shown on the foldout pages preceding the associated diagram. Each board-mounted electrical component is identified by its circuit number, as are interconnecting wires and connectors.

Wiring Color Code

Insulated wire and cable used in this instrument is color-coded to facilitate circuit tracing.

Semiconductor Basing

Figure 5-2 illustrates the basing configuration for all semiconductors used in this instrument. Some plastic-case transistors have lead configurations that do not agree with those shown here. If a replacement transistor is made by a different manufacturer than the original, check the manufacturer's basing diagram. All transistor sockets in this instrument are wired for the standard basing used for metal-case transistors.

TROUBLESHOOTING EQUIPMENT

The following equipment, in addition to that listed in the Calibration section, is useful for troubleshooting.

NOTE

LEAD CONFIGURATIONS AND CASE STYLES ARE TYPICAL, BUT MAY VARY DUE TO VENDOR CHANGES OR INSTRUMENT MODIFICATIONS.

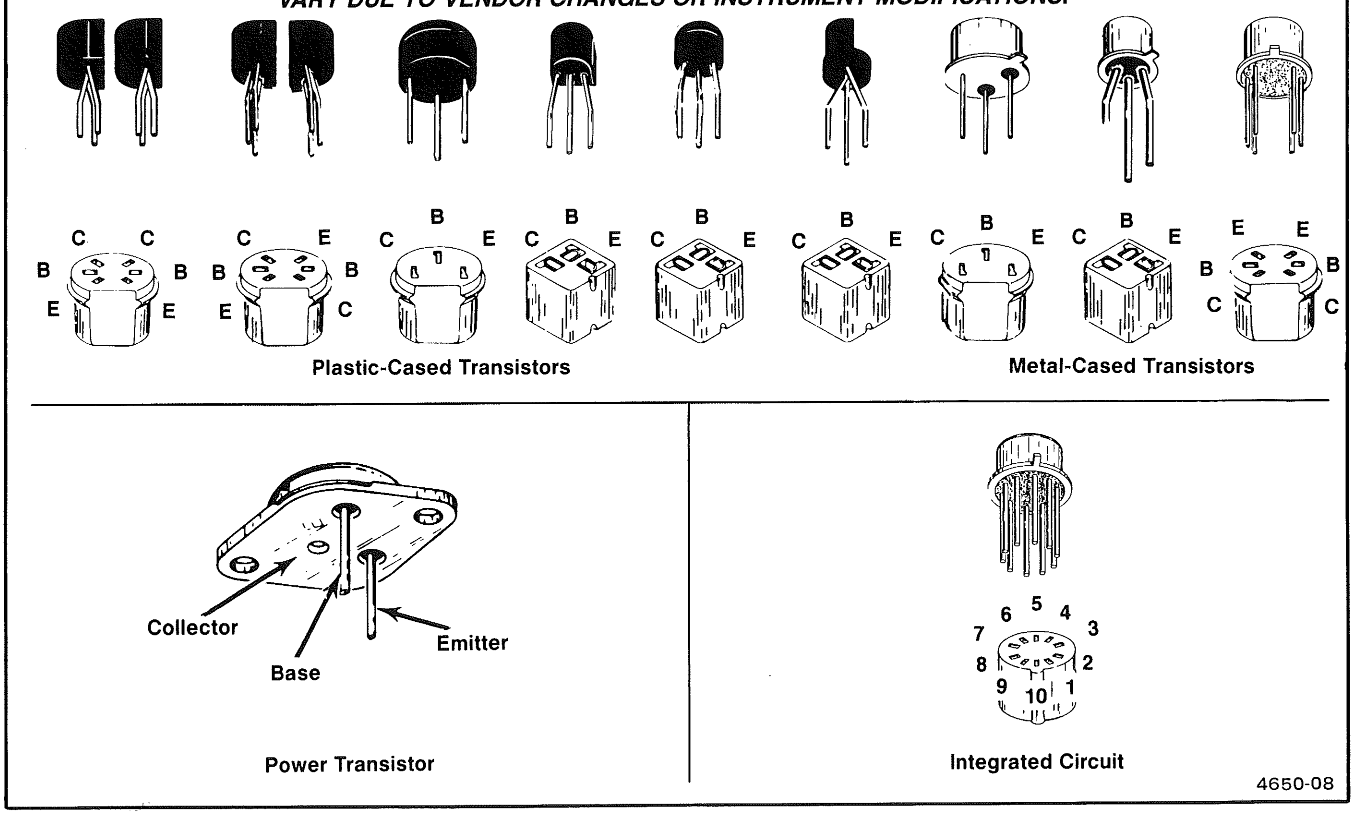


Fig. 5-2. Electrode configuration data for semiconductor devices.

Transistor Tester

Description: Dynamic-type tester.

Purpose: Test semiconductors

Recommended Tektronix types: 576 Curve Tracer, 577/177 Curve Tracer system, 7CT1N Curve tracer unit and a 7000-series oscilloscope system, or a 5CT1N Curve Tracer unit and a 5000-series oscilloscope.

Multimeter

Description: Voltmeter, 10,000 MΩ input impedance and a range of 0 to at least 50 V dc; accuracy, within 0.1%. Ohmmeter, 0 to 20 MΩ. Test probes should be insulated to prevent accidental shorting.

Purpose: Check voltage and resistance.

Test Oscilloscopes

Description: Frequency response, dc to 1 MHz minimum; deflection factor 1 mV to 5 V/div. A 10X, 10 MΩ voltage probe should be used to reduce circuit loading.

Purpose: Check operating waveforms.

TROUBLESHOOTING TECHNIQUES

The following troubleshooting procedure is arranged to check the simple trouble possibilities before proceeding with extensive troubleshooting. The first few checks ensure proper connection, operation, and adjustment. If the trouble is not located by these checks, the remaining steps aid in locating the defective component. When the defective component is located, it should be replaced using the replacement procedure given under Corrective Maintenance.

Troubleshooting Procedure

1. Check Control Settings. Incorrect control settings can indicate a trouble that does not exist. If there is any question about the correct function or operation of any control, see Section 2, Operating Instructions.

2. Check Associated Equipment. Before troubleshooting, check that the equipment used with this instrument is properly connected and that the interconnecting cables are not defective. Also, check the power source.

3. Visual Check. Visually check the portion of the instrument in which the trouble is located. Many troubles can be located by visible indications such as unsoldered connections, broken wires, damaged circuit boards, damaged components, etc.

4. Isolate Trouble to a Circuit. To isolate trouble to a circuit, note the trouble symptom. The symptom often identifies the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, check the affected circuits by taking voltage and waveform readings. Incorrect operation of all circuits often indicates trouble in the power supply. Check first for correct voltages of the individual supplies. However, a defective component elsewhere in the instrument can appear as a power-supply trouble and may also affect the operation of other circuits.

5. Check Voltages and Waveforms. Often the defective component can be located by checking for the correct voltages and waveforms in the circuit.

6. Check Instrument Adjustment. Check the adjustment of this instrument, or the affected circuit if the trouble appears in one circuit. The apparent trouble may be the result of misadjustment. Complete adjustment instructions are given in Section 4.

7. Check Individual Components. The following procedures describe methods for checking individual components. Two-lead components that are soldered in place are best checked by first disconnecting one end. This isolates the measurement from the effects of surrounding circuitry.

CAUTION

To avoid component damage, disconnect the power source before removing or replacing semiconductors.

TRANSISTORS. The best check of transistor operation is actual performance under operating conditions. A transistor can be most effectively checked by substituting a new comonent or one that has been checked previously. However, be sure that circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic tester. Static-type testers are not recommended, since they do not check operation under simulated operating conditions.

INTEGRATED CIRCUITS. IC's can be checked with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of circuit operation is desirable when troubleshooting circuits using IC's. Use care when checking voltages and waveforms around the IC's so that adjacent leads are not shorted together.

CAUTION

Do not use an ohmmeter scale that has a high internal current. High currents may damage the diode.

DIODES. A diode can be checked for an open or shorted condition by measuring the resistance between terminals with an ohmmeter scale having a low internal source current, such as the R X 1K scale. The resistance should be very high in one direction and very low when the meter leads are reversed.

RESISTORS. Check resistors with an ohmmeter. See the Replaceable Electrical Parts list for the tolerance of the resistors used in this instrument. Resistors normally do not need to be replaced unless the measured value varies widely from that specified.

INDUCTORS. Check for open inductors by checking continually with an ohmmeter. Shorted or partially shorted inductors can usually be found by checking the waveform response when high-frequency signals are passed through the circuit. Partial shorting often reduces high-frequency response.

CAPACITORS. A leaky or shorted capacitor can usually be detected by checking resistance with an ohmmeter on the highest scale. Do not exceed the voltage rating of the capacitor. The resistance reading should be high after initial charge of the capacitor. An open capacitor can best be detected with a capacitance meter or by checking that the capacitor passes ac signals.

8. Repair and Adjustment. If any defective parts are located, follow the replacement procedures given in Corrective Maintenance. Be sure to check the performance of any circuit that has been repaired or had any electrical components replaced.

CORRECTIVE MAINTENANCE

Corrective maintenance consists of component replacement and instrument repair. Special techniques required to replace components in this instrument are given here.

OBTAINING REPLACEMENT PARTS

All electrical and mechanical part replacements can be obtained through your Tektronix Field Office or representative. However, many of the standard electronic components can be obtained locally in less time than is required to order them from Tektronix, Inc. Before purchasing or ordering replacement parts, check the parts list for value, tolerance, rating, and description.

NOTE

When selecting replacement parts, remember that the physical size and shape of a component may affect the performance of the instrument, particularly at high frequencies. All parts should be direct replacements unless a different component will not adversely affect instrument performance.

Some parts are manufactured or selected by Tektronix, Inc. to satisfy particular requirements, or are manufactured to specifications for Tektronix, Inc. Most of the mechanical parts used in this instrument have been manufactured by Tektronix, Inc. To determine the manufacturer of parts, refer to parts list Cross Index Mfr. Code Number to Manufacturer.

SOLDERING TECHNIQUES

WARNING

To avoid electrical shock, disconnect the instrument from the power source before soldering.

The reliability and accuracy of this instrument can be maintained only if proper soldering techniques are used when repairing or replacing parts. General soldering techniques, which apply to maintenance of any precision electronic equipment, should be used when working on this instrument. Use only 40/60 rosin-core, electronic-grade solder. The choice of soldering iron is determined by the repair to be made. When soldering on circuit boards, use a 15- to 40-watt pencil-type soldering iron with a 1/8-inch wide, wedge-shaped tip. Keep the tip properly tinned for best heat transfer to the solder joint. A higher wattage soldering iron may separate the wiring from the base material. Avoid excessive heat; apply only enough heat to remove the component or make a good solder joint. Also, apply only enough solder to make a firm solder joint; do not apply too much solder.

For metal terminals (e.g., switch terminals, potentiometers, etc.), a higher wattage-rating soldering iron may be required. Match the soldering iron to the work being done. For example, if the component is connected to the chassis or other large heat-radiating surface, it will require a 75 W or larger soldering iron.

The following techniques should be used to replace a component on a circuit board.

1. Grip the component lead with long-nose pliers. Touch the soldering iron to the lead at the solder connection. Do not lay the iron directly on the board, as it may damage the board.

2. When the solder begins to melt, gently pull the lead out. If unable to pull out the lead without using force, try removing the other end of the component, as it may be more easily removed.

NOTE

The reason some component leads are troublesome to remove is due to a bend placed on each lead during the manufacturing process. The bent leads hold components in place during a process that solders many components at one time.

If a component lead is extremely difficult to remove, it may be helpful to straighten the leads on the back side of the board with a small screwdriver or pliers while heating the soldered connection.

Use only enough heat to remove the component lead without removing the solder from the board. If it is desired to remove solder from a circuit-board hole for easier installation of a new component, a solder-removing wick should be used.

3. Bend the leads of the new component to fit the holes in the board. If the component is replaced while the board is mounted in the instrument, cut the leads so they will just protrude through the board. Insert the leads into the holes so the component is firmly seated against the board (or as positioned originally). If it does not seat properly, heat the solder and gently press the component into place.

4. Touch the iron to the connection and apply a small amount of solder to make a firm solder joint. To protect heat-sensitive components, hold the lead between the component body and the solder joint with a pair of long-nose pliers or other heat sink.

5. Clip any excess lead protruding through the board (if not clipped in step 3).

6. Clean the area around the solder connection with a flux-removing solvent. Be careful not to remove information printed on the board.

COMPONENT REMOVAL AND REPLACEMENT

WARNING

To avoid electrical shock, disconnect the instrument from the power source before replacing components.

The exploded-view drawing associated with the Replaceable Mechanical Parts list may be helpful in the removal or disassembly of individual components or subassemblies. Component locations are shown in the Diagrams and Circuit Board Illustrations section.

Circuit Boards

If a circuit board is damaged beyond repair, replace the entire board assembly. Part numbers for completely wired boards are given in the Replaceable Electrical Parts list.

To remove or replace a board, proceed as follows:

1. Disconnect all leads connected to the board (both soldered lead connections and solderless pin connections).

2. Remove all screws holding the board to the chassis or other mounting surface. Some boards may be held fast on one side by a slotted plastic bar in addition to the screws; for these, remove the screws, then pull the circuit board from its slot to free the board. Also, remove any obstructions that would prevent the board from being lifted out of the instrument.

3. Lift the circuit board out of the unit. Do not force or bend the board.

4. To replace the board, reverse the order of removal. Use care when replacing pin connectors; if forced into place incorrectly, the pin connectors may be damaged.

Circuit-board Pins

A circuit-board pin replacement kit including the necessary tools, instructions, and replacement pins is available from Tektronix, Inc. Order from your local Tektronix Field Office or representative. Replacement of circuit-board pins on multi-layer boards is not recommended; refer such repairs to your local Tektronix Field Office or representative.

Semiconductors

CAUTION

To avoid component damage, power must be turned off before removing or replacing semiconductors.

Semiconductors should not be replaced unless actually defective. If semiconductors are removed during routine maintenance, return them to their original sockets. Unnecessary replacement of semiconductors may affect the adjustment of this instrument. When semiconductors are replaced, check the operation of that part of the instrument that may be affected.

WARNING

Handle silicone grease with care. Avoid getting silicone grease in eyes. Wash hands thoroughly after use.

Replacement devices should be of the original type or a direct replacement. Figure 5-2 shows the lead configurations of the semiconductor devices used in this instrument. Some plastic-case transistors have lead configurations that do not agree with those shown here. When replacing, check the manufacturer's basing diagram for correct basing. All transistor sockets in this instrument are wired for the standard basing used for metal-case transistors. Semiconductors that have heat radiators use silicone grease to increase heat transfer. Replace the silicone grease when replacing these semiconductors.

Interconnecting Pin Replacement. To replace a pin that is mounted on a circuit board, first disconnect any pin connectors. Then, unsolder the damaged pin and pull it out of the board with a pair of pliers. Be careful not to damage the wiring on the board with too much heat. Ream out the hole in the circuit board with a 0.031-inch drill. Remove the ferrule from the new interconnecting pin and press the new pin into the hole in the circuit board. Position the pin in the same manner as the old pin. If the old pin was bent at an angle to mate with a connector, bend the new pin to match the associated pins.

Switches

Two types of switches are used in this instrument. Contact alignment and spacing are critical to the operation of the pushbutton and cam switches. Therefore, defective switches should either be replaced as a unit or repaired only by personnel experienced with these types of switches. Your local Tektronix Field Office or representative can provide additional ifnromation. The following special maintenance information is provided for switch replacement.

Switch Replacement. The following maintenance information is provided for the cam switches and pushbutton switches used in this instrument system.

CAUTION

Repair of cam switches should be undertaken only by experienced repair personnel. Switch alignment and spring tension of the contacts must be carefully maintained for proper operation of the switch. For assistance in repair of the cam switches contact your local Tektronix Field Office or representative.

A. CAM SWITCHES

The cam switches consist of a rotating drum with lobes, whose position is controlled by the front-panel knobs, which actuate spring-leaf contacts.

The following instructions have been generalized to fit all instruments. Detailed instructions for cam switch repair, where required, will be found in the appropriate manual.

1. Remove any shields, switch shafts, interfering wires, components, or circuit boards that prevent access to the circuit board with the bad cam switch contact.

NOTE

Cam switch bearing blocks that attach to more than one circuit board should not be separated from both boards during disassembly, unless absolutely necessary, as proper bearing alignment will be difficult.

2. Completely remove from the instrument the circuit board having the defective cam switch contact.

3. To replace the defective cam switch contacts, follow the instructions given in the switch repair kit.

4. To reassemble the instrument, reverse the disassembly procedure.

B. PUSHBUTTON SWITCHES

The pushbutton switches are not repairable and should be replaced as a unit if defective. Use a de-soldering tool to remove solder from the holes in the circuit board when unsoldering the switches.

REPACKAGING FOR SHIPMENT

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument serial number and a description of the service required.

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

Surround the instrument with polyethylene sheeting to protect the finish of the instrument. Obtain a carton of corrugated cardboard of the correct carton strength and having inside dimensions of no less than six inches more than the instrument dimensions. Cushion the instrument by tightly packing three inches of dunnage or urethane foam between carton and instrument, on all sides. Seal the carton with shipping tape or industrial stapler.

The carton test strength for your instrument is 275 pounds.

INSTRUMENT OPTIONS

No options were available for this instrument at the time of this printing.

Information on any subsequent options may be found in the CHANGE INFORMATION section in the back of this manual.

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.

component number

A23R1234 — A23 R1234

Assembly number — Circuit number

Read: Resistor 1234 of Assembly 23

Example b.

component number

A23A2R1234 — A23 A2 R1234

Assembly number — Subassembly number — Circuit number

Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
00213	NYTRONICS, COMPONENTS GROUP, INC., SUBSIDIARY OF NYTRONICS, INC.	ORANGE STREET	DARLINGTON, SC 29532
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC. SEMICONDUCTOR GROUP	P.O. BOX 5012	DALLAS, TX 75222
02111	SPECTROL ELECTRONICS CORPORATION	17070 EAST GALE AVENUE	CITY OF INDUSTRY, CA 91745
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
12697	CLAROSTAT MFG. CO., INC.	LOWER WASHINGTON STREET	DOVER, NH 03820
12954	SIEMENS CORPORATION, COMPONENTS GROUP	8700 E THOMAS RD, P O BOX 1390	SCOTTSDALE, AZ 85252
14433	ITT SEMICONDUCTORS	3301 ELECTRONICS WAY P O BOX 3049	WEST PALM BEACH, FL 33402
17856	SILICONIX, INC.	2201 LAURELWOOD DRIVE	SANTA CLARA, CA 95054
19647	CADDOCK ELECTRONICS INC.	3127 CHICAGO AVENUE	RIVERSIDE, CA 92507
22229	SOLITRON DEVICES, INC., SEMICONDUCTOR GROUP	8808 BALBOA AVENUE	SAN DIEGO OPERS, CA 92123
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
53399	GERMANIUM POWER DEVICES CORP.	SHAWSHEEN VILLAGE STATION P.O. BOX 65	AMDOVER, MA 01810
56289	SPRAGUE ELECTRIC CO.	87 MARSHALL ST.	NORTH ADAMS, MA 01247
59660	TUSONIX INC.	2155 N FORBES BLVD	TUCSON, AZ 85705
59821	CENTRALAB INC SUB NORTH AMERICAN PHILIPS CORP	7158 MERCHANT AVE	EL PASO, TX 79915
63743	WARD LEONARD ELECTRIC CO., INC.	31 SOUTH ST.	MOUNT VERNON, NY 10550
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
71590	CENTRALAB ELECTRONICS, DIV. OF GLOBE-UNION, INC.	P O BOX 858	FORT DODGE, IA 50501
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
80740	BECKMAN INSTRUMENTS, INC.	2500 HARBOR BLVD.	FULLERTON, CA 92634
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A	670-0840-00			CKT BOARD ASSY:STEP GEN LOAD	80009	670-0840-00
A	670-1115-02			CKT BOARD ASSY:CALIBRATION TEST	80009	670-1115-02
A	670-1114-00			CKT BOARD ASSY:RESISTOR LOAD	80009	670-1114-00
C127	285-0708-00			CAP.,FXD,PLSTC:	80009	285-0708-00
C128	290-0086-00			CAP.,FXD,ELCTLT:2000UF,+150-10%,35OV	56289	D27740
C129	283-0026-00			CAP.,FXD,CER DI:0.2UF,+80-20%,25V	56289	274C3
C149	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	59821	2DDH66J103Z
C180	283-0011-00			CAP.,FXD,CER DI:0.01UF,2000V	59660	3902BF401Z5U0103
C200	283-0079-00			CAP.,FXD,CER DI:0.01UF,20%,250V	59660	8151B202Y5S0103M
C227	283-0054-00			CAP.,FXD,CER DI:150PF,5%,200V	59660	855-535U2J0 151J
C240	283-0077-00			CAP.,FXD,CER DI:330PF,5%,500V	59660	831-500B331J
C243	283-0083-00			CAP.,FXD,CER DI:0.0047UF,20%,500V	72982	811-565C471J
C248	283-0083-00			CAP.,FXD,CER DI:0.0047UF,20%,500V	72982	811-565C471J
C250	283-0077-00			CAP.,FXD,CER DI:330PF,5%,500V	59660	831-500B331J
C262	283-0028-00			CAP.,FXD,CER DI:0.0022UF,20%,50V	59660	0805585Y5SO222M
C270	285-0708-00			CAP.,FXD,PLSTC:	80009	285-0708-00
C278	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	71590	2DDU66B104Z
C299	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145651 104Z
C304	290-0310-00			CAP.,FXD,ELCTLT:2000UF,+75-10%,75V	56289	D44886-DFP
C310	290-0248-01			CAP.,FXD,ELCTLT:150UF,20%,15V	56289	150D157X0015S2
C313	290-0248-01			CAP.,FXD,ELCTLT:150UF,20%,15V	56289	150D157X0015S2
C330	283-0078-00			CAP.,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C335	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
C343	283-0026-00			CAP.,FXD,CER DI:0.2UF,+80-20%,25V	56289	274C3
CR124	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	07263	FDH2161
CR125	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	07263	FDH2161
CR128	152-0088-00			SEMICOND DEVICE:	04713	SR2099
CR149	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	01295	1N4152R
CR302	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
CR303	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	14433	LG4016
F100	159-0025-00			FUSE,CARTRIDGE:3AG,0.5A,250V,FAST-BLOW	71400	AGC 1/2
F126	159-0021-00			FUSE,CARTRIDGE:3AG,2A,250V,FAST-BLOW	71400	AGC 2
Q147	151-0150-00			TRANSISTOR:SILICON,NPN	80009	151-0150-00
Q234	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q241	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q251	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q256	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
Q264	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q268	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
Q271	151-1006-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	17856	FN686
Q305	151-0137-00			TRANSISTOR:GERMANIUM,PNP	53399	OBD
Q307	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q308	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q320	151-1010-00			TRANSISTOR:SILICON,JFE,DUAL	22229	FD1173
Q322	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q324	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q332	151-1006-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	17856	FN686
Q335	151-0220-00			TRANSISTOR:SILICON,PNP	07263	S036228
Q337	151-0183-00			TRANSISTOR:SILICON,NPN	27014	NS14069
Q340	151-0140-00			TRANSISTOR:SILICON,NPN	02735	36568
Q347	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01
Q348	151-0190-01			TRANSISTOR:SILICON,NPN	80009	151-0190-01

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1	308-0078-00			RES.,FXD,WW:70 OHM,5%,5W	63743	7686
R2	308-0078-00			RES.,FXD,WW:70 OHM,5%,5W	63743	7686
R3	308-0078-00			RES.,FXD,WW:70 OHM,5%,5W	63743	7686
R5	308-0431-00			RES.,FXD,WW:120 OHM,5%,3W	91637	CW2B-120R0J-TR
R7	308-0051-00			RES.,FXD,WW:	63743	21828
R9	308-0510-00			RES.,FXD,WW:24.775 OHM,2/2.25 OHM	80009	308-0510-00
R11	308-0135-00			RES.,FXD,WW:5K OHM,5%,5W	80009	308-0135-00
R13	308-0338-00			RES.,FXD,WW:150 OHM,5%,5W	91637	CW2A 150R0J
R14	308-0338-00			RES.,FXD,WW:150 OHM,5%,5W	91637	CW2A 150R0J
R101	321-0345-00			RES.,FXD,FILM:38.3K OHM,1%,0.125W	91637	MFF1816G38301F
R102	311-0550-00			RES.,VAR,NONWIR:25K OHM,10%	32997	3006Y-1-253
R103	321-0380-00			RES.,FXD,FILM:88.7K OHM,1%,0.125W	91637	MFF1816G88701F
R105	308-0572-00			RES.,SET,MTCHD:	80009	308-0572-00
R108	321-0331-00			RES.,FXD,FILM:27.4K OHM,1%,0.125W	91637	MFF1816G27401F
R109	311-0409-00			RES.,VAR,WW:1K OHM,5%,0.25W	32997	3057Y-1-102
R111	321-0309-00			RES.,FXD,FILM:16.2K OHM,1%,0.125W	91637	MFF1816G16201F
R112	311-0409-00			RES.,VAR,WW:1K OHM,5%,0.25W	32997	3057Y-1-102
R114	321-0263-00			RES.,FXD,FILM:5.36K OHM,1%,0.125W	91637	MFF1816G53600F
R115	311-0266-00			RES.,VAR,WW:	02111	40Y-501
R117	321-0228-00			RES.,FXD,FILM:2.32K OHM,1%,0.125W	91637	MFF1816G23200F
R118	311-0989-00			RES.,VAR,NONWIR:TRMR,100 OHM,0.25W	80740	78PR100
R120	315-0824-00			RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R121	311-0274-00			RES.,VAR,NONWIR:	12697	CM30929
R122	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R129	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R130	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R131	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R132	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R133	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R134	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R135	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R136	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R137	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R138	305-0273-00			RES.,FXD,CMPSN:27K OHM,5%,2W	01121	HB2735
R148	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R151	323-0498-03			RES.,FXD,FILM:1.5 MEG OHM,0.25%,0.5W		
R152	323-0498-03			RES.,FXD,FILM:1.5 MEG OHM,0.25%,0.5W		
R153	323-0498-03			RES.,FXD,FILM:1.5 MEG OHM,0.25%,0.5W		
R155	323-0611-03			RES.,FXD,FILM:900K OHM,0.25%,0.50W	91637	MFF1226D90002C
R156	323-0611-03			RES.,FXD,FILM:900K OHM,0.25%,0.50W	91637	MFF1226D90002C
R157	323-0611-03			RES.,FXD,FILM:900K OHM,0.25%,0.50W	91637	MFF1226D90002C
R159	323-0385-03			RES.,FXD,FILM:100K OHM,0.25%,0.50W	75042	CECT2-1003C
R161	323-0638-00			RES.,FXD,FILM:	75042	CECT5-5002C
R163	321-0604-00			RES.,FXD,FILM:30K OHM,0.25%,0.125W	91637	MFF1816D30001C
R165	321-0289-03			RES.,FXD,FILM:10K OHM,0.25%,0.125W	91637	MFF1816D10001C
R167	321-0748-06			RES.,FXD,FILM:4.95K OHM,0.25%,0.125W	91637	MFF1816C49500C
R168	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R169	321-0666-00			RES.,FXD,FILM:3.04K OHM,0.5%,0.125W	91637	MFF1816D30400D
R171	321-0193-03			RES.,FXD,FILM:1K OHM,0.25%,0.125W	91637	MFF1816D10000C
R173	321-0193-03			RES.,FXD,FILM:1K OHM,0.25%,0.125W	91637	MFF1816D10000C
R174	321-0193-03			RES.,FXD,FILM:1K OHM,0.25%,0.125W	91637	MFF1816D10000C
R176	321-0193-03			RES.,FXD,FILM:1K OHM,0.25%,0.125W	91637	MFF1816D10000C
R177	321-0193-03			RES.,FXD,FILM:1K OHM,0.25%,0.125W	91637	MFF1816D10000C
R180	323-0452-00			RES.,FXD,FILM:499K OHM,1%,0.50W	75042	CECT0-4993F

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R181	323-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.50W	75042	CECT0-1004D
R182	323-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.50W	75042	CECT0-1004D
R183	323-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.50W	75042	CECT0-1004D
R184	323-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.50W	75042	CECT0-1004D
R185	323-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.50W	75042	CECT0-1004D
R186	308-0459-00			RES.,FXD,WW:1.1 OHM,5%,3W	91637	CW2B-1R100J TR
R187	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R188	308-0548-00			RES.,FXD,WW:0.1 OHM,3%,5W	91637	RS5-ER1000H
R189	303-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,1W	01121	GB3625
R191	308-0537-00			RES.,FXD,WW:1K OHM,0.5%,5W	91637	RS2A-B10000D
R200	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0. 25W	01121	CB1015
R201	308-0591-00			RES.,FXD,WW:40 OHM,0.5%,55W	91637	HLT5509Z11
R202	308-0591-00			RES.,FXD,WW:40 OHM,0.5%,55W	91637	HLT5509Z11
R204	308-0545-00			RES.,FXD,WW:100 OHM,0.5%,5W	00213	1250S-100R0D
R205	308-0545-00			RES.,FXD,WW:100 OHM,0.5%,5W	00213	1250S-100R0D
R207	308-0537-00			RES.,FXD,WW:1K OHM,0.5%,5W	91637	RS2A-B10000D
R208	308-0537-00			RES.,FXD,WW:1K OHM,0.5%,5W	91637	RS2A-B10000D
R210	308-0538-00			RES.,FXD,WW:10K OHM,0.5%,5W	91637	RS2A-B10001D
R211	308-0538-00			RES.,FXD,WW:10K OHM,0.5%,5W	91637	RS2A-B10001D
R213	323-0385-01			RES.,FXD,FILM:100K OHM,0.5%,0.50W	75042	CECT0-1003D
R214	323-0385-01			RES.,FXD,FILM:100K OHM,0.5%,0.50W	75042	CECT0-1003D
R216	323-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.50W	75042	CECT0-1004D
R217	323-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.50W	75042	CECT0-1004D
R219	323-0577-01			RES.,FXD,FILM:10M OHM,0.5%,0.5W	91637	PME70T0-1005D
R220	323-0577-01			RES.,FXD,FILM:10M OHM,0.5%,0.5W	91637	PME70T0-1005D
R222	323-0604-00			RES.,FXD,FILM:	75042	CECT9-7503C
R223	323-0604-00			RES.,FXD,FILM:	75042	CECT9-7503C
R225	323-0758-07			RES.,FXD,FILM:3K OHM,0.1%,0.50W	91637	MFF1226C30000B
R226	323-0758-07			RES.,FXD,FILM:3K OHM,0.1%,0.50W	91637	MFF1226C30000B
R228	323-0758-07			RES.,FXD,FILM:3K OHM,0.1%,0.50W	91637	MFF1226C30000B
R231	311-0950-00			RES.,VAR,NONWIR:TRMR,10K OHM,0.5W	73138	91B R10K
R233	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R240	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
R242	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
R244	311-0831-00			RES.,VAR,NONWIR:TRMR,100K OHM,0.5W	73138	91-104-0
R245	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R247	315-0563-00			RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
R252	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R254	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0. 25W	01121	CB1015
R255	301-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
R257	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R258	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R259	311-0884-00			RES.,VAR,NONWIR:TRMR,100 OHM,0.5W	01121	SV1011
R260	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R262	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R263	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R265	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R266	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R268	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R274	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R275	311-0704-00			RES.,VAR,NONWIR:TRMR,500 OHM,0.5W	73138	91-101-0
R276	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R279	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R299	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R304	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R305	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R306	323-0222-00			RES.,FXD,FILM:2K OHM,1%,0.50W	75042	CECT0-2001F
R307	323-0222-00			RES.,FXD,FILM:2K OHM,1%,0.50W	75042	CECT0-2001F
R308	301-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.50W	01121	EB2025
R309	301-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.50W	01121	EB8215
R311	311-0827-00			RES.,VAR,NONWIR:TRMR,250 OHM,0.5W	01121	SV2511
R312	311-0886-00			RES.,VAR,NONWIR:TRMR,50 OHM,0.5W	01121	SV5001
R314	321-0749-06			RES.,FXD,FILM:450 OHM,0.25%,0.125W	91637	MFF1816C450R0C
R315	321-0749-06			RES.,FXD,FILM:450 OHM,0.25%,0.125W	91637	MFF1816C450R0C
R316	321-0114-01			RES.,FXD,FILM:150 OHM,0.5%,0.125W	91637	MFF1816G150R0D
R317	321-0114-01			RES.,FXD,FILM:150 OHM,0.5%,0.125W	91637	MFF1816G150R0D
R323	311-0883-00			RES.,VAR,NONWIR:50K OHM,0.50W	01121	SV5031
R324	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R329	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R330	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R332	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R338	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R343	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R345	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R347	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R349	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R350	310-0687-00			RES.,FXD,WW:		310-0687-00
R351	310-0685-00			RES.,FXD,WW:		310-0685-00
R352	310-0686-00			RES.,FXD,WW:		310-0686-00
R353	310-0684-00			RES.,FXD,WW:		310-0684-00
R354	308-0584-00			RES.,FXD,WW:20 OHM,0.5%,5W	91637	RS5-K20R00D
R356	308-0585-00			RES.,FXD,WW:50 OHM,0.5%,5W	91637	RS5-KF0R00D
R357	308-0545-00			RES.,FXD,WW:100 OHM,0.5%,5W	00213	1250S-100R0D
R358	323-0126-01			RES.,FXD,FILM:200 OHM,0.5%,0.50W	75042	CECT0-2000D
R359	308-0434-00			RES.,FXD,WW:500 OHM,0.25%,3W	91637	RS2B-A500R0C
R360	321-0193-03			RES.,FXD,FILM:1K OHM,0.25%,0.125W	91637	MFF1816D10000C
R361	321-0222-01			RES.,FXD,FILM:2K OHM,0.5%,0.125W	91637	MFF1816G20000D
R362	321-0816-07			RES.,FXD,FILM:5K OHM,0.1%,0.125W	91637	MFF1816C50000B
R363	321-0289-03			RES.,FXD,FILM:10K OHM,0.25%,0.125W	91637	MFF1816D10001C
R364	323-0318-01			RES.,FXD,FILM:20K OHM,0.5%,0.50W	91637	MFF1226G20001D
R365	321-0756-03			RES.,FXD,FILM:50K OHM,0.25%,0.125W	91637	MFF1816D50001C
R366	321-0644-00			RES.,FXD,FILM:100K OHM,0.25%,0.125W	91637	MFF1816C10002C
R367	321-0646-00			RES.,FXD,FILM:200K OHM,0.5%,0.125W	91637	MFF1816D20002D
R368	321-0648-00			RES.,FXD,FILM:500K OHM,0.5%,0.125W	91637	HFF188D50002D
R369	322-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.25W	75042	CEBT0-1004D
R371	323-0385-03			RES.,FXD,FILM:100K OHM,0.25%,0.50W	75042	CECT2-1003C
R373	323-0481-01			RES.,FXD,FILM:1M OHM,0.5%,0.50W	75042	CECT0-1004D
R375	325-0007-01			RES.,FXD,FILM:	19647	MG75010004D
R377	310-0505-00			RES.,FXD,FILM:	01295	CD2R3005F
R378	310-0505-00			RES.,FXD,FILM:	01295	CD2R3005F
R379	310-0505-00			RES.,FXD,FILM:	01295	CD2R3005F
S100	262-0883-00			SWITCH,WIRED:	80009	262-0883-00
S105	262-0885-00			SWITCH,WIRED:	80009	262-0885-00
S107	262-0886-00			SWITCH,WIRED:CALIBRATOR RANGE	80009	262-0886-00
S121	311-0274-00			RES.,VAR,NONWIR:	12697	CM30929
S165	262-0888-00			SWITCH,WIRED:HORIZONTAL VOLTS	80009	262-0888-00
S185	262-0884-00			SWITCH,WIRED:STEP GENERATOR LOADS	80009	262-0884-00
S210	105-0148-00			DRUM,CAM SWITCH:	80009	105-0148-00
S360	262-0889-00			SWITCH,WIRED:VERTICAL	80009	262-0889-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
T301	120-0625-00			XFMR,PWR,STPDN:	80009	120-0625-00
U149	156-0049-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	02735	CA741CT
U230	156-0049-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	02735	CA741CT
U327	156-0049-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	02735	CA741CT
VR138	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR139	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR140	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR141	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR142	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR143	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR144	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR145	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR146	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR147	152-0287-00			SEMICOND DEVICE:ZENER,0.4W,110V,5%	12954	1N986B
VR310	152-0171-00			SEMICOND DEVICE:ZENER,0.5W,11.7V,5%	80009	152-0171-00
VR349	152-0280-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it is in the low state.

Abbreviations are based on ANSI Y1.1-1972.

Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

Y14.15, 1966	Drafting Practices.
Y14.2, 1973	Line Conventions and Lettering.
Y10.5, 1968	Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

American National Standard Institute
1430 Broadway
New York, New York 10018

Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads (μF).

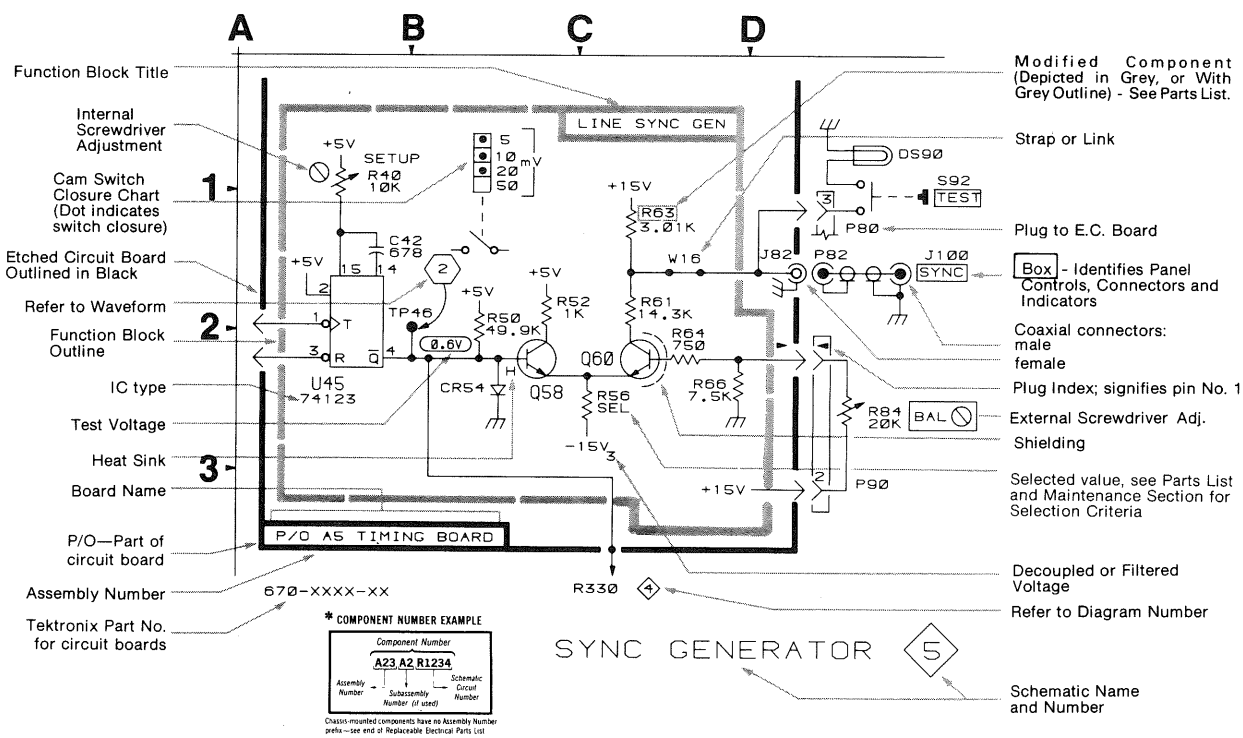
Resistors = Ohms (Ω).

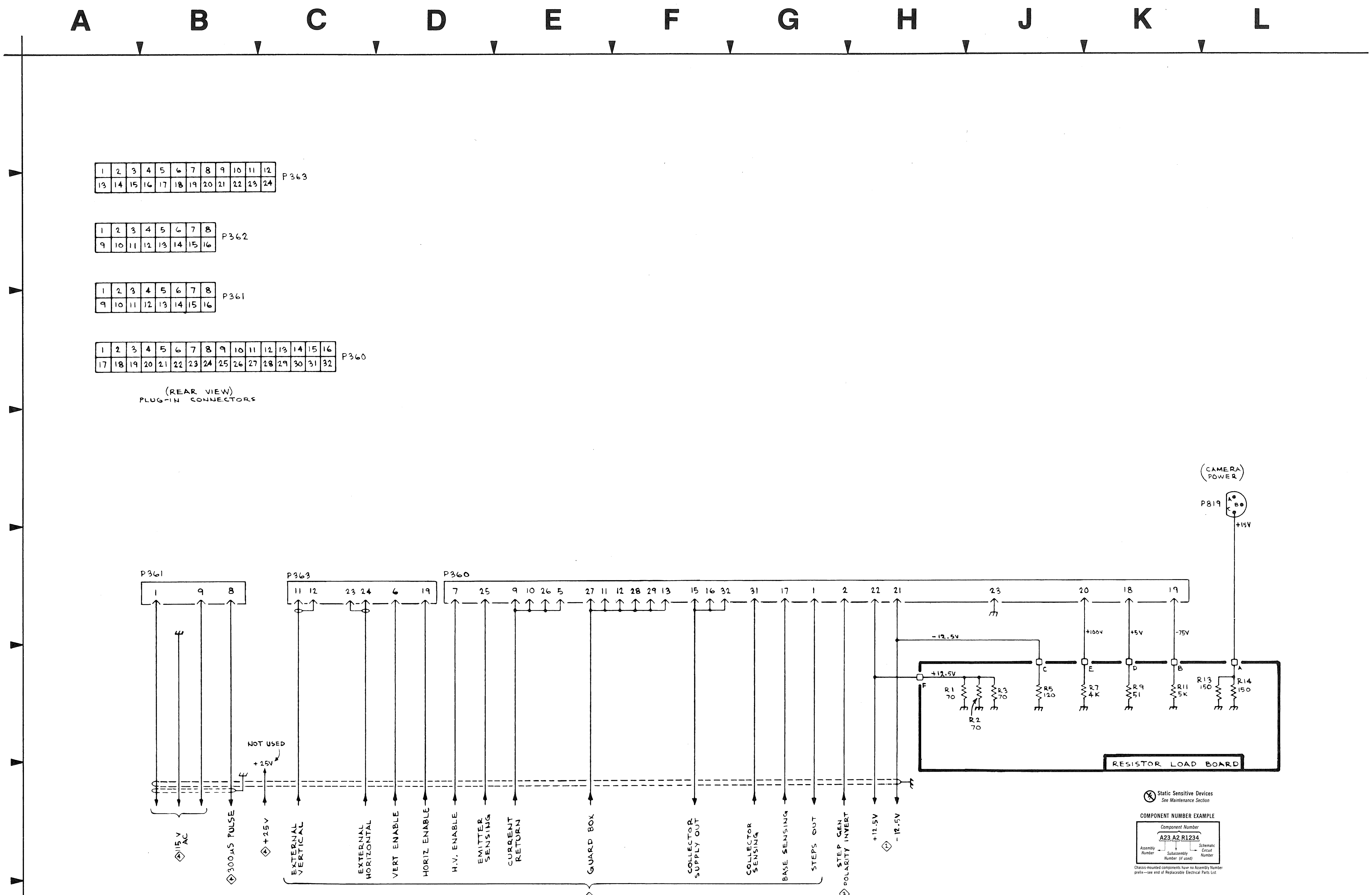
The information and special symbols below may appear in this manual.

Assembly Numbers and Grid Coordinates

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the circuit board outline on the diagram, in the title for the circuit board component location illustration, and in the lookup table for the schematic diagram and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assemblies in numerical sequence; the components are listed by component number *(see following illustration for constructing a component number).

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table. When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram on which it was illustrated; the lookup table will list the diagram number of other diagrams that the circuitry of the circuit board appears on.





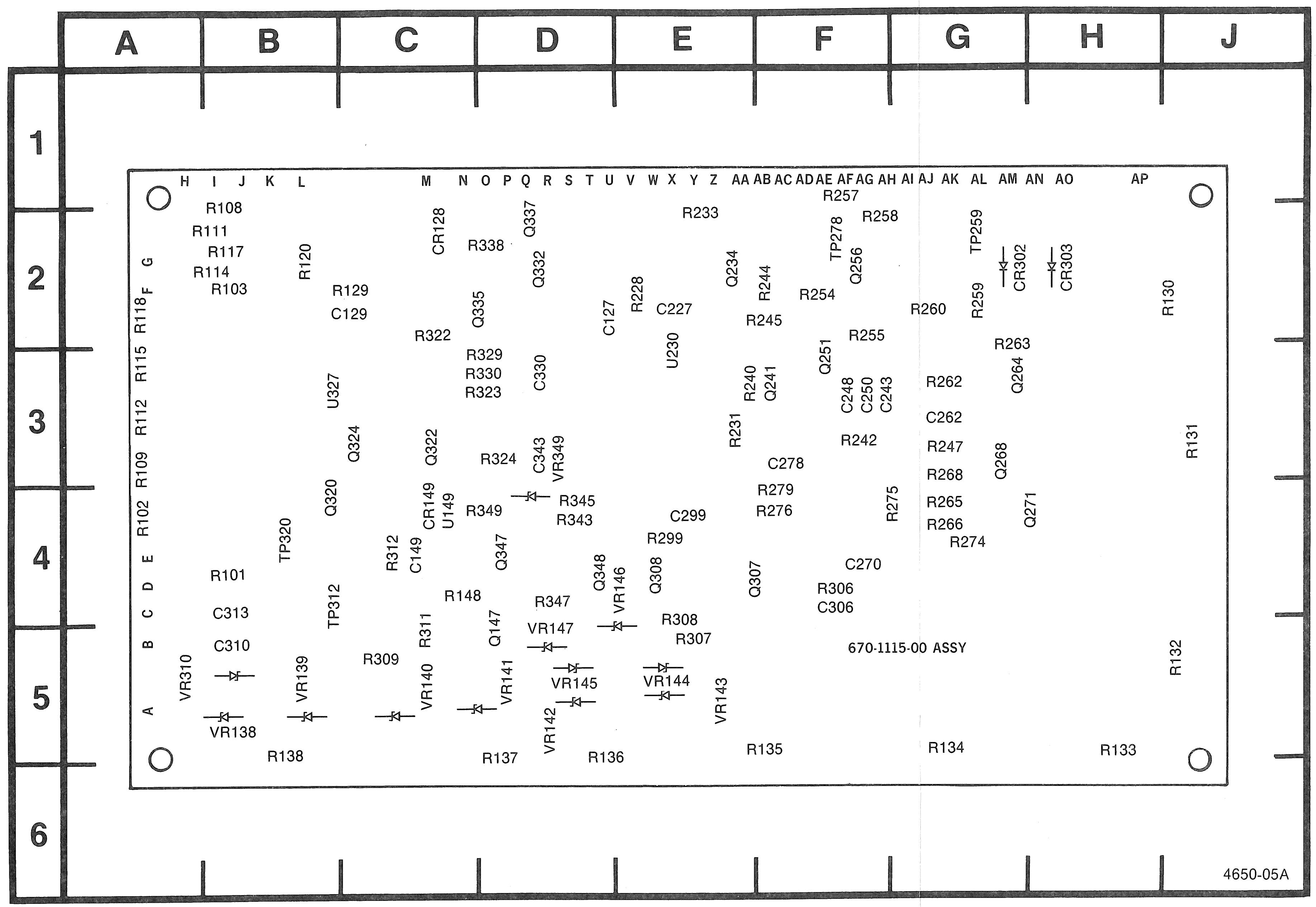
067-0599-00

4650-01

CONNECTORS TO INDICATOR 1

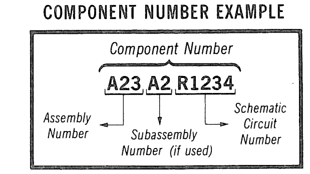
067-0599-00

MAIN BOARD
COMPONENT LOCATIONS



Located on back of board:
C308 C234 R310 VR308

COMPONENT NUMBER EXAMPLE

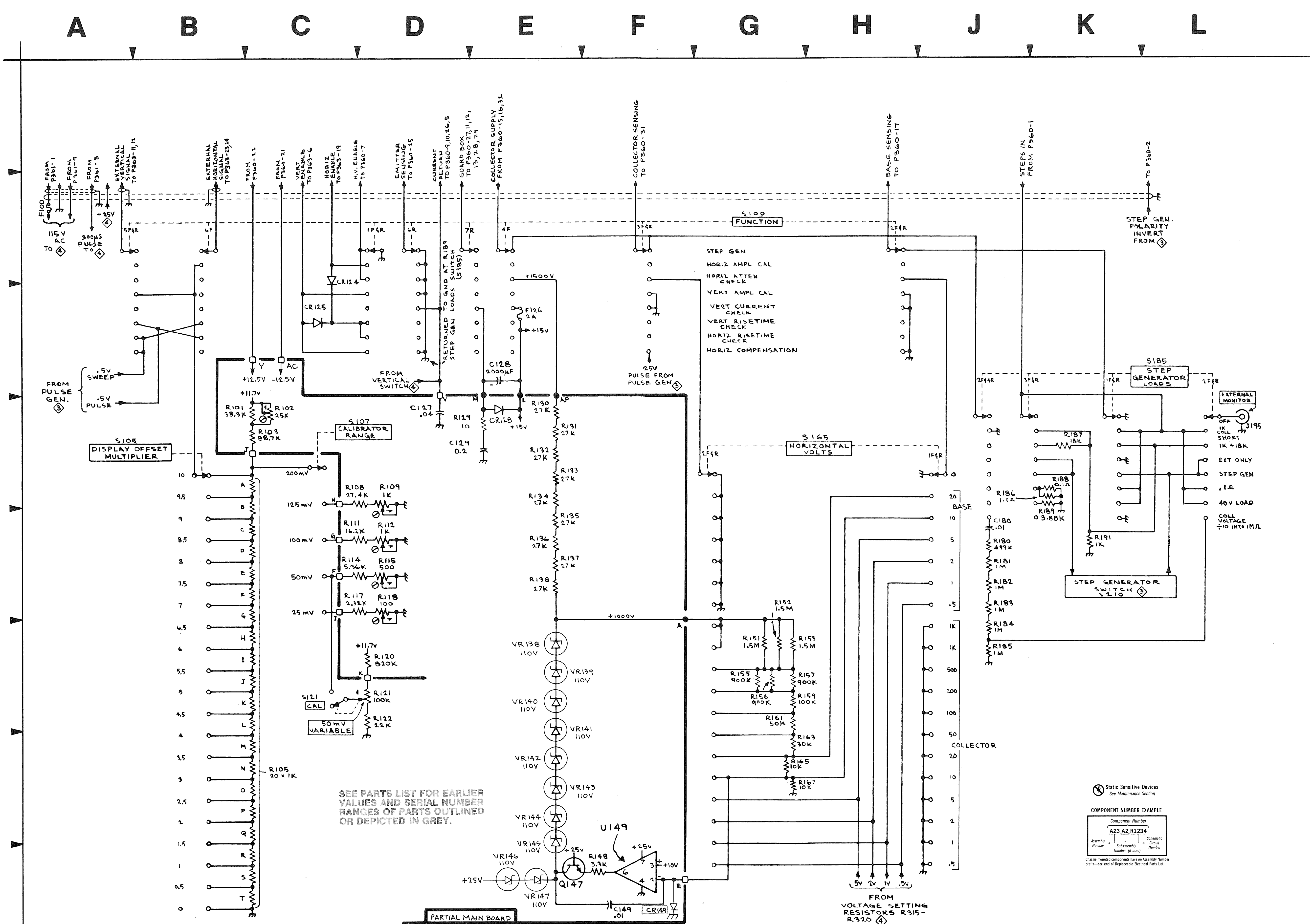


Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

P/O MAIN BOARD — **Function Switching 2**

Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
C127	4D	2D	R131	4E	3J
C129	4D	2C	R132	4E	5J
C149	8F	4C	R133	4E	5H
			R134	4E	5G
CR128	4E	2C	R135	5E	5F
CR149	7F	4C	R136	5E	6D
Q147	8E	5D	R137	5E	5D
			R138	5E	5B
R101	4B	4B	R148	8F	4C
R102	4C	4A			
R103	4C	2B	U149	7F	4C
R108	4C	1B			
R109	4D	3A	VR138	6E	5B
R111	5C	2B	VR139	6E	5B
R112	5D	3A	VR140	6E	5C
R114	5C	2B	VR141	7F	5D
R115	5D	2B	VR142	7F	5D
R117	5C	2B	VR143	7F	5E
R118	5D	2A	VR144	7F	5E
R120	6D	2B	VR145	7F	5D
R129	4D	2C	VR146	8F	4E
R130	4E	2J	VR147	8F	5D

P/O MAIN BOARD also shown on 3 & 4



067-0599-00

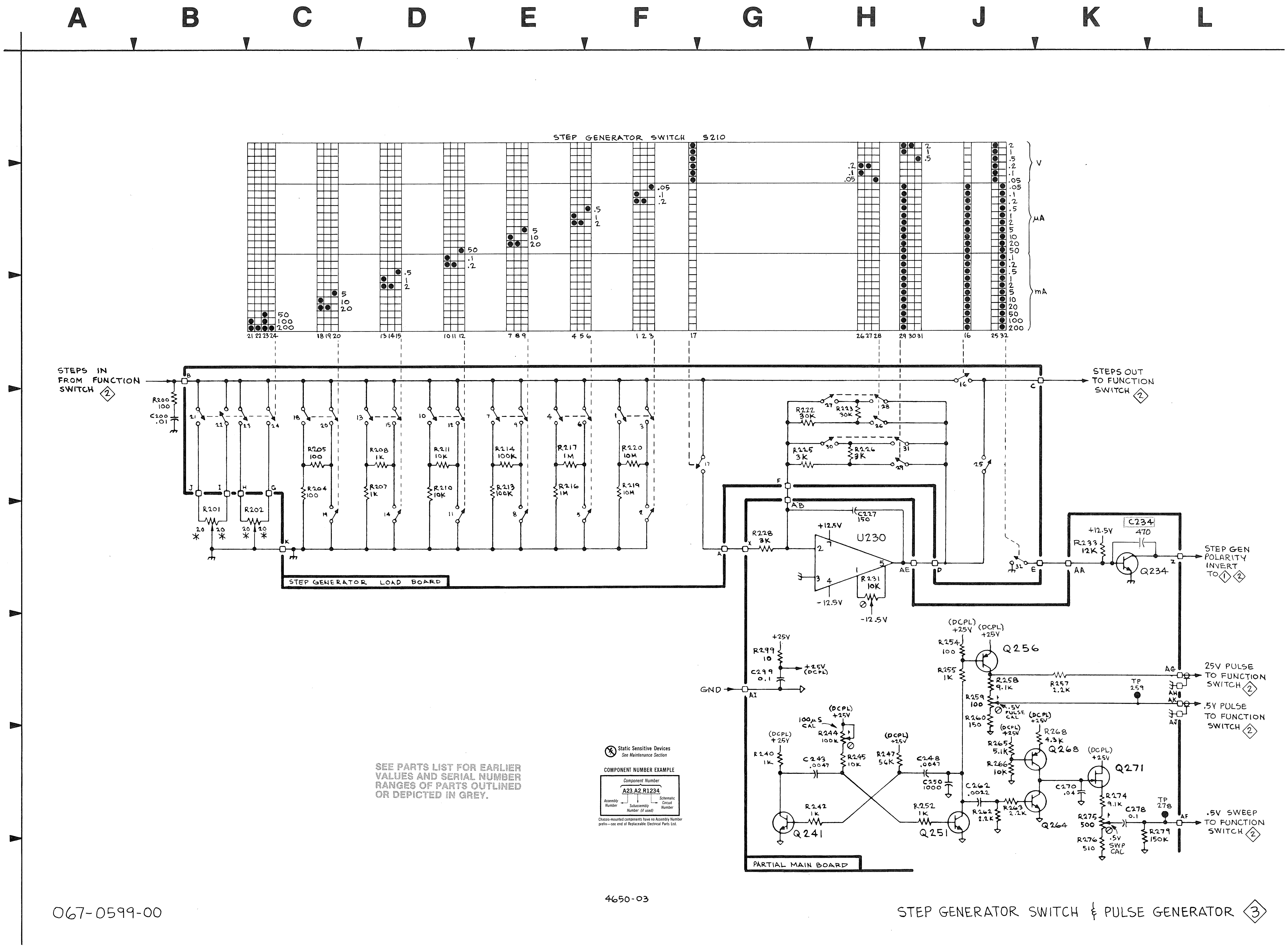
4650-02

FUNCTION SWITCHING ②

FUNCTION SWITCHING ②

P/O MAIN BOARD				Step Generator Switch & Pulse Generator 3	
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
C227	5H	2E	R245	7H	2F
C234	5K		R247	7H	3G
C243	7H	3F	R252	7J	2F
C248	7J	3F	R254	6J	2F
C250	7J	3F	R255	6J	2F
C262	7J	3G	R257	6K	1F
C270	7K	4F	R258	6J	2F
C278	7K	3F	R259	6J	2G
C299	6G	4E	R260	6J	2G
			R262	7J	3G
Q234	5L	2E	R263	7J	2G
Q241	7H	3F	R265	7J	4G
Q251	7J	3F	R266	7J	4G
Q256	6J	2F	R268	7K	3G
Q264	7K	3G	R274	7K	4G
Q268	7K	3G	R275	7K	4F
Q271	7K	4H	R276	8K	4F
			R279	7L	4F
R228	5G	2E	R299	6G	4E
R231	5H	3E			
R233	5K	2E	TP259	6K	2G
R240	7G	3E	TP278	7L	2F
R242	7H	3F			
R244	7H	2F	U230	5H	3E

P/O MAIN BOARD also shown on 2 & 4



067-0599-00

4650-03

STEP GENERATOR SWITCH & PULSE GENERATOR 3

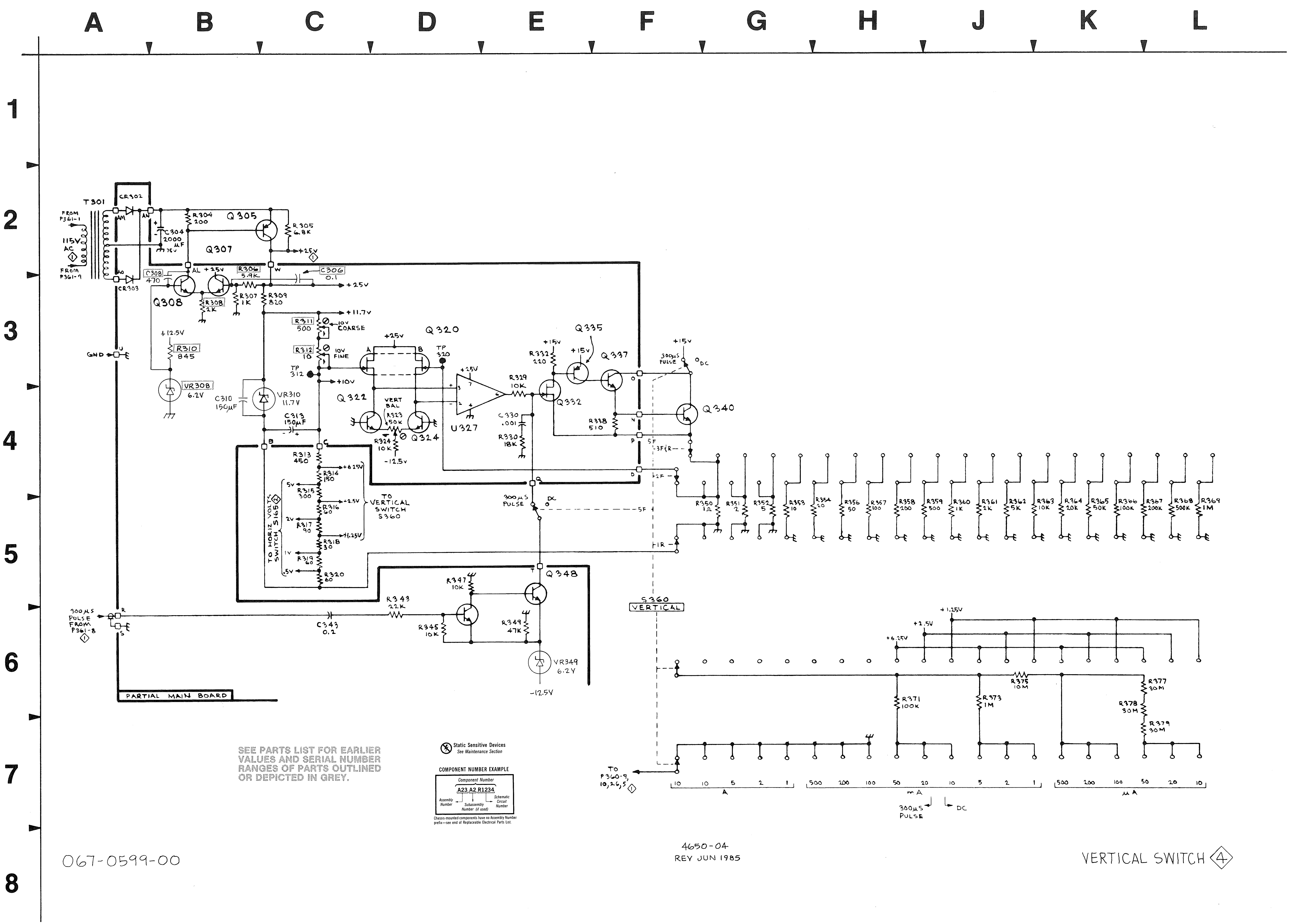
STEP GENERATOR SWITCH & PULSE GENERATOR

3

P/O MAIN BOARD | **Vertical Switch 4**

Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
C306	2C	4F	R309	3C	5C
C308	3B		R310	3B	
C310	4B	5B	R311	3C	5C
C313	4C	4B	R312	3C	4C
C330	4E	3D	R323	4D	3D
C343	6C	3D	R324	4D	3D
CR302	2A	2G	R329	3E	3D
CR303	3A	2H	R330	4E	3D
			R332	3E	2C
Q307	3B	4E	R338	4F	2D
Q308	3B	4E	R343	5D	4D
Q320	3D	4B	R345	6D	4D
Q322	4C	3C	R347	5D	4D
Q324	4D	3C	R349	6E	4D
Q332	4E	2D			
Q335	3E	2D	TP312	3C	4B
Q337	3F	2D	TP320	3D	4B
Q347	5D	4D			
Q348	5E	4D	U327	4D	3B
R306	2B	4F	VR308	3B	
R307	3B	5E	VR310	4C	5A
R308	3B	4E	VR349	6E	3D

P/O MAIN BOARD also shown on 2 & 3



SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

Static Sensitive Devices
See Maintenance Section

COMPONENT NUMBER EXAMPLE

Component Number
A23 A2 R1234
Assembly Number — Subassembly Number (if used) — Schematic Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

067-0599-00

4650-04
REV JUN 1985

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 Name & Description

Assembly and/or Component
Attaching parts for Assembly and/or Component
--- * ---
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
--- * ---
Parts of Detail Part
Attaching parts for Parts of Detail Part
--- * ---

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol --- * --- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

"	INCH	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICOND	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDENT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000AH	STANDARD PRESSED STEEL CO., UNBRAKO DIV.	8535 DICE ROAD	SANTA FE SPRINGS, CA 90670
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRUS DRIVE	BEAVERTON, OR 97005
02660	BUNKER RAMO CORP., CONNECTOR DIVISION	2801 S 25TH AVENUE	BROADVIEW, IL 60153
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
70318	ALLMETAL SCREW PRODUCTS CO., INC.	821 STEWART AVE.	GARDEN CITY, NY 11530
70485	ATLANTIC INDIA RUBBER WORKS, INC.	571 W. POLK ST.	CHICAGO, IL 60607
71785	TRW, CINCH CONNECTORS	1501 MORSE AVENUE	ELK GROVE VILLAGE, IL 60007
72653	G. C. ELECTRONICS CO., A DIVISION OF HYDROMETALS, INC.	400 S. WYMAN ST.	ROCKFORD, IL 61101
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
89663	REESE, J. RAMSEY, INC.	71 MURRAY STREET	NEW YORK, NY 10007
91506	AUGAT, INC.	33 PERRY AVE.	ATTLEBORO, MA 02703
93907	TEXTRON INC. CAMCAR DIV	600 18TH AVE	ROCKFORD, IL 61101
95712	BENDIX CORP., THE ELECTRICAL COMPONENTS DIV., MICROWAVE DEVICES PLANT	HURRICANE ROAD	FRANKLIN, IN 46131
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641
98627	UNIVERSAL OIL PRODUCTS CO., MORPLEX DIV.	1300 MORPLEX DRIVE	LACROSSE, WI 54601

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-1	333-1221-02			1	PANEL,FRONT:	80009	333-1221-02
-2	366-1009-00			1	KNOB:GY,0.252 ID X 1.29 OD X 0.7	80009	366-1009-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-3	----- -----			1	SWITCH WIRED:(SEE S100 REPL)		
					**************(ATTACHING PARTS)***********		
-4	210-0012-00			1	WASHER,LOCK:INTL,0.375 ID X 0.50" OD S	78189	1220-02-00-0541C
-5	210-0840-00			1	WASHER,FLAT:0.39 ID X 0.562 INCH OD,STL	89663	644R
-6	210-0413-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
					************(END ATTACHING PARTS)*********		
-7	366-1008-00			1	KNOB,GRAY:0.252 ID X 1.29 OD	80009	366-1008-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-8	366-0499-00			1	KNOB,GRAY:0.127 ID X 0.825 OD	80009	366-0499-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-9	----- -----			1	SWITCH,WIRED:(SEE S107 REPL)		
					**************(ATTACHING PARTS)***********		
-10	210-0012-00			1	WASHER,LOCK:INTL,0.375 ID X 0.50" OD S	78189	1220-02-00-0541C
-11	210-0413-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
					************(END ATTACHING PARTS)*********		
	----- -----			-	SWITCH ASSY INCLUDES:		
-12	367-0014-00			1	.CPLG, SHAFT,FLEX:SST WIRE, VAR RES	80009	376-0014-00
-13	384-0381-00			1	.EXTENSION SHAFT:	80009	384-0381-00
-14	----- -----			1	.SWITCH,VAR.:(SEE R121,S121 REPL)		
					.*************(ATTACHING PARTS)***********		
-15	210-0012-00			1	.WASHER,LOCK:INTL,0.375 ID X 0.50" OD S	78189	1220-02-00-0541C
-16	210-0413-00			2	.NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
					.***********(END ATTACHING PARTS)*********		
-17	366-1009-00			1	KNOB:GY,0.252 ID X 1.29 OD X 0.7	80009	366-1009-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
	----- -----			1	SWITCH,WIRED:(SEE S185 REPL)		
					**************(ATTACHING PARTS)***********		
-19	210-0012-00			1	WASHER,LOCK:INTL,0.375 ID X 0.50" OD S	78189	1220-02-00-0541C
-20	210-0840-00			1	WASHER,FLAT:0.39 ID X 0.562 INCH OD,STL	89663	644R
-21	210-0413-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
					************(END ATTACHING PARTS)*********		
-22	366-1009-00			1	KNOB:GY,0.252 ID X 1.29 OD X 0.7	80009	366-1009-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-23	----- -----			1	SWITCH,WIRED:(SEE S360 REPL)		
					**************(ATTACHING PARTS)***********		
-24	210-0840-00			1	WASHER,FLAT:0.39 ID X 0.562 INCH OD,STL	89663	644R
-25	210-0413-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
	210-0012-00			2	WASHER,LOCK:INTL,0.375 ID X 0.50" OD S	78189	1220-02-00-0541C
					************(END ATTACHING PARTS)*********		
-26	366-1009-00			1	KNOB:GY,0.252 ID X 1.29 OD X 0.7	80009	366-1009-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-27	----- -----			1	SWITCH, WIRED:(SEE S105 REPL)		
					**************(ATTACHING PARTS)***********		
-28	210-0012-00			1	WASHER,LOCK:INTL,0.375 ID X 0.50" OD S	78189	1220-02-00-0541C
-29	210-0413-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
					************(END ATTACHING PARTS)*********		
-30	366-1009-00			1	KNOB:GY,0.252 ID X 1.29 OD X 0.7	80009	366-1009-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-31	----- -----			1	SWITCH,WIRED:(SEE S165 REPL)		
					**************(ATTACHING PARTS)***********		
-32	210-0012-00			1	WASHER,LOCK:INTL,0.375 ID X 0.50" OD S	78189	1220-02-00-0541C
-33	210-0413-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
					************(END ATTACHING PARTS)*********		
-34	366-1009-00			1	KNOB:GY,0.252 ID X 1.29 OD X 0.7	80009	366-1009-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-35	131-0106-00			1	CONNECTOR,RCPT,:FEMALE,BNC	95712	9856-1
	----- -----			1	CKT BOARD ASSY:STEP GEN LOAD (SEE REPL)		
					**************(ATTACHING PARTS)***********		
-36	210-0413-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
-37	210-0840-00			1	WASHER,FLAT:0.39 ID X 0.562 INCH OD,STL	89663	644R
					************(END ATTACHING PARTS)*********		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-	----- -----			-	CKT BOARD ASSY INCLUDES:		
-38	388-1463-00			1	.CKT BOARD ASSY:STEP GEN LOAD	80009	388-1463-00 *
					.*************(ATTACHING PARTS)***********		
-39	210-0406-00			6	.NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	12161-50
-40	211-0292-00			6	.SCR,ASSEM WSHR:4-40 X 0.29,BRS NI PL	78189	OBD
-41	211-0012-00			1	.SCREW,MACHINE:4-40 X 0.375,PNH STL CD PL	83385	OBD
-42	210-0841-00			1	.WASHER,FLAT:0.058 ID X 0.02 THK, BRS	80009	210-0841-00 *
					.**********(END ATTACHING PARTS)*********		
-43	354-0219-00			1	.RING,RETAINING:FOR 0.25 INCH SHAFT	79136	5103-25-MD-R
-44	200-0941-00			1	.COVER,CAM SW:39 ELEMENTS	80009	200-0941-00
					.*************(ATTACHING PARTS)***********		
-45	211-0022-00			4	.SCREW,MACHINE:2-56 X 0.188 INCH,PNH STL	83385	OBD
-46	210-0001-00			4	.WASHER,LOCK:INTL,0.092 ID X 0.18"OD,ST	78189	1202-00-00-0541C
-47	210-0405-00			4	.NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	12157-50
					.**********(END ATTACHING PARTS)*********		
-48	214-1139-00			1	.SPRING,FLAT:0.885 X 0.156 CU BE GLD CLR	80009	214-1139-00
	214-1139-02			1	.SPRING,FLAT:GREEN COLORED	80009	214-1139-02
	214-1139-03			1	.SPRING,FLAT:RED COLORED	80009	214-1139-03
-49	214-1127-00			1	.ROLLER,DETENT:0.125 DIA X 0.125,SST	80009	214-1127-00
-50	401-0054-00			1	.BEARING,CAM SW:FRONT	80009	401-0054-00
-51	131-0604-00			32	.CONTACT,ELEC:CKT BD SW,SPR,CU BE	80009	131-0604-00
-52	407-0653-00			1	.BRACKET,COVER:CAM SWITCH,DELRIN	80009	407-0653-00
-53	----- -----			1	.ACTUATOR,CAM SW:(SEE S210 REPL)		
-54	407-0056-00			1	.BRACKET,CAP.:ALUMINUM	80009	407-0056-00
-55	131-0633-00			11	.CONTACT,ELEC:0.385 INCH LONG	80009	131-0633-00
-56	407-0642-00			1	.BRACKET,ANGLE:	80009	407-0642-00 *
					.*************(ATTACHING PARTS)***********		
-57	211-0565-00			2	.SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-58	211-0157-00			2	.SCREW,MACHINE:4-40 X 0.312 INCH,STL	000AH	OBD
-59	210-0994-00			2	.WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5702-201-20
					.**********(END ATTACHING PARTS)*********		
-60	220-0532-00			1	.NUT,BLOCK:1.27 X 1.0 X 0.225	80009	220-0532-00
-61	407-0641-00			1	BRACKET,ANGLE:	80009	407-0641-00 *
					**************(ATTACHING PARTS)***********		
-62	210-0803-00			1	WASHER,FLAT:0.15 ID X 0.032 THK,STL CD	12327	OBD
-63	211-0507-00			1	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-64	210-0449-00			2	NUT,PLAIN,HEX.:5-40 X 0.250 INCH,BRS	73743	3030-402
-65	210-0006-00			2	WASHER,LOCK:#6 INTL,0.018 THK,STL CD PL	78189	1206-00-00-0541C
					************(END ATTACHING PARTS)*********		
-66	124-0093-00			1	TERMINAL BOARD:5 NOTCH CERAMIC,CLIP MTD	80009	124-0093-00
	361-0007-00			2	SPACER,SLEEVE:0.250 INCH DIA,PLASTIC	80009	361-0007-00
-67	348-0063-00			1	GROMMET,PLASTIC:0.50 INCH DIA	80009	348-0063-00
-68	----- -----			1	XFMR,PWR,STPDN:(SEE T301 REPL)		
					**************(ATTACHING PARTS)***********		
-69	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-70	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
					************(END ATTACHING PARTS)*********		
-71	200-0293-00			1	SHLD,CAPACITOR:2.563 INCHES LONG	80009	200-0293-00
-72	----- -----			1	CAP,FXD,ELCTLT:(SEE C128 REPL)		
					**************(ATTACHING PARTS)***********		
-73	211-0543-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,RDH	83385	OBD
-74	386-0254-00			1	RETAINER,CAP.:LARGE FIBER	98627	OBD
-75	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
					************(END ATTACHING PARTS)*********		
-76	432-0048-00			1	BASE,CAP.MTG:GENERAL	80009	432-0048-00
					**************(ATTACHING PARTS)***********		
-77	211-0588-00			2	SCREW,MACHINE:6-32 X 0.75 INCH,HEX.HD STL	83385	OBD
-78	386-0255-00			1	RETAINER,CAP.:LARGE METAL	80009	386-0255-00
-79	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
					************(END ATTACHING PARTS)*********		
-80	----- -----			2	TRANSISTOR:(SEE Q305,Q340 REPL)		
					**************(ATTACHING PARTS)***********		
-81	211-0510-00			4	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	OBD
-82	386-0978-00			2	INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0978-00
					************(END ATTACHING PARTS)*********		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-83	136-0135-00			2	SOCKET,PLUG-IN:2 PIN	91506	8038-1G8
					**************(ATTACHING PARTS)***********		
-84	213-0113-00			4	SCR,TPG,THD FOR:2-32 X 0.312 INCH,PNH STL	93907	OBD
					************(END ATTACHING PARTS)*********		
-85	----- -----			2	RES,FXD,WW:(SEE R201,R202 REPL)		
					**************(ATTACHING PARTS)***********		
-86	211-0529-00			2	SCREW,MACHINE:6-32 X 1.25 INCHES,PNH STL	83385	OBD
-87	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
-88	210-0803-00			2	WASHER,FLAT:0.15 ID X 0.032 THK,STL CD	12327	OBD
					************(END ATTACHING PARTS)*********		
-89	352-0031-00			2	FUSEHOLDER:3AG FUSE	75915	357001
					**************(ATTACHING PARTS)***********		
-90	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-91	210-0201-00			1	TERMINAL,LUG:0.12 ID,LOCKING,BRZ TIN PL	86928	OBD
					**************(ATTACHING PARTS)***********		
-92	213-0041-00			1	SCR,TPG,THD CTG:6-32 X 0.375 INCH,TRH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-93	179-1393-00			1	WIRING HARNESS:BASE & CONNECTOR	80009	179-1393-00
	198-2036-00			1	WIRE SET, ELEC:	80009	198-2036-00
-94	----- -----			1	CKT BOARD ASSY:CAL TEST(SEE REPL)		
					**************(ATTACHING PARTS)***********		
-95	211-0601-00			4	SCR,ASSEM WSHR:6-32 X 0.312,DOUBLE SEMS	83385	OBD
					************(END ATTACHING PARTS)*********		
	----- -----			-	CKT BOARD ASSY INCLUDES:		
-96	136-0220-00			15	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB M	71785	133-23-11-034
-97	214-0579-00			4	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-98	136-0235-00			1	.SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-99	131-0589-00			38	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-100	136-0183-00			2	.SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
-101	136-0237-00			3	.SOCKET,PLUG-IN:8 CONTACT,ROUND	71785	133-98-12-062
-102	129-0089-00			4	POST,ELEC-MECH:6-32 X 0.25 X 0.83 INCH L	80009	129-0089-00
					**************(ATTACHING PARTS)***********		
-103	211-0507-00			4	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-104	441-0890-00			1	CHAS,CAL FXTR:MAIN	80009	441-0890-00
					**************(ATTACHING PARTS)***********		
-105	211-0541-00			6	SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-106	386-1595-00			1	SUBPANEL,FRONT:	80009	386-1595-00

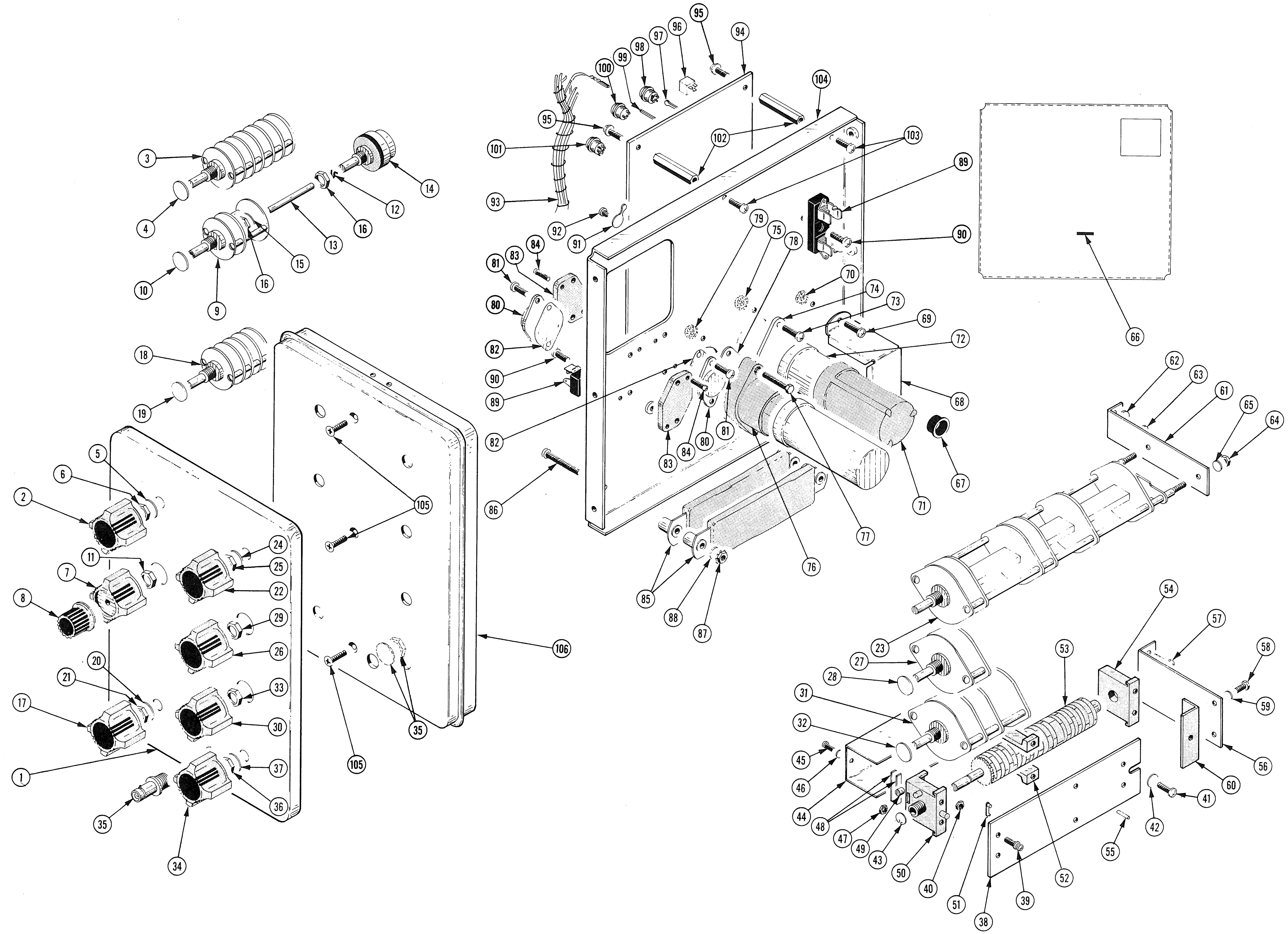


FIG. 1 FRONT

067-0599-00

FIG. 2 REAR

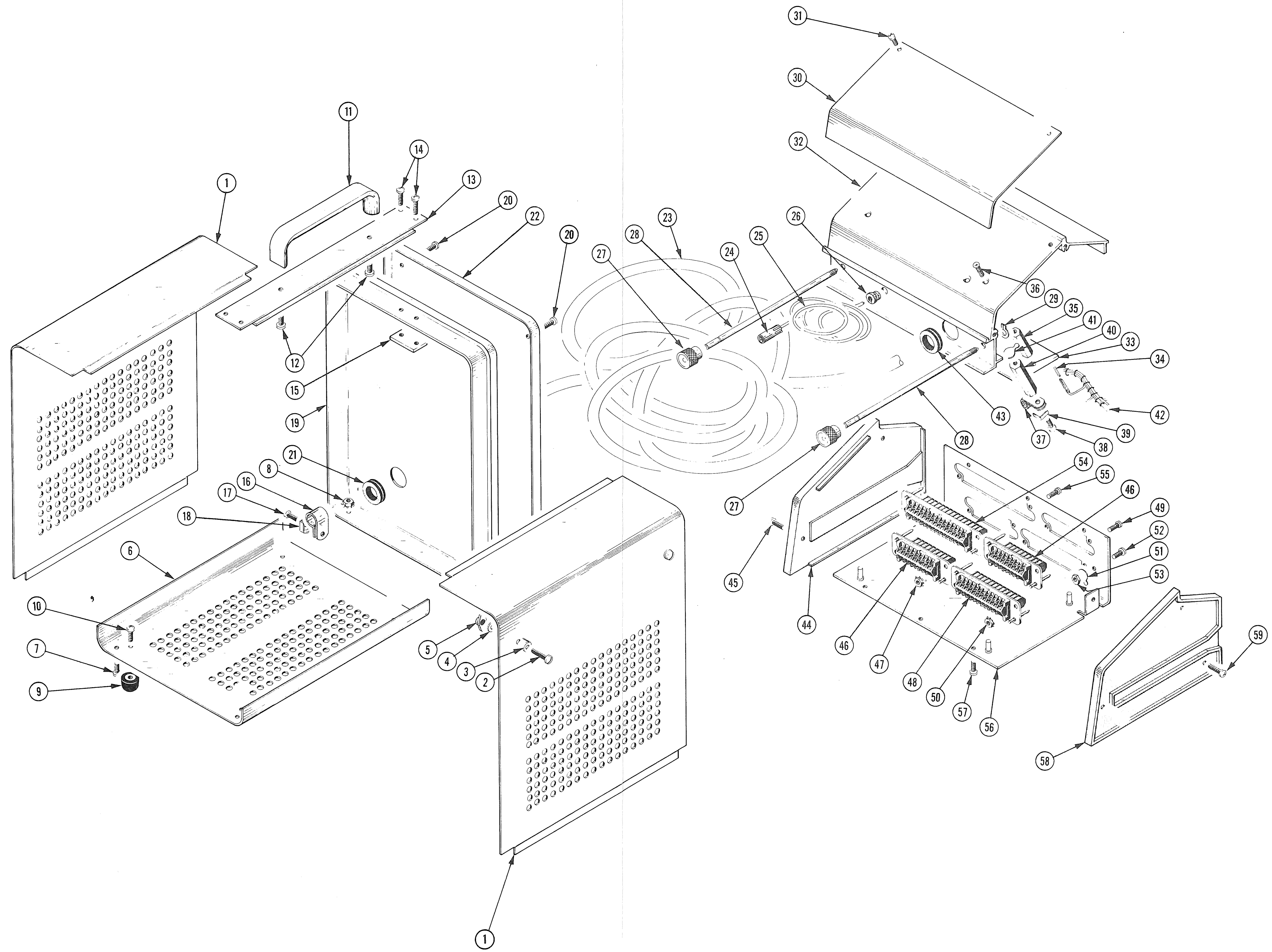


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-1	387-0261-00			2	CAB.SIDE,PLS GE:	80009	387-0261-00
-2	213-0040-00			2	.SCREW,MACHINE:6-32 X 0.5,0.312 OD HD,STL	80009	213-0040-00
-3	210-0870-00			2	.WASHER,FLAT:0.14 ID X 0.312 INCH OD STL	12327	OBD
-4	105-0009-00			2	.WASHER,KEY:STEEL,NP	80009	105-0009-00
-5	210-0470-00			2	.CLAMP,RIM CLENC:6-32 X 0.25 X 0.625,DELRI	80009	210-0470-00
-6	387-0350-00			1	COV,PULSE GEN:	80009	387-0350-00
					**************(ATTACHING PARTS)***********		
-7	211-0565-00			4	SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
-8	210-0457-00			4	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	83385	OBD
					************(END ATTACHING PARTS)*********		
	---- ----			-	BOTTOM PLATE ASSY INCLUDES:		
-9	348-0080-01			4	.FOOT,CABINET:BOTTOM	80009	348-0080-01
					.*************(ATTACHING PARTS)***********		
	210-0006-00			4	.WASHER,LOCK:#6 INTL,0.018 THK,STL CD PL	78189	1206-00-00-0541C
-10	211-0507-00			4	.SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					.***********(END ATTACHING PARTS)*********		
-11	367-0007-00			1	HANDLE,BOW:4.348 L,BRS CRPL	80009	367-0007-00
					**************(ATTACHING PARTS)***********		
-12	212-0023-00			2	SCREW,MACHINE:8-32 X 0.375,PNH,STL CD PL	83385	OBD
					************(END ATTACHING PARTS)*********		
-13	381-0159-00			1	BAR,MOUNTING:HANDLE,ALUMINUM	80009	381-0159-00
					**************(ATTACHING PARTS)***********		
-14	211-0542-00			4	SCREW,MACHINE:6-32 X 0.312 INCH,TRH STL	83385	OBD
-15	381-0084-00			2	NUT BAR:(2)6-32 X 0.5 X 0.187,AL	80009	381-0084-00
					************(END ATTACHING PARTS)*********		
-16	343-0005-00			1	CLAMP,LOOP:0.438 INCH	95987	7-16-6B
					**************(ATTACHING PARTS)***********		
-17	211-0510-00			1	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	OBD
-18	210-0863-00			1	WSHR,LOOP CLAMP:0.187 ID U/W 0.5 W CLP,STL	95987	C191
					************(END ATTACHING PARTS)*********		
-19	386-1599-00			1	SUBPANEL,REAR:	80009	386-1599-00
					**************(ATTACHING PARTS)***********		
-20	213-0088-00			4	SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-21	348-0006-00			1	GROMMET,RUBBER:0.562 ID X 0.875 INCH OD	70485	1720
-22	386-1600-00			1	PANEL,REAR:	80009	386-1600-00
-23	179-1393-00			1	WIRING HARNESS:BASE & CONNECTOR	80009	179-1393-00
-24	131-0716-00			1	CONN,RCPT,ELEC:3 CONTACT, MALE	80009	131-0716-00
-25	175-0699-00			FT	WIRE,ELECTRICAL:STRD, 25 AWG, VINYL	80009	175-0699-00
-26	358-0384-00			1	BSHG,STRAIN RLF:U/W,0.31 DIA CABLE	80009	358-0384-00
-27	366-0125-00			2	KNOB:KNURLED SECURING	80009	366-0125-00
	213-0004-00			2	.SETSCREW:6-32 X 0.188 INCH,HEX.SOC S	74445	OBD
-28	384-0715-00			2	PIN,STR,THD:6.06 L X 0.188 OD,SST	80009	384-0715-00
-29	354-0025-00			2	.RING,RETAINING:0.181 INCH FREE ID	79136	5555-18
-30	333-1233-00			1	PANEL,FRONT:	80009	333-1233-00
					**************(ATTACHING PARTS)***********		
-31	213-0088-00			2	SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-32	386-1546-02			1	SUBPANEL,FRONT:576 PLUG-IN	80009	386-1546-02
-33	---- ----			1	CKT BOARD ASSY:RESISTOR LOAD(SEE REPL)		
					**************(ATTACHING PARTS)***********		
	211-0601-00			2	SCR,ASSEM WSHR:6-32 X 0.312,DOUBLE SEMS	83385	OBD
					************(END ATTACHING PARTS)*********		
	---- ----			-	CKT BOARD ASSY INCLUDES:		
-34	131-0589-00			7	.TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-35	385-0122-00			2	SPACER,POST:0.937 L W/6-32 THD EA END,A	80009	385-0122-00
					**************(ATTACHING PARTS)***********		
-36	211-0538-00			4	SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH ST	83385	OBD
					************(END ATTACHING PARTS)*********		
-37	343-0005-00			1	CLAMP,LOOP:0.438 INCH	95987	7-16-6B
					**************(ATTACHING PARTS)***********		
-38	211-0510-00			1	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL	83385	OBD
-39	210-0863-00			1	WSHR,LOOP CLAMP:0.187 ID U/W 0.5 W CLP,STL	95987	C191
					************(END ATTACHING PARTS)*********		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
2-40	384-0647-00			1	POST,ELEC-MECH:0.312 X 1.344 INCH LONG	80009	384-0647-00
-41	210-0202-00			1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
-42	179-1396-00			1	WIRING HARNESS:LOGIC	80009	179-1396-00
-43	348-0012-00			1	GROMMET,RUBBER:0.625 INCH DIA	72653	1043-1M
-44	390-0083-00			1	CAB.SIDE,PLUG-I:LEFT,PLASTIC	80009	390-0083-00
					**************(ATTACHING PARTS)***********		
-45	213-0146-00			3	SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-46	131-0017-00			2	CONNECTOR,RCPT,:16 CONTACT,MALE	02660	26-159-16
					**************(ATTACHING PARTS)***********		
	211-0097-00			2	SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-47	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL	83385	OBD
-48	131-0149-00			1	CONNECTOR,RCPT,:24 CONTACT,MALE	02660	26-159-24
					**************(ATTACHING PARTS)***********		
-49	211-0097-00			2	SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
-50	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-51	210-0201-00			1	TERMINAL,LUG:0.12 ID,LOCKING,BRZ TIN PL	86928	OBD
					**************(ATTACHING PARTS)***********		
-52	211-0008-00			1	SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL	83385	OBD
-53	210-0591-00			1	NUT,PLAIN,HEX.:4-40 X 0.187,SST	70318	OBD
					************(END ATTACHING PARTS)*********		
-54	131-0096-00			1	CONN,RCPT,ELEC:32 CONTACT,MALE	02660	26-159-32
					**************(ATTACHING PARTS)***********		
-55	211-0097-00			2	SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL	83385	OBD
-56	390-0084-00			1	COVER,PL-IN UNIT:BOTTOM	80009	390-0084-00
					**************(ATTACHING PARTS)***********		
-57	211-0504-00			6	SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
-58	390-0082-00			1	CAB.SIDE,PLUG-I:RIGHT,PLASTIC	80009	390-0082-00
					**************(ATTACHING PARTS)***********		
-59	213-0146-00			3	SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
					************(END ATTACHING PARTS)*********		
.							
.							
.							
					STANDARD ACCESSORIES		
.							
	131-0097-00			1	CONNECTOR,RCPT,:32 CONTACT,FEMALE	02660	26-190-32
	070-4650-00			2	MANUAL,TECH:INSTRUCTION	80009	070-4650-00
	070-1207-00			1	MANUAL,TECH:SERVICE	80009	070-1207-00

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. 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 following this page, your manual is correct as printed.

Tektronix®
COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Date: 6-12-85 Change Reference: M54629 (REV)

Product: 067-0599-00 Calibration Fixture Manual Part No.: 070-4650-00

DESCRIPTION Instruction Manual for Product Group 48

These changes are effective at serial number 0000727.

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

ADD:

C308	283-0197-00	CAP.,FXD,CER DI:470PF,5%,50V

CHANGE TO:

	670-1115-03	CKT BOARD ASSY:CALIBRATION TEST

C308 is connected between the base and collector of Q308 on **VERTICAL SWITCH** ⟨4⟩.