http://manoman.sqhill.com

TEKTRONIX®

7603 / R7603

OSCILLOSCOPE

SERVICE

INSTRUCTION MANUAL

BEFORE READING

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

THIS MANUAL REPRINTED NOVEMBER 1977

http://manoman.sqhill.com

7603 / R7603

OSCILLOSCOPE

SERVICE

Serial Number _____

Tektronix, Inc. • P.O. Box 500 • Beaverton, Oregon 97005 • Phone: 644-0161 • Cables: Tektronix

070-1429-00

WARRANTY

All TEKTRONIX instruments are warranted against defective materials and workmanship for one year. Any questions with respect to the warranty should be taken up with your TEKTRONIX Field Engineer or representative.

All requests for repairs and replacement parts should be directed to the TEKTRONIX Field Office or representative in your area. This will assure you the fastest possible service. Please include the instrument Type Number or Part Number and Serial Number with all requests for parts or service.

Specifications and price change privileges reserved.

Copyright © 1972 by Tektronix, Inc., Beaverton, Oregon. Printed in the United States of America. All rights reserved. Contents of this publication may not be reproduced in any form without permission of Tektronix, Inc.

U.S.A. and foreign TEKTRONIX products covered by U.S. and foreign patents and/or patents pending.

TEKTRONIX is a registered trademark of Tektronix, Inc.

TABLE OF CONTENTS

http://manoman.sqhill.com

7603 Features

The TEKTRONIX 7603 Oscilloscope is a solid state, light weight instrument designed for general-purpose measuring applications. This instrument has three plug-in compartments that accept TEKTRONIX 7-series plug-in units to form a complete measurement system. The two plug-in compartments on the left are connected to the vertical deflection system. The right plug-in compartment is connected to the horizontal deflection system. Electronic switching between the vertical plug-in compartments allows a multi-trace vertical display. The flexibility of this plug-in feature and the variety of plug-in units available allow this system to be used for many measurement applications. In addition, the instrument contains a readout system to provide a CRT display of alphanumeric information from the plug-in units. Data such as deflection factor, sweep rate, etc. can be encoded and displayed on the CRT.

manuals.mhill.com

This instrument features a large-screen, 8 X 10 division display; each division equals 1.22 centimeters. The CRT provides small spot size and fast writing speed. Regulated DC power supplies assure that performance is not affected by variations in line voltage and frequency, or by changes in the load due to the varying power requirements of the plug-in units. Maximum power consumption is about 170 watts (60 hertz, 115-volt line).

OPERATING INSTRUCTIONS

General

To effectively use the 7603, the operation and capabilities of the instrument must be known. This section describes the operation of the front- and rear-panel controls and connectors and gives simplified and general operating information.

PRELIMINARY INFORMATION

Operating Voltage

WARNING

This instrument is designed for operation from a power source with its neutral at or near earth (ground) potential with a separate safety earth conductor. It is not intended for operation from two phases of a multi-phase system, or across the legs of a single-phase, three-wire system.

The 7603 can be operated from either a 110-volt or a 220-volt nominal line-voltage source. In addition, three operating ranges can be selected within each nominal line voltage source. The voltage-selector jumper on the Rectifier board (see Fig. 1-1) allows selection of the operating voltage. To convert the instrument from one regulating range to another, first disconnect the instrument from the power source. Then, slide out the power unit as described in the Maintenance section. Remove the voltage-selector jumper and re-install it on the set of pins which represent the desired regulating range. Select a range which is centered about the average line voltage to which the instrument is to be connected (see Table 1-1).

TABLE 1-1

Regulating Range and Fuse Data

Pins Selected	Regulating Range	
	110-volts nominal	220-volts nominal
LOW	90 to 110 volts	180 to 220 volts
MED	99 to 121 volts	198 to 242 volts
HI	108 to 132 volts	218 to 262 volts
Line Fuse	3.2 A slow-blow	1.6 A slow-blow

To convert from 110-volts to 220-volts nominal line voltage, or vice versa, remove the voltage-selector jumper and replace it with the spare jumper (stored on pins adjacent to voltage selector area). The jumpers are color-coded to indicate the nominal voltage for which they are intended; brown for 110-volt nominal operation and red for 220-volt nominal operation. Change the line fuse to provide protection for the selected nominal line voltage. Use the fuse located in the ALT FUSE holder on the Rectifier board (see Fig. 1-1) or see Table 1-1 for value. Also, change the line-cord plug to match the power-source receptacle or use a suitable adapter.

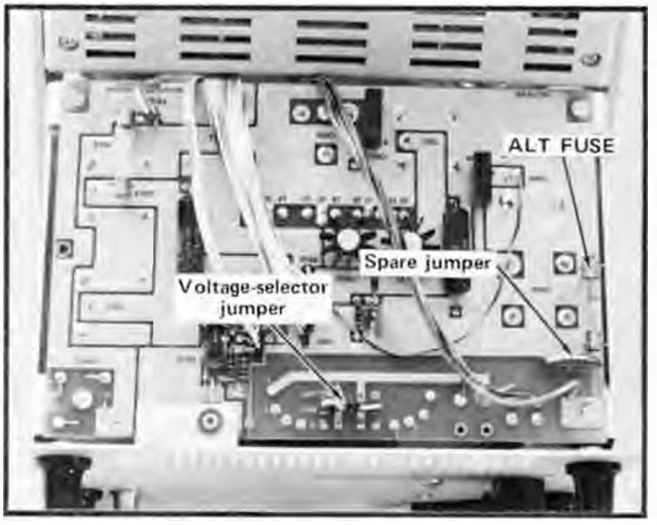


Fig. 1-1. Locations of voltage-selector jumper, spare jumper, and ALT FUSE in power unit (7603 shown).

Power Cord Conductor Identification

Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Blue	White
Grounding (Earthing)	Green-Yellow	Green-Yellow

The 7603 is designed to be used with a three-wire AC power system. If a three- to two-wire adapter is used to connect this instrument to a two-wire AC power system, be sure to connect the ground lead of the adapter to earth (ground). Failure to complete the ground system may allow the chassis of this instrument to be elevated above ground potential and pose a shock hazard.

Operating Temperature

The 7603 can be operated where the ambient air temperature is between 0°C and +50°C. This instrument

can be stored in ambient temperatures between –55°C and +75°C. After storage at temperatures beyond the operating limits, allow the chassis temperature to come within the operating limits before power is applied.

The 7603 is cooled by convection air flow through the instrument. Components which require the most cooling are mounted externally on a heat radiator at the rear. Adequate clearance must be provided on all sides to allow heat to be dissipated from the instrument. Do not block or restrict the air flow through the holes in the cabinet or the heat radiator on the rear. Maintain the clearance provided by the feet on the bottom and allow about two inches clearance on the top, sides, and rear (more if possible).

The R7603 is cooled by air drawn in through the air filter on the rear panel and blown out through the holes on the right side. Adequate clearance must be provided at these locations. Allow at least one and one-half inches clearance behind the air filter and at least one inch on the right side.

A thermal cutout in this instrument provides thermal protection and interrupts the power to the instrument if the internal temperature exceeds a safe operating level. Power is automatically restored when the temperature returns to a safe level. Operation in confined areas or in close proximity to heat-producing instruments may cause the thermal cutout to open more frequently.

http://mcmanuals.mcgraw-hill.com

Operating Position

A bale-type stand is mounted on the bottom of this instrument. This stand permits the 7603 to be tilted up about 10° for more convenient viewing.

Rackmounting

Instructions and dimensional drawings for rackmounting the R7603 are located in Section 6 of the service manual.

DISPLAY DEFINITIONS

General

The following definitions describe the types of displays which can be obtained with a 7603 Oscilloscope system with real-time amplifiers, time-base units, or combinations of these. Use of special purpose plug-in units may result in different types of displays, which are defined in the instruction manuals for these special units. The following terminology will be used throughout this manual.

Alternate Mode

A time-sharing method of displaying two or more signals with a single cathode-ray tube beam. Channel switching is sequential and occurs at the end of each sweep.

Chopped Mode

A time-sharing method of displaying two or more signals with a single cathode-ray tube beam. Channel switching is sequential and occurs at a rate determined by an internal clock generator (chopping rate).

NOTE

See Simplified Operating Instructions in this section for set-up information to obtain each of the following displays.

Single Trace

A display of a single plot produced by one vertical signal and one sweep.

Dual Trace

A display of two plots produced by two vertical signals and one sweep.

Delayed Sweep — Single Trace

A display of a single plot produced by one vertical signal and a delayed sweep. Two sweeps are used to produce this display; the sweeps are operating with a delaying/delayed relationship where one sweep (identified as the delaying sweep) delays the start of the second sweep (identified as the delayed sweep).

Delayed Sweep — Dual Trace

A display of two plots produced by combining two vertical signals and a delayed sweep. Two sweeps are used to produce this display; the sweeps are operating with a delaying/delayed relationship. Each vertical signal is displayed against the delayed sweep.

X-Y

A plot of two variables, neither of which represents time. X refers to the horizontal axis and Y refers to the vertical axis.

PLUG-IN UNITS

General

The 7603 is designed to accept up to three TEKTRONIX 7-series plug-in units. This plug-in feature allows a variety of display combinations and also allows selection of bandwidth, sensitivity, display mode, etc. to meet the measurement requirements. In addition, it allows the oscilloscope system to be expanded to meet future measurement requirements. The overall capabilities of the resultant system are in large part determined by the characteristics of the plug-in selected. For complete information on plug-ins available for use with this instrument, see the current Tektronix, Inc. catalog.

Plug-In Installation

To install a plug-in unit into one of the plug-in compartments, align the slots in the top and bottom of the plug-in with the associated guide rails in the plug-in compartment. Push the plug-in unit firmly into the plug-in compartment until it locks into place. To remove a plug-in, pull the release latch on the plug-in unit to disengage it and pull the unit out of the plug-in compartment. Plug-in units can be removed or installed without turning off the instrument power.

It is not necessary that all of the plug-in compartments be filled to operate the instrument; the only plug-in units needed are those required for the measurement to be made. However, at environmental extremes, excess radiation may be radiated into or out of this instrument through the open plug-in compartments. Blank plug-in panels are available from Tektronix, Inc. to cover the unused compartment; order TEKTRONIX Part No. 016-0155-00.

When the 7603 is calibrated in accordance with the calibration procedure given in this instruction manual, the vertical and horizontal gain are standardized. This allows calibrated plug-in units to be changed from one plug-in compartment to another without recalibration. However, the basic calibration of the individual plug-in units should be checked when they are installed in this system to verify their measurement accuracy. See the operating instructions section of the plug-in unit instruction manual for verification procedure.

Special purpose plug-in units may have specific restrictions regarding the plug-in compartments in which they can be installed. This information will be given in the instruction manual for these plug-in units.

NOTE

Later production of rackmount oscilloscopes are provided with support posts between the individual plug-in compartments. A post or posts must be removed if a multiwidth plug-in is to be installed. To remove a post, unfasten the screws that secure it at the top and bottom of the plug-in housing.

CONTROLS AND CONNECTORS

The major controls for operation of the 7603 are located on the front panel of the instrument. Figs. 1-2 and 1-3 provide a brief description of each control and connector. More detailed operating information is given under General Operating Information.

OPERATING CHECKOUT

General

The following Operating Checkout provides a means of verifying instrument operation and basic calibration without removing the covers or making internal adjustments. Since it demonstrates the use of all controls and connectors, it can also be used to provide basic training on the operation of this instrument. If re-calibration of the 7603 appears to be necessary, see the Calibration procedure in Section 5 of this manual. If re-calibration of a plug-in unit is indicated, see the instruction manual for the appropriate plug-in unit.

Set-Up Information

1. Set the front-panel controls as follows:

INTENSITY	Counterclockwise
FOCUS	Midrange
BEAM FINDER	Pressed in
GRATICULE ILLUM	As desired
VERT MODE	LEFT
TRIG SOURCE	VERT MODE
POWER	Pushed in

2. Connect the 7603 to a power source which meets the voltage and frequency requirements of this instrument. The applied voltage should be near the center of the voltage range marked on the rear panel (see Operating Voltage in this section for information on converting this instrument from one operating voltage to another).

3. Install TEKTRONIX 7A-series amplifier units into both the left and right vertical plug-in compartments. Install a 7B-series time-base unit into the horizontal compartment.

4. Pull the POWER switch to turn the instrument on. Allow several minutes warmup before proceeding.

5. Set both vertical units for a deflection factor of two volts/division and center the vertical position controls. Set both vertical units for AC input coupling.

6. Set the time-base unit for a sweep rate of one millisecond/division in the auto, internal trigger mode.

FUNCTIONS OF CONTROLS AND CONNECTORS

Front Panel

1. INTENSITY—Controls brightness of the display. Control is inoperative when horizontal compartment is vacant.

2. READOUT—Turns on the readout display and controls the readout intensity.

3. FOCUS—Provides adjustment for optimum display definition.

4. GRATICULE ILLUM—Controls graticule illumination.

5. BEAM FINDER—When pressed, the scan is limited to within the graticule area.

6. TRIG SOURCE—Selects source of internal trigger signal for the time base plug-in in the horizontal compartment.

LEFT: The trigger signal is obtained from the plug-in unit in the left vertical compartment only.

VERT MODE: Trigger signal automatically follows the vertical display except in CHOP and ADD; then the trigger signal is the algebraic sum of the signals from the left and right vertical compartments.

RIGHT: The trigger signal is obtained from the plug-in unit in the right vertical compartment only.

7. POWER—

Switch: Controls power to the instrument.

Light: Indicates that the power switch is on and that the instrument is connected to a line voltage source.

8. CALIBRATOR—Calibrator output pin jacks (4 V, 0.4 V, 40 mV, ground). Positive-going pulse or DC voltage selected by changing internal jumper. Repetition rate is approximately one kilohertz.

9. VERT MODE—Selects vertical mode of operation.

LEFT: Signals from plug-in unit in left vertical compartment are displayed.

ALT: Signals from plug-in units in both the left and right vertical compartments are displayed (dual trace). Display switched between vertical plug-in units after each sweep.

ADD: Signals from plug-in units in both the left and right vertical compartments are algebraically added and the sum is displayed on the CRT.

CHOP: Signals from plug-in units in both the left and right vertical compartments are displayed (dual trace). The display is switched between vertical plug-in units at approximately one megahertz rate.

RIGHT: Signals from plug-in unit in right vertical compartment is displayed.

10. Camera Power (Not Labeled)—Three-pin connector on CRT bezel provides power output (+15 V). Receives remote single sweep reset signal from compatible camera systems, and a ground pin connection.

http://manomanuals.com

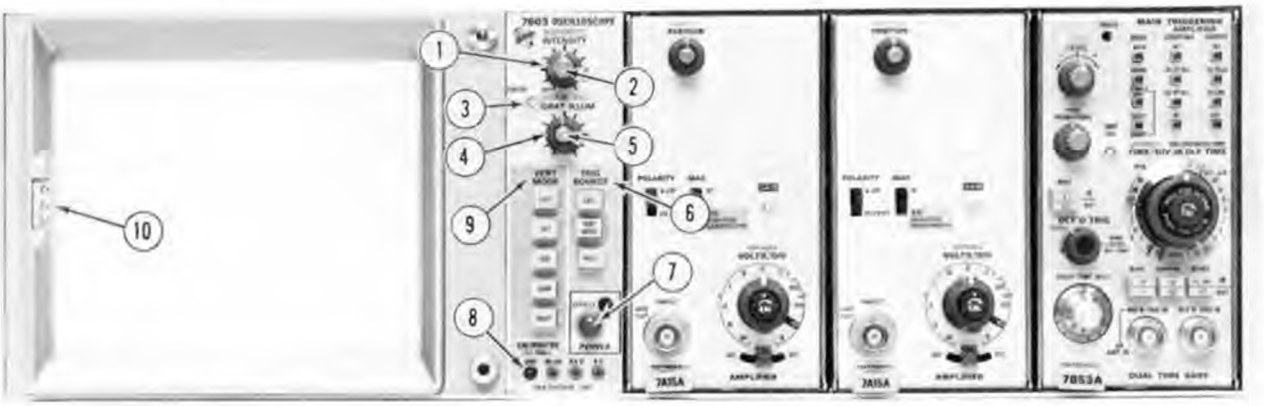


Fig. 1-2. Front-panel controls and connectors.

Rear Panel

1. FUSE—Line voltage fuse for instrument.

2. S S READY OUT—Provides an external single sweep ready indicator signal after the single sweep has been reset.

3. EXT S S RESET IN—Remote single sweep reset.

4. EXT Z AXIS IN—Input connector for intensity modulation of the CRT display.

5. VERT SIG OUT—Vertical signal selected by TRIG SOURCE switch (LEFT, RIGHT, ALT and ADD).

6. GATE OUT—Gate signal selected by gate selector switch (MAIN, AUXILIARY, and DELAY).

7. + SAWTOOTH OUT—Positive going sawtooth from time base unit.

http://manomanuals.ghlm.com

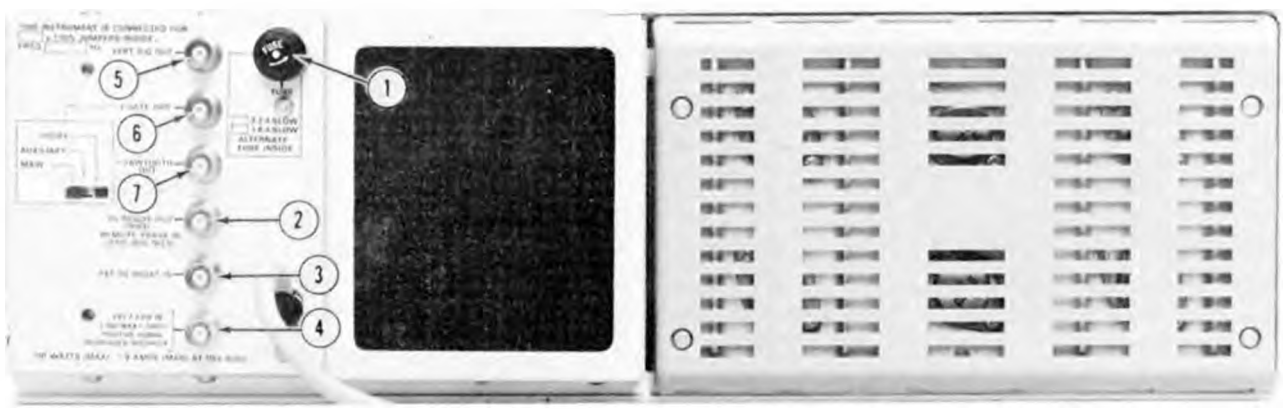


Fig. 1-3. Rear-panel controls and connectors.

7. Advance the INTENSITY control until the trace is at the desired viewing level (near midrange). Advance the READOUT until the readout display is at the desired viewing level.

8. Connect the 4 V calibrator pin-jack to the input of the left vertical unit with a BNC to pin-jack cable (supplied accessory).

Display Focus

9. Adjust the FOCUS control for a sharp, well-defined display over the entire trace length. If a properly focused display cannot be obtained with the FOCUS control, the internal Astigmatism adjustment must be re-set; see the Calibration section of this manual.

Trace Alignment

10. Disconnect the input signal and position the trace with the left vertical unit position control so it coincides with the center horizontal line of the graticule. If the trace is not parallel to the center horizontal line of the graticule, see Trace Rotation adjustment procedure in Calibration section.

Graticule Illumination

11. Rotate the GRAT ILLUM control throughout its range and notice that the illumination of the graticule lines increases as the control is turned clockwise (most obvious with tinted filter installed). Set the control so the graticule lines are illuminated as desired.

Vertical Deflection System

12. Connect the 4 V calibrator signal to the input connector of the left vertical unit with the BNC to pin-jack cable. Set both vertical units for a deflection factor of one volt/division. The display amplitude should be four divisions. Note the exact display amplitude for step 15.

13. Notice that the position control of only the left vertical unit has an effect on the position of the display. Position the display to the upper half of the graticule.

14. Press the RIGHT button of the VERT MODE switch. Remove the calibrator signal from the left vertical and connect it to the right vertical. The display amplitude should be four divisions within 0.12 division. Note the exact display amplitude for the next step.

15. A correct display in both steps 12 and 14 indicates that the 7603 Vertical Deflection System and the vertical plug-in units are calibrated. If the displays noted previously are both outside the given tolerance in the same direction (i.e., high or low), the Vertical Gain or 4 Volts calibrator adjustment probably needs re-adjustment. Otherwise, check the calibration of the vertical plug-in units.

16. Notice that the position control of only the right vertical unit has an effect on the position of the display. Position the display to the lower half of the graticule. Set both vertical units for a deflection factor of two volts/division. Connect calibrator signal to both vertical units by using a dual input coupler.

17. Press the ALT button of the VERT MODE switch. Notice that two traces are displayed on the CRT. The top trace is produced by the left vertical unit and the bottom trace is produced by the right vertical unit. Set the sweep rate to 50 milliseconds/division. Notice that the display alternates between the left and right vertical units after each sweep. Turn the sweep rate switch throughout its range. Notice that the display alternates between vertical units at all sweep rates.

18. Press the CHOP button of the VERT MODE switch. Turn the sweep rate throughout its range. Notice that a dual-trace display is presented at all sweep rates, but unlike ALT both vertical units are displayed on each sweep in a time-sharing manner. Return the sweep rate to 0.5 millisecond/division.

19. Press the ADD button of the VERT MODE switch. The display should be four divisions in amplitude. Notice that the position control of either vertical unit moves the display. Return the VERT MODE switch to LEFT.

Triggering

20. Center the display on the CRT with the left vertical unit position control. Disconnect the input signal from the right vertical unit input connector. Sequentially press all of the VERT MODE switch buttons. Notice that a stable display is obtained in all positions of the VERT MODE switch (straight line in RIGHT position).

21. Press the LEFT button of the TRIG SOURCE switch. Again, sequentially press all of the VERT MODE buttons. Notice that the display is again stable in all positions, as in the previous step.

22. Press the RIGHT button of the TRIG SOURCE switch. Sequentially press all of the VERT MODE buttons and notice that a stable display cannot be obtained in any position. This is because there is no input signal connected

to the right vertical unit. Return the TRIG SOURCE switch to VERT MODE. Remove calibrator signal from left vertical unit and connect it to right vertical unit. Repeat steps 20 to 22. The trigger signal will come from right vertical. When the LEFT button is pressed of the TRIG SOURCE switch the display is not stable because there is no input signal connected to the left vertical. Return the TRIG SOURCE switch to VERT MODE.

Horizontal Deflection System

23. Position the start of the sweep to the left graticule line with the time-base unit position control.

24. Connect a 10X probe to the input of the right vertical unit. Set the right vertical unit for a deflection factor of 10 volts/division and set the VERT MODE switch to RIGHT. Set the time-base unit for a sweep rate of five milliseconds/division.

25. Connect the probe tip to a line-voltage source. The display should show three complete cycles over the 10 divisions within 0.3 division. A correct display indicates that the 7603 Horizontal Deflection System and the time-base plug-in unit are correctly calibrated. If the display is outside the given tolerance, either the 7603 or the time-base unit needs to be recalibrated. Refer to the Calibration section of this manual, and to the time-base unit manual for adjustment procedure.

NOTE

This step is based on an accurate 60-Hertz line frequency. For other line frequencies, this procedure will need to be changed accordingly.

26. Disconnect the probe from the line-voltage source and the right vertical unit. Set the VERT MODE switch to LEFT and set the time-base unit for a sweep rate of 0.5 millisecond/division.

Beam Finder

27. Set the deflection factor of the left vertical unit to 0.1 volt/division. Notice that a square-wave display is not visible, since the deflection exceeds the scan area of the CRT.

28. Press and hold the BEAM FINDER switch. Notice that the display is returned to the viewing area in compressed form. Increase the vertical and horizontal deflection factors until the display is reduced to about two divisions vertically and horizontally (when the horizontal unit is operated in the time-base mode, change only the deflection factor of the vertical unit). Adjust the position controls of the displayed vertical unit and the time-base unit to center the compressed display about the center lines of the graticule. Release the BEAM FINDER switch. Notice that the display remains within the viewing area.

Z-Axis Input

29. If an external signal is available (five volts peak-to-peak minimum at two megahertz or less), the function of the EXT Z AXIS input can be demonstrated. Connect the external signal to both the input of the right vertical unit and the EXT Z AXIS connector with two BNC cables and a BNC T connector. Set the VERT MODE switch to RIGHT and set the vertical unit for a deflection factor of two volts/division. Set the time-base unit for a sweep rate which displays several cycles of the signal. Adjust the amplitude of the signal generator until intensity modulation is visible on the display. The positive peaks of the waveform should be blanked out and the negative peaks intensified. Notice that the setting of the INTENSITY control determines the amount of intensity modulation that is visible.

30. Disconnect the signal from the EXT Z AXIS connector, but leave it connected to the right vertical unit input. Check that peak-to-peak amplitude of the displayed signal is four divisions maximum.

31. This completes the Operating Checkout procedure for the 7603. Instrument operations not explained here, or operations which need further explanation are discussed under General Operating Information.

SIMPLIFIED OPERATING INSTRUCTIONS

The following information is provided to aid in quickly obtaining the correct setting for the 7603 controls to present a display. The operator should be familiar with the complete function and operation of this instrument as described elsewhere in this section before using this procedure. For detailed operating information for the plug-in units, see the instruction manuals for the applicable units.

Single-Trace Display

The following procedure will provide a display of a single-trace vertical unit against one time-base unit. For simplicity of explanation, the vertical unit is installed in the left vertical compartment. The right vertical compartment can be used if the procedure is changed accordingly.

1. Install a 7A-series vertical unit in the left vertical compartment.

http://manoman.sch.ro

2. Press the LEFT button of the VERT MODE switch.

3. Install a 7B-series time-base unit in the horizontal compartment.

4. Press the VERT MODE button of the TRIG SOURCE switch.

5. Connect the signal to the input connector of the vertical unit.

6. Set the vertical unit for AC input coupling and calibrated deflection factors.

7. Set the time-base unit for auto mode, internal triggering at a calibrated sweep rate of one millisecond/division.

8. Advance the INTENSITY control until a display is visible. (If no display is visible with INTENSITY at about midrange, press and hold the BEAM FINDER switch and adjust the vertical deflection factor until the display is reduced in size vertically; then center the compressed display with vertical and horizontal position controls; release the BEAM FINDER.) Adjust the FOCUS control for a well-defined display. Adjust Readout INTENSITY for the desired viewing level.

9. Set the vertical deflection factor and vertical position control for a display which remains within the graticule area vertically.

10. If necessary, set the time-base triggering controls for a stable display.

11. Adjust the time-base position control so the display begins at the left edge of the graticule. Set the time-base sweep rate to display the desired number of cycles.

Dual-Trace Display

The following procedure will provide a display of two single-trace vertical units against one time-base unit.

1. Install 7A-series vertical units in both vertical plug-in compartments.

2. Press the LEFT button of the VERT MODE switch.

3. Install a 7B-series time-base unit in the horizontal compartment.

4. Press the VERT MODE button of the TRIG SOURCE switch.

5. Connect the signal to the input connectors of the vertical units.

6. Set the vertical units for AC input coupling and calibrated deflection factors.

7. Set the time-base unit for auto mode, internal triggering at a sweep rate of one millisecond/division.

8. Advance the INTENSITY control until a display is visible. (If no display is visible with INTENSITY at midrange, press and hold BEAM FINDER switch and adjust vertical deflection factor until display is reduced in size vertically; then center compressed display with vertical and horizontal position controls; release the BEAM FINDER switch.) Set the FOCUS control for a well-defined display.

http://manoman.sqhill.com

9. Set the left vertical unit deflection factor for a display about four divisions in amplitude. Adjust the left vertical position control to move this display to the top of the graticule area.

10. Press the RIGHT button of the VERT MODE switch.

11. Set the RIGHT vertical unit deflection factor for a display about four divisions in amplitude (if display cannot be located, use BEAM FINDER switch). Position this display to the bottom of the graticule area with the right vertical unit position control.

12. Press the ALT or CHOP button of the VERT MODE switch. A dual-trace display of the signal from the left vertical and right vertical plug-in units should be presented on the CRT. (For more information on choice of dual-trace mode, see Vertical Mode in this section.)

13. If necessary, adjust the time-base triggering controls for a stable display.

14. Adjust the time-base position control so the display begins at the left edge of the graticule. Set the time-base sweep rate for the desired horizontal display.

Delayed Sweep — Single Trace

The following procedure will provide a delayed sweep display of a single-trace vertical unit.

1. Follow the complete procedure given under Single-Trace Displays.

2. Be sure the time-base unit installed in the horizontal compartment is a dual time-base with delaying/delayed capabilities.

3. Follow the procedure given in the instruction manual for the dual time-base unit to obtain a delayed-sweep display.

Delayed Sweep — Dual Trace

The following procedure will provide a delayed-sweep display of two single-trace vertical units.

1. Follow the complete procedure given under Dual-Trace Display.

2. Be sure the time-base unit installed in the horizontal compartment is a dual time-base unit with delaying/delayed capabilities.

3. Follow the procedure given in the instruction manual for the dual time-base unit to obtain a delayed-sweep display.

X-Y Display

The following procedure will provide an X-Y display (one signal versus another rather than against time).

NOTE

Some 7B-series time-base units have provisions for amplifier operation in the X-Y mode; see X-Y operation in this section for details of operation in this manner.

1. Install 7A-series amplifier units in both the left vertical and the horizontal compartments.

2. Press the LEFT button of the VERT MODE switch.

3. Connect the X-signal to the amplifier unit in the horizontal compartment.

4. Connect the Y-signal to the amplifier unit in the left vertical compartment.

5. Set both amplifier units for AC input coupling and calibrated deflection factors.

6. Advance the INTENSITY control until a display is visible. (If no display is visible, press and hold BEAM FINDER switch and adjust the deflection factors of both amplifier units until display is reduced in size both vertically and horizontally; then center compressed display with the position controls; release the BEAM FINDER switch.) Adjust the FOCUS control for a well-defined display.

GENERAL OPERATING INFORMATION

Intensity Control

The setting of the INTENSITY control may affect the correct focus of the display. Slight re-adjustment of the FOCUS control may be necessary, when the intensity level is changed. To protect the CRT phosphor; do not turn the INTENSITY control higher than necessary to provide a satisfactory display. The light filters reduce the observed light output from the CRT. When using these filters, avoid advancing the INTENSITY control to a setting that may burn the phosphor. When the highest intensity display is desired, remove the filters and use only the clear faceplate protector (permanently installed behind bezel). Apparent trace intensity can also be improved in such cases by reducing the ambient light level or using a viewing hood. Also, be careful that the INTENSITY control is not set too high when changing the time-base unit sweep rate from a fast to a slow sweep rate, or when changing to the X-Y mode of operation. The instrument incorporates protection circuitry which automatically reduces the display intensity to a lower level when the time-base unit is set to a slow sweep rate. This reduces the danger of damaging the CRT phosphor at these slower sweep rates.

Display Focus

The FOCUS control allows adjustment for best definition of the CRT display. The Readout intensity should be turned on, when adjusting the Focus control. Slight re-adjustment of this control may be necessary as the display conditions change. If a properly focused display cannot be obtained with the FOCUS control, the internal Astigmatism adjustment must be re-set; see the Calibration section of this manual.

http://manuals.com

Graticule

The graticule of the 7603 is marked on the inside of the faceplate of the CRT, providing accurate, no-parallax measurements. The graticule is divided into eight vertical and ten horizontal divisions. Each division is 1.22 centimeters square. In addition, each major division is divided into five minor divisions. The vertical gain and horizontal timing of the plug-in units are calibrated to the graticule so accurate measurements can be made from the CRT. The illumination of the graticule lines can be varied with the GRATICULE ILLUM control.

NOTE

Two types of crt graticules have been used in some Tektronix oscilloscopes. One graticule has 0% and 100% risetime reference points that are separated by 6 vertical graticule divisions. The other graticule has the 0% and 100% risetime reference points separated by 5 vertical divisions. In your manual, illustrations of the crt face or risetime measurement instructions may not correspond with the graticule markings on your oscilloscope.

Fig. 1-4 shows the graticule of the 7603 and defines the various measurement lines. The terminology defined here will be used in all discussions involving graticule measurements. Notice the 0%, 10%, 90% and 100% markings on the left side of the graticule. These markings are provided to facilitate risetime measurements.

Light Filter

The tinted filter provided with the 7603 minimizes light reflections from the face of the CRT to improve contrast when viewing the display under high ambient light conditions. This filter should be removed for waveform photographs or when viewing high writing rate displays. To remove the filter, loosen the two screws on the right side of the bezel and remove the bezel. Remove the tinted filter; leave the clear plastic faceplate protector installed and replace the bezel. The faceplate protector should be left in place at all times to protect the CRT faceplate from scratches.

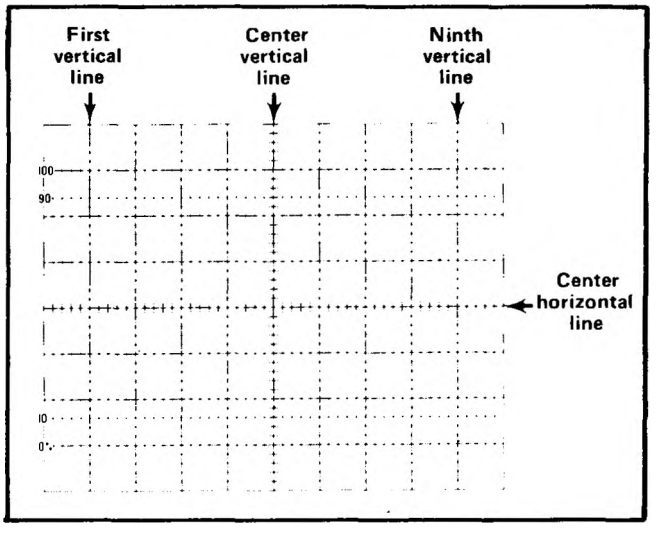


Fig. 1-4. Definition of measurement lines on 7603 graticule.

An optional mesh filter is available for use with the 7603. This filter provides shielding against radiated EMI (electro-magnetic interference) from the face of the CRT. It also serves as a light filter to make the trace more visible under high ambient light conditions. The mesh filter fits in place of the plastic CRT mask and the tinted filter. The filter can be ordered by TEKTRONIX Part No. 378-0603-00.

Beam Finder

The BEAM FINDER switch provides a means of locating a display which overscans the viewing area either vertically or horizontally. When the BEAM FINDER switch is pressed and held, the display is compressed within the graticule area. Release the BEAM FINDER switch to return to a normal display. To locate and reposition an overscanned display, use the following procedure:

1. Press and hold the BEAM FINDER switch.

2. Increase the vertical and horizontal deflection factors until the vertical deflection is reduced to about two divisions and the horizontal deflection is reduced to about four divisions (the horizontal deflection needs to be reduced only when in the X-Y mode of operation).

3. Adjust the vertical and horizontal position controls to center the display about the vertical and horizontal center lines of the graticule.

4. Release the BEAM FINDER switch; the display should remain within the viewing area.

Readout Modes

The characters of the readout display are written by the CRT beam on a time-share basis with signal waveforms. The Readout system operates in a free running mode to randomly interrupt the waveform display to present the readout characters. The readout system can also operate in a GATE TRIG'D mode. No readout signal is produced until after the sweep has occurred. In this mode the sweep must run to have the readout displayed.

Display Photography

A permanent record of the CRT display can be obtained with an oscilloscope camera system. The instruction manuals for the TEKTRONIX Oscilloscope Cameras include complete instructions for obtaining waveform photographs. The following specific information applies to the 7603.

The CRT bezel of the 7603 provides integral mounting for a TEKTRONIX Oscilloscope Camera. The three pins located on the left side of the CRT bezel connect power to compatible camera systems. It also receives control signals from TEKTRONIX automatic cameras to allow camera-controlled single-shot photography (see camera manual for further information).

Vertical Mode

Left and Right Mode. When the LEFT or RIGHT button of the VERT MODE switch is pressed, only the signal from the plug-in unit in the selected compartment is displayed.

Alternate Mode. The ALT position of the VERT MODE switch produces a display which alternates between the plug-in units in the left vertical and right vertical compartments with each sweep of the CRT. Although the ALT mode can be used at all sweep rates, the CHOP mode provides a more satisfactory display at sweep rates below about 20 milliseconds/division. At these slower sweep rates, alternate-mode switching becomes visually perceptible.

NOTE

This instrument will not operate in the ALT mode if the horizontal plug-in unit is not operated in the time-base mode.

The TRIG SOURCE switch allows selection of the triggering for an alternate display. When this switch is set to the VERT MODE position, each sweep is triggered by the signal being displayed on the CRT. This provides a stable display of two unrelated signals, but does not indicate the time relationship between the signals. In either the LEFT or RIGHT positions of the TRIG SOURCE switch, the two signals are displayed showing true time relationship. However, if the signals are not time-related, the display from the plug-in unit which is not providing a trigger signal will appear unstable on the CRT.

Chopped Mode. The CHOP position of the VERT MODE switch produces a display which is electronically switched between channels at a one-megahertz rate. In general, the CHOP mode provides the best display at sweep rates lower than about 20 milliseconds/division, or whenever dual-trace single-shot phenomena are to be displayed. At faster sweep rates, the chopped switching becomes apparent and may interfere with the display.

Correct internal triggering for the CHOP mode can be obtained in any of the three positions of the TRIG SOURCE switch. When the TRIG SOURCE switch is set to VERT MODE, the internal trigger signals from the vertical plug-in units are algebraically added and the time-base unit is triggered from the resultant signal. Use of the LEFT or RIGHT trigger-source positions trigggers the time-base unit on the internal trigger signal from the selected vertical unit only. This allows two time-related signals to be displayed showing true time relationship. However, if the signals are not time-related, the display from the channel which is not providing the trigger signal will appear unstable. The CHOP mode can be used to compare two single-shot, transient, or random signals which occur within the time interval determined by the time-base unit (ten times selected sweep rate). To provide correct triggering, the display which provides the trigger signal must precede the second display in time. Since the signals show true time relationship, time-difference measurements can be made from the display.

Algebraic Addition. The ADD position of the VERT MODE switch can be used to display the sum or difference of two signals, for common-mode rejection to remove an undesired signal, or for DC offset (applying a DC voltage to one channnel to offset the DC component of a signal on the other channel). The common-mode rejection ratio between the vertical plug-in compartments of the 7603 is greater than 20:1 at 50 megahertz. The rejection ratio increases to 100:1 at DC.

The overall deflection factor on the CRT in the ADD mode is the resultant of the algebraic addition of the signals from the two vertical plug-in units. It is difficult to determine the voltage amplitude of the resultant display unless the amplitude of the signal applied to one of the plug-in units is known. This is particularly true when the vertical units are set to different deflection factors, since it is not obvious which portion of the display is a result of the signal applied to either plug-in unit. Also, the polarity and repetition rate of the applied signals enters into the calculation.

The following general precautions should be observed to provide the best display when using the ADD mode:

1. Do not exceed the input voltage rating of the plug-in units.

2. Do not apply large signals to the plug-in inputs. A good rule to follow is not to apply a signal which exceeds an equivalent of about eight times the vertical deflection factors. For example, with a vertical deflection factor of 0.5 volt/division, the voltage applied to that plug-in unit should not exceed 4 volts. Larger voltages may result in a distorted display.

3. To ensure the greatest dynamic range in the ADD mode, set the position controls of the plug-in units to a

setting which would result in a mid-screen display if viewed in the LEFT or RIGHT positions of the VERT MODE switch.

4. For similar response from each channel, set the plug-in units for the same input coupling.

Trigger Source

The TRIG SOURCE switch allows selection of the internal trigger signal for the time-base unit. For most applications, this switch can be set to the VERT MODE position. This position is the most convenient, since the internal trigger signal is automatically switched as the VERT MODE switch is changed, or as the display is electronically switched between the left vertical and right vertical plug-in units in the ALT position of the VERT MODE switch. It also provides a usable trigger signal in the ADD or CHOP positions of the VERT MODE switch, since the internal trigger signal in these modes is the algebraic sum of the signals applied to the vertical plug-in units. Therefore, the VERT MODE position ensures that the time-base unit receives a trigger signal regardless of the VERT MODE switch setting, without the need to change the trigger source selection.

If correct triggering for the desired display is not obtained in the VERT MODE position, the LEFT or RIGHT positions can be used to obtain the trigger signal from either the left vertical or right vertical plug-in unit. The internal trigger signal is obtained from the selected vertical compartment, whether the plug-in unit in that compartment is selected for display on the CRT or not. If the internal trigger signal is obtained from one of the vertical units, but the other vertical unit is selected for display, the internal trigger signal must be time-related to the displayed signal in order to obtain a triggered (stable) display.

X-Y Operation

In some applications, it is desirable to display one signal versus another (X-Y) rather than against time (internal sweep). The flexibility of the plug-in units available for use with the 7603 provides a means for applying an external signal to the horizontal deflection system for this type of display. Some of the 7B-series time-base units can be operated as amplifiers in addition to their normal use as time-base generators. This feature allows an external signal to provide the horizontal deflection on the CRT. For most of the time-base units with the amplifier function, the X (horizontal) signal can be connected either to an external input connector on the time-base unit or it can be routed to the time-base unit through the internal triggering system (see time-base instruction manual for details). If the latter method is used, the TRIG SOURCE switches must be set so that the X (horizontal) signal is obtained from one of the vertical units and the Y (vertical) signal is obtained from the other vertical unit. The advantages of using the internal trigger system to provide the X signal are that the attenuator switch of the amplifier unit providing the horizontal signal determines the horizontal deflection factor to allow full-range operation and the plug-in units do not have to be moved between compartments when X-Y operation is desired.

Another method of obtaining an X-Y display is to install an amplifier plug-in unit in one of the horizontal plug-in compartments (check amplifier unit gain as given in the plug-in instruction manual to obtain calibrated horizontal deflection factors). This method provides the best X-Y display, particularly if two identical amplifier units are used, since both the X and Y input systems will have the same delay time, gain characteristics, input coupling, etc. For further information on obtaining X-Y displays, see the plug-in unit manuals. Also, the reference books listed under Applications provide information on X-Y measurements and interpreting the resultant lissajous displays.

Intensity Modulation

Intensity (Z-axis) modulation can be used to relate a third item of electrical phenomena to the vertical (Y-axis) and the horizontal (X-axis) coordinates without affecting the waveshape of the displayed signal. The Z-axis modulating signal applied to the CRT circuit changes the intensity of the displayed waveform to provide this type of display. "Gray scale" intensity modulation can be obtained by applying signals which do not completely blank the display. Large amplitude signals of the correct polarity will completely blank the display; the sharpest display is provided by signals with a fast rise and fall. The voltage amplitude required for visible trace modulation depends upon the setting of the INTENSITY control. A two-volt peak-to-peak signal will completely blank the display even at maximum intensity levels. Lower amplitude signals can be used to only change the trace brightness rather than completely blank the display. Negative-going modulating signals increase the display intensity and positive-going modulating signals decrease the display intensity. Useful input frequency range is DC to 10 megahertz (input voltage derating necessary above two megahertz). The maximum input voltage should be limited to 10 volts (DC plus peak AC).

Time markers applied to the EXT Z AXIS input connector provide a direct time reference on the display. With uncalibrated horizontal sweep or external horizontal mode operation, the time markers provide a means of reading time directly from the display. However, if the markers are not time-related to the displayed waveform, a single-sweep display should be used (for internal sweep only) to provide a stable display.

Raster Display

A raster-type display can be used to effectively increase the apparent sweep length. For this type of display, the trace is deflected both vertically and horizontally by sawtooth signals. This is accomplished in the 7603 by installing a 7B-series time-base unit in one of the vertical plug-in compartments. Normally, the time-base unit in the vertical compartment should be set to a slower sweep rate than the time-base unit in the horizontal compartment; the number of horizontal traces in the raster depends upon the ratio between the two sweep rates. Information can be displayed on the raster using several different methods. In the ADD position of the VERT MODE switch, the signal from an amplifier unit can be algebraically added to the vertical deflection. With this method, the vertical signal amplitude on the CRT should not exceed the distance between the horizontal lines of the raster. Another method of displaying information on the raster is to use the EXT Z AXIS input to provide intensity modulation of the display. This type of raster display could be used to provide a television-type display. Complete information on operation using the Z-axis feature is given under Intensity Modulation.

To provide a stable raster display, both time-base units must be correctly triggered. Internal triggering is not provided for the time-base units when they are in the vertical compartments; external triggering must be used. Also, blanking is not provided from the time-base units when they are installed in a vertical compartment. To blank out the retrace portion from the time-base unit in the vertical compartment, special connections must be made from this time-base unit to the blanking network of the 7603. If this mode of operation is desirable, contact your local TEKTRONIX Field Office or representative for specific information on obtaining blanking with the specific time-base unit being used in the vertical compartment.

Calibrator

General. The internal calibrator of the 7603 provides a convenient signal source for checking basic vertical gain and for adjusting probe compensation as described in the probe instruction manual. In addition, the calibrator can be used as a convenient signal source for application to external equipment.

Voltage. The calibrator provides accurate output voltage of 40 millivolts, 0.4 volt, and 4 volts at the three front-panel pin-jack connectors into high-impedance loads. Output resistance is approximately 50 ohms at the 40 mV and 0.4 V pin jacks and approximately 450 ohms at the 4 V pin jack.

Current. A 40-milliampere, one-kilohertz output current is provided when the optional current-loop accessory (TEKTRONIX Part No. 012-0259-00) is connected between the 4 V pin-jack and ground. This output can be used to check and calibrate current-measuring probe systems.

Waveshape. The square-wave output signal of the calibrator can be used as a reference waveshape when checking or adjusting the compensation of passive, high-resistance probes. Since the square-wave output from the calibrator has a flat top, any distortion in the displayed waveform is due to the probe compensation. DC voltage output is also available by changing a jumper on the calibrator board; see Fig. 1-5.

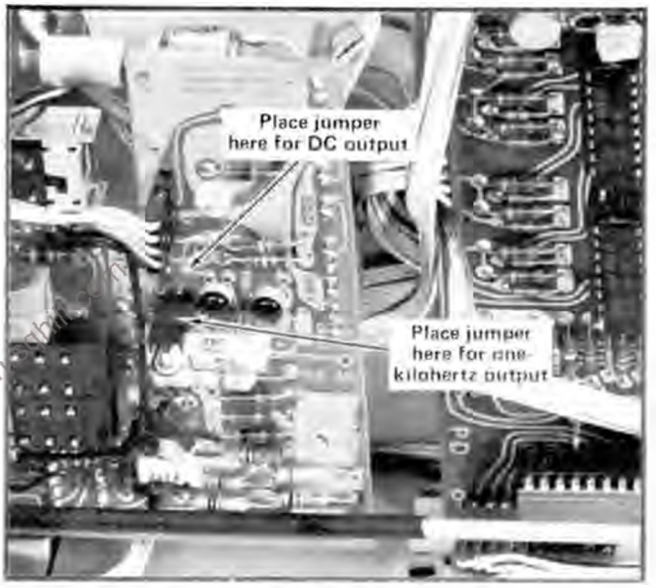


Fig. 1-5. Jumper locations for DC and one-kilohertz Calibrator operation (Calibrator board).

Signals Out

Vertical Signal. The VERT SIG OUT connector provides a sample of the vertical deflection signal. The source of the output signal is determined by the TRIG SOURCE switch. The source will follow the setting of the TRIG SOURCE switch. When the TRIG SOURCE is in the VERT MODE the output will follow the VERTICAL MODE switch except CHOP, then the signals are ADDED. The output signals are LEFT, ALT, ADD and RIGHT. The output signal into 50 ohms is about 25 millivolts/division of the vertical signal displayed on systems CRT. The output signal into 1 megohm is about 0.5 volts/division of the vertical signal displayed on the systems CRT.

+ Gate. The + gate connector provides a sweep gate signal that is generated by the time base plug-in unit. The

gate selector switch provides three gates MAIN, AUXILIARY and DELAY. The duration of the gate pulse is determined by the respective sweep. Auxiliary and Delay gates can only be produced by dual sweep time base plug-in units. The amplitude of the gate signal is about 50 millivolts into 50 ohms or 10 volts into 1 megohm.

+ Sawtooth. The + sawtooth connector provides a positive going sample of the sawtooth from the time base unit in the horizontal compartment. The rate of rise of the sawtooth signal is about 50 millivolts/unit of time into 50 ohms or 1 volt/unit of time into 1 megohm. Unit of time is determined by the time/division switch of the horizonal plug-in unit.

Applications

The 7603 Oscilloscope and its associated plug-in units provide a very flexible measurement system. The capabilities of the overall system depend mainly upon the plug-in units that are chosen for use with this instrument. Specific applications for the individual plug-in units are described in the plug-in manuals. The overall system can also be used for many applications which are not described in detail either in this manual or in the manuals for the individual plug-in units. Contact your local TEKTRONIX Field Office or representative for assistance in making specific measurements with this instrument.

The following books describe oscilloscope measurement techniques which can be adapted for use with this instrument.

John D. Lenk, "Handbook of Oscilloscopes, Theory, and Application", Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1968.

J. Czech, "Oscilloscope Measuring Techniques", Springer-Verlag, New York, 1965.

J. F. Golding, "Measuring Oscilloscopes", Transatlantic Arts, Inc., 1971.

Charles H. Roth Jr., "Use of the Oscilloscope", A Programmed text, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1970.

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 carton with shipping tape or industrial stapler.

The carton test strength for your instrument is 375 pounds.

http://manoman.sqlinfo.net

SPECIFICATION

Information given in this manual applies to the R7603 Oscilloscope also, unless otherwise indicated. The R7603 is electrically identical to the 7603, but it is adapted for mounting in a standard 19-inch rack. Rackmounting instructions and a dimensional drawing for the R7603 are given in Section 6.

This instrument will meet the following electrical specifications after complete calibration as given in Section 5. The Operating Checkout procedure which is given in Section 1 provides a convenient method of checking instrument performance without making internal checks or adjustments. The following electrical characteristics apply over an ambient temperature range of 0°C to +50°C, except as otherwise indicated. Warmup time for given accuracy is 20 minutes. Limits and tolerances given in the Supplemental Information column are provided for user information only, and should not be interpreted as Performance Requirements.

NOTE

Many of the measurement capabilities of this instrument are determined by the choice of plug-in units. The following characteristics apply to the 7603 Oscilloscope only. See the System Specification at the end of this section for specifications of the complete system.

VERTICAL DEFLECTION SYSTEM

Characteristic	Performance Requirements	Supplemental Information
Deflection Factor	Compatible with all 7000-series plug-in units.	
Between Compartments	Within 1%.	
Low Frequency Linearity	0.1 division or less compression or expansion of a center-screen 2 division signal when positioned anywhere vertically within the graticule area.	
Bandwidth	See system specifications for 7000-series instruments.	
7603 Vertical Amplifier only (6 div Reference; 0°C to +50°C)	DC to at least 115 MHz.	
Step Response Risetime	See system specifications for 7000-series instruments.	
Isolation Between Vertical Compartments	At least 100:1 from DC to 100 MHz.	
Delay Line		Permits viewing leading edge of trigger signal.
Chopped Mode		
Repetition Rate	1 MHz within 20%.	
Time Segment From Each Compartment	0.4 to 0.6 μs.	

http://manuman.sohill.com

VERTICAL DEFLECTION SYSTEM (cont)

Characteristic	Performance Requirements	Supplemental Information
Difference In Delay Between Vertical Compartments		0.5 ns or less.
Vertical Display Modes	LEFT: Left vertical unit only. ALT: Dual trace, alternate between vertical units. ADD: Added algebraically. CHOP: Dual trace, chopped between vertical units. RIGHT: Right vertical unit only.	Selected by VERT MODE switch.

TRIGGERING

Characteristic	Performance Requirements	Supplemental Information
Trigger Source	LEFT VERT: From left vertical only. VERT MODE: Determined by vertical mode. RIGHT VERT: From right vertical only.	Selected by TRIGGER SOURCE switch.

http://manonmac.sqhill.com

HORIZONTAL DEFLECTION SYSTEM

Characteristic	Performance Requirements	Supplemental Information
Fastest Calibrated Sweep Rate	5 ns/div.	
Deflection Factor	Compatible with all 7000-series plug-in units.	
Low Frequency Linearity	0.1 div or less compression or expansion of a center-screen 2 div signal when positioned anywhere horizontally within the graticule area.	
Phase Shift Between the Vertical and Horizontal Amplifiers	Less than 2° from DC to 35 kHz.	
Frequency Response Bandwidth (8 div Reference)	At least 2 MHz.	

CALIBRATOR

Characteristic	Performance Requirements	Supplemental Information
Waveshape	Positive-going squarewave or DC (DC voltage selected by internal jumper).	
Voltage Output Range	40 mV, 0.4 V, and 4 V.	Into 1 MΩ load.
Voltage Output Accuracy		
+15°C to +35°C	Within 1%.	
0°C to +50°C	Within 2%.	
Current Output Accuracy	40 mA.	
+15°C to +35°C	Within 2%.	With optional current loop accessory (012-0259-00) connected between 4 V pin jack and ground pin jack.
0°C to +50°C	Within 3%.	
Repetition Rate		Approximately 1 kHz.
Output Resistance		
40 mV and 0.4 V		Approximately 50 Ω.
4 V		Approximately 450 Ω.

EXTERNAL Z AXIS INPUT

Characteristic	Performance Requirements	Supplemental Information
Sensitivity (Full Intensity Range)	2 V peak to peak.	
Useful Input Voltage Versus Repetition Frequency	2 V peak to peak, DC to 2 MHz; reducing to 0.4 V peak to peak at 10 MHz.	
Polarity of Operation	Positive-going signal decreases intensity.	
Maximum Input Voltage		10 V (DC to peak AC).
Input Resistance		Approximately 500 Ω.

OUTPUTS

Characteristic	Performance Requirements	Supplemental Information
Camera Power (P1041 at CRT Bezel)		
Pin 1 – +15 V		
Pin 3 – single sweep reset		
Pin 5 – ground		

manuals.sqhill.com

CHARACTER GENERATOR

Characteristic	Performance Requirements	Supplemental Information
Character Size	Adjustable.	
Modes of Operation	Free-run independent of sweep.	Selected by internal READOUT mode switch.
	Triggered after sweep.	

DISPLAY (CRT) and OPTIONS

Characteristic	Performance Requirements	Supplemental Information
Cathode Ray Tube Type	T 7400.	
Graticule		
Type	Internal and illuminated.	
Area	8 X 10 div.	
Standard	1 div equals 1.22 cm.	
Option 4	1 div equals 1 cm.	
Option 6	1 div equals 1.22 cm (Spectrum Analyzer).	
Phosphor		
Standard	P31.	
Option 8	P11 of P7 on request.	
Beam Finder		Limits display to within graticule area when BEAM FINDER switch is actuated.

Photographic Writing Specifications	Phosphor	Standard	Option 4	
C53 Camera (f1.9 Lens 1:0.85 Image-to-Object Ratio)	P31	100 div/μs	180 cm/μs	Polaroid[1] film type 107 (3000 ASA). Without film fogging techniques.
	P11	140 div/μs	260 cm/μs	

[1] Registered trademark Polaroid Corporation.

POWER SOURCE

Characteristic	Performance Requirements	Supplemental Information
Line Voltage Ranges		
110 V nominal	100 V ±10%.	
	110 V ±10%.	
	120 V ±10%.	
220 V nominal	200 V ±10%.	
	220 V ±10%.	
	240 V ±10%.	
Line Frequency		50 to 400 Hz.
Maximum Power Consumption (115 V AC; 60 Hz)		170 W, 1.9 A.
Fuse Data		
110 V line (F1000)		3.2 A slow blow.
220 V line (F1000)		1.6 A slow blow.
+130 V Supply (F855)		0.15 A fast blow.

SIGNALS OUT

Characteristic	Performance Requirements	Supplemental Information
VERT SIG OUT	See systems specifications for 7000-series instruments.	
Vertical Signals	LEFT, RIGHT, ALT, and ADD.	Selected by TRIG SOURCE switch.
Gain		
Into 50 Ω		25 mV/div.
Into 1 MΩ		0.5 V/div. ±20% system CRT to VERT SIG OUT.
Risetime (Into 50 Ω)		5 ns or less.
Aberrations		
Centering		±1 div system CRT to VERT SIG OUT. (1.5 V into 1 MΩ or 75 mV into 50 Ω.
Output Resistance		950 Ω within 2%.
+GATE OUT		
Gate Signals	MAIN, AUXILIARY, and DELAY.	Selected by Gate selector switch.
Output		
Into 50 Ω		0.5 V within 10%.
Into 1 MΩ		10 V within 10%.

http://manuals.tekscan.com

SIGNALS OUT (cont)

Characteristic	Performance Requirement	Supplemental Information
Risetime (Into 50 Ω)		20 ns or less
Output Resistance		950 Ω within 2%.
+SAWTOOTH OUT		
Output		
Into 50 Ω		50 mV/unit time[2] within 15%.
Into 1 MΩ		1 V/unit time[2] within 10%.
Output Resistance		950 Ω within 2%.

ENVIRONMENTAL

Characteristic	Information
NOTE *This instrument will meet the electrical characteristics given in the Performance Requirement column of the Specifications over the following environmental limits.*	
Temperature Range	
Operating	0°C to +50°C.
Non-operating	−55°C to +75°C.
Altitude	
Operating	15,000 ft.
Non-operating	Test limit 50,000 ft.

Transportation (packaged instrument, without plug-in units) qualifies under National Safe Transit test procedure 1A, Category II.

PHYSICAL

Characteristic	Information
Ventilation	Safe operating temperature maintained by convection cooling. (7603) or forced air cooling (R7603). Automatic resetting thermal cutout protects instrument from overheating.

PHYSICAL (cont)

Characteristic	Information
Finish	Anodized aluminum front panel. Painted cabinet.
7603 Overall Dimensions (measured at maximum points)	
Height	11.4 in (28.9 cm).
Width	8.7 in (22.1 cm).
Length	24.0 in (60.9 cm).
Net Weight (instrument only)	30 lb (13.6 kg).
R7603 Overall Dimensions (measured at maximum points)	
Height	5.25 in (13.3 cm).
Width	19.0 in 48.2 cm).
Length	24.7 in (62.9 cm).
Net Weight (instrument only)	30 lb (13.6 kg).

http://manoman.spb.ru

STANDARD ACCESSORIES

Standard accessories supplied with the 7603 are given in the Mechanical Parts List illustrations. For optional accessories available for use with this instrument, see the Tektronix, Inc. catalog.

[2] **Referenced to Time/Div setting.**

7600-SERIES SYSTEM SPECIFICATIONS

Amplifier Plug-In Unit	Vertical System							
				Accuracy			SIG OUT	
	Probe	BW	T_r	EXT CAL 0 to 50°C	INT CAL 15 to 35°C	INT CAL 0 to 50°C	BW	T_r
7A11	Integral	100 MHz	3.5 ns	2%	3%	4%	60 MHz	5.9 ns
7A12	None	85 MHz	4.2 ns	2%	3%	4%	55 MHz	6.4 ns
	P6053			3%	4%	5%	55 MHz	6.4 ns
7A13	None	80 MHz	4.4 ns	1.5%	2.5%	3.5%	55 MHz	6.4 ns
	P6055			1.5%	2.5%	3.5%	45 MHz	7.8 ns
7A14	P6021	50 MHz	7.0 ns	2%	3%	4%	40 MHz	8.8 ns
	P6022	85 MHz	4.2 ns	2%	3%	4%	50 MHz	7.0 ns
7A15A	None	65 MHz	5.4 ns	3%	4%	5%	50 MHz	7.0 ns
	P6053			3%	4%	5%	50 MHz	7.0 ns
7A16	None	100 MHz	3.5 ns	2%	3%	4%	60 MHz	5.9 ns
	P6053			3%	4%	5%	60 MHz	5.9 ns
7A17	None	100 MHz	3.5 ns				15 MHz	24 ns
7A18	None	70 MHz	5.0 ns	2%	3%	4%	50 MHz	7.0 ns
	P6053			3%	4%	5%	50 MHz	7.0 ns
7A19	None or P6051	110 MHz	3.2 ns	2%	3%	4%	65 MHz	5.4 ns
	P6056/ P6057			3%	4%	5%	65 MHz	5.4 ns
7A22	None or Any	1.0 MHz ±10%	350 ns ±9%	2%	3%	4%	1.0 MHz ±10%	350 ns ±9%

http://manoman.schill.com

The bandwidth of a vertical plug-in used in the horizontal compartment is 2 MHz except for the 7A22 which has a bandwidth of 850 kHz. The X-Y phase shift between 2 similar units is 2° at 35 kHz.

TIME BASE PLUG-INS

Time Base	Performance Feature	Max Sweep Rate	Triggering Freq Range
7B50	Delayed Sweep & Ext Amplifier	5 ns/div	DC to 100 MHz
7B51	Delaying Sweep	5 ns/div	DC to 100 MHz
7B52	Delayed & Mixed Sweeps	5 ns/div	DC to 100 MHz
7B53N	Delayed & Mixed Sweeps	5 ns/div	DC to 100 MHz
7B70	Delayed Sweeps & Ext Amplifier	2 ns/div	DC to 200 MHz
7B71	Delaying Sweep	2 ns/div	DC to 200 MHz
7B92	Display Switching	2 ns/div	DC to 250 MHz

SPECIAL PURPOSE and SAMPLING PLUG-INS

Plug-In	Performance Feature
7CT1N	Low Power Semiconductor Curve Tracer
7D13	Measures: Temperature, Voltage, Current, and Resistance
7D14	Directly Gated Counter to 525 MHz
7L12	1 MHz to 1.8 GHz Spectrum Analyzer
7M11	High Quality Dual Delay Line
7S11	Accepts Plug-In Sampling Heads
7S12	TDR and Sampling Applications
7T11	Random or Sequential; Equivalent or Real-Time Sampling

For more complete specifications on plug-in units for the 7600-Series Oscilloscope System, refer to the TEKTRONIX Catalog.

CALIBRATION

Calibration Interval

To assure instrument accuracy, check the calibration of the 7603 every 1000 hours of operation, or every six months if used infrequently. Before complete calibration, thoroughly clean and inspect this instrument as outlined in the Maintenance section.

TEKTRONIX Field Service

Tektronix, Inc. provides complete instrument repair and recalibration at local Field Service Centers and the Factory Service Center. Contact your local TEKTRONIX Field Office or representative for further information.

Using This Procedure

General. This section provides several features to facilitate calibration of the 7603. These are:

Index. An index is given preceding the calibration procedure to aid in locating a step.

Partial Procedure. A partial calibration is often desirable after replacing components, or to touch up the adjustment of a portion of the instrument between major recalibrations. To calibrate only part of the instrument, set the controls as given under Preliminary Control Settings and start with the nearest Equipment Required list preceding the desired portion. To prevent unnecessary recalibration of other parts of the instrument, re-adjust only if the tolerance given in the CHECK- part of the step is not met. If re-adjustment is necessary, also check the calibration of any steps listed in the INTERACTION- part of the step.

Complete Calibration Procedure. Completion of each step in the following calibration procedure insures that this instrument is both correctly adjusted and performing within all given tolerances.

IMPORTANT NOTE

All waveforms shown in this section were taken with a TEKTRONIX Oscilloscope Camera System, unless noted otherwise.

TEST EQUIPMENT REQUIRED

General

The test equipment and accessories, or its equivalent, given in the Test Equipment table is required for complete calibration of the 7603. Specifications given for the test equipment are the minimum necessary for accurate calibration. Therefore, the specifications of any test equipment used must meet or exceed the listed specifications. All test equipment is assumed to be correctly calibrated and operating within the listed specification. Detailed operating instructions for the test equipment are not given in this procedure. Refer to the instruction manual for the test equipment if more information is needed.

Special Calibration Fixtures

Special TEKTRONIX calibration fixtures are used in this procedure only where they facilitate instrument calibration. These special calibration fixtures are available from Tektronix, Inc. Order by part number through your local TEKTRONIX Field Office or representative.

Calibration Equipment Alternatives

All of the listed test equipment is required to completely check and adjust this instrument. This Calibration procedure is based on the first item of equipment given as an example of applicable equipment. When other equipment is substituted, control settings or calibration setup may need to be altered slightly to meet the requirements of the substitute equipment. If the exact item of test equipment given as an example in the Test Equipment table is not available, first check the Specifications column carefully to see if any other equipment is available which might suffice. Then check the Usage column to see what this item of test equipment is used for. If used for a check or adjustment which is of little or no importance to your measurement requirements, the item and corresponding step(s) can be deleted.

The following procedure is written to completely check and adjust the 7603 to the limits given in Section 2 and to allow interchanging 7000-series plug-in units between 7000-series mainframes without the need to recalibrate the instruments each time. If the applications for which you will use the 7603 do not require the full available performance from the 7603/plug-in combination, this procedure and the required equipment list can be shortened accordingly. For example, the basic measurement capabilities of this instrument can be verified by checking vertical deflection accuracy, vertical square-wave response, and basic horizontal timing with 7000-series real-time plug-in units and an accurate square-wave signal. Also, if the 7603/plug-in combination is to be used as a fixed system without the need to interchange plug-in units, all tests can be made by substituting vertical plug-in units and applicable test signals for the 067-0587-01 mainframe standardizer calibration fixture.

TEST EQUIPMENT

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
1. Precision DC voltmeter	Range, zero to 150 volts; accuracy, within 0.1%.	Calibrator output accuracy check and adjustment. Low-voltage power supply adjustment.	a. TEKTRONIX DM 501 Digital Multimeter.[1] b. Fluke Model 825A Differential DC Voltmeter.
2. DC voltmeter (VOM)	Range, zero to 4000 volts; accuracy, checked to within 1% at −2960 volts.	High-voltage power supply check. Z-axis DC levels adjustment.	a. Triplett Model 630-NA. b. Simpson Model 262.
3. Time-mark generator	Marker outputs, 10 nanoseconds to 0.1 second; marker accuracy, within 0.1%. Trigger output, one millisecond.	CRT geometry check and adjustment. Horizontal timing check and adjustment.	a. TEKTRONIX TG 501 Time-Mark Generator.[1] b. TEKTRONIX 2901 Time-Mark Generator.
4. High-frequency constant amplitude signal generator	Frequency, 65 to above 190 megahertz, reference frequency, 3 megahertz output amplitude variable from 0.5 volt to 5 volts; amplitude accuracy, within 1% of reference as output frequency changes.	Vertical bandwidth check. Vertical amplifier isolation check.	Wavetek 1002 Sweep/Signal Generator.
5. Medium-frequency constant-amplitude signal generator	Frequency, 50 to 70 megahertz; reference frequency, 50 kilohertz; output amplitude, variable from five millivolts to five volts peak to peak into 50 ohms; amplitude accuracy, constant within 3% of reference as output frequency changes.	External Z-axis operation check. Vertical bandwidth check. Vertical amplifier isolation check. Horizontal bandwidth check.	a. TEKTRONIX SG 503 Signal Generator.[1] b. TEKTRONIX 191 Constant Amplitude Signal Generator. c. General Radio 1215-C with 1263-C Amplitude Regulating Power Supply.
6. Low-frequency signal generator	Frequency, 35 kilohertz; output amplitude, variable from 50 to 100 millivolts.	X-Y phase shift check.	a. TEKTRONIX FG 503 Signal Generator.[1] b. General Radio 1310-B Oscillator.
7. Test-oscilloscope system (dual-trace)	Bandwidth, DC to 50 megahertz; minimum deflection factor, 10 millivolts/division; accuracy, within 3%.	Horizontal limit centering adjustment and + GATE OUT.	a. TEKTRONIX 7603 or 7403N Oscilloscope with two 7A15A or 7A16A Amplifier and 7B50 or 7B53A Time-Base plug-in units, and two P6053B Probes. b. TEKTRONIX 465 Oscilloscope with two P6065A Probes.
8. Vertical plug-in unit (two identical units required), and a dual display vertical unit.	TEKTRONIX 7A-series 65 megahertz bandwidth required for complete procedure as written.	Used throughout procedure to provide vertical input to 7603 under calibration. Identical units required only for X-Y phase shift check. The 7A18A is used to check READOUT operation.	a. TEKTRONIX 7A15A and a 7A18 Amplifier (may be shared with 7000-series test oscilloscope) b. Any 7A-series plug-in unit (tolerances in some steps may be limited if low-frequency units used).

[1] Requires TM 500-Series Power Module.

http://dataform.mcgraw-hill.com

TEST EQUIPMENT (cont)

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
9. Time base plug-in unit	TEKTRONIX 7B-series.	Used through procedure to provide sweep.	a. TEKTRONIX 7B53A or 7B52 Time Base. b. Any 7B-series plug-in unit.
10. Mainframe standardizer calibration fixture	Produces gain-check and pluse-response waveforms.	Used throughout procedure to standardize instrument so plug-in units can be interchanged without complete recalibration.	a. TEKTRONIX Calibration Fixture 067-0587-01. b. Calibrated 7000-series plug-in units with suitable signal sources may be substituted if lower performance is acceptable.
11. 10X passive probe	Compatible with 7B-series external trigger input.	Chopped mode operation check (adjustment procedure).	a. TEKTRONIX P6053B or P6065A Probe (may be shared with test oscilloscope).
12. T connector	Connectors, BNC.	External Z-axis operation check.	a. TEKTRONIX Part No. 103-0030-00.
13. Termination	Impedance, 50 ohms; accuracy, ±2%; connectors, BNC.	Horizontal timing check and adjustment. X-Y phase shift check.	a. TEKTRONIX Part No. 011-0049-01.
14. Dual-input coupler	Connectors, BNC.	Added operation check. X-Y phase shift check.	a. TEKTRONIX Calibration Fixture 067-0525-00.
15. Cable (two required)	Impedance, 50 ohms; type, RF-58/U; length, 18 and 42 inches; connectors, BNC.	Used throughout procedure for signal interconnection.	a. TEKTRONIX Part No. 012-0076-00 (18-inch). TEKTRONIX Part No. 012-0057-01 (42-inch).
16. GR in-line termination	Impedance, 50 ohms; accuracy, ±2%; connectors, GR874 input with BNC male output.	External Z-axis operation check. Vertical bandwidth check. Vertical amplifier isolation check. Horizontal bandwidth check.	a. TEKTRONIX Part No. 017-0083-00.
17. Cable	Impedance, 50 ohms; type RG-213/U; electrical length, five nanoseconds; connectors, GR874.	External Z-axis operation check. Vertical bandwidth check. Vertical amplifier isolation check. Horizontal bandwidth check.	a. TEKTRONIX Part No. 017-0502-00.
18. BNC to pin-jack cable	Adapts pin jacks to BNC male connector.	Added operation check. Trigger source operation check. Astigmatism adjustment.	a. TEKTRONIX Part No. 175-1178-00 (one supplied as standard accessory).
19. Screwdriver	Three-inch shaft, 3/32-inch bit.	Used throughout adjustment procedure to adjust variable resistors.	a. Xcelite R-3323.
20. Low-capacitance screwdriver	1 1/2-inch shaft.	Used throughout adjustment procedure to adjust variable capacitors.	a. TEKTRONIX Part No. 003-0000-00.

http://manuals.mcgraw-hill.com

Setup Procedure

NOTE

This instrument should be adjusted at an ambient temperature of +25°C ±5°C for best overall accuracy.

1. Remove the sides and bottom covers from the 7603 or the top cover and side panel from the R7603.

2. Connect the instrument to a power source which meets the voltage and frequency requirements. The applied voltage should be near the center of the voltage range marked on the rear panel (see Section 1 for information on converting this instrument from one operating voltage to another).

NOTE

If correct line voltage is not available, use a variable autotransformer to provide the correct input voltage.

3. Set the controls as given under Preliminary Control Settings. Allow at least 20 minutes warmup before proceeding.

NOTE

Titles for external controls of this instrument are capitalized in this procedure (e.g., INTENSITY). Internal adjustments are initial capitalized only (e.g., CRT Grid Bias).

Preliminary Control Settings

Set the 7603 controls as follows:

INTENSITY	Midrange
FOCUS	Adjust for well-defined display
BEAM FINDER	Out
GRATICULE ILLUM	As desired
VERT MODE	LEFT
TRIG SOURCE	VERT MODE
POWER	ON

CALIBRATION PROCEDURE

7603 Serial No.

Calibration Date

Calibrated By

Introduction

The following procedure returns the 7603 to correct calibration. All limits and tolerances given in this procedure are calibration guides, and should not be interpreted as instrument specifications except as listed in Section 2.

Index to Calibration Procedure

http://manomanuals.shill.com

POWER SUPPLY

Equipment Required

1. Precision DC voltmeter
2. DC voltmeter (VOM)
3. Three-inch screwdriver

Control Settings

Set the controls as given under Preliminary Control Settings.

1. Adjust –50 Volt Power Supply

a. Set the INTENSITY control fully counterclockwise.

b. Connect the precision DC voltmeter between TP–50 (see Fig. 3-1A) and chassis ground.

c. CHECK—Meter reading; –50 volts ±0.1 volt.

d. ADJUST— –50 volts adjustment R881 (see Fig. 3-1B) for a meter reading of exactly –50 volts.

e. INTERACTION—Change in setting of R881 may affect operation of all circuits within the 7603.

2. Check Remaining Power-Supply Voltages

a. CHECK—Table 3-1 lists the low-voltage power supplies in this instrument. Check each supply with the precision DC voltmeter for output voltage within the given tolerance (connect meter ground lead to chassis ground). Power supply test points are shown in Fig. 3-1A.

b. Disconnect the precision DC voltmeter.

NOTE

Ripple and regulation of the individual power supplies can be checked using the procedure given under Troubleshooting Techniques in Section 5.

TABLE 3-1

Power Supply Tolerance

Power Supply	Test Point	Output Voltage Tolerance
–50 Volt	Pin 8 P1171	±0.1 volt
–15 Volt	Pin 1 P1171	±0.1 volt
+5 Volt	Pin 2 P1171	±0.07 volt
+15 Volt	Pin 3 P1171	±0.1 volt
+50 Volt	Pin 4 P1171	±0.3 volt
+130 Volt	Pin 6 P1171	±5.2 volt

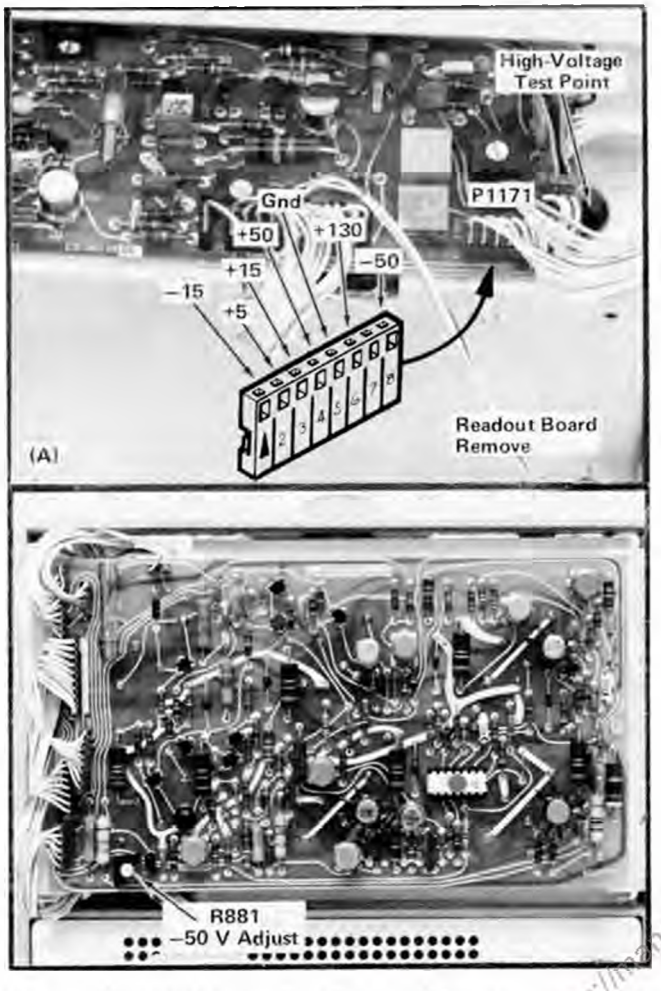


Fig. 3-1. (A) Location of power supply and high-voltage test points (right side of instrument); (B) Location of −50 V adjustment (Low Voltage Regulator board).

3. Check High-Voltage Power Supply

a. Turn off instrument.

b. Set the DC voltmeter (VOM) to measure at least 3000 volts. Then, connect it between the high-voltage test point (see Fig. 3-1A) and chassis ground.

c. Turn on instrument. Check meter reading; −2975 volts ±89 volts.

d. Turn off instrument. Disconnect the DC voltmeter.

e. Turn on instrument.

DISPLAY AND Z-AXIS

Equipment Required

1. Mainframe standardizer calibration fixture
2. 7B53A plug-in unit
3. DC Voltmeter (VOM)
4. 7A15A plug-in unit
5. Time-mark generator
6. Medium-frequency generator
7. BNC to pin-jack cable
8. 18-inch 50-ohm BNC cable
9. 42-inch 50-ohm BNC cable
10. Five-nanosecond GR cable
11. 50-ohm GR in-line termination
12. BNC T connector
13. Three-inch screwdriver
14. Low-capacitance screwdriver

Control Settings

Set the controls as given under Preliminary Control Settings.

4A. Adjust CRT Grid Bias

a. Install the mainframe standardizer calibration fixture (or a vertical plug-in) in the left vertical compartment and depress the LEFT VERT MODE button. Set the fixture for Vert or Horiz +Step Resp, amplitude fully counterclockwise, and Position to midrange.

b. Install the time base plug-in in the horizontal compartment, and set it for the slowest sweep speed. Adjust triggering for a free-running sweep.

c. Adjust the fixture Position control to bring the trace on screen, then rotate both the INTENSITY and READOUT INTENSITY controls fully counterclockwise.

d. Connect a 10X probe from the test-oscilloscope to the Z-Axis test point (see Fig. 3-2) and the probe ground lead to chassis ground.

e. Set the test-oscilloscope to DC input and a display of 5 volts/division (including probe attenuation), position the trace to the center graticule line.

f. ADJUST—INTENSITY control for a display amplitude 4 volts above the center graticule line.

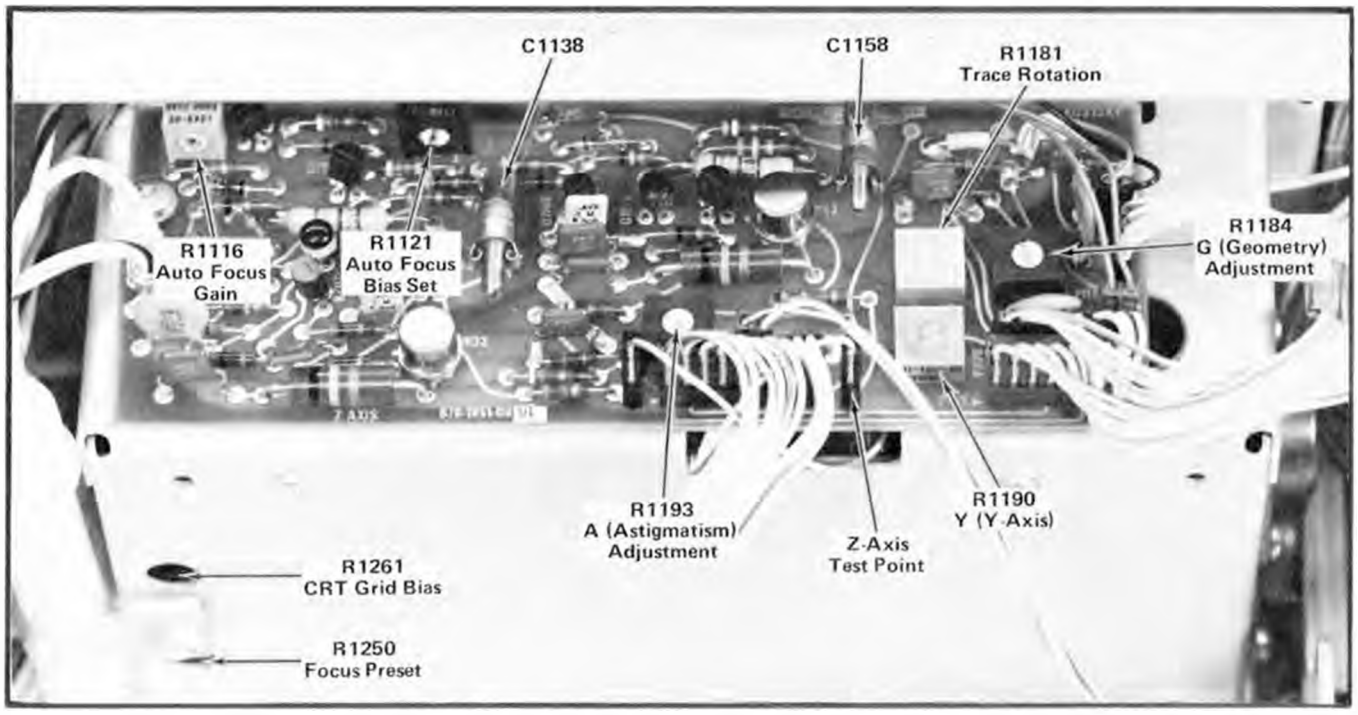


Fig. 3-2. Location of Display and Z Axis adjustments and test points.

g. ADJUST—CRT Grid Bias adjustment R1261 (see Fig. 3-2) until the trace on the 7603 is just extinguished. Set INTENSITY or a viewable trace.

4B. Check Z-Axis DC Levels

a. Set the test-oscilloscope for 10 V/division, DC input.

b. Set the time base plug-in in the 7603 to 50 ms/division and the test-oscilloscope time base to 1 sec/div.

c. Set the calibration fixture Position control to position the trace vertically off screen, and set the INTENSITY control fully clockwise.

d. CHECK—The test-oscilloscope display amplitude should be at least 58 volts, note this reading.

e. Set the 7603 time base plug-in to 0.1 second/division.

f. CHECK—Pulse amplitude deflection on the test-oscilloscope should decrease to between 25 volts to 35 volts less than the amplitude in step d.

g. Disconnect the test oscilloscope 10X probe from the 7603 and reduce the INTENSITY setting to a normal intensity. Position the trace within the graticule area.

5. Adjust Astigmatism

a. Set the 7B53A for auto, internal triggering at a sweep rate of one millisecond/division.

b. Set the mainframe standardizer calibration fixture Test switch to Vert or Horiz Aux In.

c. Connect the 4 V Calibrator pin-jack to the Aux In connector of the calibration fixure with the BNC to pin-jack cable.

d. Set the calibration fixture Position control for a centered display, and the Amplitude control for about two divisions of vertical deflection.

e. CHECK—CRT display is well defined.

f. ADJUST—FOCUS control and A (Astigmatism) adjustment R1193 (see Fig. 3-2) to obtain best display definition.

g. Disconnect the cable.

6. Adjust Trace Rotation

a. Set the INTENSITY control to midrange.

b. Move the trace to the center horizontal line with the mainframe standardizer Position control.

http://manomanuals.com

c. CHECK—Trace aligns with the center horizontal line within 0.1 division.

d. ADJUST—Trace Rotation adjustment R1181 (see Fig. 3-2) to align the trace with the center horizontal line.

7. Adjust Y-Axis Alignment

a. Inter-change the 7B53A and mainframe standardizer plug-in units.

b. Move the trace to the center vertical line with the mainframe standardizer Position control.

c. CHECK—Trace aligns with the center vertical line within 0.1 division.

d. ADJUST—Y-Axis adjustment R1190 (see Fig. 3-2) to align the trace with the center vertical line.

8. Adjust Geometry

a. Remove the mainframe standardizer and install the 7B53A in the horizontal compartment. Replace the mainframe standardizer in the left vertical compartment.

b. Set the VERT MODE switch to LEFT.

c. Connect the marker output of the time-mark generator to the Aux In connector of the calibration fixture with an 18-inch 50-ohm BNC cable.

d. Connect the trigger output of the time-mark generator to the external trigger input connector of the 7B53A with a 42-inch 50-ohm BNC cable.

e. Set the time-mark generator for one-millisecond markers and one-millisecond triggers.

f. Set the calibration fixture Test switch to Vert or Horiz Aux In and the Amplitude Step or Aux control fully clockwise.

g. Set the 7B53A for auto triggering from the external source at a sweep rate of 0.5 millisecond/division (magnifier off).

h. Set the 7B53A variable time/division control to obtain exactly one marker for each major graticule division.

i. Set the time-mark generator for both one- and 0.1-millisecond markers.

j. Position the baseline of the markers as far toward the bottom of the graticule as possible with the calibration fixture Position control.

k. CHECK—Vertical bowing and tilt of the marker display is less than 0.1 division (each 0.1-millisecond marker represents 0.1 division).

l. ADJUST—Geometry adjustment R1184 (see Fig. 3-2) for minimum bowing of time markers. Adjustment may have to be compromised to obtain less than 0.1 division bowing and tilt everywhere within the graticule area.

9. Check External Z-Axis Operation

a. Install the 7A15A in the right vertical compartment.

b. Connect the output of the medium-frequency constant-amplitude signal generator to the input of the 7A15A through the five-nanosecond GR cable, 50-ohm GR in-line termination, and the BNC T connector.

c. Set the 7A15A for a deflection factor of one volt/division.

d. Set the 7B53A for auto, internal triggering at a calibrated sweep rate of 10 microseconds/division.

e. Set the medium-frequency generator for a two-division display at its reference frequency (50 kilohertz).

f. Connect the output of the BNC T connector to the EXT Z-AXIS connector with the 42-inch 50-ohm BNC cable.

g. CHECK—Top portion of displayed waveform blanked out.

h. Disconnect cable from external Z-AXIS connector.

10. Check Beam Finder

a. Set the 7A15A deflection factor to 20 millivolts/division. Notice that the display exceeds the viewing area.

b. Press the BEAM FINDER switch.

http://manoman.sohu.com

c. CHECK–Display compressed within graticule area.

d. Increase the 7A15A deflection factor until the compressed display is reduced in amplitude.

e. Release the BEAM FINDER switch.

f. CHECK–Display remains within graticule area.

g. Disconnect all test equipment and remove the plug-in units.

VERTICAL DEFLECTION SYSTEM

Equipment Required

1. Mainframe standardizer calibration fixture
2. 7B53A plug-in unit
3. High-frequency generator
4. 7A15A plug-in unit (two)
5. 10X probe
6. Five-nanosecond GR cable
7. 50-ohm GR in-line termination
8. BNC to pin-jack cable
9. Dual-input coupler
10. Three-inch screwdriver
11. Low-capacitance screwdriver

Control Settings

Set the controls given under Preliminary Control Settings.

11. Adjust Bias Adjustment

a. Install the 7B53A in the horizontal compartment.

b. Set the 7B53A for auto, external triggering at a sweep rate of one millisecond/division.

c. Install the mainframe standardizer calibration fixture in the left vertical compartment. Set the calibration fixture Test switch to VERT or HORIZ Gain and the Rep Rate switch to 250 kHz.

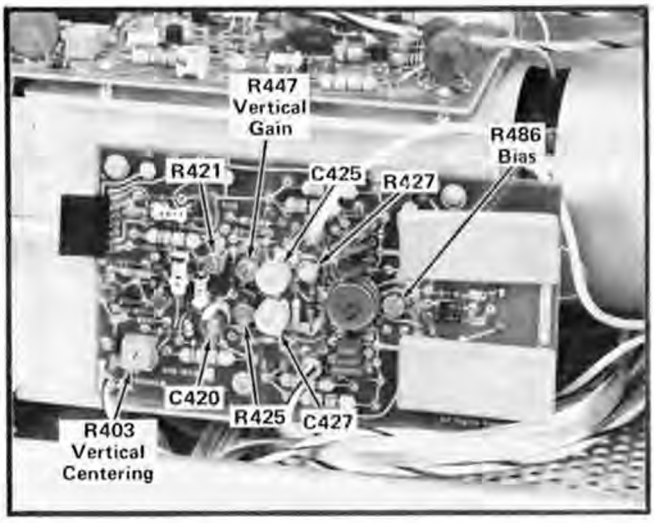


Fig. 3-3. Location of vertical system adjustments (Vertical Output board).

d. ADJUST–Bias R486 for maximum gain. (See Fig. 3-3.)

12. Adjust Vertical Centering

a. Set the calibration fixture Test switch to Triggering Gain.

b. The trace should be within 0.3 division of the graticule center line.

c. ADJUST–Vertical Centering adjustment R403 (see Fig. 3-3) to position the trace to the center horizontal line.

13. Adjust Vertical Gain

a. Set the calibration fixture Test switch to Vert or Horiz Gain.

b. Position the display so the first and ninth traces are near the top and bottom lines of the graticule.

c. CHECK–Deflection between the second and eighth traces should be six divisions ±0.06 division.

d. ADJUST–Vertical Gain adjustment R447 (see Fig. 3-3) for exactly six divisions of deflection between the second and eighth traces.

e. Remove the calibration fixture from the left vertical compartment and install it in the right vertical compartment.

http://manomanuals.tripod.com

f. Set the VERT MODE switch to RIGHT.

g. CHECK—Deflection between the second and eighth traces should be the same as part d ±1%.

h. ADJUST—If necessary, re-adjust R447 for correct tolerance in both parts d and h.

14. Check Vertical Linearity

a. Remove the mainframe standardizer calibration fixture. Install the 7A15A in the left vertical compartment and connect a 0.4 volt square wave signal from the CALIBRATOR out jacks. Set the VERT MODE switch to left.

b. Set the 7A15A Volts/Div switch to 0.2 volt/division. Adjust the position control to keep the display centered on the graticule and adjust the Variable Volts/Div control if needed for a two division display.

c. CHECK—Position the two divisions of display vertically and check for not more than 0.1 division of compression or expansion anywhere within the graticule area. Remove the 7A15A and install the mainframe standardizer calibration fixture.

15. Adjust Vertical High-Frequency Compensation

a. Set the calibration fixture Test switch to Vert or Horiz +Step Resp, Rep Rate switch to 250 kHz, and adjust the Amplitude control for a six-division display.

b. Set the 7B53A for a calibrated sweep rate of five nanoseconds/division (use X10 magnifier). Set the trigger source switch internal adjust trigger level control and position control for a stable display, centered on the graticule.

c. CHECK—Check for optimum square corner and flat top on displayed pulse with aberrations not to exceed +0.1 or −0.1 division with total peak-to-peak aberrations not to exceed 0.1 division.

d. ADJUST—High-frequency compensation as given in Table 3-2 for optimum square leading corner and flat top with minimum aberrations within limits given in part c. Location of adjustments is shown in Fig. 3-3. Use the low-capacitance screwdriver to adjust the variable capacitors. Repeat the complete adjustment procedure several times to obtain optimum adjustment.

TABLE 3-2

High-Frequency Compensation

Adjustment	Primary Area Of Pulse Affected	Best Sweep Rate
C420 and R421	First 50 nanoseconds	50 nanoseconds/division
R425 and C425	First 20 nanoseconds	20 nanoseconds/division
C427 and R427	First 5 nanoseconds	20 nanoseconds/divisions

e. Remove the calibration fixture from the left vertical compartment and install it in the right vertical compartment.

f. Set the VERT MODE switch to RIGHT.

g. CHECK—Optimum square leading corner and flat top on the displayed pulse with aberrations not to exceed +0.1 or −0.1 division, with total peak-to-peak aberrations not to exceed 0.1 division.

h. ADJUST—If necessary, compromise the adjustment of C420, R421, R425, C425, C427, R427 for best response from both the left and right vertical compartments.

i. To verify correct high-frequency compensation, perform the bandwidth check as given in next step.

16. Check Vertical Amplifier Bandwidth

a. Connect the high-frequency constant-amplitude signal generator to the CW In connector of the mainframe standardizer calibration fixture.

b. Set the Test switch of the calibration fixture to Vert or Horiz Freq Resp.

c. Set the 7B53A for a sweep rate of 0.2 microsecond/division.

d. Set the high-frequency generator for six divisions of deflection, centered on the graticule, at a reference frequency of 3 megahertz.

e. Without changing the output amplitude, increase the output frequency of the high-frequency generator until the display is reduced to 4.2 divisions (−3 dB point).

f. CHECK—Output frequency must be 110 megahertz or higher if using test fixture. If using amplifier, see systems specifications.

g. Remove the calibration fixture from the right vertical compartment and install it in the left vertical compartment (leave signal connected).

h. Set the VERT MODE switch to LEFT.

i. Repeat parts d through f. Actual frequency (right vertical), 115 megahertz or higher.

j. Disconnect all test equipment (leave plug-in units installed).

17. Check Vertical Amplifier Isolation

a. Remove the mainframe standardizer calibration fixture from the right vertical compartment and install the 7A15A in this compartment.

b. Set the 7A15A for a deflection factor of 0.1 volt/division.

c. Connect the output of the high-frequency generator to the input of the 7A15A.

d. Set the high-frequency generator for eight divisions of deflection at 100 megahertz.

e. Set the VERT MODE switch to RIGHT.

f. CHECK—CRT display for not more than 0.1 division of 100 megahertz signal (channel isolation at least 100:1).

g. Remove the 7A15A from the left vertical compartment and install it in the right vertical compartment (leave signal connected).

h. Set the high-frequency generator for eight divisions of deflection at 100 megahertz.

i. Set the VERT MODE switch to LEFT.

j. CHECK—CRT display for not more than 0.1 division of 100 megahertz signal.

k. Disconnect all test equipment.

18. Check ADD Operation

a. Install the other 7A15A in the left vertical compartment.

b. Set both 7A15A units for a deflection factor of 0.2 volt/division.

c. Connect the 0.4 V Calibrator signal to the inputs of the 7A15A units with the BNC to pin-jack cable and dual-input coupler.

d. Set the 7B53A for auto, internal triggering at a sweep rate of 0.5 millisecond/division.

e. Center the display with the left 7A15A Position control and note the vertical deflection.

f. Set the VERT MODE switch to RIGHT.

g. Center the display with the right 7A15A Position control and note the vertical deflection.

h. Set the VERT MODE switch to ADD.

i. CHECK—CRT display; vertical deflection should approximately equal the algebraic sum of the deflection noted in parts e and g of this step.

j. Disconnect the BNC to pin-jack cable and dual-input coupler.

19. Check Alternate Operation

a. Set the VERT MODE switch to ALT.

b. Position the traces about two divisions apart.

c. Turn the 7B53A Time/Division switch throughout its range.

d. CHECK—Trace alternation between the left and right 7A15A units at all sweep rates. At faster sweep rates, alternation will not be apparent; instead display appears as two traces on the screen.

http://manomano.schill.com

20. Check Vertical Chopped Mode Operation

a. Connect the 10X probe to the external trigger input of the 7B53A.

b. Connect the probe tip to TP67 (see Fig. 3-4).

c. Position the trace several divisions above the center line with the Position control.

d. Set the VERT MODE switch to CHOP.

e. Set the 7B53A for auto, external triggering at a sweep rate of 0.2 microsecond/division.

f. CHECK—CRT display for chopped waveform display with duration of the time segment from each channel, including the blanked portion, between two and three divisions. Also, check that the unblanked (visible) portion of the time segment from each channel consists of at least 75% of the duration of the total channel segment.

g. Disconnect the probe and remove all plug-in units.

TRIGGERING SYSTEM

Equipment Required

1. Mainframe standardizer calibration fixture
2. 7B53A plug-in unit
3. 7A15A plug-in unit
4. BNC to pin-jack cable

Fig. 3-4. Location of TP67 on Logic board (shown with power unit removed).

Control Settings

Set the controls as given under Preliminary Control Settings.

21. Check Trigger Source Operation

a. Install the mainframe standardizer calibration fixture in the right vertical compartment and the 7A15A in the left vertical compartment.

b. Install the 7B53A in the horizontal compartment.

c. Set the 7B53A for auto, internal triggering at a sweep rate of 0.5 millisecond/division.

d. Set the 7A15A for a deflection factor of 0.2 volt/division.

e. Connect the 0.4 V Calibrator pin-jack to the input of the 7A15A with the BNC to pin-jack cable.

f. Position the Calibrator waveform display in the upper half of the graticule area with the 7A15A Position control.

g. Set the VERT MODE switch to RIGHT.

h. Set the calibration fixture Test switch to Vert or Horiz +Step Resp, Rep Rate switch to 250 Hz, and adjust the Amplitude control for a two-division display. Position the display in the lower half of the graticule area.

i. Set the VERT MODE switch to ALT.

j. CHECK—CRT display; both square-wave displays are stable.

k. Set the TRIG SOURCE switch to LEFT.

l. CHECK—CRT display; Calibrator display only is stable.

m. Set the TRIG SOURCE switch to RIGHT.

n. CHECK—CRT display; calibration fixture display only is stable.

o. Disconnect the BNC to pin-jack cable and remove the plug-in units.

http://manoman.sqhlr.com

HORIZONTAL DEFLECTION SYSTEM

Equipment Required

1. 7B53A plug-in unit
2. 7A15A plug-in unit (two)
3. Mainframe standardizer calibration fixture
4. Test-oscilloscope system with two 10X probes
5. Time-mark generator
6. Low-frequency generator
7. Medium-frequency generator
8. Dual-input coupler
9. Five-nanosecond GR cable
10. 50-ohm GR in-line termination
11. 42-inch 50-ohm BNC cable
12. 50-ohm BNC termination
13. Three-inch screwdriver
14. Low-capacitance screwdriver

Control Settings

Set the controls as given under Preliminary Control Settings.

22. Adjust Horizontal Amplifier Limit Centering

a. Install the 7B53A in the horizontal compartment.

b. Set the 7B53A for auto, internal triggering at a sweep rate of one millisecond/division with the magnifier on.

c. Connect 10X probes to both inputs of the test oscilloscope. Connect the probe tips to the horizontal deflection plate connectors of the 7603 (be sure probes are compensated).

d. Set both channels of the test oscilloscope for a vertical deflection factor of 1.0 volt/division (ten volts/division at probe tip) in the chop dual-trace mode with the input coupling set to ground.

e. Position the ground-reference traces displayed on the test oscilloscope to the center horizontal line of the graticule. Do not change the test-oscilloscope position controls after establishing this ground reference.

f. Set the test oscilloscope for DC input coupling and set the triggering controls so the test oscilloscope is triggered from the signal on channel 1 only. Set the triggering controls for a stable display at a sweep rate of two milliseconds/division.

g. CHECK—The base line of both displayed waveforms should be at the same DC level within 0.2 division (see Fig. 3-5).

h. ADJUST—Limit Centering adjustment R535 (see Fig. 3-6) to match the DC levels of both waveforms.

i. Disconnect all test equipment, and remove the 7B53A.

23. Adjust Horizontal Amplifier Centering

a. Install the calibration fixture in the horizontal compartment and set the Test Switch to Triggering Gain.

b. CHECK—Spot produced by calibration fixture should align with the vertical center of the graticule within 0.3 division.

c. ADJUST—Horizontal Centering adjustment R525 (see Fig. 3-6) to position the spot to the vertical center line.

d. INTERACTION—If R525 is adjusted, re-check steps 22 and 23.

e. Remove the calibration fixture from the horizontal compartment.

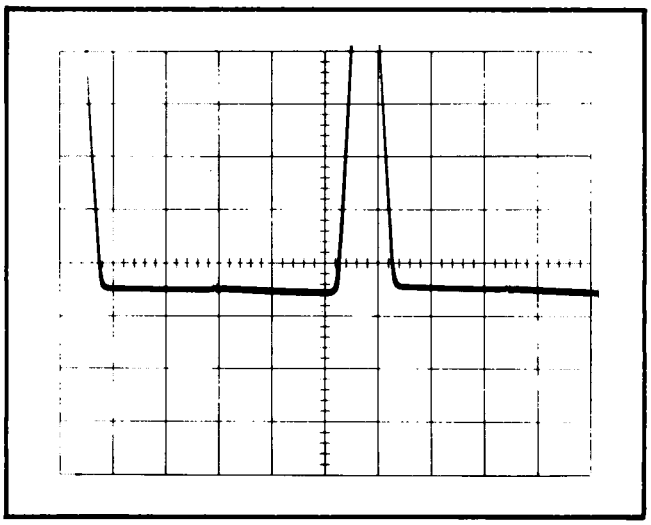


Fig. 3-5. Test oscilloscope waveforms when horizontal limit centering is properly adjusted.

http://manoman.sqhil.com

24. Check/Adjust Horizontal Amplifier Gain and Low-Frequency Linearity

a. Install the 7A15A in the horizontal compartment and the 7B53A in the vertical compartment. Set the 7A15A Volts/Div switch to 0.2 volt/division. Connect a 0.4 volt square wave CALIBRATOR signal to the 7A15A; adjust the Position control to keep the display centered on the graticule and adjust the Variable Volts/Div control if needed for two division display.

b. Check—Position the two division display horizontally and check for not more than 0.1 division compression or expansion anywhere within the graticule area. Remove the 7A15A and install the mainframe standardizer calibration fixture. Set the Test switch on the calibration fixture to Vert or Horiz gain, and Rep Rate to 250 kHz.

c. Set the 7B53A for auto, external triggering at a sweep rate of one millisecond/division.

d. Position the display so the first and eleventh traces are near the far left and right vertical lines of the graticule.

e. CHECK—Deflection between the second and tenth traces is eight divisions ±0.08 division.

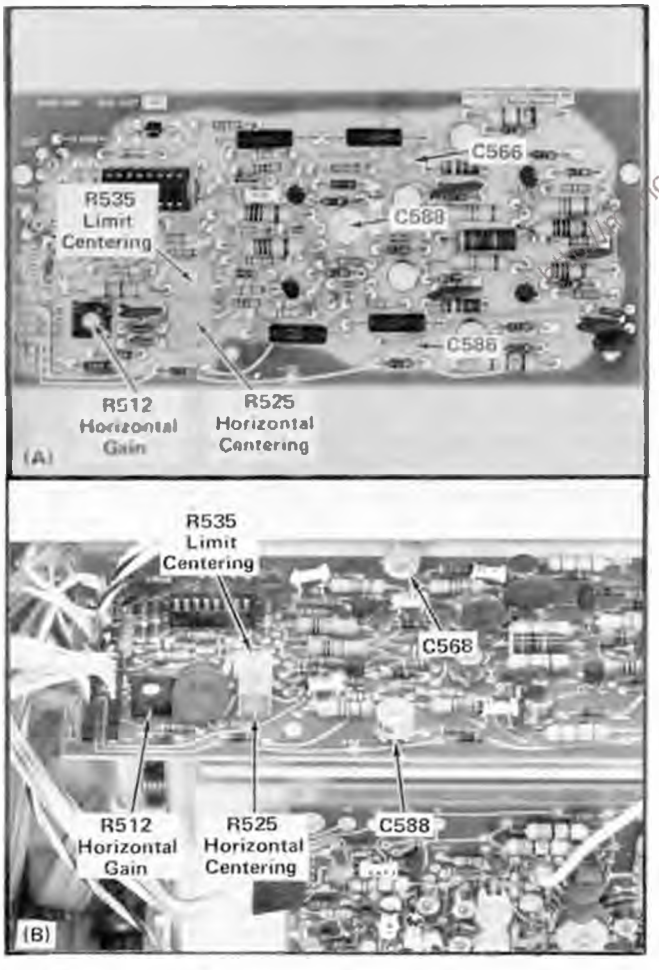


Fig. 3-6. Location of Horizontal adjustments (Horizontal Amplifier board). (A) SNB030000-up; (B) Below SNB030000.

f. ADJUST—Horizontal Gain adjustment R512 (see Fig. 3-6) for exactly eight divisions of deflection between the second and tenth traces.

g. CHECK—With gain set exactly, all nine vertical traces align with their respective graticule lines within 0.05 division.

h. INTERACTION—If R512 is adjusted, recheck steps 22 and 23.

i. Remove the calibration fixture and install the 7B53A in the horizontal compartment.

25. Adjust High-Frequency Timing

a. Install the 7A15A in the left vertical compartment.

b. Connect the time-mark generator to the input connector of the 7A15A with the 42-inch 50-ohm BNC cable and the 50-ohm BNC termination.

c. Set the time-mark generator for one-millisecond markers. Set the deflection factor of the 7A15A so the markers are at least two divisions in amplitude.

d. Set the 7B53A for auto, internal triggering at a sweep rate of one millisecond/division.

e. Position the first marker to the left vertical line of the graticule.

f. Set the 7B53A Swp Cal adjustment for one marker each major graticule division between the second and tenth lines.

g. Set the time-mark generator for 10-nanosecond markers.

h. Set the 7B53A for a sweep rate of 0.1 microsecond/division with the X10 magnifier on; set the deflection factor of the 7A15A as necessary so the markers are about two divisions in amplitude for the rest of step 25.

i. CHECK—CRT display for one marker each division over the center eight divisions.

j. ADJUST—For SN B030000-up—C588 for one marker each division (for SN below B030000, adjust C568 and C588 for one marker each division while maintaining approximately equal capacitances). Use low capacitance adjustment tool for all adjustments in this step.

k. Set the 7B53A for a sweep rate of 0.05 microsecond/division with X10 magnifier on.

l. ADJUST—For SN B030000-up—C566 and C586 for one marker each two divisions while maintaining approximately equal capacitances. (For SN below B030000, readjust C568 and C588 for best compromise between 5 nanosecond and 10 nanosecond timing.)

m. Repeat parts j, k, and l to achieve the best compromise for 5 nanosecond and 10 nanosecond timing over the center 8 horizontal divisions.

26. Check X-Y Phase Shift

a. Install the 7A15A plug-in units in the left vertical and horizontal compartments.

b. Set both 7A15A units for a deflection factor of 10 millivolts/division with DC input coupling.

c. Connect the low-frequency signal generator to the inputs of both 7A15A plug-in units with the 42-inch 50-ohm BNC cable, 50-ohm BNC termination, and dual-input coupler.

d. Set the low-frequency generator for eight divisions of vertical and horizontal deflection at an output frequency of 35 kilohertz.

e. CHECK—CRT lissajous display for an opening at the center vertical line of 0.28 division or less (indicates 2° or less phase shift; see Fig. 3-7).

f. Disconnect all test equipment (leave plug-in units installed).

27. Check Horizontal Bandwidth

a. Install the 7B53A in the right vertical compartment.

b. Set the VERT MODE switch to RIGHT.

c. Set the 7B53A for auto triggering at a sweep rate of one millisecond/division (display will free run).

d. Connect the medium-frequency generator to the input of the 7A15A in the horizontal compartment with the five-nanosecond GR cable and the 50-ohm GR in-line termination.

e. Set the medium-frequency generator for 8 divisions of horizontal deflection at its reference frequency (50 kilohertz).

f. Without changing the output amplitude, increase the output frequency of the generator to two megahertz.

g. CHECK—For at least 5.6 division of signal amplitude.

h. Disconnect all test equipment and remove the plug-in units.

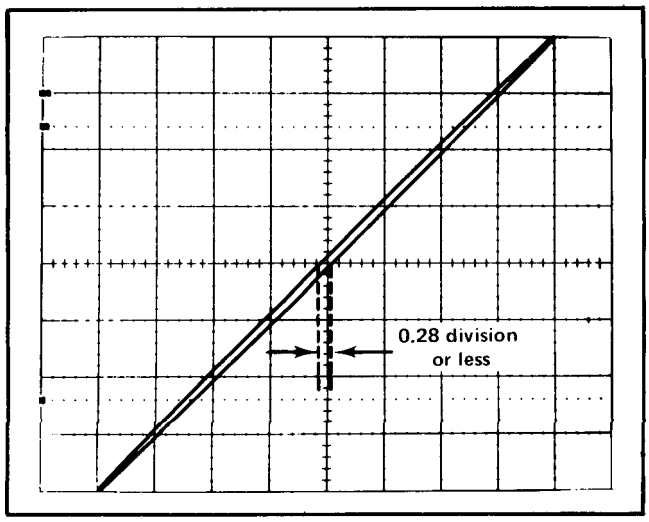


Fig. 3-7. Typical CRT display when checking X-Y phase shift.

Z-AXIS and AUTO FOCUS SYSTEM

Equipment Required

1. 7B53A plug-in unit
2. 7A15A plug-in unit
3. 10X passive probe
4. Medium-frequency generator
5. 42-inch 50-ohm BNC cable
6. 50-ohm BNC termination

28. Adjust Z-Axis Compensation

a. Install the 7A15A in the right vertical compartment.

b. Set the VERT MODE switch to RIGHT.

c. Connect the 10X probe to the input of the 7A15A. Check the probe compensation.

d. Set the 7B53A for a sweep rate of one microsecond/division with the X10 magnifier on.

e. Connect the probe tip to R1157, Z-Axis output and connect the ground strap to the 7603 chassis.

f. Set the 7A15A for a deflection factor of one volt/division (10 volts/division at probe tip).

g. ADJUST–the INTENSITY control for three divisions of vertical deflection on the CRT. Position the display so the positive leading edge of the waveform is displayed.

h. ADJUST–C1158 for optimum square positive leading corner (use a low capacitance screwdriver to adjust the variable capacitor).

i. Disconnect the probe.

29. Auto Focus Compensation and Operating Levels

a. Connect the probe tip to R1137, Auto Focus output.

b. ADJUST–the INTENSITY control for three divisions of vertical deflection on the CRT. Position the display so the negative leading edge of the waveform is displayed.

c. ADJUST–C1138 for optimum square negative leading corner (use a low capacitance screwdriver to adjust the variable capacitor).

d. Disconnect the probe.

e. Set the 191 constant amplitude signal generator to 50 kHz only.

f. Connect the 191 output to the input of the 7A15A. Adjust the amplitude of the 191 for a two division display.

g. Midrange R1045, the front panel FOCUS control.

h. Reduce the intensity so the display is just visible. Adjust R1250, the Focus Preset control, for optimum focus.

i. Increase the INTENSITY control to midrange and adjust R1121 Auto Focus bias set control for optimum focus.

j. Increase the intensity to almost maximum and adjust R1116 Auto Focus Gain for optimum focus.

k. Repeat steps m through o. Focus the display for a low intensity display and change the intensity to a brighter display. Check that the focus of the display remains optimized.

l. Disconnect all test equipment.

CALIBRATOR

Equipment Required

1. Precision DC voltmeter
2. 7A15A plug-in unit
3. 7B53A plug-in unit
4. BNC to pin-jack cable.
5. Three-inch screwdriver

Control Settings

Set the controls as given under Preliminary Control Settings.

30. Adjust Calibrator Output Voltage

a. Change jumper P1066 (see Fig. 3-8) to the DC position.

b. Connect the precision DC voltmeter between the 4 V and GND pin jacks.

c. CHECK–Meter reading: 4 volts ± 0.04 volt (within ±0.08 volt if this measurement is made outside the +15°C to +35°C range).

d. ADJUST–4 Volts adjustment R1077 (see Fig. 3-8) for a meter reading of exactly 4 volts.

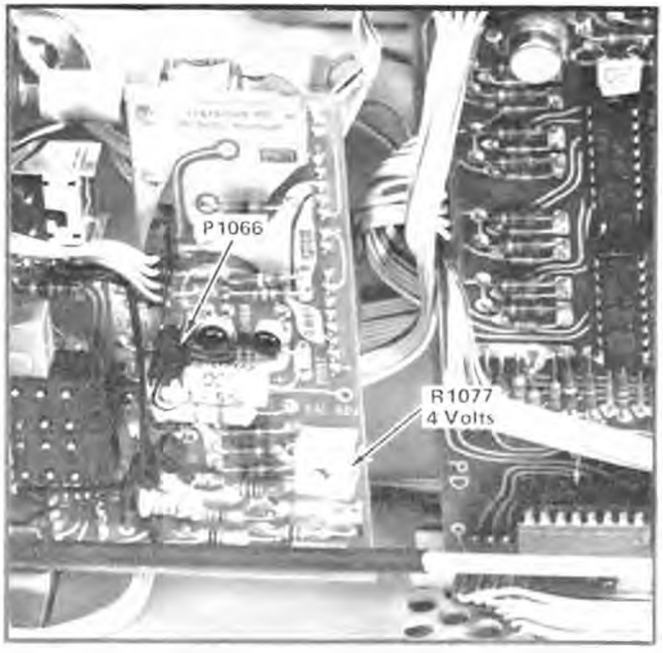


Fig. 3-8. Location of Calibrator adjustments (Calibrator board).

http://manoman.sghill.com

e. Connect the precision DC voltmeter between the 0.4 V Calibrator pin-jack and pin jack ground.

f. CHECK—Meter reading; 0.4 volt ±0.004 volt (within 0.008 volt if this measurement is made outside the +15°C to +35°C range).

g. Connect the precision DC voltmeter between the 40 mV Calibrator pin-jack and pin jack ground.

h. CHECK—Meter reading; 40 millivolts ±0.4 millivolt (within 0.8 millivolt if this measurement is made outside the +15°C to +35°C range).

i. Disconnect the precision DC voltmeter.

31. Check Calibrator Repetition Rate

a. Change jumper P1066 (see Fig. 3-8) to the 1 kHz position.

b. Install the 7A15A in the left vertical compartment and the 7B53A in the horizontal compartment.

c. Set the 7A15A for a deflection factor of one volt/division.

d. Set the 7B53A for auto, internal triggering at a sweep rate of 0.2 millisecond/division.

e. Connect the 4 V calibrator pin-jack to the input of the 7A15A with the BNC to pin-jack cable.

f. Position the start of the square wave to the left line of the graticule.

g. CHECK—CRT display for length of one complete cycle between 4.2 and 6.3 divisions (one kilohertz ±20%).

SIGNALS IN AND OUT

Equipment Required

1. 7A15A (two)
2. 7B53A
3. DC Voltmeter
4. BNC to pin-jack cable
5. Test Oscilloscope

32. Check S S READY OUT

a. Connect a voltmeter to the S S READY OUT connector and connect the calibrator signal to the input of the 7A15A. Obtain a triggered display of 2 or more divisions.

b. Set the 7B53A to SINGLE Sweep at a sweep rate of 0.5 seconds/division.

c. CHECK—for 0 volt at S S READY OUT connector.

d. Press the 7B53A RESET button.

e. CHECK—for a +5 volt level at the S S READY OUT connector.

f. CHECK—that S S READY OUT returns to 0 volt after single sweep has been displayed and hold off has occurred.

33. Check EXT S S RESET IN

a. CHECK—that when the EXT SS RESET IN input is grounded that the time base single sweep function is reset.

34. Check VERT SIG OUT

a. Set the 7B53A to Auto and adjust the trigger level for stable display at 1 microsecond/division.

b. Connect a BNC cable to the VERT SIG OUT connector and to the 7A15A in the right vertical compartment. Set TRIG SOURCE switch to LEFT VERT.

c. Connect the 0.4 V CALIBRATOR signal to the input of 7A15A in the left vertical compartment. Set both vertical amplifiers for a deflection factor of 0.2 volts/division with each input set to DC and each Position control set so its trace is centered.

d. CHECK—that a 2 division signal is displayed by the left vertical amplifier.

e. Set VERT Mode switch to RIGHT and, check that a signal of about 5 divisions is displayed by the right vertical amplifier.

http://manoman.sqhill.com

f. Interchange the connections to the vertical amplifiers. Set the TRIG SOURCE switch to right.

g. CHECK—that a 2 division signal is displayed by the right vertical amplifier.

h. Set the VERT MODE switch to LEFT and check that a signal of about 5 divisions is displayed.

i. Install a 50 Ω termination between the cable and the input of the right vertical amplifier.

j. Set the deflection factor of the left vertical to 100 mV/division. Check for a display of about 5 divisions.

k. Disconnect all cables.

35. Check +SAWTOOTH OUT

a. Connect the +SAWTOOTH OUT to the input of the left vertical amplifier. Set the deflection factor of the left vertical amplifier for 2 volts/division.

b. CHECK—for a sawtooth display of about 5 divisions in amplitude and greater than 10 cm in length.

36. Check +GATE OUT

a. Connect the +GATE OUT to the vertical input of the test-oscilloscope and set the deflection factor to 2 volts/division. Set the time/division switch to 1 ms/div. Place the GATE selector switch in the MAIN GATE position.

b. CHECK—that displayed signal is about 5 divisions in amplitude.

c. Disconnect all test equipment and remove the 7B53A and the 7A15A units.

READOUT OPERATION

Equipment Required

1. 7A18 dual display vertical plug-in unit

37. Check READOUT Operation

NOTE

If the CRT has been replaced, the words identify may not be positioned horizontally as described in steps 37a, e, and f. Select a value for R519 which will provide a correct display.

a. Install the 7A18 in the left vertical compartment. Set the 7A18 to a dual trace mode. Push and hold the Identify buttons on the 7A18. (Switch S2110 should be in the free run position.) Check that the word identify is within the top division and the bottom division of the graticule. Check that the words identify are positioned within the left third of the graticule. Check completeness of characters without over scanning (over scanning causes a bright dot where traces overlap).

b. ADJUST—Vertical Separation R2291 so the channel 1 characters are within top division, and the channel 2 characters are within bottom division.

c. ADJUST—Character height size R2273 as needed.

d. ADJUST—Character scan R2128 if characters are over scanned.

e. Remove the 7A18 from the left vertical and install it in the right vertical compartment. Push and hold the identify buttons on the 7A18. Check that the words identify are positioned within the center third of the graticule.

f. Remove the 7A18 from the right vertical and install it in the horizontal compartment. Push and hold the identify buttons on the 7A18. Check that the words identify are positioned within the right third of the graticule.

g. If the correct characters are displayed there is no need to adjust the Row Match adjustment R2183 or the Column Match adjustment R2214.

h. ADJUST—Row Match adjustment R2183 and Column Match adjustment R2214 for correct readout display.

READOUT GATE TRIG'D OPERATION

38. Check Readout Gate Trig'd Operation

a. Set switch S2110 to Gate Trig'd position.

b. Set sweep rate to 1 sec/division.

c. CHECK—that during the sweep that there is no readout information displayed, until after the sweep has been displayed. At fast sweep rates this is not noticeable.

This completes the calibration/checkout procedure for the 7603. Disconnect all test equipment and replace the side panels. If the instrument has been completely checked and adjusted to the tolerances given in this procedure, it will meet or exceed the specifications given in Section 1.

http://manoman.sghill.com/

CIRCUIT DESCRIPTION

Introduction

This section of the manual contains a description of the circuitry used in the 7603 Oscilloscope. The description begins with a discussion of the instrument using the basic block diagram shown in Fig. 4-1. Then, each circuit is described in detail using detailed block diagrams to show the interconnections between the stages within each major circuit and the relationship of the external controls and connectors to the individual stages.

A complete block diagram is located in the Diagrams section at the back of this manual. This block diagram shows the overall relationship between all of the circuits. Complete schematics of each circuit are also given in the Diagrams section. Refer to these diagrams throughout the following circuit description for electrical values and relationship.

BLOCK DIAGRAM

The following discussion is provided to aid in understanding the overall concept of the 7603 before the individual circuits are discussed in detail. A basic block diagram of the 7603 is shown in Fig. 4-1. Only the basic interconnections between the individual blocks are shown on this diagram. Each block represents a major circuit within the instrument. The number on each block refers to the complete circuit diagram located at the rear of the manual.

Vertical signals to be displayed on the CRT are applied to the Vertical Interface circuit from both vertical plug-in compartments. The Vertical Interface circuit determines whether the signal from the left and/or right vertical unit is displayed. The selected vertical signal is then amplified by the Vertical Amplifier circuit to bring it to the level necessary to drive the vertical deflection plates of the CRT.

Horizontal signals for display on the CRT are connected to the Horizontal Amplifier circuit from the horizontal plug-in compartment. The Horizontal Amplifier circuit amplifies this signal to provide the horizontal deflection for the CRT.

The internal trigger signals from the vertical plug-in units are connected to the Trigger Selector circuit. This circuit selects the trigger signal which is connected to the horizontal plug-in unit. The Calibrator circuit produces a square-wave output signal with accurate amplitude which can be used to check the calibration of this instrument and the compensation of probes.

The Logic circuit develops control signals for use in other circuits within this instrument and the plug-in units. These output signals automatically determine the correct instrument operation in relation to the plug-ins installed and/or selected, plug-in control settings, and 7603 control settings. The CRT circuit produces the voltages and contains the controls necessary for operation of the cathode-ray tube. It also contains the Z-Axis Amplifier which provides the drive signal to control the intensity level of the CRT display.

The power necessary for the operation of this instrument is produced by the Low-Voltage Power Supply circuit. These voltages are connected to all circuits within the instrument.

CIRCUIT OPERATION

This section provides a detailed description of the electrical operation and relationship of the circuits in the 7603. The theory of operation for circuits unique to this instrument is described in detail in this discussion. Circuits which are commonly used in the electronics industry are not described in detail. If more information is desired on these commonly used circuits, refer to the following textbooks (also see books under Logic Fundamentals):

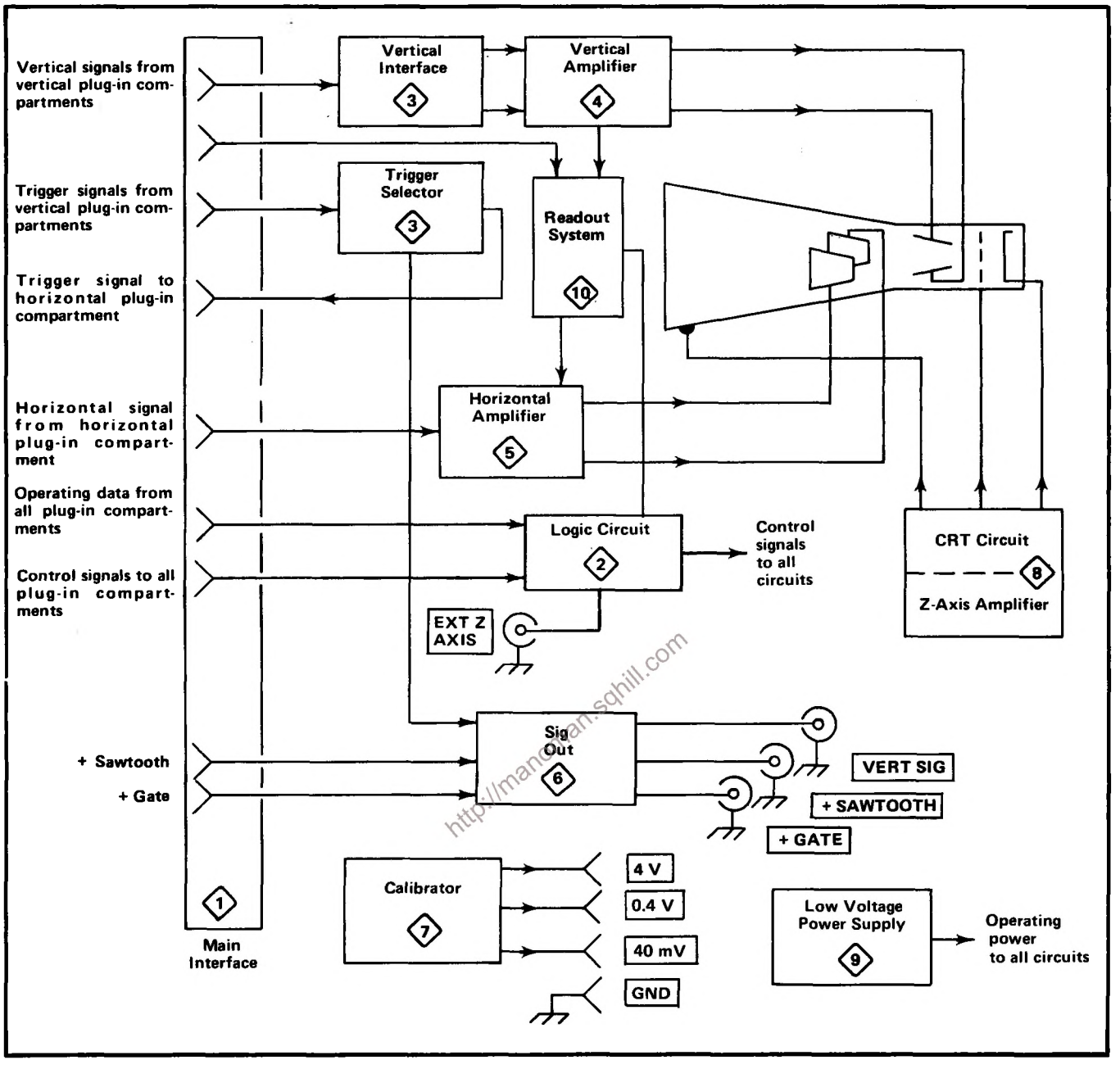


Fig. 4-1. Basic block diagram of 7603 Oscilloscope.

Phillip Cutler, "Semiconductor Circuit Analysis", McGraw-Hill, New York, 1964.

Lloyd P. Hunter (Ed.), "Handbook of Semiconductor Electronics", second edition, McGraw-Hill, New York, 1962.

Jacob Millman and Herbert Taub, "Pulse, Digital, and Switching Waveforms", McGraw-Hill, New York, 1965.

The following circuit analysis is written around the detailed block diagrams which are given for each major circuit. These detailed block diagrams give the names of the individual stages within the major circuits and show how they are connected together to form the major circuit. The block diagrams also show the inputs and outputs for each circuit and the relationship of the external controls and connectors to the individual stages. The circuit diagrams from which the detailed block diagrams are derived are shown in the Diagrams section.

NOTE

All references to direction of current in this manual are in terms of conventional current; i.e., from plus to minus.

LOGIC FUNDAMENTALS

Digital logic techniques are used to perform many functions within this instrument. The function and operation of the logic circuits are described using logic symbology and terminology. This portion of the manual is provided to aid in the understanding of these symbols and terms. The following information is a basic introduction to logic concepts, not a comprehensive discussion of the subject. For further information on binary number systems and the associated Boolean Algebra concepts, the derivation of logic functions, a more detailed analysis of digital logic, etc., refer to the following textbooks:

Robert C. Baron and Albert T. Piccirilli, "Digital Logic and Computer Operation", McGraw-Hill, New York, 1967.

Thomas C. Bartee, "Digital Computer Fundamentals", McGraw-Hill, New York, 1966.

Yaohan Chu, "Digital Computer Design Fundamentals" McGraw-Hill, New York, 1962.

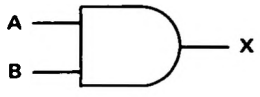
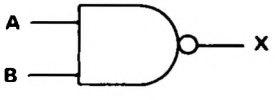
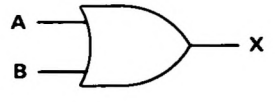
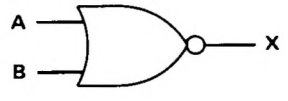
Joseph Millman and Herbert Taub, "Pulse, Digital, and Switching Waveforms", McGraw-Hill, New York, Chapters 9 – 11, 1965.

Symbols

The operation of circuits within the 7603 which use digital techniques is described using the graphic symbols set forth in military standard MIL-STD-806B. Table 4-1 provides a basic logic reference for the logic devices used within this instrument. Any deviations from the standard symbology, or devices not defined by this standard will be described in the circuit description for the applicable device.

TABLE 4-1

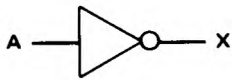
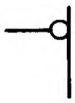
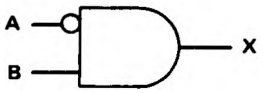
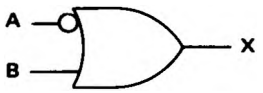
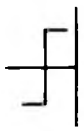
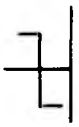
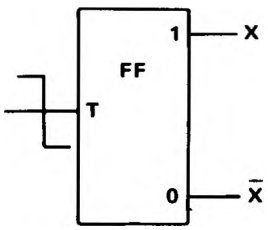
Basic Logic Reference

Device	Symbol	Description	Input/Output Table
AND gate		A device with two or more inputs and one output. The output of the AND gate is HI if and only if all of the inputs are at the HI state.	Input / Output A B X LO LO LO LO HI LO HI LO LO HI HI HI
NAND gate		A device with two or more inputs and one output. The output of the NAND gate is LO if and only if all of the inputs are at the HI state.	Input / Output A B X LO LO HI LO HI HI HI LO HI HI HI LO
OR gate		A device with two or more inputs and one output. The output of the OR gate is HI if one or more of the inputs are at the HI state.	Input / Output A B X LO LO LO LO HI HI HI LO HI HI HI HI
NOR gate		A device with two or more inputs and one output. The output of the NOR gate is LO if one or more of the inputs are at the HI state.	Input / Output A B X LO LO HI LO HI LO HI LO LO HI HI LO

http://manuals.tektronix.com

TABLE 4-1 (cont)

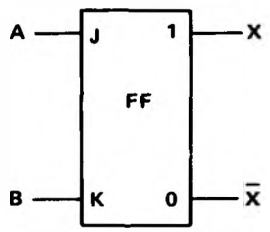
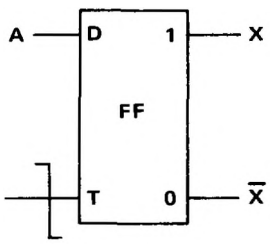
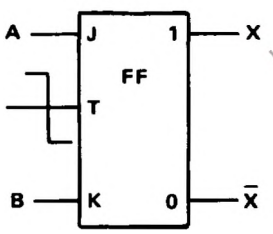
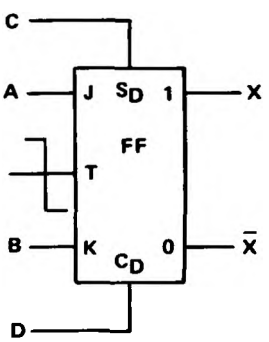
Basic Logic Reference

Device	Symbol	Description	Input/Output Table
Inverter		A device with one input and one output. The output state is always opposite to the input state.	Input / Output A: X LO: HI HI: LO
LO-state indicator		A small circle at the input or output of a symbol indicates that the LO state is the significant state. Absence of the circle indicates that the HI state is the significant state. Two examples follow:	
		AND gate with LO-state indicator at the A input. The output of this gate is HI if and only if the A input is LO and the B input is HI.	Input / Output A, B, X LO, LO, LO LO, HI, HI HI, LO, LO HI, HI, LO
		OR gate with LO-state indicator at the A input: The output of this gate is HI if either the A input is LO or the B input is HI.	Input / Output A, B, X LO, LO, HI LO, HI, HI HI, LO, LO HI, HI, HI
Edge symbol		Normally superimposed on an input line to a logic symbol. Indicates that this input (usually the trigger input of a flip-flop) responds to the indicated transition of the applied signal.	
			
Triggered (toggle) Flip-Flop		A bistable device with one input and two outputs (either or both outputs may be used). When triggered, the outputs change from one stable state to the other stable state with each trigger. The outputs are complementary (i.e., when one output is HI the other is LO). The edge symbol on the trigger (T) input may be of either polarity depending on the device.	Input / Output Condition before trigger pulse: X, $\bar{X}$ Condition after trigger pulse: X, $\bar{X}$ LO, HI, HI, LO HI, LO, LO, HI

http://manoranjan.com

TABLE 4-1 (cont)

Basic Logic Reference

Device	Symbol	Description	Input/Output Table
Set-Clear (J-K) Flip-Flop		A bistable device with two inputs and two outputs (either or both outputs may be used). The outputs change state in response to the states at the inputs. The outputs are complementary (i.e., when one output is HI the other is LO).	Input / Output A B X $\overline{X}$ LO LO No change LO HI LO HI HI LO HI LO HI HI Changes state
D (data) Type Flip-Flop		A bistable device with two inputs and two outputs (either or both outputs may be used). When triggered the state of the "1" output changes to the state at the data (D) input prior to the trigger. The outputs are complementary (i.e., when one output is HI the other is LO). The edge symbol on the trigger (T) input may be of either polarity, depending on the device.	Input / Output A X $\overline{X}$ LO LO HI HI HI LO Output conditions shown after trigger pulse
Triggered Set-Clear (J-K) Flip-Flop		A bistable device with three or more inputs and two outputs (either or both outputs may be used). When triggered, the outputs change state in response to the states at the inputs prior to the trigger. The outputs are complementary (i.e., when one output is HI the other is LO). The edge symbol on the trigger (T) input may be of either polarity depending on the device.	Input / Output A B X $\overline{X}$ LO LO No change LO HI LO HI HI LO HI LO HI HI Changes state Output conditions shown after trigger pulse
Flip-flop with direct inputs (may be applied to all triggered flip-flops)		For devices with direct-set (S_D) or direct-clear (C_D) inputs, the indicated state at either of these inputs over-rides all other inputs (including trigger) to set the outputs to the states shown in the input/output table.	Input / Output A B C D X $\overline{X}$ 1 1 LO LO No change [1] Φ Φ LO HI LO HI Φ Φ HI LO HI LO Φ Φ HI HI Undefined Φ = Has no effect in this case [1] Output state determined by conditions at triggered inputs

http://manuman.sohu.com

NOTE

Logic symbols used on the diagrams depict the logic function and may differ from the manufacturer's data.

Logic Polarity

All logic functions are described using the positive logic. Positive logic is a system of notation where the more positive of two levels (HI) is called the true or 1-state; the more negative level (LO) is called the false or 0-state. The HI-LO method of notation is used in this logic description. The specific voltages which constitute a HI or LO state vary between individual devices.

NOTE

The HI-LO logic notation can be conveniently converted to 1-0 notation by disregarding the first letter of each step. Thus:

HI = 1

LO = 0

Wherever possible, the input and output lines are named to indicate the functions that they perform when at the HI (true) state. For example, the line labeled, "Display B Command" means that the B Time-Base unit will be displayed when this line is HI or true. Likewise, the line labeled "X-Compensation Inhibit" means that the X-Compensation function is inhibited or disabled when this line is HI.

Input/Output Tables

Input/output (truth) tables are used in conjunction with the logic diagrams to show the input combinations which are of importance to a particular function, along with the resultant output conditions. This table may be given either for an individual device or for a complete logic stage. For examples of input/output tables for individual devices, see Table 4-1.

Non-Digital Devices

It should be noted that not all of the integrated circuit devices in this instrument are digital logic devices. The function of non-digital devices will be described individually using operating waveforms or other techniques to illustrate their function.

MAIN INTERFACE

Diagram 1 shows the plug-in interface and the interconnections between the plug-in compartments, circuit boards, etc. of this instrument.

LOGIC CIRCUIT

The Logic Circuit develops control signals for use in other circuits within this instrument and in the associated plug-in units. These output signals automatically determine the correct instrument operation in relation to the plug-in installed and/or selected, plug-in control settings, and the 7603 control settings. A schematic of this circuit is shown on diagram 2 at the rear of this manual.

Logic Block Diagram

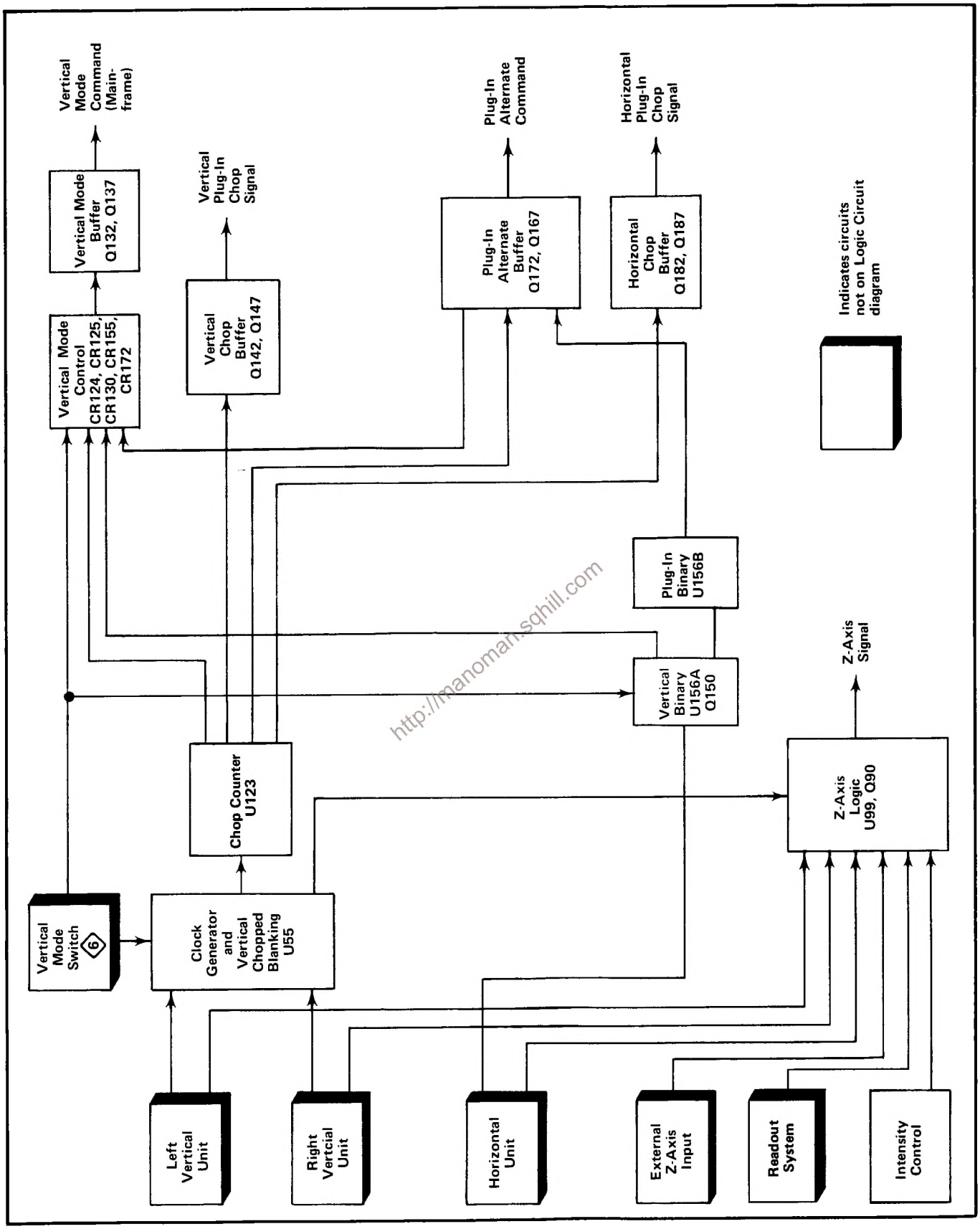
A block diagram of the Logic Circuit is shown in Fig. 4-2. This diagram shows the source of the input control signals, the output signals produced by this circuit, and the basic interconnections between blocks. The interconnections shown are intended only to indicate inter-relation between blocks and do not indicate a direct connection or that only a single connection is made between the given blocks. Details of the inter-relationship between stages within this circuit are given in the circuit description which follows.

The operation of each of these stages is discussed relating the input signals and/or levels to the output, with consideration given to the various modes of operation that may affect the stage. A logic diagram is also provided where applicable. These diagrams are not discussed in detail, but are provided to aid in relating the function performed by a given stage to standard logic techniques. It should be noted that these logic diagrams are not an exact representation of the circuit but are only a logic diagram of the function performed by the stage. An input/output table is given, where applicable, for use along with this circuit description and logic diagram. These input/output tables document the combination of input conditions which are of importance to perform the prescribed function of an individual stage.

Z-Axis Logic

The Z-Axis Logic stage produces an output current which sets the intensity of the display on the CRT. The level of this output current is determined by the setting of the front-panel INTENSITY control, an external signal from the rear panel EXT Z AXIS input connector, or signals from the plug-in compartments. The Vertical Chopped Blanking from U55 is applied to this stage to blank the CRT display during vertical trace switching. The Intensity Limit input from the horizontal plug-in compartment provides protection for the CRT phosphor at slow sweep rates.

The Z-Axis Logic stage consists of transistor 108, dual-transistor Q90 and integrated circuit U99, which is a five-transistor array. A simplified schematic of the Z-Axis



http://manoman.sqhill.com

Fig. 4-2. Block diagram of Logic circuit.

Logic stage is shown in Fig. 4-3. Only the components essential to operation of this stage are shown in this simplified schematic.

Transistor U99C is connected in the common-base configuration to provide the output for this stage. The collector load for U99C is provided by the Z-Axis Amplifier in the CRT Circuit. Transistors U99D and U99E provide a current-limiting action for this stage. The collector current of U99D, represented by I_t, is the maximum amount of current that can flow in the circuit. The amount of this current is determined by the relationship between the Intensity Limit and Vertical Chopped Blanking. When both of these inputs are HI the collector current of U99D, I_t, is maximum. This maximum level of I_t is determined by current I_1 in the base circuit of U99D established by networks R76-R77 and R62-R63 into R110 and the collector of U99E. During Vertical Chopped Blanking, the respective input level goes LO. This shunts the current I_1 from the base of U99D so the collector current of U99D, I_t, drops to minimum to blank the CRT display during vertical trace switching.

The Intensity Limit function limits the output current of this stage to protect the CRT phosphor whenever the time-base unit is set to a slow sweep rate. For conditions that do not require limiting, quiescent current is added to I_1 from the +15-volt supply through R76-R77. When the time-base unit is set to a sweep rate which requires intensity

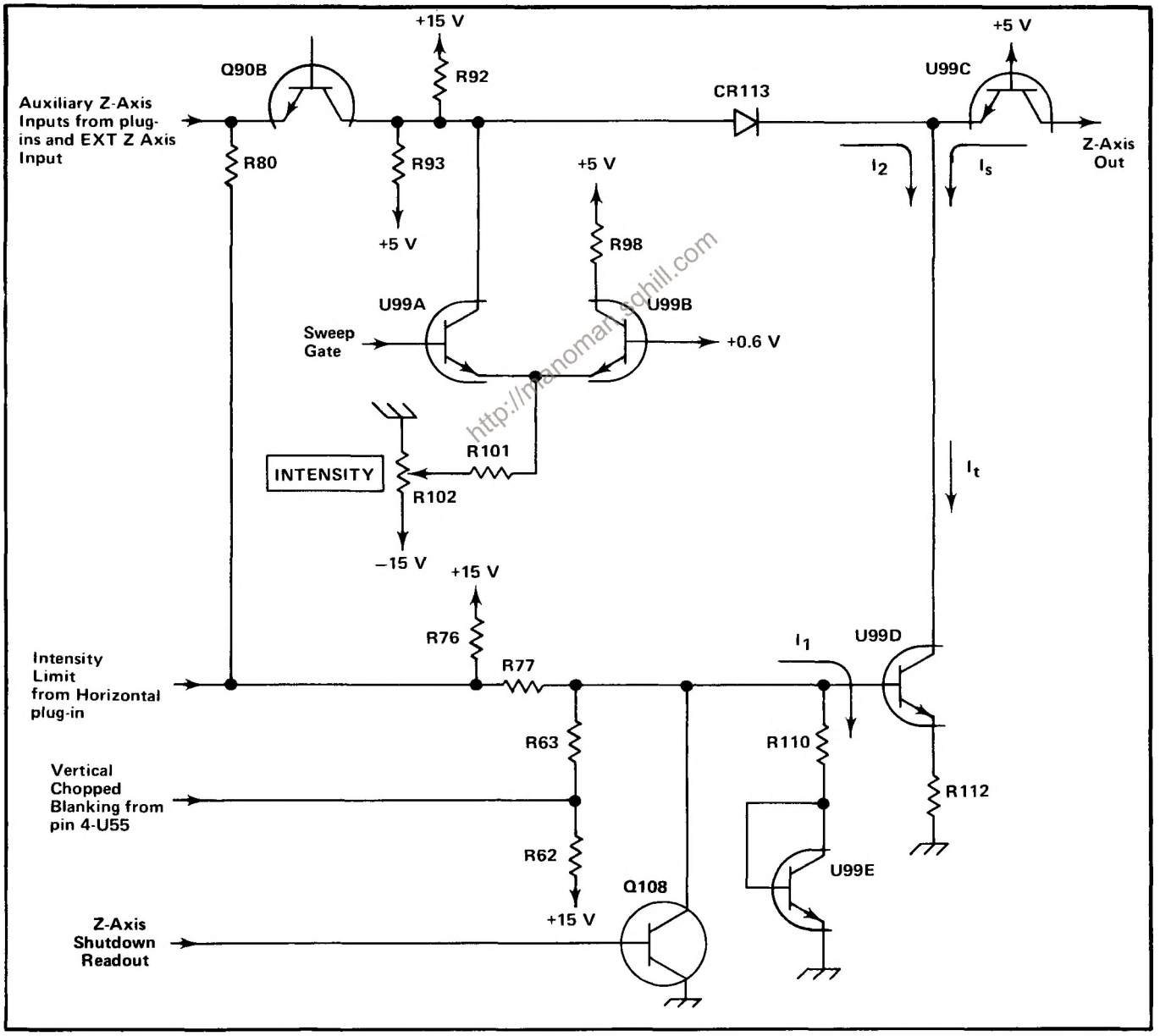


Fig. 4-3. Simplified schematic of Z-Axis Logic stage.

limiting, the Intensity Limit input goes to ground level in the plug-in unit. This reduces the level of I_1 at the base of U99D and therefore reduces I_t and the output current to reduce the intensity of the display. At the same time, the ground level from the Intensity Limit input is connected to the emitter of Q90B through R80. This connection limits the maximum level to which the INTENSITY control can be set to aid in obtaining intensity limiting at slow sweep rates.

The collector current of U99D is made up of two currents; I_s and I_2 is determined by divider R92 and R93. When the Sweep Gate level at the base of U99A is LO (no sweep in progress), I_2 is at its maximum level so that I_s is minimum to provide minimum intensity of the display (I_s + I_2 is always equal to I_t). During sweep time, the Sweep Gate level at the base of U99A as established by INTENSITY control R102 determines the output current. As the INTENSITY control is turned toward maximum, the level of I_2 decreases. This allows I_s to increase to produce a brighter display. The Auxiliary Z-Axis Inputs from the plug-in compartments and the intensity modulating signal from the EXT Z-AXIS input connector are connected to the emitter of Q90B. These signals modulate the level of I_2 to, in turn, modulate the intensity of the display.

When readout information is to be displayed on the CRT, the Z-Axis shutdown goes LO. This forward biases Q180, and it saturates, shunting I_1, through Q108 to ground. This reduces the output current to zero during the readout time.

Clock Generator

One half of integrated circuit U55 along with the external components shown in Fig. 4-4A make up the Clock Generator stage. R1, Q1, Q2, and Q3 represent an equivalent circuit contained within U55A. This circuit along with discrete components C59, R56, R57, and R59 comprise a two-megahertz free-running oscillator to provide a timing signal (clock) for mainframe vertical and plug-in chopping.

The stage operates as follows: Assume that Q2 is conducting and Q1 is off. The collector current of Q2 produces a voltage drop across R1 which holds Q1 off. This negative level at the collector of Q2 is also connected to pin 14 through Q3 (see waveforms in Fig. 4-4B at time T_0). Since there is no current through Q1, C59 begins to charge towards −15 volts through R56-R57. The emitter of Q1 goes negative as C59 charges until it reaches a level about 0.6 volt more negative than the level at its base. Then, Q1 is forward biased and its emitter rapidly rises positive. Since

http://manoman.sqhat.com

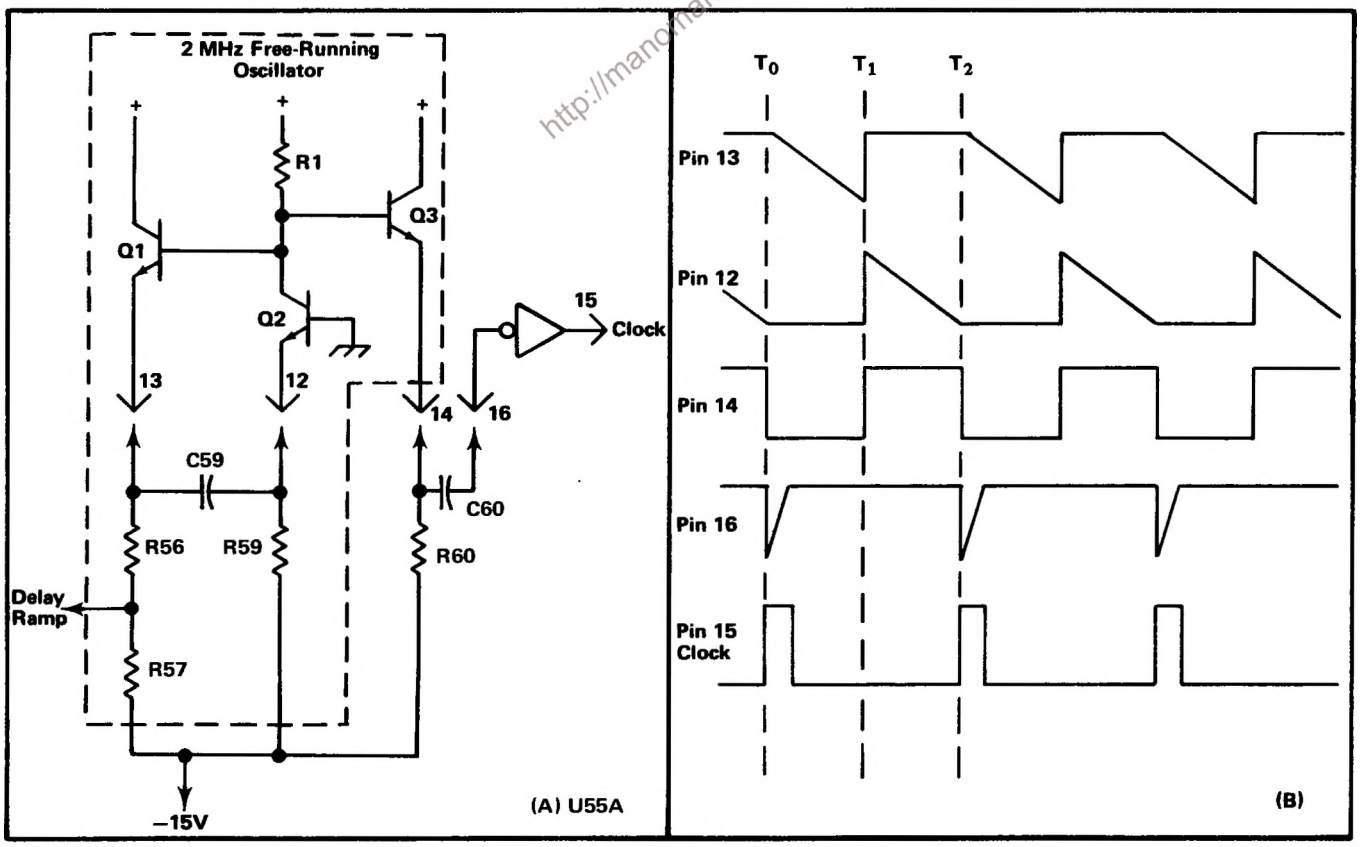


Fig. 4-4. (A) Diagram of Clock Generator stage. (B) Idealized waveforms from Clock Generator stage.

C59 cannot change its charge instantaneously, the sudden change in voltage at the emitter of Q1 pulls the emitter of Q2 positive also, to reverse-bias it. With Q2 reverse biased, its collector rises positive to produce a positive output level at pin 14 (see time T_1 on the waveforms).

Now, conditions are reversed. Since Q2 is reverse biased, there is no current through it. Therefore, C59 can begin to discharge through R59. The emitter level of Q2 follows the discharge of C59 until it reaches a level about 0.6 volt more negative than its base. Then Q2 is forward biased and its collector drops negative to reverse-bias Q1. The level at pin 14 drops negative also, to complete the cycle. Once again, C59 begins to charge through R56-R57 to start the second cycle.

Two outputs are provided from this oscillator. The Delay Ramp signal from the junction of R56-R57 is connected to the Vertical Chopped Blanking stage. This signal has the same waveshape as shown by the waveform at pin 13, with its slope determined by the divider ratio between R56-R57. A square-wave output is provided at pin 14. The frequency of this square wave is determined by the RC relationship between C59 and R1. The duty cycle is determined by the ratio of R56-R57 to R59.

The square wave at pin 14 is connected to pin 16 through C60. C60, along with the internal resistance of U55A, differentiates the square wave at pin 14 to produce a negative-going pulse coincident with the falling edge of the square wave (positive-going pulse coincident with rising edge has no effect on circuit operation). This negative-going pulse is connected to pin 15 through an inverter-shaper which is also part of U55A. The output at pin 15 is a positive-going Clock pulse at a repetition rate of about two megahertz.

Vertical Chopped Blanking

The Vertical Chopped Blanking stage is made up of the remaining half of integrated circuit U55B, Fig. 4-5A. This stage determines if Vertical Chopped Blanking pulses are required, based upon the operating mode of the vertical system or the plug-in units (dual trace units only). Vertical Chopped Blanking pulses are produced if: (1) VERT MODE switch is set to CHOP; (2) dual-trace vertical unit is operating in the chopped mode and that unit is being displayed; (3) dual-trace vertical unit is operating in the chopped mode with the VERT MODE switch set to ADD. The repetition rate of the negative-going Vertical Chopped Blanking pulse output at pin 4 is always two megahertz as determined by the Clock Generator stage.

The Delay Ramp signal from the Clock Generator stage determines the repetition rate and pulse width of the Vertical Chopped Blanking pulses. The Delay Ramp applied to pin 10 starts to go negative from a level of about +1.1 volts coincident with the leading edge of the Clock pulse (see waveforms in Fig. 4-5B). This results in a HI quiescent condition for the Vertical Chopped Blanking pulse. The slope of the negative-going Delay Ramp is determined by the Clock Generator stage. As it reaches a level slightly negative from ground, the Vertical Chopped Blanking pulse output level changes to the LO state. This signal remains LO until the Delay Ramp goes HI again. Notice the delay between the leading edge of the Clock pulse generated by U55A and the leading edge of the Vertical Chopped Blanking pulses (see Fig. 4-5B). The amount of delay between the leading edges of these pulses is determined by the slope of the Delay Ramp applied to pin 10. This delay is necessary due to the delay line in the vertical deflection system. Otherwise, the trace blanking resulting from the Vertical Chopped Blanking pulse would not coincide with the switching between the displayed traces. The duty cycle of the square wave produced in the Clock Generator stage determines the pulse width of the Vertical Chopped Blanking pulses (see Clock Generator discussion for more information).

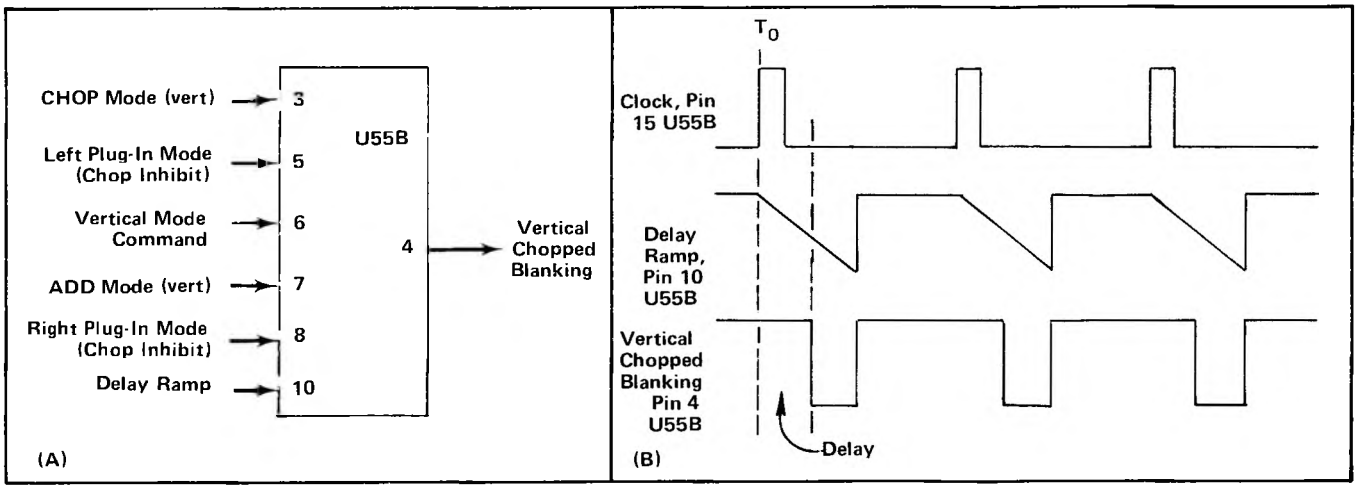


Fig. 4-5. (A) Input and output pins for Vertical Chopped Blanking stage, (B) Idealized waveforms for Vertical Chopped Blanking stage.

Whenever this instrument is turned on, the Vertical Chopped Blanking pulses are being produced at a two-megahertz rate. However, these pulses are available as an output at pin 4 only when the remaining inputs to U55B are at the correct levels. The following discussions give the operating conditions which produce Vertical Chopped Blanking pulses to blank the CRT during vertical trace switching. Fig. 4-5A identifies the functions of the pins of U55B.

1. CHOP VERTICAL MODE

When the VERT MODE switch is set to CHOP, Vertical Chopped Blanking pulses are available at pin 4 at all times. The input conditions necessary are:

PIN 3 HI—VERT MODE switch set to CHOP.

Pin 7 LO—VERT MODE switch set to any position except ADD.

Pin 10 LO—Delay Ramp more negative than about 0 volts.

2. LEFT VERTICAL UNIT SET FOR CHOPPED OPERATION

If the Left Vertical unit is set for chopped operation, the setting of the VERT MODE switch determines whether the Vertical Chopped Blanking pulses are available. If the VERT MODE switch is set to the CHOP position, conditions are as described in No. 1 above. Operation in the ADD position of the VERT MODE switch is given later. For the LEFT position of the VERT MODE switch, or when the left vertical unit is to be displayed in the ALT mode, Vertical Chopped Blanking pulses are available at all times (two-megahertz rate). The input conditions are:

Pin 3 LO—VERT MODE switch set to any position except CHOP.

Pin 5 LO—Left vertical unit set to chopped mode.

Pin 6 LO—Left vertical unit to be displayed (Vertical Mode Command LO).

Pin 7 LO—VERT MODE switch set to any position except ADD.

Pin 10 LO—Delay Ramp more negative than about 0 volts.

Notice that the Vertical Mode Command at pin 6 must be LO for output pulses to be available at pin 4. This means that when the VERT MODE switch is set to ALT, Vertical Chopped Blanking pulses are produced only during the time that the left vertical unit is to be displayed (unless right vertical unit is also set for chopped operation).

3. RIGHT VERTICAL UNIT SET FOR CHOPPED OPERATION

If the right vertical unit is set for chopped mode, operation is the same as described previously for the left vertical unit except that Vertical Chopped Blanking pulses are produced when the VERT MODE switch is set to RIGHT or when the Vertical Mode Command is HI in the ALT mode. The input conditions are:

Pin 3 LO—VERT MODE switch set to any position except CHOP.

Pin 6 HI—Right vertical unit to be displayed (Vertical Mode Command HI).

Pin 7 LO—VERT MODE switch set to any position except ADD.

Pin 8 LO—Right vertical unit set to chopped mode.

Pin 10 LO—Delay Ramp more negative than about 0 volts.

4. ADD VERTICAL MODE

When the VERT MODE switch is in the ADD position and either or both of the vertical units are operating in the chopped mode, Vertical Chopped Blanking pulses must be available to block out the transition between traces of the vertical units. The input conditions are:

Pin 3 LO—VERT MODE switch set to any position except CHOP.

Pin 5 LO—Left vertical unit set to chopped mode (can be HI if pin 8 is LO).

Pin 7 HI—VERT MODE switch set to ADD.

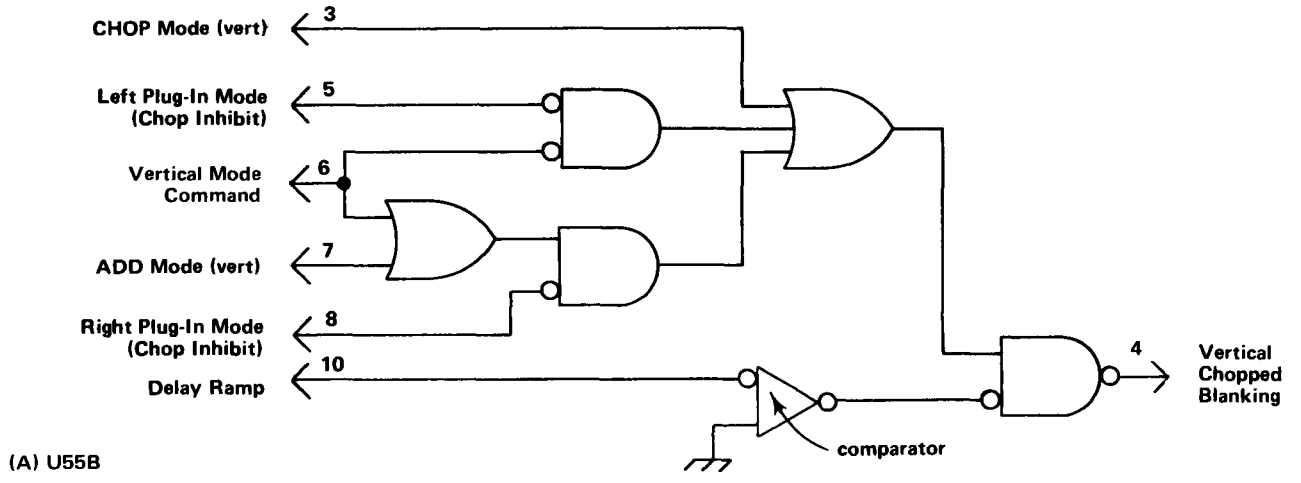
Pin 8 LO—Right vertical unit set to chopped mode (can be HI if pin 5 is LO).

Pin 10 LO—Delay Ramp more negative than about 0 volt.

Fig. 4-6A shows a logic diagram of the Vertical Chopped Blanking stage. Notice the comparator block on this diagram (one input connected to pin 10). The output of this comparator is determined by the relationship between the levels at its inputs. If pin 10 is more positive (HI) than the grounded input, the output is HI also; if it is more negative (LO), the output is LO. An input/output table for this stage is given in Fig. 4-6B.

Chop Counter

The Chop Counter stage produces the Mainframe Chop Signal and the Vertical Plug-In Chop Signal. The Clock



(A) U55B

(B)

Input						Output	
CHOP Mode (vert) 3	Left Plug-In Mode (Chop Inhibit) 5	Vertical Mode Command 6	Add Mode (vert) 7	Right Plug-In Mode (Chop Inhibit) 8	Delay Ramp 10[1]	Vertical Chopped Blanking 4[2]	Conditions
HI	Φ	Φ	LO	Φ	LO	LO	CHOP Mode (vert)
LO	LO	LO	LO	Φ	LO	LO	Left Plug-in Chopped
LO	Φ	HI	LO	LO	LO	LO	Right Plug-in Chopped
LO	LO[3]	Φ	HI	LO[3]	LO	LO	ADD Mode, Left or Right Plug-in Chopped
All other combinations						HI	No Vertical Chopped Blanking pulses at output.

Φ = Has no effect in this case.

[1] Ramp signal; considered LO when more negative than about zero volts.

[2] Negative-going pulse at two megahertz rate.

[3] Pin 5 can be HI and not affect operation if pin 8 is LO, and vice versa.

Fig. 4-6. (A) Logic diagram for Vertical Chopped Blanking stage, (B) Table of input/output combinations for Vertical Chopped Blanking stage.

pulse produced by the Clock Generator stage provides the timing signal for this stage. A logic diagram of the Chop Counter, identifying the inputs and outputs, is shown in Fig. 4-7.

The Chop Counter stage consists of integrated circuit U123, a dual D-type flip-flop with direct-set, direct-clear inputs (see Table 4-1 for operation of D-type flip-flip). As connected in this circuit, these D-type flip-flops operate as triggered (toggle) flip-flops.

The two-megahertz clock pulses from the Clock Generator stage are connected to the trigger (T) input of U123B. As connected, U123B changes output states with each positive-going Clock pulse, and the signal at its "1" output is a square wave which switches between the HI and LO levels at a one-megahertz rate. This signal is connected to the Vertical Mode Control stage to provide the Vertical Mainframe Chop Signal. It is also connected to the trigger input of U123A. U123A also changes output states with each positive-going pulse at its trigger input to produce a 500 kilohertz square wave at its "1" output. The output from U123A provides the Vertical Plug-In Chop Signal to

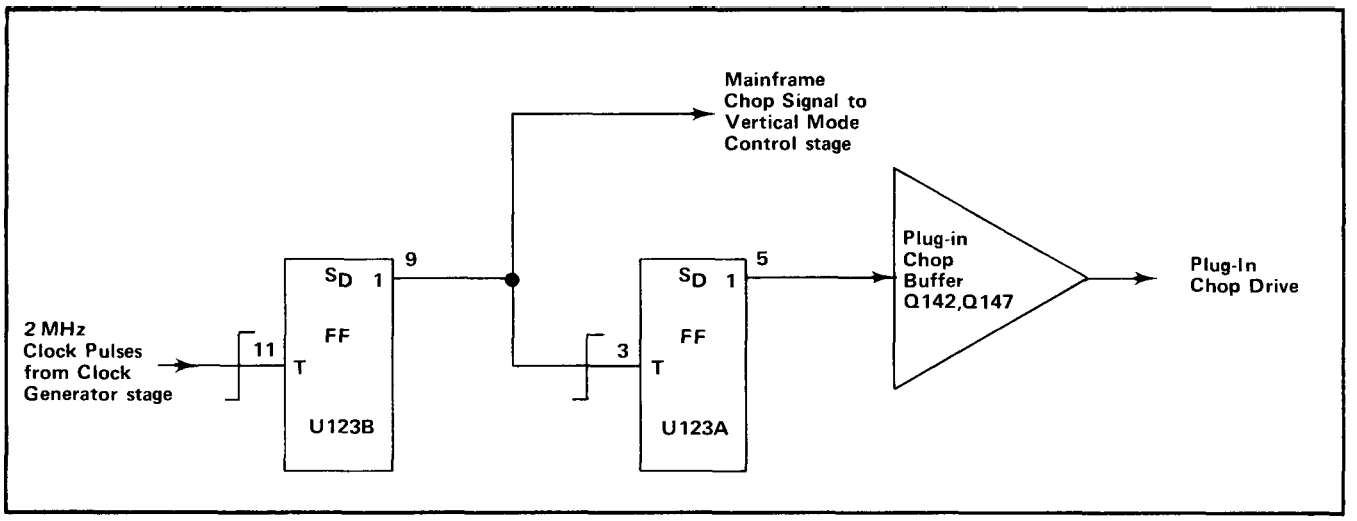


Fig. 4-7. Detailed logic diagram of Chop Counter stage.

the Plug-In Chop Buffer stage. Idealized waveforms showing the timing relationship between the input and output signals for this stage are shown in Fig. 4-8.

Vertical Mode Control

The Vertical Mode Control stage is made up of discrete components CR124-CR125, CR126, CR130-CR155, CR172, and buffer amplifier Q132-Q137. These components develop the Mainframe Vertical Mode Command which is connected to the Main Interface circuit (vertical plug-in compartments and trigger selection circuitry) and the Vertical Interface circuit to indicate which vertical unit is to be displayed. When this output level is HI, the right vertical unit is displayed and when it is LO, the left vertical unit is displayed.

The VERT MODE switch located on diagram 7 provides control levels for this stage. This switch provides a HI level on only one of four output lines to indicate the selected vertical mode; the remaining lines are LO. The fifth mode, LEFT, is indicated when all four output lines are LO. Operation of this stage in all positions of the VERT MODE switch is as follows:

Right. When the VERT MODE switch is set to RIGHT, a HI level is connected to the Buffer Amplifier through R126 and CR126. The LO level at the anodes of diodes CR125 and CR130 holds them reverse biased. The resultant Vertical Mode Command output from the Vertical Mode Buffer Amplifier is a HI level to indicate that the right vertical unit is to be displayed.

Chop. In the CHOP position of the VERT MODE switch, a HI level is applied to the anodes of diodes CR124-CR125 through R125. Both diodes are forward biased so the Vertical Chop Signal from pin 9 of U123B can pass to the emitter of Q132. This signal switches between the HI and LO levels at a one-megahertz rate and it produces a corresponding Mainframe Vertical Mode Command output at the emitter of Q137. When this output is

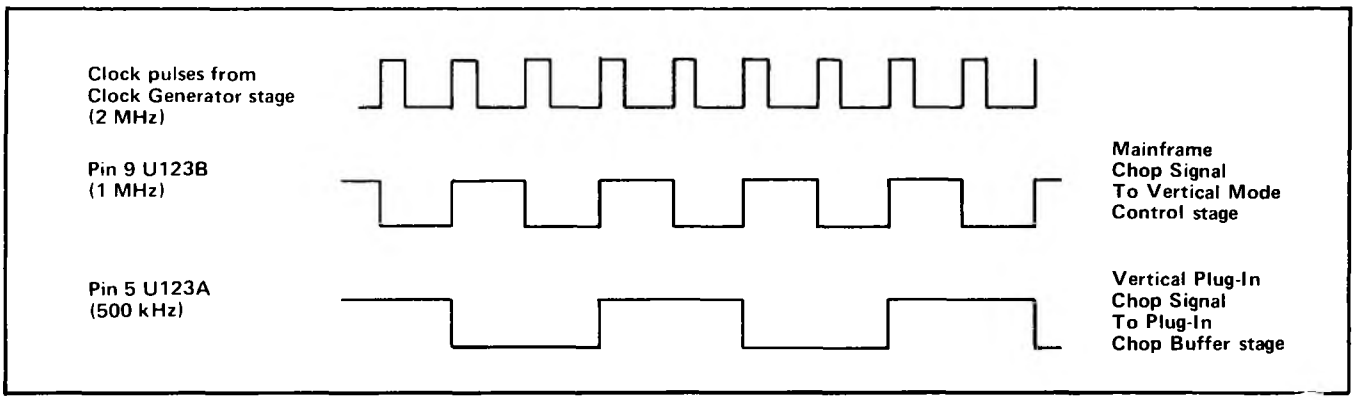


Fig. 4-8. Idealized input and output waveforms for Chop Counter stage.

HI, the right vertical unit is displayed and when it switches to LO, the left vertical unit is displayed.

Alt. In the ALT mode, the VERT MODE switch applies a HI level to the anodes of diodes CR130-CR155 through R130. These diodes are forward biased so the Display Right Command from pin 5 of U156A can pass to the emitter of Q132 to determine the Mainframe Vertical Mode Command level. The Display Right Command switches between its HI and LO levels at a rate determined by the Vertical Binary stage.

Add and Left. The control levels in the ADD and LEFT positions of the VERT MODE switch are not connected to this stage. However, since only the line corresponding to the selected vertical mode can be HI, the RIGHT, CHOP, and ALT lines must remain at their LO level when either LEFT or ADD are selected. Therefore, the emitter of Q132 remains LO to produce a LO Mainframe Vertical Mode Control output level. Final control of LEFT or ADD mode is made by the Vertical Interface circuit.

A logic diagram of the Vertical Mode Control stage is shown in Fig. 4-9. The discrete components which make up each logic function are identified. The gate connected to the input of the Vertical Mode Buffer Amplifier is a phantom-OR gate. A phantom-OR gate performs the OR logic function merely by interconnection of the three inputs.

Vertical Binary

The Vertical Binary stage consists of integrated circuit U156A and transistor Q150. U156A is a D-type flip-flop with direct-set and direct-clear inputs (see Table 4-1 for operating details). The connection between the "0" output and the data (D) input enables this flip-flop to operate in the triggered mode. A logic diagram of the Vertical Binary stage is shown in Fig. 4-10.

The operation of the Vertical Binary stage is controlled by the level of the ALT Mode line from the VERT MODE switch. When this switch is set to ALT, a HI level is connected to the emitter of Q150 through R152. This HI level disables Q150 so its collector remains HI. As a result, Q150 has no effect upon operation of the Vertical Binary stage and the direct-clear input of U156A remains HI so it does not affect the operation of U156A. Therefore, U156A operates as a basic triggered flip-flop which changes output states with each positive-going Sweep Holdoff pulse at the trigger (T) input. The Sweep Holdoff pulse goes positive at the end of each sweep. The signal at the "1" output of U156A switches between the HI and LO level at one-half the rate of the Sweep Holdoff signal from the horizontal plug-in unit. Fig. 4-11 shows the time relationship between the input and output signals for this stage, and gives the resultant display with each signal combination.

For any other position, the emitter of Q150 is pulled LO by the ALT Mode command from the VERT MODE switch. This enables Q150, but it does not change output state unless the level at the "1" output of U156A is HI. Quiescently, the output of Q150 is LO. Therefore, when the positive-going Sweep Hold-off pulse is received at the end of the sweep, the "1" output of U156A goes HI. This activates Q150 and its output goes LO to provide a direct-clear reset to U156A. The "1" output of U156A is reset to its LO level, and Q150 is again disabled so its output returns to the HI level. The stage is now ready for

http://manomanuals.com

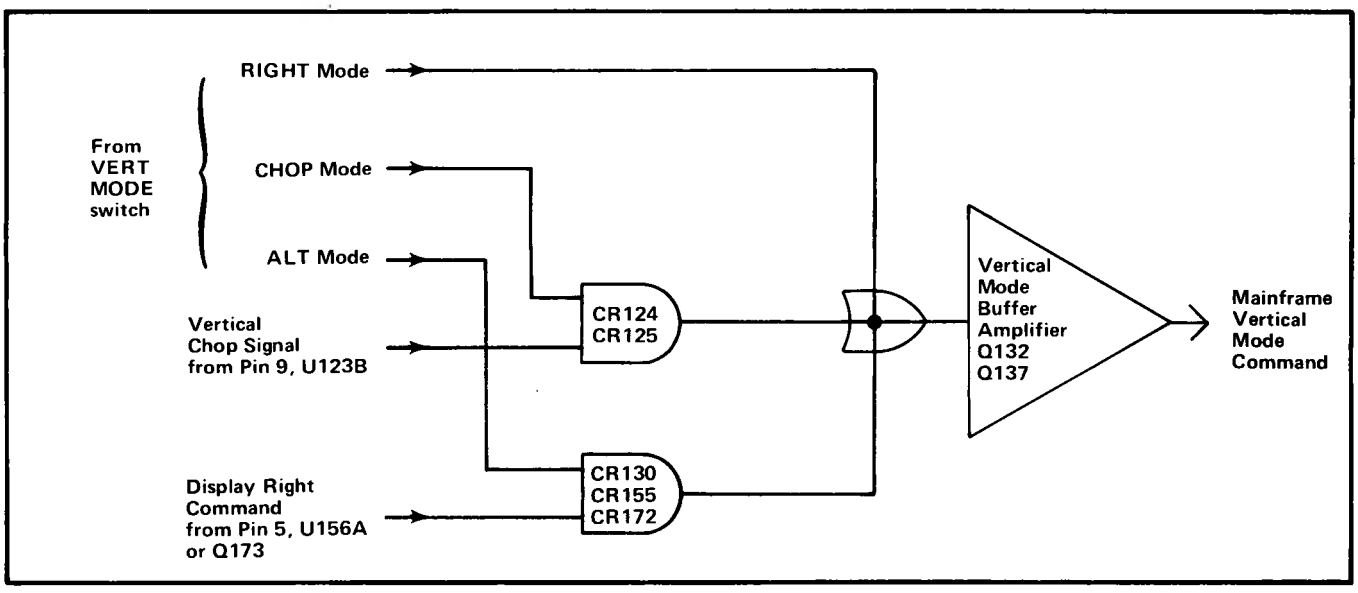


Fig. 4-9. Logic diagram of Vertical Mode Control and Vertical Mode Buffer Amplifier stages.

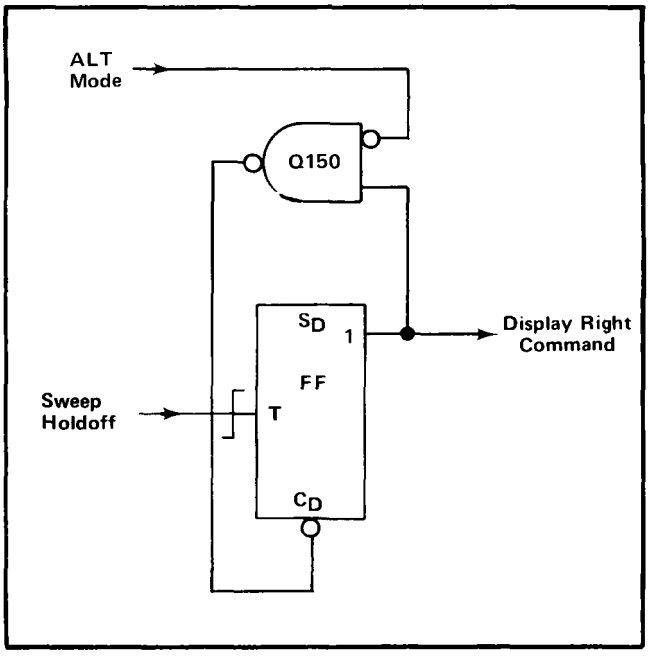


Fig. 4-10. Logic diagram of Vertical Binary stage.

the next positive-going Sweep Hold-off pulse. The action is the same with each pulse, so the signal at the output of this stage is at the same repetition rate as the Sweep Holdoff input. Therefore, this stage is now operating as a divide-by-one counter rather than a divide-by-two counter as described previously. The output under this condition is used only by the Plug-In Binary stage.

Since the Vertical Binary stage can change output states only at the end of each sweep, there will be no Alternate Drive signal for either the mainframe or vertical plug-in units if a sweep is not being produced by the horizontal plug-in unit.

Plug-In Binary

The Plug-In Binary stage consists of U156B, which is connected as a triggered flip-flop with direct-set input. The trigger input for this stage is the Display Right Command from the Vertical Binary stage. When the VERT MODE switch is set to ALT, the repetition rate of the Display Channel 2 Command output of this stage is one-fourth of the Sweep Holdoff input (see waveforms in Fig. 4-11). For any position of the VERT MODE switch except ALT, the repetition rate of the output signal from this stage is one-half of the Sweep Holdoff input. A logic diagram of the Plug-In Binary stage is shown in Fig. 4-12.

http://manuman.sghill.com

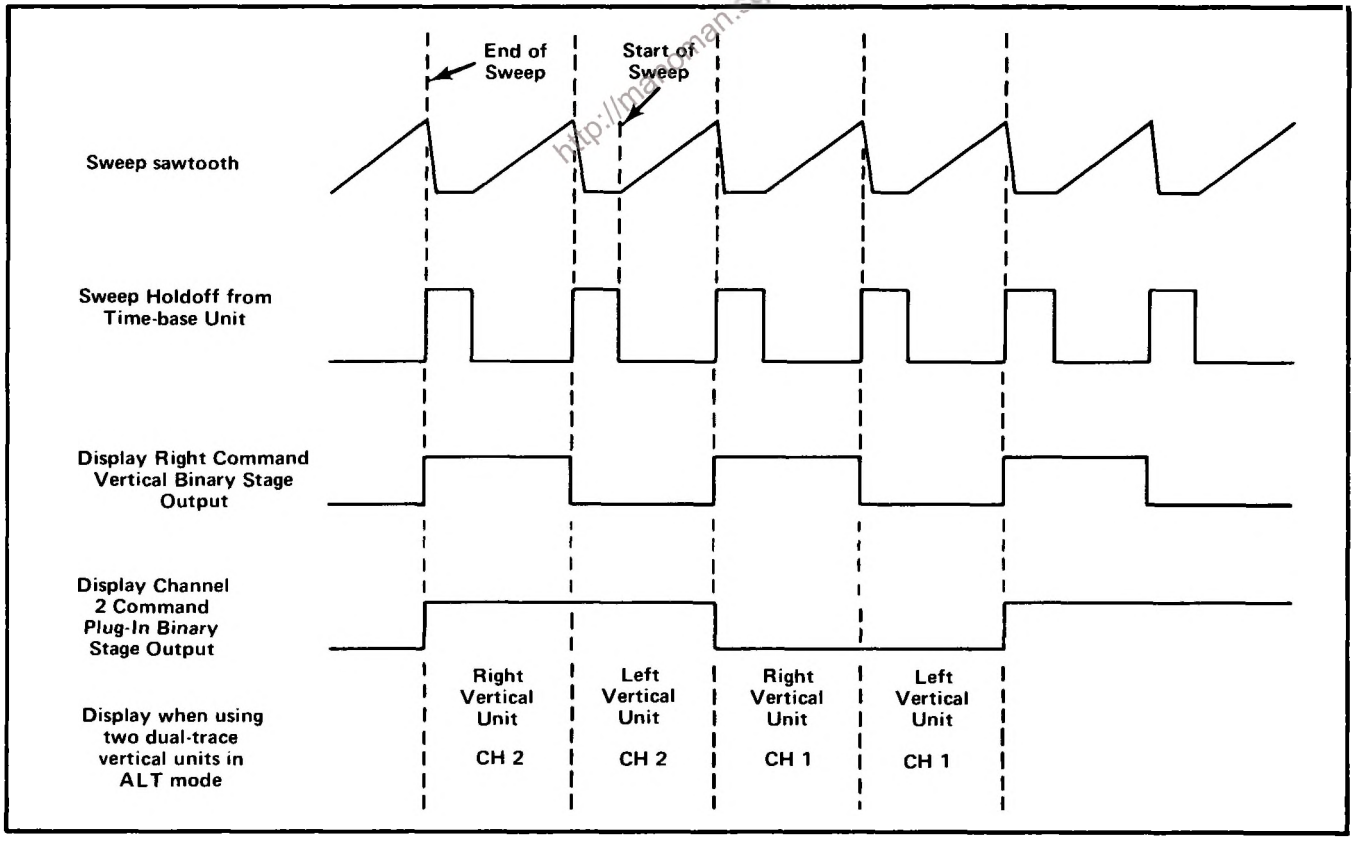


Fig. 4-11. Idealized waveforms showing relationship between input and output waveforms for Vertical Binary and Plug-In Binary stages when operating in ALT mode.

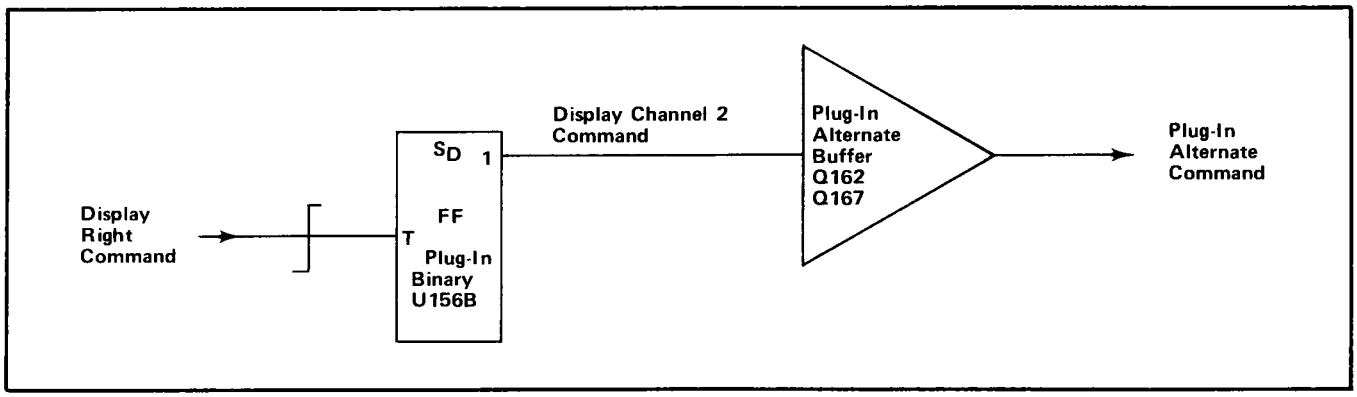


Fig. 4-12. Logic diagram of Plug-In Binary and Plug-In Alternate Buffer stages.

Output Buffers

The output switching commands from the Logic circuit are provided through buffer stages Q142-Q137, Q142-Q147, Q162-Q167, and Q182-Q187. Each of these stages includes a common-base input transistor to provide a low-impedance load for the associated driving stages. The output transistor is connected as an emitter-follower to provide isolation between the Logic circuit and other circuits within this instrument or the plug-in units.

TRIGGER SELECTOR

The Trigger source switch determines which vertical signal is connected to the time-base unit, and which vertical signal, that is provided at VERT SIG/OUT connector on the rear panel. Fig. 4-13 shows a detailed block diagram of the Trigger Selector circuit, along with a simplified diagram of all the circuitry involved in selection of the trigger source. A schematic of the Trigger Selector circuit is shown on diagram 3 at the rear of this manual. Also, see diagrams 6 and 7 for the signal selection circuitry not shown on diagram 3.

Trigger Mode and Add Signals

General. The circuitry shown on the left side of the simplified diagram in Fig. 4-13 determines the operation of the Trigger Channel Switch stage. TRIG SOURCE switch S1011 controls Trigger Channel Switch U324 through Q314. When the TRIG SOURCE switch is set to the VERT MODE position, the setting of the VERT MODE switch determines the trigger selection. In the LEFT or RIGHT positions, the trigger signal is obtained from the indicated vertical unit. The following discussions give detailed operation in each position of the TRIG SOURCE switch.

Vert Mode. In the VERT MODE position of the TRIG SOURCE switch, the setting of the VERT MODE switch determines the operation of the Trigger Channel Switch stage. In the LEFT position of the VERT MODE switch, the base of Q314 is connected to ground through the ALT and RIGHT sections of S1021, CR1021 and CR1026, and S1011. This holds Q314 reverse biased to provide a LO level to pin 4 of U324 (see Fig. 4-14).

When the VERT MODE switch is set to ALT, +5 volts is applied to the base of Q314 through CR1021 and S1011. Q314 is forward biased and its emitter level is determined by the Mainframe Vertical Mode Command signal from the Logic circuit applied to its collector. This signal switches between the HI level (Right Vertical unit to be displayed) and the LO level (Left Vertical unit to be displayed) at the end of each sweep. When the Mainframe Vertical Mode Command is HI, it provides a positive collector voltage to Q314. Q314 is saturated due to CR1021, and its emitter level is very near the collector level. This provides a HI output level to the Trigger Channel Switch stage. As the Mainframe Vertical Mode Command goes LO, the collector supply for Q314 also goes negative. Q314 remains saturated and the output again follows the collector level to supply a LO output level to U324.

For ADD and CHOP vertical mode operation, +5 volts is connected to pin 14 of U324 through CR1023 or CR1024 and S1011. At the same time, the base of Q314 is held LO by the ground connection through the ALT and RIGHT section of S1021 so the level at pin 4 of U324 is LO also (produces an ADD mode in Trigger Channel Switch; see description of this circuit which follows). In the RIGHT position of the VERT MODE switch, +5 volts is connected to the base of Q314 through CR1026 and S1011 to forward-bias the transistor. The Mainframe Vertical Mode Command signal connected to the collector of Q314 is also HI in this mode, and a HI output level is produced at the emitter of Q314.

Left. When the LEFT trigger source is selected, the VERT MODE switch is disconnected from the trigger selector circuitry. Now the ground connection through the

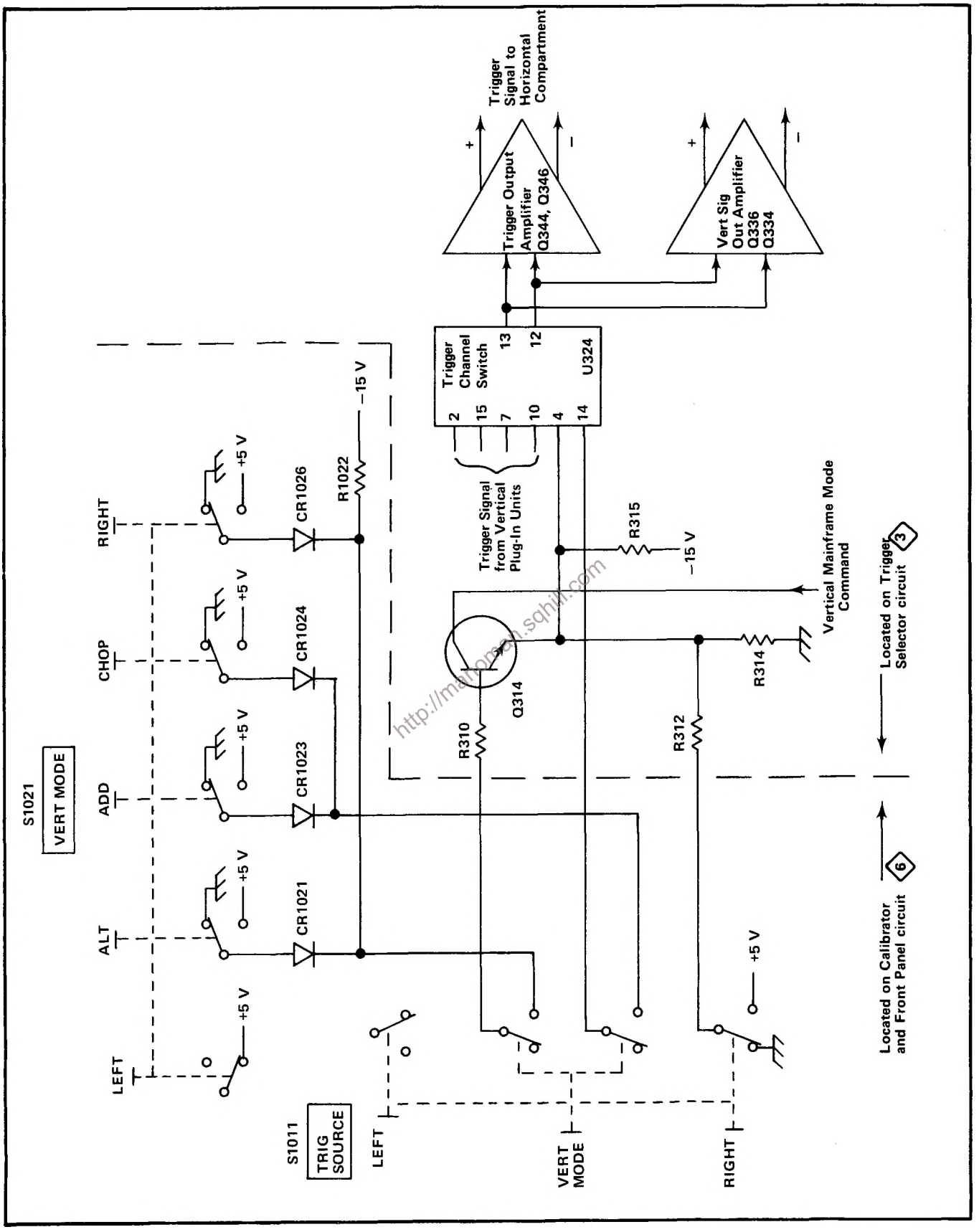
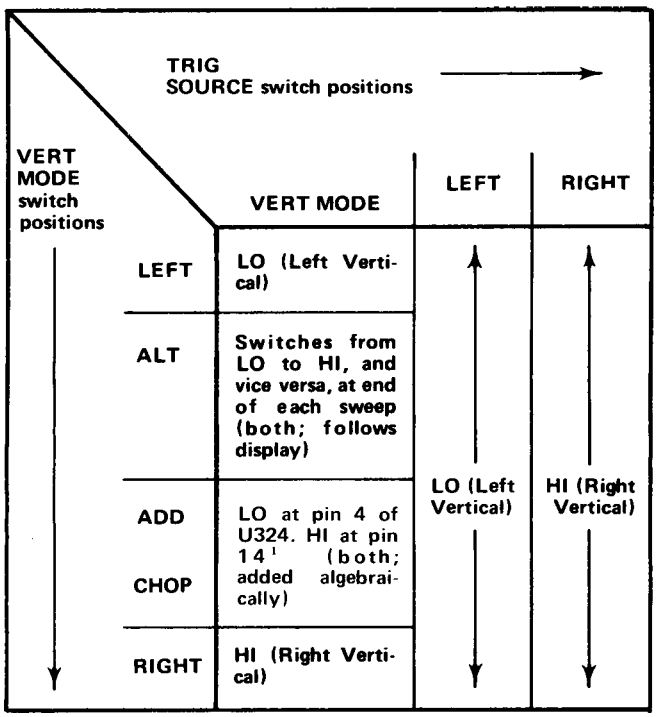


Fig. 4-13. Detailed block diagram of Trigger Selector circuit along with simplified diagram of trigger source selection circuitry.



[1] Pin 14 LO for all other conditions.

Fig. 4-14. Input levels at pin 4 of U324 (source of triggering is shown in parenthesis).

RIGHT section of S1011 establishes a LO output level at the emitter of Q314.

Right. In the RIGHT position of the TRIG SOURCE switch, +5 volts is connected to the emitter of Q314 through S1011 and R312. This produces a HI output level to the Trigger Channel Switch stage.

Trigger Channel Switch

The Trigger Channel Switch stage determines which input signal provides the trigger signal to the horizontal compartment as controlled by the Trigger Mode and ADD signals from the trigger selection circuitry. Refer to diagram 3 during the following discussion.

Resistors R317-R319 establish the input resistance and provide a load for the trigger signal from the right vertical plug-in unit. Resistors R307 and R308, provide the input resistance and load for the left vertical plug-in unit. R321-R323-R324 and R326-R327-R328 establish the operating level of the Trigger Channel Switch; R321-R323 and R326-R328 set the current gain for each channel. This stage is made up primarily of integrated circuit U324. An input/output table for U324 is shown in Fig. 4-15. U324 provides a high impedance differential input for the trigger signal from the left vertical unit at pins 2 and 15, and for the trigger signal from the right vertical unit at pins 7 and 10. The output signal at pins 12 and 13 is a differential signal. The sum of the DC current at pins 12 and 13 is always equal to the sum of the DC currents at pins 1, 8, 9, and 16 in all modes. This provides a constant DC bias to the stages which follow as the TRIG SOURCE or the VERT MODE switches are changed.

When the level at pin 4 is LO (see Trigger Mode and ADD Signals discussion and Fig. 4-15), the trigger signal from the left vertical unit passes to the output, while the trigger signal from the right vertical unit is blocked. A HI level at pin 4 connects the trigger signal from the right vertical unit to the output and the trigger signal from the left vertical unit is blocked. For VERT MODE operation in the ALT position of the VERT MODE switch, the level at pin 4 switches between the LO and HI level at a rate determined by the Vertical Binary stage (see Logic circuit description). This action obtains the trigger signal from the left vertical unit when the left vertical unit is being displayed and from the right vertical unit when it is being displayed.

When the level at pin 4 is LO and the level at pin 14 is HI, the trigger signal from both the left and right vertical units passes to the output pins. This condition occurs only when the TRIG SOURCE switch is set to VERT MODE and the VERT MODE switch is set to either ADD or CHOP. Under this operating mode, the trigger output signal is the algebraic sum of the trigger input signals from the left and right vertical units to prevent triggering on the vertical chopping transition, or only on one signal of an added display.

Trigger Output Amplifier

The trigger output at pins 12 and 13 of U324 is connected to the bases of Q344-Q346 to provide the internal trigger signal for the horizontal unit (via the Main Interface circuit). The horizontal unit provides a 50-ohm differential load for this stage. If it is removed from its compartment, the collector load for Q344-Q346 changes and the voltage at their collectors increases. This stage prevents this change from affecting the vertical signal for the Output Signals board. CR341-CR349 clamp the collectors of Q344 and Q346 at about +0.6 volt to prevent these transistors from saturating under this no-load condition.

Vertical Signal Buffer

The trigger output signal at pin 12 and 13 of U324 is also connected to the emitter of a common-base amplifier Q336 and Q334. The output signal at the collector of Q336 and Q334 is connected to the signals out board.

Input		Output
Trigger Mode Signal	Trigger ADD	Trigger Output Signal
4	14	12, 13
LO	LO	Left trigger signal
HI	LO	Right trigger signal
LO	HI	Both (added algebraically)

Fig. 4-15. Input/output table for Trigger Channel Switch stage.

VERTICAL INTERFACE

The Vertical Interface circuit selects the vertical deflection signal from the output of the left vertical and/or the right vertical plug-in unit. Fig. 4-16 shows a detailed block diagram of the Vertical Interface circuit. A schematic of this circuit is shown on diagram 3 at the rear of this manual.

Vertical Channel Switch

The Vertical Channel Switch stage determines which input signal provides the vertical signal to the Delay-Line Driver stage as controlled by the Mainframe Vertical Mode Command from the Logic circuit. Resistors R200-R202 and R204-R206 establish the input resistance of this stage and provide a load for the left and right vertical units. Resistors R209-R211-R212 and R216-R218-R219 establish the operating levels for this stage. R209-R212 and R216-R219 set the current gain for each channel. C208-R208 and C215-R215 provide frequency compensation.

This stage is made up primarily of integrated circuit U214, which is the same type as used for the Trigger Channel Switch. An input/output table for U214 is shown in Fig. 4-17. U214 provides a high impedance differential input for the signal from the left vertical unit at pins 2 and 15, and the signal from the right vertical unit at pins 7 and 10. The output signal at pins 12 and 13 is a differential signal which is connected to the Delay-Line Driver stage through R222-R224. The sum of the DC output currents at

http://manomanuals.com

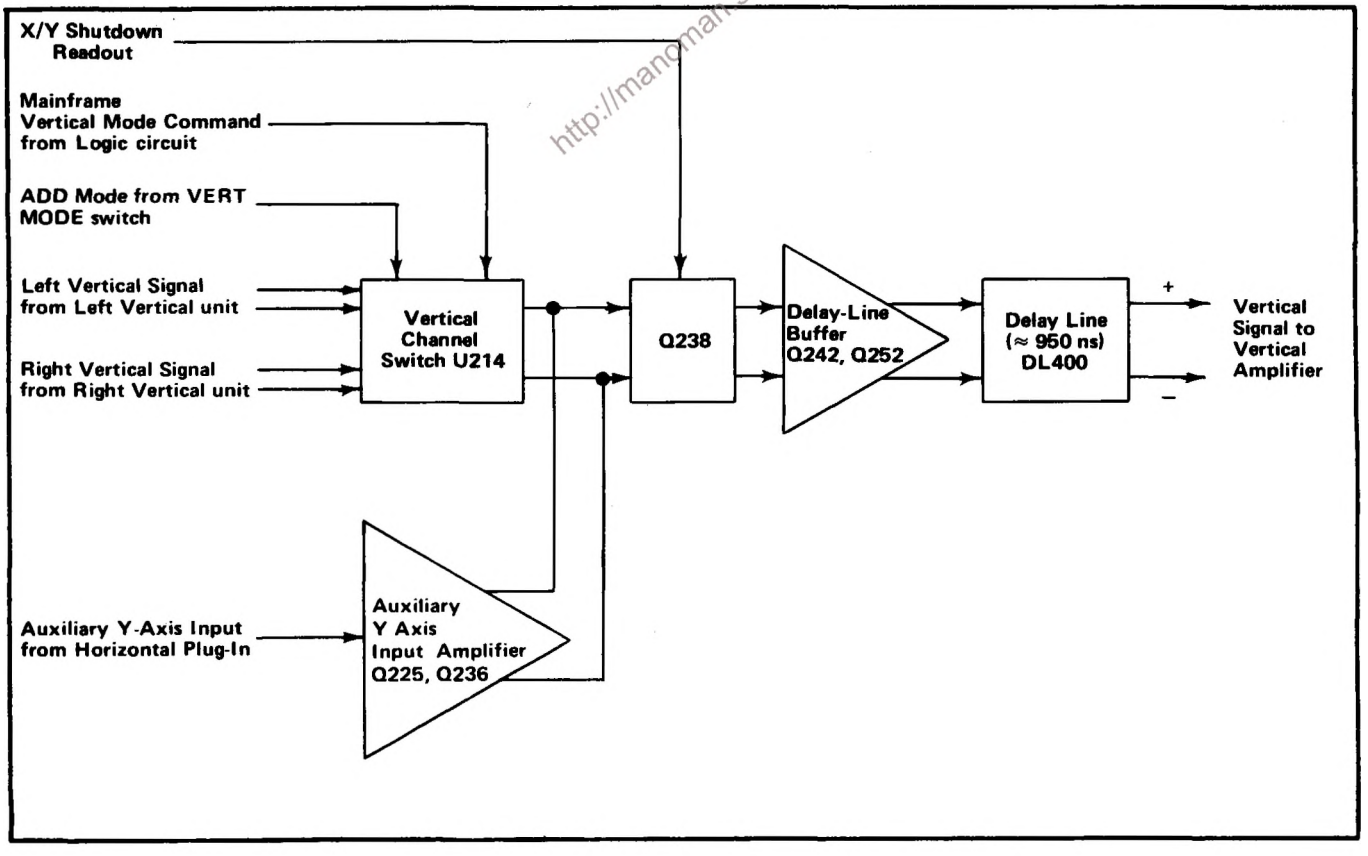


Fig. 4-16. Vertical Interface detailed block diagram.

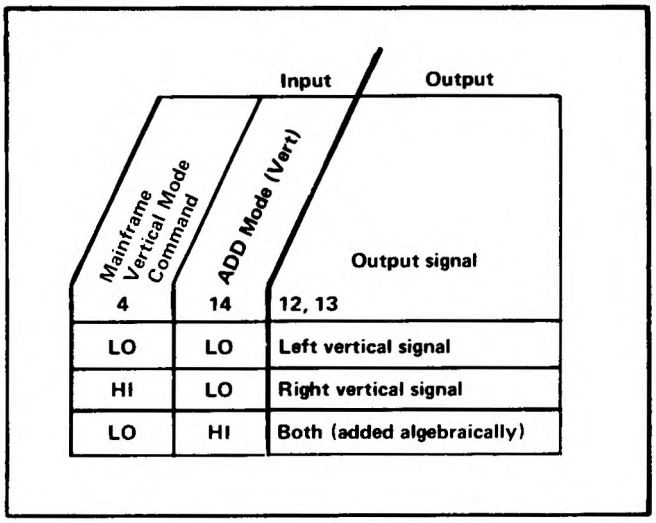


Fig. 4-17. Input/output table for Vertical Channel Switch.

pins 12 and 13 is always equal to the sum of the DC input currents at pins 1, 8, 9, and 16 in all modes. This provides a constant DC bias to the following stage as the VERT MODE switch is changed.

When the VERT MODE swich is set to LEFT, the level at pin 4 is LO. This level allows the signal from the left vertical unit to pass to the output while the signal from the right vertical unit is blocked. In the RIGHT position of the VERT MODE switch, the level at pin 4 is HI. Now, the signal from the right vertical unit is connected to the output while the signal from the left vertical unit is blocked.

When the VERT MODE switch is set to either ALT or CHOP, the Mainframe Vertical Mode Command at pin 4 switches between the LO and HI levels at a rate determined by either the Chop Counter or the Vertical Binary stages (see Logic circuit description). This action allows the signal from the left vertical unit to be displayed when the Mainframe Vertical Mode Command is LO and the signal from the right vertical unit is displayed when the Mainframe Vertical Mode Command is HI. When ADD vertical mode operation is selected, a HI level is applied to pin 14 and the level at pin 4 is LO as determined by the Vertical Mode Control stage in the Logic Circuit. This allows both the right and left vertical signals to pass to the output pins. Now, the signal from both vertical units is algebraically added and the resultant signal determines the vertical deflection.

The X/Y Shutdown signal from the Readout system is applied to pin 6 of U214. It has final control over the output signal from U214. Quiescently, the X/Y Shutdown signal is LO and the signal from the selected vertical can pass to the output pins 12 and 13. However, when the Readout system is ready to display Readout information, the level at pin 6 goes HI. This level blocks the signals from both vertical compartments and there is no output from U214 under this condition. Transistor Q238 will conduct and provide about the same current for the output stage as under normal conditions. This limits any change in positioning that would otherwise occur when the X/Y Shutdown signal from the Readout system is applied.

Auxiliary Y-Axis Input Amplifier

The Auxiliary Y-Axis Input Amplifier accepts an input from horizontal plug-in units having compatible features. Normally, this input is a positioning voltage to offset the display. The single-ended signal connected to the input of this stage is converted to a push-pull signal at the collectors of Q225 and Q236. This signal is connected to the Delay-Line Buffer stage along with the output from the Vertical Channel Switch.

Delay-Line Buffer

The output of the Vertical Channel Switch stage, along with any signal from the Auxiliary Y-Axis Input Amplifier, is connected to the emitters of Q242-Q252. These transistors are connected as common-base amplifiers to provide a low-impedance current-summing point. The signal at the collectors of Q242-Q252 is connected to Delay Line DL400. Resistor R260 provides reverse termination for the Delay Line.

Delay Line

Delay Line DL400 provides approximately 150 nanoseconds delay for the vertical signal, to allow the horizontal circuits time to initiate a sweep before the vertical signal reaches the vertical deflection plates of the CRT. This allows the instrument to display the leading edge of the signal originating the trigger pulse when using internal triggering. The delay line used in this instrument has a characteristic impedance of about 50 ohms per side, or about 100 ohms differentially. It is of the coaxial type, which does not produce preshoot or phase distortion in the CRT display.

VERTICAL AMPLIFIER

The Vertical Amplifier circuit provides final amplification for the vertical signal before it is applied to the vertical deflection plates of the CRT. This circuit includes an input from the BEAM FINDER switch to compress an overscanned display within the viewing area of the CRT. Fig. 4-18 shows a detailed block diagram of the Vertical Amplifier circuit. A schematic of this circuit is shown on diagram 4 at the rear of this manual.

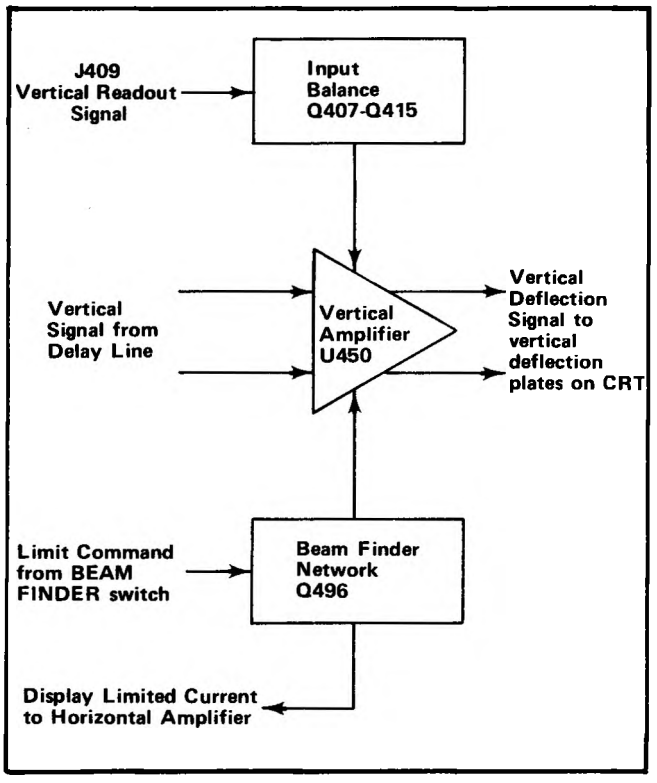


Fig. 4-18. Vertical Amplifier detailed block diagram.

Input Balance

Q407-Q415 comprise a paraphase amplifier to provide input balance for the Vertical Amplifier by changing the DC levels at pins 2 and 4 of U450. Vertical Centering adjustment R403 determines the bias at the base of Q407. As this bias is changed, the levels at the collectors of Q407 and Q415 change due to paraphase action. This DC level is connected to pin 2 of U450 through R408-R423 and to pin 4 through R414-R424. R403 is adjusted so the trace is displayed at the center of the CRT when the inputs to this circuit are at the same potential.

The input to the base of Q407 through J409 is used for Vertical readout signal.

Output Amplifier

Amplification of the vertical signal is accomplished by integrated circuit U450. The circuit shown within the shaded area is a representation of the circuit contained within U450. Notice that the circuit is made up of three similar push-pull stages. Each stage has a pair of common emitter transistors driving a pair of low input impedance common base transistors. Frequency compensation is provided by the networks connected between pins 2 and 4 in the first amplifier stage and pins 7 and 8, 13 and 14 in the third amplifier stage. The resistive network connected to pins 3, 6, and 16 determines the gain of the Vertical Amplifier. Vertical Gain adjustment R447 sets the gain of the second amplifier stage to determine the overall gain of the vertical deflection system and thereby provide a calibrated deflection factor. Bias adjustment R486 sets the voltage level at pin 10 of U450 (nominally 4.3 volts) to balance the third amplifier stage for maximum gain-bandwidth operation.

Beam Finder Network

The Beam Finder Network, consisting of transistor Q496 and associated components, provides a means of locating a display which overscans the graticule area. Under normal operation, −15 volts is connected to the base of Q496 from the BEAM FINDER switch (see diagram 7) to reverse bias it. Therefore, the normal operating levels for U450 are determined by the resistive network connected to pins 3, 6, and 16. When the BEAM FINDER switch is pressed, the −15 volts is interrupted and the base of Q496 rises positive to turn it on. The resulting change in current of U450 unbalances the second amplifier stage so as to limit its gain. This action compresses the display vertically within the display area.

HORIZONTAL AMPLIFIER

The Horizontal Amplifier circuit amplifies the push-pull horizontal deflection signals from the plug-in unit in the horizontal compartment and connects it to the horizontal deflection plates of the CRT. Fig. 4-19 shows a detailed block diagram of the Horizontal Amplifier circuit. A schematic of this circuit is shown on diagram 5 at the rear of this manual.

Horizontal Channel Switch

The horizontal signals from the plug-in unit in the horizontal compartment are connected to pin 2 and pin 15 of U510. The Readout signal is connected to pin 7 of U510. Integrated circuit U510 determines which input signal will provide the signal for the Horizontal amplifier circuit as controlled by the X/Y Shutdown signal from the Readout system. When the X/Y Shutdown is LO, the signal from horizontal compartment is passed to the output of U510. When the X/Y Shutdown is high, the Readout signal is passed to the output of U510. Resistors R514, R515, R521, and R522 establish the operating levels for this circuit. R512 adjusts the circuit gain. R511 and R513 establish the range for the gain adjustment (see Trigger Channel Switch under TRIGGER SELECTOR in this section).

For normal operation, the gain and current level resistors are connected to the Display Limit Command line. The

manoman.sghill.com

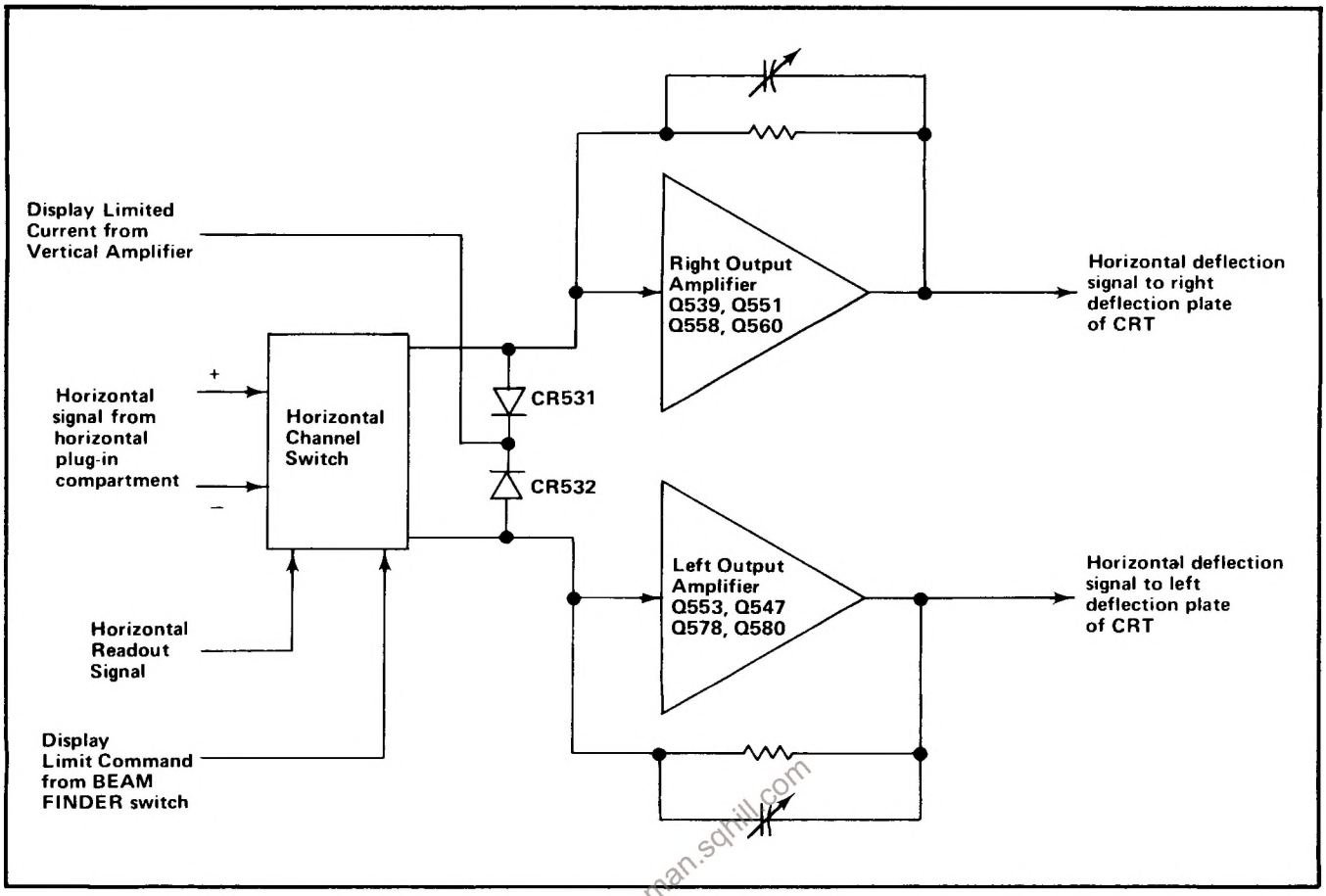


Fig. 4-19. Horizontal Amplifier detailed block diagram.

Display Limit Command is connected to the −15 supply through the BEAM FINDER switch. When the BEAM FINDER switch is actuated, the −15 volt is interrupted to limit the current to U510. At the same time, current is added through CR531 and CR532 from the display limited current line. This added current maintains about the same DC currents through the output circuit in both positions of the BEAM FINDER switch. The signal at the output is connected to the right and left amplifier inputs. Resistor R525 adjusts the amplifier for center screen deflection in the absence of an input signal to U510.

Output Amplifier

Transistors Q539, Q551, Q558, and Q560 function as a current driven feedback amplifier. The input current is converted to a voltage output signal to drive the right horizontal CRT deflection plate. R558 establishes the quiescent current level for series connected transistors Q558 and Q560.

The CRT deflection plates present a capacitive load to the amplifier, which requires additional current during fast transients. Extra current for positive excursions is provided by Q551 via R555, C555, and Q558; for negative excursions, by Q560 via R563.

Resistor R556 reduces the power dissipation in Q558. Resistors R566, R567, and R569 provide DC feedback and establish low frequency gain. Capacitors C566 and C588 (C568 for lower serial numbers) are adjusted for correct gain at fastest sweep rates (in later serial numbered instruments, C588 replaces C568 and a differently located C588, a thermal compensation network C584-R584 is added).

Basic operation of the Left Output Amplifier stage is the same as described for the Right Output Amplifier. C586 and C588 set the gain for the fastest sweep rates (C588 is relocated for later serial numbers and affects both Right and Left Output Amplifiers). The output signal at the collectors of Q578-Q580 connects to the left deflection plate of the CRT through R585.

The series circuit CR549 and R549 stabilize the output amplifier during fast retrace intervals. R535 is adjusted to balance the negative excursions of the right and left sides of the amplifier when the time base plug-in is used in X10 Magnified mode.

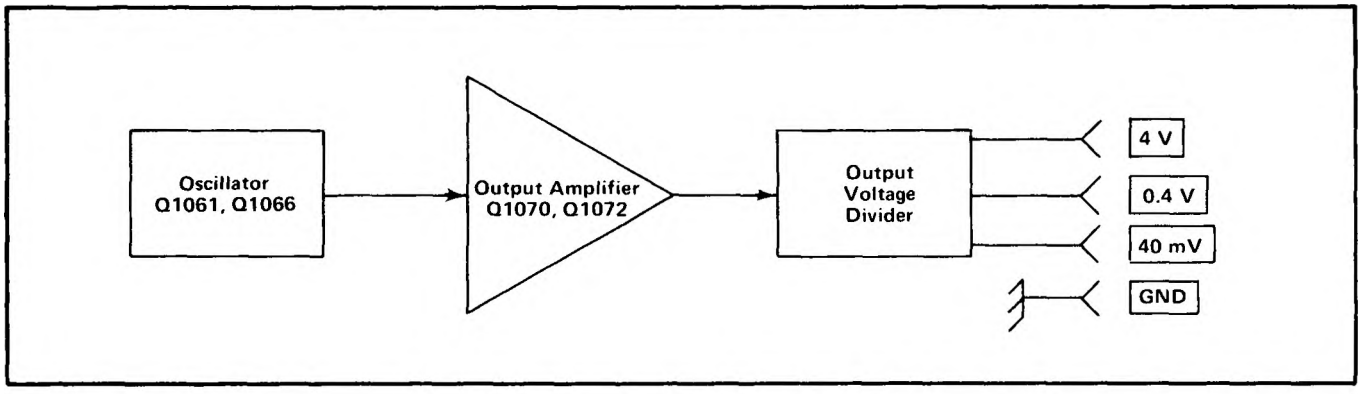


Fig. 4-20. Calibrator detailed block diagram.

CALIBRATOR AND FRONT PANEL SWITCHING

The Calibrator and Front Panel Switching circuit provides output voltage to the front-panel Calibrator pin-jacks and includes the front-panel switches and controls. Fig. 4-20 shows a detailed block diagram of the Calibrator portion of this circuit. A schematic of this circuit is shown on diagram 7 at the rear of this manual.

Mode Switch Logic

The VERT MODE switch determines the operating mode of the Vertical Interface circuit. The levels established by this switch are also used in various other circuits throughout this instrument. This switch is designed so it is self-cancelling (i.e., only one button can be pressed at a time). Specific operation of this switch is described in connection with the circuits that it controls.

The TRIG SOURCE switch controls the operation of the Trigger Selector circuit. This switch is also self-cancelling so only one of the buttons can be pressed at a time. Operation of this switch is discussed in connection with the Trigger Selector circuit.

Calibrator

General. The Calibrator circuit provides accurate voltage output at the front-panel Calibrator pin-jacks. Repetition rate of the output signal is about one kilohertz.

Oscillator. Q1061 and Q1066 are connected as a square-wave oscillator to determine the repetition rate of the Calibrator circuit. Oscillation occurs as follows: Assume that Q1061 is conducting and Q1066 is off. The collector current of Q1061 through R1061 produces a voltage level which holds the base of Q1066 low. This keeps Q1066 turned off, and since there is no current through it, its collector goes positive to produce the positive portion of the square wave. At the same time, C1064 begins to charge toward −15 volts through R1069. The emitter of Q1066 goes negative also as C1064 charges, until it reaches a level about 0.6 volt more negative than the level at its base. Then, Q1066 is forward biased and its emitter rapidly rises positive. Since C1064 cannot change its charge instantaneously, the sudden change in voltage at the emitter of Q1066 pulls the emitter of Q1061 positive also, to reverse bias it. The current through Q1066 produces a voltage drop at its collector to produce the negative portion of the square wave.

Now, conditions are reversed. Since Q1061 is reverse biased, there is no current through it. Therefore, C1064 can begin to discharge through R1063. The emitter level of Q1061 follows the discharge of C1064 until it reaches about −0.6 volt. Then, Q1061 is forward biased and its collector drops negative to reverse bias Q1066. This interrupts the current through Q1066, and its collector goes positive again to complete the square wave. Once again, C1064 begins to charge through R1069 to start the second cycle. The signal produced at the collector of Q1066 has a repetition rate of about one kilohertz.

The Oscillator stage can be changed by jumper P1066. When this jumper is installed in the DC position, the Oscillator is disabled and the collector of Q1066 rises positive. This produces a positive DC voltage output to the front-panel Calibrator pin-jacks.

Output Amplifier. Transistors Q1070 and Q1072 are connected as a comparator with the reference level at the base of Q1072 determined by the network R1073-R1074-R1076-R1077. The 4 Volts adjustment R1077, is set to provide accurate output voltage at the 4 V Calibrator pin-jack.

http://bnoman.sqrill.com

The output of the Oscillator stage is connected to the base of Q1070. This signal controls the conduction of comparator Q1070-Q1072. When the base of Q1070 is high, it is off and Q1072 is conducting. This produces a positive output voltage at the Calibrator pin-jacks. When the level at the base of Q1070 is switched low, Q1070 conducts and Q1072 is reverse biased. Now, the voltage level at the Calibrator pin-jacks drops to zero.

Output Voltage Divider. The collector current of Q1072 in the Output Amplifier stage is applied across the voltage divider made up of resistors R1079 through R1085. This divider is designed to provide a low output resistance in the 40 mV and 0.4 V positions while providing accurate output voltages. The output resistance at the 4 V pin-jack is about 450 ohms and at the 0.4 V and 40 mV pin-jacks is about 50 ohms.

CRT CIRCUIT

The CRT Circuit produces the high-voltage potentials and provides the control circuits necessary for the operation of the cathode-ray tube (CRT). This circuit also includes the Z-Axis Amplifier stage to set the intensity of the CRT display and the Auto Focus amplifier to assure

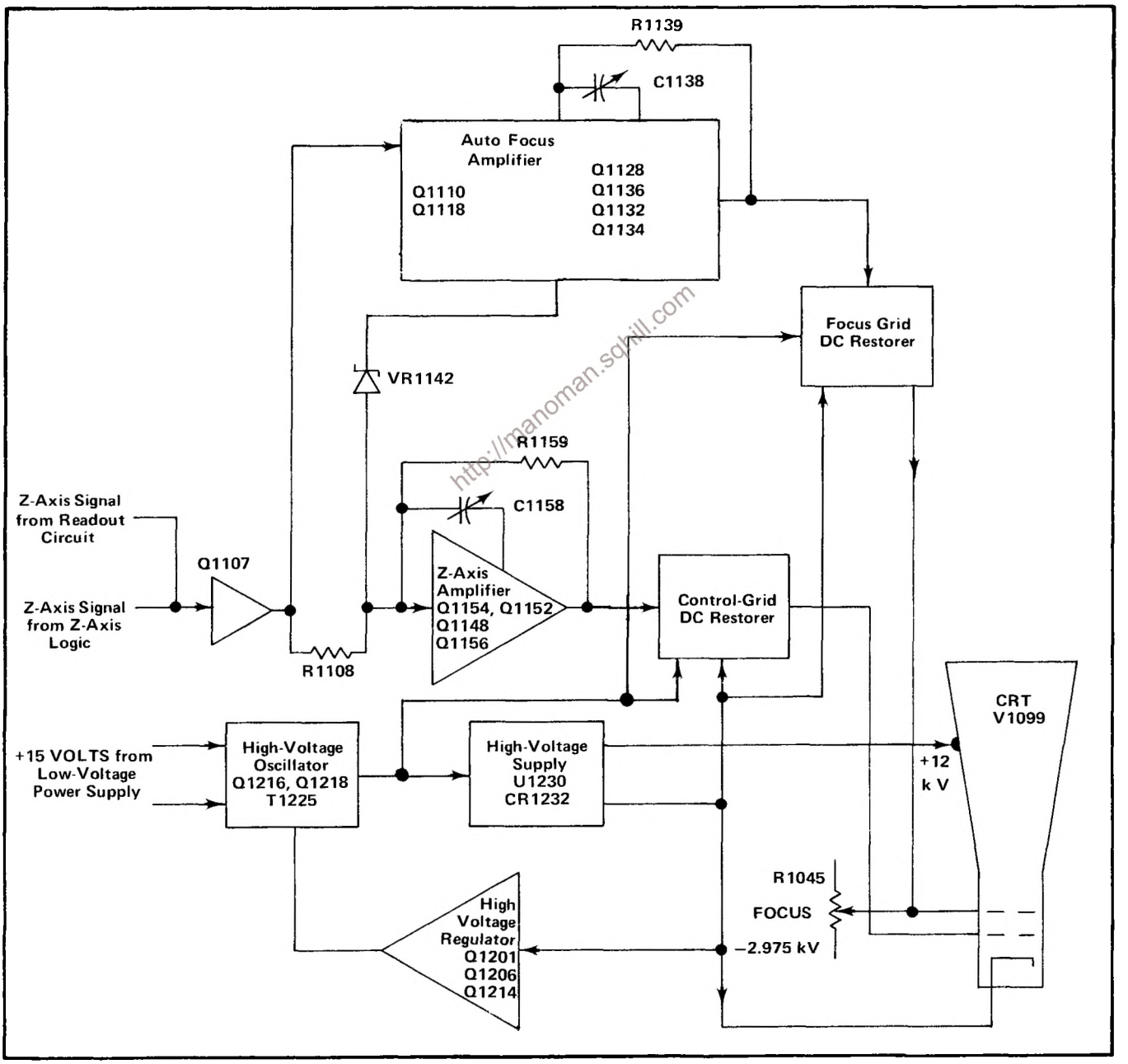


Fig. 4-21. CRT Circuit detailed block diagram.

optimum focus. Fig. 4-21 shows a detailed block diagram of the CRT Circuit. A schematic of this circuit is shown on diagram 8 at the rear of this manual.

Z-Axis Amplifier

The Z-Axis signal from the Logic circuit and the Z-Axis signal from the Readout system are connected to the emitter of Q1107. Transistor Q1107 is a common-base amplifier to establish a low input impedance for the input signals. Transistors Q1148, Q1152, Q1154, and Q1156 form a current driven operational amplifier. The input and output transistors are complementary to provide a fast rise-time and a fast fall-time response. The amplifier input is through resistor R1108. Resistor R1152 establishes a low current in the series connected output transistors. Transistor Q1148 supplies additional current through C1151 for the positive transients, and transistor Q1156 supplies additional current through C1158 for negative transients. Capacitor C1158 is adjusted for optimum square-wave output, resistors R1158 and R1159 along with capacitor C1158 form the feedback network. Zener diode VR1142 provides the necessary change of voltage from the collector of Q1107 to the base of Q1156.

Auto Focus Amplifier

The voltage developed across R1108 by the Z-Axis amplifier driving current is inverted and amplified non-linearly by Q1110 and Q1118, to conform to the requirements of the CRT focus electrode. As the base of Q1110 is driven negative CR1115 is forward biased, producing a knee in the amplifier response. The Level where the knee occurs is determined by the adjustment R1121. The operation of the remaining amplifier is identical to the Z-Axis amplifier.

High-Voltage Oscillator

Power for operation of the high-voltage supply is provided from the +15-Volt Supply. At the time of turn-on, CR1215 is reversed biased holding the collector of Q1214 positive. This allows the starting base bias current for the High-Voltage Oscillator to be supplied from the +5-Volt Supply through R1214, Q1214, and the base feedback windings of T1225 while the emitter potential of Q1216-Q1218 is established by the negative side of the +15-Volt Supply. As the output of the high-voltage supply increases to its required output level, the collector of Q1214 goes negative until CR1215 is forward biased. Then the collector level of Q1214 is clamped about 0.6 volt more negative than the negative side of the +15-Volt Supply. This configuration provides a controlled starting current for the High-Voltage Oscillator at turn-on, and at the same time allows the High-Voltage Regulator stage to control the current for the High-Voltage Oscillator after the stage reaches operating potentials to provide a regulated high-voltage output.

Q1216-Q1218 and the associated circuitry comprise an oscillator to drive high-voltage transformer T1225. When the instrument is turned on, assume that Q1216 comes into conduction first. The collector current of Q1216 produces a corresponding current increase in the base-feedback winding of T1225 to further increase the conductivity of Q1216. At the same time, the voltage developed across the base-feedback winding connected to Q1216 holds Q1218 reverse biased.

As long as the collector current of Q1216 continues to increase, voltage is induced into the base-feedback windings of T1225 which holds Q1216 forward biased and Q1218 reverse biased. However, when the collector current of Q1216 stabilizes, the magnetic field built up in T1225 begins to collapse. This induces an opposite current into the base windings which reverse biases Q1216, but forward biases Q1218. When the induced voltage at the base of Q1218 exceeds the bias set by the High-Voltage Regulator, Q1218 conducts and the amplified current at its collector adds to the current flowing through T1225 due to the collapsing field. Then, as the current through T1225 stabilizes again, the magnetic field around it once more begins to collapse. This reverses the conditions to start another cycle.

The signal produced across the primary of T1225 is a sine wave at a frequency of 35 to 45 kilohertz. The amplitude of the oscillations in the primary of T1225 is controlled by the High-Voltage Regulator to set the total accelerating potential for the CRT. Filter network C1222-L1222 decouples high peak operating current from the +15-Volt Supply.

High-Voltage Regulator

A sample of the secondary voltage from T1225 is connected to the High-Voltage Regulator stage through divider R1245A-R1245B. Q1201 and Q1206 are connected as an error amplifier to sense any change in the voltage level at the base of Q1201. The ground reference for the emitter of Q1201 through R1202, establishes the reference level for this stage. The output voltage is set by the fixed values of the components in this circuit.

Regulation occurs as follows: If the output voltage at the −2975 V test point starts to go positive (less negative), a sample of this positive-going change is connected to the base of Q1201 through R1245B. Both Q1201 and Q1206

are forward biased by this positive change, which in turn increases the conduction of Q1214. This results in a greater bias current delivered to the bases of Q1216-Q1218 through Q1214. Now, the bases of both Q1216 and Q1218 are biased closer to their conduction level so the feedback voltage induced into their base-feedback windings produces a larger collector current. This results in a larger induced voltage in the secondary of T1225 to produce a more negative level at the −2975 V test point to correct the original error. In a similar manner, the circuit compensates for output changes in a negative direction. Since the amplitude of the voltage induced into the secondary of T1225 also determines the output level of the positive High-Voltage Supply and the Control-Grid Supply, the total high-voltage output is regulated by sampling the output of the negative High-Voltage Supply.

High-Voltage Supplies

High-voltage transformer T1225 has two output windings. One winding provides filament voltage for the cathode-ray tube. The other winding provides the negative and positive accelerating potential for the CRT and the bias voltage for the control grid. All of these voltages are regulated by the High-Voltage Regulator stage to maintain a constant output voltage as previously described.

Positive accelerating potential for the CRT anode is supplied by the voltage quadrupler U1230. The applied voltage from the secondary of T1225 is about six kilovolts peak-to-peak. This results in an output voltage of about +12 kilovolts at the CRT anode. The negative accelerating potential for the CRT cathode is also obtained from this same secondary winding. Half-wave rectifier CR1232 provides an output voltage of about −2.975 kilovolts which is connected to the CRT cathode through R1234. The cathode and filament are connected together through R1275 to prevent cathode-to-filament breakdown due to a large difference in potential between these CRT elements. A sample of the negative accelerating voltage is connected to the High-Voltage Regulator to maintain a regulated high-voltage output.

The network consisting of diodes CR1269-CR1268-CR1270-CR1264-VR1264 provides the negative voltage for the control grid of the CRT. Output level of this supply is set by CRT Grid Bias adjustment R1261. Approximately 800 volts peak-to-peak from the secondary of T1225 is connected to the Control-Grid Supply through C1266 and R1266. Diodes CR1268 and CR1264 clip this signal to determine the operating level at the control grid. CR1268 limits the negative excursion of the signal; quiescently when the CRT is blanked, the anode of CR1268 is set at about +15 volts by the Z-Axis Amplifier stage. The positive clipping level at the cathode of CR1264 is set by CRT Grid Bias adjustment R1261. R1261 is adjusted to bias the control grid of the CRT just enough negative so the trace is blanked between sweeps. Under normal conditions, this biases the control grid about 80 volts more negative than the cathode.

The negative level at the CRT cathode is connected to the cathode of CR1270. This level is held constant by the High-Voltage Regulator as described previously. The clipped voltage developed by diodes CR1264 and CR1268 is peak to peak rectified by diodes CR1269 and CR1270 and super-imposed on this negative voltage to result in a level at the grid of the CRT which is more negative than the CRT cathode level. C1269 acts as a filter to provide a constant voltage output level. The unblanking gate level developed by the Z-Axis Amplifier stage is applied to the anode of CR1268 through R1157. The fast rising and falling portions of this signal are coupled directly to the output through C1269. The overall effect of the unblanking gate is to further clip the negative excursions thereby reducing the voltage difference between grid and cathode of the CRT. This allows the cathode current of the CRT to pass to the anode so the display can be viewed.

CRT Control Circuits

The focus of the display is determined by the FOCUS control R1045. This control and the Auto Focus amplifier maintains a well-defined display for fast changes in the intensity of the display. The network consisting of CR1255, CR1254, CR1253, CR1258, and VR1258 provide the negative voltage for the focus grid of the CRT. Approximately 800 volts peak to peak from the secondary of T1225 is connected to the focus grid supply through C1257 and R1257. The positive clipping level at the anode of CR1258 is set by the FOCUS control setting. This determines the operating level at the focus grid. Under normal operating conditions the voltage applied to the focus grid is more positive (less negative) than the control grid or the cathode of the CRT. The signal developed by the Auto Focus amplifier is coupled to the focus grid by C1254. When there is a sudden change in intensity levels the focus grid level will change to maintain a well-defined display. Astigmatism adjustment R1193, which is used in conjunction with the FOCUS control to obtain a well-defined display, varies the positive level on the astigmatism grid. Geometry adjustment R1184 varies the positive level on the horizontal deflection-plate shield to control the overall geometry of the display.

Two adjustments control the trace alignment by varying the magnetic field induced by coils around the CRT. Y-Axis Alignment R1190 controls the current through L1098, which affects the CRT beam after vertical deflection, but before horizontal deflection. Therefore, it affects only the vertical (Y) components of the display. Beam Rotation adjustment R1181 controls the current through L1099 and affects both the vertical and horizontal rotation of the display.

LOW-VOLTAGE POWER SUPPLY

The Low-Voltage Power Supply circuit provides the operating power for this instrument from six regulated supplies. Electronic regulation is used to provide stable, low-ripple output voltages. Each supply (except the +130 V supply, which is fused) contains a short-protection circuit to prevent instrument damage if a supply is inadvertently over-loaded or shorted to ground. Fig. 4-22 shows a detailed block diagram of the Low-Voltage Power Supply circuit. A schematic of this circuit is shown on diagram 9 at the rear of this manual.

Power Input

Power is applied to the primary of transformer T801 through line fuse F1000, thermal cutout S1000, and POWER switch S1001. The Voltage-Selector Jumper, P1001, connects the two halves of the primary of T801 in parallel for 110-volt (nominal) operation. Voltage-Selector Jumper P1002 connects the two halves of the primary in series for 220-volt (nominal) operation. The line fuse, F1000, must be changed to provide the correct protection for 220-volt nominal operation.

Each half of the primary of T801 has taps above and below the 110-volt (220-volt) nominal point. When the Voltage Selector Jumper is moved from LOW to MED to HI, more turns are effectively added to the primary winding and the turns ratio is decreased to compensate for the increased primary voltage. This configuration extends the regulating range of the 7603.

For the R7603 a fan provides forced-air cooling. The fan is connected in parallel with one half of the primary winding of T801. Therefore, it always has the same voltage applied regardless of the position of the Voltage-Selector Jumper.

Thermal cutout S1000 provides thermal protection for this instrument. If the internal temperature of the instrument exceeds a safe operating level, S1000 opens to interrupt the applied power. When the temperature returns to a safe level, S1000 automatically closes to re-apply the power.

–50-Volt Supply

The following discussion includes the description of the 50 V Rectifier, –50 V Series Regulator, –50 V Feedback Amplifier, –50 V Reference, and –50 V Current Limiting stages. Since these stages are closely related in the operation of the –50-volt regulated output, their performance is most easily understood when discussed as a unit.

The 50 V Rectifier assembly CR808 rectifies the output at the secondary of T801 to provide the unregulated voltage source for both the –50- and +50-volt supplies. CR808 is connected as a bridge rectifier and its output is filtered by C808-C809. Transistors Q886, Q896, Q900 operate as a feedback-stabilized regulator circuit to maintain a constant –50-volt output level. Q886 is connected as a differential amplifier to compare the feedback voltage at the base of Q886B against the reference voltage at the base of Q886A. The error output at the collector of Q886B reflects the difference, if any, between these two inputs. The change in error-output level at the collector of Q886B is always opposite in direction to the change in the feedback input at the base of Q886B (out of phase).

Zener diode VR890 sets a reference level of about –9 volts at the base of Q886A. A feedback sample of the output voltage from this supply is connected to the base of Q886B through divider R880-R881-R882. R881 in this divider is adjustable to set the output level of this supply. Notice that the feedback voltage to this divider is obtained from a line labeled –50 V Sense. Fig. 4-23 illustrates the reason for this configuration. The inherent resistance of the interconnecting wire between the output of the –50-Volt Supply and the load produces a voltage drop which is equal to the output current multiplied by the resistance of the interconnecting wire. Even though the resistance of the wire is small, it results in a substantial voltage drop due to the high output current of this supply. Therefore, if the feedback voltage were obtained ahead of this drop, the voltage at the load might not maintain close regulation. However, the –50 V Sense feedback configuration overcomes this problem since it obtains the feedback voltage from a point as close as practical to the load. Since the current in the –50 V Sense line is small and constant, the feedback voltage is an accurate sample of the voltage applied to the load.

Regulation occurs as follows: If the output level of this supply decreases (less negative) due to an increase in load, or a decrease in input voltage (as a result of line voltage changes or ripple), the voltage across divider R880-R881-R882 decreases also. This results in a more positive feedback level at the base of Q886B than that established by the –50 V Reference stage at the base of Q886A. Since the transistor with the more positive base controls the conduction of the differential amplifier, the output current at the collector of Q886B increases. This increase in output from Q886B allows more current to flow through Q896 and Q900 to result in increased conduction of –50 V Series Regulator Q903. The load current increases and the output voltage of this supply also increases (more negative). As a result, the feedback voltage from the –50 V Sense line increases and the base of Q886B returns to the same level as the base of Q886A. Similarly, if the output level of this supply increases (more negative), the output current of Q886B decreases. The feedback through Q896 and Q900 reduces the conduction of the –50 V Series Regulator to decrease the output voltage of this supply.

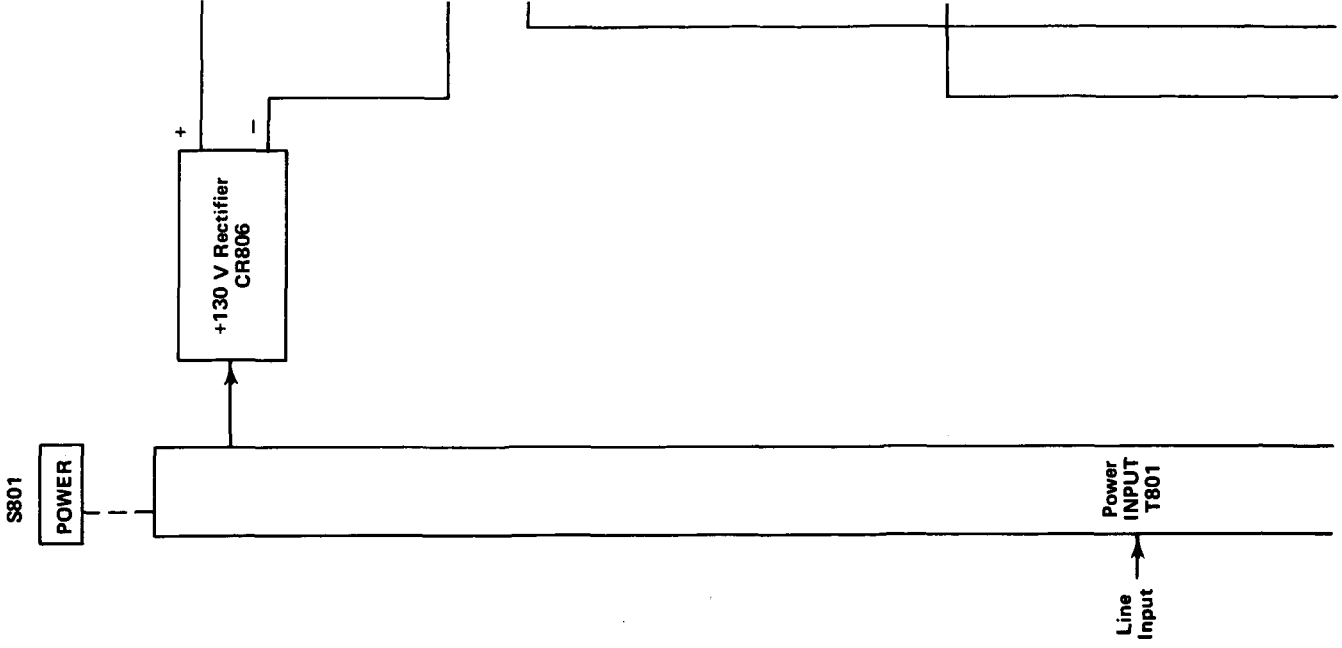
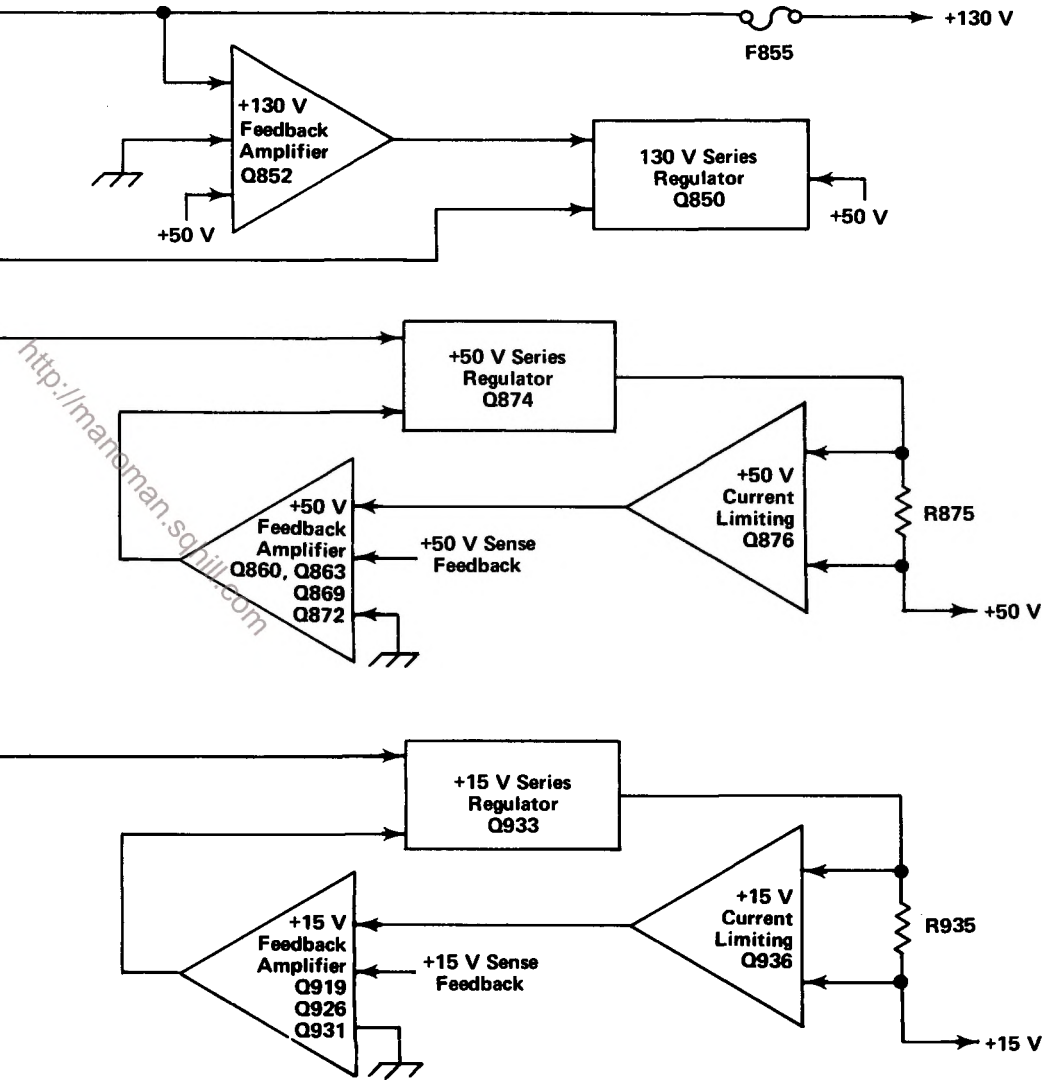


Fig. 4-22. Low-Voltage Power Supply detailed block diagram.



http://manoman.sohil.com

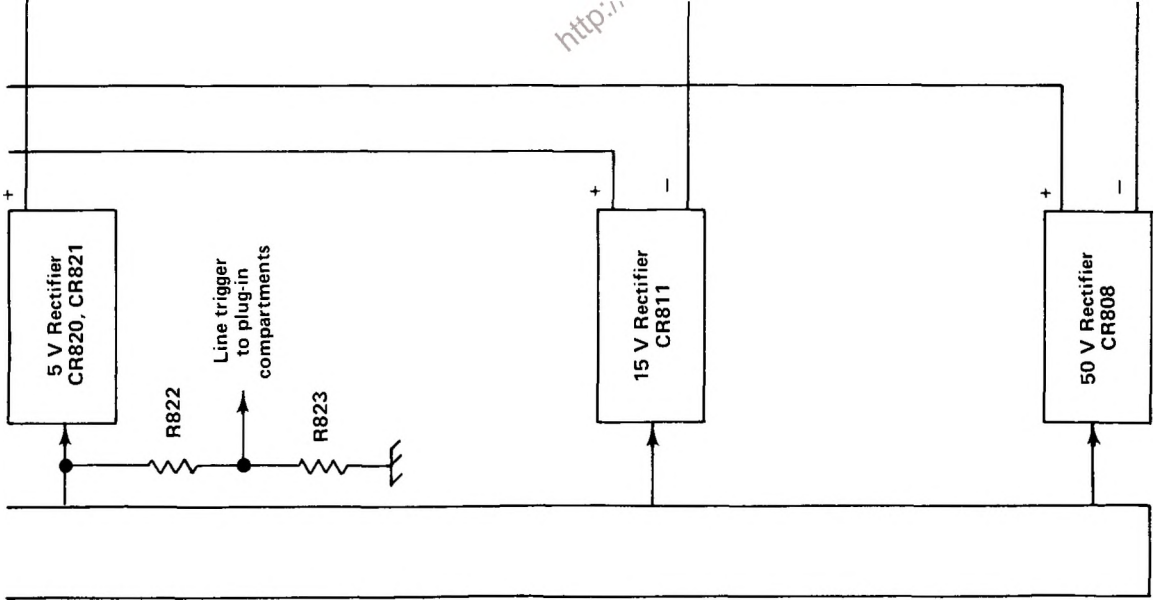
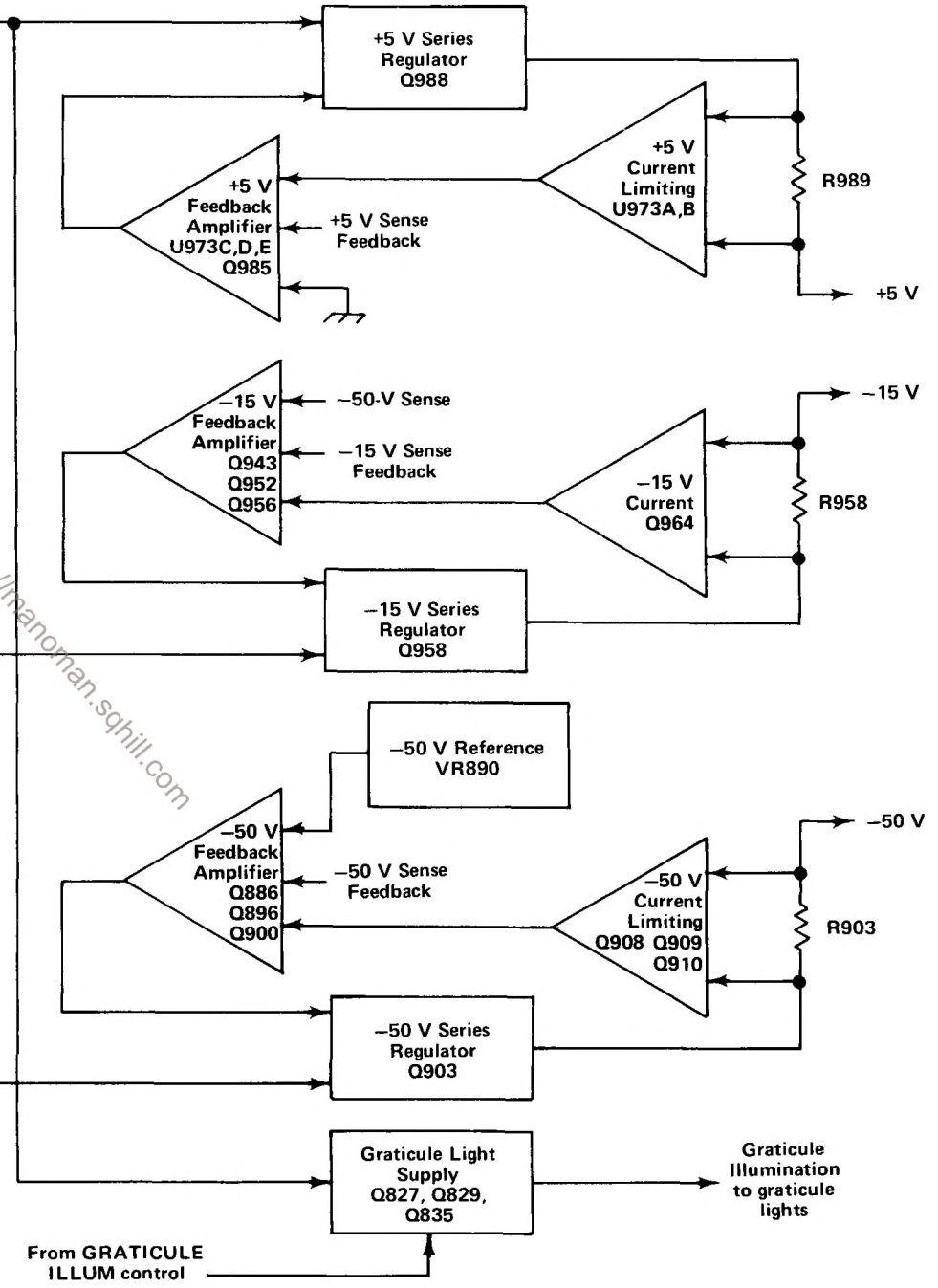


Fig. 4-22. Low-Voltage Power Supply detailed block diagram (cont).



manoman.sqhill.com

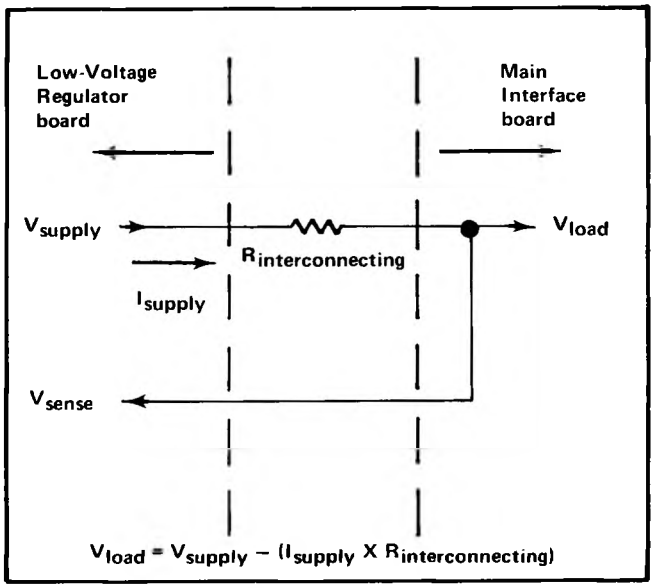


Fig. 4-23. Schematic illustrating voltage drop between power supply output and load due to resistance of interconnecting wire.

−50 Volts adjustment R881 determines the divider ratio to the base of Q886B and thereby determines the feedback voltage. This adjustment sets the output level of the supply in the following manner: If R881 is adjusted so the voltage at its variable arm goes less negative (closer to ground), this appears as an error signal at the base of Q886B. In the same manner as described previously, this positive-going change at the feedback input of the differential amplifier increases the conduction of the −50 V Series Regulator to produce more current to the load, and thereby increase the output voltage of this supply. This places more voltage across divider R880-R881-R882 and the divider action returns the base of Q886B to about −9 volts. Notice that the feedback action of this supply forces a change in the output level which always returns the base of Q886B to the same level as the base of Q886A. In this manner, the output level of the −50-Volt Supply can be set to exactly −50 volts by correct adjustment of R881.

The −50 V Current Limiting stage Q908-Q909-Q910 protects the −50-Volt Supply if excess current is demanded from this supply. All of the output current from the −50-Volt Supply flows through R903. Transistor Q908 senses the voltage at the collector of the −50 V Series Regulator Q903 and compares it against the −50 V output level at the base of Q909 which is obtained from the other side of R903. Under normal operation, Q908 is held in conduction and Q909 is off. However, when excess current is demanded from the −50 V Series Regulator due to a short circuit or similar malfunction at the output of this supply, the voltage drop across R903 increases until the base of Q908 goes more negative than the level at the base of Q909. Then Q909 takes over conduction of the comparator. The collector current of Q909 increases the voltage drop across R896 to reduce the conduction of Q896 in the −50 V Feedback Amplifier and limit the conduction of Q903. Q910 is connected as a constant-current source for Q908-Q909.

−15-Volt Supply

Basic operation of all stages in the −15-V Supply is the same as for the −50-Volt Supply. Reference level for this supply is established by divider R945-R946 between ground and the −50 V Sense voltage. The divider ratio of R945-R946 sets a level of −15 volts at the base of Q943A. The level on the −50 V Sense line is held stable by the −50-Volt Supply as described previously. The −15 V Sense voltage is connected to the base of Q943B through R940. Any change at the output of the −15-Volt Supply appears at the base of Q943B as an error signal. The output voltage is regulated in the same manner as described for the −50-Volt Supply.

+5-Volt Supply

Basic operation of the +5-Volt Supply is the same as described for the previous supplies. The +5 V Current Limiting and +5 V Feedback Amplifier (except for Q985) is made up of a five-transistor array U973. Notice that both U973C and Q985 in the +5 V Feedback Amplifier are connected as emitter followers, since inversion is not necessary in the feedback path for positive output voltages. Reference voltage for the +5 V Feedback Amplifier stage is established by divider R970-R971 between the +5 V Sense and −50 V Sense feedback voltages. This divider establishes a quiescent level of about 0 volt at the base of U973E.

+15-Volt Supply

The +15-Volt Supply operates in the same manner as described for the previous supplies. The unregulated +15-Volt Supply provides the source voltage for the High-Voltage Oscillator stage in the CRT circuit through fuse F814 and P870.

+50-Volt Supply

Operation of the +50-Volt Supply is the same as described for the previous supplies. The unregulated +50 volts, from 50 V Rectifier CR808, is used to provide a positive starting voltage for the −50-Volt Supply.

+130-Volt Supply

The +130-V Rectifier CR806 provides the rectified voltage for the +130-Volt Supply. However, this secondary winding of T801 does not supply the full potential necessary to obtain the +130-volt output level. To provide the required output level, the +50-Volt Supply is connected in series with this supply through Q850. Basic regulation of

the output voltage is provided by +130 V Feedback Amplifier Q852, and +130 V Series Regulator Q850.

The output voltage of this supply is connected across divider R855-R856. This divider provides a quiescent level of about +50 volts at the base of Q852. The reference level for this supply is provided by the +50-Volt Supply connected to the emitter of Q852. If the output of this supply changes, this change is sensed by Q852 and an amplified error signal is connected to the base of Q850. This error signal changes the conduction of the +130 V Series Regulator Q850 to correct the output error. Fuse F855 protects this supply if the output is shorted. However, since the response time of F855 is slow to a shorted condition, VR851 provides additional current to the base of Q850 to protect it from damage due to overvoltage. Diode CR852 limits the reverse bias on Q852 to about 0.6 volt when F855 is blown.

Graticule Light Supply

Power for the graticule lights is supplied by the Graticule Light Supply. Rectified voltage for this supply is provided by 5 V Rectifier CR820-CR821. Q835 operates as a series regulator transistor. Emitter follower Q829 determines the conduction of this series regulator as controlled by front panel GRATICULE ILLUM Control R1095. Current-limiting to protect this supply is provided by Q827. Under normal operation, divider R830-R831-R833 sets the base of Q827 below its conduction level. However, if excess current is demanded from this supply, the voltage drop across R837-R838 increases until Q827 comes into conduction. The collector of Q827 then limits the conduction of this supply to limit its output current.

Divider R822-R823 provides a sample of the line voltage in the secondary of T801 to the plug-in unit. This provides a line-frequency reference to the plug-in units for internal triggering at line frequency or for other applications.

DC Fan (R7603 only)

The DC fan (Option 5) uses a brushless, Hall-effect motor. The Hall-effect devices, located inside the motor housing, control the base current to motor-driving transistors Q1034-Q1035-Q1037-Q1038 depending upon the magnitude and polarity of the magnetic field around them. A permanent magnet, located in the rotor, changes the magnetic field as the rotor turns, causing the Hall-effect devices to turn on the appropriate transistors to drive the motor windings.

Transistor Q1041 provides a constant current source for the Hall-effect devices, responding to voltage changes at the emitters of the driving transistors, thus controlling the motor current. Transistor Q1030, along with R1203, provides a biasing arrangement to make the Hall-effect devices compatible with the silicon driving transistors.

SIGNAL OUT BOARD

VERT SIG OUT

The vertical signal is selected by the TRIG SOURCE switch. The vertical signal selected is applied to the bases of a differential amplifier Q606 and Q618. A single-ended signal is taken off the collector of Q618 and connected to an output buffer Q620. CR621 and CR622 provide protection against a high voltage inadvertently applied to the output connector.

+ GATE OUT

The gate signal is connected to a comparator circuit Q662 and Q666 through resistor R660. From the comparator the gate signal is connected to the emitter of an output buffer Q672. Gate Selector switch connects one of the gate signals to R660, the input of the Gate Amplifier. Possible gate signals are MAIN gate and, with a dual-sweep time-base unit, a DELAY or an AUXILIARY gate signal can be selected. CR674 and CR676 provide protection against a high voltage inadvertently applied to the output connector.

+ SAWTOOTH OUT

The sawtooth signal is connected to the Sawtooth Amplifier through R36. Q631, Q634, and Q640 comprise a negative feedback amplifier with a gain of two, determined by the ratio of feedback resistor R645 to the combined input resistance of R630 and R63. CR635 and CR676 provide protection against a high voltage inadvertently applied to the output connector.

READOUT SYSTEM

The Readout System in the 7603 provides alphanumeric display of information encoded by the plug in units. This display is presented on the CRT and is written by the CRT beam on a time-shared basis. Schematics for the total Readout System are shown on diagrams at the rear of this manual.

The definitions of several terms must be clearly understood to follow this description of the Readout System. These are:

Character—A character is a single number, letter, or symbol which is displayed on the CRT, either alone or in combination with other characters.

Word—A word is made up of a related group of characters. In the 7603 Readout System, a word can consist of up to ten characters.

Frame—A frame is a display of all words for a given operating mode and plug-in combination. Up to six words can be displayed in one frame. Fig. 4-24 shows one complete frame (simulated readout) and the position at which each of the six words is displayed.

Column—One of the vertical lines in the Character Selection Matrix (see Fig. 4-25). Columns C-O (column zero) to C-10 (column 10) can be addressed in the 7603 system.

Row—One of the horizontal lines in the Character Selection Matrix (Fig. 4-25). Rows R-1 (row 1) to R-10 (row 10) can be addressed in the 7603 system.

Time-slot—A location in a pulse train. In the 7603 Readout System, the pulse train consists of 10 negative-going pulses. Each of these time-slots is assigned a number between one and ten. For example, the first time-slot is TS-1.

Time-multiplexing—Transmission of data from two or more sources over a common path by using different time intervals for different signals.

Display Format. Up to six words of readout information can be displayed on the 7603 CRT. The position of each word is fixed and is directly related to the plug-in unit from which it originated. Fig. 4-24 shows the area of the graticule where the readout from each plug-in unit is displayed. Notice that channel 1 of each plug-in unit is displayed within the top division of the CRT and channel 2 is displayed directly below within the bottom division. Fig. 4-26 shows a typical display.

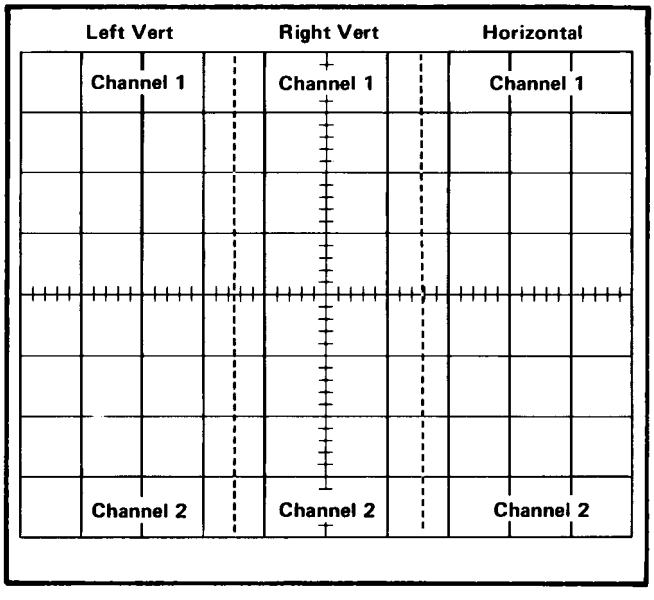


Fig. 4-24. Location of readout words on the CRT identifying the originating plug-in unit and channel (one complete frame shown, simulated readout).

Each word in the readout display can contain up to 10 characters, although the typical display will contain between two and seven characters per word. The characters are selected from the Character Selection Matrix shown in Fig. 4-25. Any one of the 50 separate characters can be addressed and displayed on the CRT. In addition, 12 operational addresses are provided for special instructions to the Readout System. The unused locations in the Matrix (shaded areas) are available for future expansion of the Readout System. The method of addressing the locations in the Character Selection Matrix is described in the following discussion.

Developing the Display. The following basic description of the Readout System uses the block diagram shown in Fig. 4-27. This description is intended to relate the basic function of each stage to the operation of the overall Readout System. Detailed information on circuit operation is given later.

http://manoman.sqlu.com

The key block in the Readout System is the Timer stage. This stage produces the basic signals which establish the timing sequences within the Readout System. Period of the timing signal is about 250 microseconds (drops to about 210 microseconds when Display-Skip is received; see detailed description of Timing stage for further information). This stage also produces control signals for other stages within this circuit and interrupt signals to the Vertical Interface, Horizontal Interface, CRT Circuit, and Z-Axis Logic stage which allow a readout display to be presented. The Time-Slot Counter stage receives a trapezoidal voltage signal from the Timer stage and directs it to one of ten output lines. These output lines are labeled TS-1 through TS-10 (time-slots one through ten) and are connected to the vertical and horizontal plug-in compartments as well as to various stages within the Readout System. The output lines are energized sequentially so there is a pulse on only one of the 10 lines during any 250 microsecond timing period. When the Time-Slot Counter stage has completed time-slot 10, it produces an End-of-Word pulse which advances the system to the next channel.

Two output lines, row and column, are connected from each channel of the plug-in units back to the Readout System. Data is encoded on these output lines by connecting resistors between them and the time-slot input lines. The resultant output is a sequence of ten analog

ROW NUMBER ↓ / COLUMN NUMBER →	CURRENT (MILLI-AMPERES)	C-0	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10
		0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	⩾ 1.0
R-1	0	SKIP[1]	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
R-2	0.1		*ϟ*	*<*	*I*	*/*	*+*	*−*	*+*	*C*	*Δ*	*>*
R-3	0.2		ADD[1] ONE ZERO	ADD[1] TWO ZEROS	SHIFT[1] PREFIX ←	SHIFT[1] PREFIX ← AND ADD ONE ZERO						*IDENTIFY*[1]
R-4	0.3		*m*	*μ*	*n*	*p*	*X*	*K*	*M*	*G*	*T*	*R*
R-5	0.4		*S*	*V*	*A*	*W*	*H*	*d*	*B*	*c*	*Ω*	*E*
R-6	0.5		*U*	*N*	*L*	*Z*	*Y*	*P*	*F*	*J*	*Q*	*D*
R-7	0.6				DECIMAL[1] POINT LOCATION NO. 3	DECIMAL[1] POINT LOCATION NO. 4	DECIMAL[1] POINT LOCATION NO. 5	DECIMAL[1] POINT LOCATION NO. 6	DECIMAL[1] POINT LOCATION NO. 7			
R-8	0.7										DECIMAL[2] POINT	
R-9	0.8											
R-10	0.9	ADD SPACE IN DISPLAY[1]										

UNUSED LOCATIONS. AVAILABLE FOR FUTURE EXPANSION OF READOUT SYSTEM

[1] OPERATIONAL ADDRESS.

[2] DECIMAL POINT CHARACTER. SEE DECIMAL POINT CHARACTER DESCRIPTION IN TEXT.

Fig. 4-25. Character Selection Matrix for 7603 Readout System.

1195-25A

http://manoranjan.mhill.com

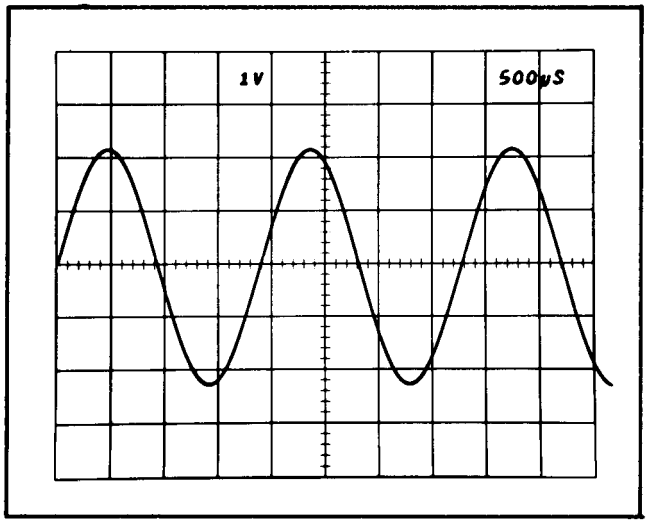


Fig. 4-26. Typical readout display where only channel 1 of the Right Vertical and Horizontal units is displayed.

current levels which range from zero to one milliampere (100 microamperes/step) on the row and column output lines. This row and column correspond to the row and column of the Character Selection Matrix in Fig. 4-25. The standard format in which information is encoded onto the output lines is given in Table 4-2 (special purpose plug-in units may have their own format for readout; these special formats will be defined in the manuals for these units).

The encoded column and row data from the plug-in units is selected by the Column Data Switch and Row Data Switch stages respectively. These stages take the analog currents from the six data lines (two channels from each of the three plug-in compartments) and produce a single time-multiplexed analog voltage output which contains all of the column or row information from the plug-ins. The Column Data Switch and Row Data Switch are sequenced by the binary Channel Address No. 1 code from the Channel Counter.

The time multiplexed output of the Column Data Switch is monitored by the Display-Skip Generator to determine if it represents valid information which should be displayed. Whenever information is not encoded in a time-slot, the Display-Skip Generator produces an output level to prevent the Timer stage from producing the control signals which normally interrupt the CRT display and present a character.

The analog outputs of the Column Data Switch and Row Data Switch are connected to the Column Decoder and Row Decoder stages respectively. These stages sense the magnitude of the analog voltage input and produce an output current on one of ten lines. The outputs of the Column Decoder stage are identified as C-1 to C-10 (column 1 to 10) which correspond to the column information encoded by the plug-in unit. Likewise, the outputs of the Row Decoder stage are identified as R-1 to R-10 (row 1 to 10) which correspond to the row information encoded by the plug-in unit. The primary function of the row and column outputs is to select a character from the Character Selection Matrix to be produced by the Character Generator stage. However, these outputs are also used at other points within the system to indicate when certain information has been encoded. One such stage is the Zeros Logic and Memory. During time-slot 1 (TS-1), this stage checks if zero-adding or prefix-shifting information has been encoded by the plug-in unit and stores it in memory until time-slots 5, 6, or 8. After storing this information, it triggers the Display-Skip Generator stage so there is no display during this time slot (as defined by Standard Readout Format; see Table 4-2). When time-slots 5, 6, and 8 occur, the memory is addressed and any information stored there during time-slot 1 is transferred out and connected to the input of the Column Decoder stage to modify the analog data during the applicable time-slot.

http://manoman.sqhill.com

TABLE 4-2

Standard Readout Format

Time-Slot Number	Description
TS-1	Determines decimal magnitude (number of zeros displayed or prefix change information) or the IDENTIFY function (no display during this time-slot).
TS-2	Indicates normal or inverted input (no display for normal).
TS-3	Indicates calibrated or uncalibrated condition of plug-in variable control (no display for calibrated condition).
TS-4	1-2-5 scaling.
TS-5 TS-6 TS-7	Not encoded by plug-in unit. Left blank to allow addition of zeros by Readout System.
TS-8	Defines the prefix which modifies the units of measurement.
TS-9 TS-10	Define the units of measurement of the plug-in unit. May be standard units of measurement (V, A, S, etc.,) or special units selected from the Character Selection Matrix.

Another operation of the Zeros Logic and Memory stage is to produce the IDENTIFY function. When time-slot 1 is encoded for IDENTIFY (column 10, row 3), this stage produces an output level which connects the Column Data Switch and Row Data Switch to a coding network within the Readout System. Then, during time-slots 2 through 9, an analog current output is produced from the Column Data Switch and Row Data Switch which addresses the correct points in the Character Selection Matrix to display the word "IDENTIFY" on the CRT. The Zeros Logic and Memory stage is reset after each word by the Word Trigger pulse.

The Character Generator stage produces the characters which are displayed on the CRT. Any of the 50 characters shown on the Character Selection Matrix of Fig. 4-24 can be addressed by proper selection of the column and row current. Only one character is addressable in any one time-slot; a space can be added into the displayed word by the Decimal Point Logic and Character Position Counter stage when encoded by the plug-in. The latter stage counts how many characters have been generated and produces an output current to step the display one character position to the right for each character. In addition, the character position is advanced once during each of time-slots 1, 2, and 3 whether a character is generated during these time-slots or not. This action fixes the starting point of the standard-format display such that the first digit of the scaling factor always starts at the same point within each word regardless of the information encoded in time-slot 2 (normal/invert) or time-slot 3 (cal/uncal) which precedes this digit. Also, by encoding row 10 and column 0 during any time-slot, a blank space can be added to the display. Decimal points can be added to the display at any time by addressing row 7 and columns 3 through 7 (see Character Selection Matrix for location of these decimal points). The Decimal Point Logic and Character Position Counter stage is reset after each word by the Word Trigger pulse.

The Format Generator stage provides the output signals to the vertical and horizontal deflection systems of the instrument to produce the character display. The binary Channel Address No. 2 code from the Channel Counter stage is connected to this stage so that the display from each channel is positioned to the area of the CRT which is associated with the plug-in and channel originating the word (see Fig. 4-24). The positioning current or decimal point location current generated by the Decimal Point Logic and Character Position Counter stage is added to the horizontal (X) signal at the input to the Format Generator stage to provide horizontal positioning of the characters within each word. The X- and Y-output signals are connected to the Horizontal Amplifier and Vertical Amplifier through the Horizontal Output and Vertical Output stages respectively.

The Word Trigger stage produces a trigger from the End-of-Word pulse generated by the Time-Slot Counter stage after the tenth time-slot. This Word Trigger pulse advances the Channel Counter to display the information from the next channel or plug-in. It also provides a reset pulse to the Zeros Logic and Memory stage and the Decimal Point Logic and Character Position Counter stage. The Word Trigger stage can also be advanced to jump a complete word or a portion of a word when a Jump command is received from the Row Decoder stage.

The Single-Shot Lockout stage allows the display sequence of the Readout System to be changed. Normally, the Readout System operates in a free-running mode so the waveform display is interrupted randomly to display characters. However, under certain conditions (such as single-shot photography), it is desirable that the Readout System operate in a triggered mode where the readout portion of the display is normally blanked out but can be presented on command. The Readout Mode switch determines the operating mode of the readout system.

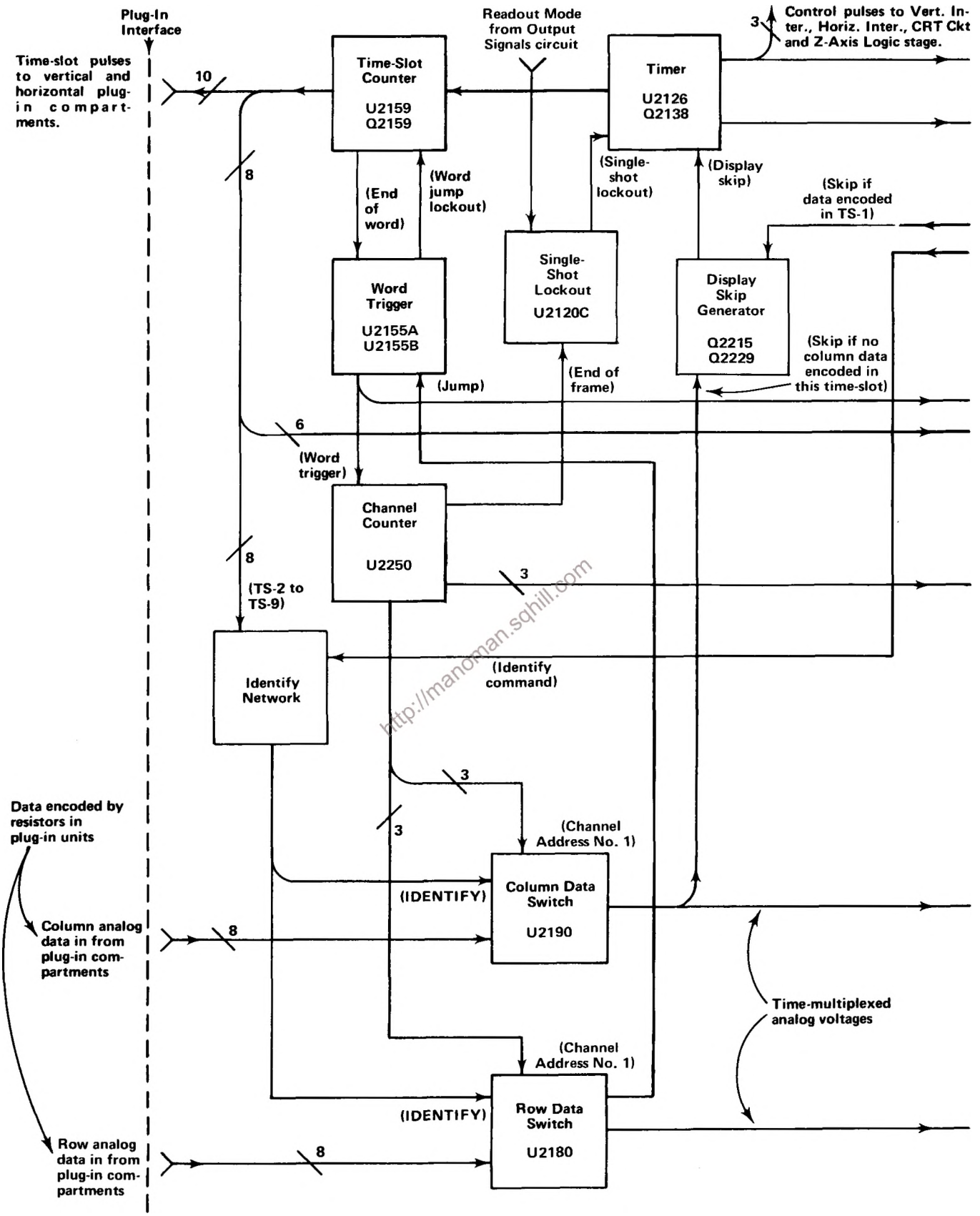
Circuit Analysis of Readout System

The following analysis of the Readout System describes the operation of each stage in detail. Complete schematics of the Readout System are shown on diagram 10 at the read of this manual.

Timer

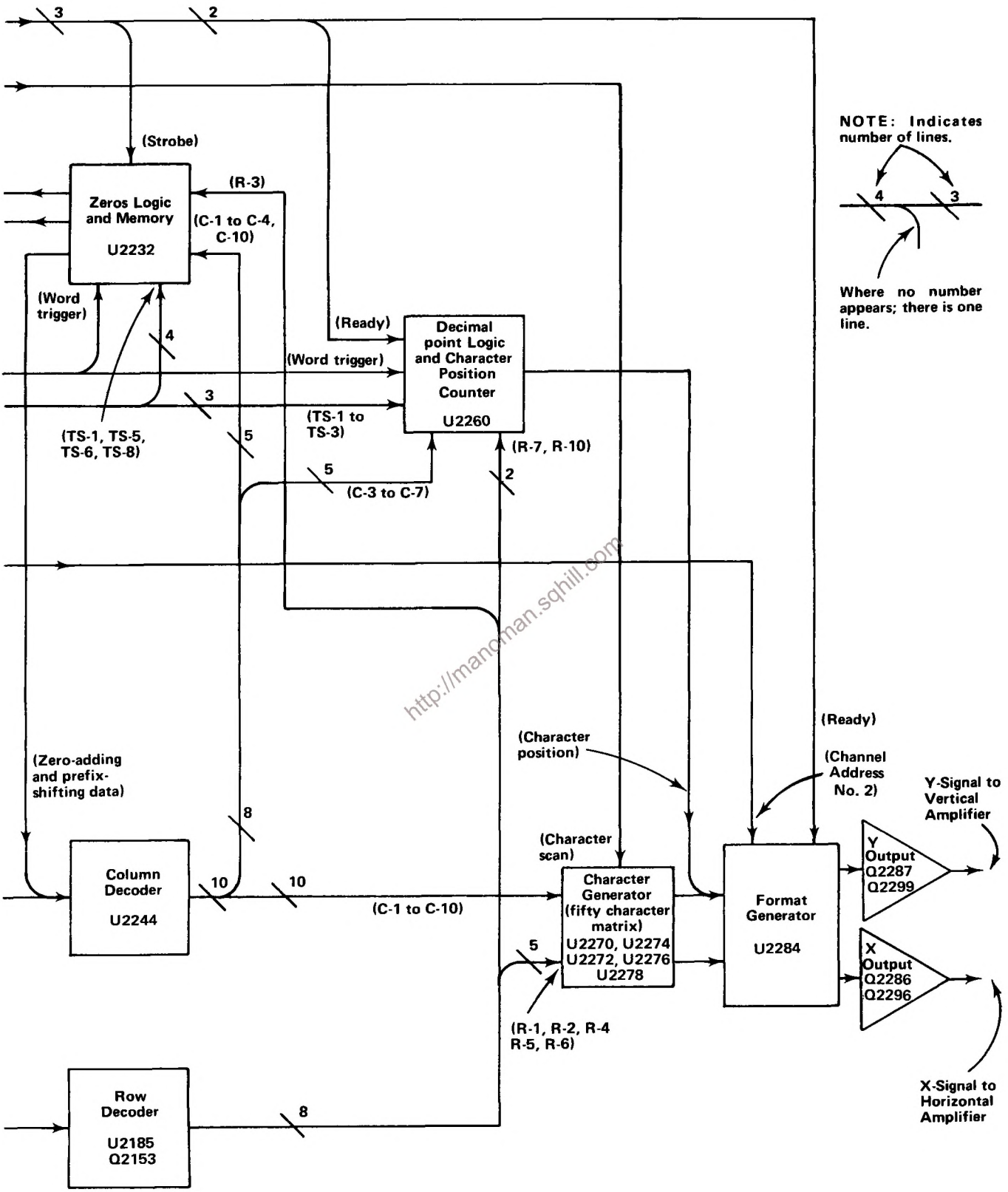
Timer U2126 establishes the timing sequence for all circuits within the Readout System This stage produces seven time-related output waveforms (see Fig. 4-28). The triangle waveform produced at pin 6 forms the basis for the remaining signals. The basic period of this triangle waveform is about 250 microseconds as controlled by RC network C1214-R1214. The triangle waveform is clipped and amplified by U1210 to form the trapezoidal output signal at pin 10. The amplitude of this output signal is exactly 15 volts as determined by V2126 (exact amplitude necessary to accurately encode data in plug-in units; see Encoding the Data). The Trigger output at pin 5 provides the switching signal for the Time-Slot Counter and Word Trigger stages.

The signals at pins 12, 13, 14, and 16 are produced only when the triangle waveform is on its negative slope and the trapezoidal waveform has reached the lower level. The timing sequence of these waveforms is very important to the correct operation of the Readout System (see expanded waveforms in Fig. 4-29). The Z-Axis Logic OFF Command at pin 14 is produced first. This negative-going signal provides a blanking pulse to the Z-Axis Logic stage (see diagram 2) to blank the CRT before the display is switched to the Readout System. It also produces the Strobe pulse through R2137, Q2138, and CR2142 to signal other stages within the Readout System to begin the sequence necessary



http://manoman.sqhill.com

Fig. 4-27. Detailed block diagram of Readout System.



http://manoman.sqhill.com

Fig. 4-27. Detailed block diagram of Readout System (cont).

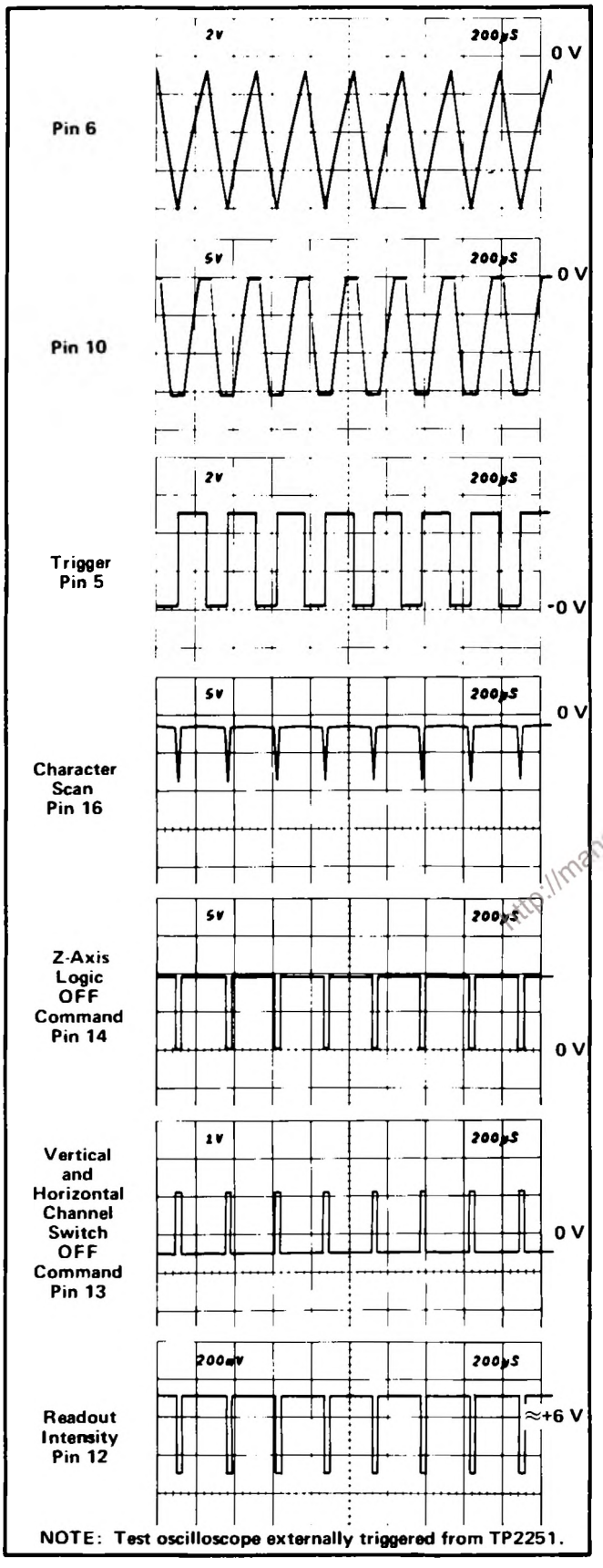


Fig. 4-28. Output waveforms of Timer stage.

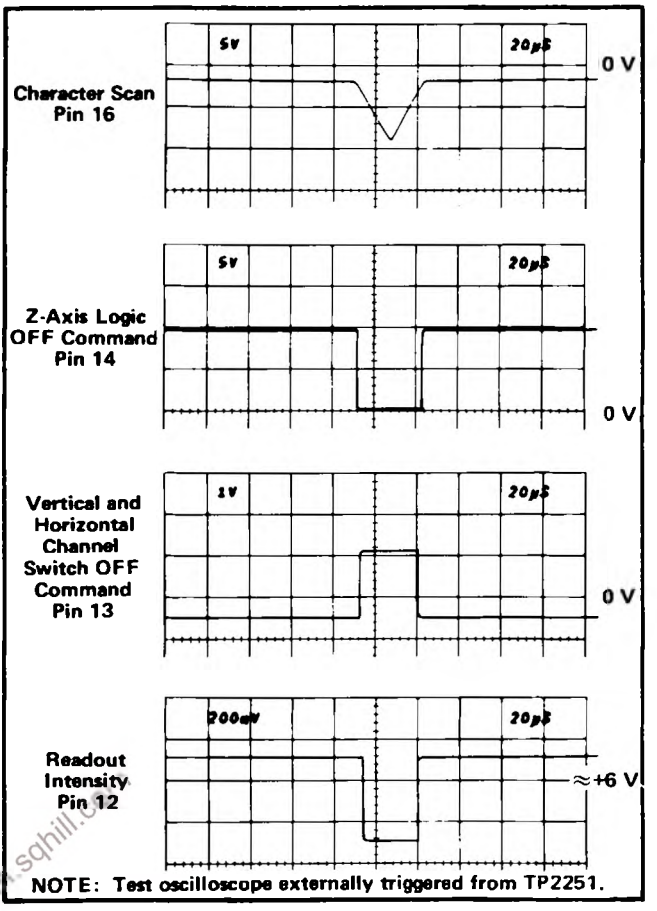


Fig. 4-29. Detail of outputs at pins 12, 13, 14, and 16 of U2126.

to produce a character. The collector of Q2138 is also connected to Character Generator No. 2, U2272 through C2140, CR2140. This activated U2272 during the quiescent period of the Strobe pulse (collector of Q2138 negative) and diverts the output current of Row Decoder U2185 to row 2. The purpose of this configuration is to prevent the Zeros Logic and Memory stage U2232 from storing incorrect data during the quiescent period of the Strobe pulse. When the Strobe pulse goes positive, CR2140 is reverse biased to disconnect Q2138 from U2272 and allow the Row Decoder stage to operate in the normal manner.

The next signal to be produced is the Vertical/Horizontal Channel Switch OFF Command at pin 13. This positive-going signal disconnects the plug-in signals in the vertical and horizontal deflection systems so the plug-in units do not control the position of the CRT beam during the readout display. The Ready signal derived from this output is connected to the Decimal Point Logic and Character Position Counter stage and the Format Generator stage (see diagram 10). The Readout Intensity output at pin 12 is produced next. This current is connected to the CRT Circuit to unblank the CRT to the intensity level determined by READOUT intensity control R2124. The Character Scan ramp at pin 16 started to go negative as this

http://manomax.sqhill.com

timing sequence began. However, character-generation does not start until the readout intensity level has been established. The triangular Character Scan ramp runs negatively from about −2 volts to about −8.5 volts and then returns back to the original level. This waveform provides the scanning signal for the Character Generator stages (see diagram 10). The Full Character Scan adjustment R2128 sets the DC level of the Character Scan ramp to provide complete characters on the display.

The Timer stage operates in one of two modes as controlled by the Display-Skip level at pin 4. The basic mode just described is a condition which does not occur unless all ten characters of each word (60 characters total) are displayed on the CRT. Under typical conditions only a few characters are displayed in each word. The Display-Skip level at pin 4 determines the period of the Timer output signal. When a character is to be generated, pin 4 is LO and the circuit operates as just described. However, when a character is not to be displayed, a HI level is applied to pin 4 of U2126 through CR2125 from the Display-Skip Generator stage. This signal causes the Timer to shorten its period of operation to about 210 microseconds. The waveforms shown in Fig. 4-30 show the operation of the Timer stage when the Display-Skip condition occurs for all positions in a word. Notice that there is no output at pin 12, 13, 14, and 16 under this condition. This means that the CRT display is not interrupted to display characters. Also notice that the triangle waveform at pin 6 does not go as far negative and that the negative portion of the trapezoidal waveform at pin 10 is shorter. Complete details on operation of the Display-Skip Generator are given later.

The Single-Shot Lockout level at pin 2 determines the operating mode of U2126. If this level is LO, the Timer operates as just described. However, if the Single-Shot Lockout stage sets a HI level at this pin, the Timer stage is locked out and can not produce any output signals (see Single-Shot Lockout description for further information).

The READOUT intensity control R2124 sets the intensity of the readout display independently of the INTENSITY control. The READOUT intensity control also provides a means of turning the Readout System off when a readout display is not desired. When R2124 is turned fully counterclockwise, switch S102 opens. The current to pin 11 of U2126 is interrupted and at the same time a positive voltage is applied to pin 4 through R2122 and CR2124. This positive voltage switches the stage to the same conditions as were present under the Display-Skip condition. Therefore, the CRT display is not interrupted to present characters. However, time-slot pulse continue to be generated.

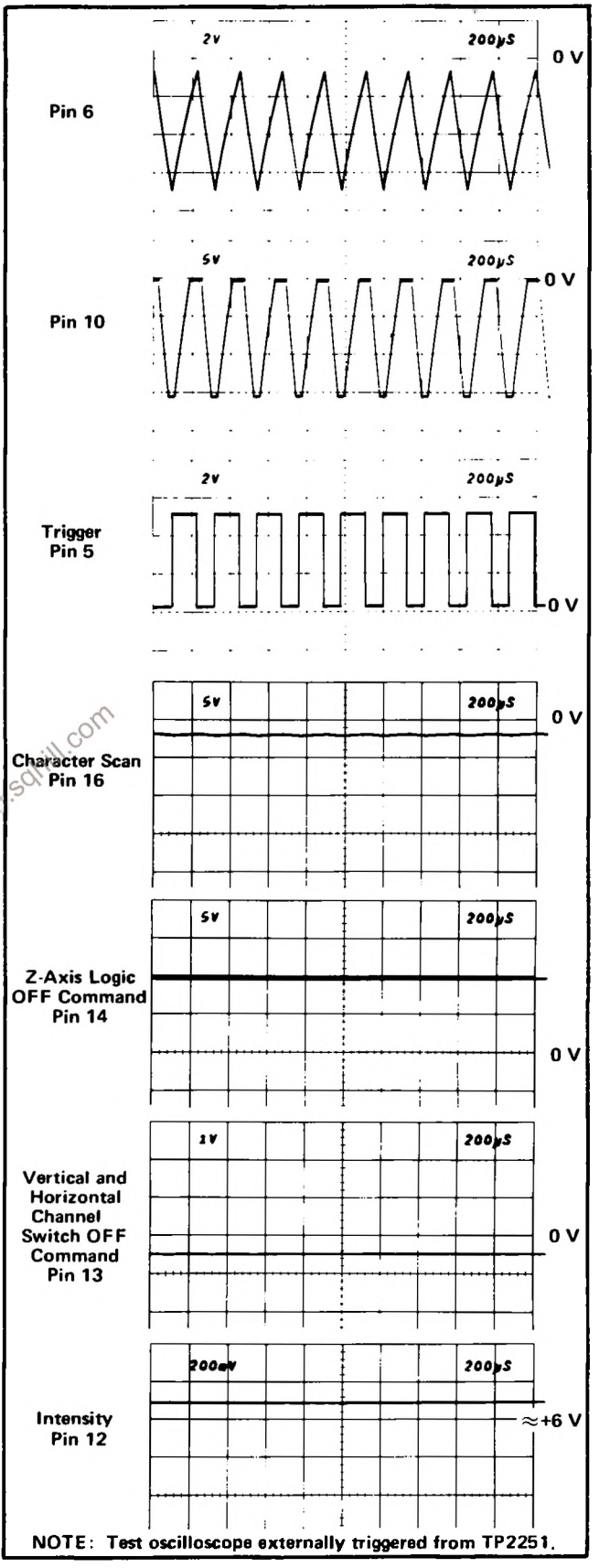


Fig. 4-30. Timer stage operation when Display-Skip condition occurs.

Time-Slot Counter

Time-Slot Counter U2126 is a sequential switch which directs the trapezoidal waveform input at pin 8 to one of its 10 output lines. These time-slot pulses are used to interrogate the plug-in units to obtain data for the Readout System. The Trigger pulse at pin 15 switches the Time-Slot Counter to the next output line; the output signal is sequenced consecutively from time-slot 1 through time-slot 10. Fig. 4-31 shows the time-relationship of the time-slot pulses. Notice that only one of the lines carries a time-slot pulse at any given time. When time-slot 10 is completed, a negative-going End-of-Word pulse is produced at pin 2. The End-of-Word pulse provides a drive pulse for the Word Trigger stage and also provides an enabling level to the Display-Skip Generator during time-slot 1 only.

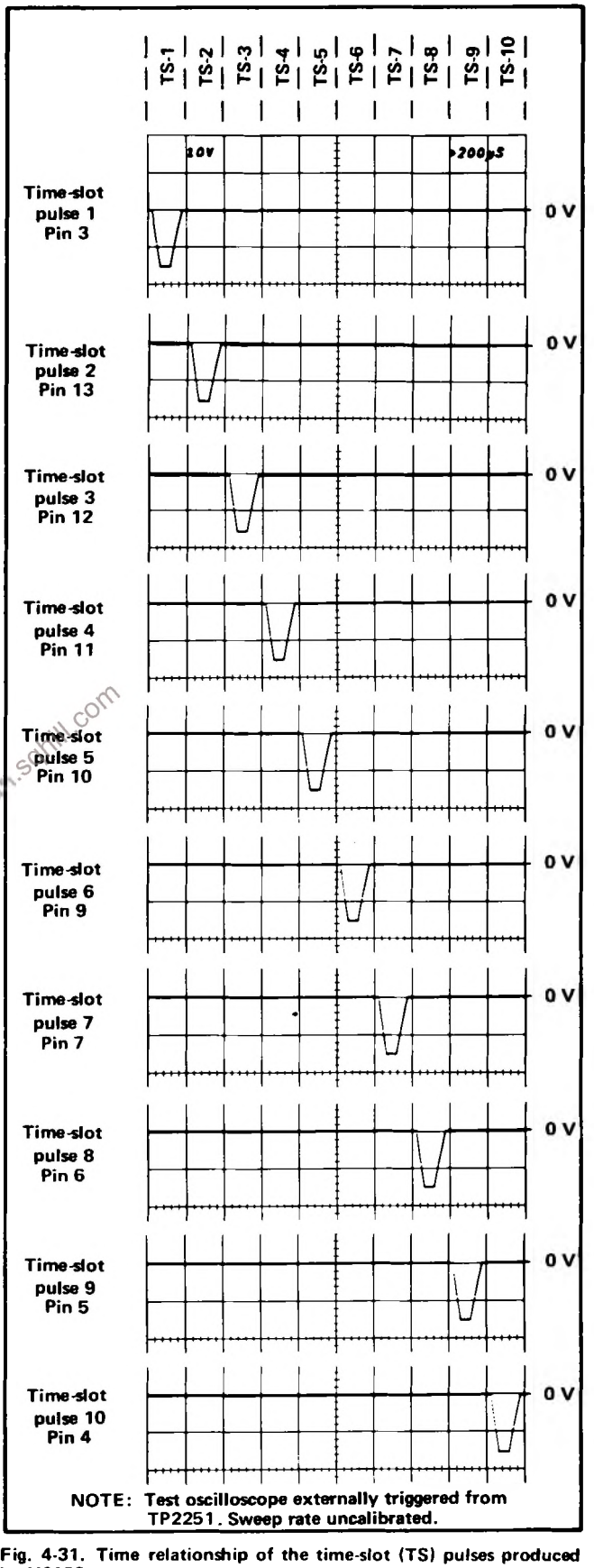
Pin 16 is a reset input for the Time-Slot Counter. When this pin is held LO, the Time-Slot Counter resets to time-slot 1. The Time-Slot Counter can be reset in this manner only when a Jump signal is received by U2155C (see following discussion).

Word Trigger

The Word Trigger stage is made up of the 4 two-input NOR gates contained in U2155. Quiescently, pin 2 of U2155A is LO as established by the operating conditions of U2155D and U2155C. Therefore, the LO End-of-Word pulse produced by the Time-Slot Counter results in a HI level at pin 1 of U2155A. This level is inverted by U2155B to provide a negative-going advance pulse to the Channel Counter.

An advance pulse is also produced by U2155A when a Jump signal is received at pin 8 of U2155C. This condition can occur during any time-slot (see Row Decoder for further information on origin of the Jump signal). U2155D and U2155C are connected as a bistable flip-flop. The positive-going Jump signal at pin 8 of U2155C produces a LO at pin 10. This LO is inverted by U2155D to produce a HI at pin 13, which allows pin 9 of U2155C to be pulled HI through R2155. The flip-flop has now been set and it remains in this condition until reset, even though the Jump signal at pin 8 returns to its LO level. The HI output level at pin 13 turns on Q2159 through R2158 to pull pin 16 of the Time-Slot Counter LO. This resets the Time-Slot Counter to time-slot 1 and holds it there until U2155C is reset. At the same time, a HI level is applied to pin 4 of the Timer through CR2125 and CR2124. This HI level causes the Timer to operate in the display-skip mode so that a character is not generated.

The next Trigger pulse is not recognized by the Time-Slot Counter since U2159 is locked in time-slot 1 by U2155. However, this Trigger pulse resets the Word Trigger



NOTE: Test oscilloscope externally triggered from TP2251. Sweep rate uncalibrated.

Fig. 4-31. Time relationship of the time-slot (TS) pulses produced by U2126.

stage through C2155. Pin 13 of U2155D goes LO to enable the Time-Slot Counter and Timer stages for the next time-slot pulse. At the same time, the negative-going edge produced at U2155D switches output states which is connected to pin 3 of U2155D. This results in a negative-going Word Trigger output at pin 4 of U2155B to advance the Channel Counter to the next word. When the next Trigger pulse is received at pin 15, the Time-Slot Counter returns to the normal sequence of operation and produces an output on the time-slot 1 line.

Channel Counter

The Channel Counter, made up of integrated circuit U2250 is a binary counter which produces the Channel Address code for the Column and Row Decoder stages and the Format Generator stage. This code instructs these stages to sequentially select and display the six channels of data from the plug-in units. The input channel which is displayed with each combination of the Channel Address code is given in the discussion of the applicable stages.

Single-Shot Lockout

Q2108, Q2117, and U2120 makes up the Single-Shot Lockout stage. This stage allows a single readout frame (Six complete words) to be displayed on the CRT, after which the Readout System is locked out so further readout displays are not presented until the circuit is reset. U2120C and U2120B are connected to form a bistable flip-flop. For normal operation, pin 3 of U2120 is pulled HI through R2108. This activates U2120C to result in a LO output level at pin 10. This level enables the Timer stage so it can operate in the free-running manner as described previously. The LO at pin 10 of U2120C is also applied to pin 5 of U2120B. Since pin 6 of U2120A is LO, U2120B is disabled and its output goes HI.

The output of this stage remains LO to allow U2126 to operate in the free-running mode until a LO is received at pin 8 of U2120C. When this occurs, the output level at pin 10 of U2120C does not change immediately. However, the Readout System is now enabled as far as the single-shot lockout function is concerned. If the Channel Counter has not completed word six (Channel 2 of the Horizontal unit), the Readout System continues to operate in the normal manner. However, when word six is completed, a positive-going End-of-Frame pulse is produced at pin 9 of U2120B as the Channel Counter shifts to the code necessary to display word one. This pulse is coupled to pin 3 of U2120A and pin 12 of U2120D. The momentary HI at pin 3 activates U2120B and its output goes LO to disable U2120C (pin 3 already LO). The output of U2120C goes HI to disable the Timer so it operates in the display-skip mode. The HI at pin 10 of U2120C also holds U2120B enabled so it maintains control of the flip-flop.

The Single-Shot Lockout stage remains in this condition until a positive-going trigger pulse is applied to pin 8 of U2120C. This trigger pulse produces a LO at pin 10 of U2120C which enables U2120B and disables U2120C. Now, the Timer can operate in the normal manner for another complete frame. When word six is completed, the Channel Counter produces another End-of-Frame pulse to again lock out the Timer stage.

Encoding the Data

Data is conveyed from the plug-in units to the Readout System in the form of an analog code having up to 11 current levels (from zero to one milliampere in 100 microampere steps). The characters which can be selected by the encoded data are shown on the Character Selection Matrix (see Fig. 4-25). Each character requires two currents to define it; these currents are identified as the column current and the row current which correspond to the column and row of the matrix. The column and row data is encoded by resistive programming in the plug-in units. Fig. 4-32 shows a typical encoding scheme for a voltage-sensing amplifier plug-in unit. Notice that the 10 time-slot (TS) pulses produced by the Time-Slot Counter stage are connected to the plug-in unit. However, time-slots 5, 6, 7, and 10 are not used by the plug-in unit to encode data when using the Standard Readout Format (see Table 4-2 for Standard Readout Format). The amplitude of the time-slot pulses is exactly −15 volts as determined by the Timer stage. Therefore, the resultant output current from the plug-in units can be accurately controlled by the programming resistors in the plug-in units.

For example, in Fig. 4-32, resistors R10 through R90 control the row analog data which is connected back to the Readout System. These resistors are of fixed value and define the format in which the information will be presented by the Readout System. Fig. 4-33A shows an idealized output current waveform of row analog data which results from the 10 time-slot pulses. Each of the steps of current shown in these waveforms corresponds to 100 microamperes of current. The row numbers on the left-hand side of the waveform correspond to the rows in the Character Selection Matrix shown in Fig. 4-35. The row analog data is connected back to the Readout System via terminal B37 of the plug-in interface.

The Column analog data is defined by resistors R110 through R190. The program resistors are connected to the time-slot lines by switch closures to encode the desired data. The data as encoded by the circuit shown in Fig. 4-32 indicates a 100 microvolt sensitivity with the display inverted and calibrated vertical deflection factors. This results in the idealized output current waveforms shown in Fig. 4-33B at the column analog data output, terminal A37 of the plug-in interface. Resistor R111, connected between time-slot 1 and the column analog data output, encodes two units of current during time-slot 1. Referring to the

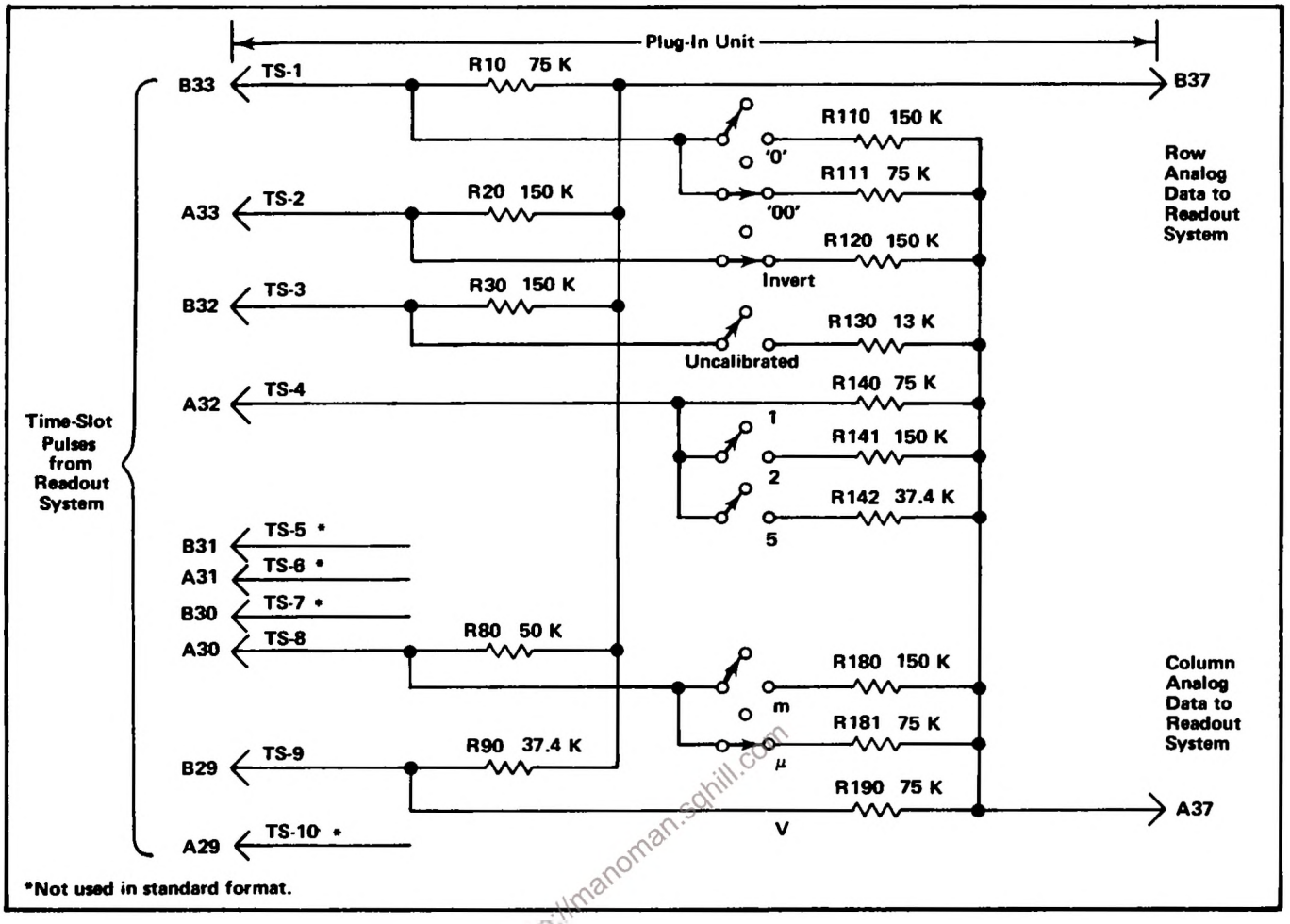


Fig. 4-32. Typical encoding scheme for voltage-sensing amplifier plug-in unit. Coding shown for deflection factor of 100 microvolts.

Character Selection Matrix, two units of column current along with the two units of row current encoded by R10 (row 3) indicates that two zeros should be added to the display. Resistor R120 adds one unit of column current during time-slot 2 and along with the one unit of current from the row output, the Readout System is instructed to add an invert arrow to the display. R130 is not connected to the time-slot 3 line since the vertical deflection factors are calibrated. Therefore, there is no column current output during this time-slot and there is no display on the CRT (see Display-Skip Generator for further information). During time-slot 4, two units of column current are encoded by R140. There is no row current encoded during this time-slot and this results in the numeral 1 being displayed on the CRT. Neither row nor column analog data is encoded during time-slots 5, 6, and 7 as defined by the Standard Readout Format. During time-slot 8, two units of column current and three units of row current are encoded by resistors R181 and R80 respectively. This addresses the μ prefix in the Character Selection Matrix. The final data output is provided from time-slot 9 by R190 connected to the column output and R90 to the row output. These resistors encode three units of column current and four units of row current to cause a V (volts) to be displayed. Time-slot 10 is not encoded in accordance with the Standard Readout Format. The resultant CRT readout will be ↓ 100 μV.

In the above example, the row analog data was programmed to define which row of the Character Selection Matrix was addressed to obtain information in each time-slot. The column data changes to encode the applicable readout data as the operating conditions change. For example, if the variable control of the plug-in unit was activated, R130 would be connected between time-slot 3 and the column analog data output lines. This encodes 10 units of column current (see shaded area in time-slot 3 of the waveform shown in Fig. 4-33B). Since one unit of row current is also encoded during this time-slot by R30, a > symbol is added to the display. The CRT readout will now say ↓ >100 μV. In a similar manner, the other switches can change the encoded data for the column output and thereby change the readout display. See the descriptions which follow for decoding this information.

The column analog data encoded by the plug-in can be modified by attenuator probes connected to the input

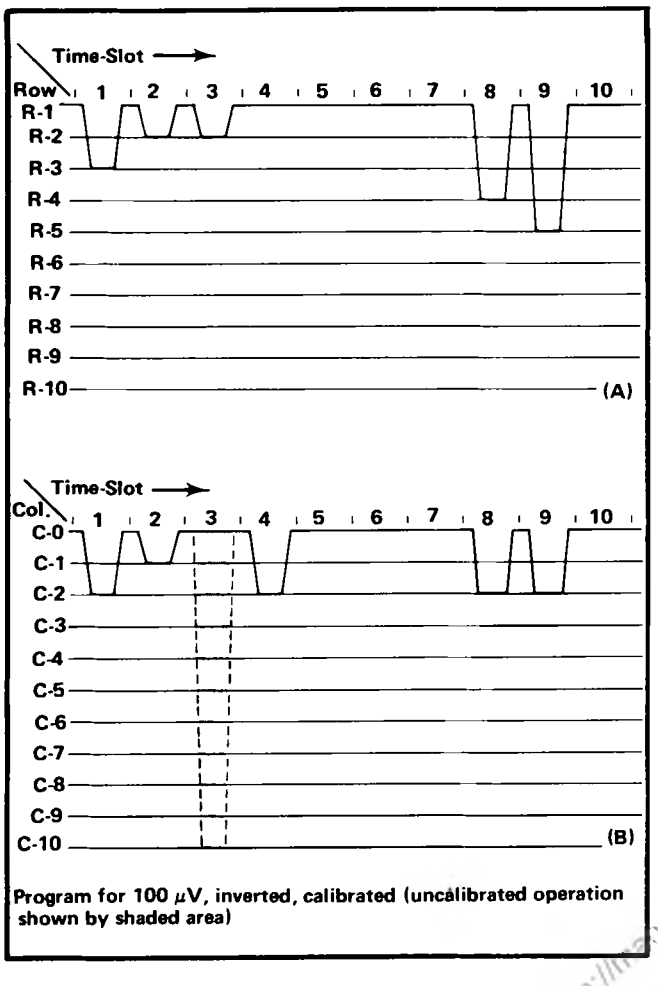


Fig. 4-33. Idealized current waveforms of: (A) Row analog data, (B) Column analog data.

connectors of vertical plug-in units. A special coding ring around the input connector of the plug-in unit senses the attenuation ratio of the probe (with readout-coded probes only). The probe contains a resistor which results in additional column current. For example, if a 10X attenuator probe is connected to a plug-in with the coding for 100 microvolts as shown in Fig. 4-32, an additional unit of current is added to the column analog data during time-slot 1. Since two units of current were encoded by R111 (see Fig. 4-32), this additional current results in a total of three units of column analog current during this time-slot. Referring to the Character Selection Matrix, three units of column current along with the two units of row current encoded by R10 indicates that the prefix should be reduced. Since this instruction occurs in the same time-slot which previously indicated that two zeros should be added to the display and only one instruction can be encoded during a time-slot, the zeros do not appear in the display. The CRT readout will now be changed to 1 mV (readout) program produced by plug-in same as for previous example.

Likewise, if a 100X readout-coded probe is connected to the input of the plug-in unit, the column current during time-slot 1 will be increased two units for a total of four units of column current. This addresses an instruction in the Character Selection Matrix which reduces the prefix and adds one zero to the display. The resultant CRT readout with the previous program is 10 mV.

Three other lines of information are connected from the plug-in compartments to the Readout System. The column and row analog data from channel 2 of a dual-channel plug-in are connected to the Readout System through terminals A38 and B38 of the plug-in interface, respectively. Force readout information is encoded on terminal A35; function of this input is described under Column and Row Data Switches.

The preceding information gave a typical example of encoding data from an amplifier plug-in unit. Specific encoding data and circuitry is shown in the individual plug-in unit manual.

Column and Row Data Switches

The readout data from the plug-in units is connected to the Column and Row Data Switch stages in the Readout System. A column-data line and a row-data line convey analog data from each of the eight data sources (two channels from each of the four plug-in compartments).

TABLE 4-3

Channel Address

Pin 1 U2232 "Identify" Command	Pin 11 U2250	Pin 8 U2250	Pin 9 U2250	Channel Selected
HI	HI	HI	HI	Channel 1 Left Vertical
HI	HI	HI	LO	Channel 2 Left Vertical
HI	HI	LO	HI	Channel 1 Right Vertical
HI	HI	LO	LO	Channel 2 Right Vertical
HI	LO	HI	HI	Channel 1 Horizontal
HI	LO	HI	LO	Channel 2 Horizontal

The Column Data Switch U2190 and the Row Data Switch U2180 receive the Channel Address No. 1 code from the Channel Counter. This binary code directs the Column Data Switch and the Row Data Switch as to which channel should be the source of the readout data. Table 4-3

gives the eight combinations of the Channel Address No. 1 code and the resultant channel which is selected with each combination. These stages have nine inputs and provide a single time-multiplexed output at pin 7 which includes the information from all of the input channels. Eight of the nine inputs to each stage originate in the plug-in units; the ninth input comes from a special data-encoding network composed of resistors R2201 through R2209 and R2191 through R2199 (see Zeros Logic and Memory description for further information on ninth channel).

In addition to the data inputs from the plug-in units, channel-inhibit inputs are provided from each of the plug-in units. The channel inhibit lines are LO only when the associated plug-in unit has been selected for display. When a plug-in unit is not selected, the respective line is HI which forward biases the associated diode CR2162, CR2163, CR2167, CR2166, CR2171, CR2170, CR2175, or CR1174 to by-pass the encoded data from this plug-in. However, since it may be desired to display information from special-purpose plug-ins even though they do not produce a normal waveform display on the CRT, a feature is provided to over-ride the channel inhibit. This is done by applying a LO to the associated forcing over-ride input. The LO level diverts the HI channel inhibit current and allows the data from this plug-in unit to reach the Column Data Switch, even though it has not been selected for display by the mode switches.

Display-Skip Generator

The Display-Skip Generator, Q2215, Q2223, Q2229, and Q2225 monitors the time-multiplexed column data at the output of the Column Data Switch during each time-slot to determine if the information at this point is valid data which should result in a CRT display. The voltage at the base of Q2215B is set by divider R2219, R2220, and R2221. Quiescently, there is about 100 microamperes of current flowing through R2213 and R2214 from Q2240 and the Zeros Logic and Memory stage (purpose of this quiescent current will be discussed in connection with the Zeros Logic and Memory stage). This current biases Q2215A so its base is about 0.2 volt more positive than the base of Q2215B in the absence of column data. Therefore, since Q2215A and Q2215B are connected as a comparator, Q2215A will remain on unless its base is pulled more negative than the base of Q2215B. The analog data output from the Column Data Switch produces a 0.5 volt change at the base of Q2215A for each unit of column current that has been encoded by the plug-in unit. Therefore, whenever any information appears at the output of the Column Data Switch, the base of Q2215A is pulled more negative than the base of Q2215B resulting in a negative (LO) Display-Skip output to the Timer stage through Q2225. Recall that a LO was necessary at the skip input of the Timer so it could perform the complete sequence necessary to display a character.

Q2223-Q2229 also provide display-skip action. The End-of-Word level connected to their emitters through R2229 is LO only during time-slot 1. This means that Q2223-Q2229 are enabled only during time-slot. These transistors allow the Zeros Logic and Memory stage to generate a display-skip signal during time-slot 1 when information has been stored in memory which is not to be displayed on the CRT (further information given under Zeros Logic and Memory discussion).

Column and Row Decoder

The Column Decoder U2244 and Row Decoder U2185 sense the magnitude of the analog voltages at their inputs and produce a binary output on one of ten lines corresponding to the column or row data which was encoded by the plug-in. These outputs provide the Column Digital Data and Row Digital Data which is used by the Character Generator stages to select the desired character for display on the CRT. The column and row data is also used throughout the Readout System to perform other functions. The input current at pin 9 of the Column Decoder stage is steered to only one of the ten Column Digital Data outputs. The size of the character which will be displayed on the CRT is determined by the value of R2227. When a display-skip signal is present (collector of Q2225 is HI), pin 9 is pulled HI through CR2226. This ensures that no current is connected to the Character Generator stage under this condition. Notice the corresponding input on the Row Decoder. This input is connected to ground and causes only one of the ten row outputs to saturate to ground.

The network at the input of the Row Decoder, made up of Q2153 and its associated components, is a Row 13 detector which produces the Jump command. This row current is encoded by special-purpose plug-ins to cause all or part of a word to be jumped. Whenever row 13 (thirteen units of row current; 1.3 milliamperes) is encoded, the base of Q2153 is pulled negative enough so that this transistor is reverse biased to produce a HI Jump output at its collector. This Jump command is connected to the Word Trigger stage (diagram 10) to advance the Channel Counter stage to the next word and to reset the Time-Slot Counter to time-slot 1.

Zeros Logic and Memory

The Zeros Logic and Memory stage U2232 stores data encoded by the plug-in units to provide zeros-adding and prefix-shifting logic for the Readout System. The Strobe pulse at pin 15 goes positive when the data has stabilized and can be inspected. This activates the Zeros Logic and Memory stage so it can store the encoded data. A block representation of the memory sequence is shown in Fig. 4-34. Typical output waveforms for the five possible input conditions that can occur are shown in Fig. 4-35. When time-slot 1 occurs, a store command is given to all of the

http://manomanuals.com

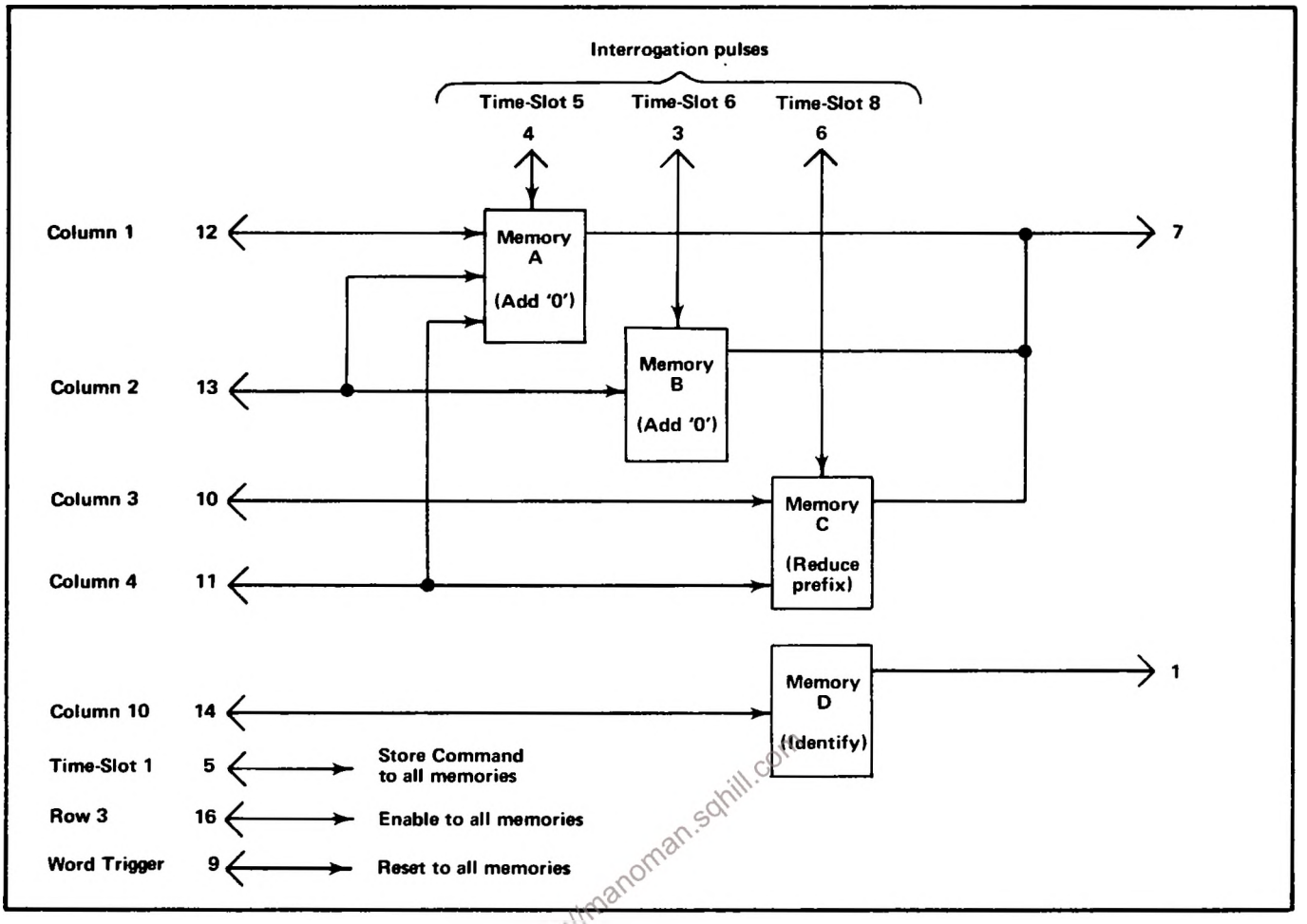


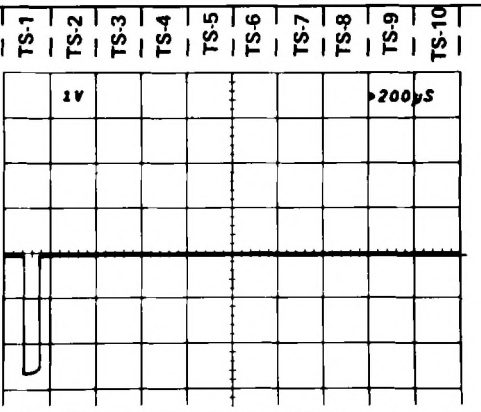
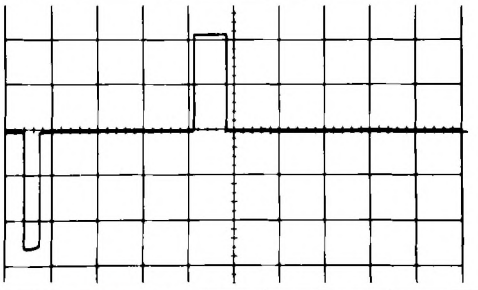
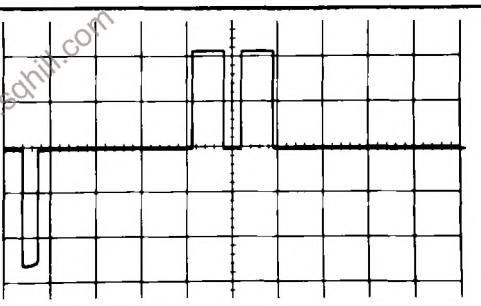
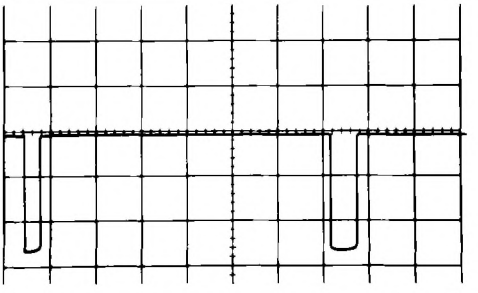
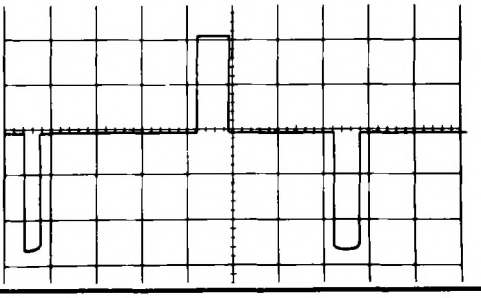
Fig. 4-34. Block representation of memory sequence in U2232.

memories. If the plug-in unit encoded data for column 1, 2, 3, 4, or 10 during time-slot 1, the appropriate memory (or memories) is set. Notice that row 3 information from the Row Decoder must also be present at pin 16 for data to be stored in the memory of U2232. If data was encoded during time-slot 1, a negative-going output is produced at pin 7 as the memories are being set. This negative-going pulse is connected to the base of Q2229 in the Display-Skip Generator to produce a Display-Skip output. Since the information that was encoded during time-slot 1 was only provided to set the memories and was not intended to be displayed on the CRT at this time, the display-skip output prevents a readout display during this time-slot.

During time-slot 5, memory A is interrogated. If information was stored in this memory, a positive-going output is produced at pin 7. This pulse is connected to pin 10 of the Column Decoder through Q2240 to add one unit of current at the input of the Column Decoder. This produces a zero after the character displayed on the CRT during time-slot 4. During time-slot 6, memory B is interrogated to see if another zero should be added. If another zero is necessary, a second positive output is produced at pin 7 which again results in a column 1 output from the Column Decoder and a second zero in the CRT display.

Finally, memory C is interrogated during time-slot 8 to obtain information on whether the prefix should be reduced or left at the value which was encoded. If data has been encoded which calls for a reduction in prefix, a negative-going output level is produced at pin 7. This negative level subtracts one unit of column current from the data at the input to the Column Decoder. Notice on the Character Selection Matrix of Fig. 4-24 that a reduction of one column when row 4 is programmed results in a one unit reduction of the prefix. For example, with the 100 μV program shown in Fig. 4-31, if the data received from the plug-in called for a reduction in prefix, the CRT readout would be changed to 1 mV (zeros deleted by program; see Encoding the Data).

The 100 microamperes of quiescent current through R2213 and R2214 that was provided by Q2240 (see Display-Skip Generator) allows the prefix to be reduced

Input Pins of Zeros Logic & Memory	Command	Time Slot
14	IDENTIFY	 0 V
12	Add one zero	 0 V
13	Add two zeros	 0 V
10	Decrease prefix	 0 V
11	Decrease prefix and add one zero	 0 V

http://manoman.sqhit.com

Fig. 4-35. Typical output waveforms for Zeros Logic and Memory stage operation (at pin 7 of U2232).

from m (100 microamperes column current; column 1) to no prefix (zero column current; column zero) so only the unit of measurement encoded during time-slot 9 is displayed. Notice that reducing the prefix program from column 1 to column 0 programs the Readout System to not display a character at this readout location.

A further feature of the Zeros Logic and Memory is the Identify function. If 10 units of column current are encoded by the plug-in unit along with row 3 during time-slot 1, the Zeros Logic and Memory produces a negative-going output pulse at pin 1 which switches the Column Data Switch and Row Data Switch to the ninth channel. Then, time-slot pulses 2 through 9 encode an output current through resistors R2191-R2199 for column data and R2201-R2209 for row data. This provides the currents necessary to display the word IDENTIFY on the CRT in the word position allotted to the channel which originated the Identify command. After completion of this word, the Column Data Switch and Row Data Switch continue with the next word in the sequence.

The Word Trigger signal from the Word Trigger stage is connected to pin 9 of U2232 through C2242. At the end of each word of readout information, this pulse goes LO. This erases the four memories in the Zeros Logic and Memory in preparation for the data to be received from the next channel.

Character Generators

The Character Generator stage consists of five similar integrated circuits U2270, U2272, U2274, U2276, and U2278, which generate the X (horizontal) and Y (vertical) outputs at pins 16 and 1 respectively to produce the character displayed on the CRT. Each integrated circuit can produce 10 individual characters. U2270, which is designated as the "Numerals" Character Generator, can produce the numerals 0 through 9 shown in row 1 of the Character Selection Matrix (Fig. 4-24). U2272 can produce the symbols shown in row 2 of the Character Selection Matrix and U2274 produces the prefixes and some letters of the alphabet which are used as prefixes in row 4. U2276 and U2278 produce the remaining letters of the alphabet shown in rows 5 and 6 of the Character Selection Matrix. All of the stages receive the column digital data from Column Decoder U2244 in parallel. However, only one of the character generators receives row data at a particular time; only the stage which receives both row and column data is activated. For example, if column 2 is encoded by a plug-in unit, the five Character Generators are enabled so that either a 1, < μ, V, or an N can be produced. However, if at the same time row 4 has also been encoded by the plug-in unit, only the Prefix Character Generator U2274 will produce an output to result in a μ displayed on the screen. This integrated circuit provides current outputs to the Format Generator which produce the selected character on the CRT. In a similar manner, any of the 50 characters shown in the Character Selection Matrix can be displayed by correct addressing of the row and column.

Decimal Point Logic and Character Position Counter

The Decimal Point Logic and Character Position Counter stage U2260 performs two functions. The first function is to produce a staircase current which is added to the X (horizontal) signal to space the characters horizontally on the CRT. After each character is generated, the negative-going edge of the Ready signal at pin 5 advances the Character Position Counter. This produces a current step output at pin 3 which, when added to the X signal, causes the next character to be produced one character space to the right. This stage can also be advanced when a Space instruction is encoded by the plug-in unit so that a space is left between the displayed characters on the CRT. Row 10 information from the Row Decoder is connected to pin 4 of U2260 through R2265. When row 10 and column 0 are encoded, the output of this stage advances one step to move the next character another space to the right. However, under this condition, no display is produced on the CRT during this time-slot.

Time-slot pulses 1, 2, and 3 are also connected to pin 4 of U2260 through VR2262, VR2263, and VR2264 respectively and R2262-R2265. This configuration adds a space to the displayed word during time-slots 1, 2, and 3 even if information is not encoded for display during these time-slots. With this feature, the information which is displayed during time-slot 4 (1-2-5 data) always starts in the fourth character position whether data has been displayed in the previous time-slots or not. Therefore, the resultant CRT display does not shift position as normal/invert or cal/uncal information is encoded by the plug-in. The Word Trigger pulse connected to pin 8 of U2260 through C2255 resets the Character Position Counter to the first character position at the end of each word.

The Decimal Point Logic portion of this stage allows decimal points to be added to the CRT display as encoded by the plug-in units. When row 7 is encoded in coincidence with columns 3 through 7 (usually encoded during time-slot 1), a decimal point is placed at one of the five locations on the CRT identified in row 7 of the Character Selection Matrix (Fig. 4-24). This instruction refers to the decimal point location in relation to the total number of characters that can be displayed on the CRT (see Fig. 4-36). For example, if column 3 and row 7 are encoded during time-lost 1, the system is instructed to place a decimal point in location No. 3. As shown in Fig. 4-36, this displays a decimal point before the third character that can be displayed on the CRT (first three time-slots produce a space whether data is encoded or not; see previous paragraph). The simultaneous application of row 7 data to the Y-input

http://manoman.tekmill.com

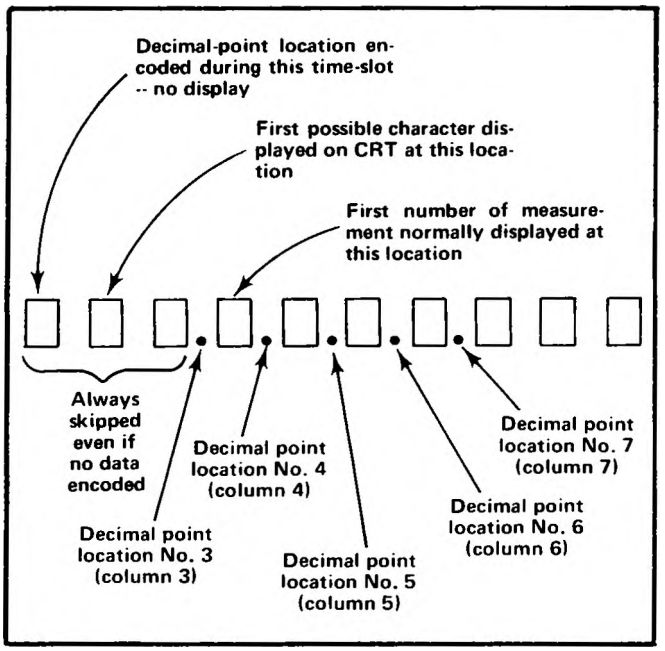


Fig. 4-36. Readout word relating 10 possible character locations to the decimal-point instructions that can be encoded and the resulting display.

of the Format Generator through R2280 raises the decimal point so it appears between the displayed characters.

When decimal-point data is encoded, the CRT is unblanked so a readout display is presented. However, since row 7 does not activate any of the five Character Generators, the CRT beam is not deflected but instead remains in a fixed position to display a decimal point between the characters along the bottom line of the readout word. After the decimal point is produced in the addressed location, the CRT beam returns to the location indicated by the Character Position Counter to produce the remainder of the display.

Format Generator

The X- and Y-deflection signals produced by the Character Generator stage, are connected to pins 2 and 7 respectively of Format Generator U2284. The Channel Address No. 2 code from the Channel Counter is also connected to pins 1, 8, and 15 of this stage. The Channel Address No. 2 code directs the Format Generator to add current to the X and Y signals to deflect the CRT beam to the area of the CRT which is associated with the plug-in channel that originated the information (see Fig. 4-24). The Channel Address No. 2 Code and the resultant word positions are shown in Table 4-4. In addition, the character position current from the Decimal Point Logic and Character Position stage is added to the X (horizontal) input signal to space the characters horizontally on the CRT (see previous discussion). The Ready signal at pin 13 (coincident with Vertical/Horizontal Channel Switch OFF Command) activates this stage when a character is to be displayed on the CRT.

TABLE 4-4

Channel Address

Pin 11 U2250	Pin 8 U2250	Pin 9 U2250	Channel Displayed
LO	LO	LO	Channel 1 Left Vertical
LO	LO	HI	Channel 2 Left Vertical
LO	HI	LO	Channel 1 Right Vertical
LO	HI	HI	Channel 2 Right Vertical
HI	LO	LO	Channel 1 Horizontal
HI	LO	HI	Channel 2 Horizontal

http://manoman.sqhill.com

Y-Output Amplifiers

The Y-output signal at pin 6 of U2284 is connected to the Y-Output Amplifier Q2287-Q2299. This stage provides a low impedance load for the Format Generator while providing isolation between the Readout System and the Vertical Amplifier. Vertical Separation adjustment R2291 changes the gain of this stage to control the vertical separation between the readout words displayed at the top and bottom of the graticule area.

X-Output Amplifier

The X-Output Amplifier Q2286-Q2296 operates similarly to the Y-Output Amplifier to provide the horizontal deflection from the readout signal available at pin 4 of U2284. The gain of this stage is fixed by the values of the resistors in the circuit.

Display Sequence

Fig. 4-37 shows a flow chart for the Readout System. This chart illustrates the sequence of events which occurs in the Readout System each time a character is generated and displayed on the CRT.

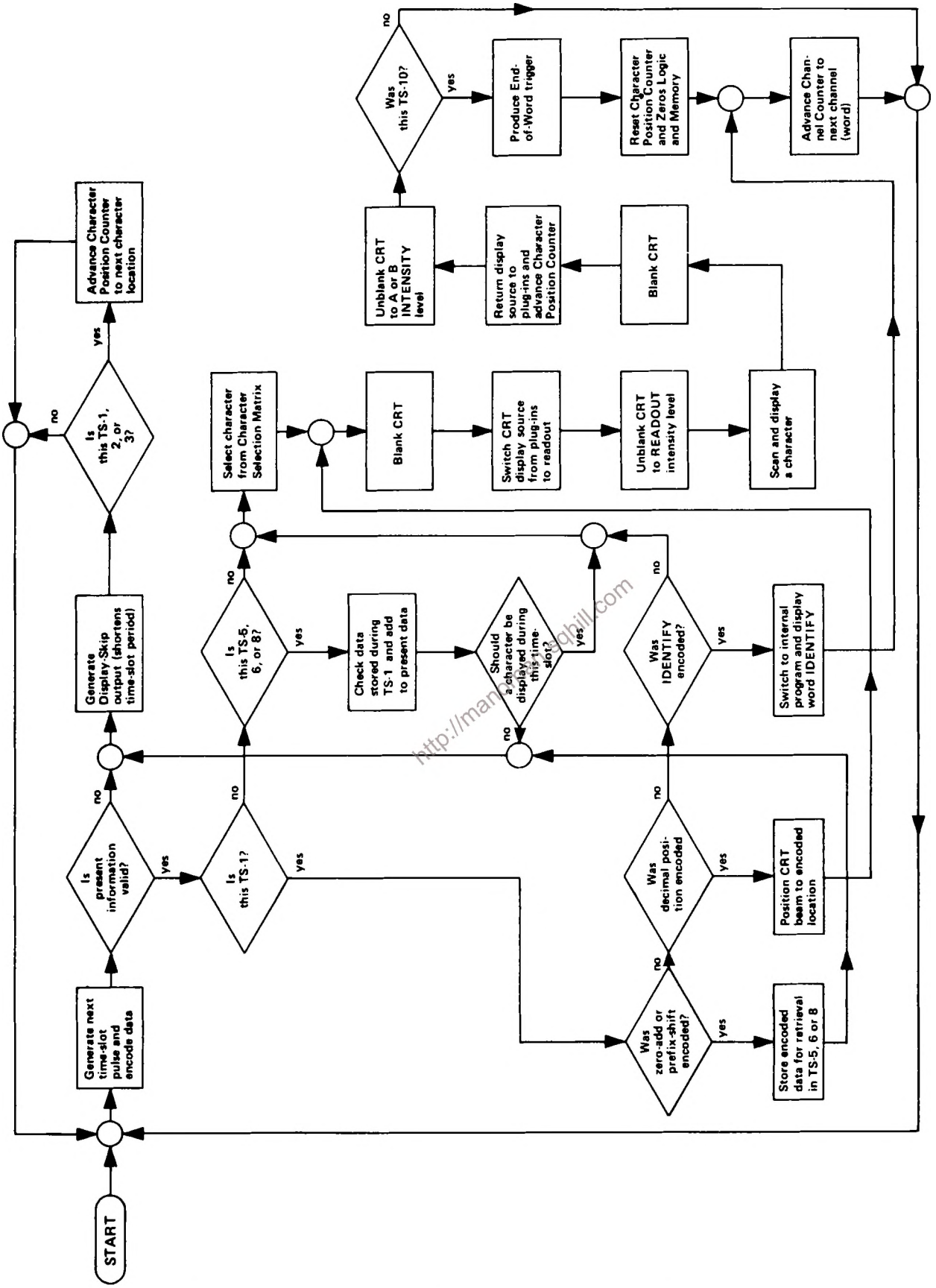


Fig. 4-37. Flow chart of character generation sequence by the Readout System.

MAINTENANCE

This section of the manual contains maintenance information for use in preventive maintenance, corrective maintenance, or troubleshooting of the 7603.

Panel Removal

WARNING

Dangerous potentials 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.

Cabinet Model. The side panels of the 7603 are held in place by spring-action of the panels themselves. To remove the panels, push the panel toward the top of the instrument until the bottom of the panel is clear of the slot along the bottom rail of the instrument. Then, pull the panel out at the bottom and lift away from the instrument. The bottom panel is held in place with eight screws. The panels protect this instrument from dust in the interior, and also provide protection to personnel from the operating potentials present. They also reduce the EMI radiation from this instrument or EMI interference to the display due to other equipment.

Rack Model. The top cover is held in place with six screws. To remove the cover, the screws need only be loosened slightly to slide the cover out of the slots.

A panel on the left side of the instrument, held in place with six screws, allows access to the vertical amplifier circuit board.

A plastic cover on the rear of the instrument, held in place with four screws, allows access to the power supply regulating transistors. It also allows access to three of the five screws holding the regulating circuit board assembly in the instrument.

Power-Unit Removal

The power unit can be slid out of the back of the 7603 to gain access to the Logic and Rectifier circuit boards and for power-unit maintenance. The power unit can be left connected to the rest of the instrument so that it can be operated in this position for troubleshooting. To remove the power unit, use the following procedure:

1. Remove the side panels (top panel for R7603).

2. Remove the five screws which secure the power unit to the sides of the instrument, and the four rear panel screws (see Fig. 5-1 for locations of screws on R7603).

3. Slide the power unit out of the rear of the instrument until it can be set down on the work surface (guide the interconnecting cables so they do not catch on other parts of the instrument).

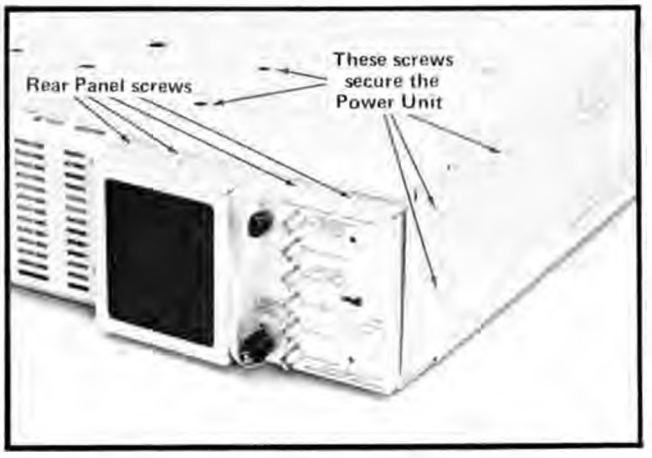


Fig. 5-1. Power unit removal for the R7603.

PREVENTIVE MAINTENANCE

General

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 this instrument. The severity of the environment to which the 7603 is subjected determines the frequency of maintenance. A convenient time to perform preventive maintenance is preceding recalibration of the instrument.

Cleaning

The 7603 should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause overheating and component breakdown. Dirt on components acts as an insulating blanket and prevents efficient heat dissipation. It also provides an electrical conduction path which may result in instrument failure. The side panels provide protection against dust in the interior of the instrument. Operation without the panels in place necessitates more frequent cleaning.

CAUTION

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

Exterior. Loose dust accumulated on the outside of the 7603 can be removed with a soft cloth or small brush. The brush is particularly useful for dislodging dirt on and around the front-panel controls. Dirt which remains can be removed with a soft cloth dampened in a mild detergent and water solution. Abrasive cleaners should not be used.

http://tehomanuals.com

CRT. Clean the plastic light filter, faceplate protector, and the CRT face with a soft, lint-free cloth dampened with denatured alcohol.

The optional CRT mesh filter can be cleaned in the following manner:

1. Hold the mesh filter in a vertical position and brush lightly with a soft No. 7 water-color brush to remove light coatings of dust or lint.

2. Greasy residues or dried-on dirt can be removed with a solution of warm water and a neutral-pH liquid detergent. Use the brush to lightly scrub the filter.

3. Rinse the filter thoroughly in clean water and allow to air dry.

4. If any lint or dirt remains, use clean low-pressure air to remove it. Do not use tweezers or other hard cleaning tools on the filter, as the special finish may be damaged.

5. When not in use, store the mesh filter in a lint-free, dust-proof container such as a plastic bag.

Interior. Dust in the interior of this 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 which 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 or for cleaning ceramic terminal strips and circuit boards.

The high-voltage circuits, particularly parts located in the high-voltage compartment and the area surrounding the post-deflection anode lead, should receive special attention. Excessive dirt in these areas may cause high-voltage arcing and result in improper instrument operation.

Air Filter (For Rackmount Versions only). The air filter should be visually checked every few weeks and cleaned or replaced if dirty. More frequent inspections are required under severe operating conditions. If the filter is to be replaced, order new filters from your local Tektronix Field Office or representative; order by Tektronix Part No. 378-0041-01. The following procedure is suggested for cleaning the filter.

1. Remove the filter by pulling it out of the retaining frame on the rear panel. Be careful not to drop any of the accumulated dirt into the instrument.

2. Flush the loose dirt from the filter with a stream of hot water.

3. Place the filter in a solution of mild detergent and hot water and let soak for several minutes.

4. Squeeze the filter to wash out any dirt which remains.

5. Rinse the filter in clean water and let dry.

6. Coat the dry filter with an air-filter coating (available from air conditioner suppliers or order Tektronix Part No. 006-0580-00).

7. Let the filter thoroughly dry.

8. Re-install the filter in the retaining frame.

Lubrication

The reliability of potentiometers, switches, and other moving parts can be maintained if they are kept properly lubricated. However, over-lubrication is as detrimental as too little lubrication. A lubrication kit containing necessary lubricants and instructions is available from Tektronix, Inc. Order Part No. 003-0342-01.

Visual Inspection

The 7603 should be inspected occasionally for such defects as broken connections, improperly seated semiconductors, damaged or improperly installed 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.

Semiconductor Checks

Periodic checks of the semiconductors in the 7603 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.

Recalibration

To assure accurate measurements, check the calibration of this instrument after each 1000 hours of operation or every six months if used infrequently. In addition, replacement of components may necessitate recalibration of the affected circuits. The calibration procedure can also be helpful in localizing certain troubles in the instrument. In some cases, minor troubles may be revealed and/or corrected by recalibration.

TROUBLESHOOTING

Introduction

The following information is provided to facilitate troubleshooting of the 7603. 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, particularly where integrated circuits are used. See the Circuit Description section for complete information.

Troubleshooting Aids

Diagrams. Complete circuit diagrams are given on fold-out pages in the Diagrams section. The component number and electrical value of each component in this instrument are shown on these diagrams. Each main circuit is assigned a series of component numbers. Table 5-1 lists the main circuits in the 7603 and the series of component numbers assigned to each. Important voltages and waveforms are also shown on the diagrams. The portions of the circuit mounted on circuit boards are enclosed with blue lines.

Circuit Boards. Fig. 5-2 shows the location of the circuit boards within the 7603; Fig. 5-3 shows the location of circuit boards in the R7603. Pictures of these circuit boards are shown in Figs. 8-1 through 8-10. These pictures are located in the Diagrams section on the back of the page opposite the circuit diagram, to aid the cross-referencing between the diagrams and the circuit-board components. Each electrical component on the boards is identified by its circuit number. The color and location of the interconnecting connectors are also shown. The circuit boards are also outlined on the diagrams with a blue line to show which portions of the circuit are located on a circuit board.

TABLE 5-1

Component Numbers

Component numbers on diagrams	Diagram numbers	Circuit
1-49	1	Main Interface
50-199	2	Logic Circuit
300-399	3	Trigger Selector
200-299	3	Vertical Interface
400-499	4	Vertical Amplifier
500-599	5	Horizontal Amplifier
600-699	6	Output Signals
1000-1099	7	Calibrator and Front Panel
1100-1299	8	CRT Circuit and High Voltage
800-999	9	Low Voltage Power Supply
2100-2299	10	Readout System

Wiring Color-Code. All insulated wire and cable used in the 7603 is color-coded to facilitate circuit tracing.

Power Cord Conductor Identification

Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Blue	White
Grounding (Earthing)	Green-Yellow	Green-Yellow

Resistor Color-Code. In addition to the brown composition resistors, some metal-film resistors and some wire-wound resistors are used in the 7603. The resistance values of wire-wound resistors are usually printed on the body of the component. The resistance values of composition resistors and metal-film resistors are color-coded on the components with EIA color-code (some metal-film resistors may have the value printed on the body). The color-code is read starting with the stripe nearest the end of the resistor. Composition resistors have four stripes which consist of two significant figures, a multiplier, and a tolerance value (see Fig. 5-2). Metal-film resistors have five stripes consisting of three significant figures, a multiplier, and a tolerance value.

Capacitor Marking. The capacitance values of common disc capacitors and small electrolytics are marked on the side of the component body. The white ceramic capacitors used in the 7603 are color-coded in picofarads using a modified EIA code (see Fig. 5-4).

http://manoman.sqhill.com

Diode Color-Code. The cathode end of each glass-encased diode is indicated by a stripe, a series of stripes, or a dot. For most silicon or germanium diodes with a series of stripes, the color-code identifies the three significant digits of the TEKTRONIX Part Number using the resistor color-code system (e.g., a diode color-coded pink- or blue-, brown-gray-green indicates TEKTRONIX Part No. 152-0185-00). The cathode and anode ends of metal-encased diodes can be identified by the diode symbol marked on the body.

Semiconductor Lead Configuration. Fig. 5-5 shows the lead configuration for the semiconductors used in this instrument. This view is as seen from the bottom of the semiconductors.

Troubleshooting Equipment

The following equipment is useful for troubleshooting the 7603.

1. Transistor Tester

Description: TEKTRONIX Type 576 Transistor-Curve Tracer or equivalent.

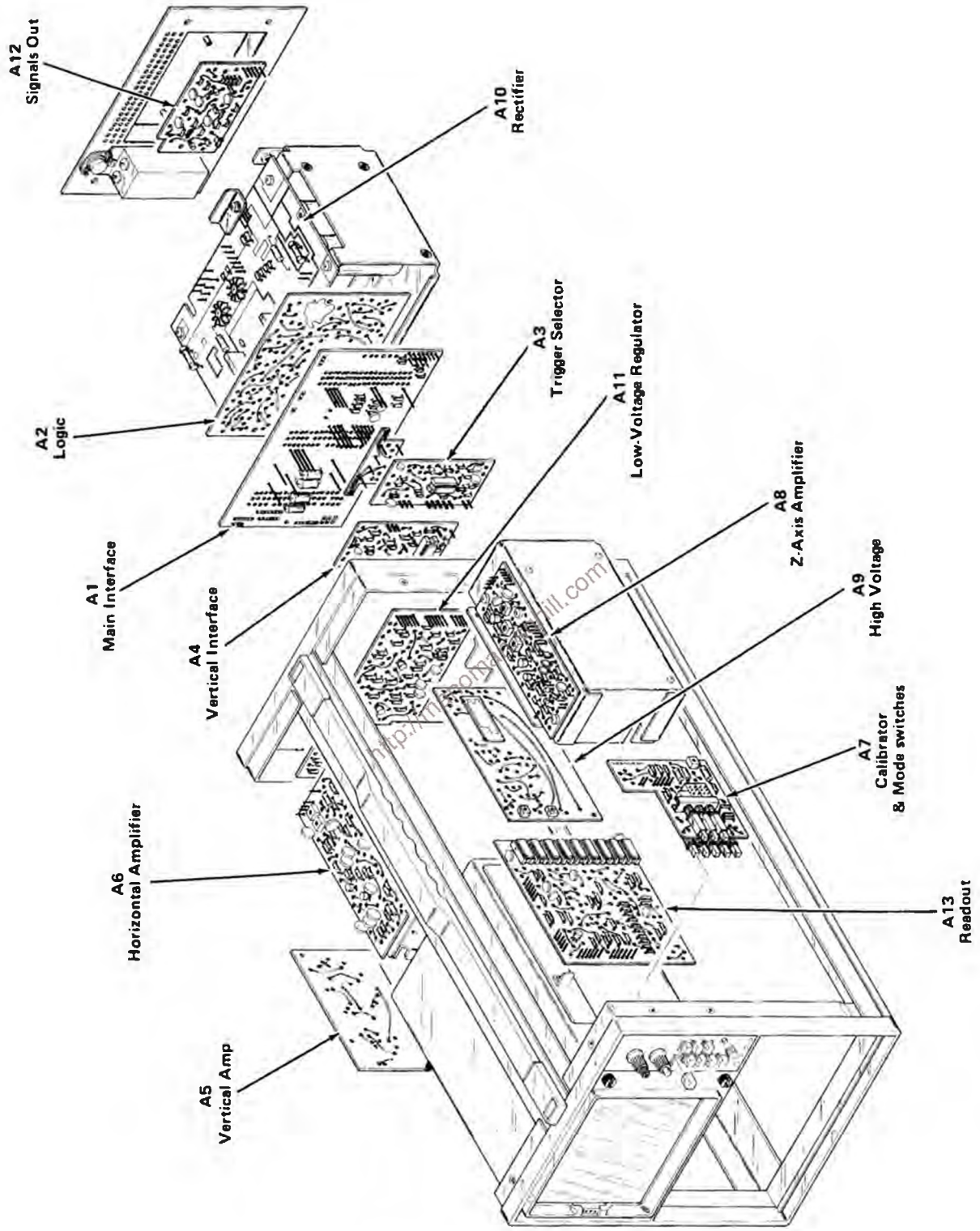


Fig. 5-2. Location of circuit boards in the 7603.

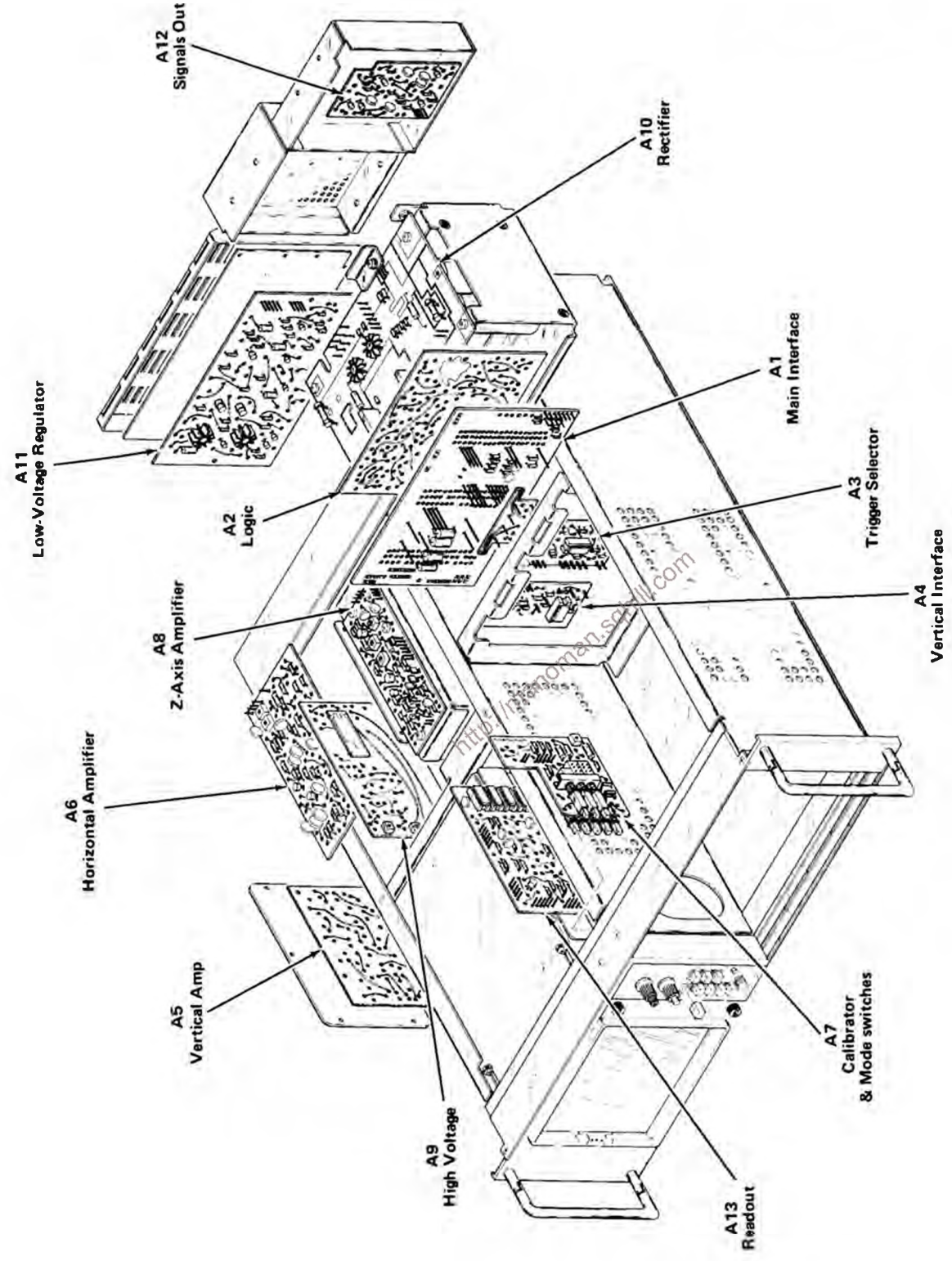
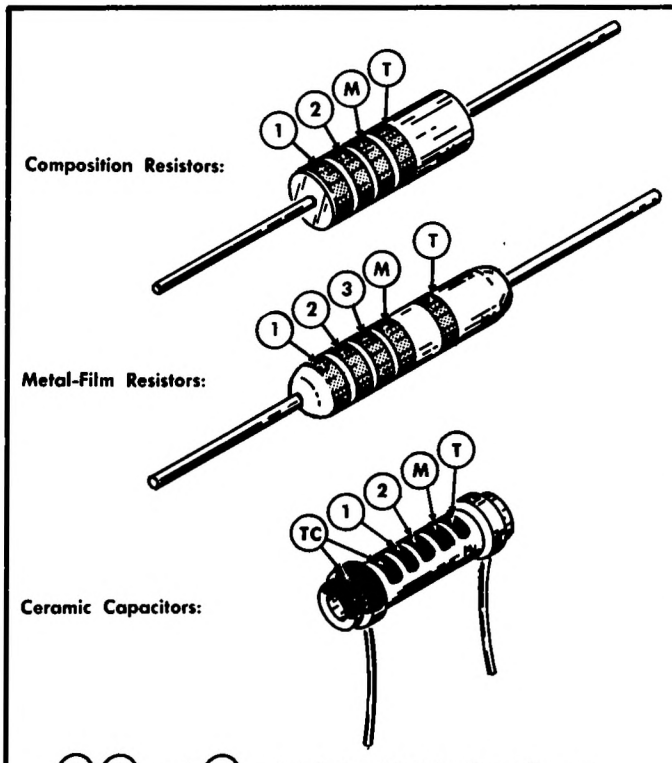


Fig. 5-3. Location of circuit boards in the R7603.



Resistor and Capacitor Color Code

Color	Significant Figures	Multiplier		Tolerance	
		Resistors	Capacitors	Resistors	Capacitors
Silver	---	10^{-2}	---	±10%	---
Gold	---	10^{-1}	---	±5%	---
Black	0	1	1	---	±20% or 2 pF*
Brown	1	10	10	±1%	±1% or 0.1 pF*
Red	2	10^2	10^2	±2%	±2%
Orange	3	10^3	10^3	±3%	±3%
Yellow	4	10^4	10^4	±4%	+100% —0%
Green	5	10^5	10^5	±0.5%	±5% or 0.5 pF*
Blue	6	10^6	10^6	---	---
Violet	7	---	---	---	---
Gray	8	---	10^{-2}	---	+80% —20% or 0.25 pF*
White	9	---	10^{-1}	---	±10% or 1 pF*
(none)	---	---	---	±20%	±10% or 1 pF*

*For capacitance of 10 pF or less.

(1) (2) and (3) —1st, 2nd and 3rd significant figures;
(M) —multiplier; (T) —tolerance;
(TC) —temperature coefficient.

NOTE: (T) and/or (TC) color code for capacitors depends upon manufacturer and capacitor type. May not be present in some cases.

Fig. 5-4. Color code for resistors and ceramic capacitors.

Purpose: To test the semiconductors used in this instrument.

2. Multimeters

Description: Digital voltmeter, 10 megohm input impedance and 0 to 500 volts range; ohmmeter, 0 to 2 megohms. Accuracy, within 1%. Test probes must be insulated to prevent accidental shorting.

Purpose: To check voltages and for general troubleshooting in this instrument.

NOTE

A 20,000 ohms/volt VOM can be used to check the voltages in this instrument if allowances are made for the circuit loading of the VOM at high-impedance points.

3. Test Oscilloscope

Description: Frequency response, DC to 50 megahertz; deflection factor, 50 volts/division. A 10X probe should be used to reduce circuit loading.

Purpose: To check operating waveforms in this instrument.

Troubleshooting Techniques

This troubleshooting procedure is arranged in an order which checks the simple trouble possibilities before proceeding with extensive troubleshooting. The first few checks assure proper connection, operation, and calibration. 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 following the replacement procedures given under corrective maintenance.

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 the Operating Instructions section.

2. Check Associated Equipment. Before proceeding with troubleshooting of the 7603, check that the equipment used with this instrument is operating correctly.

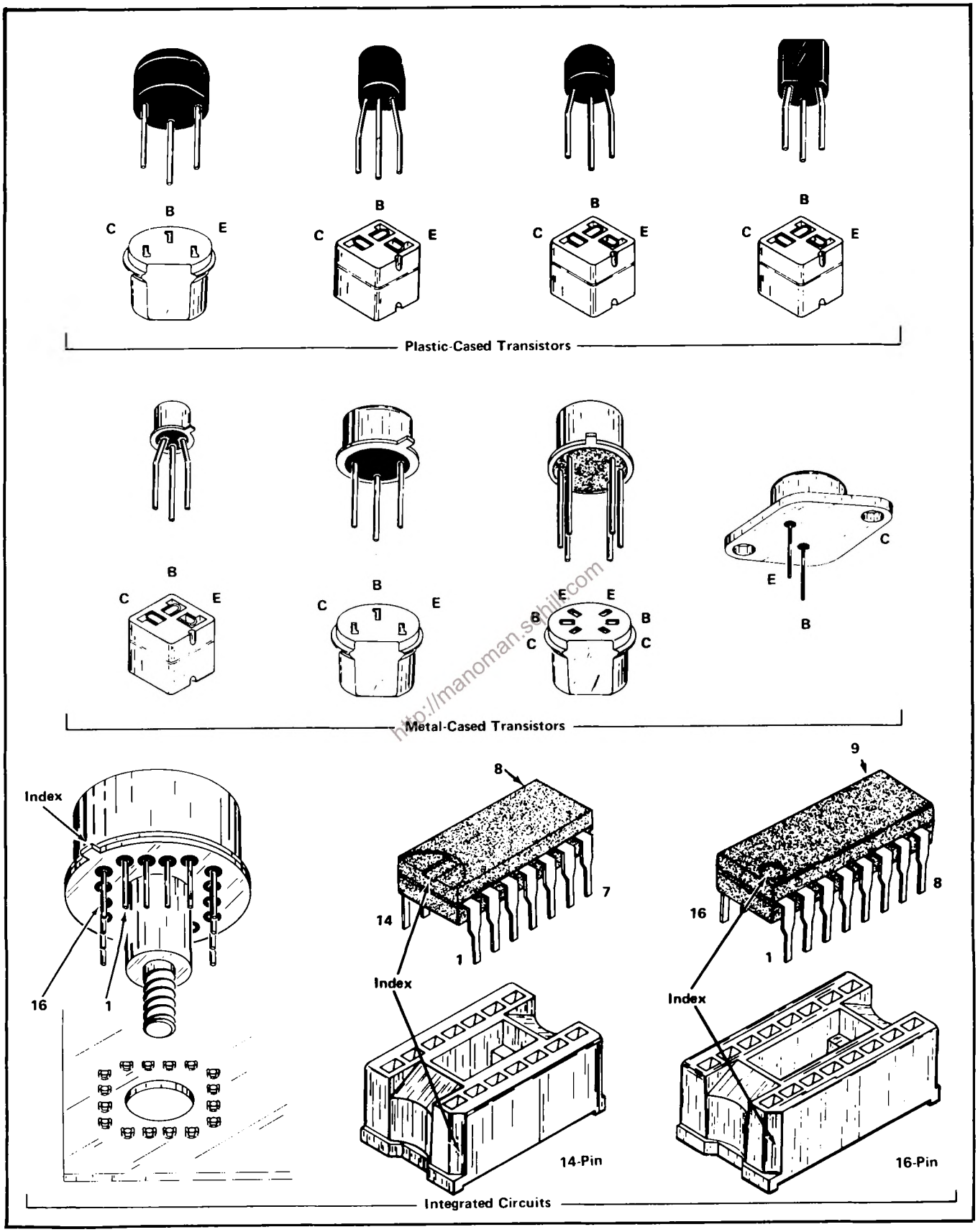


Fig. 5-5. Electrode configuration for semiconductors used in this instrument.

Check that the signal is properly connected and that the interconnecting cables are not defective. Also, check the power source. The associated plug-in units can be checked for proper operation by substituting other units which are known to be operating properly (preferably of the same types). If the trouble persists after substitution, the 7603 is probably at fault.

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

4. Check Instrument Calibration. Check the calibration of this instrument, or the affected circuit if the trouble appears in one circuit. The apparent trouble may only be a result of misadjustment, or may be corrected by calibration. Complete calibration instructions are given in the Calibration section.

5. Isolate Trouble To a Circuit. To isolate trouble to a particular circuit, note the trouble symptom. The symptom often identifies the circuit in which the trouble is located. For example, poor focus indicates that the CRT circuit (includes high-voltage supplies) is probably at fault. When trouble symptoms appear in more than one circuit, check affected circuits by taking voltage and waveform readings. Typical voltages and waveforms are given on the schematics in the Diagrams section.

Incorrect operation of all circuits often indicates trouble in the power supply. Check first for correct voltage of the individual supplies. A defective component elsewhere in the instrument can appear as a power-supply trouble and may also affect the operation of other circuits. Table 5-2 lists the tolerances of the power supplies in this instrument. These voltages are measured between the power-supply test points (see Section 3 for test-point location) and ground. If a power-supply voltage is within the listed tolerance, the supply can be assumed to be working correctly. If outside the tolerance, the supply may be misadjusted or operating incorrectly. Use the procedure given in the Calibration section to adjust the power supplies.

Fig. 5-6 provides a guide for locating a defective circuit. This chart does not include checks for all possible defects; use steps 6 and 7 in such cases. Start from the top of the chart and perform the given checks on the left side of the page until a step is found which does not produce the indicated results. Further checks and/or the circuit in which the trouble is probably located are listed to the right of this step.

TABLE 5-2

Power Supply Tolerance and Ripple

Power Supply	Test Point	Output Voltage Tolerance	Maximum ripple (peak-to-peak)
−50 Volt	TP−50 (back of Main Interface board) on P1171-Pin 8	±0.1 volt	5 mV
−15 Volt	P1171-Pin 1	±0.3 volt	2 mV
+5 Volt	P1171-Pin 2	±0.15 volt	2 mV
+15 Volt	P1171-Pin 3	±0.3 volt	2 mV
+50 Volt	P1171-Pin 4	±0.6 volt	5 mV
+130 Volt	P1171-Pin 6	±5.2 volts	300 mV

If incorrect operation of the power supplies is suspected, connect the 7603 to a variable autotransformer. Then, check for correct regulation with a DC voltmeter (0.1% accuracy) and correct ripple with a test oscilloscope while varying the autotransformer throughout the regulating range of this instrument.

After the defective circuit has been located, proceed with steps 6 and 7 to locate the defective component(s).

6. Check Voltages and Waveforms. Often the defective component can be located by checking for the correct voltage or waveform in the circuit. Typical voltages and waveforms are given on the diagrams.

NOTE

Voltages and waveforms given on the diagrams are not absolute and may vary slightly between instruments. To obtain operating conditions similar to those used to take these readings, see the first diagram page.

7. Check Individual Components. The following procedures describe methods of checking individual components in the 7603. Components which are soldered in place are best checked by first disconnecting one end. This isolates the measurement from the effects of surrounding circuitry.

A. SEMICONDUCTORS.

CAUTION

Power switch must be turned off before removing or replacing semiconductors.

CIRCUIT ISOLATION TROUBLESHOOTING CHART

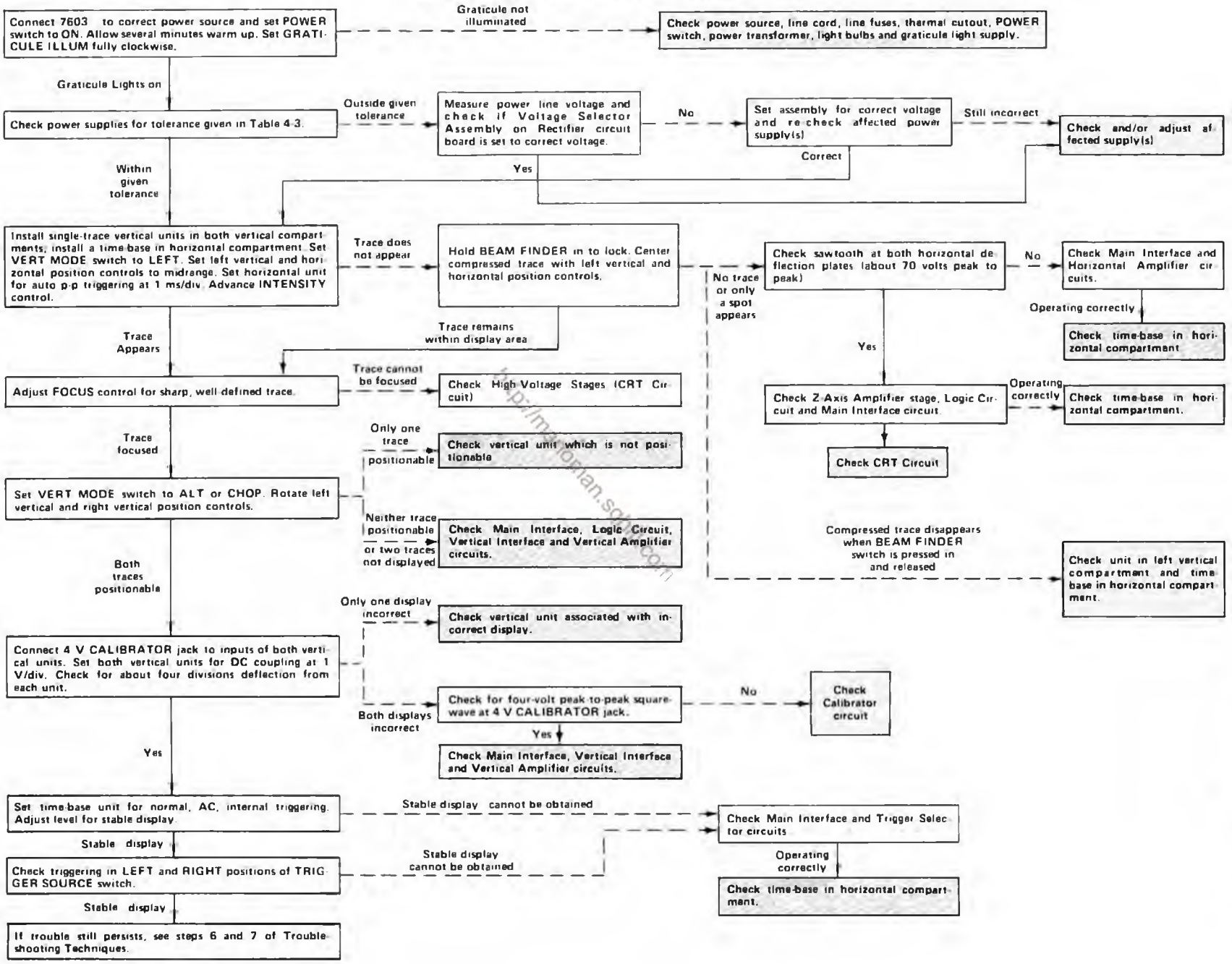


Fig. 5-6.

A good check of transistor operation is actual performance under operating conditions. A transistor can most effectively be checked by substituting a new component for it (or one which 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 can be checked with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of the circuit operation is essential to trouble-shooting circuits using integrated circuits. In addition, operating waveforms, logic levels, and other operating information for the integrated circuits are given in the Circuit Description section. Use care when checking voltages and waveforms around the integrated circuits so adjacent leads are not shorted together. A convenient means of clipping a test probe to the 14- and 16-pin integrated circuits is with an integrated-circuit test clip. This device also doubles as an integrated-circuit extraction tool.

B. DIODES.

A diode can be checked for an open or for a short circuit by measuring the resistance between terminals with an ohmmeter set to the R X 1k scale. The diode resistance should be very high in one direction and very low when the meter leads are reversed. Do not check tunnel diodes or back diodes with an ohmmeter.

CAUTION

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

C. RESISTORS.

Check the resistors with the ohmmeter. See the 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 the specified value.

D. INDUCTORS.

Check for open inductors by checking continuity 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 (roll-off).

E. CAPACITORS.

A leaky or shorted capacitor can best 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 if the capacitor passes AC signals.

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

CORRECTIVE MAINTENANCE

General

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

Obtaining Replacement Parts

Standard Parts. All electrical and mechanical part replacements for the 7603 can be obtained through your local 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, it is important to remember that the physical size and shape of a component may affect its performance in the instrument, particularly at high frequencies. All replacement parts should be direct replacements unless it is known that a different component will not adversely affect instrument performance.

Special Parts. In addition to the standard electronic components, some special components are used in the 7603. These components are manufactured or selected by Tektronix, Inc. to meet specific performance requirements, or are manufactured for Tektronix, Inc. in accordance with our specifications. Most of the mechanical parts used in this instrument have been manufactured by Tektronix, Inc. Order all special parts directly from your local TEKTRONIX Field Office or representative.

Ordering Parts. When ordering replacement parts from Tektronix, Inc., include the following information:

1. Instrument type.

2. Instrument serial number.

3. A description of the part (if electrical, include circuit number).

4. TEKTRONIX part number.

Soldering Techniques

WARNING

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 60/40 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 35- 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 to 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-watt or larger soldering iron. The pencil-type soldering iron used on the circuit board can be used for soldering to switch terminals, potentiometers, or metal terminals mounted in plastic holders.

After soldering is completed, clean the area around the solder connection with a flux-remover solvent. Be careful not to remove any information printed in the area.

Component Replacement

WARNING

Disconnect the instrument from the power source before replacing components.

General. The exploded-view drawings associated with the Mechanical Parts List (located at rear of manual) may be helpful in the removal or disassembly of individual components or sub-assemblies.

Circuit Board Replacement. If a circuit board is damaged beyond repair, the entire assembly including all soldered-on components, can be replaced. Part numbers are given in the Mechanical Parts List for either the completely wired (670-xxxx-xx) or the unwired board (388-xxxx-xx).

NOTE

Even though unwired boards are available without components, use of the completely wired replacement board is recommended due to the large number of components mounted on most of the boards.

Most of the circuit boards in this instrument are mounted on the chassis; pin connectors are used for interconnection with other circuits. Use the following procedure to remove the chassis-mounted circuit boards (removal instructions for the exceptions will be given later).

A. CHASSIS-MOUNTED BOARDS.

1. Disconnect any pin connectors on the board or connected to other portions of the instrument. Note the order of these connectors so they can be correctly replaced.

2. Remove the securing screws.

3. Remove the board.

4. To replace the board, reverse the order of removal. Match the arrows on the multi-pin connectors to the arrows on the board. Correct location of the pin connectors is shown in the circuit board illustrations in the Diagrams section.

B. TRIGGER SELECTOR AND VERTICAL INTERFACE CIRCUIT BOARD REPLACEMENT.

The Trigger Selector and Vertical Interface circuit boards plug onto the front of the Main Interface circuit board. Use the following procedure to replace either board.

1. Remove the securing screws.

2. Pull out on the edges of the board until the board clears the interconnecting terminals. Hold the board parallel to the Main Interface board until the board is free, so as not to bend the interconnecting terminals.

3. To replace the circuit board, position it so the interconnecting pins and sockets mate properly.

4. Gently press the circuit board against the mounting surface. Be sure that all the interconnecting pins and sockets mate properly.

5. Replace the securing screws.

C. LOGIC CIRCUIT BOARD REPLACEMENT.

1. Slide out the power unit as described previously.

2. Disengage the plastic snaps which secure the sides of the board.

3. Pull out on the edges of the board until the board clears the interconnecting terminals. Hold the board parallel to the Main Interface board until the board is free, so as not to bend the interconnecting terminals.

4. To replace the Logic board, position it so the guide holes in the board mate with the guide posts. Check that all the interconnecting pins and sockets mate properly.

5. Gently press the board against the Main Interface board until the plastic snaps secure the board.

D. MAIN INTERFACE CIRCUIT BOARD REPLACEMENT.

1. Slide out the power unit as described previously.

2. Remove all of the plug-on circuit boards from the Main Interface board (remove plug-in units to gain access to plug-on boards on front of Main Interface board).

3. Disconnect the multi-pin connectors from the rear of the Main Interface board. Note the order of these connectors so they can be correctly replaced.

4. Remove the three screws from inside each plug-in compartment which hold the plug-in interface connectors to the chassis (total of nine screws). Also remove the hexagonal posts which secure the ground straps to the Main Interface board.

5. Remove the Main Interface board assembly through the rear of the instrument.

6. To replace the Main Interface board, reverse the order of removal. Match the arrows on the multi-pin connectors to the arrows on the board. Correct location of the pin connectors is shown in the circuit board illustration in the Diagrams section.

E. LOW-VOLTS REGULATOR CIRCUIT BOARD REPLACEMENT.

1. Remove the four screws which secure the heat radiator to the rear frame of the instrument.

2. Slide the heat radiator out of the rear of the instrument and disconnect the pin connectors. Remove the heat radiator from the instrument.

3. Remove the four screws which secure the plastic protective cover to the heat radiator.

4. Remove the power transistors from the back of the heat radiator. Note the location of each power transistor.

5. To replace the Low-Voltage Regulator board, reverse the order of removal.

NOTE

After replacing the power transistors, check that the transistor cases are not shorted to the heat radiator before applying power.

F. RECTIFIER BOARD REPLACEMENT.

To replace the Rectifier board, proceed as follows:

1. Slide out the power unit as described previously.

2. Disconnect the pin connectors from the board.

3. Disconnect the wires soldered to the top of the board.

http://manuman.sqhill.com

4. Unsolder all of the power transformer wires connected to the top of the board. Use a vacuum-type desoldering tool to remove the solder from the hole in the circuit board.

5. Remove the screws holding each corner of the board to the chassis.

6. To replace the Rectifier board, reverse the order of removal. Be sure that all of the transformer wires are properly placed before resoldering. Match the arrows on the multi-pin connectors to the arrows on the board. Correct location of the pin connectors and the wire color code is shown on the circuit board illustration in the Diagrams section.

G. CALIBRATOR BOARD REPLACEMENT.

1. Unsolder power on/off indicator.

2. Remove FOCUS, INTENSITY, BEAM FINDER and GRATICULE ILLUM knobs.

3. Remove securing nut which holds INTENSITY and GRATICULE ILLUM control to front panel.

4. Disengage the power switch actuating rod from the coupler. Remove the rod and plastic bushing through the front of the instrument.

5. Remove two screws holding the VERT MODE switch to the front sub-panel.

6. Remove the screw holding the calibrator board to the support on the CRT shield.

7. Pull the Calibrator board out far enough to allow the multi-pin connectors and wire leads to be disconnected from the Calibrator board (note the wire color code).

8. Remove the board.

9. To replace the circuit board, reverse the removal procedure. Match the arrows on the multi-pin connectors to the arrows on the circuit board.

Plug-In Interface Connectors. The individual contacts of the plug-in interface connectors can be replaced. However, it is recommended that the entire Main Interface board be replaced if a large number of the contacts are damaged. An alternative solution is to refer the maintenance of the damaged Main Interface board to your local TEKTRONIX Field Office or representative. Use the following procedure to replace an individual contact of the plug-in interface connector.

1. Remove the Main Interface circuit board from the instrument as described previously.

2. Snap the connector cover (white plastic) off the side of the plug-in interface connector which needs repair.

3. Unsolder and remove the damaged contact.

4. Install the replacement contact. Carefully form it to the required shape to fit against the connector body.

5. Snap the connector cover back onto the plug-in interface connector. Check that the contact which was replaced is aligned with the other contacts.

6. Replace the Main Interface board.

http://manoman.sohill.com

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

CAUTION

POWER switch must be turned off before removing or replacing semiconductors.

Replacement semiconductors should be of the original type or a direct replacement. Fig. 5-5 shows the lead configuration of the semiconductors used in this instrument. Some plastic case transistors have lead configurations which 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 for correct basing. All transistor sockets in this instrument are wired for the standard basing as used for metal-cased transistors. Transistors which have heat radiators or are mounted on the chassis use silicone grease to increase heat transfer. Replace the silicone grease when replacing these transistors.

WARNING

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

An extracting tool should be used to remove the 14- and 16-pin integrated circuits to prevent damage to the pins. This tool is available from Tektronix, Inc. Order TEKTRONIX Part No. 003-0619-00. If an extracting tool is not available when removing one of these integrated circuits, pull slowly and evenly on both ends of the device. Try to avoid having one end of the integrated circuit disengage from the socket before the other, as this may damage the pins.

Access to Power Transistors. The power transistors associated with the Low-Voltage Power Supply are mounted on the heat radiator at the rear of the instrument. To gain access to these transistors, remove the screws which secure the plastic protective cover to the heat radiator. The transistors are mounted in sockets so they can be removed from the rear by taking out the two screws in the mounting tabs (cases elevated above chassis; be sure power is off). To replace the sockets, refer to the procedure for removal of the Low-Voltage Regulator circuit board.

NOTE

After replacing a power transistor, check that the collector is not shorted to ground before applying power.

Interconnecting Pin Replacement. Interconnecting pins are used to interconnect many of the circuit boards in the 7603. Two types of mating connectors are used for these interconnecting pins. If the mating connector is mounted on a plug-on circuit board, a special socket is soldered into the board. If the mating connector is on the end of a lead, an end-lead pin connector is used which mates with the interconnecting pin. The following information provides the replacement procedure for the various types of interconnecting methods.

A. CIRCUIT-BOARD PINS.

NOTE

A circuit-board pin replacement kit including necessary tools, instructions and replacement pins is available from Tektronix, Inc. Order TEKTRONIX Part No. 040-0542-00.

To replace a pin which is mounted on a circuit board, first disconnect the pin connectors. Then, unsolder the damaged pin and pull it out of the circuit 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. Then, solder the pin on both sides of the circuit board. If the old pin was bent at an angle to mate with a connector, bend the new pin to match the associated pins.

B. CIRCUIT-BOARD PIN SOCKETS.

The pin sockets on the circuit boards are soldered to the rear of the board. To replace one of these sockets, first unsolder the pin (use a vacuum-type desoldering tool to remove excess solder). Then straighten the tabs on the socket and remove it from the hole in the circuit board. Place the new socket in the circuit board hole and press the tabs down against the board. Solder the tabs of the socket to the circuit board; be careful not to get solder into the socket.

NOTE

The spring tension of the pin sockets ensures a good connection between the circuit board and the pin. This spring tension can be destroyed by using the pin sockets as a connecting point for spring-loaded probe tips, alligator clips, etc.

http://manoman.mcgraw-hill.com

C. END-LEAD PIN CONNECTORS.

The pin connectors used to connect the wires to the interconnecting pins are clamped to the ends of the associated leads. To replace damaged end-lead pin connectors, remove the old pin connector from the end of the lead and clamp the replacement connector to the lead.

Some of the pin connectors are grouped together and mounted in a plastic holder; the overall result is that these connectors are removed and installed as a multi-pin connector. To provide correct orientation of this multi-pin connector when it is replaced, an arrow is stamped on the circuit board and a matching arrow is molded into the plastic housing of the multi-pin connector. Be sure these arrows are aligned as the multi-pin connector is replaced. If the individual end-lead pin connectors are removed from the plastic holder, note the color of the individual wires for replacement.

Cathode-Ray Tube Replacement. To replace the cathode-ray tube, proceed as follows:

WARNING

Use care when handling a CRT. Protective clothing and safety glasses should be worn. Avoid striking it on any object which might cause it to crack or implode. When storing a CRT, place it in a protective carton or set it face down in a protected location on a smooth surface with a soft mat under the faceplate to protect it from scratches.

A. REMOVAL.

1. Remove the heat radiator/Low-Voltage Regulator circuit board assembly as described previously.

2. Remove the CRT base socket from the rear of the CRT.

3. Loosen the two screws located on each side of the CRT socket until the tension of the springs on these screws is released. Then, press in on the screws to be sure that the CRT clamp is loose.

4. Disconnect the deflection-plate connectors. Be careful not to bend these pins.

5. Disconnect the CRT anode plug from the jack located on the front of the high-voltage compartment. Ground this lead to the chassis to dissipate any stored charge.

6. Remove the two screws securing the CRT bezel to the front panel. Remove the plastic faceplate protector and light filter.

7. Hold one hand on the CRT faceplate and push forward on the CRT base with the other. As the CRT starts out of the shield, grasp it firmly. Guide the anode lead through the cutout in the CRT shield as the CRT is removed.

B. REPLACEMENT.

1. Loosen clamp blocks located at each corner of CRT shield. Insert the CRT into the shield. Guide the anode lead through the hole in the CRT shield.

2. Clean the CRT faceplate, plastic faceplate protector, and the light filter with denatured alcohol.

3. Re-install the CRT bezel, faceplate protector, and light filter. Firmly tighten the two screws.

4. Push forward on the CRT base to be certain that the CRT is as far forward as possible. Then tighten the two screws beside the CRT base until the springs on the screws are fully compressed.

5. Reposition and tighten down clamp blocks to hold the faceplate of the CRT tightly against the implosion shield. The clamps are located at each corner of the CRT shield.

6. Replace the CRT base socket.

7. Reconnect the CRT anode plug.

8. Re-install the heat radiator/Low-Voltage Regulator circuit board assembly.

9. Carefully reconnect the deflection-plate connectors. After each connector is installed, lightly pull on its lead to be sure that it will remain in its socket.

10. Check the calibration of the complete instrument. Calibration procedure is given in Section 3.

Switch Replacement. The pushbutton switches used in the 7603 are not repairable and should be replaced as a unit if defective.

Graticule-Bulb Replacement. To remove a graticule bulb, first remove the two screws securing the CRT bezel to the front panel. Remove the plastic light shield and retaining spring. Now, firmly grasp the defective bulb and pull straight out. Push the replacement bulb straight into the socket as far as it will go. Replace the retaining spring, light shield, and CRT bezel.

Power Transformer Replacement. Replace the power transformer only with a direct replacement transformer. When removing the transformer, tag the leads with the corresponding terminal numbers to aid in connecting the new transformer. After the transformer has been replaced, check the performance of the complete instrument using the procedure given in the Calibration section.

High-Voltage Compartment. The components located in the high-voltage compartment can be reached for maintenance or replacement by using the following procedure. Diagram 8 shows the location of the components in the high-voltage compartment and color-coding of the wires.

NOTE

All solder joints in the high-voltage compartment should have smooth surfaces. Any protrusions may cause high-voltage arcing at high altitudes.

1. Remove the heat radiator/Low-Voltage Regulator assembly as described previously.

2. Disconnect the CRT base socket.

3. Disconnect the CRT anode plug and discharge it to the chassis. Using an insulated probe or wire, discharge the jack portion of the CRT anode connector to chassis ground.

4. Disconnect the multi-pin connectors on the Z-Axis Amplifier board.

5. Remove the screw on the bottom of the high-voltage compartment and the two screws located at the top.

6. Guide the high-voltage compartment away from the instrument chassis. Be careful not to damage any of the components or the pin connectors on the High-Voltage or Z-Axis Amplifier circuit boards. Disconnect the multi-pin connectors on the High-Voltage board.

7. Using an insulated shorting strap, discharge the exposed connections to chassis ground.

8. Remove the two power transistors and the four screws which secure the High-Voltage board to the high-voltage compartment. Now, all of the circuitry in the high-voltage box can be reached for maintenance or replacement except those in the encapsulated assembly.

9. To replace the encapsulated assembly, remove the four screws located on the bottom of the High-Voltage circuit board (remove board to reach screws).

10. To replace the high-voltage compartment, reverse the above procedure. Be careful not to pinch any of the interconnecting wires when re-attaching the high-voltage compartment to the chassis.

Fuse Replacement. Table 5-3 gives the rating, location, and function of the fuses used in this instrument.

TABLE 5-3

Fuse Rating

Circuit Number	Rating	Location	Function
F1000	3.2 A Slow	Rear panel	110-volt line
F1000	1.6 A Slow	Rectifier board	220-volt line
F814	2 A Fast	Rectifier board	High voltage
F855	0.15 A Fast	Low-Voltage Regulator board	+130 volts

http://manoman.sqhi.com

Recalibration After Repair

After any electrical component has been replaced, the calibration of that particular circuit should be checked, as well as the calibration of other closely related circuits. Since the low-voltage supply affects all circuits, calibration of the entire instrument should be checked if work has been done in the low-voltage supply or if the power transformer has been replaced.

RACKMOUNTING

Introduction

The R7603 Oscilloscope is designed to be installed in a standard 19-inch wide rack. It can be mounted in racks with Universal, EIA, RETMA, or Western Electric mounting-hole spacing. The following information provides complete rackmounting instructions for this instrument.

Instrument Dimensions

A dimensional drawing showing the major dimensions of the R7603 is shown in Fig. 6-6.

Rack Dimensions

Height. At least 5¼ inches of vertical space is required to mount this instrument in a rack. This allows sufficient clearance for adjacent instruments or panels. Additional height may be necessary if an oscilloscope camera system is to be used with this instrument.

Width. Minimum dimension between the front rails of the rack is 17 5/8 inches. This allows room on each side of the instrument for the slide-out tracks to operate freely, permitting the instrument to move in and out of the rack.

Depth. Total depth necessary to mount this instrument in an enclosed cabinet rack is 24 inches. This allows sufficient room for air circulation, power cord and signal connections, and for the necessary mounting hardware.

NOTE

If this instrument is mounted in a shallow rack where the rear mounting brackets must extend behind the instrument, a maximum of 26 inches clearance behind the front rails is required.

The rear mounting brackets supplied allow mounting this instrument in racks which have rear rails spaced between 14 5/8 and 28 1/2 inches from the front rail. Do not mount the R7603 in an installation where it is not correctly supported at the rear, as the instrument may be damaged.

Slide-Out Tracks

The slide-out tracks provided with this instrument permit it to be extended out of the rack for maintenance and calibration without removing it from the rack. To operate this instrument in the extended position, be sure the power cord and any signal cables are long enough for this purpose.

The slide-out tracks consist of two assemblies; one for the left side of the instrument and one for the right side. Fig. 6-1 shows the complete slide-out track assemblies. The stationary section of each assembly attaches to the front and rear rails of the track, and the chassis section is attached to the instrument. The intermediate section slides between the stationary and chassis sections to allow the instrument to be extended out of the rack.

The hardware needed to mount the slide-out tracks to the rack is shown in Fig. 6-1. Since the hardware supplied is intended to make the tracks compatible with a variety of cabinet racks and installation methods, not all of it will be needed for this installation. Use only the hardware that is required for the mounting method used.

http://mhoman.sghill.com

Mounting Procedure

Use the following procedure to install this instrument in a rack:

1. Select the proper front-rail mounting holes for the stationary sections using the measurements shown in Fig. 6-2.

2. Mount the front-flanges of the stationary sections to the front rails of the rack with a bar nut and two pan-head screws (see Fig. 6-3A).

NOTE

If the rails of the rack are tapped, drill out these three holes with a 0.196-inch drill.

3. Mount the rear of the stationary sections to the rear rails using the method shown in either 6-3B or 6-3C. Be sure the tracks are mounted level.

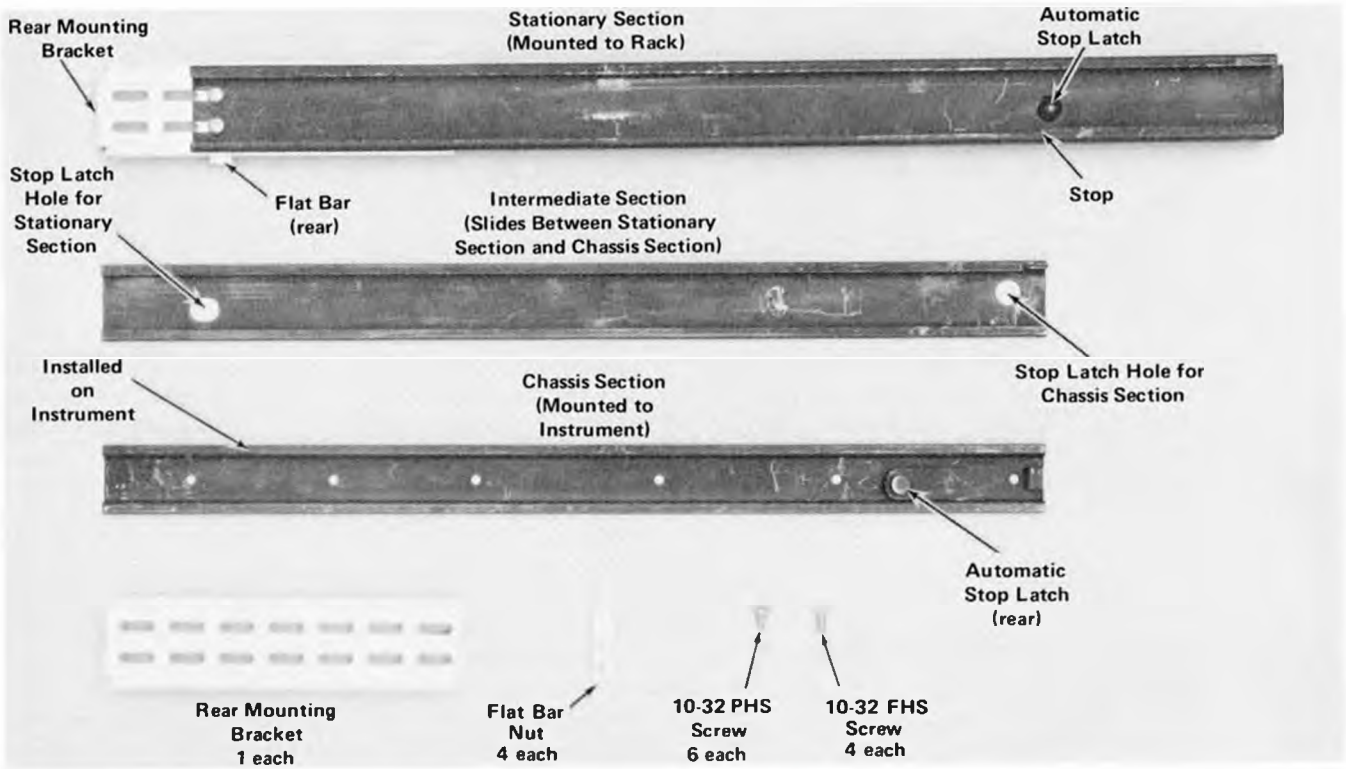


Fig. 6-1. Left side slide-out track assembly.

http://manoman.sqhill.com

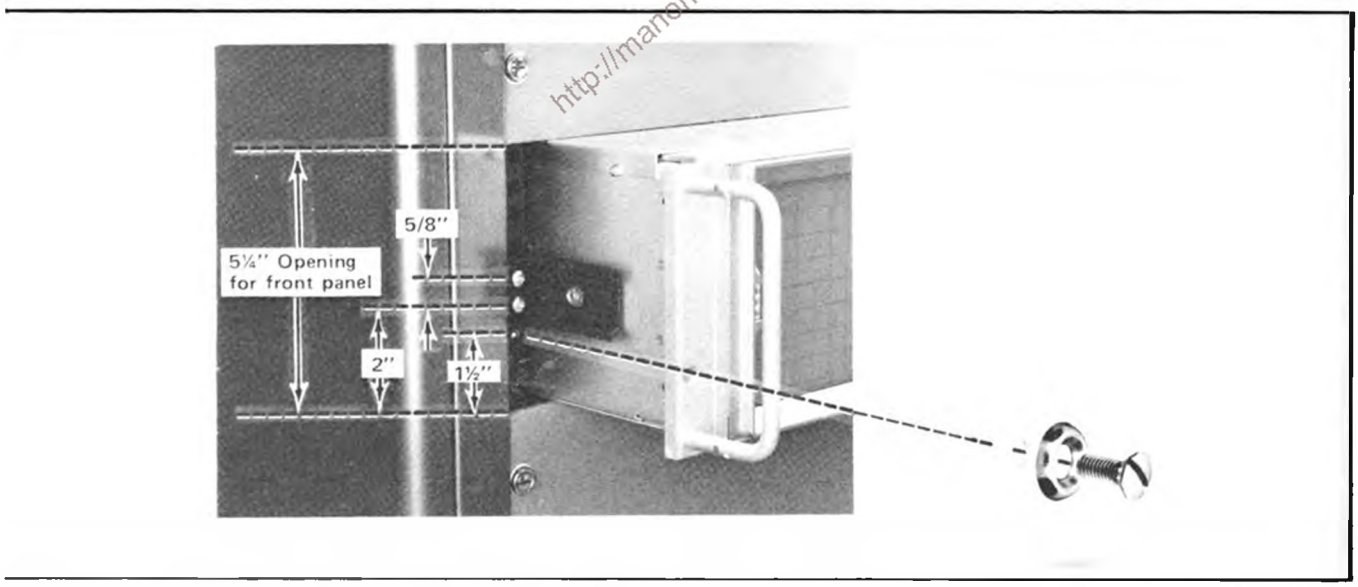


Fig. 6-2. Locating the mounting holes for the left stationary section. Same dimensions apply to right stationary section.

4. Refer to Fig. 6-4 to install the instrument into the rack.

5. Follow the procedure given in Fig. 6-5 to adjust the alignment of the stationary sections.

6. After the tracks operate smoothly, connect the power cord to the power source and connect any necessary cables to the rear panel connectors.

7. Push the instrument all the way into the rack and secure it to the front-rail of the rack with the securing

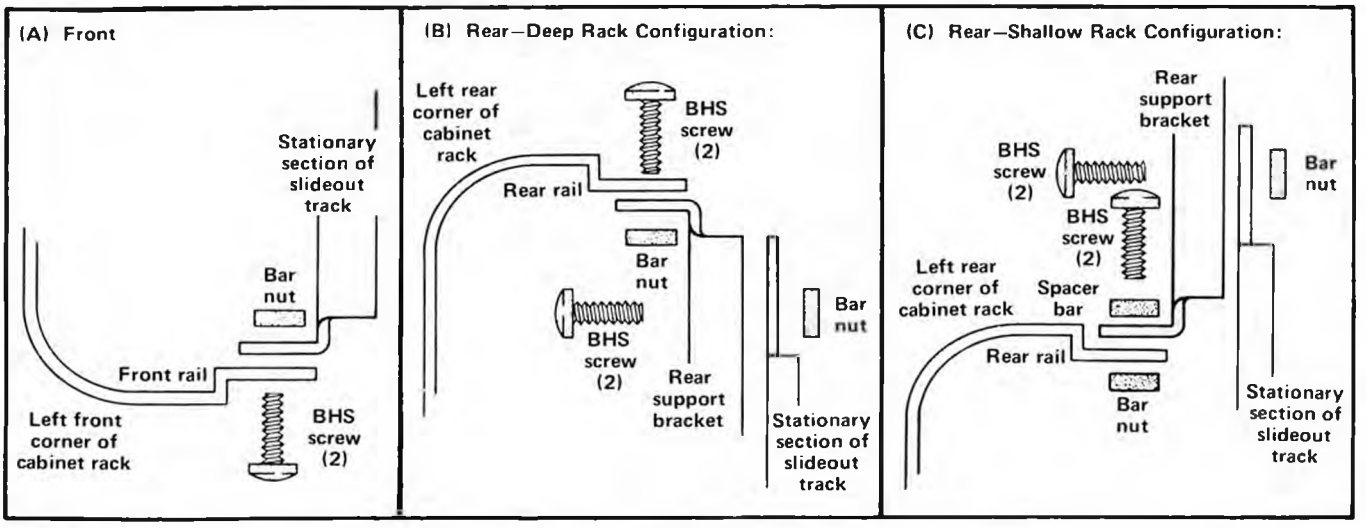


Fig. 6-3. Details for mounting stationary sections.

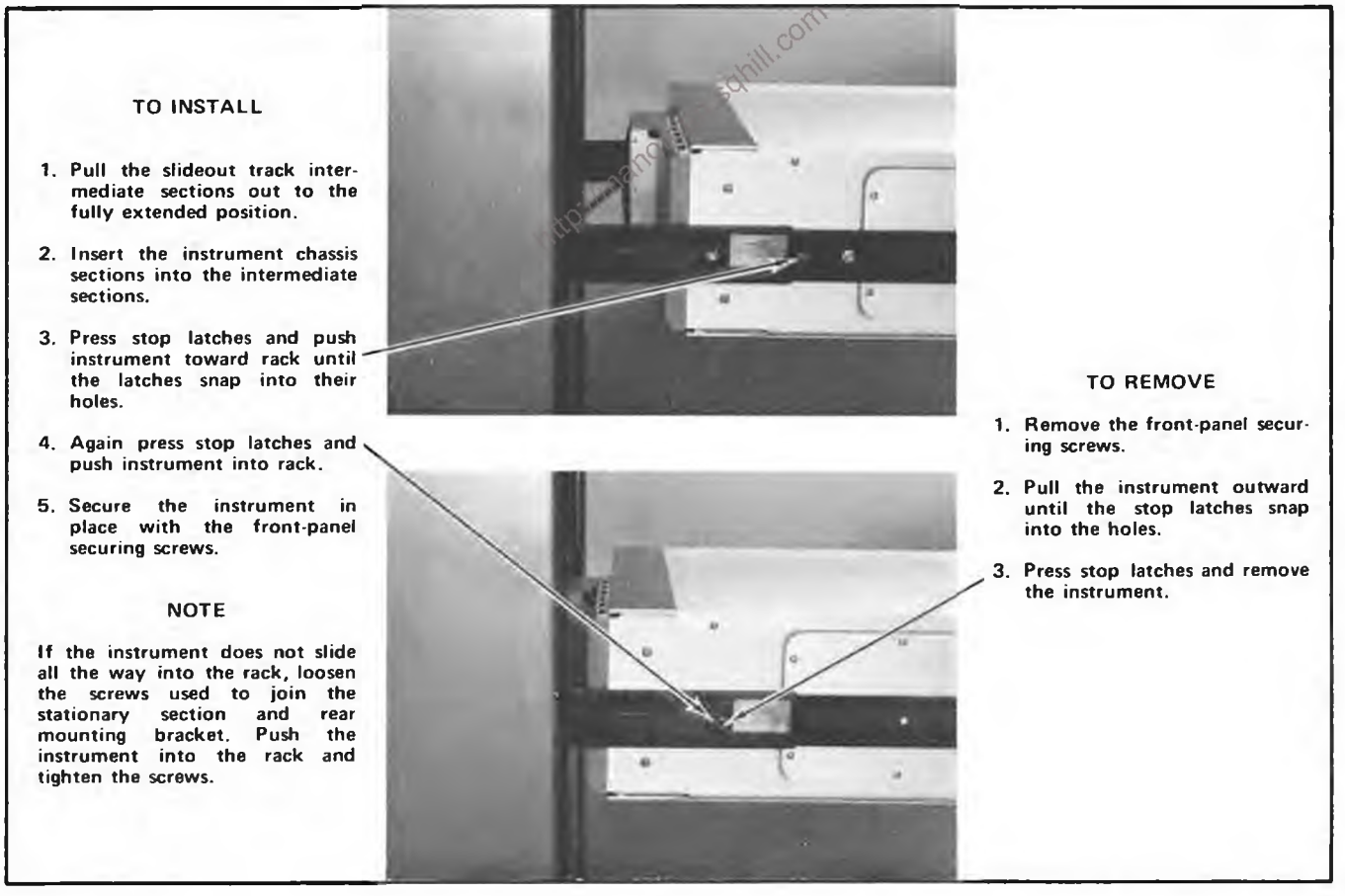


Fig. 6-4. Installing and removing the instrument after the tracks have been installed.

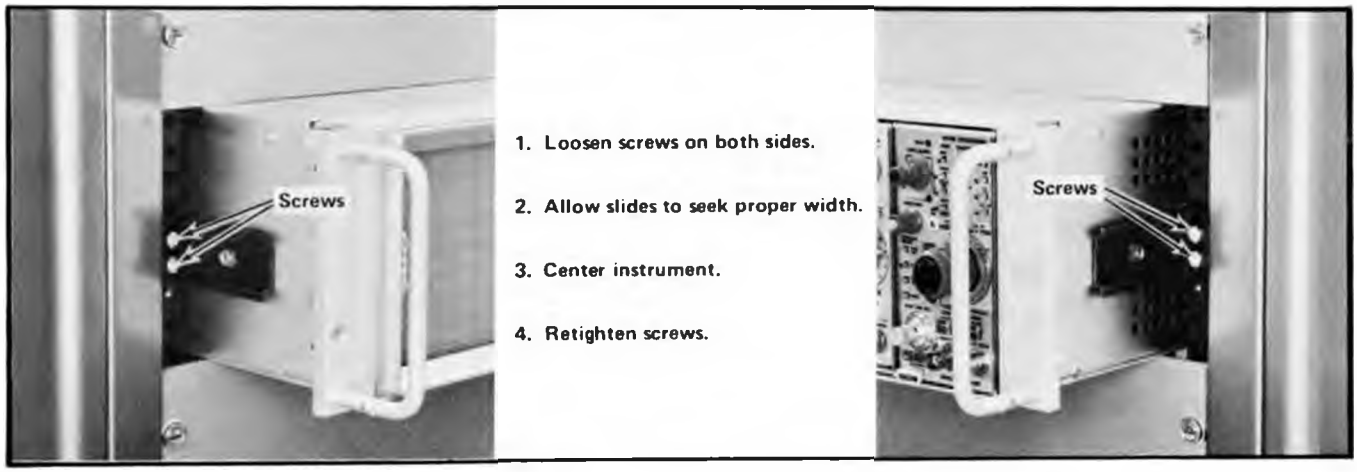


Fig. 6-5. Adjusting the slide-out tracks for smooth sliding action.

screws and washers shown in Fig. 6-2. If the securing hole is not tapped, use a "speed-nut" or similar item to install the securing screw.

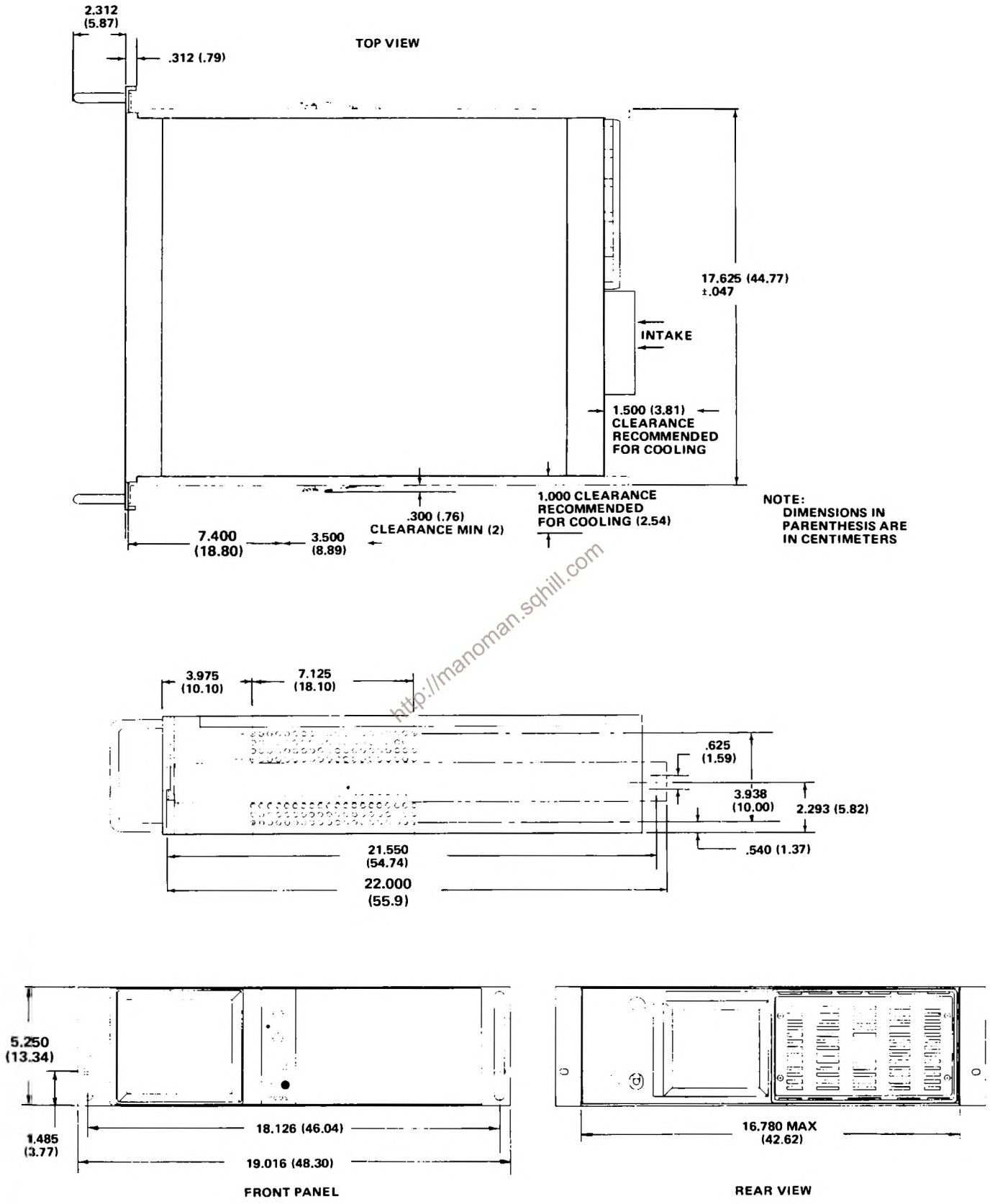
Removing or Installing the Instrument

After initial installation and adjustment of the slide-out tracks, the instrument can be removed or installed by following the instructions given in Fig. 6-4. No further adjustments are required under normal conditions.

Slide-Out Track Lubrication

The special finish on the sliding surfaces of the slide-out tracks provides permanent lubrication. However, if the tracks do not slide smoothly even after proper adjustment, a thin coating of paraffin can be rubbed onto the sliding surfaces for additional lubrication.

http://manoman.sqi.it.com



http://manoman.sqhill.com

Fig. 6-6. Dimensional drawing.

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.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

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.

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

http://manuals.tektronix.com

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
0000L	MATSUHITA ELECTRIC	200 PARK AVENUE, 54TH FLOOR	NEW YORK, NY 10017
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867, 19TH AVE. SOUTH	MURTLE BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05091	TRI-ORDINATE CORPORATION	343 SNYDER AVENUE	BERKELEY HEIGHTS, NJ 07922
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
07910	TELEDYNE SEMICONDUCTOR	12515 CHADRON AVE.	HAWTHORNE, CA 90250
08806	GENERAL ELECTRIC CO., MINIATURE LAMP PRODUCTS DEPARTMENT	NELA PARK	CLEVELAND, OH 44112
12294	ERIE TECHNOLOGICAL PROD. OF CANADA LTD.	5 FRASER AVENUE	TRENTON, ONTARIO, CANADA
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
12969	UNITRODE CORPORATION	580 PLEASANT STREET	WATERTOWN, MA 02172
14936	GENERAL INSTRUMENT CORP., SEMICONDUCTOR PRODUCTS GROUP	P.O. BOX 600,600 W. JOHN ST.	HICKSVILLE, NY 11802
15454	RODAN INDUSTRIES, INC.	2905 BLUE STAR ST.	ANAHEIM, CA 92806
15818	TELEDYNE SEMICONDUCTOR	1300 TERRA BELLA AVE.	MOUNTAIN VIEW, CA 94043
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
28875	IMC MAGNETICS CORP., NEW HAMPSHIRE DIV.	ROUTE 16	ROCHESTER, NH 03867
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
50157	N. L. INDUSTRIES, INC., ELECTRONICS DEPT.	P. O. BOX 787	MUSKEGON, MI 49445
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
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
74970	JOHNSON, E. F., CO.	299 10TH AVE. S. W.	WASECA, MN 56093
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
79727	C-W INDUSTRIES	550 DAVISVILLE RD.,P O BOX 96	WARMINISTER, PA 18974
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
81483	INTERNATIONAL RECTIFIER CORP.	9220 SUNSET BLVD.	LOS ANGELES, CA 90069
82647	TEXAS INSTRUMENTS, INC., CONTROL PRODUCTS DIV.	34 FOREST ST.	ATTLEBORO, MA 02703
83003	VARO, INC.	P O BOX 411, 2203 WALNUT STREET	GARLAND, TX 75040
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601
91929	HONEYWELL, INC., MICRO SWITCH DIV.	CHICAGO & SPRING STS.	FREEPORT, IL 61032
92702	IMC MAGNETICS CORP., EASTERN DIV.	570 MAIN ST.	WESTBURY, L.I., NY 11591
93410	ESSEX INTERNATIONAL, INC., CONTROLS DIV. LEXINGTON PLANT	P. O. BOX 1007	MANSFIELD, OH 44903

http://manoman.sqwill.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-1956-00	B010100	B159999	CKT BOARD ASSY:MAIN INTERFACE	80009	670-1956-00
A1	670-1956-01	B160000		CKT BOARD ASSY:MAIN INTERFACE	80009	670-1956-01
A2	670-1370-02	B010100	B129999	CKT BOARD ASSY:LOGIC	80009	670-1370-02
A2	670-1370-04	B130000		CKT BOARD ASSY:LOGIC	80009	670-1370-04
A3	670-1371-05			CKT BOARD ASSY:TRIGGER SELECTOR	80009	670-1371-05
A4	670-1373-06	B010100	B112349	CKT BOARD ASSY:VERTICAL INTERFACE	80009	670-1373-06
A4	670-1373-08	B112350		CKT BOARD ASSY:VERTICAL INTERFACE	80009	670-1373-08
A5	670-1958-00	B010100	B019999	CKT BOARD ASSY:VERTICAL AMPLIFIER	80009	670-1958-00
A5	670-1958-02	B020000		CKT BOARD ASSY:VERTICAL AMPLIFIER	80009	670-1958-02
A6	670-1957-00	B010100	B029999	CKT BOARD ASSY:HORIZONTAL AMPLIFIER	80009	670-1957-00
A6	670-1957-01	B030000	B059999	CKT BOARD ASSY:HORIZONTAL AMPLIFIER	80009	670-1957-01
A6	670-1957-02	B060000	B169999	CKT BOARD ASSY:HORIZONTAL AMPLIFIER	80009	670-1957-02
A6	670-1957-03	B170000		CKT BOARD ASSY:HORIZONTAL AMPLIFIER	80009	670-1957-03
A7	670-1379-01			CKT BOARD ASSY:CALIBRATOR AND MODE SWITCHES	80009	670-1379-01
A8	670-1951-01			CKT BOARD ASSY:Z AXIS AMPLIFIER	80009	670-1951-01
A8[1]	670-1951-02	XB030492		CKT BOARD ASSY:Z AXIS AMPLIFIER	80009	670-1951-02
A9	670-2128-00	B010100	B099999	CKT BOARD ASSY:HV	80009	670-2128-00
A9	670-2128-02	B100000	B149999	CKT BOARD ASSY:HV	80009	670-2128-02
A9	670-2128-04	B150000	B254774	CKT BOARD ASSY:HV	80009	670-2128-04
A9	670-2128-06	B254775	B329999	CKT BOARD ASSY:HV	80009	670-2128-06
A9	670-2128-08	B330000		CKT BOARD ASSY:HV	80009	670-2128-08
A9[1]	670-2128-01	XB030492	B099999	CKT BOARD ASSY:HV	80009	670-2128-01
A9[1]	670-2128-03	B100000	B149999	CKT BOARD ASSY:HV	80009	670-2128-03
A9[1]	670-2128-05	B150000	B254774	CKT BOARD ASSY:HV	80009	670-2128-05
A9[1]	670-2128-07	B254775	B329999	CKT BOARD ASSY:HV	80009	670-2128-07
A9[1]	670-2128-09	B330000		CKT BOARD ASSY:HV	80009	670-2128-09
A10	670-1382-05	B010100	B249999	CKT BOARD ASSY:RECTIFIER	80009	670-1382-05
A10	670-1382-06	B250000		CKT BOARD ASSY:RECTIFIER	80009	670-1382-06
A11	670-1376-10	B010100	B199999	CKT BOARD ASSY:LV REGULATOR	80009	670-1376-10
A11	670-1376-16	B020000		CKT BOARD ASSY:LV REGULATOR	80009	670-1376-16
A12	670-1961-00			CKT BOARD ASSY:SIGNAL OUTPUT	80009	670-1961-00
A13	670-1900-01	B010100	B139999	CKT BOARD ASSY:READOUT	80009	670-1900-01
A13	670-1900-03	B140000		CKT BOARD ASSY:READOUT	80009	670-1900-03
A14	670-4346-00	XB270000		CKT BOARD ASSY:PROTECTION	80009	670-4346-00
A15	670-4856-00	XB330000		CKT BOARD ASSY:FOCUS DC RESTORER	80009	670-4856-00
A16	670-4856-01	XB330000		CKT BOARD ASSY:Z AXIS DC RESTORER	80009	670-4856-01
B1001	119-0390-00			FAN,AXIAL:46 CFM,19W,115 VAC,60 HZ	28875	MBS-2107F-0-1
B1001[2]	119-0396-00			FAN,TUBEAXIAL:50-400HZ,115V,AC	92702	MBC2206F6
C1	290-0271-00			CAP.,FXD,ELCTLT:9UF,+20-15%,125V	56289	109D905C2125F2
C3	290-0302-00			CAP.,FXD,ELCTLT:100UF,10%,20V	12954	D100D20KI
C5	290-0302-00			CAP.,FXD,ELCTLT:100UF,10%,20V	12954	D100D20KI
C7	290-0302-00			CAP.,FXD,ELCTLT:100UF,10%,20V	12954	D100D20KI
C9	290-0271-00			CAP.,FXD,ELCTLT:9UF,+20-15%,125V	56289	109D905C2125F2
C16	283-0068-00			CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C18	283-0068-00			CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C44	283-0068-00	B010100	B159999	CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C44	283-0081-00	B160000		CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C47	281-0638-00	B010100	B159999X	CAP.,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
C48	283-0068-00	B010100	B159999	CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C48	283-0081-00	B160000		CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C55	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C58	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z

[1]Option 4 only.
[2]Option 5 only.

http://www.sqhill.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C59	283-0672-00			CAP.,FXD,MICA D:200PF,1%,500V	00853	D155F201F0
C60	281-0564-00			CAP.,FXD,CER DI:24PF,5%,500V	72982	301-000C0G0240J
C67	281-0605-00			CAP.,FXD,CER DI:200PF,10%,500V	04222	7001-1375
C76	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C89	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C136	281-0547-00			CAP.,FXD,CER DI:2.7PF,10%,500V	72982	301-000C0J0279C
C137	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C138	281-0503-00			CAP.,FXD,CER DI:8PF,+/-0.5PF,500V	72982	301-000C0H0809D
C146	281-0547-00			CAP.,FXD,CER DI:2.7PF,10%,500V	72982	301-000C0J0279C
C148	281-0503-00			CAP.,FXD,CER DI:8PF,+/-0.5PF,500V	72982	301-000C0H0809D
C149	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C152	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C166	281-0547-00			CAP.,FXD,CER DI:2.7PF,10%,500V	72982	301-000C0J0279C
C168	281-0503-00			CAP.,FXD,CER DI:8PF,+/-0.5PF,500V	72982	301-000C0H0809D
C193	283-0026-00			CAP.,FXD,CER DI:0.2UF,+80-20%,25V	56289	274C3
C195	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C196	283-0026-00			CAP.,FXD,CER DI:0.2UF,+80-20%,25V	56289	274C3
C198	283-0026-00			CAP.,FXD,CER DI:0.2UF,+80-20%,25V	56289	274C3
C207	281-0538-00			CAP.,FXD,CER DI:1PF,20%,500V	80009	281-0538-00
C208	281-0528-00			CAP.,FXD,CER DI:82PF,+/-8.2PF,500V	72982	301-000U2M0820K
C215	281-0589-00			CAP.,FXD,CER DI:170PF,5%,500V	72982	301000Z5D171J
C217	281-0537-00			CAP.,FXD,CER DI:0.68PF,20%,600V	80009	281-0537-00
C220	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039 E 105Z
C227	281-0503-00			CAP.,FXD,CER DI:8PF,+/-0.5PF,500V	72982	301-000C0H0809D
C260	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C301	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C305	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	655-558-Z5V0203Z
C322	281-0572-00			CAP.,FXD,CER DI:6.8PF,+/-0.5PF,500V	72982	301-000C0H0689D
C329	281-0572-00			CAP.,FXD,CER DI:6.8PF,+/-0.5PF,500V	72982	301-000C0H0689D
C342	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C348	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C401	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C418	281-0629-00			CAP.,FXD,CER DI:33PF,5%,600V	72982	308-000C0G0330J
C420	281-0153-00			CAP.,VAR,AIR DI:1.7-10PF,250V	74970	187-0106-005
C421	281-0504-00			CAP.,FXD,CER DI:10PF,+/-1PF,500V	72982	301-055C0G0100F
C425	281-0160-00			CAP.,VAR,CER DI:7-25PF,350V	72982	538-011B7-25
C427	281-0160-00			CAP.,VAR,CER DI:7-25PF,350V	72982	538-011B7-25
C433	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C455	283-0100-00			CAP.,FXD,CER DI:0.0047UF,10%,200V	56289	273C3
C456	283-0119-00			CAP.,FXD,CER DI:2200PF,5%,200V	72982	855-535B222J
C458	283-0116-00			CAP.,FXD,CER DI:820PF,5%,500V	72982	801-547B821J
C465	283-0211-00			CAP.,FXD,CER DI:0.1UF,10%,200V	72982	8141N227C104K
C466	283-0187-00	B010100	B029999	CAP.,FXD,CER DI:0.047UF,10%,400V	72982	8131N401X5R473K
C466	283-0341-00	B030000		CAP.,FXD,CER DI:0.047UF,10%,100V	72982	8131N127X7R0473K
C468	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
C480	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C486	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C492	290-0522-00			CAP.,FXD,ELCTLT:1UF,20%,50V	56289	196D105X0050HA1
C494	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C496	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C521[1]		B010100	B029999X			
C522[1]		B010100	B029999X			
C527	281-0504-00	B010100	B029999X	CAP.,FXD,CER DI:10PF,+/-1PF,500V	72982	301-055C0G0100F

[1]Added if necessary.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C545	281-0550-00			CAP.,FXD,CER DI:120PF,10%,500V	04222	7001-1373
C552	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C555	283-0083-00			CAP.,FXD,CER DI:0.0047UF,20%,500V	72982	811-565C472J
C566	281-0095-00	XB030000	B059999X	CAP.,VAR,PLSTC:0.25-1.5PF,600V	12294	057001
C566	281-0064-00	B060000		CAP.,VAR,PLSTC:0.25-1.5PF,600V	72982	530-002
C567	281-0557-00	B010100	B029999X	CAP.,FXD,CER DI:1.8PF,10%,500V	72982	301-000C0K0189B
C568	281-0097-00	B010100	B029999	CAP.,VAR,CER DI:9-35PF,200V	72982	538-006-D9-35
C568	281-0089-00	B030000	B059999X	CAP.,VAR,CER DI:2-8PF,350V	72982	538-006-A2-8
C569	281-0579-00	B010100	B029999X	CAP.,FXD,CER DI:21PF,5%,500V	72982	301-050C0G0210J
C571	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C574	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C575	283-0083-00			CAP.,FXD,CER DI:0.0047UF,20%,500V	72982	811-565C472J
C584	281-0546-00	XB060000		CAP.,FXD,CER DI:330PF,10%,500V	04222	7001-1380
C586	281-0095-00	XB030000	B059999	CAP.,VAR,PLSTC:0.25-1.5PF,600V	12294	057001
C586	281-0064-00	B060000		CAP.,VAR,PLSTC:0.25-1.5PF,600V	72982	530-002
C587	281-0557-00	B010100	B029999X	CAP.,FXD,CER DI:1.8PF,10%,500V	72982	301-000C0K0189B
C588	281-0092-00	B010100	B029999	CAP.,VAR,CER DI:9-35PF,200V	72982	538-011 D9-35
C588	281-0091-00	B030000		CAP.,VAR,CER DI:2-8PF	72982	538-011 A2-8
C589	281-0579-00	B010100	B029999X	CAP.,FXD,CER DI:21PF,5%,500V	72982	301-050C0G0210J
C591	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C593	283-0002-00			CAP.,FXD,CER DI:0.01UF,+80-20%,500V	72982	811-546E103Z
C595	283-0081-00	B010100	B039999	CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C595	283-0024-00	B040000		CAP.,FXD,CER DI:0.1UF,+80-20%,30V	72982	8131N039Z5U-104Z
C597	283-0081-00	B010100	B039999	CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C597	283-0024-00	B040000		CAP.,FXD,CER DI:0.1UF,+80-20%,30V	72982	8131N039Z5U-104Z
C599	283-0081-00	B010100	B039999	CAP.,FXD,CER DI:0.1UF,+80-20%,25V	56289	36C600
C599	283-0024-00	B040000		CAP.,FXD,CER DI:0.1UF,+80-20%,30V	72982	8131N039Z5U-104Z
C605	281-0612-00	B010100	B285249	CAP.,FXD,CER DI:5.6PF,+/-0.5PF,500V	72982	374-001C0H0569D
C605	281-0584-00	B285250		CAP.,FXD,CER DI:100PF,5%,500V	72982	301-000Y5D101J
C610	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C615	281-0513-00			CAP.,FXD,CER DI:27PF,+/-5.4PF,500V	72982	301-000P2G0270M
C619	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C622	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C637	281-0510-00			CAP.,FXD,CER DI:22PF,+/-4.4PF,500V	72982	301-000C0G0220M
C639	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C643	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C662	283-0080-00			CAP.,FXD,CER DI:0.022UF,+80-20%,25V	56289	19C611
C667	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C669	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C679	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C806	290-0468-00			CAP.,FXD,ELCTLT:250UF,+75-10%,150V	56289	68D10470
C808	290-0507-00			CAP.,FXD,ELCTLT:1800UF,+75-10%,75V	56289	68D10472
C809	290-0507-00			CAP.,FXD,ELCTLT:1800UF,+75-10%,75V	56289	68D10472
C810	285-0555-00			CAP.,FXD,PLSTC:0.1UF,20%,100V	56289	410P10401
C811	290-0581-00			CAP.,FXD,ELCTLT:14,000UF,+75-10%,25V	56289	68D10489
C813	290-0506-00			CAP.,FXD,ELCTLT:9600UF,+100-10%,25V	56289	68D10471
C814	290-0506-00			CAP.,FXD,ELCTLT:9600UF,+100-10%,25V	56289	68D10471
C820	285-0555-00			CAP.,FXD,PLSTC:0.1UF,20%,100V	56289	410P10401
C821	290-0508-00			CAP.,FXD,ELCTLT:18,000UF,+100-10%,15V	56289	68D10444
C823	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C827	283-0077-00	XB070000		CAP.,FXD,CER DI:330PF,5%,500V	56289	40C94A3
C858	283-0078-00			CAP.,FXD,CER DI:0.001UF,20%,500V	56289	20C114A8
C866	283-0078-00			CAP.,FXD,CER DI:0.001UF,20%,500V	56289	20C114A8

http://scopes.com sqm.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C876	283-0328-00	XB060000		CAP.,FXD,CER DI:0.03UF,+80-20%,200V	72982	8131N225651303Z
C880	283-0638-00			CAP.,FXD,MICA D:130PF,1%,100V	00853	D151E131F0
C889	290-0415-00			CAP.,FXD,ELCTLT:5.6UF,10%,35V	56289	150D565X9035B2
C923	281-0591-00			CAP.,FXD,CER DI:5600PF,20%,200V	72982	3930-01Z5V0562Z
C936	283-0178-00	XB060000		CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C943	283-0078-00	XB090000		CAP.,FXD,CER DI:0.001UF,20%,500V	56289	20C114A8
C950	283-0083-00			CAP.,FXD,CER DI:0.0047UF,20%,500V	72982	811-565C472J
C975	283-0000-00	XB010175		CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C979	281-0591-00			CAP.,FXD,CER DI:5600PF,20%,200V	72982	3930-01Z5V0562Z
C985	283-0083-00			CAP.,FXD,CER DI:0.0047UF,20%,500V	72982	811-565C472J
C1002[1]	285-0562-00			CAP.,FXD,PLSTC:0.47UF,20%,400V	56289	410P47404
C1064	285-0703-00			CAP.,FXD,PLSTC:0.1UF,5%,100V	56289	410P112
C1079	281-0605-00			CAP.,FXD,CER DI:200PF,10%,500V	04222	7001-1375
C1105	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1124	283-0004-00	B010100	B319999	CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1124	283-0068-00	B320000		CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C1126	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1128	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C1131	283-0004-00	B010100	B319999	CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1131	283-0068-00	B320000		CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C1138	281-0053-00			CAP.,VAR,PLSTC:0.7-3PF,350V	72982	535-060 0.7-3
C1141	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1144	283-0004-00	B010100	B319999	CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1144	283-0068-00	B320000		CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C1146	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1148	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C1151	283-0004-00	B010100	B319999	CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1151	283-0068-00	B320000		CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C1158	281-0053-00			CAP.,VAR,PLSTC:0.7-3PF,350V	72982	535-060 0.7-3
C1184	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1193	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C1196	283-0004-00	B010100	B319999	CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C1196	283-0068-00	B320000		CAP.,FXD,CER DI:0.01UF,+100-0%,500V	56289	19C241
C1215	285-0629-00	B010100	B329999	CAP.,FXD,PLSTC:0.047UF,20%,100V	56289	410P47301
C1215	283-0341-00	B330000		CAP.,FXD,CER DI:0.047UF,10%,100V	72982	8131N127X7R0473K
C1222	290-0272-00	B010100	B029999	CAP.,FXD,ELCTLT:47UF,20%,50V	56289	109D476X0050F2
C1222	290-0287-00	B030000	B329999	CAP.,FXD,ELCTLT:47UF,20%,25V	56289	30D476X0025CC4
C1222	290-0770-00	B330000		CAP.,FXD,ELCTLT:100UF,+50-10%,25V	0000L	ECE-A25V100L
C1232	283-0082-00	B010100	B329999	CAP.,FXD,CER DI:0.01UF,+80-20%,4000V	56289	112C29
C1232	283-0261-00	B330000		CAP.,FXD,CER DI:0.01UF,20%,4000V	56289	575C1A1
C1234	283-0082-00			CAP.,FXD,CER DI:0.01UF,+80-20%,4000V	56289	112C29
C1240	290-0410-00	B010100	B329999	CAP.,FXD,ELCTLT:15UF,+50-10%,100V	56289	30D156F100DD4
C1240	290-0768-00	B330000		CAP.,FXD,ELCTLT:10UF,+50-10%,100V	0000L	ECE-A100V10L
C1241	283-0203-00	B010100	B109999	CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C1241	283-0221-00	B110000		CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8141N077C474M
C1241[2]	283-0129-00	XB112360		CAP.,FXD,CER DI:0.56UF,20%,100V	56289	725C7
C1247	283-0279-00	B010100	B329999	CAP.,FXD,CER DI:0.001UF,20%,3000V	56289	55C153
C1247	283-0188-00	B330000		CAP.,FXD,CER DI:0.001UF,20%,6000V	72982	8486KVX5T0102M
C1247[2]	283-0271-00	XB030492		CAP.,FXD,CER DI:0.001UF,20%,4000V	56289	33C325
C1250	283-0013-00	B010100	B329999	CAP.,FXD,CER DI:0.01UF,+100-0%,1000V	56289	33C29A7
C1250	283-0188-00	B330000		CAP.,FXD,CER DI:0.001UF,20%,6000V	72982	8486KVX5T0102M
C1254	283-0279-00	B010100	B329999X	CAP.,FXD,CER DI:0.001UF,20%,3000V	56289	55C153
C1254[2]	283-0271-00	XB030492		CAP.,FXD,CER DI:0.001UF,20%,4000V	56289	33C325

[1]Option 5 only.
[2]Option 4 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C1255	283-0279-00	B010100	B329999X	CAP.,FXD,CER DI:0.001UF,20%,3000V	56289	55C153
C1255[1]	283-0271-00	XB030492		CAP.,FXD,CER DI:0.001UF,20%,4000V	56289	33C325
C1257	281-0513-00			CAP.,FXD,CER DI:27PF,+/-5.4PF,500V	72982	301-000P2G0270M
C1258	290-0164-00			CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C1264	290-0164-00	B010100	B329999	CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2
C1264	290-0766-00	B330000		CAP.,FXD,ELCTLT:2.2UF,+50-10%,160V	56289	502D232
C1266	281-0513-00			CAP.,FXD,CER DI:27PF,+/-5.4PF,500V	72982	301-000P2G0270M
C1268	283-0279-00	B010100	B329999X	CAP.,FXD,CER DI:0.001UF,20%,3000V	56289	55C153
C1268[1]	283-0271-00	XB030492		CAP.,FXD,CER DI:0.001UF,20%,4000V	56289	33C325
C1269	283-0082-00	B010100	B329999X	CAP.,FXD,CER DI:0.01UF,+80-20%,4000V	56289	112C29
C1275	281-0543-00	B010100	B099999	CAP.,FXD,CER DI:270PF,10%,500V	72982	301055X5P271K
C1275	281-0589-00	B100000	B329999	CAP.,FXD,CER DI:170PF,5%,500V	72982	301000Z5D171J
C1275	281-0638-00	B330000		CAP.,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
C1276	283-0279-00	B010100	B099999	CAP.,FXD,CER DI:0.001UF,20%,3000V	56289	55C153
C1276	283-0261-00	B100000	B329999	CAP.,FXD,CER DI:0.01UF,20%,4000V	56289	575C1A1
C1276	283-0034-00	B330000		CAP.,FXD,CER DI:0.005UF,20%,4000V	56289	41C107A
C1276[1]	283-0271-00	XB030492		CAP.,FXD,CER DI:0.001UF,20%,4000V	56289	33C325
C1310	283-0402-00	XB330000		CAP.,FXD,CER DI:0.001UF,+80-20%,4000V	56289	OBD
C1312	283-0402-00	XB330000		CAP.,FXD,CER DI:0.001UF,+80-20%,4000V	56289	OBD
C1410	283-0402-00	XB330000		CAP.,FXD,CER DI:0.001UF,+80-20%,4000V	56289	OBD
C1411	283-0402-00	XB330000		CAP.,FXD,CER DI:0.001UF,+80-20%,4000V	56289	OBD
C1412	283-0402-00	XB330000		CAP.,FXD,CER DI:0.001UF,+80-20%,4000V	56289	OBD
C2101	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2109	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C2112	283-0077-00			CAP.,FXD,CER DI:330PF,5%,500V	56289	40C94A3
C2115	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C2117	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C2119	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C2121	283-0594-00			CAP.,FXD,MICA D:0.001UF,1%,100V	00853	D151F102F0
C2135	285-0698-00			CAP.,FXD,PLSTC:0.0082UF,5%,100V	56289	410P82251
C2140	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C2144	281-0544-00			CAP.,FXD,CER DI:5.6PF,10%,500V	72982	301-000C0H0569D
C2145	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C2155	283-0103-00			CAP.,FXD,CER DI:180PF,5%,500V	56289	40C638
C2183	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C2185	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2214	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	831-500Z5D471J
C2242	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C2244	283-0004-00			CAP.,FXD,CER DI:0.02UF,+80-20%,150V	72982	855-558-Z5V0203Z
C2255	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C2281	283-0054-00	XB140000		CAP.,FXD,CER DI:150PF,5%,200V	72982	855-535U2J151J
CR26	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR27	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR33	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR42	152-0141-02	B010100	B159999X	SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR44	152-0141-02	XB160000		SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR48	152-0141-02	XB160000		SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR84	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	80009	152-0333-00
CR85	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	80009	152-0333-00
CR93	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR124	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR125	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152

[1]Option 4 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR126	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR130	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR140	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR155	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR160	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR238	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR341	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR349	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR460	152-0269-00			SEMICOND DEVICE:SILICON,VAR VCAP.,4V,33PF	80009	152-0269-00
CR461	152-0269-00			SEMICOND DEVICE:SILICON,VAR VCAP.,4V,33PF	80009	152-0269-00
CR496	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR530	152-0153-00			SEMICOND DEVICE:SILICON,15V,50MA	80009	152-0153-00
CR531	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR532	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR533	152-0153-00			SEMICOND DEVICE:SILICON,15V,50MA	80009	152-0153-00
CR543	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR544	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR549	152-0153-00			SEMICOND DEVICE:SILICON,15V,50MA	80009	152-0153-00
CR621	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR622	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR635	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR641	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR672	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR674	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR676	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR806	152-0488-00			SEMICOND DEVICE:SILICON,200V,1500MA	80009	152-0488-00
CR808	152-0488-00			SEMICOND DEVICE:SILICON,200V,1500MA	80009	152-0488-00
CR811	152-0406-00			SEMICOND DEVICE:SILICON,200V,3A	80009	152-0406-00
CR820	152-0423-00			SEMICOND DEVICE:SILICON,400V,3A	04713	1N5000
CR821	152-0423-00			SEMICOND DEVICE:SILICON,400V,3A	04713	1N5000
CR852	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR861	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR867	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR868	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR875	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR883	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR885	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR888	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR891	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR894	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR895	152-0141-02	XB200000		SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR896	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR903	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR920	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR924	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR925	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR935	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR941	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR950	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR951	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR952	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR958	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR961	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR973	152-0061-00	XB050000		SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR980	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR981	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR989	152-0066-00			SEMICOND DEVICE:SILICON,400V,750MA	80009	152-0066-00
CR1021	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1023	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1024	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1026	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1028	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1115	152-0153-00			SEMICOND DEVICE:SILICON,15V,50MA	80009	152-0153-00
CR1215	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1216	152-0141-02	XB150000		SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR1232	152-0409-00			SEMICOND DEVICE:SILICON,12,000V,5MA	83003	VG12X
CR1244	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	80009	152-0333-00
CR1253	152-0242-00	B010100	B329999X	SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1254	152-0242-00	B010100	B329999X	SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1255	152-0242-00	B010100	B329999X	SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1258	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1262[1]	152-0586-00	XB330000		SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J
CR1263[1]	152-0586-00	XB330000		SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J
CR1264	152-0242-00			SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1268	152-0242-00	B010100	B329999X	SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1269	152-0242-00	B010100	B329999X	SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1270	152-0242-00	B010100	B329999X	SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1313	152-0242-00	XB330000		SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1315	152-0242-00	XB330000		SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1317	152-0242-00	XB330000		SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1413	152-0242-00	XB330000		SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1415	152-0242-00	XB330000		SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR1417	152-0242-00	XB330000		SEMICOND DEVICE:SILICON,225V,200MA	12969	NDP341
CR2124	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2125	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2127	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2140	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2141	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2142	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2145	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2146	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2156	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2157	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2162	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2163	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2166	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2167	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2170	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2171	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2174	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2175	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2192	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2193	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2196	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2198	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR2226	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152

[1]Option 4 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR2335						
THRU						
CR2366	152-0333-00	XB270000		SEMICOND DEVICE:SILICON,55V,200MA	80009	152-0333-00
DL400	119-0288-02			DELAY LINE,ELEC:	80009	119-0288-02
DS1001	150-0121-02			LAMP,CARTRIDGE:GREEN,5V,60MA	80009	150-0121-02
DS1090	150-0047-00			LAMP,INCAND:6.3V,0.2A	08806	398
DS1091	150-0047-00			LAMP,INCAND:6.3V,0.2A	08806	398
DS1092	150-0047-00			LAMP,INCAND:6.3V,0.2A	08806	398
DS1270	150-0030-00	XB330000		LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS1271	150-0030-00	XB330000		LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS1272	150-0030-00	XB330000		LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS1273	150-0030-00	XB330000		LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS1274	150-0030-00	XB330000		LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
F814	159-0021-00			FUSE,CARTRIDGE:3AG,2A,250V,FAST-BLOW	71400	AGC 2
F855	159-0083-00			FUSE,CARTRIDGE:0.15A,250V,FAST-BLOW	71400	AGC 15/100
F1000	159-0026-00			FUSE,CARTRIDGE:3AG,3.2A,125V,SLOW-BLOW	71400	MDX 3 2/10
J1	131-0767-02	B010100	B039999	CONNECTOR,RCPT,:76 CONTACT	80009	131-0767-02
J1	131-0767-08	B040000		CONNECTOR,RCPT,:PLUG-IN CKT BD,70 CONTACT	80009	131-0767-08
J2	131-0767-02	B010100	B039999	CONNECTOR,RCPT,:76 CONTACT	80009	131-0767-02
J2	131-0767-08	B040000		CONNECTOR,RCPT,:PLUG-IN CKT BD,70 CONTACT	80009	131-0767-08
J3	131-0767-00	B010100	B039999	CONNECTOR,RCPT,:76 CONTACT	80009	131-0767-00
J3	131-0767-07	B040000		CONNECTOR,RCPT,:PLUG-IN CKT BD,70 CONTACT	80009	131-0767-07
J26	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J27	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J401	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J409	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J431	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J503	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J508	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J601	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J603	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J629	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J649	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J679	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J1047	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J1049	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J1050	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
J1132	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J2132	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J2138	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J2139	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J2192	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
J2296	131-1003-00			CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
L425	108-0707-00			COIL,RF:150NH	80009	108-0707-00
L475	276-0528-00			SHIELDING BEAD,:0.1UH	80009	276-0528-00
L479	276-0528-00			SHIELDING BEAD,:0.1UH	80009	276-0528-00
L1098	108-0605-00			COIL,TUBE DEFLE:Y AXIS ALIGNMENT	80009	108-0605-00
L1099[1]	108-0647-00			COIL,RF:TRACE ROTATION	80009	108-0647-00
L1222	108-0646-00	B010100	B149999	COIL,RF:80UH	80009	108-0646-00

[1]Furnished as a unit with DL400.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
L1222	108-0422-00	B150000		COIL,RF:80UH	80009	108-0422-00
L2283	108-0331-00			COIL,RF:0.75UH	80009	108-0331-00
LR55	108-0245-00	XB130000		COIL,RF:3.9UH	80009	108-0245-00
LR193	108-0604-00	B010100	B129999	COIL,RF:3.2UH	80009	108-0604-00
LR193	108-0245-00	B130000		COIL,RF:3.9UH	80009	108-0245-00
LR195	108-0604-00	B010100	B129999	COIL,RF:3.2UH	80009	108-0604-00
LR195	108-0245-00	B130000		COIL,RF:3.9UH	80009	108-0245-00
LR198	108-0604-00	B010100	B129999	COIL,RF:3.2UH	80009	108-0604-00
LR198	108-0245-00	B130000		COIL,RF:3.9UH	80009	108-0245-00
LR473	108-0715-00			COIL,RF:255NH	80009	108-0715-00
LR479	108-0715-00			COIL,RF:255NH	80009	108-0715-00
LR482	108-0 31-00			COIL,RF:0.75UH	80009	108-0331-00
P60	131-0589-00	XB160000		CONTACT,ELEC:0.46 INCH LONG	22526	47350
Q90A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q108	151-0199-00			TRANSISTOR:SILICON,PNP	27014	ST65038
Q132	151-0199-00			TRANSISTOR:SILICON,PNP	27014	ST65038
Q137	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q142	151-0199-00			TRANSISTOR:SILICON,PNP	27014	ST65038
Q147	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q150	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q162	151-0199-00			TRANSISTOR:SILICON,PNP	27014	ST65038
Q167	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q236A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q238	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q242	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q252	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q314	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q334	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q336	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q344	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q346	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q407	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q415	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q496	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q539	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q547	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q551	151-0103-00			TRANSISTOR:SILICON,NPN	04713	2N2219A
Q553	151-0103-00			TRANSISTOR:SILICON,NPN	04713	2N2219A
Q558	151-0270-00	B010100	B029999	TRANSISTOR:SILICON,PNP	80009	151-0270-00
Q558	151-0406-00	B030000		TRANSISTOR:SILICON,PNP	80009	151-0406-00
Q560	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q578	151-0270-00	B010100	B029999	TRANSISTOR:SILICON,PNP	80009	151-0270-00
Q578	151-0406-00	B030000		TRANSISTOR:SILICON,PNP	80009	151-0406-00
Q580	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q606	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q618	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q620	151-0220-00	B010100	B285249	TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q620	151-0221-00	B285250		TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q631	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q634	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q640	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q662	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00

http://manuals.mcgraw-hill.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q666	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q672	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q827	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q829	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q835	151-0334-00			TRANSISTOR:SILICON,NPN	80009	151-0334-00
Q850	151-0337-00			TRANSISTOR:SILICON,NPN	80009	151-0337-00
Q852	151-0276-00			TRANSISTOR:SILICON,PNP	04713	2N5087
Q860	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q863	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q869	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q872	151-0279-00	B010100	B309999	TRANSISTOR:SILICON,NPN	80009	151-0279-00
Q872	151-0407-00	B310000		TRANSISTOR:SILICON,NPN	80009	151-0407-00
Q874	151-0336-00	B010100	B193849	TRANSISTOR:SILICON,NPN	80009	151-0336-00
Q874	151-0487-00	B193850		TRANSISTOR:SILICON,NPN,SEL FROM 2N3773	80009	151-0487-00
Q876A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q886A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q896	151-0228-00			TRANSISTOR:SILICON,PNP,SEL FROM 2N4888	80009	151-0228-00
Q900	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q903	151-0336-00	B010100	B193849	TRANSISTOR:SILICON,NPN	80009	151-0336-00
Q903	151-0487-00	B193850		TRANSISTOR:SILICON,NPN,SEL FROM 2N3773	80009	151-0487-00
Q908	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q909	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q910	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q919A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q926	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q931	151-0260-02			TRANSISTOR:SILICON,NPN	04713	2N5859
Q933	151-0337-00	B010100	B193849	TRANSISTOR:SILICON,NPN	80009	151-0337-00
Q933	151-0487-00	B193850		TRANSISTOR:SILICON,NPN,SEL FROM 2N3773	80009	151-0487-00
Q936A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q943A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q952	151-0134-00			TRANSISTOR:SILICON,PNP	80009	151-0134-00
Q956	151-0260-00			TRANSISTOR:SILICON,NPN	80009	151-0260-00
Q958	151-0337-00	B010100	B193849	TRANSISTOR:SILICON,NPN	80009	151-0337-00
Q958	151-0487-00	B193850		TRANSISTOR:SILICON,NPN,SEL FROM 2N3773	80009	151-0487-00
Q964A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q985	151-0136-00			TRANSISTOR:SILICON,NPN	02735	35495
Q988	151-0337-00			TRANSISTOR:SILICON,NPN	80009	151-0337-00
Q1061	151-0224-00			TRANSISTOR:SILICON,NPN	07263	2N3904
Q1066	151-0224-00			TRANSISTOR:SILICON,NPN	07263	2N3904
Q1070	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q1072	151-0220-00			TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q1107	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q1110	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q1118	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q1128	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q1132	151-0270-00	B010100	B029999	TRANSISTOR:SILICON,PNP	80009	151-0270-00
Q1132	151-0406-00	B030000		TRANSISTOR:SILICON,PNP	80009	151-0406-00
Q1134	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q1136	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q1148	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q1152	151-0270-00	B010100	B029999	TRANSISTOR:SILICON,PNP	80009	151-0270-00
Q1152	151-0406-00	B030000		TRANSISTOR:SILICON,PNP	80009	151-0406-00
Q1154	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00

http://www.xiaobo.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q1156	151-0223-00	B010100	B090000	TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q1156	151-0195-00	B100000		TRANSISTOR:SILICON,NPN	80009	151-0195-00
Q1201	151-0126-00			TRANSISTOR:SILICON,NPN	15818	2N2484
Q1206	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q1214	151-0136-00			TRANSISTOR:SILICON,NPN	02735	35495
Q1216	151-0140-00			TRANSISTOR:SILICON,NPN	80009	151-0140-00
Q1218	151-0140-00			TRANSISTOR:SILICON,NPN	80009	151-0140-00
Q2108	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q2112	151-0221-00			TRANSISTOR:SILICON,PNP	80009	151-0221-00
Q2138	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q2153	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q2159	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q2215A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q2223	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q2225	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q2229	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q2240	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q2286	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q2287	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q2296	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q2299	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
R12	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R14	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R20	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R21	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R26	315-0122-00	XB160000		RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R28	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R29	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R31	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R33	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R34	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R35	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R36	321-0231-00			RES.,FXD,FILM:2.49K OHM,1%,0.125W	91637	MFF1816G24900F
R37	315-0152-00	XB160000		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R38	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R39	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R42	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R44	315-0334-00	B010100	B159999	RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
R44	315-0152-00	B160000		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R46	315-0151-00	B010100	B159999X	RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R47	315-0683-00	B010100	B159999	RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R47	315-0243-00	B160000		RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R48	315-0334-00	B010100	B150000	RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
R48	315-0152-00	B160000		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R49	315-0105-00	B010100	B159999	RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R49	315-0104-00	B160000		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R50	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R51	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R53	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R54	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R55	315-0470-00	B010100	B129999X	RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R56	315-0471-00	B010100	B129999	RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R56	321-0169-00	B130000		RES.,FXD,FILM:562 OHM,1%,0.125W	91637	MFF1816G562R0F
R57	315-0682-00	B010100	B129999	RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R57	321-0266-00	B130000		RES.,FXD,FILM:5.76K OHM,1%,0.125W	91637	MFF1816G57600F
R58	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R59	315-0103-00	B010100	B129999	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R59	321-0282-00	B130000		RES.,FXD,FILM:8.45K OHM,1%,0.125W	91637	MFF1816G84500F
R61	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R62	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R63	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R67	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R74	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R76	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R77	315-0392-00	B010100	B129999	RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R77	315-0362-00	B130000		RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R78	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R80	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R82	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R83	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R84	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R85	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R86	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R88	321-0230-00			RES.,FXD,FILM:2.43K OHM,1%,0.125W	91637	MFF1816G24300F
R89	315-0910-00			RES.,FXD,CMPSN:91 OHM,5%,0.25W	01121	CB9105
R90	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R92	321-0202-00			RES.,FXD,FILM:1.24K OHM,1%,0.125W	91637	MFF1816G12400F
R93	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R95	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R96	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R98	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R99	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R101	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R102A,B	311-1404-00			RES.,VAR,NONWIR:5K OHM X 5K OHM,20%,1W	01121	10M901
R104	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R105	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R106	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R109	321-0243-00			RES.,FXD,FILM:3.32K OHM,1%,0.125W	91637	MFF1816G33200F
R110	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
R112	321-0097-00			RES.,FXD,FILM:100 OHM,1%,0.125W	91637	MFF1816G100R0F
R123	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R124	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R125	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R126	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R130	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R132	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R133	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R134	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R135	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R136	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R137	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R138	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R140	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R141	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R142	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225

http://www.manuals.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R143	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R144	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R145	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R146	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R147	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R148	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R149	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R150	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R152	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R154	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R155	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R157	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R159	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R160	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R161	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R162	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R163	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R164	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R165	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R166	315-068_-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R168	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R200	321-1068-02			RES.,FXD,FILM:50.5 OHM,0.5%,0.125W	91637	MFF1816D50R50D
R202	321-1068-02			RES.,FXD,FILM:50.5 OHM,0.5%,0.125W	91637	MFF1816D50R50D
R204	321-1068-02			RES.,FXD,FILM:50.5 OHM,0.5%,0.125W	91637	MFF1816D50R50D
R206	321-1068-02			RES.,FXD,FILM:50.5 OHM,0.5%,0.125W	91637	MFF1816D50R50D
R208	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R209	321-0741-02			RES.,FXD,FILM:40.9 OHM,0.5%,0.125W	91637	MFF1816D40R90D
R211	322-0197-00			RES.,FXD,FILM:1.1K OHM,1%,0.25W	91637	MFF1421G11000F
R212	321-0741-02			RES.,FXD,FILM:40.9 OHM,0.5%,0.125W	91637	MFF1816D40R90D
R214	322-0212-00			RES.,FXD,FILM:1.58K OHM,1%,0.25W	75042	CEBT0-1581F
R215	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R216	321-0741-02			RES.,FXD,FILM:40.9 OHM,0.5%,0.125W	91637	MFF1816D40R90D
R218	322-0197-00			RES.,FXD,FILM:1.1K OHM,1%,0.25W	91637	MFF1421G11000F
R219	321-0741-02			RES.,FXD,FILM:40.9 OHM,0.5%,0.125W	91637	MFF1816D40R90D
R222	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
R224	315-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.25W	01121	CB3305
R225	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R226	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R228	321-0060-00			RES.,FXD,FILM:41.2 OHM,1%,0.125W	91637	MFF1816G41R20F
R230	321-0236-00			RES.,FXD,FILM:2.8K OHM,1%,0. 25W	91637	MFF1816G28000F
R232	321-0060-00			RES.,FXD,FILM:41.2 OHM,1%,0.125W	91637	MFF1816G41R20F
R234	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R236	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R238	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R240	323-0149-00			RES.,FXD,FILM:348 OHM,1%,0.50W	75042	CECT0-3480F
R241	321-0212-00			RES.,FXD,FILM:1.58K OHM,1%,0.125W	91637	MFF1816G15800F
R246	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R250	323-0149-00			RES.,FXD,FILM:348 OHM,1%,0.50W	75042	CECT0-3480F
R251	321-0212-00			RES.,FXD,FILM:1.58K OHM,1%,0.125W	91637	MFF1816G15800F
R259	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R261	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R301	307-0106-00			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB47G5
R303	307-0106-00			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB47G5

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R305	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R307	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R308	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R310	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R312	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R314	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R315	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R317	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R319	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R320	321-02 8-00			RES.,FXD,FILM:1.82K OHM,1%,0.125W	91637	MFF1816G18200F
R321	321-0061-00			RES.,FXD,FILM:42.2 OHM,1%,0.125W	91637	MFF1816G42R20F
R322	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R323	321-0061-00			RES.,FXD,FILM:42.2 OHM,1%,0.125W	91637	MFF1816G42R20F
R324	322-0184-00			RES.,FXD,FILM:806 OHM,1%,0.25W	75042	CEBT0-8060F
R326	321-0061-00			RES.,FXD,FILM:42.2 OHM,1%,0.125W	91637	MFF1816G42R20F
R327	322-0184-00			RES.,FXD,FILM:806 OHM,1%,0.25W	75042	CEBT0-8060F
R328	321-0061-00			RES.,FXD,FILM:42.2 OHM,1%,0.125W	91637	MFF1816G42R20F
R329	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R330	321-0049-00			RES.,FXD,FILM:31.6 OHM,1%,0.125W	91637	MFF1816G31R60F
R332	321-0220-00			RES.,FXD,FILM:1.91K OHM,1%,0.125W	91637	MFF1816G19100F
R333	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	91637	MFF1816G301R0F
R334	321-0082-00			RES.,FXD,FILM:69.8 OHM,1%,0.125W	91637	MFF1816G69R80F
R335	321-0049-00			RES.,FXD,FILM:31.6 OHM,1%,0.125W	91637	MFF1816G31R60F
R336	321-0129-00			RES.,FXD,FILM:215 OHM,1%,0.125W	91637	MFF1816G215R0F
R337	321-0129-00			RES.,FXD,FILM:215 OHM,1%,0.125W	91637	MFF1816G215R0F
R338	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R339	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R340	321-0214-00			RES.,FXD,FILM:1.65K OHM,1%,0.125W	91637	MFF1816G16500F
R341	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R342	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R344	321-0040-00			RES.,FXD,FILM:25.5 OHM,1%,0.125W	91637	MFF1816G25R50F
R345	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R346	321-0040-00			RES.,FXD,FILM:25.5 OHM,1%,0.125W	91637	MFF1816G25R50F
R348	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R349	315-0680-00			RES.,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
R350	321-0214-00			RES.,FXD,FILM:1.65K OHM,1%,0.125W	91637	MFF1816G16500F
R352	315-0430-00			RES.,FXD,CMPSN:43 OHM,5%,0.25W	01121	CB4305
R401	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
R403	311-1228-00			RES.,VAR,NONWIR:10K OHM,20%,0.50W	32997	3386F-T04-103
R404	321-0326-00			RES.,FXD,FILM:24.3K OHM,1%,0.125W	91637	MFF1816G24301F
R405	321-0322-00			RES.,FXD,FILM:22.1K OHM,1%,0.125W	91637	MFF1816G22101F
R407	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R408	321-0230-00			RES.,FXD,FILM:2.43K OHM,1%,0.125W	91637	MFF1816G24300F
R409	323-0237-00			RES.,FXD,FILM:2.87K OHM,1%,0.50W	75042	CECT0-2871F
R411	321-0236-00			RES.,FXD,FILM:2.8K OHM,1%,0.125W	91637	MFF1816G28000F
R413	323-0237-00			RES.,FXD,FILM:2.87K OHM,1%,0.50W	75042	CECT0-2871F
R414	321-0230-00			RES.,FXD,FILM:2.43K OHM,1%,0.125W	91637	MFF1816G24300F
R415	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R416	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R417	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R418	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R420	315-0271-00			RES.,FXD,CMPSN:270 OHM,5%,0.25W	01121	CB2715
R421	311-1261-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	32997	3329P-L58-501

http://www.tekscan.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R423	317-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.125W	01121	BB4705
R424	317-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.125W	01121	BB4705
R425	311-1260-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	32997	3329P-L58-251
R427	311-1007-00			RES.,VAR,NONWIR:20 OHM,20%,0.50W	73138	82-38-0
R429	321-0114-00			RES.,FXD,FILM:150 OHM,1%,0.125W	91637	MFF1816G150R0F
R433	321-0068-00			RES.,FXD,FILM:49.9 OHM,1%,0.125W	91637	MFF1816G49R90F
R440	321-0181-00			RES.,FXD,FILM:750 OHM,1%,0.125W	91637	MFF1816G750R0F
R442	321-0092-00			RES.,FXD,FILM:88.7 OHM,1%,0.125W	91637	MFF1816G88R70F
R443	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
R444	321-0092-00			RES.,FXD,FILM:88.7 OHM,1%,0.125W	91637	MFF1816G88R70F
R446	321-0097-00			RES.,FXD,FILM:100 OHM,(NOM VALUE),SEL	91637	MFF1816G100R0F
R447	311-1261-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	32997	3329P-L58-501
R448	321-0097-00			RES.,FXD,FILM:100 OHM,(NOM VALUE),SEL	91637	MFF1816G100R0F
R450	321-0181-00			RES.,FXD,FILM:750 OHM,1%,0.125W	91637	MFF1816G750R0F
R452	323-0150-00			RES.,FXD,FILM:357 OHM,1%,0.50W	91637	MFF1226G357R0F
R453	323-0150-00			RES.,FXD,FILM:357 OHM,1%,0.50W	91637	MFF1226G357R0F
R455	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	73138	82-32-0
R456	315-0181-00	B010100	B029999	RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R456	315-0181-00	B030000	B339915X	RES.,FXD,CMPSN:180 OHM,(NOM VALUE),SEL	01121	CB1815
R458	315-0161-00	B010100	B029999	RES.,FXD,CMPSN:160 OHM,5%,0.25W	01121	CB1615
R458	315-0161-00	B030000	B339915X	RES.,FXD,CMPSN:160 OHM,(NOM VALUE),SEL	01121	CB1615
R460	315-0620-00	B010100	B259999	RES.,FXD,CMPSN:62 OHM,5%,0.25W	01121	CB6205
R460	315-0620-00	B260000		RES.,FXD,CMPSN:62 OHM,(NOM VALUE),SEL	01121	CB6205
R461	315-0824-00			RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R462	323-0150-00			RES.,FXD,FILM:357 OHM,1%,0.50W	91637	MFF1226G357R0F
R463	323-0150-00			RES.,FXD,FILM:357 OHM,1%,0.50W	91637	MFF1226G357R0F
R465	315-0681-00	B010100	B029999	RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R465	315-0681-00	B030000	B339915X	RES.,FXD,CMPSN:680 OHM,(NOM VALUE),SEL	01121	CB6815
R466	311-0635-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	73138	82-32-0
R468	315-0301-00	B010100	B029999	RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
R468	315-0301-00	B030000	B339915X	RES.,FXD,CMPSN:300 OHM,(NOM VALUE),SEL	01121	CB3015
R474	310-0701-00			RES.,FXD,WW:430 OHM,1%,8W	80009	310-0701-00
R478	310-0701-00			RES.,FXD,WW:430 OHM,1%,8W	80009	310-0701-00
R480	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R484	321-0197-00			RES.,FXD,FILM:1.1K OHM,1%,0.125W	91637	MFF1816G11000F
R486	311-1260-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	32997	3329P-L58-251
R488	323-0054-00			RES.,FXD,FILM:35.7 OHM,1%,0.50W	75042	CECT0-35R70F
R490	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R491	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R492	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R495	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R496	315-0431-00	B010100	B279999	RES.,FXD,CMPSN:430 OHM,(NOM VALUE),SEL	01121	CB4315
R496	315-0361-00	B280000		RES.,FXD,CMPSN:360 OHM,(NOM VALUE),SEL	01121	CB3615
R501	321-1068-01			RES.,FXD,FILM:50.5 OHM,0.5%,0.125W	91637	MFF1816G50R50D
R502	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R503	321-1068-01			RES.,FXD,FILM:50.5 OHM,0.5%,0.125W	91637	MFF1816G50R50D
R505	321-0297-00			RES.,FXD,FILM:12.1K OHM,1%,0.125W	91637	MFF1816G12101F
R506	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R508	321-0184-00			RES.,FXD,FILM:806 OHM,1%,0.125W	91637	MFF1816G806R0F
R509	321-0069-00			RES.,FXD,FILM:51.1 OHM,1%,0.125W	91637	MFF1816G51R10F
R511	321-0155-00			RES.,FXD,FILM:402 OHM,1%,0.125W	91637	MFF1816G402R0F
R512	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R513	321-0136-00			RES.,FXD,FILM:255 OHM,1%,0.125W	91637	MFF1816G255R0F

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R514	323-0219-00			RES.,FXD,FILM:1.87K OHM,1%,0.50W	75042	CECT0-1871F
R515	323-0219-00			RES.,FXD,FILM:1.87K OHM,1%,0.50W	75042	CECT0-1871F
R517	321-0212-00			RES.,FXD,FILM:1.58K OHM,1%,0.125W	91637	MFF1816G15800F
R519	321-0108-00	B010100	B129999	RES.,FXD,FILM:130 OHM,1%,0.125W	91637	MFF1816G130R0F
R519	321-0108-00	B130000		RES.,FXD,FILM:130 OHM,(NOM VALUE),SEL	91637	MFF1816G130R0F
R520[1]	[illegible]	B010100	B029999X			
R521	321-0261-00			RES.,FXD,FILM:5.11K OHM,1%,0.125W	91637	MFF1816G51100F
R522	321-0261-00			RES.,FXD,FILM:5.11K OHM,1%,0.125W	91637	MFF1816G51100F
R524	321-0202-00			RES.,FXD,FILM:1.24K OHM,1%,0.125W	91637	MFF1816G12400F
R525	311-1222-00			RES.,VAR,NONWIR:100 OHM,20%,0.50W	32997	3386F-T04-101
R526	321-0202-00			RES.,FXD,FILM:1.24K OHM,1%,0.125W	91637	MFF1816G12400F
R527	315-0222-00	B010100	B029999X	RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R529	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R531	323-0222-00			RES.,FXD,FILM:2K OHM,1%,0.50W	75042	CECT0-2001F
R532	323-0222-00			RES.,FXD,FILM:2K OHM,1%,0.50W	75042	CECT0-2001F
R534	321-0269-00			RES.,FXD,FILM:6.19K OHM,1%,0.125W	91637	MFF1816G61900F
R535	311-1225-00			RES.,VAR,NONWIR:1K OHM,20%,0.50W	32997	3386F-T04-102
R536	321-0269-00			RES.,FXD,FILM:6.19K OHM,1%,0.125W	91637	MFF1816G61900F
R538	321-0320-00			RES.,FXD,FILM:21K OHM,1%,0.125W	91637	MFF1816G21001F
R540	321-0225-00			RES.,FXD,FILM:2.15K OHM,1%,0.125W	91637	MFF1816G21500F
R542	315-0300-00			RES.,FXD,CMPSN:30 OHM,5%,0.25W	01121	CB3005
R543	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R544	315-0300-00			RES.,FXD,CMPSN:30 OHM,5%,0.25W	01121	CB3005
R546	321-0320-00			RES.,FXD,FILM:21K OHM,1%,0.125W	91637	MFF1816G21001F
R548	321-0225-00			RES.,FXD,FILM:2.15K OHM,1%,0.125W	91637	MFF1816G21500F
R549	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R551	303-0470-00			RES.,FXD,CMPSN:47 OHM,5%,1W	01121	GB4705
R555	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R556	301-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.50W	01121	EB3935
R558	323-0231-00			RES.,FXD,FILM:2.49K OHM,1%,0.50W	75042	CECT0-2491F
R559	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R561	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R562	323-0097-00			RES.,FXD,FILM:100 OHM,1%,0.50W	75042	CECT0-1000F
R563	323-0066-00			RES.,FXD,FILM:47.5 OHM,1%,0.50W	75042	CECT0-47R50F
R565	315-0101-00			RES.,FXD,CMPSN:100 OHM,(NOM VALUE),SEL	01121	CB1015
R566	323-0287-00			RES.,FXD,FILM:9.53K OHM,1%,0.50W	75042	CECT0-9531F
R567	323-0287-00			RES.,FXD,FILM:9.53K OHM,1%,0.50W	75042	CECT0-9531F
R568	315-0471-00	B010100	B029999X	RES.,FXD,CMPSN:470 OHM,(NOM VALUE),SEL	01121	CB4715
R569	321-0189-00			RES.,FXD,FILM:909 OHM,1%,0.125W	91637	MFF1816G909R0F
R570	321-0251-00			RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
R571	321-0830-03			RES.,FXD,FILM:2.41K OHM,0.25%,0.125W	91637	MFF1816D24100C
R573	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R574	323-0352-00			RES.,FXD,FILM:45.3K OHM,1%,0.50W	75042	CECT0-4532F
R575	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R576	301-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.50W	01121	EB3935
R578	323-0231-00			RES.,FXD,FILM:2.49K OHM,1%,0.50W	75042	CECT0-2491F
R579	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R581	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R582	323-0097-00			RES.,FXD,FILM:100 OHM,1%,0.50W	75042	CECT0-1000F
R583	323-0066-00			RES.,FXD,FILM:47.5 OHM,1%,0.50W	75042	CECT0-47R50F
R584	315-0185-00	XB060000		RES.,FXD,CMPSN:1.8M OHM,5%,0.25W	01121	CB1855
R585	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R586	323-0287-00			RES.,FXD,FILM:9.53K OHM,1%,0.50W	75042	CECT0-9531F

[1]Added if necessary.

http://www.tekscan.sqworks.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R587	323-0287-00			RES.,FXD,FILM:9.53K OHM,1%,0.50W	75042	CECT0-9531F
R588	315-0471-00	B010100	B029999X	RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R589	321-0189-00			RES.,FXD,FILM:909 OHM,1%,0.125W	91637	MFF1816G909R0F
R593	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R595	307-0106-00			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB47G5
R597	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R599	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R602	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R605	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R607	321-0020-00			RES.,FXD,FILM:15.8 OHM,1%,0.125W	91637	MFF1816G15R80F
R608	321-0089-00			RES.,FXD,FILM:82.5 OHM,1%,0.125W	91637	MFF1816G82R50F
R610	307-0106-00			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB47G5
R612	321-0193-00	B010100	B285249	RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R612	321-0612-00	B285250		RES.,FXD,FILM:500 OHM,1%,0.125W	91637	MFF1816G500R0F
R613	321-0222-00	B010100	B285249	RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R613	321-0193-00	B285250		RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R615	315-0240-00			RES.,FXD,CMPSN:24 OHM,5%,0.25W	01121	CB2405
R617	321-0020-00			RES.,FXD,FILM:15.8 OHM,1%,0.125W	91637	MFF1816G15R80F
R619	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R622	321-0208-00			RES.,FXD,FILM:1.43K OHM,1%,0.125W	91637	MFF1816G14300F
R623	307-0106-00			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB47G5
R625	321-0224-00			RES.,FXD,FILM:2.1K OHM,1%,0.125W	91637	MFF1816G21000F
R627	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R630	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R633	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R636	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R637	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R639	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R641	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R643	315-0220-00			RES.,FXD,CMPSN:22 OHM,5%,0.25W	01121	CB2205
R645	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	91637	MFF1816G49900F
R647	321-0190-00			RES.,FXD,FILM:931 OHM,1%,0.125W	91637	MFF1816G931R0F
R651	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R652	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R654	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R655	315-0 23-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R657	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R658	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R660	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R662	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R663	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R667	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R669	307-0106-00			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB47G5
R670	321-0143-00			RES.,FXD,FILM:301 OHM,1%,0.125W	91637	MFF1816G301R0F
R672	321-0180-00			RES.,FXD,FILM:732 OHM,1%,0.125W	91637	MFF1816G732R0F
R673	321-0226-00			RES.,FXD,FILM:2.21K OHM,1%,0.125W	91637	MFF1816G22100F
R675	321-0189-00			RES.,FXD,FILM:909 OHM,1%,0.125W	91637	MFF1816G909R0F
R677	315-0390-00			RES.,FXD,CMPSN:39 OHM,5%,0.25W	01121	CB3905
R679	307-0106-00			RES.,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB47G5
R805	307-0113-00	B010100	B139999X	RES.,FXD,CMPSN:5.1 OHM,5%,0.25W	01121	CB51G5
R806	302-0473-00	XB020000		RES.,FXD,CMPSN:47K OHM,10%,0.50W	01121	EB4731
R808	302-0223-00	XB020000		RES.,FXD,CMPSN:22K OHM,10%,0.50W	01121	EB2231
R809	302-0223-00	XB020000		RES.,FXD,CMPSN:22K OHM,10%,0.50W	01121	EB2231

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R811	302-0472-00	XB020000		RES.,FXD,CMPSN:4.7K OHM,10%,050W	01121	EB4721
R813	302-0472-00	XB020000		RES.,FXD,CMPSN:4.7K OHM,10%,050W	01121	EB4721
R821	302-0472-00	XB020000		RES.,FXD,CMPSN:4.7K OHM,10%,050W	01121	EB4721
R822	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R823	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R824	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R826	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R827	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R830	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R831	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R833	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R837	307-0054-00			RES.,FXD,CMPSN:3.6 OHM,5%,0.50W	01121	EB36GB
R838	307-0054-00			RES.,FXD,CMPSN:3.6 OHM,5%,0.50W	01121	EB36GB
R853	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R855	323-0309-00			RES.,FXD,FILM:16.2K OHM,1%,0.50W	75042	CECT0-1622F
R856	323-0289-00			RES.,FXD,FILM:10K OHM,1%,0.50W	75042	CECT0-1002F
R858	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
R859	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
R860	315-0684-00			RES.,FXD,CMPSN:680K OHM,5%,0.25W	01121	CB6845
R862	315-0204-00			RES.,FXD,CMPSN:200K OHM,5%,0.25W	01121	CB2045
R864	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R866	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R867	315-0824-00			RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R870	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R872	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R875	308-0677-00			RES.,FXD,WW:1 OHM,5%,2W	75042	BWH-1R000J
R876	315-0204-00	B010100	B019999	RES.,FXD,CMPSN:200K OHM,5%,0.25W	01121	CB2045
R876	315-0154-00	B020000		RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R877	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R878	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R879	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R880	323-0272-00			RES.,FXD,FILM:6.65K OHM,1%,0.50W	75042	CECT0-6651F
R881	311-1223-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	32997	3386F-T04-251
R882	323-0206-00			RES.,FXD,FILM:1.37K OHM,1%,0.50W	75042	CECT0-1371F
R883	321-0223-00			RES.,FXD,FILM:2.05K OHM,1%,0.125W	91637	MFF1816G20500F
R884	323-0306-00			RES.,FXD,FILM:15K OHM,1%,0.50W	75042	CECT0-1502F
R886	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
R889	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R890	323-0264-00			RES.,FXD,FILM:5.49K OHM,1%,0.50W	91637	MFF1226G54900F
R891	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R892	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R894	315-0245-00			RES.,FXD,CMPSN:2.4M OHM,5%,0.25W	01121	CB2455
R896	301-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.50W	01121	EB3635
R898	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R901	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R903	308-0677-00			RES.,FXD,WW:1 OHM,5%,2W	75042	BWH-1R000J
R904	308-0679-00			RES.,FXD,WW:0.51 OHM,5%,2W	75042	BWH-R5100J
R906	315-0304-00			RES.,FXD,CMPSN:300K OHM,5%,0.25W	01121	CB3045
R907	315-0104-00	B010100	B129999	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R907	315-0753-00	B130000		RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R908	315-0431-00			RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
R910	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R911	315-0563-00			RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R912	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R915	321-1296-07			RES.,FXD,FILM:12K OHM,0.1%,0.125W	91637	MFF1816C12001B
R916	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
R918	301-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.50W	01121	EB6835
R921	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R922	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R923	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R924	315-0623-00			RES.,FXD,CMPSN:62K OHM,5%,0.25W	01121	CB6235
R927	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R932	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R935	308-0678-00			RES.,FXD,WW:0.1 OHM,5%,2W	75042	BWH-R1000J
R936	301-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.50W	01121	EB2735
R937	315-0361-00	B010100	B119999	RES.,FXD,CMPSN:360 OHM,5%,0.25W	01121	CB3615
R937	321-0151-00	B120000		RES.,FXD,FILM:365 OHM,1%,0.125W	91637	MFF1816G365R0F
R938	315-0303-00	B010100	B119999	RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R938	321-0330-00	B120000		RES.,FXD,FILM:26.7K OHM,1%,0.125W	91637	MFF1816G26701F
R939	315-0184-00	B010100	B119999	RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R939	321-0409-00	B120000		RES.,FXD,FILM:178K OHM,1%,0.125W	91637	MFF1816G17802F
R940	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R942	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R945	321-0332-07			RES.,FXD,FILM:28K OHM,0.1%,0.125W	91637	MFF1816C28001B
R946	321-1296-07			RES.,FXD,FILM:12K OHM,0.1%,0.125W	91637	MFF1816C12001B
R948	315-0914-00			RES.,FXD,CMPSN:910K OHM,5%,0.25W	01121	CB9145
R950	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R952	301-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.50W	01121	EB3035
R954	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R956	307-0103-00			RES.,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R957	315-0151-00	B010100	B309999	RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R957	315-0510-00	B310000		RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R958	308-0678-00			RES.,FXD,WW:0.1 OHM,5%,2W	75042	BWH-R1000J
R959	308-0680-00			RES.,FXD,WW:0.045 OHM,10%,3W	91637	RS2B-R0450K
R961	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R963	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R966	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R967	315-0364-00			RES.,FXD,CMPSN:360K OHM,5%,0.25W	01121	CB3645
R970	321-0926-07			RES.,FXD,FILM:4K OHM,0.1%,0.125W	91637	MFF1816C40000B
R971	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
R973	315-0104-00	B010100	B049999	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R973	315-0683-00	B050000		RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R974	315-0303-00	XB050000		RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R975	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R977	315-0184-00			RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R979	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R980	315-0164-00			RES.,FXD,CMPSN:160K OHM,5%,0.25W	01121	CB1645
R983	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R985	304-0470-00			RES.,FXD,CMPSN:47 OHM,10%,1W	01121	GB4701
R986	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R989	308-0678-00			RES.,FXD,WW:0.1 OHM,5%,2W	75042	BWH-R1000J
R991	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R993	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R994	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R995	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1018	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025

http://www.tek-manuals.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1019	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1020	315-0150-00			RES.,FXD,CMPSN:15 OHM,5%,0.25W	01121	CB1505
R1022	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R1045	311-1044-00	B010100	B039999	RES.,VAR,NONWIR:50K OHM,20%,0.50W	01121	W-7542A
R1045	311-1529-00	B040000		RES.,VAR,NONWIR:50K OHM,20%	12697	381-CM39977
R1061	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R1062	315-0362-00			RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R1063	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R1066	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R1067	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R1069	315-0433-00			RES.,FXD,CMPSN:43K OHM,5%,0.25W	01121	CB4335
R1071	323-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.50W	75042	CECT0-4991F
R1073	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R1074	315-0 02-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1076	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R1077	311-1227-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R1079	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
R1081	321-0812-07			RES.,FXD,FILM:455 OHM,0.1%,0.125W	91637	MFF1816C455R0B
R1082	321-0825-03			RES.,FXD,FILM:50.8 OHM,0.25%,0.125W	91637	MFF1816D50R80C
R1084	321-0816-07			RES.,FXD,FILM:5K OHM,0.1%,0.125W	91637	MFF1816C50000B
R1085	321-1068-07			RES.,FXD,FILM:50.5 OHM,0.1%,0.125W	91637	MFF1816C50R50B
R1087	308-0679-00			RES.,FXD,WW:0.51 OHM,5%,2W	75042	BWH-R5100J
R1095[1]	311-1055-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W,W/SW	12697	381-CM40034
R1101	315-0470-00			RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1103	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R1105	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1106	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R1108	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R1111	321-0233-00			RES.,FXD,FILM:2.61K OHM,1%,0.125W	91637	MFF1816G26100F
R1113	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1114	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R1115	315-0121-00			RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R1116	311-1248-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	73138	72X-23-0-501K
R1119	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1120	301-0563-00			RES.,FXD,CMPSN:56K OHM,5%,0.50W	01121	EB5635
R1121	311-1237-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3386X-T07-102
R1122	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R1124	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1126	303-0203-00			RES.,FXD,CMPSN:20K OHM,5%,1W	01121	GB2035
R1128	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1129	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1131	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1132	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1135	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1137	315-0121-00			RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R1138	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R1139	323-0312-00			RES.,FXD,FILM:17.4K OHM,1%,0.50W	91637	MFF1226G17401F
R1139[2]	323-0314-00	XB030492		RES.,FXD,FILM:18.2K OHM,1%,0.50W	75042	CECT0-1822F
R1141	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R1144	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1146	303-0203-00			RES.,FXD,CMPSN:20K OHM,5%,1W	01121	GB2035
R1148	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1149	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025

[1]Furnished as a unit with S1030.
[2]Option 4 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1151	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1152	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1155	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1157	315-0121-00			RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R1158	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R1159[1]	323-0312-00			RES.,FXD,FILM:17.4K OHM,1%,0.50W	91637	MFF1226G17401F
R1159[1]	323-0317-00	XB030492		RES.,FXD,FILM:19.6K OHM,1%,0.50W	75042	CECT0-1962F
R1181	311-1227-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R1184	311-1235-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	32997	3386F-T04-104
R1190	311-1227-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R1193	311-1235-00			RES.,VAR,NONWIR:100K OHM,20%,0.50W	32997	3386F-T04-104
R1195	315-0183-00	B010100	B079999	RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R1195	315-0362-00	B080000		RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R1196	315-0183-00	B010100	B079999	RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R1196	315-0362-00	B080000		RES.,FXD,CMPSN:3.6K OHM,5%,0.25W	01121	CB3625
R1201	315-0103-00	XB150000	B329999X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1201[1]	315-0103-00	XB330000		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1202	315-0102-00	B010100	B329999X	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1202[1]	315-0102-00	XB330000		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1204	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R1205[1]	315-0202-00	XB330000		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R1207	315-0102-00	B010100	B329999X	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1207[1]	315-0102-00	XB330000		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1208	315-0104-00	B010100	B329999X	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1208[1]	315-0104-00	XB330000		RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1210	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1210[1]	315-0152-00	XB330000		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R1211	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1211[1]	315-0562-00	XB330000		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R1214	315-0102-00	B010100	B329999X	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1214[1]	315-0102-00	XB330000		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R1217[1]	315-0470-03	XB330000		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1234	315-0203-00	B010100	B329999X	RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R1234[1]	315-0472-03	XB330000		RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1235[1]	315-0470-03	XB330000		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1242	315-0101-00	XB010175	B329999X	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1242[1]	315-0101-00	XB330000		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1243	315-0434-00	B010100	B109999	RES.,FXD,CMPSN:430K OHM,5%,0.25W	01121	CB4345
R1243	315-0364-00	B110000		RES.,FXD,CMPSN:360K OHM,5%,0.25W	01121	CB3645
R1243[1]	321-0407-00	XB030492	B329999	RES.,FXD,FILM:169K OHM,1%,0.125W	91637	MFF1816G16902F
R1243[1]	315-0364-00	B330000		RES.,FXD,CMPSN:360K OHM,5%,0.25W	01121	CB3645
R1244[1]	321-0335-00	XB030492		RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R1245A				412K OHM		
R1245B	307-0359-00			RES.,FXD,FILM:24.5M OHM	80009	307-0359-00
R1245C				20.5M OHM		
R1245D				4.5M OHM		
R1250	311-1256-00			RES.,VAR,NONWIR:2.5M OHM,20%,0.50W	73138	72PM-78-0-255
R1252	315-0915-00	B010100	B329999	RES.,FXD,CMPSN:9.1M OHM,5%,0.25W	01121	CB9155
R1252	322-0524-0.	B330000		RES.,FXD,FILM:2.8M OHM,0.5%,0.25W	91637	MFF1421G28003D
R1253	315-0103-00	XB102280	B329999X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1253[1]	315-0103-00	XB030492		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1254	315-0103-00	XB254775	B329999X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1257	315-0105-00	B010100	B099999	RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055

[1]Option 4 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R1257	315-0754-00	B100000	B329999X	RES.,FXD,CMPSN:750K OHM,5%,0.25W	01121	CB7545
R1257 [1]	315-0754-03	XB330000		RES.,FXD,CMPSN:750K OHM,5%,0.25W	01121	CB7545
R1258	315-0103-00	XB102280	B329999X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1258 [1]	315-0103-00	XB030492		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1259	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R1259 [1]	315-0513-00	XB330000		RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R1260 [1]	315-0103-03	XB330000		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1261	311-1232-00			RES.,VAR,NONWIR:50K OHM,20%,0.50W	32997	3386F-T04-503
R1262	315-0103-00	XB102280	B329999X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1262 [1]	315-0103-03	XB030492		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1263	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R1263 [1]	315-0513-00	XB330000		RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R1266	315-0125-00	B010100	B099999	RES.,FXD,CMPSN:1.2M OHM,5%,0.25W	01121	CB1255
R1266	315-0754-00	B100000	B329999X	RES.,FXD,CMPSN:750K OHM,5%,0.25W	01121	CB7545
R1266 [1]	315-0754-03	XB330000		RES.,FXD,CMPSN:750K OHM,5%,0.25W	01121	CB7545
R1270	315-0103-00	XB102280	B329999X	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1270 [1]	315-0103-00	XB030492		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1271	315-0915-00	B010100	B329999X	RES.,FXD,CMPSN:9.1M OHM,5%,0.25W	01121	CB9155
R1271 [1]	315-0134-00	XB330000		RES.,FXD,CMPSN:130K OHM,5%,0.25W	01121	CB1345
R1274	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1275	315-0474-00	B010100	B099999	RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R1275	315-0563-00	B100000	B329999X	RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
R1275 [1]	315-0134-03	XB330000		RES.,FXD,CMPSN:130K OHM,5%,0.25W	01121	CB1345
R1276 [1]	308-0703-00	XB030492		RES.,FXD,WW:1.8 OHM,5%,2W	75042	BWH-1R800J
R1278	315-0470-00	XB330000		RES.,FXD,CMPSN:47 OHM,5%,0.25W	01121	CB4705
R1313	315-0243-03	XB330000		RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R1315	315-0103-03	XB330000		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1317	315-0206-01	XB330000		RES.,FXD,CMPSN:20M OHM,5%,0.25W	01121	CB2065
R1319	315-0103-03	XB330000		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1413	315-0243-03	XB330000		RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R1415	315-0103-03	XB330000		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R1417	315-0206-01	XB330000		RES.,FXD,CMPSN:20M OHM,5%,0.25W	01121	CB2065
R1419	315-0824-02	XB330000		RES.,FXD,CMPSN:820K OHM,5%,0.25W	01121	CB8245
R2101	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R2102	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2104	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R2105	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R2107	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R2108	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R2109	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R2112	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2113	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
R2122	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R2123	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R2127	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R2128	311-1225-00	B010100	B139999	RES.,VAR,NONWIR:1K OHM,20%,0.50W	32997	3386F-T04-102
R2128	311-1263-00	B140000		RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
R2129	315-0183-00			RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R2135	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R2137	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R2139	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R2144	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R2146	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525

[1]Option 4 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R2148	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2150	321-0403-00			RES.,FXD,FILM:154K OHM,1%,0.125W	91637	MFF1816G15402F
R2151	321-0372-00			RES.,FXD,FILM:73.2K OHM,1%,0.125W	91637	MFF1816G73201F
R2153	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R2155	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R2158	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R2161	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2162	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2163	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2165	315-0 02-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2166	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2167	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2169	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2170	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2171	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2173	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2174	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2175	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R2177	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R2178	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R2179	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R2182	321-0262-00			RES.,FXD,FILM:5.23K OHM,1%,0.125W	91637	MFF1816G52300F
R2183	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R2191	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R2192	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R2193	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R2194	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R2196	321-0308-00			RES.,FXD,FILM:15.8K OHM,1%,0.125W	91637	MFF1816G15801F
R2197	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R2198	321-0319-00			RES.,FXD,FILM:20.5K OHM,1%,0.125W	91637	MFF1816G20501F
R2199	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R2201	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R2202	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R2203	321-0344-00			RES.,FXD,FILM:37.4K OHM,1%,0.125W	91637	MFF1816G37401F
R2204	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R2206	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R2207	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R2208	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R2209	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R2211	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R2213	321-0259-00			RES.,FXD,FILM:4.87K OHM,1%,0.125W	91637	MFF1816G48700F
R2214	311-1224-00			RES.,VAR,NONWIR:500 OHM,20%,0.50W	32997	3386F-T04-501
R2215	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R2217	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R2219	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R2220	321-0299-00			RES.,FXD,FILM:12.7K OHM,1%,0.125W	91637	MFF1816G12701F
R2221	321-0212-00			RES.,FXD,FILM:1.58K OHM,1%,0.125W	91637	MFF1816G15800F
R2226	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R2227	321-0268-00			RES.,FXD,FILM:6.04K OHM,1%,0.125W	91637	MFF1816G60400F
R2229	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
R2231	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R2235	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R2236	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035

http://manuals.sqlu.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R2237	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R2238	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R2241	321-0326-00			RES.,FXD,FILM:24.3K OHM,1%,0.125W	91637	MFF1816G24301F
R2251	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2252	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2253	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2254	315-0303-00	XB140000		RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R2261	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R2262	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2265	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R2266	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R2268	321-0296-00			RES.,FXD,FILM:11.8K OHM,1%,0.125W	91637	MFF1816G11801F
R2273	311-1226-00			RES.,VAR,NONWIR:2.5K OHM,20%,0.50W	32997	3386F-T04-252
R2274	321-0153-00			RES.,FXD,FILM:383 OHM,1%,0.125W	91637	MFF1816G383R0F
R2275	321-0170-00			RES.,FXD,FILM:576 OHM,1%,0.125W	91637	MFF1816G576R0F
R2276	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R2277	321-0250-00			RES.,FXD,FILM:3.92K OHM,1%,0.125W	91637	MFF1816G39200F
R2278	315-0823-00	XB140000		RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
R2279	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R2280	315-0823-00			RES.,FXD,CMPSN:82K OHM,5%,0.25W	01121	CB8235
R2281	315-0101-00	XB140000		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R2282	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R2283	315-0753-00	XB140000		RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R2284	321-0216-00			RES.,FXD,FILM:1.74K OHM,1%,0.125W	91637	MFF1816G17400F
R2285	321-0245-00			RES.,FXD,FILM:3.48K OHM,1%,0.125W	91637	MFF1816G34800F
R2286	321-0209-00	B010100	B326669	RES.,FXD,FILM:1.47K OHM,1%,0.125W	91637	MFF1816G14700F
R2286	315-0210-00	B326670		RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G1500F
R2287	321-0199-00			RES.,FXD,FILM:1.15K OHM,1%,0.125W	91637	MFF1816G11500F
R2288	321-0273-00			RES.,FXD,FILM:6.81K OHM,1%,0.125W	91637	MFF1816G68100F
R2289	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R2291	311-1225-00			RES.,VAR,NONWIR:1K OHM,20%,0.50W	32997	3386F-T04-102
R2292	315-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
R2293	321-0245-00			RES.,FXD,FILM:3.48K OHM,1%,0.125W	91637	MFF1816G34800F
R2294	321-0255-00			RES.,FXD,FILM:4.42K OHM,1%,0.125W	91637	MFF1816G44200F
R2295	321-0241-00			RES.,FXD,FILM:3.16K OHM,1%,0.125W	91637	MFF1816G31600F
R2297	315-0102-00	B010100	B039999	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2297	315-0152-00	B040000		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R2298	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R2299	315-0511-00	B010100	B139999	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R2299	315-0431-00	B140000		RES.,FXD,CMPSN:430 OHM,5%,0.25W	01121	CB4315
RT417	307-0125-00			RES.,THERMAL:500 OHM,10%,25 DEG C	50157	2D1595
RT461	307-0181-00			RES.,THERMAL:100K OHM,10%,4MW/DEG C	15454	1DE104-K-220EC
S659	260-0984-00			SWITCH,SLIDE:DP 3 POSN,0.5A,125VAC-DC	79727	G-128SPC/7140
S1000	260-0724-00	B010100	B153278	SW,THERMOSTATIC:OPEN 83.3 DEG,CL 66.7 DEG C	93410	110181
S1000	260-1759-00	B153279		SW,THERUOSTATIC:OPEN 83.3 DEG,CL 66.7 DEG	82647	20700L66-322
S1001	260-1222-00			SWITCH,PUSH-PUL:10A,250VAC	91929	2DM301
S1011	260-1379-00			SWITCH,PUSH:TRIG SOURCE	71590	2KBC120000-595
S1021	260-1378-00			SWITCH,PUSH:VERT MODE	71590	2KBC140000-608
S1030[1]				:BEAM FINDER		
S2110	260-0723-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
T523	120-0546-00	XB030000		XFMR,TOROID:4 TURNS BIFILAR	80009	120-0546-00
T801	120-0708-00			XFMR,PWR,STPDN:LV	80009	120-0708-00

[1]Furnished as a unit with R1095.

http://manuals.search.com

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
T1225	120-0709-00	B010100	B029999	XFMR,PWR,STPDN:HV POWER	80009	120-0709-00
T1225	120-0823-00	B030000	B099999	XFMR,PWR,STPDN:HV POWER	80009	120-0823-00
T1225	120-0879-00	B100000	B329999	XFMR,PWR,STPDN:HV POWER	80009	120-0879-00
T1225	120-1087-00	B330000		XFMR,PWR,SDN/SU:HV POWER	80009	120-1087-00
U55	155-0011-00			MICROCIRCUIT,DI:ML,CLOCK AND CHOP BLANKING	80009	155-0011-00
U99	156-0048-00			MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY	02735	CA3046
U123	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U156	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U214	155-0022-00			MICROCIRCUIT,DI:ML,CHANNEL SWITCH	80009	155-0022-00
U324	155-0022-00			MICROCIRCUIT,DI:ML,CHANNEL SWITCH	80009	155-0022-00
U450	155-0080-00			MICROCIRCUIT,LI:HYBRID	80009	155-0080-00
U510	155-0022-00			MICROCIRCUIT,DI:ML,CHANNEL SWITCH	80009	155-0022-00
U973	156-0065-00			MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY	80009	156-0065-00
U1230[1]	119-0286-00	B010100	B029999	MULTIPLIER,HV:	80009	119-0286-00
U1230[1,2]	119-0401-00	B030000		MULTIPLIER,HV:	80009	119-0401-00
U1230[1]	152-0495-00			SEMICOND DEVICE:V MULTR,6KV IN,12KV OUT	80009	152-0495-00
U2120	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U2126	155-0021-00	B010100	B122784	MICROCIRCUIT,DI:ML,TIMING GENERATOR	80009	155-0021-00
U2126	155-0021-01	B122785		MICROCIRCUIT,DI:ML,TIMING GENERATOR	80009	155-0021-01
U2155	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U2159	155-0017-00			MICROCIRCUIT,DI:ML,ZERO LOGIC COUNTER	80009	155-0017-00
U2180	155-0015-01			MICROCIRCUIT,DI:ML,ANALOG DATA SWITCH	80009	155-0015-01
U2185	155-0014-01			MICROCIRCUIT,DI:ML,ANALOG TO DECIMAL CONV	80009	155-0014-01
U2190	155-0015-01			MICROCIRCUIT,DI:ML,ANALOG DATA SWITCH	80009	155-0015-01
U2232	155-0018-00			MICROCIRCUIT,DI:ZERO LOGIC	80009	155-0018-00
U2244	155-0014-01			MICROCIRCUIT,DI:ML,ANALOG TO DECIMAL CONV	80009	155-0014-01
U2250	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	01295	SN7493AN
U2260	155-0019-00			MICROCIRCUIT,DI:ML,DECIMAL POINT AND SPACE	80009	155-0019-00
U2270	155-0023-00			MICROCIRCUIT,DI:ML,CHAR GEN NUMERALS	80009	155-0023-00
U2272	155-0024-00			MICROCIRCUIT,DI:ML,CHAR GEN SPCL SYMBOLS	80009	155-0024-00
U2274	155-0025-00			MICROCIRCUIT,DI:ML,CHAR GEN PREFIXES	80009	155-0025-00
U2276	155-0026-00			MICROCIRCUIT,DI:ML,CHAR GEN LETTERS	80009	155-0026-00
U2278	155-0027-00			MICROCIRCUIT,DI:ML,CHAR GEN SPCL ALPHA	80009	155-0027-00
U2284	155-0020-00			MICROCIRCUIT,DI:ML,CHANNEL SW OUTPUT ASSY	80009	155-0020-00
V1099	154-0640-00	B010100	B019999	ELECTRON TUBE:CRT	80009	154-0640-00
V1099	154-0640-05	B020000	B327256	ELECTRON TUBE:CRT	80009	154-0640-05
V1099	154-0640-10	B327257		ELECTRON TUBE:CRT,P31 INT SCALE	80009	154-0640-10
V1099[2]	154-0672-00	XB030492		ELECTRON TUBE:CRT,P31	80009	154-0672-00
V1099[3]	154-0673-00			ELECTRON TUBE:CRT,P31	80009	154-0673-00
VR244	152-0243-00			SEMICOND DEVICE:ZENER,0.4W,15V,5%	81483	1N965B
VR254	152-0243-00			SEMICOND DEVICE:ZENER,0.4W,15V,5%	81483	1N965B
VR851	152-0283-00			SEMICOND DEVICE:ZENER,0.4W,43V,5%	04713	1N976B
VR890	152-0124-00			SEMICOND DEVICE:ZENER,0.5W,9V,5%	80009	152-0124-00
VR1142	152-0055-00			SEMICOND DEVICE:ZENER,0.4W,11V,5%	04713	1N962B
VR1258	152-0283-00	B010100	B329999X	SEMICOND DEVICE:ZENER,0.4W,43V,5%	04713	1N976B
VR1258[2]	152-0287-00	XB330000		SEMICOND DEVICE:ZENER,0.4W,110V,5%	04713	1N986B
VR1262[2]	152-0428-00	XB330000		SEMICOND DEVICE:ZENER,0.4W,120V,5%	04713	1N987B
VR1264	152-0282-00			SEMICOND DEVICE:ZENER,0.4W,30V,5%	04713	1N972B
VR2262	152-0405-00			SEMICOND DEVICE:ZENER,1W,15V,5%	80009	152-0405-00
VR2263	152-0405-00			SEMICOND DEVICE:ZENER,1W,15V,5%	80009	152-0405-00
VR2264	152-0405-00			SEMICOND DEVICE:ZENER,1W,15V,5%	80009	152-0405-00

[1]Either of these HV Multipliers may be used in an instrument.
[2]Option 4 only.
[3]Option 6 only.

SECTION 8

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols and Reference Designators

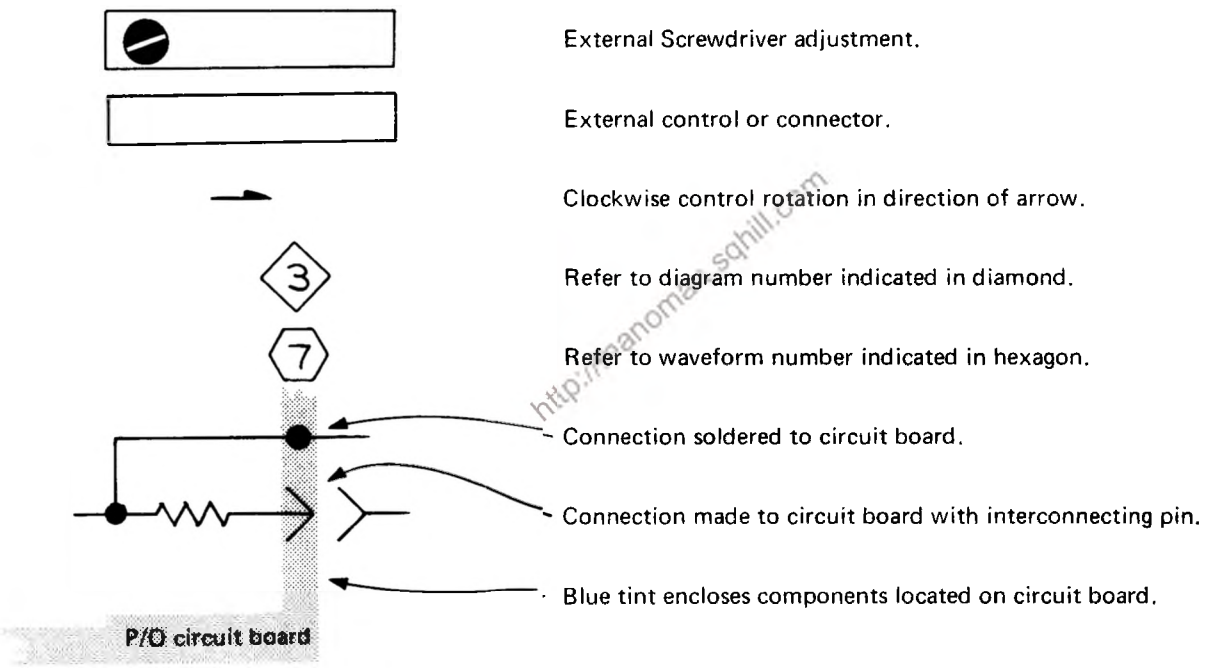
Electrical components shown on the diagrams are in the following units unless noted otherwise:

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

Symbols used on the diagrams are based on USA Standard Y32.2-1967.

Logic symbology is based on MIL-STD-806B in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following special symbols are used on the diagrams:



External Screwdriver adjustment.

External control or connector.

Clockwise control rotation in direction of arrow.

Refer to diagram number indicated in diamond.

Refer to waveform number indicated in hexagon.

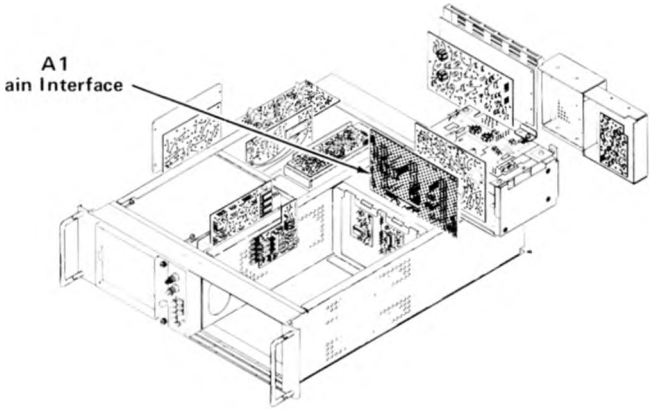
Connection soldered to circuit board.

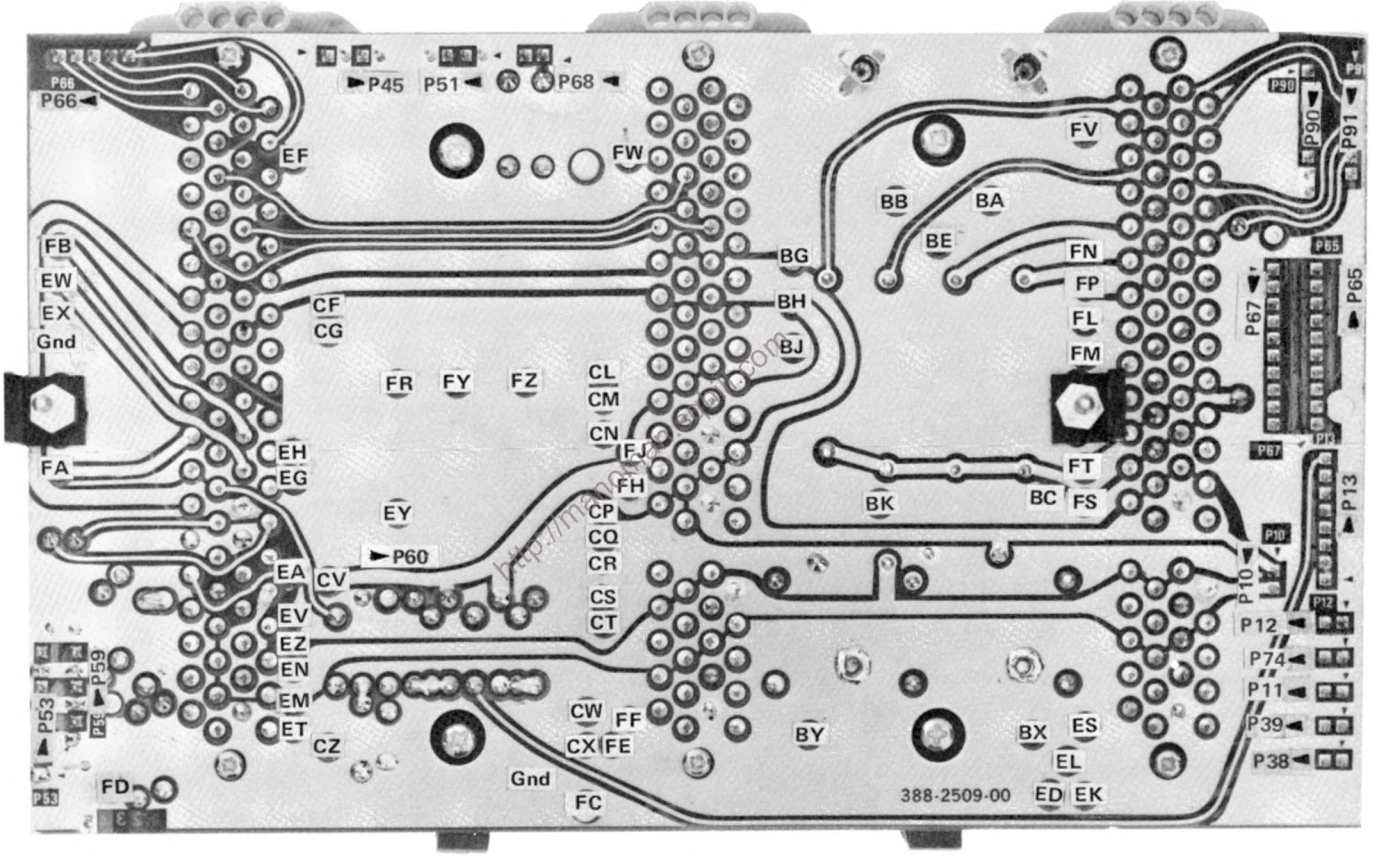
Connection made to circuit board with interconnecting pin.

Blue tint encloses components located on circuit board.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

A	Assembly, separable or repairable (circuit board, etc.)
AT	Attenuator, fixed or variable
B	Motor
BT	Battery
C	Capacitor, fixed or variable
CR	Diode, signal or rectifier
DL	Delay line
DS	Indicating device (lamp)
F	Fuse
FL	Filter
H	Heat dissipating device (heat sink, heat radiator, etc.)
HR	Heater
J	Connector, stationary portion
K	Relay
L	Inductor, fixed or variable
LR	Inductor/resistor combination
M	Meter
Q	Transistor or silicon-controlled rectifier
P	Connector, movable portion
R	Resistor, fixed or variable
RT	Thermistor
S	Switch
T	Transformer
TP	Test point
U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
V	Electron tube
VR	Voltage regulator (zener diode, etc.)
Y	Crystal





*See Parts List for serial number ranges.

Fig. 8-2. A1. Main Interface (rear) circuit board.

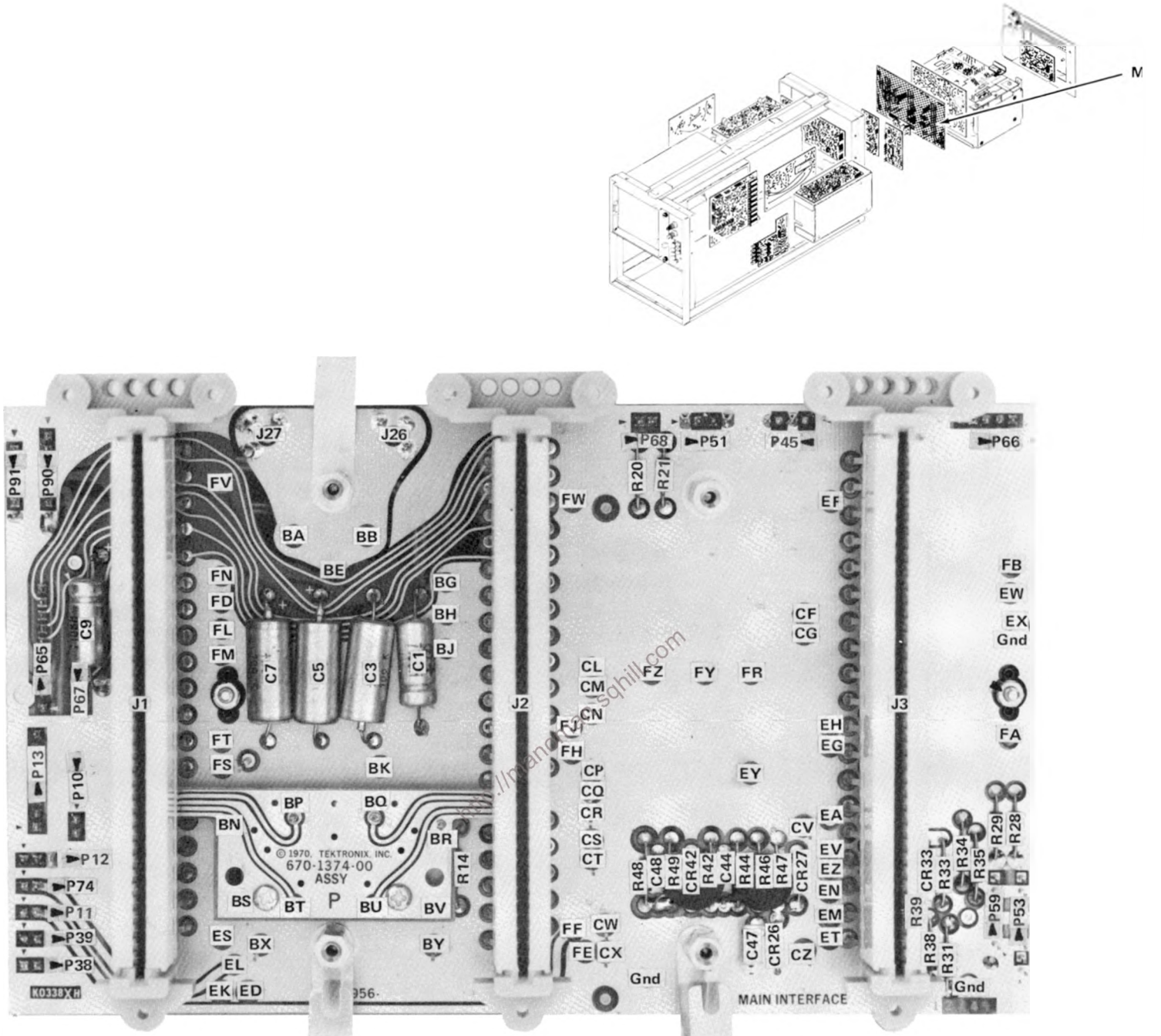


Fig. 8-1B. A1. Main Interface (front) circuit board below SN B160000.

On Back of Board 670-1374-00:

C16

C18

R12

R36

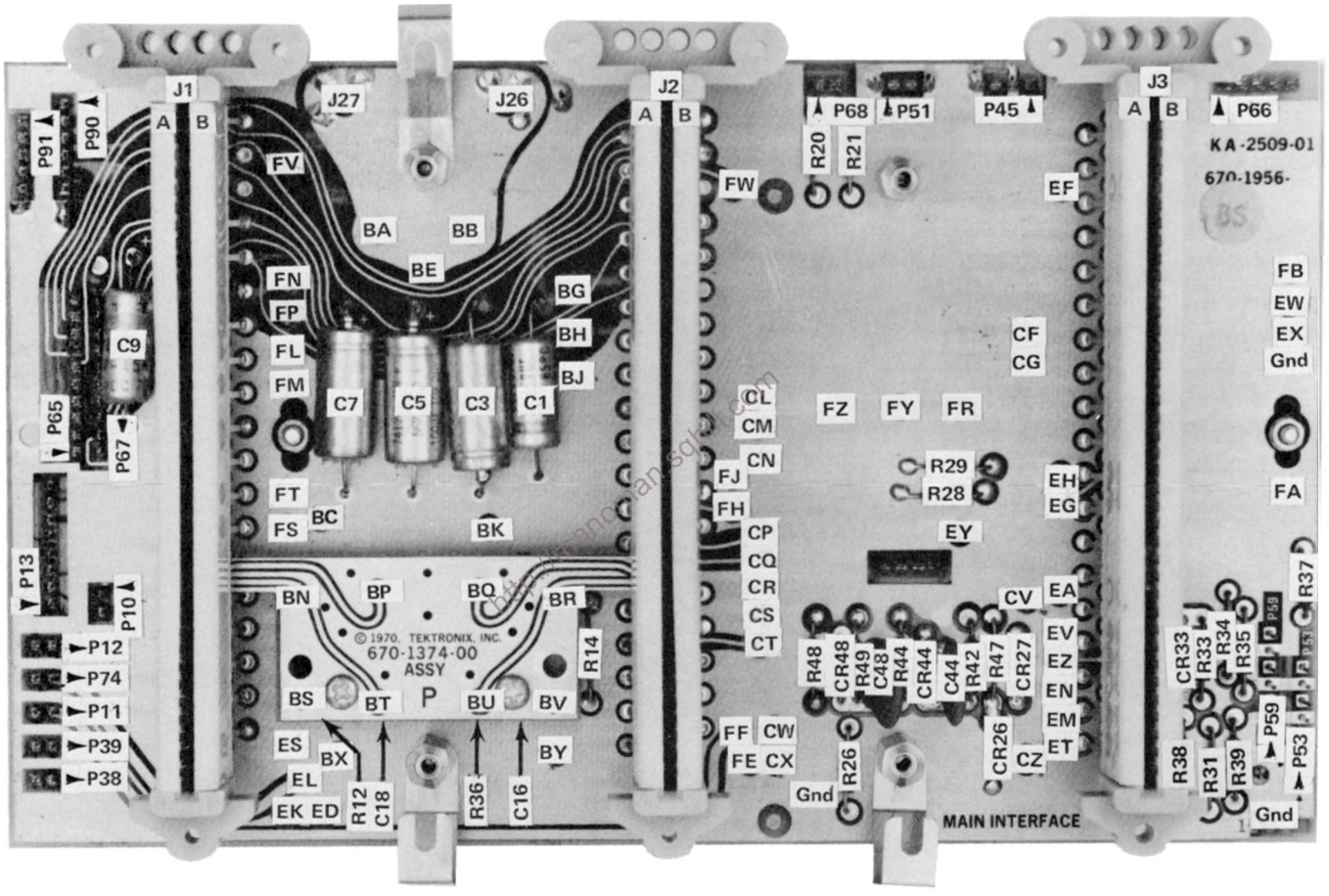
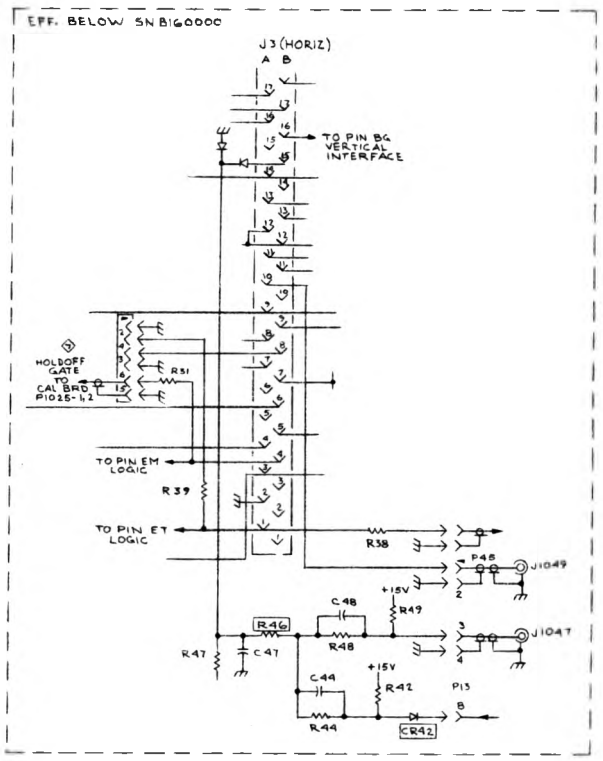
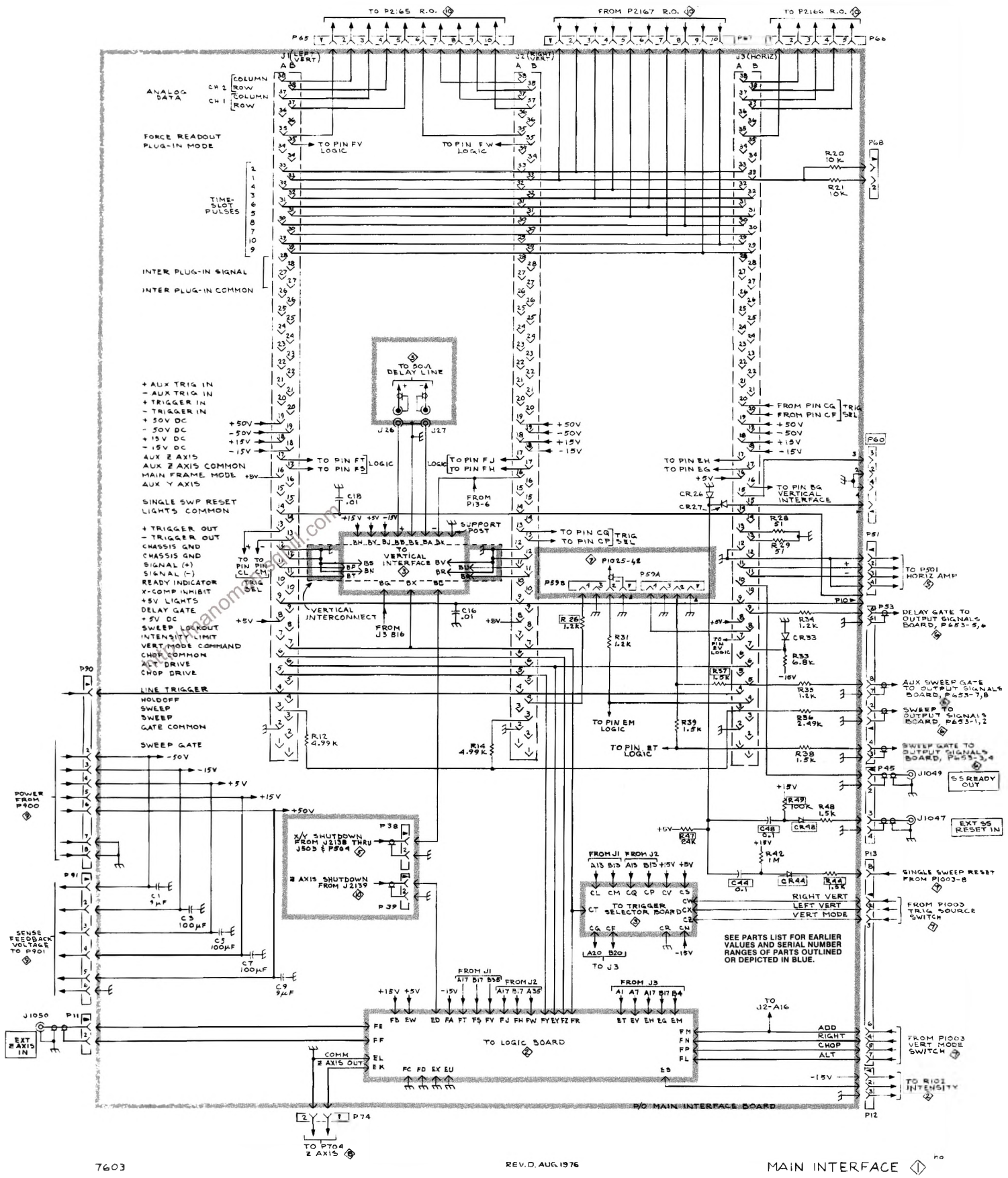


Fig. 8-1A. A1. Main Interface (front) circuit board, SN B160000-up.

EFF. BELOW SN B160000



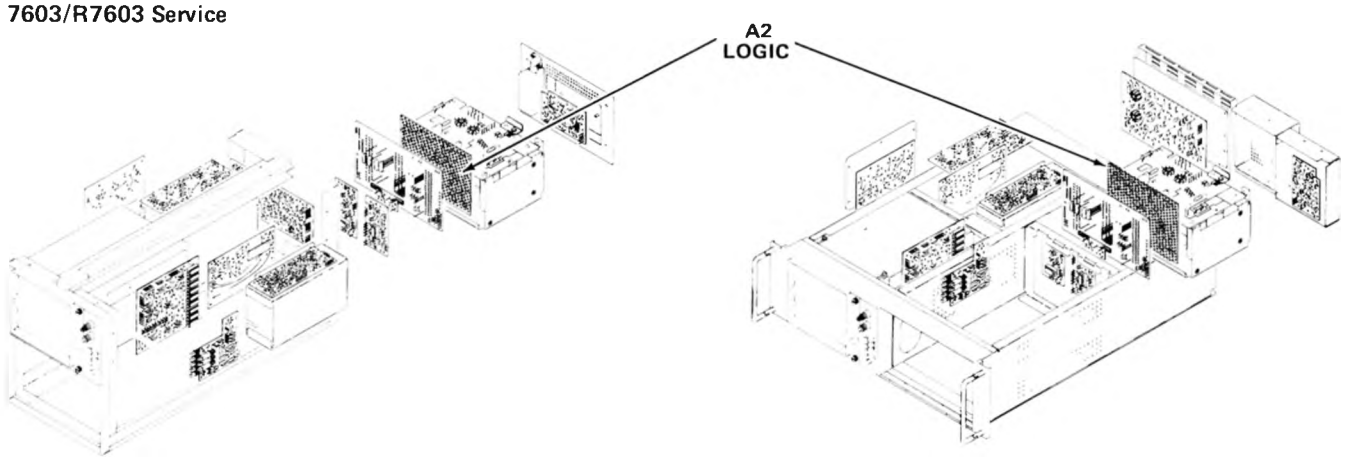


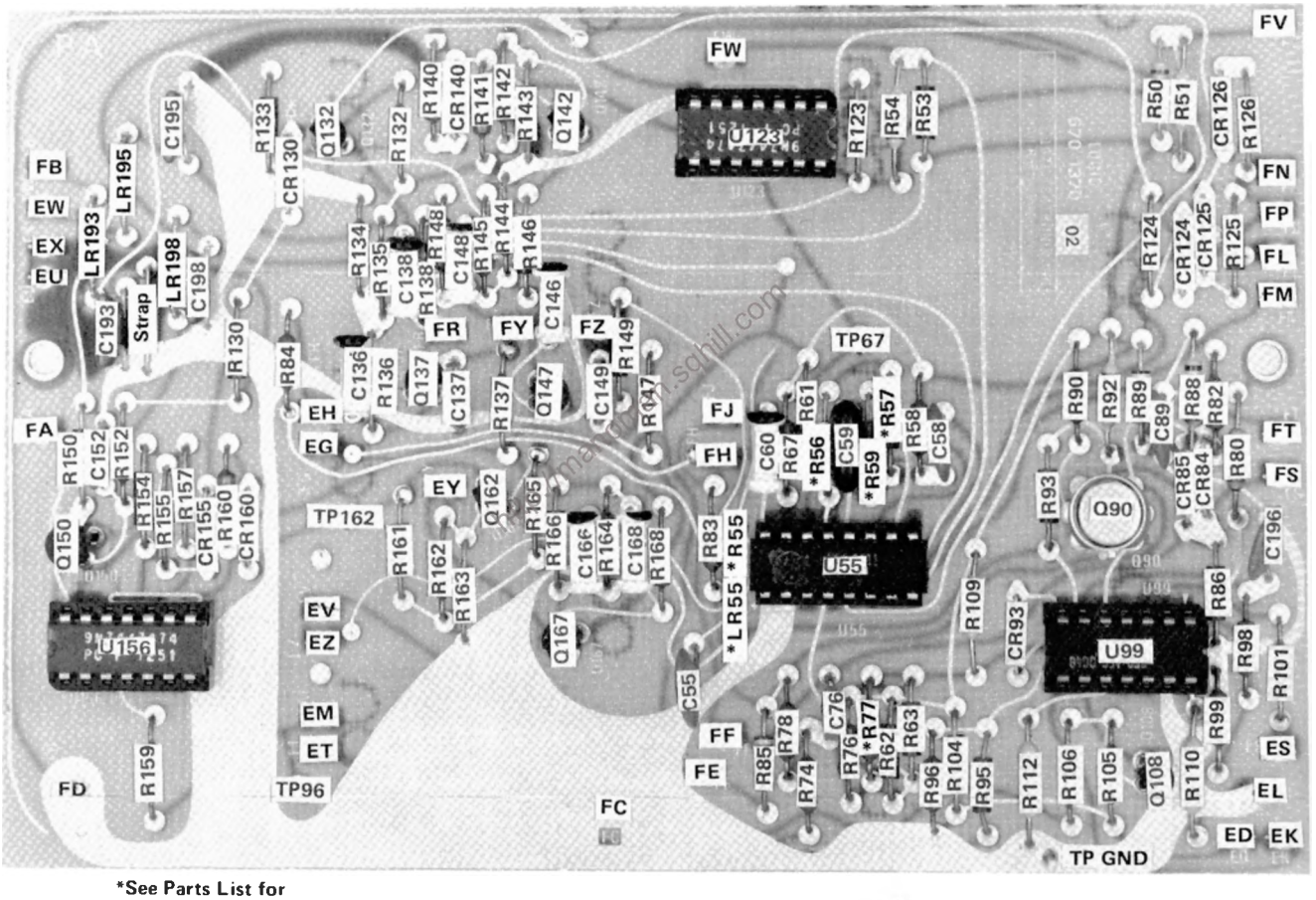
manuals4you.com

7603

REV. D, AUG 1976

MAIN INTERFACE

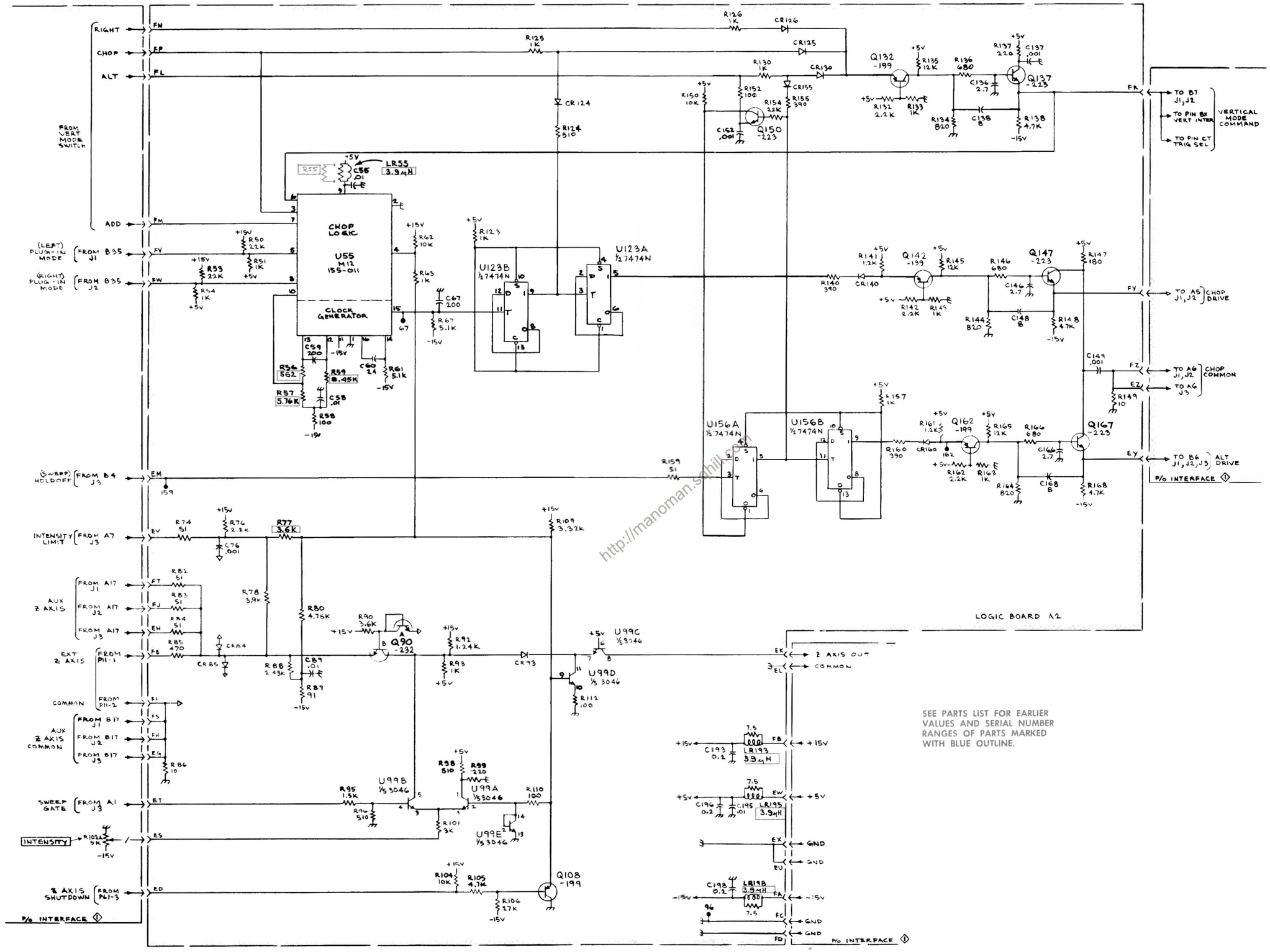




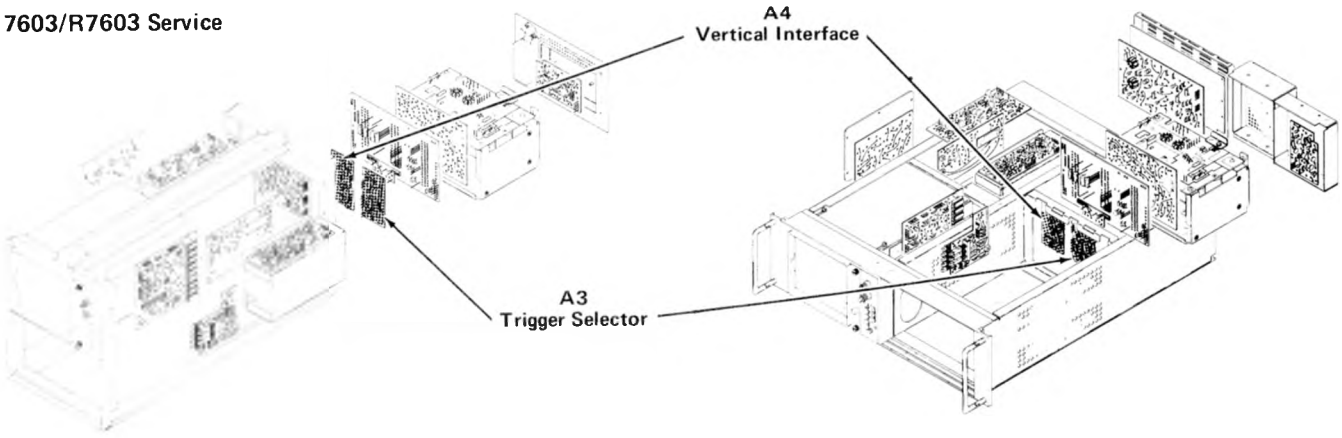
*See Parts List for serial number ranges.

Fig. 8-3. A2. Logic circuit board.

C67 Located on back of board.



http://manoman.stahlfilm.com/



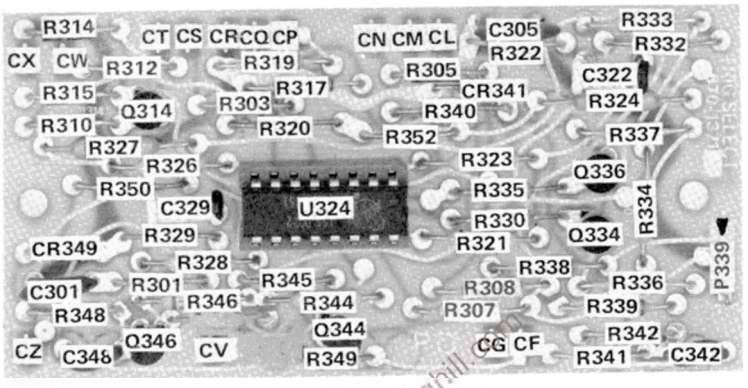


Fig. 8-4. A3. Trigger Selector circuit board.

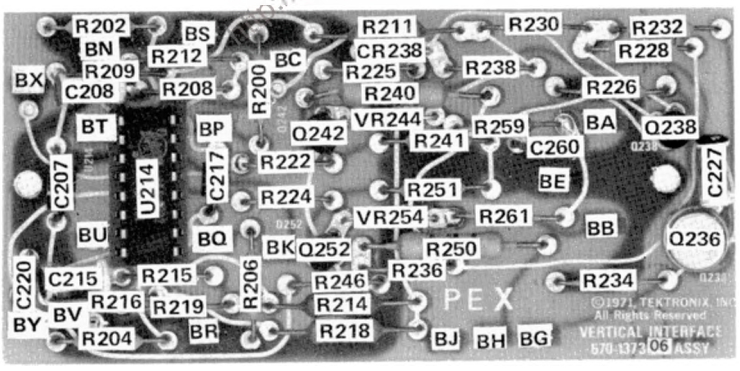
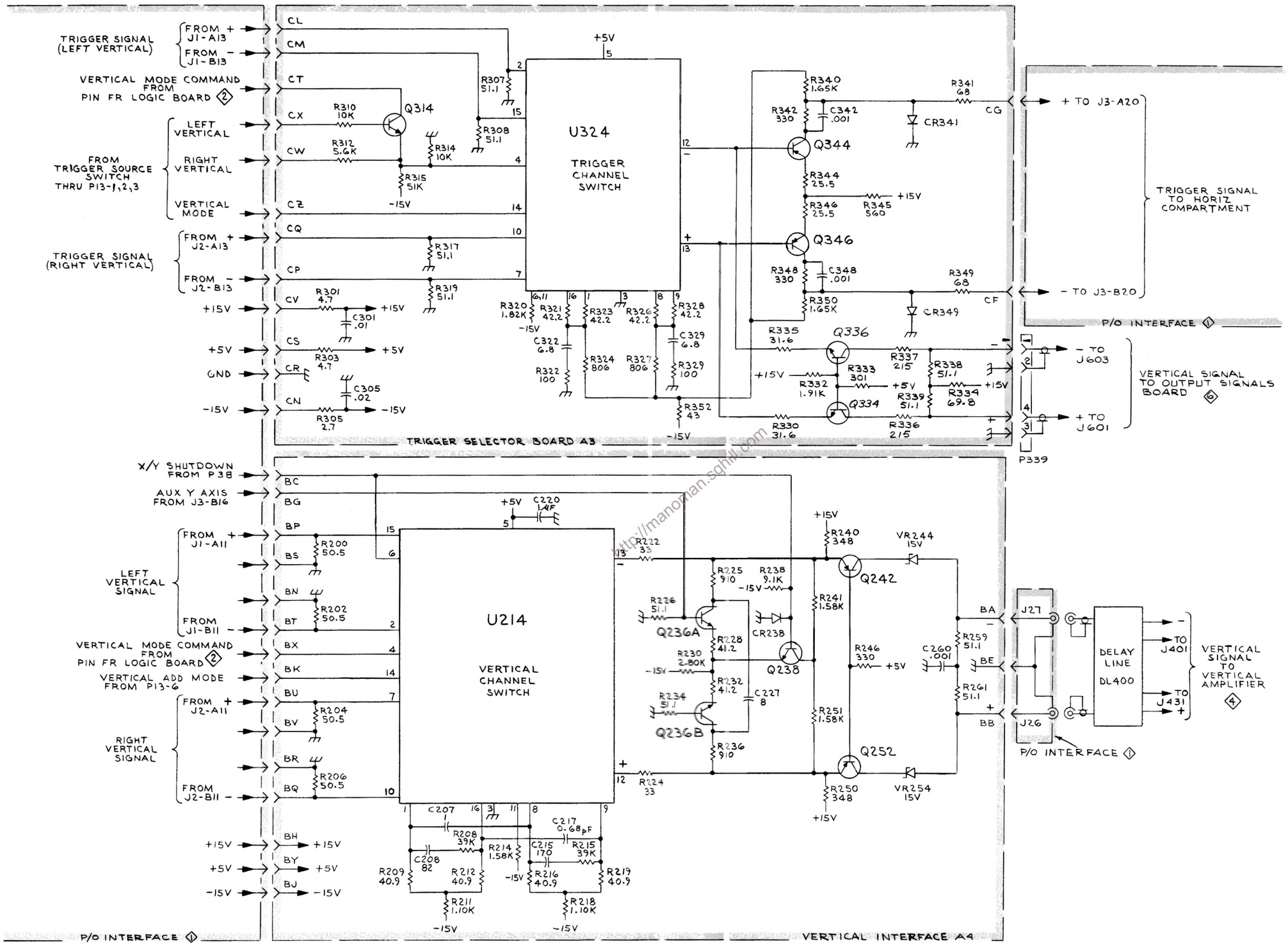


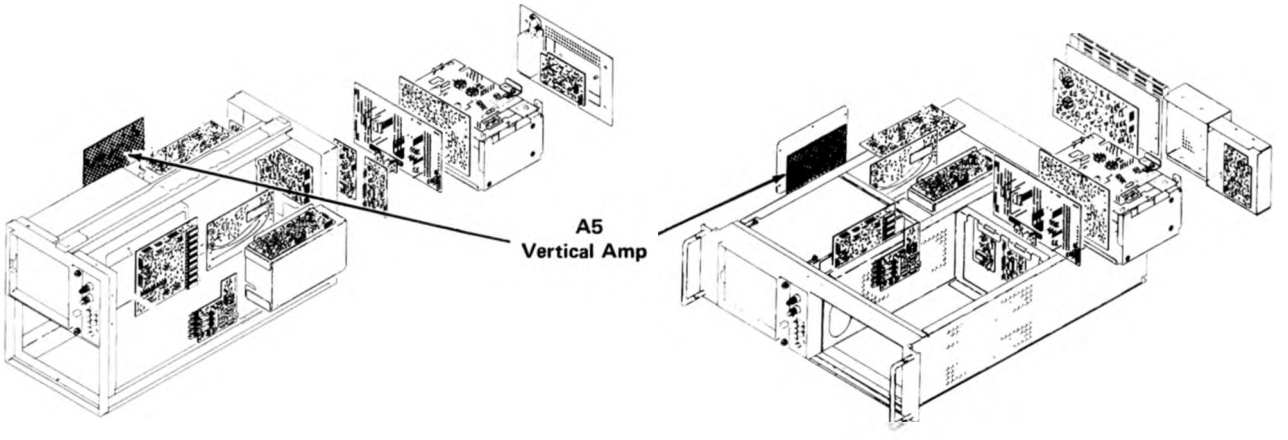
Fig. 8-5. A4. Vertical Interface circuit board.

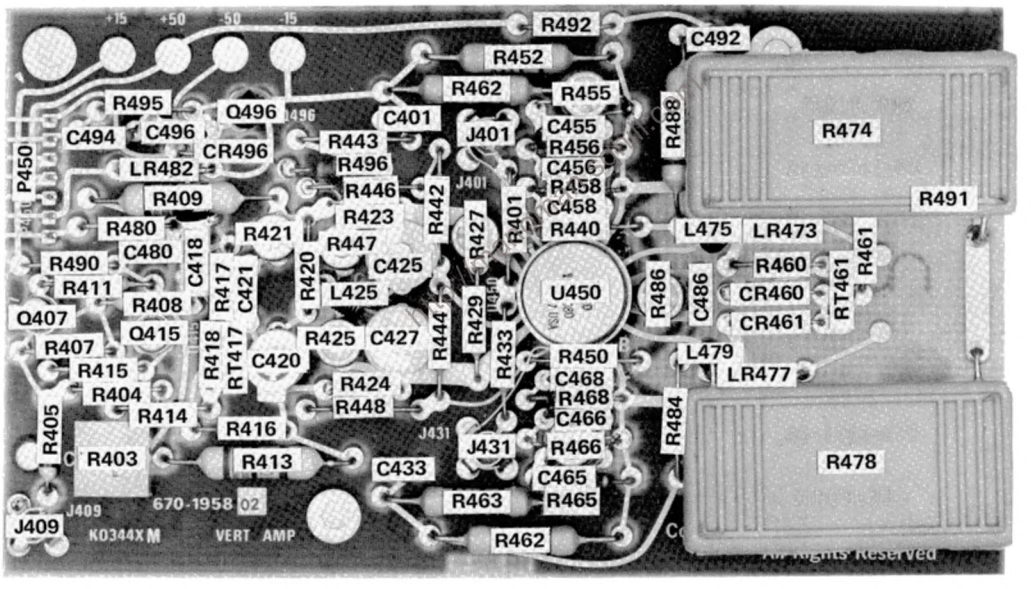


http://manoman.sqhw.com

TRIGGER SELECTOR & VERTICAL INTERFACE 3

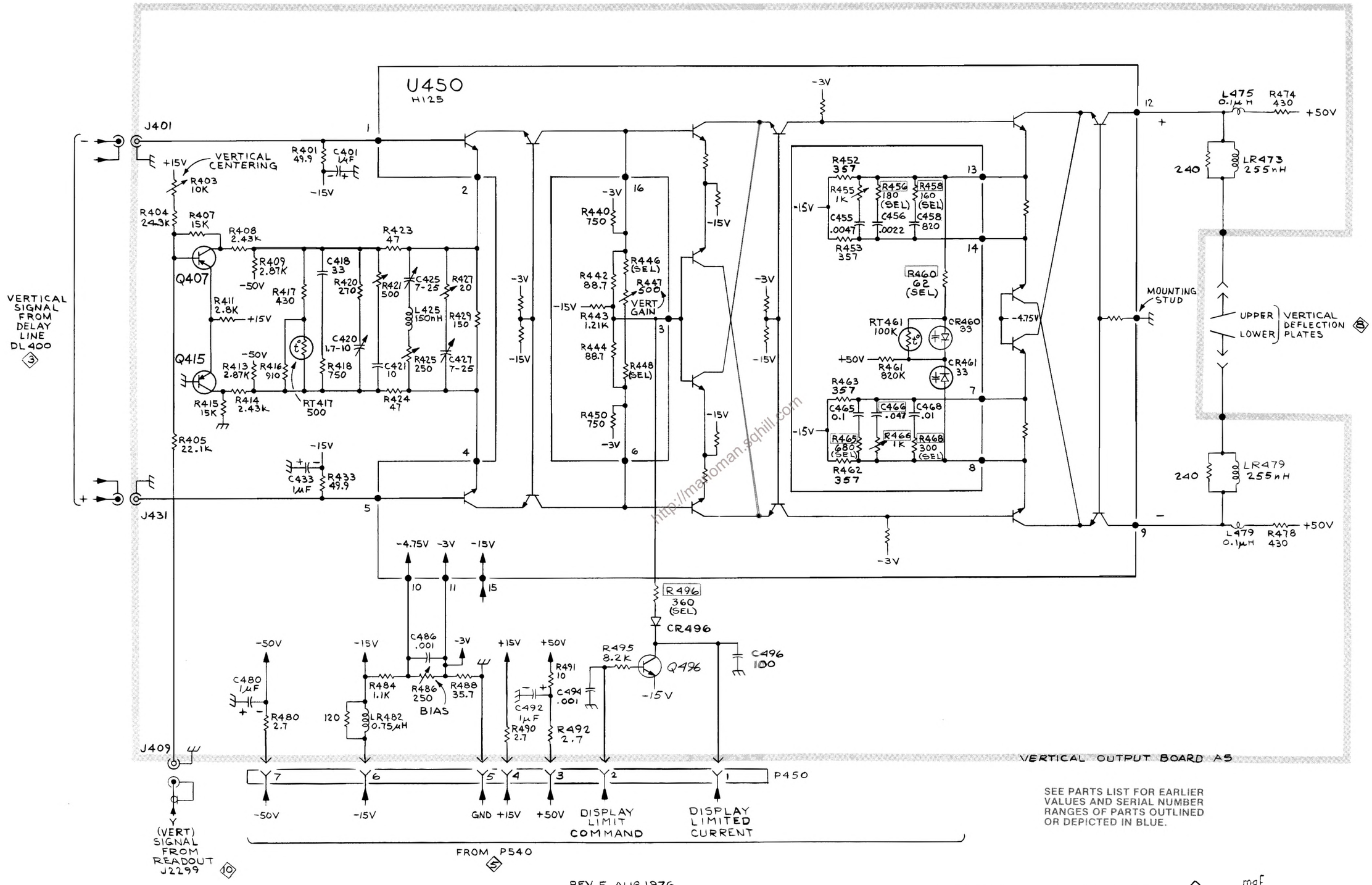
mgf 173





*See Parts List for serial number ranges.

Fig. 8-6. A5. Vertical Amp circuit board.



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

http://manoman.sqhill.com

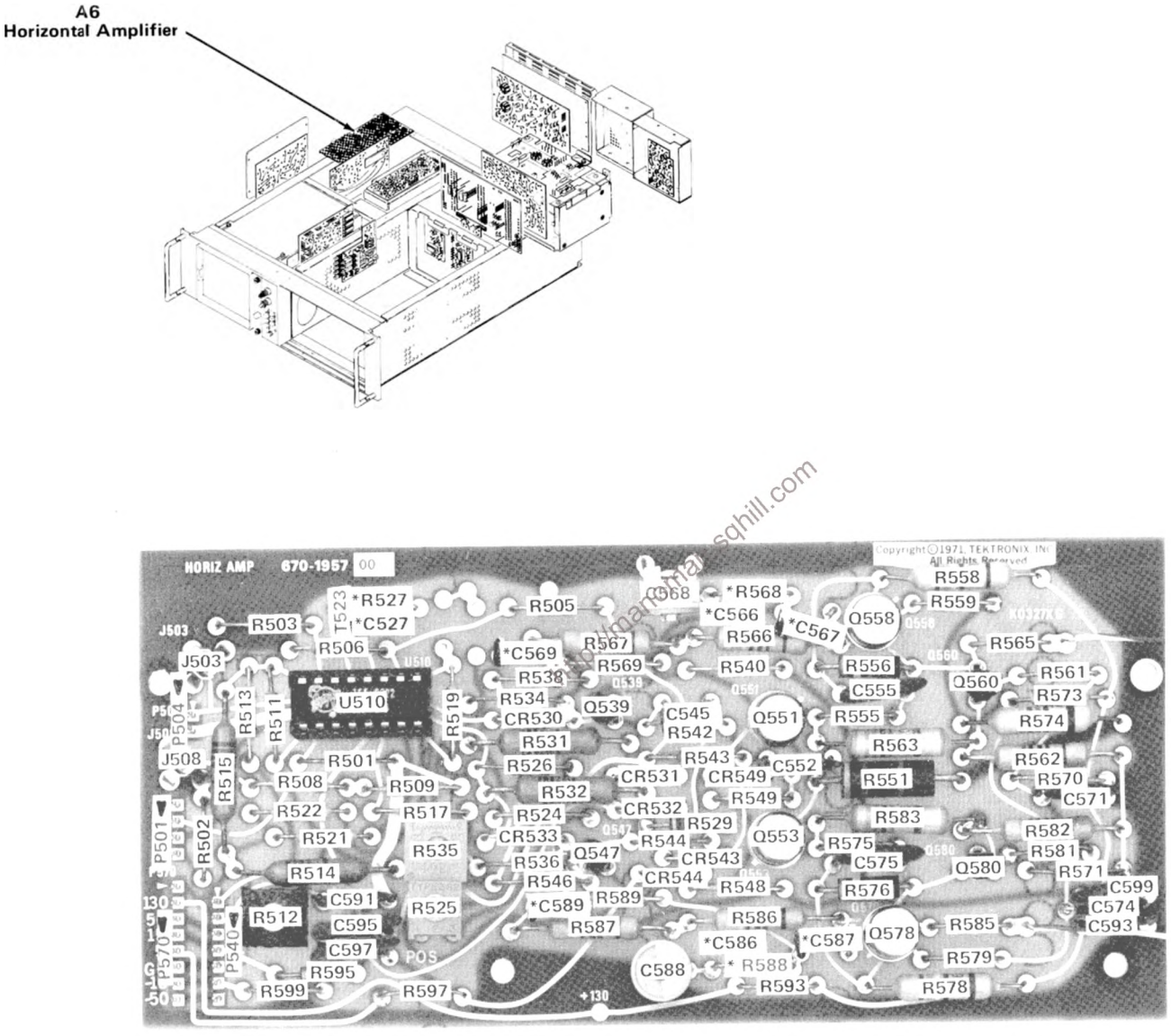
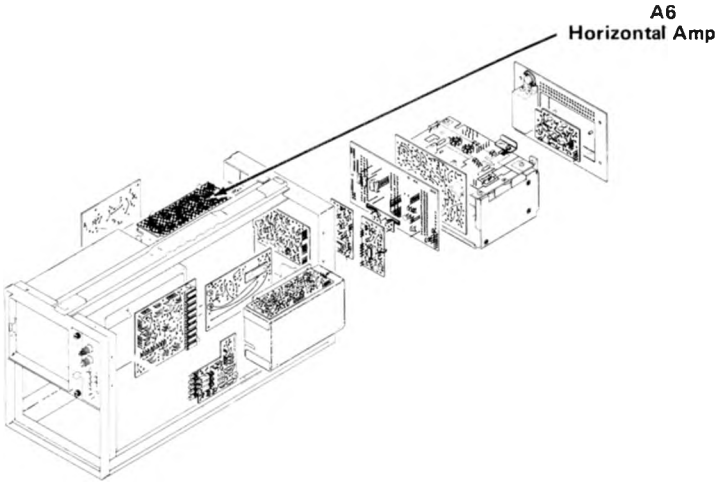


Fig. 8-7B. A6. Horizontal Amplifier circuit board below SN B060000.

*See Parts List for serial number ranges.



†CR549 & C552 transposed in some instruments.

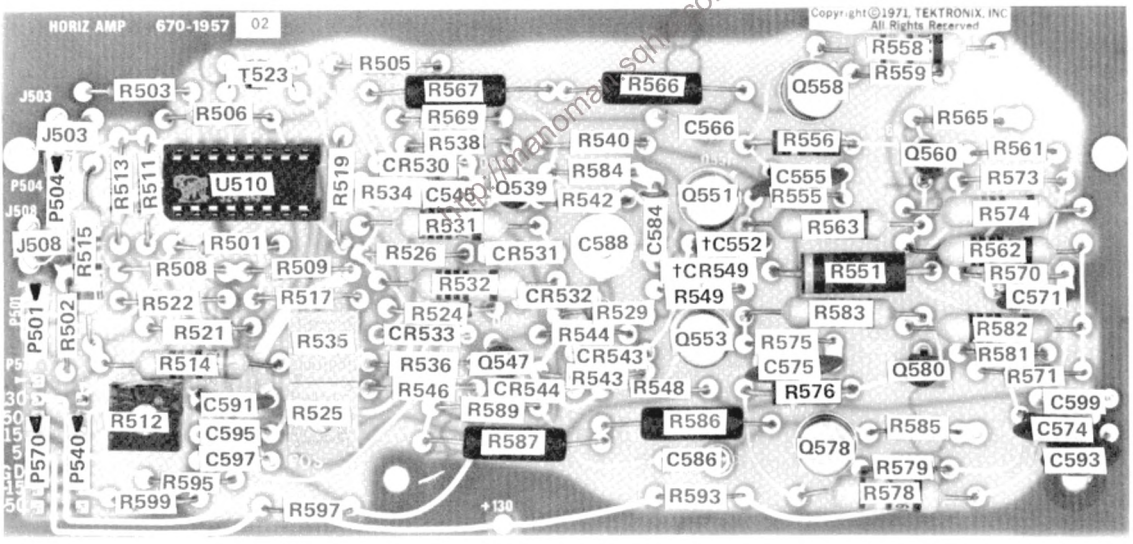
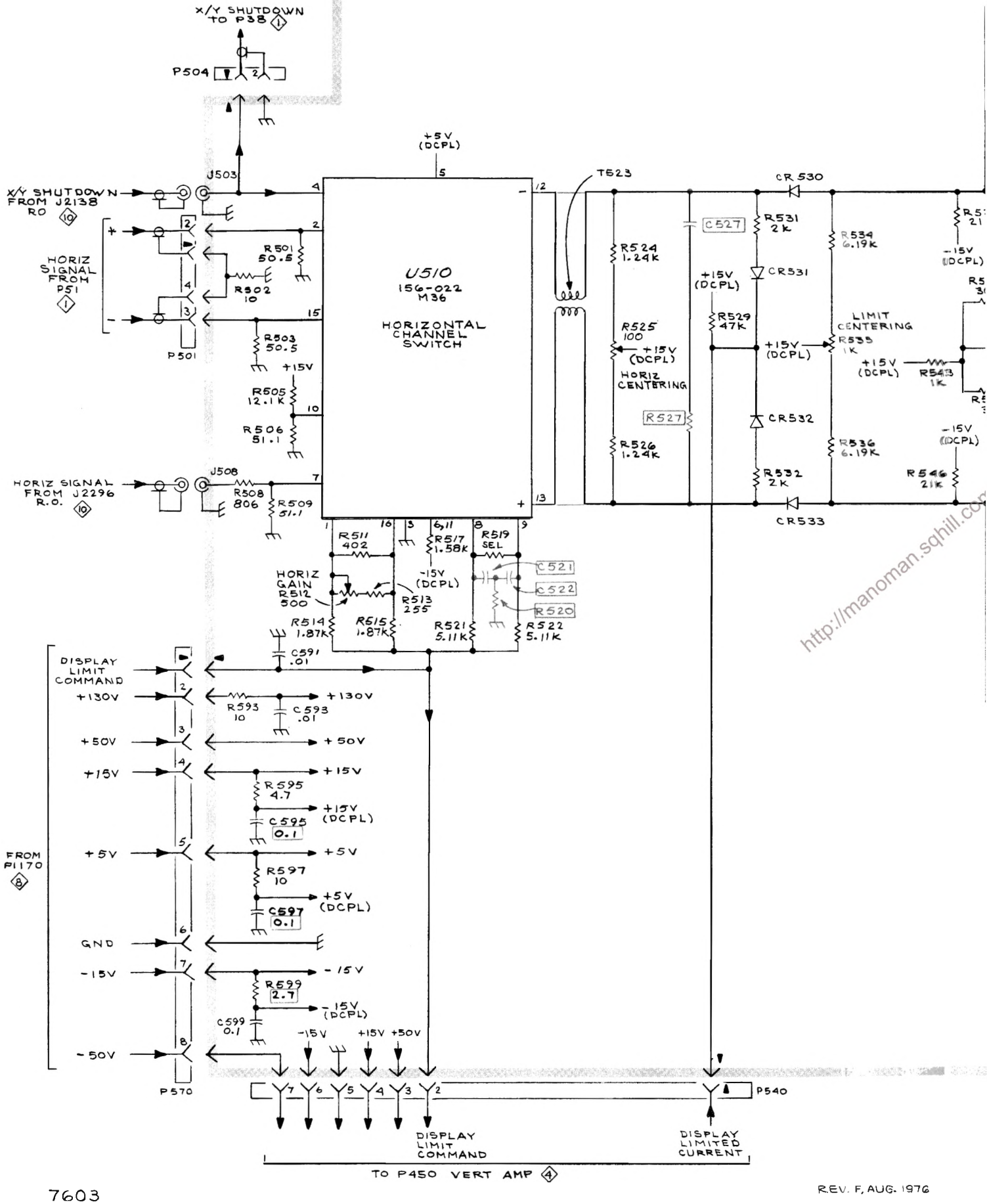
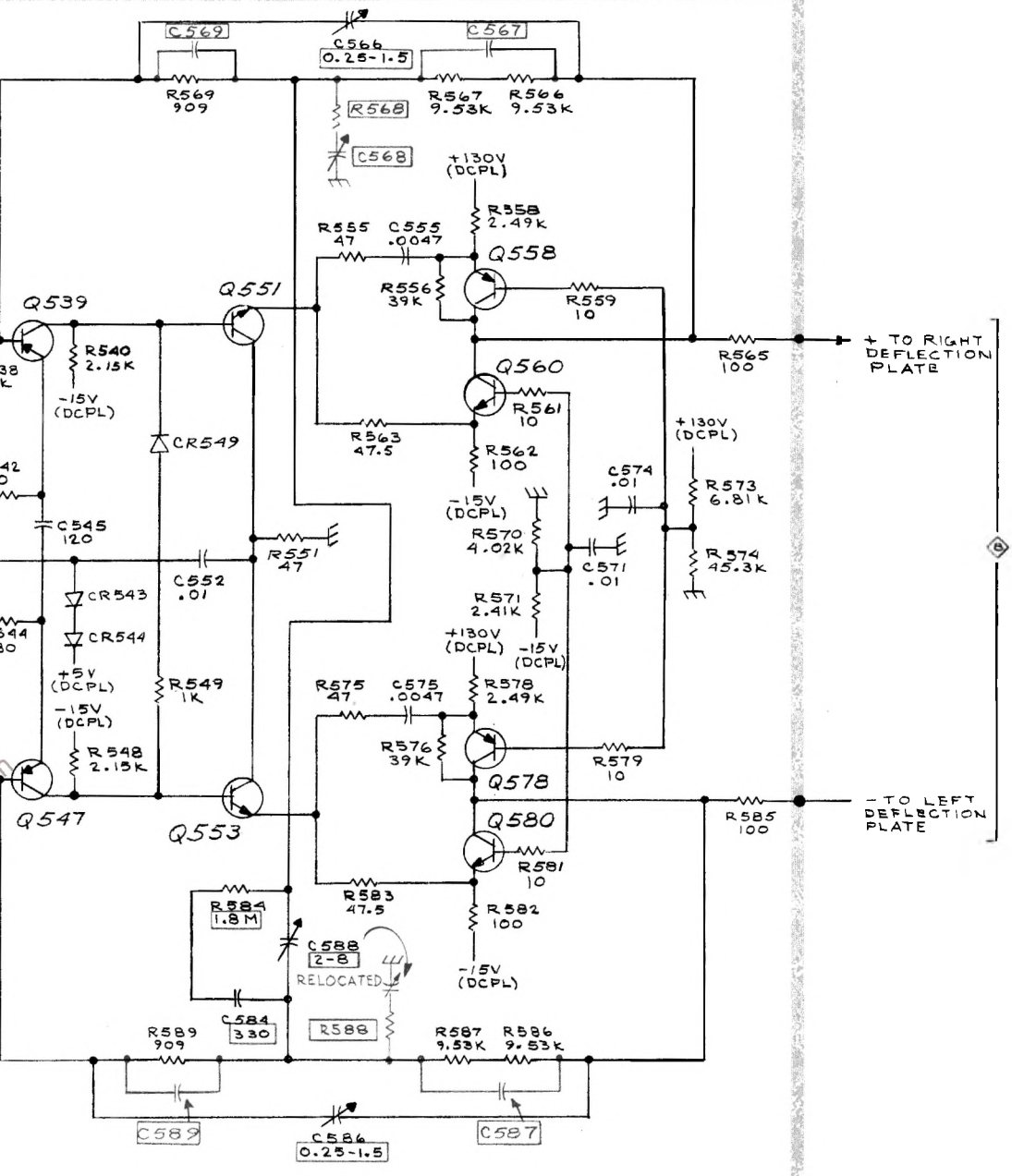


Fig. 8-7A. A6. Horizontal Amplifier circuit board SN B060000-up.



http://manoman.sqhill.com



SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS MARKED WITH BLUE OUTLINE.

HORIZONTAL AMPLIFIER BOARD A6

hq

HORIZONTAL AMPLIFIER ⑤

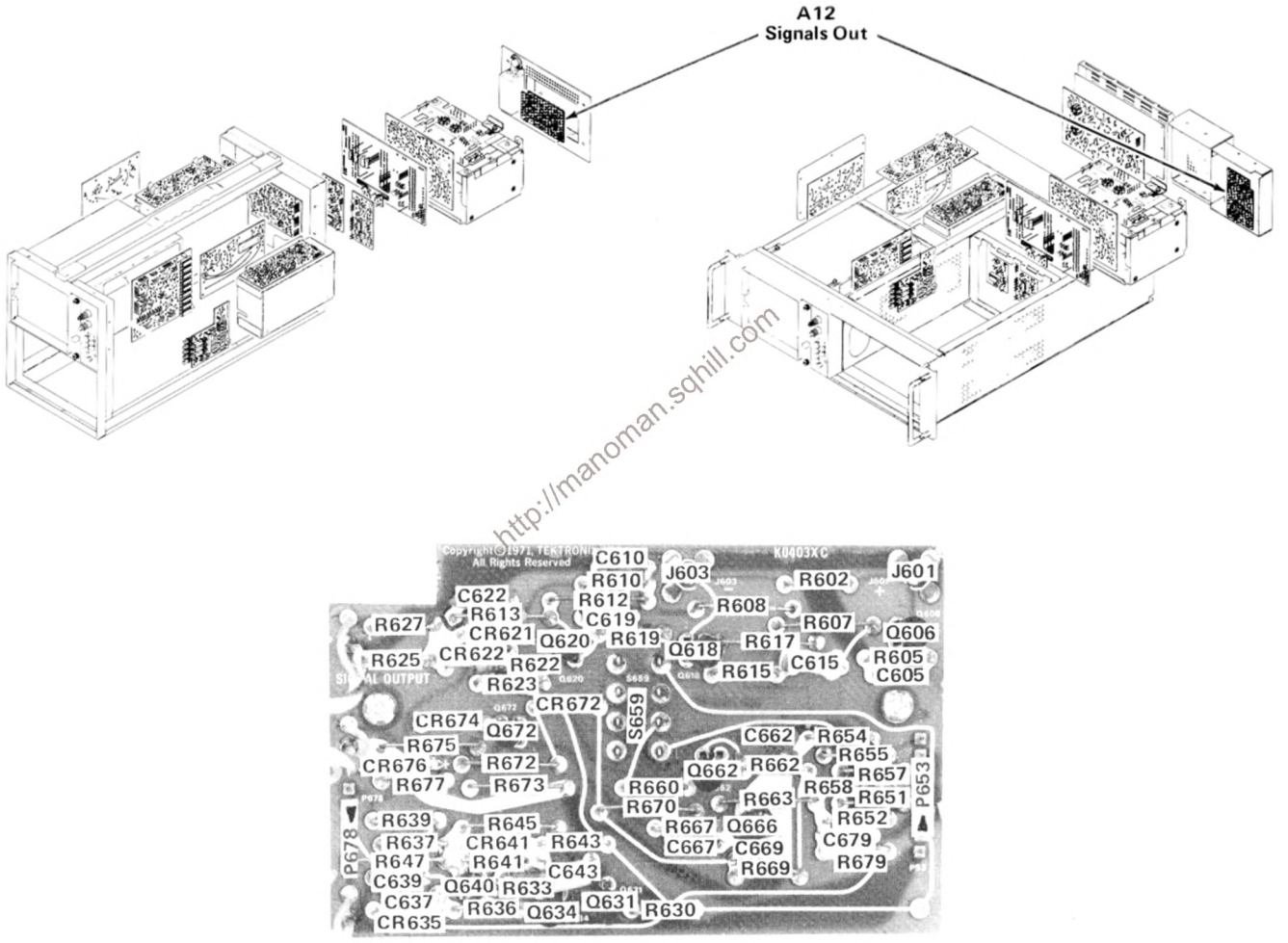
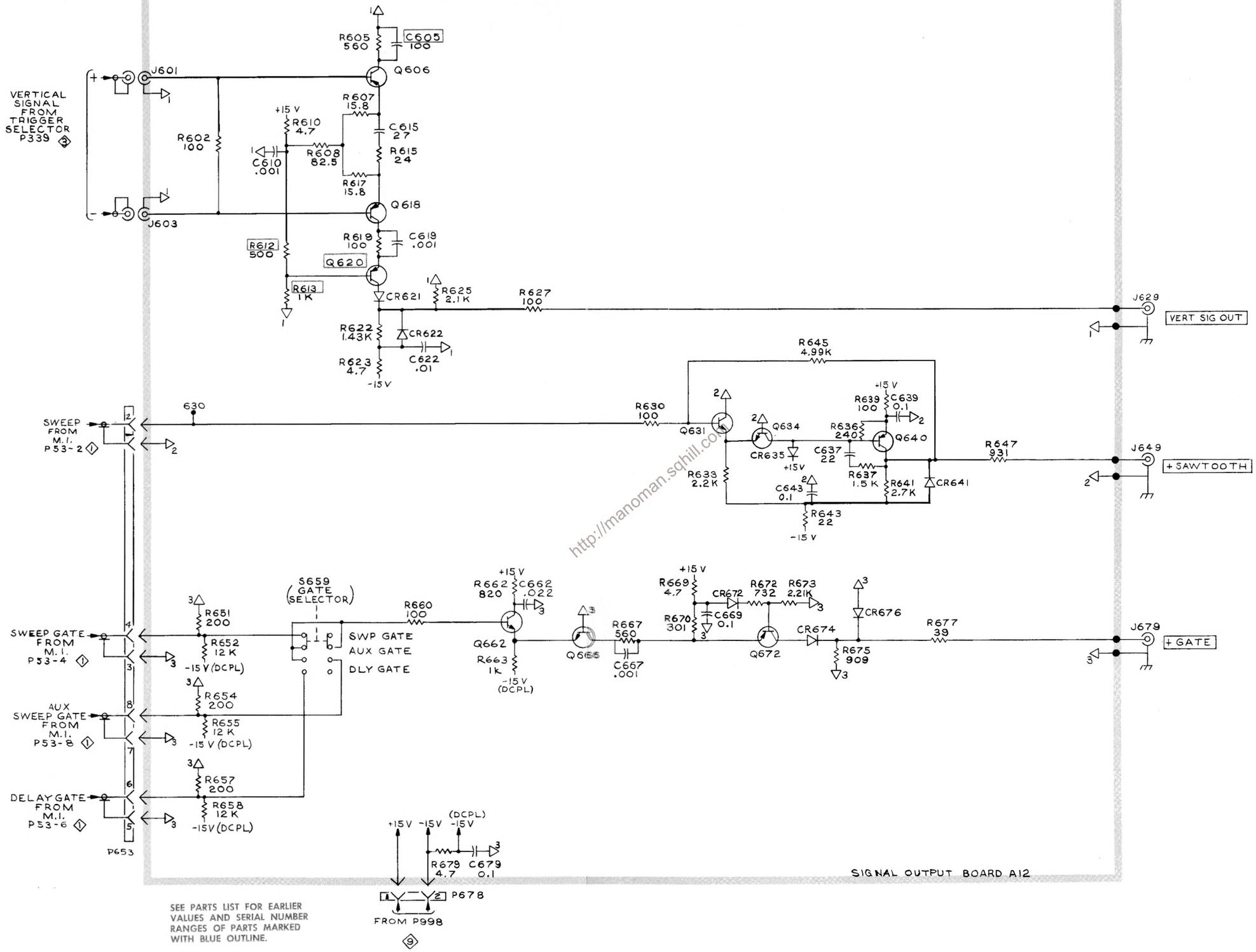


Fig. 8-8. A12. Signal Output circuit board.

http://manoman.sqhill.com



http://manoman.sghill.com

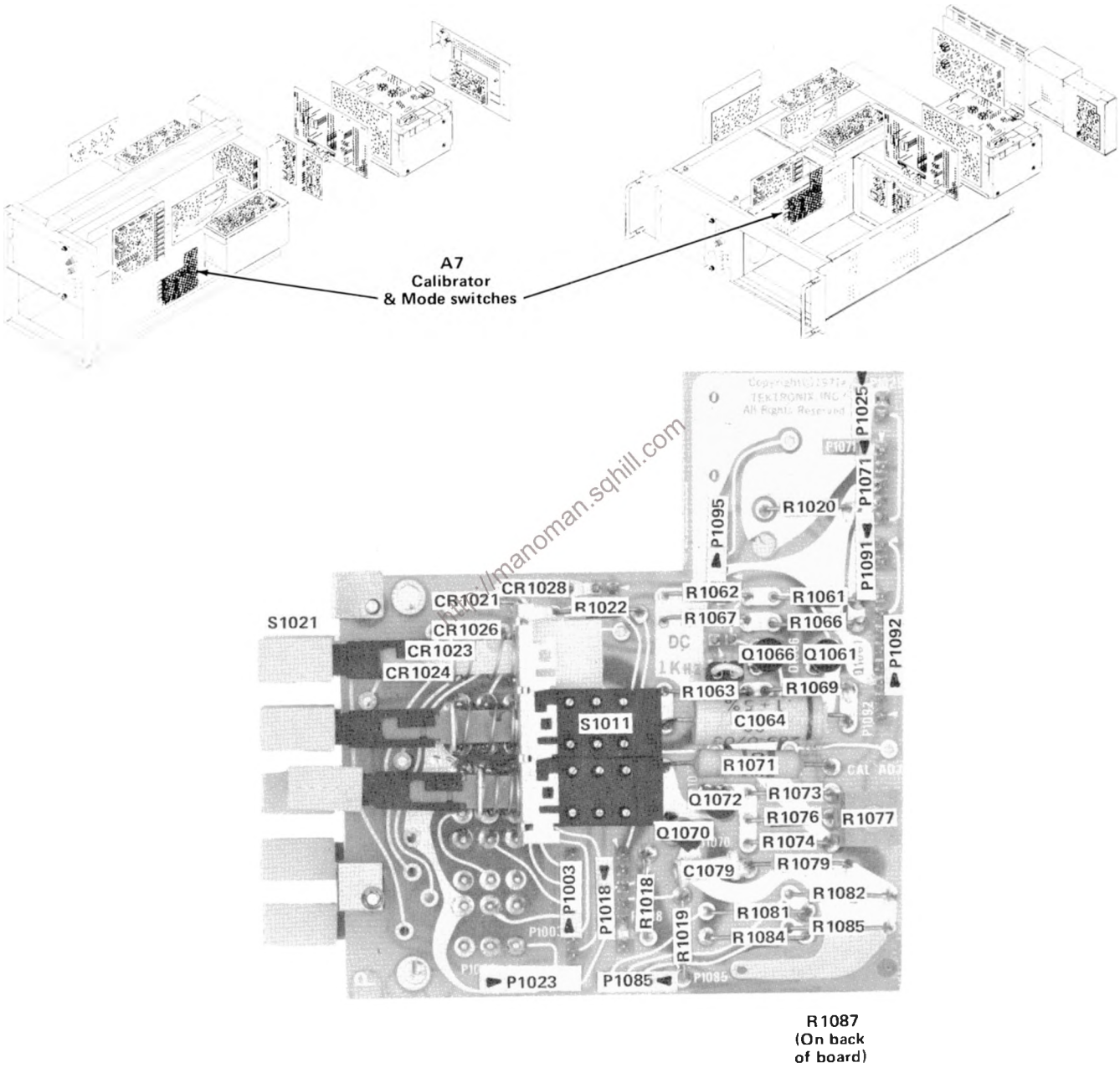
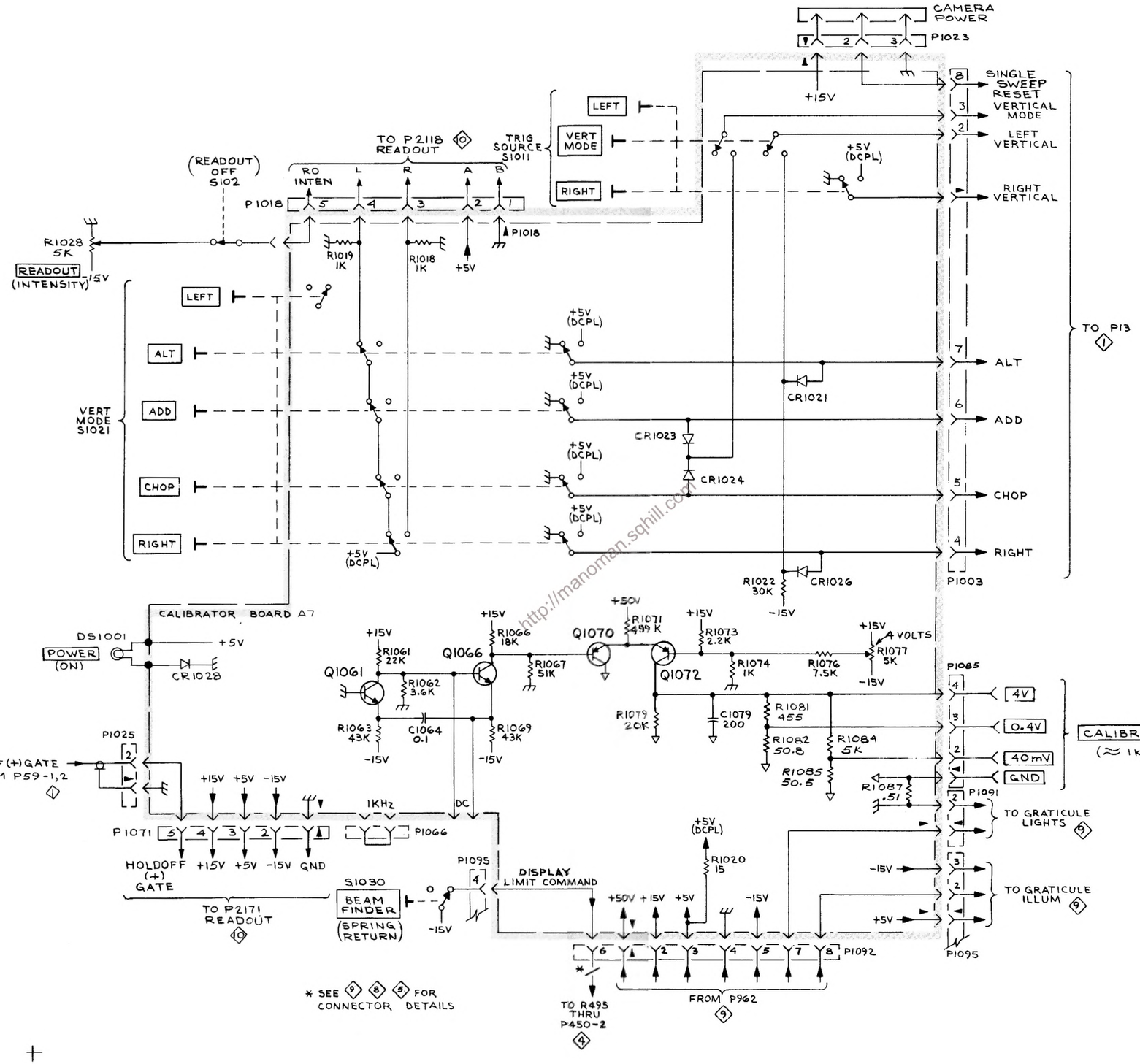


Fig. 8-9. A7. Calibrator and Mode switches circuit board.



http://manoman.sqhill.com

7603

A2

CALIBRATOR & FRONT PANEL SWITCHING 7

mgf 173

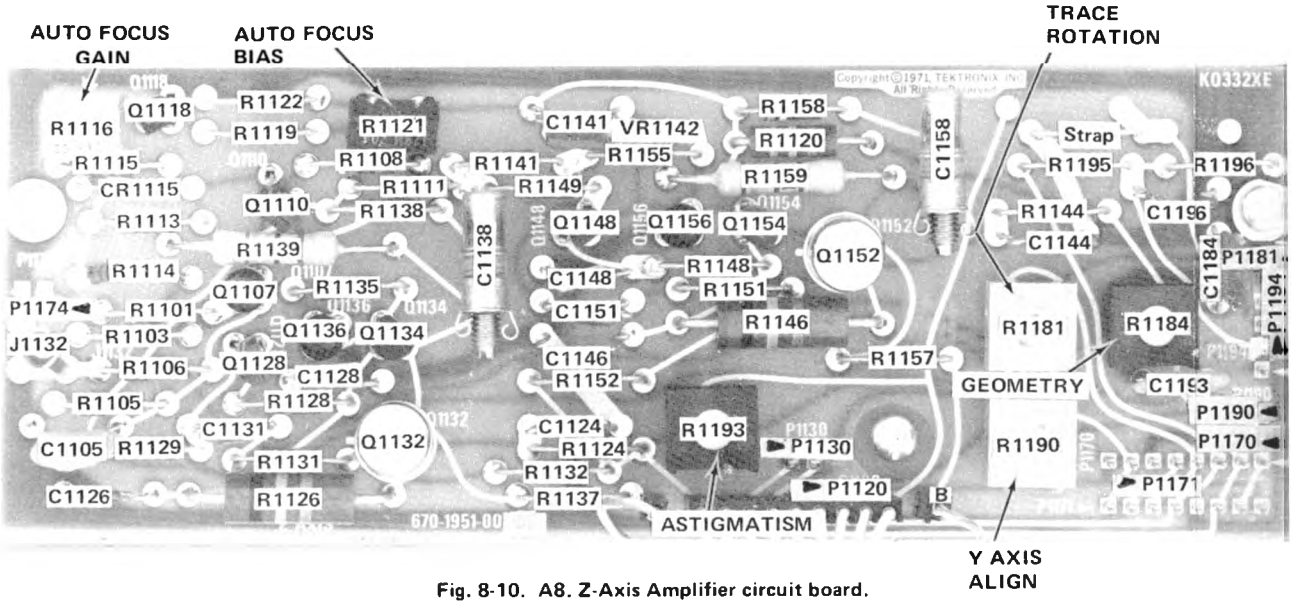
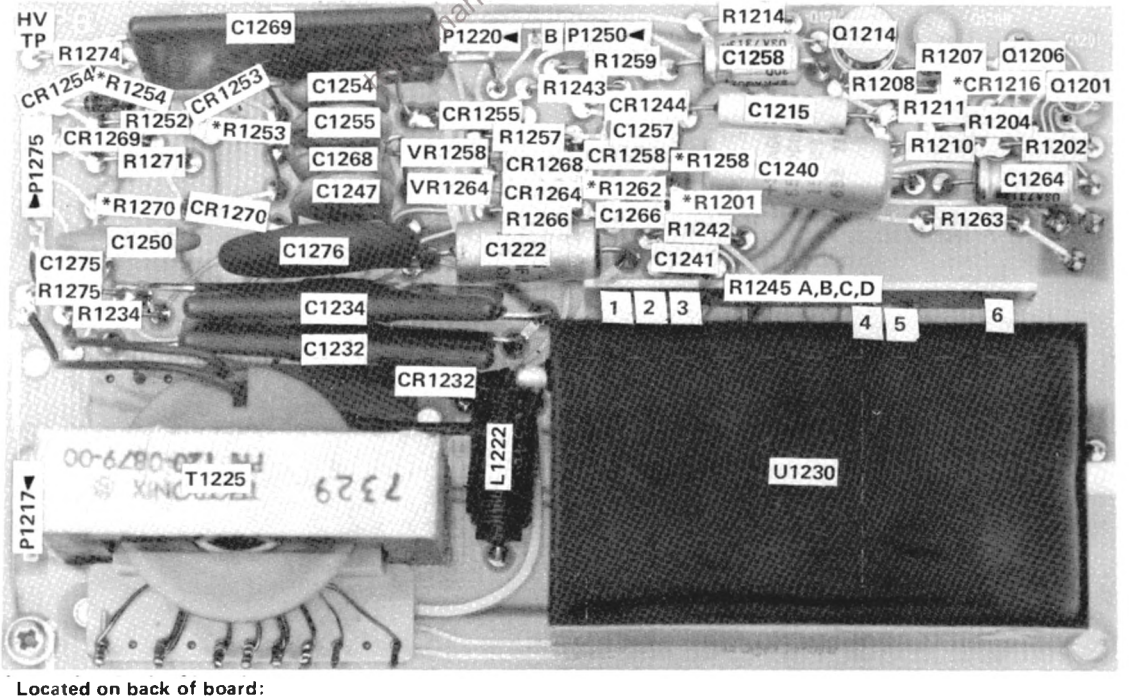


Fig. 8-10. A8. Z-Axis Amplifier circuit board.

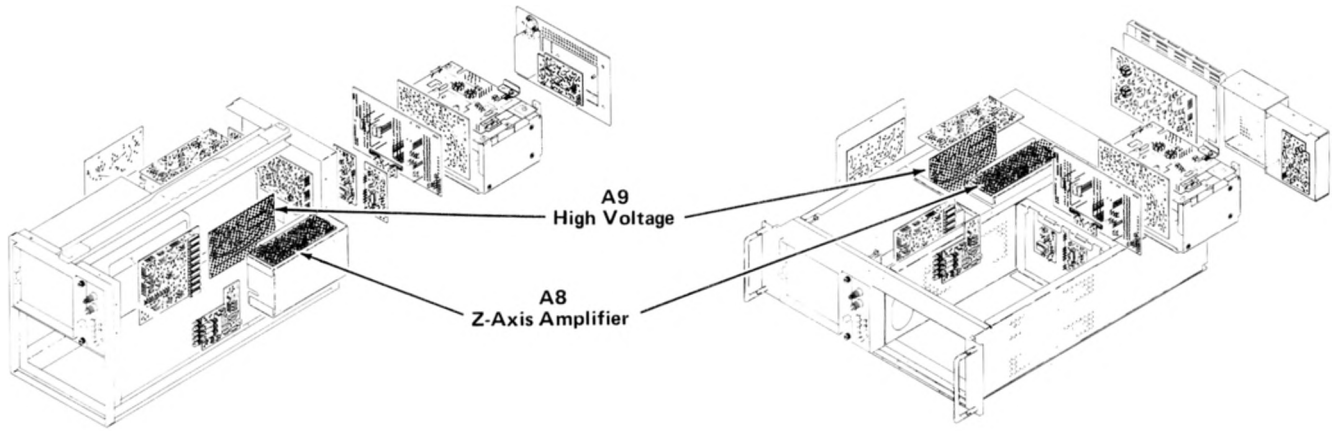
manoman.sqhill.com

*See Parts List for serial number ranges.

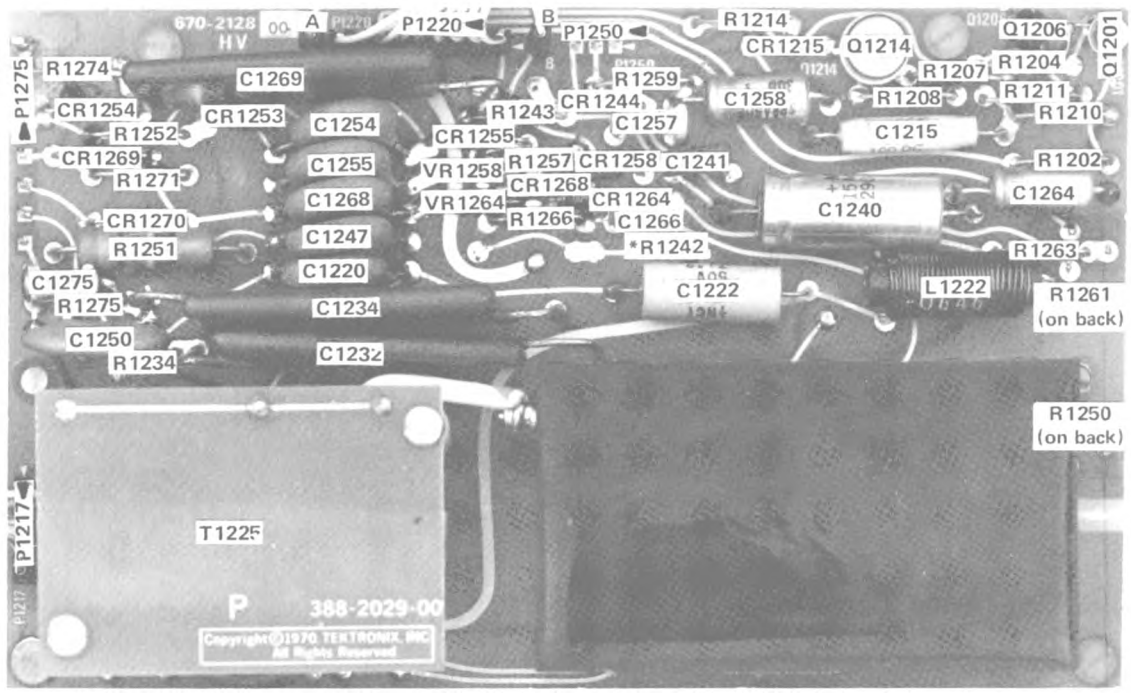


Located on back of board:
R1250
R1261
R1201

Fig. 8-11A. A9. High Voltage circuit board SN B100000-up.

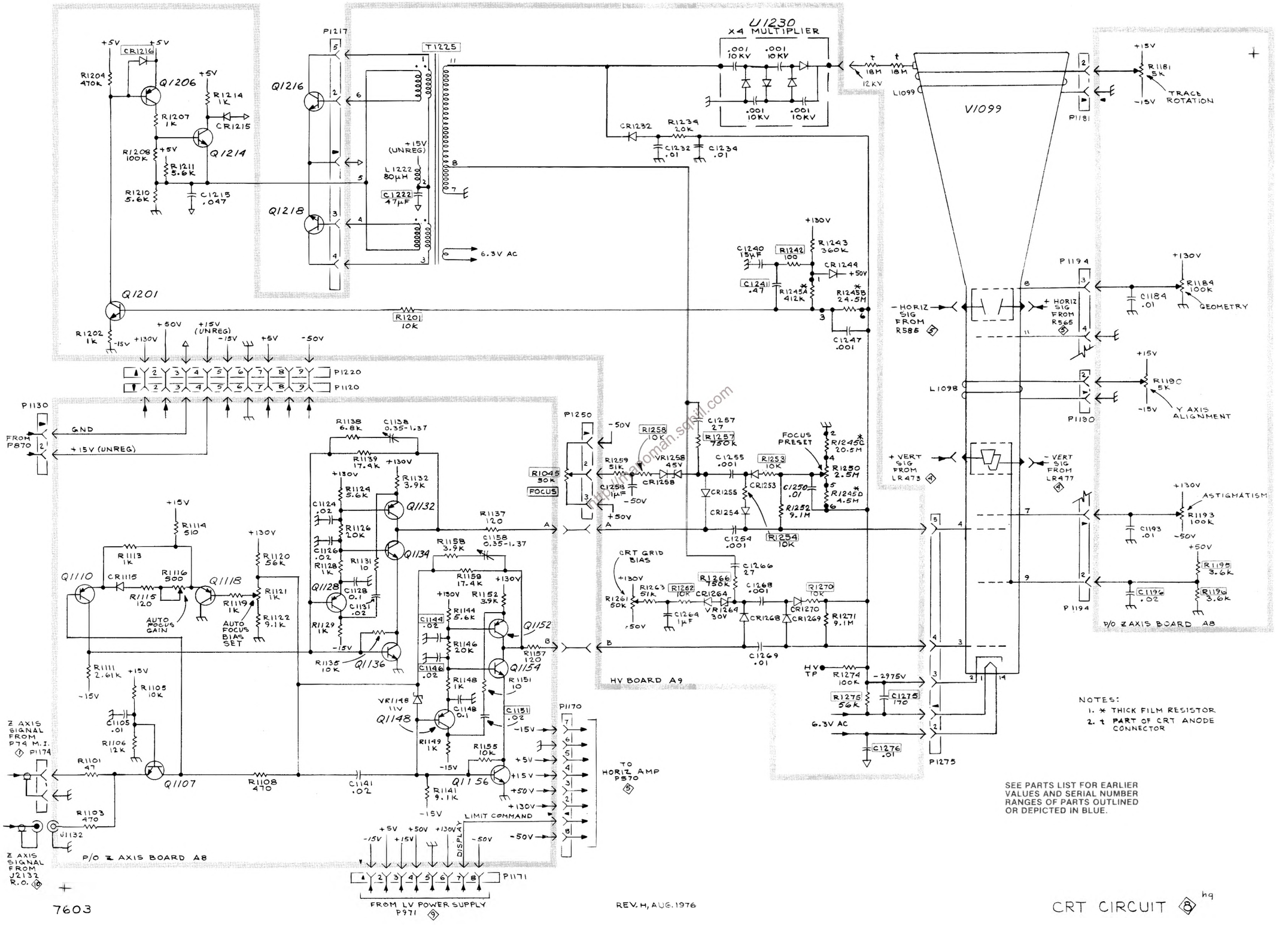


http://manoman.sqhill.com

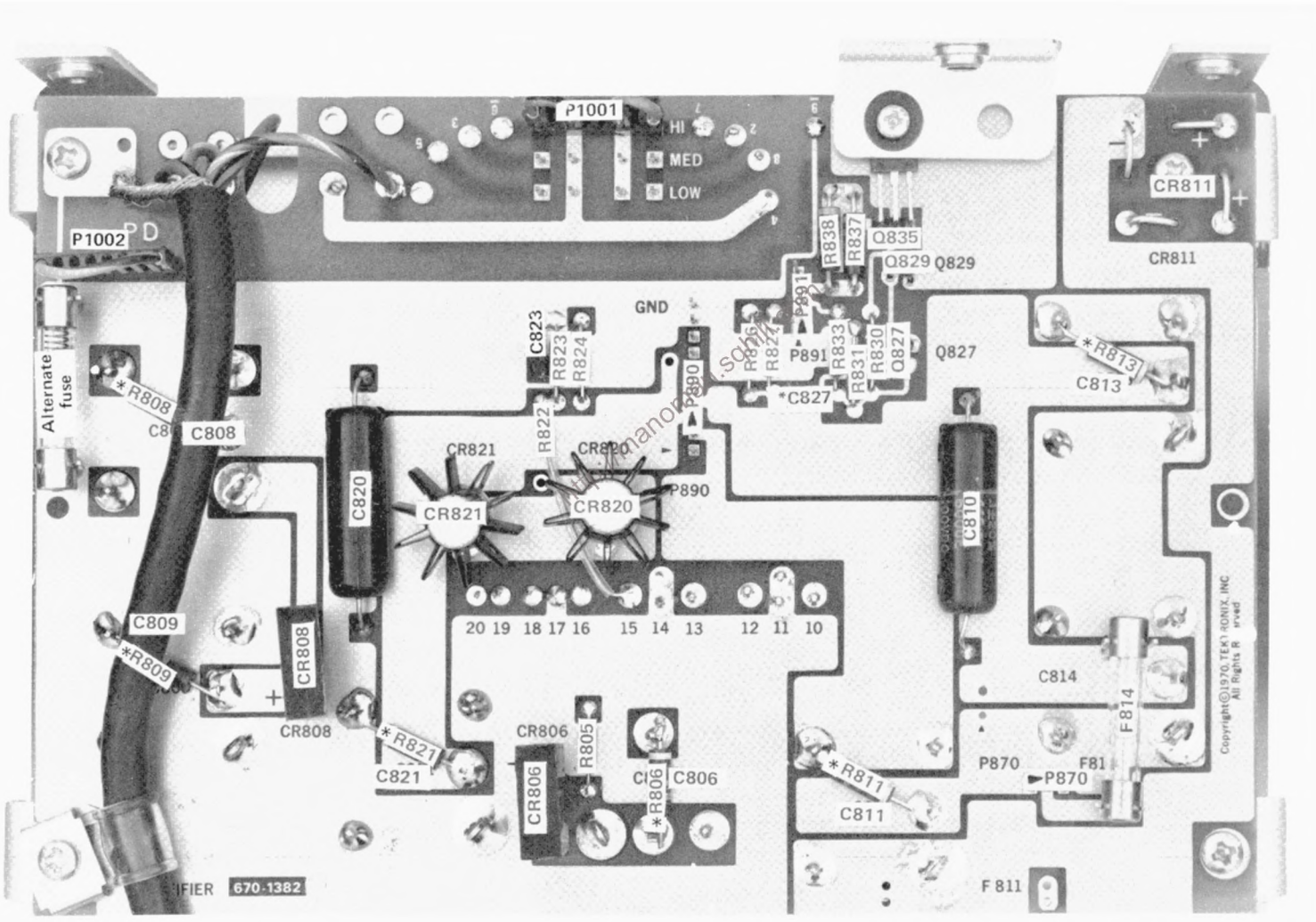


*R1242 added to back of board SN B010175. Later moved to front.

Fig. 8-11B. A9. High Voltage circuit board below SN B100000.

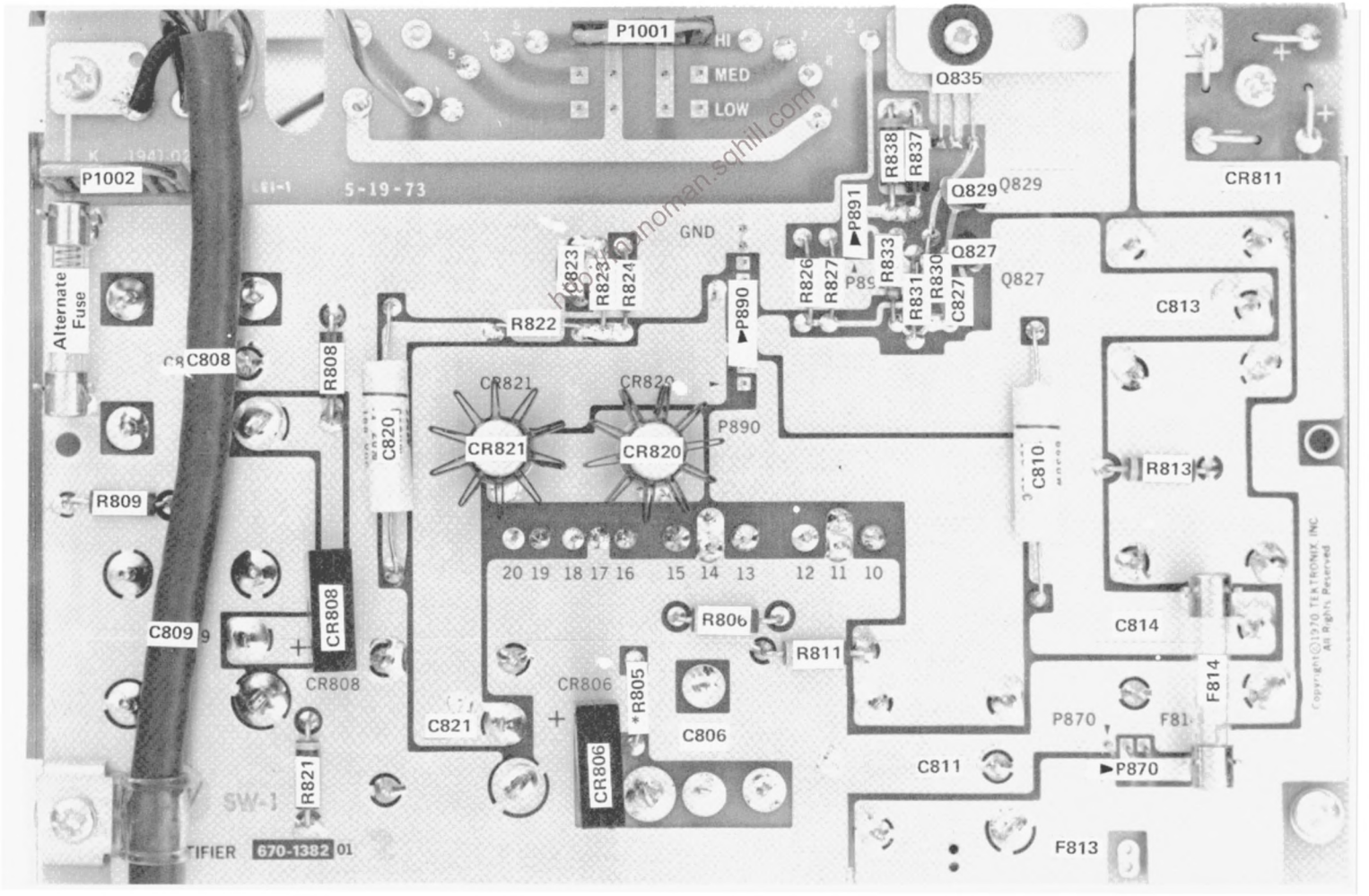


http://manuals.search.com



*See Parts List for serial number ranges.

Fig. 8-13B. A10, Rectifier circuit board below B061550.



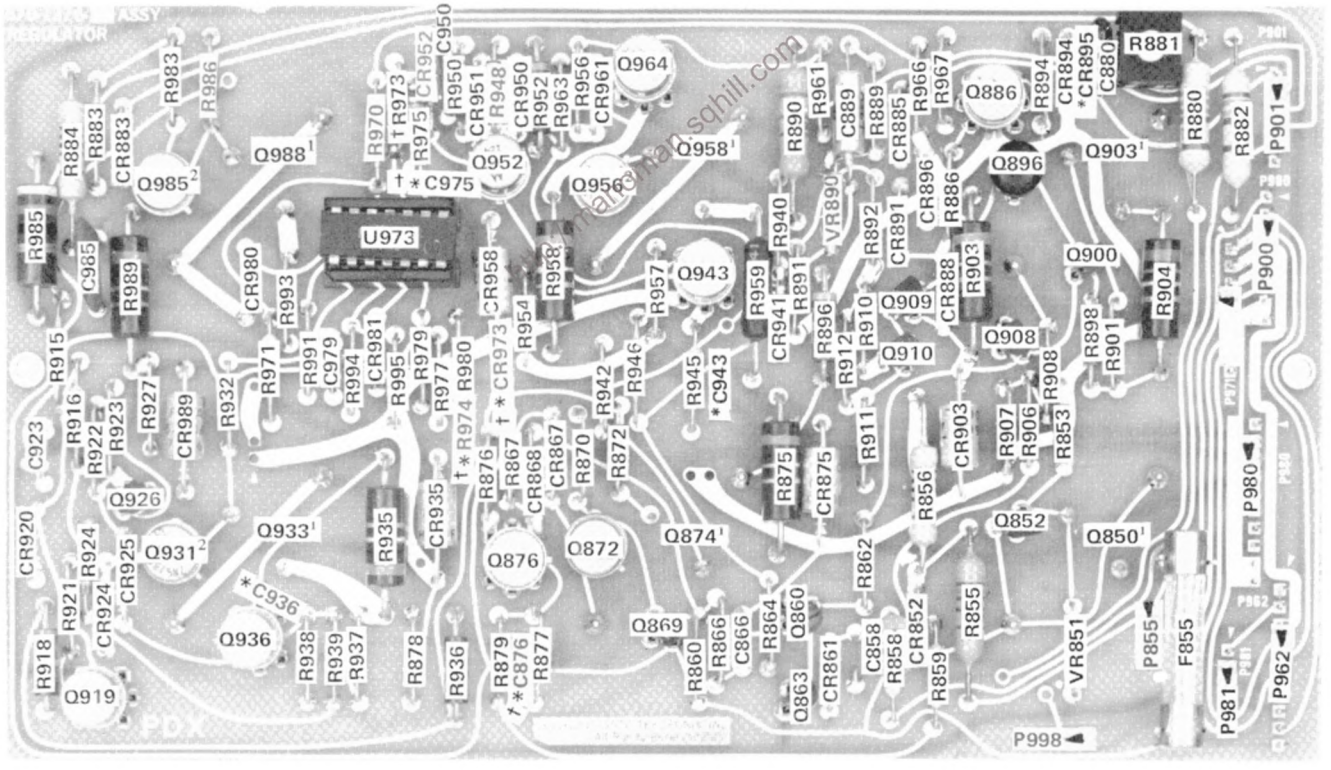
*See Parts List for serial number ranges.

Fig. 8-13A. A10. Rectifier circuit board B061550-up.

REV. JULY 1974

Added to back of board:

*C827
*CR975



REV. D, MAR. 1975

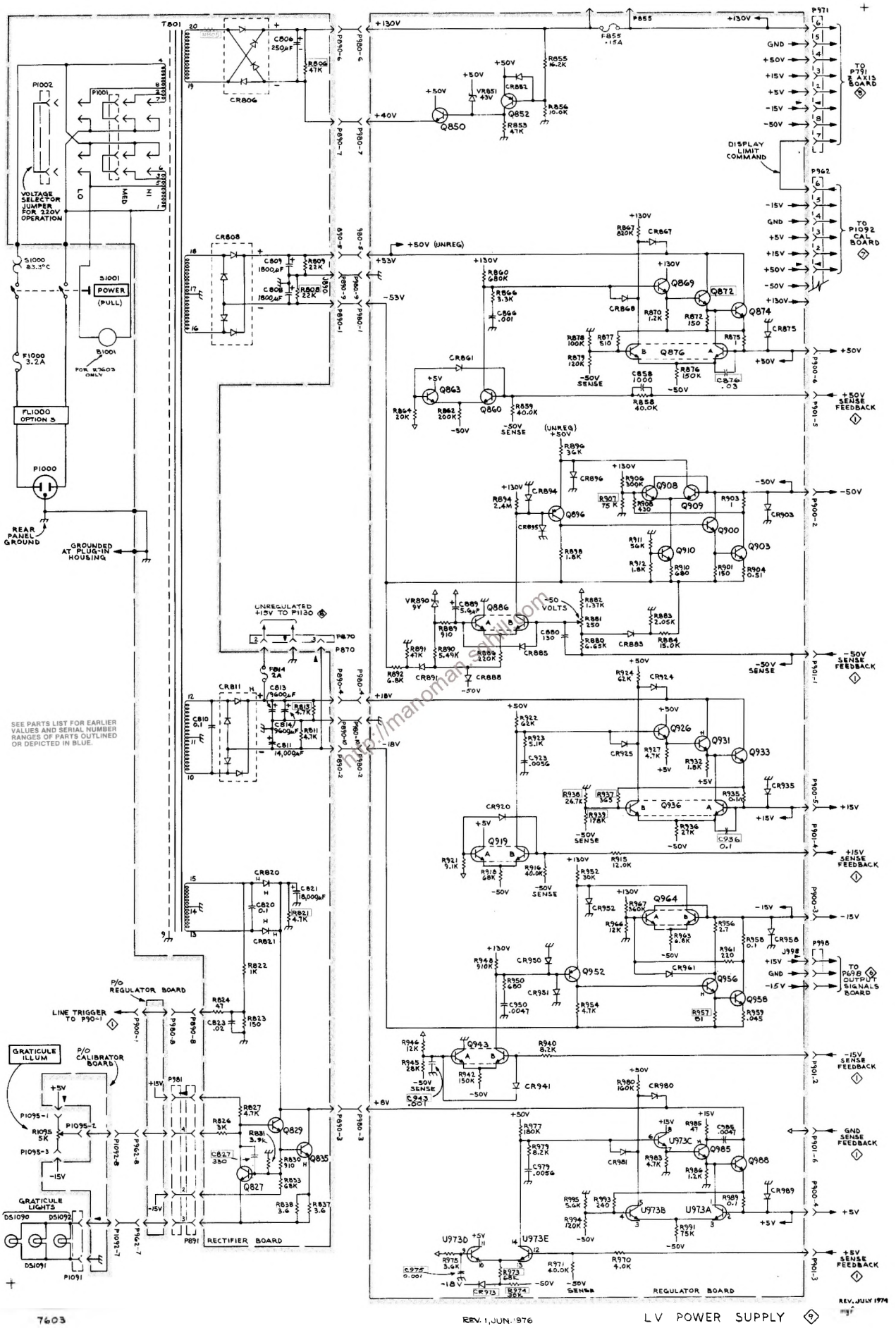
Fig. 8-12. A11. Low-Voltage Regulator circuit board.

[1] Mounted on heat sink

[2] Have heat sinks

†Located on back of board some serial numbers

*See Parts List for serial number ranges.



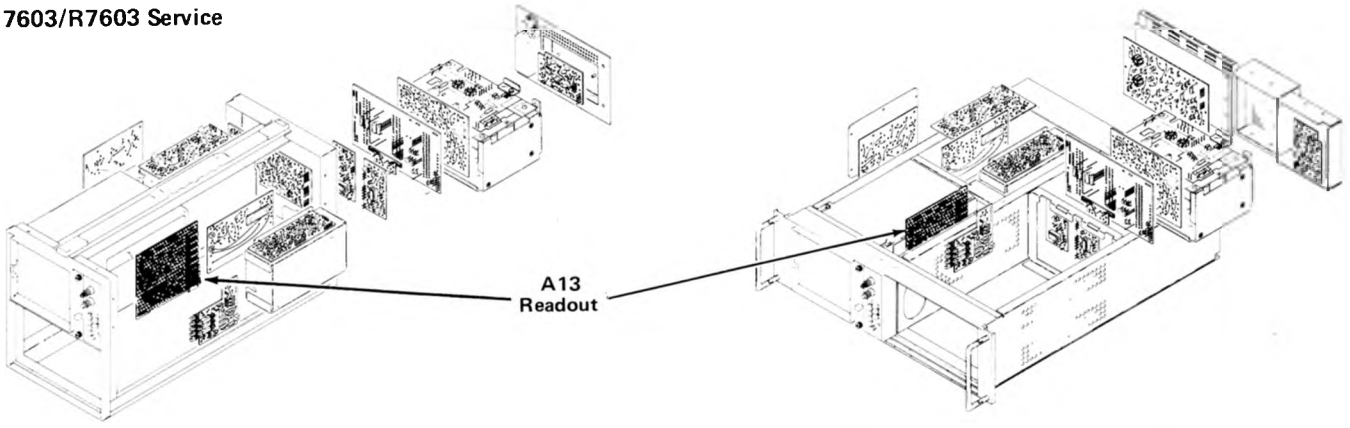
http://manoman.servio.com

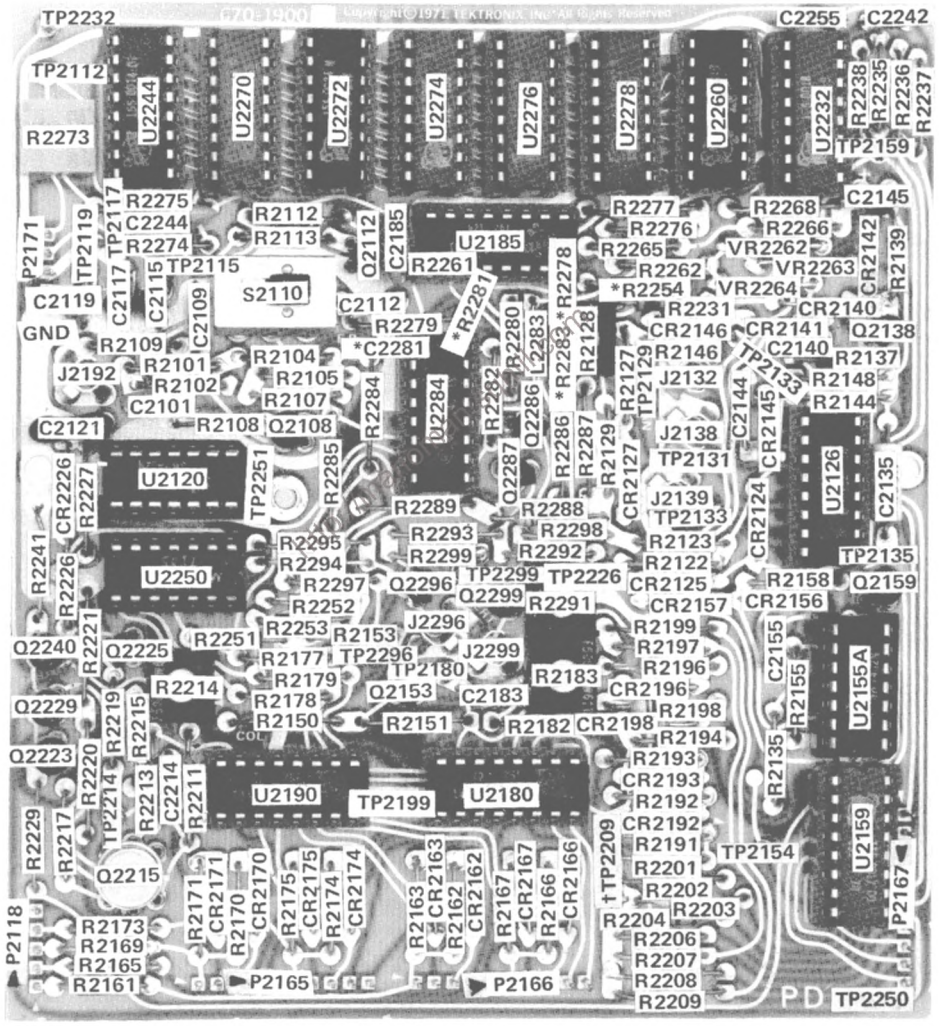
7603

REV. 1, JUN. 1976

LV POWER SUPPLY 9

REV. JULY 1974





*See Parts List for serial number ranges.

†Removed SN B260000-UP

Fig. 8-14. A13, Readout circuit board.

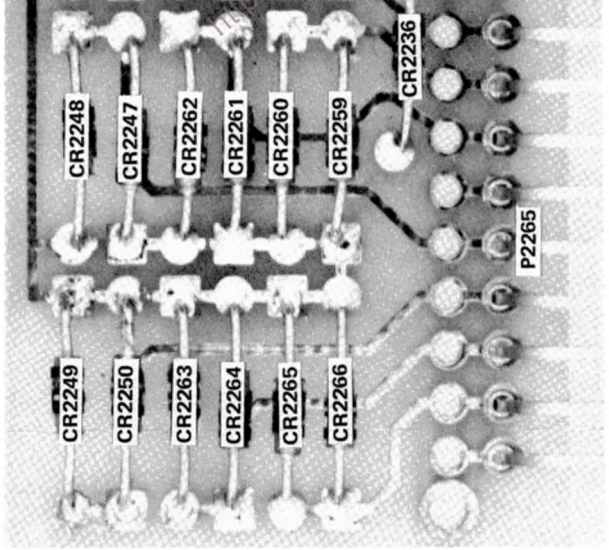
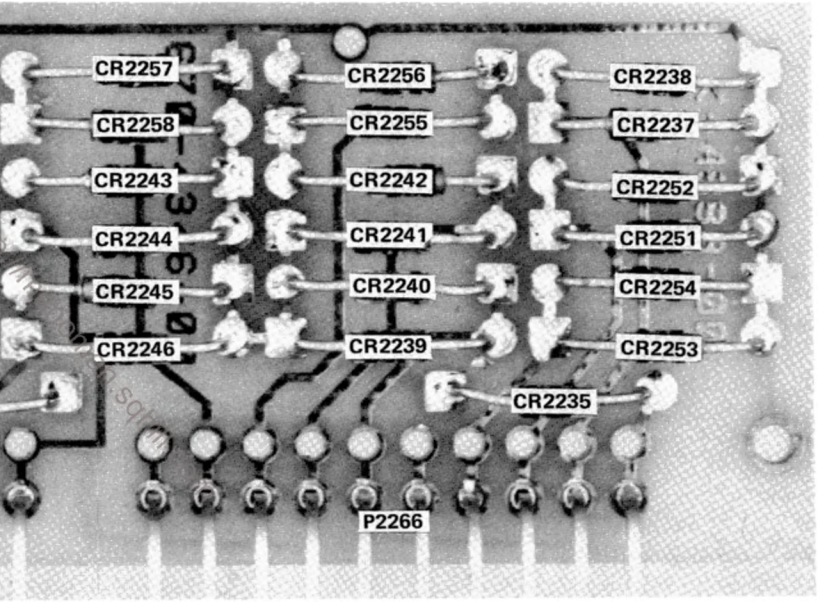
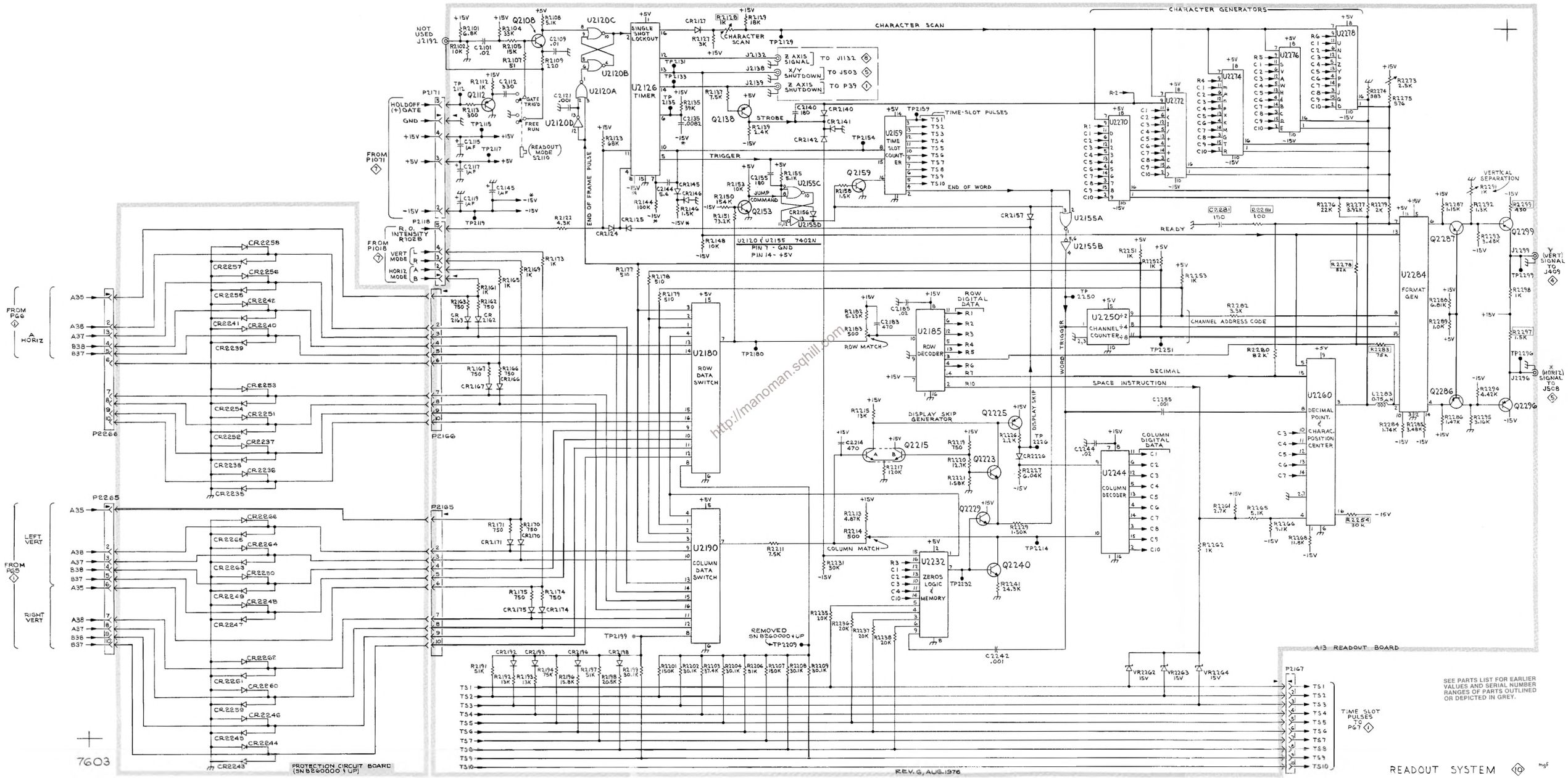


FIG. 8-14A A14. Protection circuit board (SN B260000 & UP).


CR2257
CR2256
CR2238
CR2258
CR2255
CR2237
CR2243
CR2242
CR2252
CR2244
CR2241
CR2251
CR2245
CR2240
CR2254
CR2246
CR2239
CR2253
CR2235
P2266


CHARACTER GENERATORS
CHARACTER SCAN
TRIGGER
END OF FRAME PULSE
TIME-SLOT PULSES
END OF WORD
READY
VERTICAL SEPARATION
CHANNEL ADDRESS CODE
ROW DIGITAL DATA
COLUMN DIGITAL DATA
DISPLAY SKIP GENERATOR
ROW MATCH
COLUMN MATCH
DECIMAL
SPACE INSTRUCTION
JUMP COMMAND
STROBE
Z AXIS SIGNAL
X/Y SHUTDOWN
Z AXIS SHUTDOWN
TO J1132
TO J503
TO P39
FROM P66
FROM P1071
FROM P1018
HORIZ
LEFT VERT
RIGHT VERT
TO P67
TIME SLOT PULSES TO P67
A13 READOUT BOARD
PROTECTION CIRCUIT BOARD (SN B020000 & UP)
REMOVED SN B020000 & UP
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
7603
REV. G, AUG. 1976
READOUT SYSTEM

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.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

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.

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.

ABBREVIATIONS

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

http://manoman.stabill.com

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
01881	ANACONDA AMERICAN BRASS COMPANY, A DIV. OF ANACONDA COMPANY	414 MEADOW STREET	WATERBURY, CT 06720
05091	TRI-ORDINATE CORPORATION	343 SNYDER AVENUE	BERKELEY HEIGHTS, NJ 07922
05820	WAKEFIELD ENGINEERING, INC.	AUDUBON ROAD	WAKEFIELD, MA 01880
06229	ELECTROVERT, INC.	86 HARTFORD AVENUE	MT. VERNON, NY 10553
06540	AMATOM ELECTRONIC HARDWARE, DIV. OF MITE CORP.	446 BlAKE ST.	NEW HAVEN, CT 06515
07700	TECHNICAL WIRE AND PRODUCTS, INC.	129 DERMODY ST.	CRANFORD, NJ 07016
07707	USM CORP., USM FASTENER DIV.	510 RIVER RD.	SHELTON, CT 06484
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
09422	PLASTIC STAMPING CORPORATION	2216 W. ARMITAGE AVE.	CHICAGO, IL 60647
11897	PLASTIGLIDE MFG. CORPORATION	P O BOX 867, 1757 STANFORD ST.	SANTA MONICA, CA 90406
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
12360	ALBANY PRODUCTS CO., DIV. OF PNEUMO DYNAMICS CORPORATION	145 WOODWARD AVENUE	SOUTH NORWALK, CT 06586
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
23499	GAVITT WIRE AND CABLE, DIVISION OF RSC INDUSTRIES, INC.	455 N. QUINCE ST.	ESCONDIDO, CA 92025
26365	GRIES REPRODUCER CO., DIV. OF COATS AND CLARK, INC.	125 BEECHWOOD AVE.	NEW ROCHELLE, NY 10802
28520	HEYMAN MFG. CO.	147 N. MICHIGAN AVE.	KENILWORTH, NJ 07033
28875	IMC MAGNETICS CORP., NEW HAMPSHIRE DIV.	ROUTE 16	ROCHESTER, NH 03867
55210	GETTIG ENG. AND MFG. COMPANY	PO BOX 85, OFF ROUTE 45	SPRING MILLS, PA 16875
70276	ALLEN MFG. CO.	P. O. DRAWER 570	HARTFORD, CT 06101
70485	ATLANTIC INDIA RUBBER WORKS, INC.	571 W. POLK ST.	CHICAGO, IL 60607
71279	CAMBRIDGE THERMIONIC CORP.	445 CONCORD AVE.	CAMBRIDGE, MA 02138
71590	CENTRALAB ELECTRONICS, DIV. OF GLOBE-UNION, INC.	P O BOX 858	FORT DODGE, IA 50501
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
74921	ITEN FIBRE CO., THE	4001 BENEFIT AVE., P O BOX 9	ASHTABULA, OH 44004
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
79727	C-W INDUSTRIES	550 DAVISVILLE RD.,P O BOX 96	WARMINISTER, PA 18974
79807	WROUGHT WASHER MFG. CO.	2100 S. O BAY ST.	MILWAUKEE, WI 53207
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83058	CARR COMPANY, THE UNITED-CARR DIV. OF TRW, INC	31 AMES ST.	CAMBRIDGE, MA 02142
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
86445	PENN FIBRE AND SPECIALTY CO., INC.	2032 E. WESTMORELAND ST.	PHILADELPHIA, PA 19134
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
91929	HONEYWELL, INC., MICRO SWITCH DIV.	CHICAGO & SPRING STS.	FREEPORT, IL 61032
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641
97913	INDUSTRIAL ELECTRONIC HARDWARE CORP.	109 PRINCE STREET	NEW YORK, NY 10012

http://manuals.tektronix.com

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	200-1209-03			1		BEZEL,CRT:	80009	200-1209-03
						(ATTACHING PARTS)		
-2	211-0634-00			2		THUMBSCREW:6-32 X 0.850 L	80009	211-0634-00
-3	210-0894-00			2		WASHER,NONMETAL:0.19 ID X 0.438" OD,PLSTC	09422	OBD
						- - - * - - -		
	198-2595-00			1		WIRE KIT,ELEC:	80009	198-2595-00
-4	204-0476-00			1		BODY,TERMINAL:	80009	204-0476-00
						(ATTACHING PARTS)		
-5	213-0055-00			2		SCR,TPG,THD FOR:2-32 X 0.188 INCH,PNH STL	83385	OBD
						- - - * - - -		
-6	210-0713-01			3		EYELET,METALLIC:0.059 DIA X 0.125 INCH LONG	80009	210-0713-01
-7	337-1700-00			1		SHLD,IMPLOSION:SMOKEY GRAY	80009	337-1700-00
-8	378-0624-00			1		DIFFUSER,LIGHT:	80009	378-0624-00
-9	214-1253-00			1		SPR HSG,SC LAMP:2.420 INCH L	80009	214-1253-00
-10	358-0378-00			1		BUSHING,SLEEVE:PRESS MOUNT	80009	358-0378-00
-11	366-1391-00			1		KNOB:GRAY	80009	366-1391-00
	213-0140-00			1		. SETSCREW:2-56 X 0.94 INCH,HEX SOC STL	70276	OBD
-12	366-1077-00			1		KNOB:GRAY	80009	366-1077-00
	213-0153-00			1		. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-13	366-1059-00			1		PUSH BUTTON:GRAY	80009	366-1059-00
-14	366-1215-00			1		KNOB:GRAY	80009	366-1215-00
	213-0153-00			1		. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-15	366-1402-02			2		PUSH BUTTON:LEFT	80009	366-1402-02
-16	366-1402-03			1		PUSH BUTTON:ALT	80009	366-1402-03
-17	366-1402-04			1		PUSH BUTTON:ADD	80009	366-1402-04
-18	366-1257-31			1		PUSH BUTTON:CHOP	80009	366-1257-31
-19	366-1402-06			2		PUSH BUTTON:RIGHT	80009	366-1402-06
-20	366-1402-07			1		PUSH BUTTON:VERT MODE	80009	366-1402-07
-21	426-0681-00			8		FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00
-22	136-0387-01			1		JACK,TIP:BLACK	71279	450-4352-01-0310
-23	136-0387-00			3		JACK,TIP:GRAY	71279	4352-1-0318
-24	358-0216-00			1		BUSHING,PLASTIC:0.257 ID X 0.412 INCH OD	80009	358-0216-00
-25	333-1587-00			1		PANEL,FRONT:	80009	331-1587-00
-26	----- -----			1		LIGHT,INDICATOR(SEE EPL)		
-27	386-2269-00			1		SUBPANEL,FRONT:	80009	386-2269-00
						(ATTACHING PARTS)		
-28	211-0559-00			3		SCREW,MACHINE:6-32 X 0.375"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-29	136-0445-00			1		LAMPHOLDER ASSY:	80009	136-0445-00
						(ATTACHING PARTS)		
-30	211-0501-00			2		SCREW,MACHINE:6-32 X 0.125 INCH,PNH STL	83385	OBD
						- - - * - - -		
-31	385-0079-00			2		SPACER,POST:0.25 HEX X 0.375 L,W/6-32 THD	80009	385-0079-00
						(ATTACHING PARTS FOR EACH)		
	211-0541-00			1		SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-32	407-0915-00			1		BRACKET,ANGLE:	80009	407-0915-00
						(ATTACHING PARTS)		
	211-0541-00			2		SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-33	----- -----			2		RESISTOR,VAR:		
						(ATTACHING PARTS FOR EACH)		
-34	210-0583-00			1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-35	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
						- - - * - - -		
-36	----- -----			1		CKT BD ASSY:CALIBRATOR AND MODE SW(SEE A7 EPL)		
-37	131-0608-00			46		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-38	136-0252-04			12		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-39	260-1379-00			1		. SWITCH,PUSH:TRIG SOURCE	71590	2KBC120000-595
						(ATTACHING PARTS)		
-40	361-0411-00			4		. SPACER,PUSH SW:0.13 W X 0.375 INCH L,PLSTC	71590	J64285-00
						- - - * - - -		

http://manuals.homan.sqfw.com

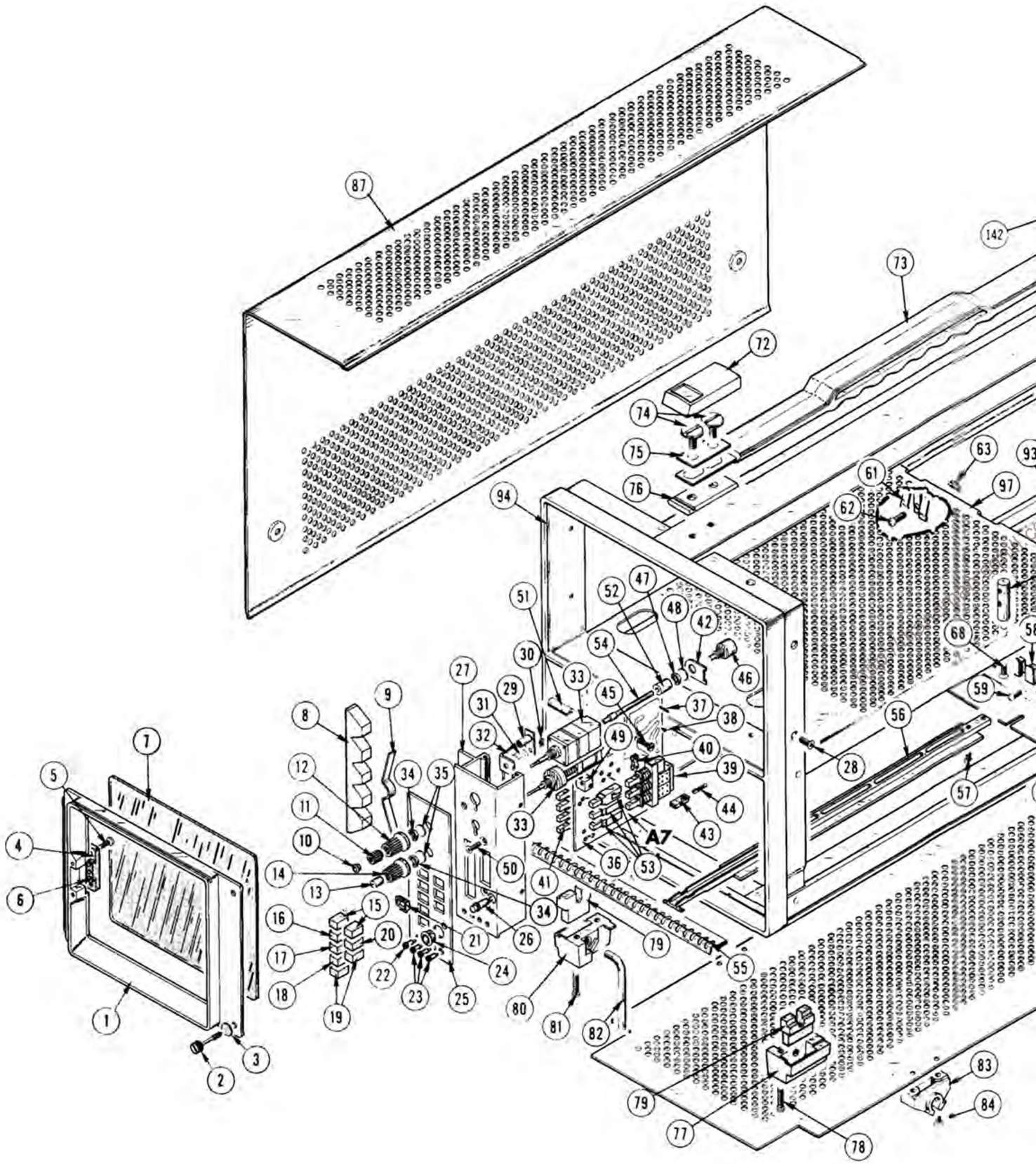
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-	131-0993-00			1		. LINK,TERM.CONNE:2 WIRE BLACK	00779	530153-2
-41	260-1378-00			1		. SWITCH,PUSH:VERT MODE	71590	2KBC140000-608
	361-0411-00			8		. SPACER,PUSH SW:0.13 W X 0.375 INCH L,PLSTC	71590	J64285-00
-42	386-2285-00			1		. PLATE,RES MTG:	80009	386-2285-00
-43	352-0161-00			1		. CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0161-00
-44	131-0707-00			2		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
						(ATTACHING PARTS FOR CKT BD ASSY)		
	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-45	211-0040-00			1		SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC	26365	OBD
						- - - * - - -		
-46	----- -----			1		RESISTOR,VAR:		
						(ATTACHING PARTS)		
-47	210-0583-00			1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-48	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
						- - - * - - -		
-49	220-0455-00			2		NUT,BLOCK:0.281"SQ,THREE 4-40 THRU THDS	80009	220-0455-00
						(ATTACHING PARTS FOR EACH)		
-50	211-0101-00			1		SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-51	361-0137-00			1		POST,ELEC-MECH:1.345 INCH,W/4-40 THREAD	80009	361-0137-00
						(ATTACHING PARTS)		
	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-52	376-0029-00	B010100	B039999X	1		CPLG,SHAFT,RGD:0.128 ID X 0.312 OD X 0.5"L	80009	376-0029-00
	213-0075-00			2		. SETSCREW:4-40 X 0.094 INCH,HEX SOC STL	70276	OBD
-53	384-1136-00			3		EXTENSION SHAFT:0.95 INCH LONG	80009	384-1136-00
-54	384-1112-01	B010100	B039999X	1		EXTENSION SHAFT:1.910 INCH L,EPOXY GLASS	80009	384-1112-01
-55	348-0278-00			2		SHLD GSKT,ELEC:	80009	348-0278-00
-56	351-0295-00			3		GUIDE,SLIDE:	80009	351-0295-00
						(ATTACHING PARTS FOR EACH)		
-57	213-0088-00	B010100	B234532	1		SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL	83385	OBD
	213-0054-00	B234533		1		SCR,TPG,THD FOR:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-58	131-0930-00			2		CONTACT,ELEC:PLUG-IN GROUND	80009	131-0930-00
						(ATTACHING PARTS FOR EACH)		
-59	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-60	210-0586-00			1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
						- - - * - - -		
-61	131-0799-00			2		CONTACT,ELEC:	80009	131-0799-00
						(ATTACHING PARTS FOR EACH)		
-62	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-63	210-0586-00			1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
						- - - * - - -		
-64	131-1018-00			4		CONTACT,ELEC:PLUG-IN GROUND	80009	131-1018-00
						(ATTACHING PARTS FOR EACH)		
-65	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-66	210-0586-00			1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
						- - - * - - -		
-67	385-0113-00			1		INS,STANDOFF:0.313 OD X 1.125 INCH L,NYL	80009	385-0113-00
						(ATTACHING PARTS)		
-68	211-0538-00			1		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-69	210-0202-00			1		TERMINAL,LUG:SE #6	78189	2104-06-00-2520N
						(ATTACHING PARTS)		
-70	211-0504-00			1		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
-71	210-0407-00			1		NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
						- - - * - - -		
-72	200-0728-00			2		COV,HANDLE END:	80009	200-0728-00
-73	367-0108-00			1		HANDLE,SCOPE:	80009	367-0108-00
						(ATTACHING PARTS)		
-74	212-0597-00			4		SCREW,MACHINE:10-32 X 0.50 INCH,STL	83385	OBD
-75	386-1624-00			2		PL,RET.,HANDLE:	80009	386-1624-00
-76	386-1283-02	B010100	B019999	2		PLATE,HDL MTG:	80009	386-1283-02
	386-1283-03	B020000		2		PLATE,HDL MTG:PLASTIC	80009	386-1283-03

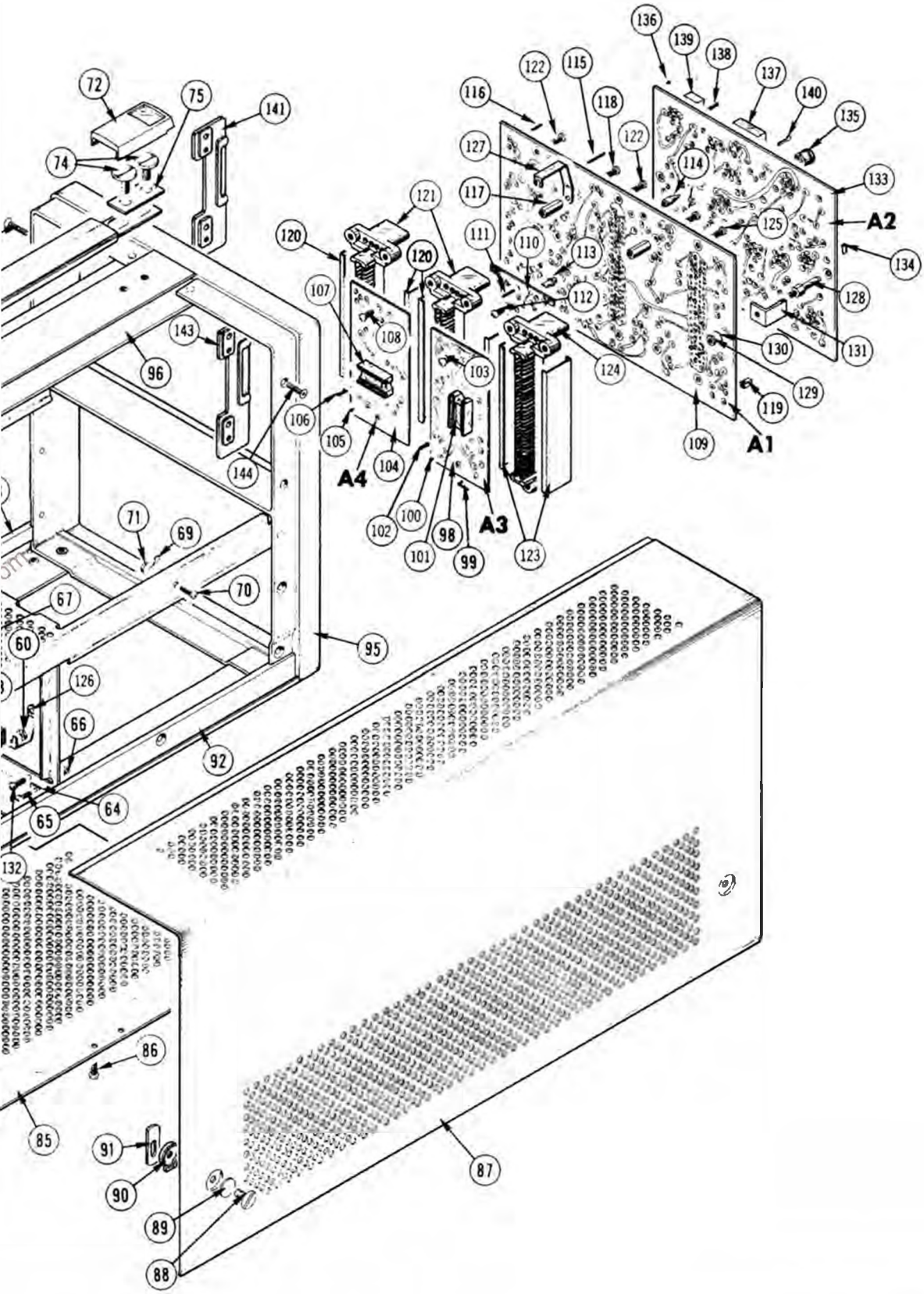
http://manuals.mcgraw-hill.com

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-	358-0485-00	XB020000		4		BUSHING,SLEEVE:0.196ID X 0.287OD X 0.13" L	80009	358-0485-00
						- - - * - - -		
-77	348-0074-00			2		SPT PIVOT,FLIP:RIGHT FRONT AND LEFT REAR	80009	348-0074-00
						(ATTACHING PARTS FOR EACH)		
-78	211-0532-00			2		SCREW,MACHINE:6-32 X 0.75 INCH,FILH STL	83385	OBD
						- - - * - - -		
-79	377-0119-00			4		PAD,CUSHIONING:	80009	377-0119-00
-80	348-0073-00			2		SPT PIVOT,FLIP:LEFT FRONT AND RIGHT REAR	80009	348-0073-00
						(ATTACHING PARTS FOR EACH)		
-81	211-0532-00			2		SCREW,MACHINE:6-32 X 0.75 INCH,FILH STL	83385	OBD
						- - - * - - -		
-82	348-0282-00			1		STAND,ELEC EQPT:	80009	348-0282-00
-83	343-0256-00			2		RTNR BLK,SCOPE:	80009	343-0256-00
						(ATTACHING PARTS FOR EACH)		
-84	211-0578-00			1		SCREW,MACHINE:6-32 X 0.438 INCH,PNH STL	83385	OBD
						- - - * - - -		
-85	390-0204-00			1		COVER,SCOPE:	80009	390-0204-00
						(ATTACHING PARTS)		
-86	211-0503-00			4		SCREW,MACHINE:6-32 X 0.188 INCH,PNH STL	83385	OBD
						- - - * - - -		
-87	390-0306-00			2		COVER,SCOPE:	80009	390-0306-00
	214-0812-00			2		. FASTENER,PAWL:	80009	214-0812-00
-88	214-0603-01			1		. . PIN,SECURING:0.27 INCH LONG	80009	214-0603-01
-89	214-0604-00			1		. . WASH.,SPG TNSN:0.26 ID X 0.47 INCH OD	80009	214-0604-00
-90	386-0227-00			1		. . PL,LATCH INDEX:	80009	386-0227-00
-91	386-0226-00			1		. . PL,LATCH LKG:FOR 0.080 INCH THICKNESS	80009	386-0226-00
	426-1042-00			1		FR ASSY,SCOPE:	80009	426-1042-00
-92	426-0857-00			1		. FRAME SECT,CAB.:LOWER RIGHT	80009	426-0857-00
						(ATTACHING PARTS)		
	210-0782-00			5		. RIVET,SOLID:0.125 OD X 0.312"100 DEG FLH	12360	OBD
						- - - * - - -		
-93	426-0858-00			1		. FRAME SECT,CAB.:LOWER LEFT	80009	426-0858-00
						(ATTACHING PARTS)		
	210-0782-00			5		. RIVET,SOLID:0.125 OD X 0.312"100 DEG FLH	12360	OBD
						- - - * - - -		
-94	426-0741-06			1		. FRAME SECT,CAB.:FRONT	80009	426-0741-06
						(ATTACHING PARTS)		
	210-0782-00			4		. RIVET,SOLID:0.125 OD X 0.312"100 DEG FLH	12360	OBD
						- - - * - - -		
-95	426-0741-03			1		. FRAME SECT,CAB.:REAR	80009	426-0741-03
						(ATTACHING PARTS)		
	210-0782-00			4		. RIVET,SOLID:0.125 OD X 0.312"100 DEG FLH	12360	OBD
						- - - * - - -		
-96	426-0753-00			1		. FRAME SECT,CAB.:TOP CENTER	80009	426-0753-00
-97	380-0238-00			1		. HOUSING,PLUG-IN:	80009	380-0238-00
-98	----- -----			1		CKT BOARD ASSY:TRIGGER SELECTOR(SEE A3 EPL)		
-99	131-0589-00			4		. CONTACT,ELEC:0.46 INCH LONG	22526	47350
-100	136-0252-01	B010100	B122799	15		. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
	136-0350-00	B122800		5		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
-101	136-0260-01			1		. SOCKET,PLUG-IN:16 CONTACT,RECT SHAPE	71785	133-51-02-075
-102	136-0263-03			16		. SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	00779	86250-2
						(ATTACHING PARTS)		
-103	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-104	----- -----			1		CKT BOARD ASSY:VERTICAL INTERFACE(SEE A4 EPL)		
-105	136-0252-04	B010100	B122799	21		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-04	B122800		12		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0350-00	B122800		3		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
-106	136-0263-03			16		. SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	00779	86250-2
-107	136-0260-02			1		. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
						(ATTACHING PARTS FOR CKT BD)		
-108	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-109	----- -----			1		CKT BOARD ASSY:MAIN INTERFACE(SEE A1 EPL)		
-110	670-1374-00			1		. CKT BOARD ASSY:VERT INTERCONNECT	80009	670-1374-00

http://manuals.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
1-111	131-0787-00			8	. . CONTACT,ELEC:0.64 INCH LONG	22526	47359
					(ATTACHING PARTS FOR CKT BD)		
-112	211-0008-00			2	. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-113	351-0213-00			2	. GUIDE-POST,LOCK:0.285 INCH LONG	80009	351-0213-00
					- - - * - - -		
-114	386-1558-00			2	. SPACER,CKT CARD:PLASTIC	80009	386-1558-00
	131-0591-00			32	. CONTACT,ELEC:0.835 INCH LONG	22526	47352
-115	131-0592-00			26	. CONTACT,ELEC:0.885 INCH LONG	22526	47353
	136-0252-04	XB163700		2	. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-116	131-0608-00			74	. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-117	129-0308-00			4	. POST,ELEC-MECH:HEX.,0.25 X 0.465 INCH LONG	80009	129-0308-00
					(ATTACHING PARTS FOR EACH)		
-118	211-0008-00			1	. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	210-0803-00	XB050000		1	. WASHER,FLAT:0.15 ID X 0.375 INCH OD,STL	12327	OBD
					- - - * - - -		
-119	131-1003-00			2	. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
	131-0767-02	B010100	B039999	2	. CONNECTOR,RCPT,:76 CONTACT	80009	131-0767-02
	131-0767-08	B040000		2	. CONNECTOR,RCPT,:PLUG-IN CKT BD,70 CONTACT	80009	131-0767-08
	----- -----			-	. . EACH CONNECTOR INCLUDES:		
-120	200-0950-00			2	. . COVER,ELEC CONN:PLASTIC	80009	200-0950-00
-121	204-0365-00			1	. . BODY,CONNECTOR:PLUG-IN CIRCUIT CARD	80009	204-0365-00
	131-0726-00	B010100	B039999	36	. . CONTACT,ELEC:STRAIGHT	80009	131-0726-00
	131-0726-00	B040000		33	. . CONTACT,ELEC:STRAIGHT	80009	131-0726-00
	131-0727-00	B010100	B039999	36	. . CONTACT,ELEC:OFFSET	80009	131-0727-00
	131-0727-00	B040000		33	. . CONTACT,ELEC:OFFSET	80009	131-0727-00
	131-0899-00			4	. . CONTACT,ELEC:0.048 X 0.006 INCH THK	80009	131-0899-00
					(ATTACHING PARTS FOR EACH CONN)		
-122	213-0232-00			2	. SCR,TPG,THD FOR:2-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
	131-0767-00	B010100	B039999	1	. CONNECTOR,RCPT,:76 CONTACT	80009	131-0767-00
	131-0767-07	B040000		1	. CONNECTOR,RCPT,:PLUG-IN CKT BD,70 CONTACT	80009	131-0767-07
-123	200-0950-00			2	. . COVER,ELEC CONN:PLASTIC	80009	200-0950-00
-124	204-0365-02			1	. . BODY,CONNECTOR:PLUG-IN CIRCUIT CARD	80009	204-0365-02
	131-0726-00	B010100	B039999	38	. . CONTACT,ELEC:STRAIGHT	80009	131-0726-00
	131-0726-00	B040000		35	. . CONTACT,ELEC:STRAIGHT	80009	131-0726-00
	131-0727-00	B010100	B039999	38	. . CONTACT,ELEC:OFFSET	80009	131-0727-00
	131-0727-00	B040000		35	. . CONTACT,ELEC:OFFSET	80009	131-0727-00
					(ATTACHING PARTS)		
-125	211-0232-00			2	. SCREW,MACHINE:4-40 X 0.25 INCH,FIL STL	83385	OBD
	210-0906-00			1	. WASHER,NONMETAL:FIBER,0.125 ID X 0.203"OD	86928	OBD
					- - - * - - -		
-126	131-0804-00			1	. LINK,TERM.CONNE:J-SHAPE	80009	131-0804-00
-127	131-0805-00			2	. LINK,TERM.CONNE:J-SHAPE,0.90X0.82 X 0.312"	80009	131-0805-00
-128	214-1568-00			2	. PIN,GUIDE:	80009	214-1568-00
					(ATTACHING PARTS FOR EACH)		
-129	210-0406-00			1	. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-130	210-0054-00			1	. WASHER,LOCK:SPLIT,0.118 ID X 0.212"OD STL	83385	OBD
					- - - * - - -		
-131	344-0147-00			2	. CLIP,SPR,TNSN:CIRCUIT CARD MOUNTING	80009	344-0147-00
					(ATTACHING PARTS FOR CKT BD)		
-132	213-0034-00			9	SCR,TPG,THD CTG:4-40 X 0.188 INCH,PNH STL	83385	OBD
					- - - * - - -		
-133	----- -----			1	CKT BOARD ASSY:LOGIC(SEE A2 EPL)		
-134	131-0566-00			1	. LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-135	136-0235-00			1	. SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-136	136-0252-04	B010100	B122799	24	. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0350-00	B122800		8	. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
-137	136-0260-02			1	. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
-138	136-0263-03			33	. SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	00779	86250-2
-139	136-0269-02			3	. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402
-140	214-0579-00			4	. TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-141	407-1145-01			1	BRKT,HEAT SINK:LEFT	80009	407-1145-01
					(ATTACHING PARTS)		
-142	211-0538-00			2	SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
					- - - * - - -		
-143	407-1145-02			1	BRKT,HEAT SINK:RIGHT	80009	407-1145-02
					(ATTACHING PARTS)		
-144	211-0538-00			2	SCREW,MACHINE:6-32 X 0.312" 100 DEG,FLH STL	83385	OBD
					- - - * - - -		


A7


72
75
141
74
96
143
144
106
107
108
120
121
105
104
A4
102
100
101
98
99
A3
103
123
111
110
113
112
124
116
122
115
118
127
117
114
136
139
138
137
140
135
133
A2
125
134
128
130
131
129
119
109
A1
71
69
70
67
60
95
126
66
92
64
65
132
86
85
91
90
89
88
87

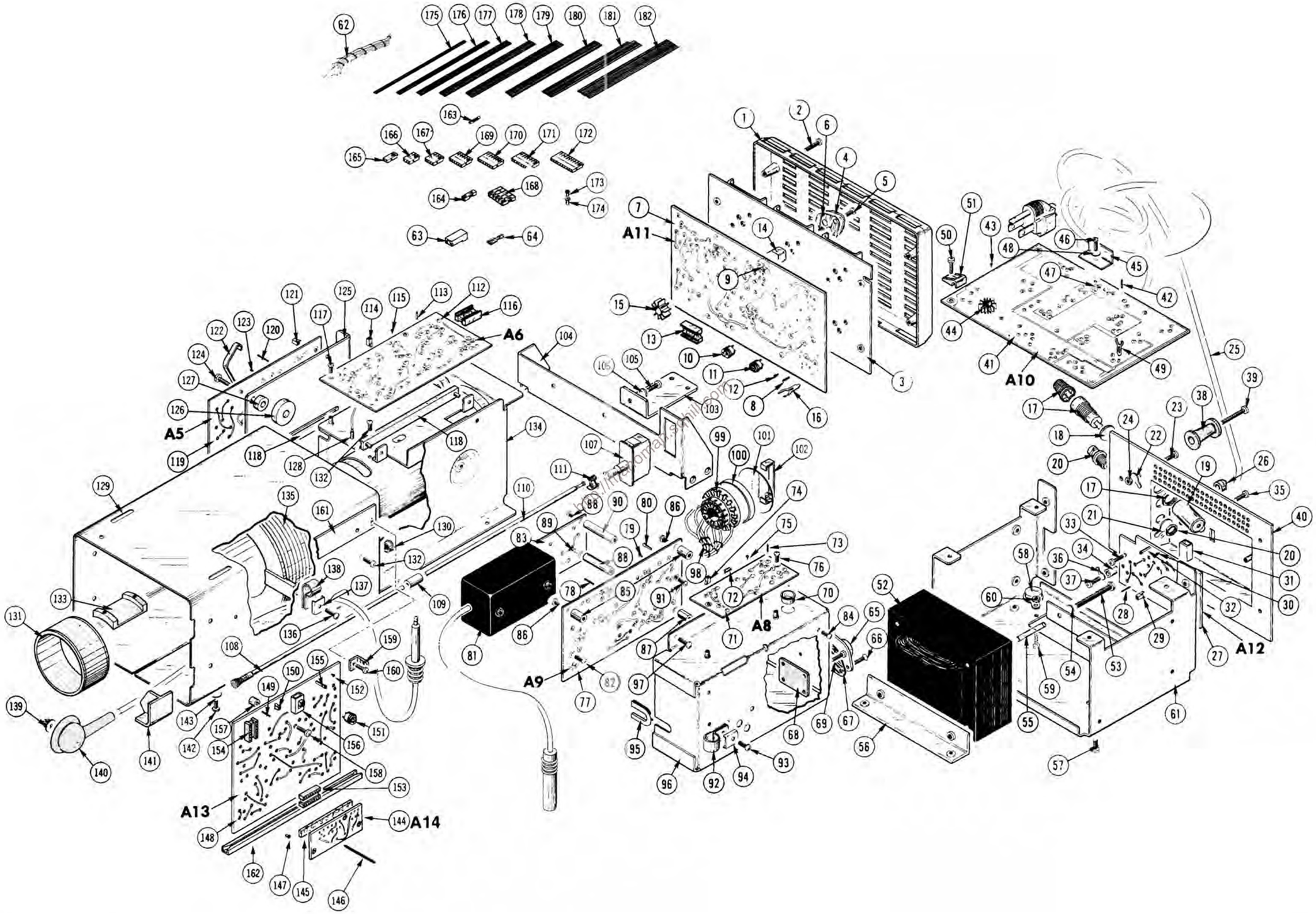

A5
A6
A9
A10
A11
A12
A13
A14
A8

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	337-1425-00			1		SHIELD,ELEC:	80009	337-1425-00
						(ATTACHING PARTS)		
-2	211-0516-00			4		SCREW,MACHINE:6-32 X 0.875 INCH,PNH STL	83385	OBD
						- - - * - - -		
-3	441-1060-01			1		CHAS,ELEC EQPT:MAIN	80009	441-1060-01
						(ATTACHING PARTS)		
	211-0538-00			4		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-4	----- -----			6		TRANSISTOR:		
						(ATTACHING PARTS FOR EACH)		
-5	211-0511-00			2		SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
-6	386-0978-00			1		INSULATOR,PLATE:0.002 INCH MICA,FOR TO-3	80009	386-0978-00
						- - - * - - -		
-7	----- -----			1		CKT BOARD ASSY:REGULATOR(SEE A11 EPL)		
-8	131-0608-00			45		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-9	131-0847-00			12		. TERMINAL STUD:6-32 X 0.435 INCH LONG	80009	131-0847-00
-10	136-0183-00			3		. SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
-11	136-0235-00			6		. SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-12	136-0252-04			36		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-13	136-0269-02			1		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402
-14	136-0361-00			6		. SOCKET,PLUG-IN:	80009	136-0361-00
	136-0384-00			12		. SOCKET,PIN TERM:FOR 0.04 DIAMETER PIN	00779	52120
-15	214-1291-00			3		. HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H	05820	207-AB
-16	344-0154-00			2		. CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
-17	352-0076-00			1		FUSEHOLDER:W/HARDWARE	75915	342012
						(ATTACHING PARTS)		
-18	210-0873-00			1		WASHER,NONMETAL:0.5 ID X 0.688 INCH OD,NPRN	70485	OBD
						- - - * - - -		
	614-0104-00	B010100	B224392	1		SUBPANEL ASSY:	80009	614-0104-00
	614-0104-03	B224393		1		SUBPANEL ASSY:	80009	614-0104-03
-19	200-1388-00	B010100	B234589	1		. COVER,FUSE:	80009	200-1388-00
	200-1388-01	B234590		1		. COVER,FUSE:	80009	200-1388-01
-20	131-0955-00			6		. CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
-21	210-0255-00			1		. TERMINAL,LUG:0.391" ID INT TOOTH	80009	210-0255-00
-22	210-0202-00	B010100	B224392	1		. TERMINAL,LUG:SE #6	78189	2104-06-00-2520N
	210-0202-00	B224393		2		. TERMINAL,LUG:SE #6	78189	2104-06-00-2520N
						(ATTACHING PARTS)		
-23	211-0504-00	B010100	B224392	1		. SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
	211-0507-00	B224393		1		. SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-24	210-0407-00	B010100	B224392	1		. NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
	210-0407-00	B224393		2		. NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
						- - - * - - -		
-25	161-0033-09			1		. CABLE ASSY,PWR,:3 WIRE,92 INCH LONG	80009	161-0033-09
-26	358-0323-00			1		. BSHG,STRAIN RLF:90 DEG,0.515 DIA HOLE	28520	SR15-1
-27	----- -----			1		. CKT BOARD ASSY:SIGNAL OUT(SEE A12 EPL)		
-28	131-0608-00			11		. . CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-29	131-1003-00			2		. . CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-30	136-0252-01			2		. . CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
	136-0252-04	B010100	B122799	27		. . SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0350-00	B122800		9		. . SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
-31	260-0984-00			1		. . SWITCH,SLIDE:DP 3 POSN,0.5A,125VAC-DC	79727	G-128SPC/7140
-32	214-0579-00			1		. . TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
						(ATTACHING PARTS FOR CKT BD)		
-33	211-0008-00			2		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-34	385-0100-00			1		. INS,STANDOFF:0.312 INCH X 0.50 INCH LONG	80009	385-0100-00
						(ATTACHING PARTS)		
-35	211-0504-00			1		. SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-36	210-0202-00			1		. TERMINAL,LUG:SE #6	78189	2104-06-00-2520N
						(ATTACHING PARTS)		
-37	211-0504-00			1		. SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		

http://tekman.sghill.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-38	348-0191-00			1		. LEG,ELEC EQUIP.:PLASTIC	80009	348-0191-00
-39	211-0529-00			1		. SCREW,MACHINE:6-32 X 1.25 INCHES,PNH STL	83385	OBD
-40	386-2199-00			1		PANEL,REAR:POWER	80009	386-2199-00
-41	----- -----			1		CKT BOARD ASSY:RECTIFIER(SEE A10 EPL)		
-42	131-0608-00			28		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-43	136-0252-04	B010100	B122799	6		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0350-00	B122800		2		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
-44	214-1292-00			2		. HEAT SINK,ELEC:TRANSISTOR	05820	205-AB
-45	214-1731-00	B010100	B030812	1		. HEAT SINK,ELEC:TRANSISTOR	80009	214-1731-00
	214-1731-01	B030813		1		. HEAT SINK,ELEC:TRANSISTOR	80009	214-1731-01
						(ATTACHING PARTS)		
-46	211-0014-00	B010100	B316169	1		. SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
	211-0016-00	B316170		1		. SCREW,MACHINE:4-40 X 0.625 INCH,PNH STL	83385	OBD
-47	210-0586-00			1		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
-48	210-0935-00			1		. WASHER,NONMETAL:FIBER,0.14 IDX 0.375"OD	74921	OBD
	210-0851-00	XB316170		1		. WASHER,FLAT:0.119 ID X 0.375 INCH OD,STL	12327	OBD
						- - - * - - -		
	131-0566-00	XB140000		1		. LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-49	344-0154-00			4		. CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
						(ATTACHING PARTS FOR CKT BD)		
-50	211-0507-00			3		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
	211-0511-00			1		SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
	211-0008-00	XB030813		1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-51	343-0081-00			1		STRAP,RETAINING:	95987	3-16H
-52	----- -----			1		TRANSFORMER:(SEE T801 EPL)		
						(ATTACHING PARTS)		
-53	212-0522-00			2		SCREW,MACHINE:10-32 X 2.50",HEX HD STL	83385	OBD
-54	210-0812-00			2		WASHER,NONMETAL:#10,FIBER	86445	OBD
-55	166-0457-00			2		INSUL SLVG,ELEC:0.19 ID X 1.875"LONG MYLAR	80009	166-0457-00
						- - - * - - -		
	407-1837-00	XB316170		1		. BRACKET,CKT BD:	80009	407-1837-00
						(ATTACHING PARTS)		
	220-0410-00	XB316170		1		NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	OBD
	212-0522-00	XB316170		1		SCREW,MACHINE:10-32 X 2.50",HEX HD STL	83385	OBD
	210-0805-00	XB316170		1		WASHER,FLAT:0.204 ID X 0.438 INCH OD,STL	12327	OBD
	166-0457-00	XB316170		1		INSUL SLVG,ELEC:0.19 ID X 1.875"LONG MYLAR	80009	166-0457-00
						- - - * - - -		
-56	407-0921-00			1		BRKT,XFMR MTG:	80009	407-0921-00
						(ATTACHING PARTS)		
-57	212-0023-00			2		SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL	83385	OBD
	210-0804-00	XB031007		2		WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	OBD
						- - - * - - -		
-58	----- -----			1		SWITCH,THERMO:		
						(ATTACHING PARTS)		
-59	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-60	210-0586-00			2		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
						- - - * - - -		
-61	441-0993-01			1		CHAS,ELEK EQPT:	80009	441-0993-01
						(ATTACHING PARTS)		
	212-0040-00			6		SCREW,MACHINE:8-32 X 0.375 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-62	179-1637-00			1		WIRING HARNESS,:POWER	80009	179-1637-00
-63	200-1075-00			4		. COVER,ELEC CONN:PLASTIC	00779	1-480435-0
-64	131-0861-00			4		. CONTACT,ELEC:QUICK DISCONNECT	00779	42617-2
-65	----- -----			2		TRANSISTOR:		
						(ATTACHING PARTS FOR EACH)		
-66	213-0146-00			2		SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
-67	386-0978-00			1		INSULATOR,PLATE:0.002 INCH MICA,FOR TO-3	80009	386-0978-00
						- - - * - - -		
-68	136-0280-00			2		SOCKET,PLUG-IN:FOR TO-3 FOR TO-3	97913	LST 2202-2
						(ATTACHING PARTS FOR EACH)		
-69	211-0101-00			2		SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-70	348-0063-00			1		GROMMET,PLASTIC:0.50 INCH DIA	80009	348-0063-00
-71	----- -----			1		CKT BOARD ASSY:Z AXIS(SEE EPL A8)		
-72	131-0566-00			1		. LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-73	131-0608-00			36		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-74	131-1003-00			1		. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-75	136-0252-04	B010100	B122799	33		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-04	B122800		6		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0350-00	B122800		9		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
	136-0252-01			1		. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
						(ATTACHING PARTS FOR CKT BD)		
-76	211-0008-00			3		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
	672-0658-00	XB330000		1		CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0658-00
	----- -----	XB330000		1		. CKT BOARD ASSY:Z AXIS RESTORER(SEE A16 EPL)		
	131-1261-00	XB330000		4		. . CONTACT,ELEC:F-SHAPED	00779	1-380953-0
	----- -----	XB330000		1		. CKT BOARD ASSY:FOCUS DC RESTORER(SEE A15 EPL)		
	131-1261-00	XB330000		4		. . CONTACT,ELEC:F-SHAPED	00779	1-380953-0
-77	----- -----			1		. CKT BOARD ASSY:HIGH VOLTAGE(SEE A9 EPL)		
-78	131-0589-00			5		. . CONTACT,ELEC:0.46 INCH LONG	22526	47350
	131-0608-00			17		. . CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-79	136-0252-04			9		. . SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-80	214-0579-00			1		. . TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
	166-0292-00			2		. . SPACER,SLEEVE:PLSTC,0.155 DIA X 0.065"L	80009	166-0292-00
-81	152-0495-00	XB010200		1		. . SEMICOND DEVICE:V MULTR,6KV IN,12KV OUT	80009	152-0495-00
						(ATTACHING PARTS)		
-82	211-0008-00	B010100	B229999X	3		. . SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	210-0008-00	B230000		2		. . WASHER,LOCK:INTL,0.172 ID X 0.331"OD,STL	78189	1208-00-00-0541C
						- - - * - - -		
	119-0286-00	B010100	B029999	1		. . MULTIPLIER,HV:	80009	119-0286-00
	119-0401-00	B030000		1		. . MULTIPLIER,HV:	80009	119-0401-00
-83	388-2029-00	B010100	B029999X	1		. . CKT BOARD ASSY:	80009	388-2029-00
						(ATTACHING PARTS)		
	211-0040-00	B010100	B029999X	1		. . SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC	26365	OBD
						- - - * - - -		
						(ATTACHING PARTS FOR CKT BD)		
-84	211-0008-00	B010100	B229999	3		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	211-0008-00	B230000		2		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
	129-0236-00	XB230000		1		. SPACER,POST:0.188 HEX X 0.375 INCH LONG	06540	9726-A-0440
						(ATTACHING PARTS)		
	211-0008-00	XB230000		1		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	210-0004-00	XB230000		1		. WASHER,LOCK:INTL,0.12 ID X 0.26"OD,STL	78189	1204-00-00-0541C
						- - - * - - -		
-85	129-0143-00			3		. INSULATOR,STDF:0.312 OD X 0.406" L,NYLON	80009	129-0143-00
						(ATTACHING PARTS)		
-86	21 -0008-00			3		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-87	129-0098-00			1		. POST,ELEC-MECH:0.250 HEX.X0.406 INCH L,BRS	80009	129-0098-00
-88	129-0305-00	B010100	B029999X	1		POST,ELEC-MECH:0.25 OD X 1.23 INCH LONG,BRS	80009	129-0305-00
						(ATTACHING PARTS)		
-89	211-0008-00	B010100	B029999X	1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-90	129-0304-00	B010100	B029999X	1		INSULATOR,STDF:0.25 OD X 1.23 INCH LONG	80009	129-0304-00
						(ATTACHING PARTS)		
-91	211-0008-00	B010100	B029999X	1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-92	343-0006-00			1		CLAMP,LOOP:0.50 INCH DIAMETER,PLSTC	95987	1-2-6B
						(ATTACHING PARTS)		
-93	211-0510-00			1		SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
-94	210-0863-00			1		WSHR,LOOP CLAMP:FOR 0.50" WIDE CLAMP,STL	95987	C191
						- - - * - - -		
-95	255-0334-00	B010100	B040974	FT		PLASTIC CHANNEL:	11897	122-37-2500
	255-0334-00	B040795	B051189	FT		PLASTIC CHANNEL:	11897	122-37-2500
	348-0012-00	B040975		1		GROMMET,RUBBER:0.625 INCH DIA	72653	1043-1M

http://manuals.tektronix.com

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-	348-0085-00	B051190	B239999	1		GROMMET,PLASTIC:U-SHAPED	80009	348-0085-00
	358-0166-00	B240000		1		GROMMET,PLASTIC:BLACK	80009	358-0166-00
-96	337-1538-01			1		SHIELD,ELEC:	80009	337-1538-01
						(ATTACHING PARTS)		
-97	211-0504-00			3		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-98	136-0505-00	B010100	B149999	1		WIRING HARNESS:CRT SOCKET	80009	136-0505-00
	136-0505-01	B150000		1		WIRING HARNESS:CRT SOCKET	80009	136-0505-01
-99	136-0304-02			1		. SOCKET,PLUG-IN:CRT,14 PIN SOCKET,W/PINS	80009	136-0304-02
	352-0201-00	B010100	B149999	1		. CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0201-00
	352-0202-00	B150000		1		. CONN BODY,PL,EL:6 WIRE BLACK	80009	352-0202-00
	131-0621-00			5		. CONTACT,ELEC:0.577"L,22-26 AWG WIRE	22526	46233
	131-0707-00			4		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	352-0162-00			1		. CONN BODY,PL,EL:4 WIRE BLACK	80009	352-0162-00
-100	200-0917-01			1		. COV,ELECTRON TU:2.052 OD X 0.291" THK,PLSTC	80009	200-0917-01
-101	367-0117-00			1		. PULL,SOC,PL-IN:	80009	367-0117-00
-102	343-0235-00			1		. CLAMP,SOCKET:	80009	343-0235-00
-103	386-2390-00			1		SUPPORT,CHASSIS:	80009	386-2390-00
						(ATTACHING PARTS)		
	211-0538-00			2		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-104	407-0914-00			1		BRACKET,CHASSIS:	80009	407-0914-00
						(ATTACHING PARTS)		
	211-0538-00			4		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
	210-0457-00			4		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-105	211-0510-00			2		SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
-106	210-0949-00			2		WASHER,FLAT:0.141 ID X 0.50 INCH OD,BRS	12327	OBD
						- - - * - - -		
-107	260-1222-00			1		SWITCH,PUSH-PUL:10A,250VAC	91929	2DM301
-108	384-1081-00			1		EXTENSION SHAFT:W/KNOB	80009	384-1081-00
-109	376-0053-00			1		CPLG,SHAFT,RGD:0.128 ID X 0.312 OD	80009	376-0053-00
	213-0048-00			2		. SETSCREW:4-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-110	384-1107-00			1		EXTENSION SHAFT:7.07 L X 0.125 OD AL	80009	384-1107-00
-111	376-0127-00			1		COUPLER,SHAFT:PLASTIC	80009	376-0127-00
-112	----- -----			1		CKT BOARD ASSY:HORIZONTAL AMPLIFIER(SEE A6 EPL)		
-113	131-0608-00			17		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-114	131-1003-00			2		. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-115	136-0252-04	B010100	B122799	24		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0365-00	B122800		6		. SOCKET,PLUG-IN:3 PIN	80009	136-0365-00
	136-0350-00	B122800		2		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
	136-0252-01			2		. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
-116	136-0260-02			1		. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
						(ATTACHING PARTS FOR CKT BD)		
-117	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-118	351-0087-00			2		GUIDE,CKT CARD:4.75 INCH LONG,PLASTIC	80009	351-0087-00
-119	----- -----			1		CKT BOARD ASSY:VERTICAL AMPLIFIER(SEE A5 EPL)		
-120	131-0589-00			7		. CONTACT,ELEC:0.46 INCH LONG	22526	47350
-121	131-1003-00			3		. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-122	131-1303-00			9		. CONTACT,ELEC:IC GROUND	80009	131-1303-00
-123	136-0252-04	B010100	B122799	9		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0350-00	B122800		3		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
	136-0252-01			19		. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
						(ATTACHING PARTS FOR CKT BD)		
-124	211-0014-00			2		SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-125	214-1652-00			1		HEAT SINK,ELEC:	80009	214-1652-00
-126	214-1757-00			1		HEAT SINK,ELEC:1.0 DIA X 0.27 THICK	80009	214-1757-00
-127	361-0477-00			2		SPACER,SLEEVE:0.25 L X 0.238 ID	80009	361-0477-00
-128	195-0085-00			1		LEAD SET,ELEC:	80009	195-0085-00
	131-0865-00			4		. CONTACT,ELEC:0.450 INCH L	80009	131-0865-00

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-	352-0071-00	XB290000		1		INS,STANDOFF:0.25 OD X 0.525 LONG	80009	352-0071-00
						(ATTACHING PARTS)		
	211-0008-00	XB290000		1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
	337-1432-04	XB050410		1		SHLD,ELCTRN TUB:	80009	337-1432-04
						(ATTACHING PARTS)		
	211-0541-00			2		SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-129	337-1432-00			1		. SHLD,ELCTRN TUB:	80009	337-1432-00
-130	348-0056-00			2		. GROMMET,PLASTIC:0.375 INCH DIA	80009	348-0056-00
-131	----- -----			1		. COIL:(SEE L1098 EPL)		
						(ATTACHING PARTS)		
-132	213-0138-00			2		. SCR,TPG,THD FOR:4-40 X 0.188 INCH,PNH STL	83385	OBD
-133	343-0217-00			1		. CLAMP,COIL:Y-AXIS	80009	343-0217-00
						- - - * - - -		
	252-0562-00			FT		. PLASTIC CHANNEL:0.100 X 0.120,POLYETHYLENE	06229	OBD
-134	441-1124-00			1		. CHAS,ELEC EQUIP:	80009	441-1124-00
						(ATTACHING PARTS)		
	210-0781-00	B010100	B139999	2		. RIVET,BLIND:	83385	OBD
	211-0590-00	B140000		2		. SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
	210-0457-00	B140000		2		. NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
	348-0070-01			1		PAD,CUSHIONING:0.69 INCH,RUBBER	80009	348-0070-01
-135	119-0288-02			1		DELAY LINE,ELEC:	80009	119-0288-02
						(ATTACHING PARTS)		
-136	213-0034-00			2		SCR,TPG,THD CTG:4-40 X 0.188 INCH,PNH STL	83385	OBD
-137	210-0863-00			1		WSHR,LOOP CLAMP:FOR 0.50" WIDE CLAMP,STL	95987	C191
						- - - * - - -		
-138	343-0013-00			1		CLAMP,LOOP:0.375 INCH DIA	95987	3-8-6B
	131-1093-00			1		LEAD,ELECTRICAL:ANODE	80009	131-1093-00
-139	131-0026-00			1		. BUTTON,PLUG:	83058	118738
-140	200-0544-00			1		. COVER,ELEC CONN:	80009	200-0544-00
-141	386-1952-00			4		SUPPORT,CRT:	80009	386-1952-00
						(ATTACHING PARTS FOR EACH)		
-142	211-0603-00			1		SCREW,MACHINE:6-32 X 0.312 INCH,HEX HD STL	83385	OBD
-143	210-0803-00			1		WASHER,FLAT:0.15 ID X 0.375 INCH OD,STL	12327	OBD
						- - - * - - -		
	672-0572-00	XB220000		1		CKT BOARD ASSY:PROTECTION AND READOUT	80009	672-0572-00
-144	----- -----	XB220000		1		. CKT BOARD ASSY:PROTECTION(SEE A14 EPL)		
-145	253-0162-00	XB220000		FT		. . TAPE,PRESS.SENS:	80009	253-0163-00
-146	131-0589-00	XB220000		20		. . CONTACT,ELEC:0.46 INCH LONG	22526	47350
-147	210-0702-00	XB220000		2		. . EYELET,METALLIC:0.047 OD X 0.125 INCH LONG	07707	S6127
-148	----- -----			1		. CKT BOARD ASSY:READOUT(SEE A13 EPL)		
-149	131-0608-00			42		. . CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-150	131-1003-00			6		. . CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-151	136-0235-00			1		. . SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-152	136-0252-04	B010100	B143165	42		. . SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0235-00	B143166		1		. . SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
	136-0220-00	B143166		13		. . SOCKET,PLUG-IN:3 PIN,SQUARE	71785	133-23-11-034
	136-0252-01			14		. . CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
-153	136-0260-01			14		. . SOCKET,PLUG-IN:16 CONTACT,RECT SHAPE	71785	133-51-02-075
-154	136-0269-00			3		. . SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	71785	133-59-02-073
-155	214-0579-00	B010100	B219999	21		. . TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
	214-0579-00	B220000		20		. . TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-156	260-0723-00			1		. . SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
-157	361-0527-00			1		. . SPACER,CKT CARD:0.188 OD X 0.13 INCH LONG	80009	361-0527-00
	211-0205-00			1		. . SCREW MACHINE:RDH SST	80009	211-0205-00
						(ATTACHING PARTS FOR CKT BD)		
-158	211-0008-00			1		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-159	344-0133-00			2		CLIP,SPR,TNSN:CIRCUIT CARD MOUNTING	80009	344-0133-00
						(ATTACHING PARTS FOR EACH)		
-160	213-0088-00			1		SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		

http://manuals.tm.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-161	441-1048-00			1		CHAS,ELEK EQPT:	80009	441-1048-00
						(ATTACHING PARTS)		
	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-162	351-0179-00			1		GUIDE,CKT CARD:6.75 INCH LONG,PLASTIC	80009	351-0179-00
						(ATTACHING PARTS)		
	211-0101-00			2		SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-163	131-0707-00			260		CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	131-0708-00			10		CONTACT,ELEC:0.48"L,28-32 AWG WIRE	22526	47437
-164	352-0171-00			4		CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0171-00
-165	352-0169-00			2		CONN BODY,PL,EL:2 WIRE BLACK	80009	352-0169-00
	352-0169-01			1		CONN BODY,PL,EL:2 WIRE BROWN	80009	352-0169-01
	352-0169-04			1		CONN BODY,PL,EL:2 WIRE YELLOW	80009	352-0169-04
	352-0169-05			2		CONN BODY,PL,EL:2 WIRE GREEN	80009	352-0169-05
	352-0169-08			2		CONN BODY,PL,EL:2 WIRE GRAY	80009	352-0169-08
	352-0169-09			1		CONN BODY,PL,EL:2 WIRE WHITE	80009	352-0169-09
-166	352-0161-00			2		CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0161-00
	352-0161-02			1		CONN BODY,PL,EL:3 WIRE RED	80009	352-0161-02
	352-0161-03			1		CONN BODY,PL,EL:3 WIRE ORANGE	80009	352-0161-03
	352-0161-08			1		CONN BODY,PL,EL:3 WIRE GRAY	80009	352-0161-08
-167	352-0162-00			5		CONN BODY,PL,EL:4 WIRE BLACK	80009	352-0162-00
	352-0162-05			1		CONN BODY,PL,EL:4 WIRE GREEN	80009	352-0162-05
-168	352-0163-00			3		CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0163-00
	352-0163-06			2		CONN BODY,PL,EL:5 WIRE BLUE	80009	352-0163-06
	352-0163-08			2		CONN BODY,PL,EL:5 WIRE GRAY	80009	352-0163-08
-169	352-0164-01			4		CONN BODY,PL,EL:6 WIRE BROWN	80009	352-0164-01
-170	352-0165-00			2		CONN BODY,PL,EL:7 WIRE BLACK	80009	352-0165-00
-171	352-0166-00			6		CONN BODY,PL,EL:8 WIRE BLACK	80009	352-0166-00
	352-0166-01			2		CONN BODY,PL,EL:8 WIRE BROWN	80009	352-0166-01
	352-0166-02			3		CONN BODY,PL,EL:8 WIRE RED	80009	352-0166-02
	352-0166-03			2		CONN BODY,PL,EL:8 WIRE ORANGE	80009	352-0166-03
-172	352-0168-00			2		CONN BODY,PL,EL:10 WIRE BLACK	80009	352-0168-00
	352-0168-05			2		CONN BODY,PL,EL:10 WIRE GREEN	80009	352-0168-05
	352-0168-07			2		CONN BODY,PL,EL:10 WIRE VIOLET	80009	352-0168-07
-173	210-0775-00			6		EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-174	210-0774-00			6		EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
-175	175-0825-00			FT		WIRE,ELECTRICAL:2 WIRE RIBBON	08261	OBD
-176	175-0826-00			FT		WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-177	175-0827-00			FT		WIRE,ELECTRICAL:4 WIRE RIBBON	80009	175-0827-00
-178	175-0828-00			FT		WIRE,ELECTRICAL:5 WIRE RIBBON	08261	OBD
-179	175-0829-00			FT		WIRE,ELECTRICAL:6 WIRE RIBBON	08261	OBD
-180	175-0830-00			FT		WIRE,ELECTRICAL:7 WIRE RIBBON	08261	OBD
-181	175-0831-00			FT		WIRE,ELECTRICAL:8 WIRE RIBBON	08261	OBD
	175-0857-00			FT		WIRE,ELECTRICAL:8 WIRE RIBBON	23499	TEK-175-0857-00
-182	175-0855-00			FT		WIRE,ELECTRICAL:10 WIRE RIBBON	23499	TEK-175-0855-00
	179-1825-00			1		WIRING HARNESS,:VERTICAL SIGNAL	80009	179-1825-00
	210-0775-00			2		. EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
	210-0774-00			2		. EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
	131-0707-00			4		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	352-0162-00			1		. CONN BODY,PL,EL:4 WIRE BLACK	80009	352-0162-00
	179-1826-00			1		WIRING HARNESS,:SWEEP GATE	80009	179-1826-00
	131-0707-00			16		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	352-0166-03			2		. CONN BODY,PL,EL:8 WIRE ORANGE	80009	352-0166-03
	179-1827-00			1		WIRING HARNESS:RESET	80009	179-1827-00
	131-0707-00			4		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	352-0162-05			1		. CONN BODY,PL,EL:4 WIRE GREEN	80009	352-0162-05

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-1	200-1209-03			1		BEZEL,CRT:	80009	200-1209-03
						(ATTACHING PARTS)		
-2	211-0634-00			2		THUMBSCREW:6-32 X 0.850 L	80009	211-0634-00
-3	210-0894-00			2		WASHER,NONMETAL:0.19 ID X 0.438" OD,PLSTC	09422	OBD
						- - - * - - -		
-4	204-0476-00			1		BODY TERMINAL:	80009	204-0476-00
						(ATTACHING PARTS)		
-5	213-0055-00			2		SCR,TPG,THD FOR:2-32 X 0.188 INCH,PNH STL	83385	OBD
						- - - * - - -		
-6	210-0713-01			3		EYELET,METALLIC:0.059 DIA X 0.125 INCH LONG	80009	210-0713-01
-7	337-1700-00			1		SHLD,IMPLOSION:	80009	337-1700-00
-8	378-0624-00			1		DIFFUSER,LIGHT:	80009	378-0624-00
-9	214-1253-00			1		SPR HSG,SC LAMP:2.420 INCH L	80009	214-1253-00
-10	358-0378-00			1		BUSHING,SLEEVE:PRESS MOUNT	80009	358-0378-00
-11	366-1391-00			1		KNOB:GRAY	80009	366-1391-00
	213-0140-00			1		. SETSCREW:2-56 X 0.94 INCH,HEX SOC STL	70276	OBD
-12	366-1077-00			1		KNOB:GRAY	80009	366-1077-00
	213-0153-00			1		. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-13	366-1059-00			1		PUSH BUTTON:GRAY	80009	366-1059-00
-14	366-1215-00			1		KNOB:GRAY	80009	366-1215-00
	213-0153-00			1		. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-15	366-1402-02			2		PUSH BUTTON:LEFT	80009	366-1402-02
-16	366-1402-03			1		PUSH BUTTON:ALT	80009	366-1402-03
-17	366-1402-04			1		PUSH BUTTON:ADD	80009	366-1402-04
-18	366-1257-31			1		PUSH BUTTON:CHOP	80009	366-1257-31
-19	366-1402-06			2		PUSH BUTTON:RIGHT	80009	366-1402-06
-20	366-1402-07			1		PUSH BUTTON:VERT MODE	80009	366-1402-07
-21	426-0681-00			8		FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00
-22	136-0387-01			1		JACK,TIP:BLACK	71279	450-4352-01-0310
-23	136-0387-00			3		JACK,TIP:GRAY	71279	4352-1-0318
-24	358-0216-00			1		BUSHING,PLASTIC:0.257 ID X 0.412 INCH OD	80009	358-0216-00
-25	333-1587-00			1		PANEL,FRONT:	80009	333-1587-00
-26	----- -----			1		LIGHT,INDICATOR:(SEE EPL)		
-27	386-2269-00			1		SUBPANEL,FRONT:	80009	386-2269-00
						(ATTACHING PARTS)		
-28	211-0559-00			4		SCREW,MACHINE:6-32 X 0.375"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-29	136-0445-00			1		LAMPHOLDER ASSY:	80009	136-0445-00
						(ATTACHING PARTS)		
-30	211-0501-00			2		SCREW,MACHINE:6-32 X 0.125 INCH,PNH STL	83385	OBD
						- - - * - - -		
-31	385-0079-00			2		SPACER,POST:0.25 HEX X 0.375 L,W/6-32 THD	80009	385-0079-00
						(ATTACHING PARTS FOR EACH)		
	211-0541-00			1		SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
	200-0103-00	XB061463		1		NUT,PLAIN,KNURL:0.25-28 X 0.375" OD,BRASS	80009	200-0103-00
	355-0131-00	XB061463		1		STUD,BDG POST:GROUND	80009	355-0131-00
						(ATTACHING PARTS)		
	212-0023-00	XB061463		1		SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL	83385	OBD
	210-0008-00	XB061463		1		WASHER,LOCK:INTL,0.172 ID X 0.331"OD,STL	78189	1208-00-00-0541C
						- - - * - - -		
-32	407-0915-00			1		BRACKET,ANGLE:	80009	407-0915-00
						(ATTACHING PARTS)		
	211-0541-00			2		SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-33	----- -----			2		RESISTOR,VAR:		
						(ATTACHING PARTS FOR EACH)		
-34	210-0583-00			1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-35	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
						- - - * - - -		
-36	----- -----			1		CKT BD ASSY:CALIBRATOR AND MODE SW(SEE A7 EPL)		
-37	131-0608-00			46		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-38	136-0252-04	B010100	B122799	12		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060

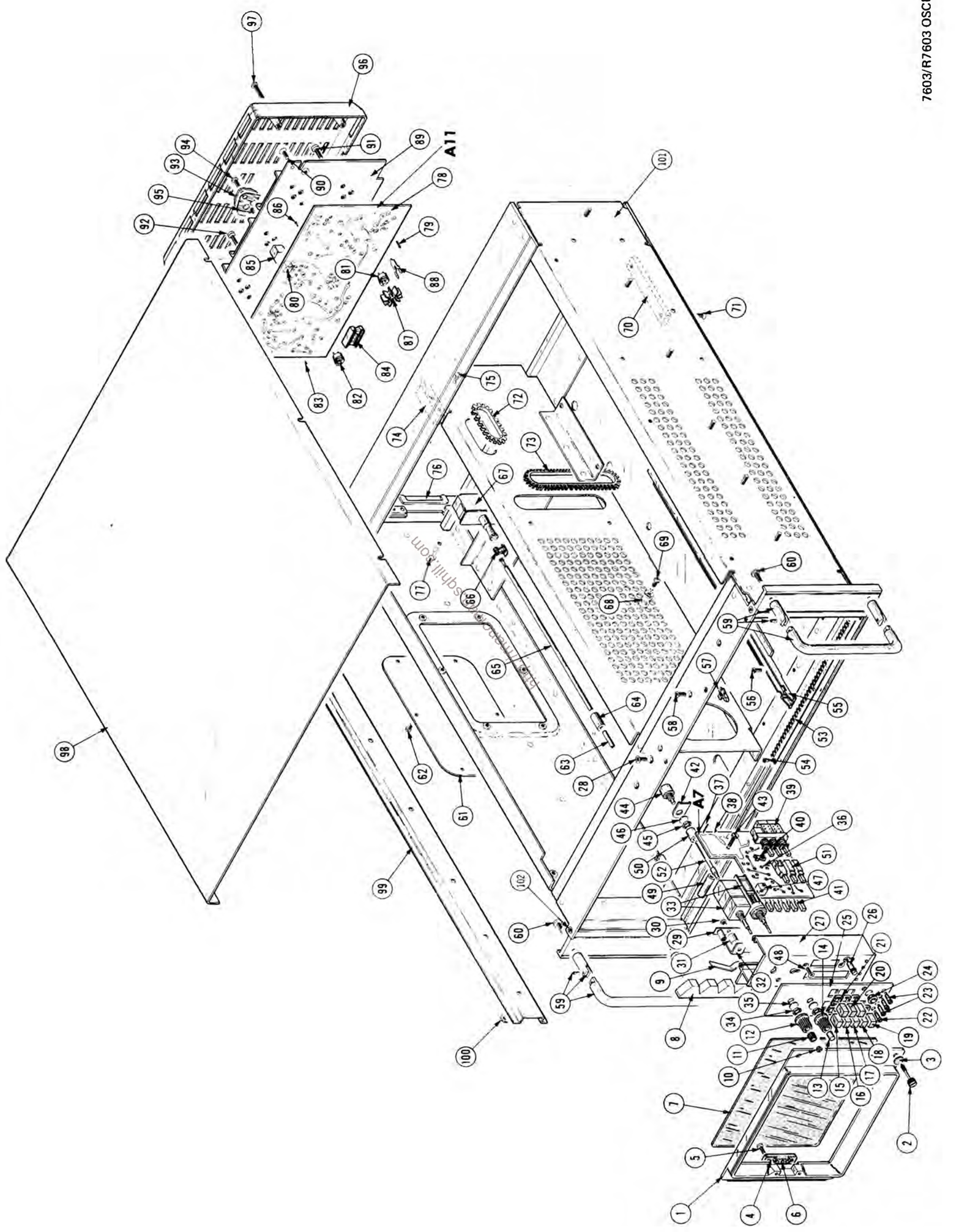
http://tomman.sqhl.com

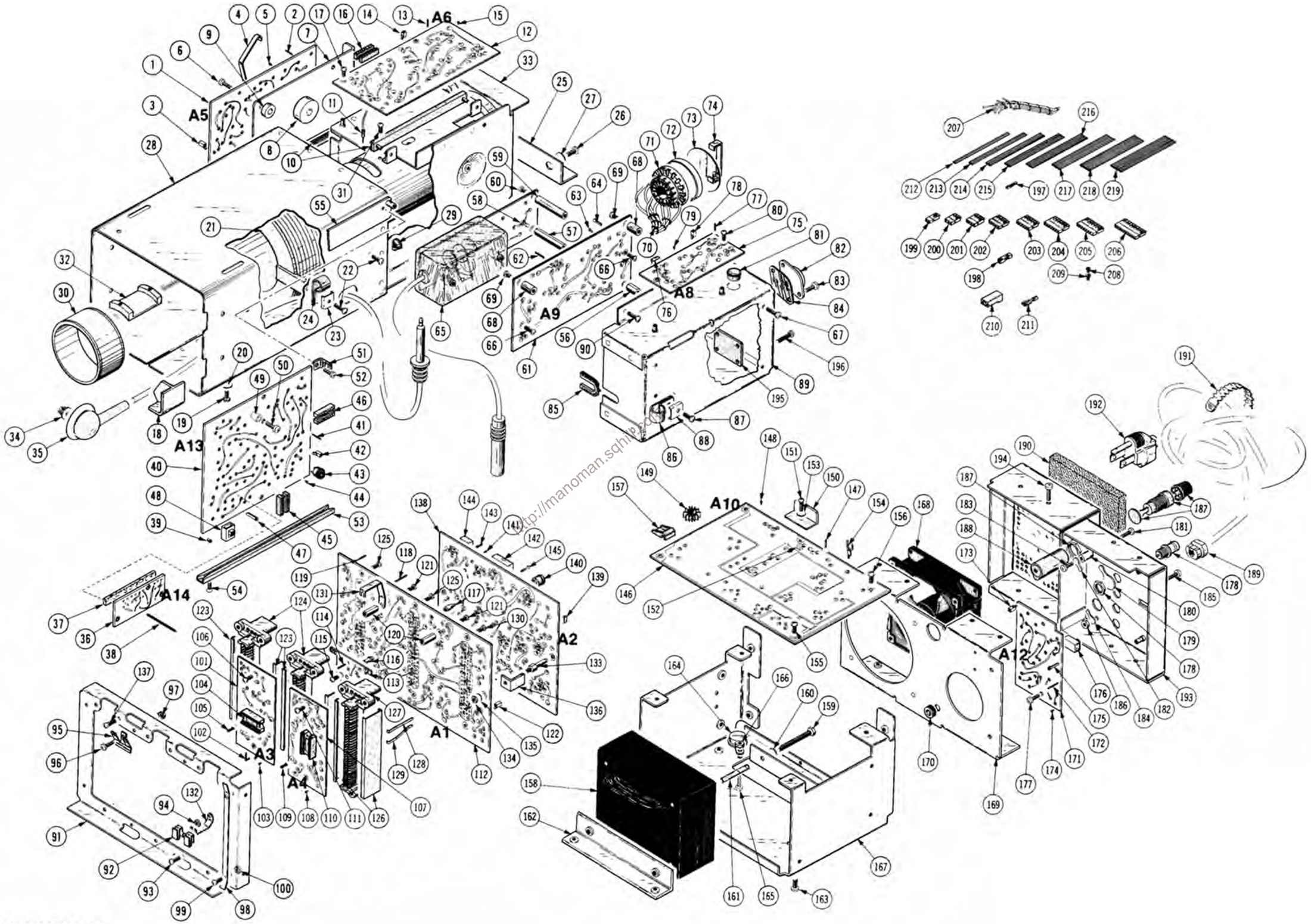
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-	136-0350-00	B122800		4		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
-39	260-1379-00			1		. SWITCH,PUSH:TRIG SOURCE	71590	2KBC120000-595
						(ATTACHING PARTS)		
-40	361-0411-00			4		. SPACER,PUSH SW:0.13 W X 0.375 INCH L,PLSTC	71590	J64285-00
						- - - * - - -		
-41	260-1378-00			1		. SWITCH,PUSH:VERT MODE	71590	2KBC140000-608
						(ATTACHING PARTS)		
	361-0411-00			3		. SPACER,PUSH SW:0.13 W X 0.375 INCH L,PLSTC	71590	J64285-00
						- - - * - - -		
-42	386-2285-00			1		. PLATE,RES MTG:	80009	386-2285-00
	352-0161-00			1		. CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0161-00
	131-0707-00			2		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	131-0993-00			1		. LINK,TERM.CONNE:2 WIRE BLACK	00779	530153-2
						(ATTACHING PARTS FOR CKT BD)		
	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-43	211-0040-00			1		SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC	26365	OBD
						- - - * - - -		
-44	----- -----			1		RESISTOR,VAR:		
						(ATTACHING PARTS)		
-45	210-0583-00			1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20224-402
-46	210-0940-00			1		WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL	79807	OBD
						- - - * - - -		
-47	220-0455-00			2		NUT,BLOCK:0.281"SQ,THREE 4-40 THRU THDS	80009	220-0455-00
						(ATTACHING PARTS FOR EACH)		
-48	211-0101-00			1		SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-49	361-0137-00			1		POST,ELEC-MECH:1.345 INCH,W/4-40 THREAD	80009	361-0137-00
						(ATTACHING PARTS)		
	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-50	376-0029-00	B010100	B039999X	1		CPLG,SHAFT,RGD:0.128 ID X 0.312 OD X 0.5"L	80009	376-0029-00
	213-0075-00			2		. SETSCREW:4-40 X 0.094 INCH,HEX SOC STL	70276	OBD
-51	384-1136-00			3		EXTENSION SHAFT:0.95 INCH LONG	80009	384-1136-00
-52	384-11 2-01	B010100	B092114	1		EXTENSION SHAFT:1.910 INCH L,EPOXY GLASS	80009	384-1112-01
-53	348-0274-01	B010100	B092114	2		SHLD,GSKT,ELEC:	80009	348-0274-01
	348-0354-00	B091125		2		SHLD GSKT,ELEC:8.10 INCH LONG	80009	348-0354-00
						(ATTACHING PARTS FOR EACH)		
-54	210-0632-00	B010100	B092114X	3		EYELET,METALLIC:0.089 OD X 0.125"LONG,BRS	01881	3168
						- - - * - - -		
-55	351-0295-02			3		GUIDE,SLIDE::	80009	351-0295-02
						(ATTACHING PARTS FOR EACH)		
-56	211-0105-00			1		SCREW,MACHINE:4-40 X 0.188"100 DEG,FLH STL	83385	OBD
	213-0088-00			1		SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-57	351-0305-01			3		GUIDE,PLUG-IN:UPPER	80009	351-0305-01
						(ATTACHING PARTS FOR EACH)		
-58	211-0101-00			1		SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-59	367-0138-00			2		HANDLE,BOW:U SHAPED	06540	14053-A-1032-1B
						(ATTACHING PARTS FOR EACH)		
-60	212-0518-00			2		SCREW,MACHINE:10-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-61	200-1259-00			1		COVER,ACCESS:	80009	200-1259-00
						(ATTACHING PARTS)		
-62	211-0008-00			6		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-63	384-1081-00			1		EXTENSION SHAFT:W/KNOB	80009	384-1081-00
-64	376-0053-00			1		CPLG,SHAFT,RGD:0.128 ID X 0.312 OD	80009	376-0053-00
-65	384-1107-00			1		EXTENSION SHAFT:7.07 L X 0.125 OD AL	80009	384-1107-00
-66	376-0127-00			1		COUPLER,SHAFT:PLASTIC	80009	376-0127-00
-67	260-1222-00			1		SWITCH,PUSH-PUL:10A,250VAC	91929	2DM301

manuals.tekscope.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-68	351-0312-00			1		GUIDE,SHAFT:0.312 DIA X 0.52 INCH LONG	80009	351-0312-00
						(ATTACHING PARTS)		
-69	213-0124-00			1		SCR,TPG,THD FOR:6-20 X 0.250 INCH,PNH STL	83385	OBD
						- - - * - - -		
-70	386-2054-00			1		SPRT,PWR SUPPLY:	80009	386-2054-00
						(ATTACHING PARTS)		
-71	211-0101-00			1		SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-72	255-0334-00			FT		PLASTIC CHANNEL:	11897	122-37-2500
-73	255-0334-00			FT		PLASTIC CHANNEL:	11897	122-37-2500
-74	220-0614-00			1		NUT,BLOCK:	80009	220-0614-00
						(ATTACHING PARTS)		
-75	211-0507-00			2		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-76	407-1145-02			1		BRKT,HEAT SINK:RIGHT	80009	407-1145-02
						(ATTACHING PARTS)		
-77	211-0504-00			2		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-78	----- -----			1		CKT BOARD ASSY:REGULATOR(SEE A11 EPL)		
-79	131-0608-00			47		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-80	131-0847-00			12		. TERMINAL STUD:6-32 X 0.435 INCH LONG	80009	131-0847-00
-81	136-0183-00			3		. SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
-82	136-0235-00			3		. SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-83	136-0252-04	B010100	B122799	45		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-04	B122800		18		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0350-00	B122800		9		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
-84	136-0269-02			1		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402
-85	136-0361-00			6		. SOCKET,PLUG-IN:	80009	136-0361-00
-86	136-0384-00			12		. SOCKET,PIN TERM:FOR 0.04 DIAMETER PIN	00779	52120
-87	214-1291-00			3		. HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H	05820	207-AB
-88	344-0154-00			2		. CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
-89	441-1060-01			1		CHAS,ELEC EQPT:MAIN	80009	441-1060-01
						(ATTACHING PARTS)		
-90	211-0538-00			1		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
-91	211-0541-00			2		SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
-92	213-0034-00			2		SCR,TPG,THD CTG:4-40 X 0.188 INCH,PNH STL	83385	OBD
						- - - * - - -		
-93	----- -----			6		TRANSISTOR:		
						(ATTACHING PARTS FOR EACH)		
-94	211-0511-00			2		SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
-95	386-0978-00			1		INSULATOR,PLATE:0.002 INCH MICA,FOR TO-3	80009	386-0978-00
						- - - * - - -		
-96	337-1425-00			1		SHIELD,ELEC:	80009	337-1425-00
						(ATTACHING PARTS)		
-97	211-0516-00			4		SCREW,MACHINE:6-32 X 0.875 INCH,PNH STL	83385	OBD
						- - - * - - -		
-98	390-0229-00			1		COVER,SCOPE:	80009	390-0229-00
-99	351-0313-00			1		GUIDE,RACKMOUNT:19.218 INCH LONG,PAIR	80009	351-0313-00
						(ATTACHING PARTS)		
-100	210-0458-00			11		NUT,PLAIN,EXT W:8-32 X 0.344 INCH,STL	83385	OBD
						- - - * - - -		
-101	437-0126-00	B010100	B059999	1		CAB.,ELEK EQPT:	80009	437-0126-00
	437-0143-00	B060000	B092114	1		CAB.,ELEK EQPT:	80009	437-0143-00
	437-0143-01	B092115		1		CAB.,ELEK EQPT:	80009	437-0143-01
-102	211-0559-00			2		SCREW,MACHINE:6-32 X 0.375"100 DEG,FLH STL	83385	OBD
	129-0441-00	XB060000		2		POST,ELEC-MECH:0.125 OD X 5.045 INCH LONG	80009	129-0441-00
						(ATTACHING PARTS FOR EACH)		
	211-0087-01	XB060000		2		SCREW,MACHINE:2-56 X 0.188" 82 DEG,FLH,STL	83385	OBD
						- - - * - - -		

FIG. 3 R7603 FRONT & FRAME





http://manoman.sqhi.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
4-1	----- -----			1	CKT BOARD ASSY:VERTICAL AMPLIFIER(SEE A5 EPL)		
-2	131-0589-00			7	. CONTACT,ELEC:0.46 INCH LONG	22526	47350
-3	131-1003-00			1	. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-4	131-1303-00			1	. CONTACT,ELEC:IC GROUND	80009	131-1303-00
-5	136-0252-04			9	. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-01			19	. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
					(ATTACHING PARTS)		
-6	211-0014-00			2	SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-7	214-1652-00			1	HEAT SINK,ELEC:	80009	214-1652-00
-8	214-1757-00			1	HEAT SINK,ELEC:1.0 DIA X 0.27 THICK	80009	214-1757-00
-9	361-0477-00			2	SPACER,SLEEVE:0.25 L X 0.238 ID	80009	361-0477-00
-10	351-0087-00			2	GUIDE,CKT CARD:4.75 INCH LONG,PLASTIC	80009	351-0087-00
-11	195-0085-00			1	LEAD SET,ELEC:	80009	195-0085-00
	131-0865-00			4	. CONTACT,ELEC:0.450 INCH L	80009	131-0865-00
-12	----- -----			1	CKT BOARD ASSY:HORIZONTAL AMPLIFIER(SEE A6 EPL)		
-13	131-0608-00			17	. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-14	131-1003-00			2	. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-15	136-0252-04			25	. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-01			2	. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
-16	136-0260-02			1	. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
	129-0075-00	XB030000	B060000X	1	. INSULATOR,STDF:	80009	129-0075-00
	361-0007-00	XB030000	B060000X	1	. SPACER,SLEEVE:0.250 INCH DIA,PLASTIC	80009	361-0007-00
					(ATTACHING PARTS FOR CKT BD ASSY)		
-17	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-18	386-1952-00			4	SUPPORT,CRT:	80009	386-1952-00
					(ATTACHING PARTS FOR EACH)		
-19	211-0603-00			1	SCREW,MACHINE:6-32 X 0.312 INCH,HEX HD STL	83385	OBD
-20	210-0803-00			1	WASHER,FLAT:0.15 ID X 0.375 INCH OD,STL	12327	OBD
					- - - * - - -		
-21	119-0288-02			1	DELAY LINE,ELEC:	80009	119-0288-02
					(ATTACHING PARTS)		
-22	213-0034-00			2	SCR,TPG,THD CTG:4-40 X 0.188 INCH,PNH STL	83385	OBD
-23	210-0863-00			1	WSHR,LOOP CLAMP:FOR 0.50" WIDE CLAMP,STL	95987	C191
					- - - * - - -		
-24	343-0013-00			1	CLAMP,LOOP:0.375 INCH DIA	95987	3-8-6B
-25	407-0970-00			1	BRACKET,ANGLE:	80009	407-0970-00
					(ATTACHING PARTS)		
	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
	210-0457-00			2	NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
					- - - * - - -		
	337-1432-04			1	SHLD,ELCTRN TUB:	80009	337-1432-04
					(ATTACHING PARTS)		
	211-0510-00			2	SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
-26	211-0510-00			2	SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
-27	210-0949-00			2	WASHER,FLAT:0.141 ID X 0.50 INCH OD,BRS	12327	OBD
					- - - * - - -		
-28	337-1432-00			1	. SHLD,ELCTRN TUB:	80009	337-1432-00
-29	348-0056-00			2	. GROMMET,PLASTIC:0.375 INCH DIA	80009	348-0056-00
-30	----- -----			1	. COIL:(SEE L1098 EPL)		
					(ATTACHING PARTS)		
-31	213-0138-00			2	. SCR,TPG,THD FOR:4-40 X 0.188 INCH,PNH STL	83385	OBD
					- - - * - - -		
-32	343-0217-00			1	. CLAMP,COIL:Y-AXIS	80009	343-0217-00
	252-0562-00			FT	. PLASTIC CHANNEL:0.100 X 0.120,POLYETHYLENE	06229	OBD
-33	441-1124-00			1	. CHAS,ELEC EQUIP:	80009	441-1124-00
					(ATTACHING PARTS)		
	210-0781-00	B010100	B139999	2	. RIVET,BLIND:	83385	OBD
	211-0590-00	B140000		2	. SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
	210-0457-00	B140000		2	. NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
					- - - * - - -		
	348-0070-01	XB193960		1	PAD,CUSHIONING:0.69 INCH,RUBBER	80009	348-0070-01

http://manuals.hill.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
4-	131-1093-00			1	LEAD,ELECTRICAL:ANODE	80009	131-1093-00
-34	131-0026-00			1	. BUTTON,PLUG:	83058	118738
-35	200-0541-00			1	. FR,FLTR ELEM,AI:4.562 H X 5.625 INCH WIDE	80009	200-0541-00
	672-0572-00	XB220000		1	CKT BOARD ASSY:PROTECTION AND READOUT		
-36	----- -----	XB220000		1	. CKT BOARD ASSY:PROTECTION(SEE A14 EPL)		
-37	253-0162-00	XB220000		FT	. . TAPE,PRESS,SENS:	80009	253-0162-00
-38	131-0589-00	XB220000		20	. . CONTACT,ELEC:0.46 INCH LONG	22526	47350
-39	210-0702-00	XB220000		2	. . EYELET,METALLIC:0.047 OD X 0.125 INCH LONG	07707	S6127
-40	----- -----			1	. CKT BOARD ASSY:READOUT(SEE A13 EPL)		
-41	131-0608-00			42	. . CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-42	131-1003-00			6	. . CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-43	136-0235-00			1	. . SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-44	136-0252-00			42	. . SOCKET,PIN TERM:0.145 INCH LONG	00779	2-330808-7
	136-0252-01			14	. . CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
-45	136-0260-01			14	. . SOCKET,PLUG-IN:16 CONTACT,RECT SHAPE	71785	133-51-02-075
-46	136-0269-00			3	. . SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	71785	133-59-02-073
-47	214-0579-00	B010100	B219999	21	. . TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
	214-0579-00	B220000		20	. . TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-48	260-0723-00			1	. . SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
-49	361-0527-00			1	. . SPACER,CKT CARD:0.188 OD X 0.13 INCH LONG	80009	361-0527-00
	211-0205-00			1	. . SCREW MACHINE:RDH SST	880009	211-0205-00
					(ATTACHING PARTS FOR CKT BD)		
-50	211-0205-00			1	. SCREW MACHINE:RDH SST	80009	211-0205-00
					- - - * - - -		
-51	344-0133-00			2	CLIP,SPR,TNSN:CIRCUIT CARD MOUNTING	80009	344-0133-00
					(ATTACHING PARTS FOR EACH)		
-52	213-0088-00			1	SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-53	351-0179-00			1	GUIDE,CKT CARD:6.75 INCH LONG,PLASTIC	80009	351-0179-00
					(ATTACHING PARTS)		
-54	211-0101-00			2	SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
					- - - * - - -		
-55	441-1048-00			1	CHAS,ELEK EQPT:	80009	441-1048-00
					(ATTACHING PARTS)		
	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-56	129-0098-00			1	POST,ELEC-MECH:0.250 HEX.X0.406 INCH L,BRS	80009	129-0098-00
-57	129-0305-00	B010100	B029999X	1	POST,ELEC-MECH:0.25 OD X 1.23 INCH LONG,BRS	80009	129-0305-00
					(ATTACHING PARTS)		
-58	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-59	129-0304-00	B010100	B029999X	1	INSULATOR,STDF:0.25 OD X 1.23 INCH LONG	80009	129-0304-00
					(ATTACHING PARTS)		
-60	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-61	----- -----			1	CKT BOARD ASSY:HIGH VOLTAGE(SEE A9 EPL)		
-62	131-0589-00			5	. CONTACT,ELEC:0.46 INCH LONG	22526	47350
	131-0608-00			17	. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-63	136-0252-04			9	. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-64	214-0579-00			1	. TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-65	152-0495-00			1	. SEMICOND DEVICE:V MULTR,6KV IN,12KV OUT	80009	152-0495-00
					(ATTACHING PARTS)		
-66	211-0008-00	B010100	B229999	3	. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	210-0008-00	B230000		3	. WASHER,LOCK:INTL,0.172 ID X 0.331"OD,STL	78189	1208-00-00-0541C
					- - - * - - -		
	119-0286-00	B010100	B029999	1	. MULTIPLIER,HV:	80009	119-0286-00
	119-0401-00	B030000		1	. MULTIPLIER,HV:	80009	119-0401-00
	388-2029-00	B010100	B029999X	1	. CKT BOARD ASSY:	80009	388-2029-00
					(ATTACHING PARTS)		
	211-0040-00	B010100	B029999X	1	. SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC	26365	OBD
					- - - * - - -		

http://manuals.tektronix.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4-	166-0292-00			2		. SPACER,SLEEVE:PLSTC,0.155 DIA X 0.065"L	80009	166-0292-00
						(ATTACHING PARTS)		
-67	211-0008-00			3		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-68	129-0143-00			3		INSULATOR,STDF:0.312 OD X 0.406" L,NYLON	80009	129-0143-00
						(ATTACHING PARTS)		
-69	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-70	136-0505-00	B010100	B149999	1		WIRING HARNESS:CRT SOCKET	80009	136-0505-00
	136-0505-01	B150000		1		WIRING HARNESS:CRT SOCKET	80009	136-0505-01
-71	136-0304-02			1		. SOCKET,PLUG-IN:CRT,14 PIN SOCKET,W/PINS	80009	136-0304-02
-72	200-0917-01			1		. COV,ELECTRON TU:2.052 OD X 0.291" THK,PLSTC	80009	200-0917-01
-73	367-0117-00			1		. PULL,SOC,PL-IN:	80009	367-0117-00
-74	343-0235-00			1		. CLAMP,SOCKET:	80009	343-0235-00
	131-0621-00			5		. CONTACT,ELEC:0.577"L,22-26 AWG WIRE	22526	46233
	131-0707-00			4		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	352-0162-00			1		. CONN BODY,PL,EL:4 WIRE BLACK	80009	352-0162-00
	352-0201-00	B010100	B149999	1		. CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0201-00
	352-0202-00	B150000		1		. CONN BODY,PL,EL:6 WIRE BLACK	80009	352-0202-00
-75	----- -----			1		CKT BOARD ASSY:Z AXIS(SEE A8 EPL)		
-76	131-0566-00			1		. LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-77	131-0608-00			36		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-78	131-1003-00			1		. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-79	136-0252-04			33		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-01			1		. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
						(ATTACHING PARTS FOR CKT BD)		
-80	211-0008-00			3		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-81	348-0063-00			1		GROMMET,PLASTIC:0.50 INCH DIA	80009	348-0063-00
-82	----- -----			2		TRANSISTOR:		
						(ATTACHING PARTS FOR EACH)		
-83	213-0146-00			2		SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
-84	386-0978-00			1		INSULATOR,PLATE:0.002 INCH MICA,FOR TO-3	80009	386-0978-00
						- - - * - - -		
-85	255-0334-00	B010100	B040974	FT		PLASTIC CHANNEL:	11897	122-37-2500
	255-0334-00	B040975	B051189	FT		PLASTIC CHANNEL:	11897	122-37-2500
	348-0012-00	B040975		1		GROMMET,RUBBER:0.625 INCH DIA	72653	1043-1M
	348-0085-00	B051190	B239999	1		GROMMET,PLASTIC:U-SHAPED	80009	348-0085-00
	358-0166-00	B240000		1		GROMMET,PLASTIC:BLACK	80009	358-0166-00
-86	348-0006-00			1		GROMMET,RUBBER:0.562 ID X 0.875 INCH OD	70485	1720
						(ATTACHING PARTS)		
-87	211-0510-00			1		SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
-88	210-0863-00			1		WSHR,LOOP CLAMP:FOR 0.50" WIDE CLAMP,STL	95987	C191
						- - - * - - -		
-89	337-1538-01			1		SHIELD,ELEC:	80009	337-1538-01
						(ATTACHING PARTS)		
-90	211-0504-00			3		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-91	407-0973-00			1		BRACKET,CONN:	80009	407-0973-00
						(ATTACHING PARTS)		
	211-0507-00			4		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-92	131-0930-00			2		CONTACT,ELEC:PLUG-IN GROUND	80009	131-0930-00
						(ATTACHING PARTS)		
-93	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-94	210-0586-00			1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
						- - - * - - -		
-95	131-0799-00			2		CONTACT,ELEC:	80009	131-0799-00
						(ATTACHING PARTS FOR EACH)		
-96	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-97	210-0586-00			1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
4-98	131-0800-00			2	CONTACT,ELEC:PLUG-IN GROUND	80009	131-0800-00
					(ATTACHING PARTS FOR EACH)		
-99	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-100	210-0586-00			1	NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
					- - - * - - -		
-101	----- -----			1	CKT BOARD ASSY:TRIGGER SELECTOR(SEE A3 EPL)		
-102	131-0589-00			4	. CONTACT,ELEC:0.46 INCH LONG	22526	47350
-103	136-0252-01			15	. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
-104	136-0260-01			1	. SOCKET,PLUG-IN:16 CONTACT,RECT SHAPE	71785	133-51-02-075
-105	136-0263-03			16	. SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	00779	86250-2
					(ATTACHING PARTS FOR CKT BD)		
-106	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-107	----- -----			1	CKT BOARD ASSY:VERTICAL INTERFACE(SEE A4 EPL)		
-108	136-0252-04			21	. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-109	136-0263-03			16	. SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	00779	86250-2
-110	136-0260-02			1	. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
					(ATTACHING PARTS FOR CKT BD ASSY)		
-111	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
					- - - * - - -		
-112	----- -----			1	CKT BOARD ASSY:MAIN INTERFACE(SEE A1 EPL)		
-113	670-1374-00			1	. CKT BOARD ASSY:VERT INTERCONNECT	80009	670-1374-00
-114	131-0787-00			8	. . CONTACT,ELEC:0.64 INCH LONG	22526	47359
					(ATTACHING PARTS FOR CKT BD)		
-115	211-0008-00			2	. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-116	351-0213-00			2	. GUIDE-POST,LOCK:0.285 INCH LONG	80009	351-0213-00
					- - - * - - -		
-117	386-1558-00			2	. SPACER,CKT CARD:PLASTIC	80009	386-1558-00
	131-0590-00			32	. CONTACT,ELEC:0.71 INCH LONG	22526	47351
-118	131-0592-00			26	. CONTACT,ELEC:0.885 INCH LONG	22526	47353
-119	131-0608-00			74	. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-120	129-0308-00			4	. POST,ELEC-MECH:HEX.,0.25 X 0.465 INCH LONG	80009	129-0308-00
					(ATTACHING PARTS FOR EACH)		
-121	211-0008-00			1	. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	210-0803-00	XB060000		1	. WASHER,FLAT:0.15 ID X 0.375 INCH OD,STL	12327	OBD
					- - - * - - -		
-122	131-1003-00			2	. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
	131-0767-02	B010100	B039999	2	. CONNECTOR,RCPT,:76 CONTACT	80009	131-0767-02
	131-0767-08	B040000		2	. CONNECTOR,RCPT,:PLUG-IN CKT BD,70 CONTACT	80009	131-0767-08
-123	200-0950-00			2	. . COVER,ELEC CONN:PLASTIC	80009	200-0950-00
-124	204-0365-00			1	. . BODY,CONNECTOR:PLUG-IN CIRCUIT CARD	80009	204-0365-00
	131-0726-00	B010100	B039999	36	. . CONTACT,ELEC:STRAIGHT	80009	131-0726-00
	131-0726-00	B040000		33	. . CONTACT,ELEC:STRAIGHT	80009	131-0726-00
	131-0727-00	B010100	B039999	36	. . CONTACT,ELEC:OFFSET	80009	131-0727-00
	131-0727-00	B040000		33	. . CONTACT,ELEC:OFFSET	80009	131-0727-00
	131-0899-00			4	. . CONTACT,ELEC:0.048 X 0.006 INCH THK	80009	131-0899-00
					(ATTACHING PARTS FOR EACH)		
-125	213-0232-00			3	. SCR,TPG,THD FOR:2-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
	131-0767-00	B010100	B039999	1	. CONNECTOR,RCPT,:76 CONTACT	80009	131-0767-00
	131-0767-07	B040000		1	. CONNECTOR,RCPT,:PLUG-IN CKT BD,70 CONTACT	80009	131-0767-07
-126	200-0950-00			2	. . COVER,ELEC CONN:PLASTIC	80009	200-0950-00
-127	204-0365-02			1	. . BODY,CONNECTOR:PLUG-IN CIRCUIT CARD	80009	204-0365-02
-128	131-0726-00	B010100	B039999	38	. . CONTACT,ELEC:STRAIGHT	80009	131-0726-00
	131-0726-00	B040000		35	. . CONTACT,ELEC:STRAIGHT	80009	131-0726-00
-129	131-0727-00	B010100	B039999	38	. . CONTACT,ELEC:OFFSET	80009	131-0727-00
	131-0727-00	B040000		35	. . CONTACT,ELEC:OFFSET	80009	131-0727-00
					(ATTACHING PARTS)		
-130	213-0232-00			2	. SCR,TPG,THD FOR:2-32 X 0.312 INCH,PNH STL	83385	OBD
	210-0906-00			1	. WASHER,NONMETAL:FIBER,0.125 ID X 0.203"OD	86928	OBD
					- - - * - - -		
-131	131-0804-00			1	. LINK,TERM.CONNE:J-SHAPE	80009	131-0804-00
-132	131-0805-00			2	. LINK,TERM.CONNE:J-SHAPE,0.90X0.82 X 0.312" "	80009	131-0805-00

http://manuals.tm.com

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4 -133	214-1568-00			2		. PIN,GUIDE:	80009	214-1568-00
						(ATTACHING PARTS FOR EACH)		
-134	210-0406-00			1		. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-135	210-0054-00			1		. WASHER,LOCK:SPLIT,0.118 ID X 0.212"OD STL	83385	OBD
						- - - * - - -		
-136	344-0147-00			2		. CLIP,SPR,TNSN:CIRCUIT CARD MOUNTING	80009	344-0147-00
						(ATTACHING PARTS FOR CKT BD)		
-137	213-0034-00			9		SCR,TPG,THD CTG:4-40 X 0.188 INCH,PNH STL	83385	OBD
						- - - * - - -		
-138	----- -----			1		CKT BOARD ASSY:LOGIC(SEE A2 EPL)		
-139	131-0566-00			1		. LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-140	136-0235-00			1		. SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
-141	136-0252-04			24		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-142	136-0260-02			1		. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
-143	136-0263-03			33		. SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	00779	86250-2
-144	136-0260-02			3		. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
-145	214-0579-00			4		. TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-146	----- -----			1		CKT BOARD ASSY:RECTIFIER(SEE A10 EPL)		
-147	131-0608-00			28		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-148	136-0252-04			6		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-149	214-1292-00			2		. HEAT SINK,ELEC:TRANSISTOR	05820	205-AB
	136-0350-00			2		. SOCKET,PLUG-IN:3 PIN,LOW PROFILE	80009	136-0350-00
-150	214-1731-00			1		. HEAT SINK,ELEC:TRANSISTOR	80009	214-1731-00
						(ATTACHING PARTS)		
-151	211-0012-00			1		. SCREW,MACHINE:4-40 X 0.375 INCH,PNH STL	83385	OBD
-152	210-0586-00			1		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
-153	210-0935-00			1		. WASHER,NONMETAL:FIBER,0.14 IDX 0.375"OD	74921	OBD
						- - - * - - -		
	131-0566-00	XB150000		1		. LINK,TERM.CONNE:0.086 DIA X 2.375 INCH L	55210	L-2007-1
-154	344-0154-00			4		. CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
						(ATTACHING PARTS FOR CKT BD)		
-155	211-0507-00			3		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-156	211-0511-00			1		SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
	211-0008-00	XB030000		1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-157	343-0081-00			1		STRAP,RETAINING:	95987	3-16H
-158	----- -----			1		TRANSFORMER:(SEE T801 EPL)		
						(ATTACHING PARTS)		
-159	212-0522-00			2		SCREW,MACHINE:10-32 X 2.50",HEX HD STL	83385	OBD
-160	210-0812-00			2		WASHER,NONMETAL:#10,FIBER	86445	OBD
-161	166-0457-00			2		INSUL SLVG,ELEC:0.19 ID X 1.875"LONG MYLAR	80009	166-0457-00
						- - - * - - -		
-162	407-0921-00			1		BRKT,XFMR MTG:	80009	407-0921-00
						(ATTACHING PARTS)		
-163	212-0023-00			2		SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL	83385	OBD
	210-0804-00	XB031009		2		WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	OBD
						- - - * - - -		
-164	----- -----			1		SW,THERMOSTATIC:		
						(ATTACHING PARTS)		
-165	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-166	210-0586-00			2		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	OBD
						- - - * - - -		
-167	441-0993-00			1		CHAS,ELEC EQUIP:	80009	441-0993-00
						(ATTACHING PARTS)		
	212-0004-00			5		SCREW,MACHINE:8-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-168	119-0390-00			1		FAN,AXIAL:46 CFM,19W,115 VAC,60 HZ	28875	MBS-2107F-0-1
						(ATTACHING PARTS)		
	210-0457-00			4		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-169	386-2410-00	B010100	B061272	1		SUBPANEL,REAR:	80009	386-2410-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4-	386-2410-01	B061273		1		SUBPANEL,REAR:	80009	386-2410-01
						(ATTACHING PARTS)		
	211-0504-00			4		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-170	348-0004-00			1		GROMMET,RUBBER:0.281 ID X 0.563 INCH OD	70485	763
-171	----- -----			1		CKT BOARD ASSY:SIGNALS OUT(SEE A12 EPL)		
-172	131-0608-00			11		. CONTACT,ELEC:0.365 L X 0.25 PH BRZ GOLD PL	22526	47357
-173	131-1003-00			2		. CONNECTOR BODY,:CKT CD MT,3 PRONG	80009	131-1003-00
-174	136-0252-04			27		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-01			2		. CONTACT,ELEC:0.178 INCH LONG	00779	1-332095-2
-175	214-0579-00			1		. TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-176	260-0984-00			1		. SWITCH,SLIDE:DP 3 POSN,0.5A,125VAC-DC	79727	G-128SPC/7140
						(ATTACHING PARTS FOR CKT BD)		
-177	211-0008-00			2		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-178	131-0955-00			6		CONNECTOR,RCPT,:BNC,FEMALE,W/HARDWARE	05091	31-279
-179	210-0255-00			1		TERMINAL,LUG:0.391" ID INT TOOTH	80009	210-0255-00
-180	385-0100-00			1		INS,STANDOFF:0.312 INCH X 0.50 INCH LONG	80009	385-0100-00
						(ATTACHING PARTS)		
-181	211-0504-00			1		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-182	210-0202-00			1		TERMINAL,LUG:SE #6	78189	2104-06-00-2520N
						(ATTACHING PARTS)		
-183	210-0504-00			1		NUT,PLAIN,HEX.:0-8 X 0.156 INCH,BRS	73743	3004-402
						- - - * - - -		
-184	210-0202-00	B010100	B219999	1		TERMINAL,LUG:SE #6	78189	2104-06-00-2520N
	210-0202-00	B220000		2		TERMINAL,LUG:SE #6	78189	2104-06-00-2520N
						(ATTACHING PARTS)		
-185	211-0504-00	B010100	B219999	1		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
	211-0507-00	B220000		1		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-186	210-0407-00	B010100	B219999	1		NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
	210-0407-00	B220000		2		NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
						- - - * - - -		
-187	352-0076-00			1		FUSEHOLDER:W/HARDWARE	75915	342012
-188	200-1388-00	B010100	B234589	1		COVER,FUSE:	80009	200-1388-00
	200-1388-01	B234590		1		COVER,FUSE:	80009	200-1388-01
-189	358-0025-00	B010100	B061272	1		BSHG,STRAIN RLF:	28520	SR-6P-4
	358-0161-00	B061273		1		BSHG,STRAIN RLF:FOR 0.50 INCH HOLE,PLASTIC	28520	SR5P4
-190	378-0041-01			1		FILTER ELEM,AIR:	80009	378-0041-01
-191	346-0077-00			1		STRAP,TIEDOWN E:6.225 INCH L	80009	346-0077-00
	162-0512-00	XB254860		FT		INS SLV,ELEC:#10 YELLOW,0.104 FEET		
-192	161-0033-09			1		CABLE ASSY,PWR,:3 WIRE,92 INCH LONG	80009	161-0033-09
-193	386-2401-00	B010100	B061272	1		PANEL,REAR:	80009	386-2401-00
	386-2401-02	B061273		1		PANEL,REAR:	80009	386-2401-02
						(ATTACHING PARTS)		
-194	211-0008-00	B010100	B061272	8		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	211-0101-00	B061273		8		SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-195	136-0280-00			2		SOCKET,PLUG-IN:FOR TO-3 FOR TO-3	97913	LST 2202-2
						(ATTACHING PARTS)		
-196	211-0101-00			2		SCREW,MACHINE:4-40 X 0.25" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-197	131-0707-00			260		CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	131-0708-00			10		CONTACT,ELEC:0.48"L,28-32 AWG WIRE	22526	47437
-198	352-0171-00			3		CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0171-00
-199	352-0169-01			1		CONN BODY,PL,EL:2 WIRE BROWN	80009	352-0169-01
	352-0169-04			1		CONN BODY,PL,EL:2 WIRE YELLOW	80009	352-0169-04
	352-0169-05			2		CONN BODY,PL,EL:2 WIRE GREEN	80009	352-0169-05
	352-0169-08			2		CONN BODY,PL,EL:2 WIRE GRAY	80009	352-0169-08
	352-0169-09			1		CONN BODY,PL,EL:2 WIRE WHITE	80009	352-0169-09
-200	352-0161-00			2		CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0161-00
	352-0169-02			1		CONN BODY,PL,EL:2 WIRE RED	80009	352-0169-00
	352-0161-03			1		CONN BODY,PL,EL:3 WIRE ORANGE	80009	352-0161-03

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4-	352-0169-08			1		CONN BODY,PL,EL:2 WIRE GRAY	80009	352-0169-08
-201	352-0162-00			5		CONN BODY,PL,EL:4 WIRE BLACK	80009	352-0162-00
	352-0162-05			1		CONN BODY,PL,EL:4 WIRE GREEN	80009	352-0162-05
-202	352-0163-00			3		CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0163-00
	352-0163-06			2		CONN BODY,PL,EL:5 WIRE BLUE	80009	352-0163-06
	352-0163-08			2		CONN BODY,PL,EL:5 WIRE GRAY	80009	352-0163-08
-203	352-0164-01			4		CONN BODY,PL,EL:6 WIRE BROWN	80009	352-0164-01
-204	352-0165-00			2		CONN BODY,PL,EL:7 WIRE BLACK	80009	352-0165-00
-205	352-0166-00			6		CONN BODY,PL,EL:8 WIRE BLACK	80009	352-0166-00
	352-0166-01			2		CONN BODY,PL,EL:8 WIRE BROWN	80009	352-0166-01
	352-0166-02			3		CONN BODY,PL,EL:8 WIRE RED	80009	352-0166-02
	352-0166-03			2		CONN BODY,PL,EL:8 WIRE ORANGE	80009	352-0166-03
-206	352-0168-00			2		CONN BODY,PL,EL:10 WIRE BLACK	80009	352-0168-00
	352-0168-05			2		CONN BODY,PL,EL:10 WIRE GREEN	80009	352-0168-05
-207	179-1825-00			1		WIRING HARNESS,:VERTICAL SIGNAL	80009	179-1825-00
-208	210-0775-00			2		. EYELET,METALLIC:0.126 OD X 0.23 INCH L,BRS	80009	210-0775-00
-209	210-0774-00			2		. EYELET,METALLIC:0.152 OD X 0.245 INCH L,BRS	80009	210-0774-00
	131-0707-00			4		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	352-0162-00			1		. CONN BODY,PL,EL:4 WIRE BLACK	80009	352-0162-00
	179-1826-00			1		WIRING HARNESS,:SWEEP GATE	80009	179-1826-00
	131-0707-00			16		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	352-0166-03			2		. CONN BODY,PL,EL:8 WIRE ORANGE	80009	352-0166-03
	179-1827-00			1		WIRING HARNESS:RESET	80009	179-1827-00
	131-0707-00			4		. CONTACT,ELEC:0.48" L,22-26 awg wire	22526	75691-00596-6331
	352-0162-05			1		. CONN BODY,PL,EL:4 WIRE GREEN	80009	352-0162-05
	179-1637-01			1		WIRING HARNESS:POWER	80009	179-1637-01
-210	200-1075-00			4		. COVER,ELEC CONN:PLASTIC	00779	1-480435-0
-211	131-0861-00			4		. CONTACT,ELEC:QUICK DISCONNECT	00779	42617-2
-212	175-0825-00			FT		WIRE,ELECTRICAL:2 WIRE RIBBON	08261	OBD
-213	175-0826-00			FT		WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-214	175-0827-00			FT		WIRE,ELECTRICAL:4 WIRE RIBBON	80009	175-0827-00
-215	175-0828-00			FT		WIRE,ELECTRICAL:5 WIRE RIBBON	08261	OBD
-216	175-0829-00			FT		WIRE,ELECTRICAL:6 WIRE RIBBON	08261	OBD
-217	175-0830-00			FT		WIRE,ELECTRICAL:7 WIRE RIBBON	08261	OBD
-218	175-0831-00			FT		WIRE,ELECTRICAL:8 WIRE RIBBON	08261	OBD
	175-0857-00			FT		WIRE,ELECTRICAL:8 WIRE RIBBON	23499	TEK-175-0857-00
-219	175-0855-00			FT		WIRE,ELECTRICAL:10 WIRE RIBBON	23499	TEK-175-0855-00

OPTION 3 Electromagnetic Interference (EMI)

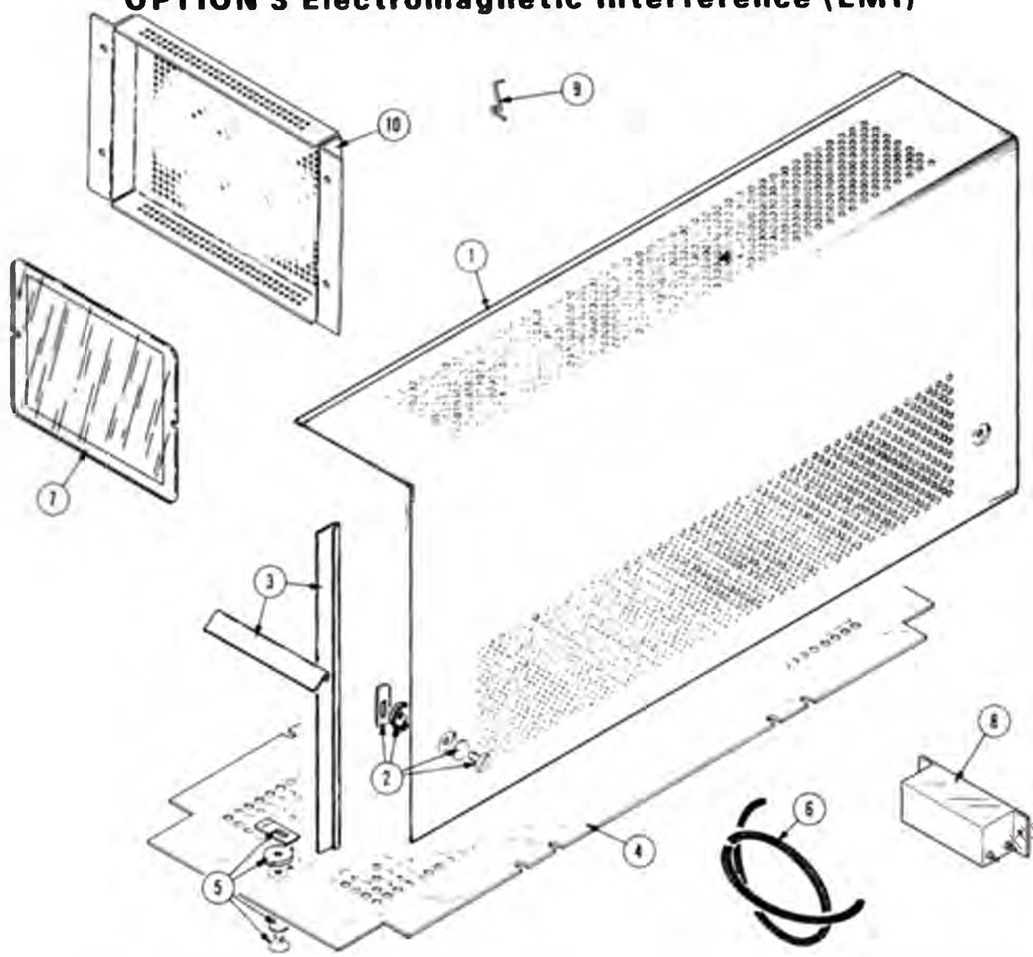


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
-1	390-0297-00			2	CAB SIDE,SCOPE:	80009	390-0297-00
-2	214-0816-00			6	. LATCH ASSEMBLY	80009	214-0816-00
-3	348-0274-00			4	. SHLD GSKT,ELEC:	30817	97-555CDC
-4	390-0355-00			1	CAB BDT,SCOPE	80009	390-0355-00
-5	214-0816-00			2	. LATCH ASSEMBLY:	80009	214-0816-00
-6	348-0340-00			FT	SHLD GSKT,ELEC:	07700	85-10168
-7	378-0696-00			1	FILTER,LT,CRT:	80009	378-0696-00
-8	119-0113-05			1	FILTER,RFI:	72982	9604-000-9000
-9	131-1266-00			1	CONTACT,ELEC:	80009	131-1266-00
-10	337-1726-00			1	SHIELD,ELEC:	80009	337-1726-00

OPTIONAL ACCESSORIES

	016-0155-00			1	PANEL,BLANK:	80009	016-0155-00

OPTION 7 Without Signals Out

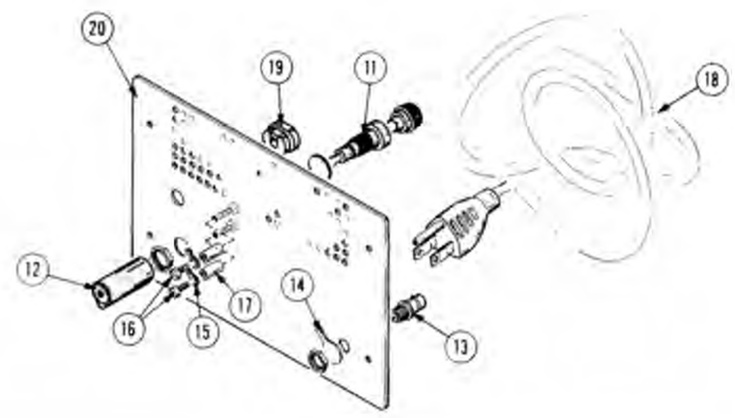
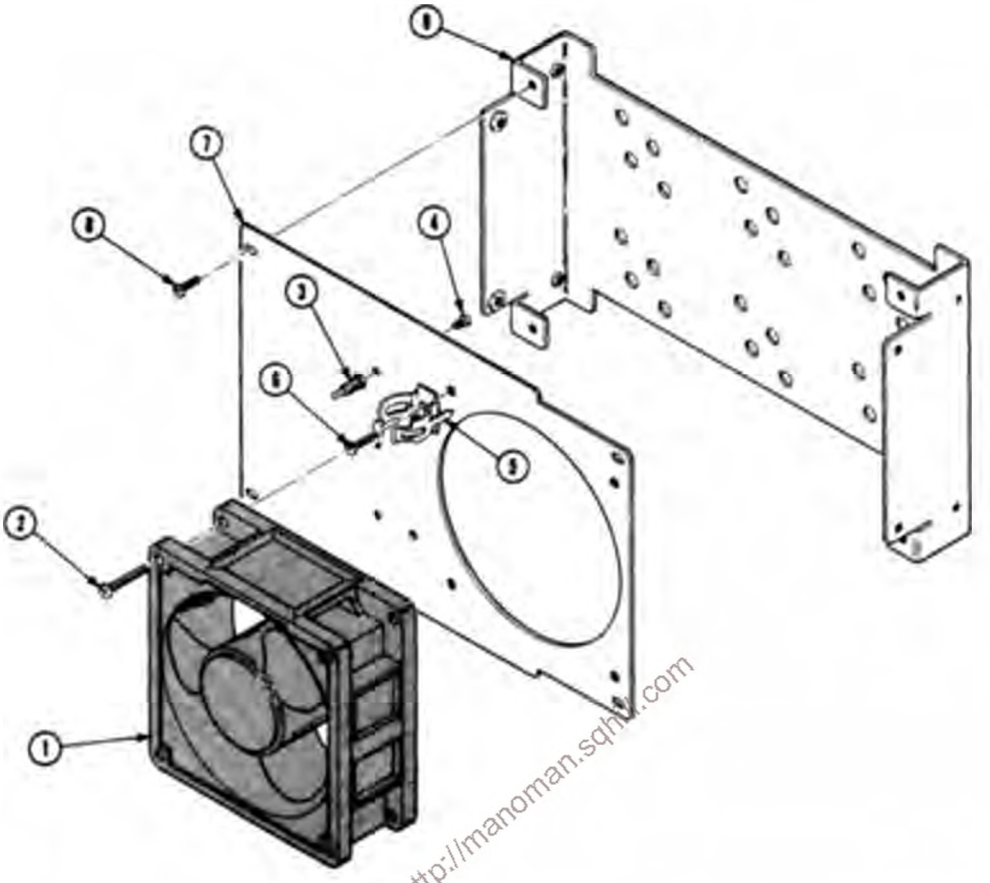


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
-11	352-0076-00			1	FUSEHOLDER:W/HARDWARE	75915	342012
-12	200-1388-00			1	COVER,FUSE:	80009	200-1388-00
-13	131-0955-00			1	CONNECTOR,RCPT,:BNC,FEMALE	24931	28JR200-1
-14	210-0255-00			1	TERMINAL,LUG:0.391" ID INT TOOTH	80009	210-0255-00
-15	210-0201-00			2	TERMINAL,LUG:SE #4	78189	2104-04-00-2520N
-16	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-17	385-0149-00			2	INS,STANDOFF:4-40 X 0.25 INCH DIAMETER	80009	385-0149-00
-18	161-0033-09			1	CABLE ASSY,PWR:3 WIRE,92 INCH LONG	16428	KH8035
-19	358-0323-00			1	BSHG,STRAIN RLF:90 DEG,0.515 DIA HOLE	28520	SR15-1
-20	386-2329-00			1	PANEL,REAR:	80009	386-2329-00

http://manuman.sqhill.com

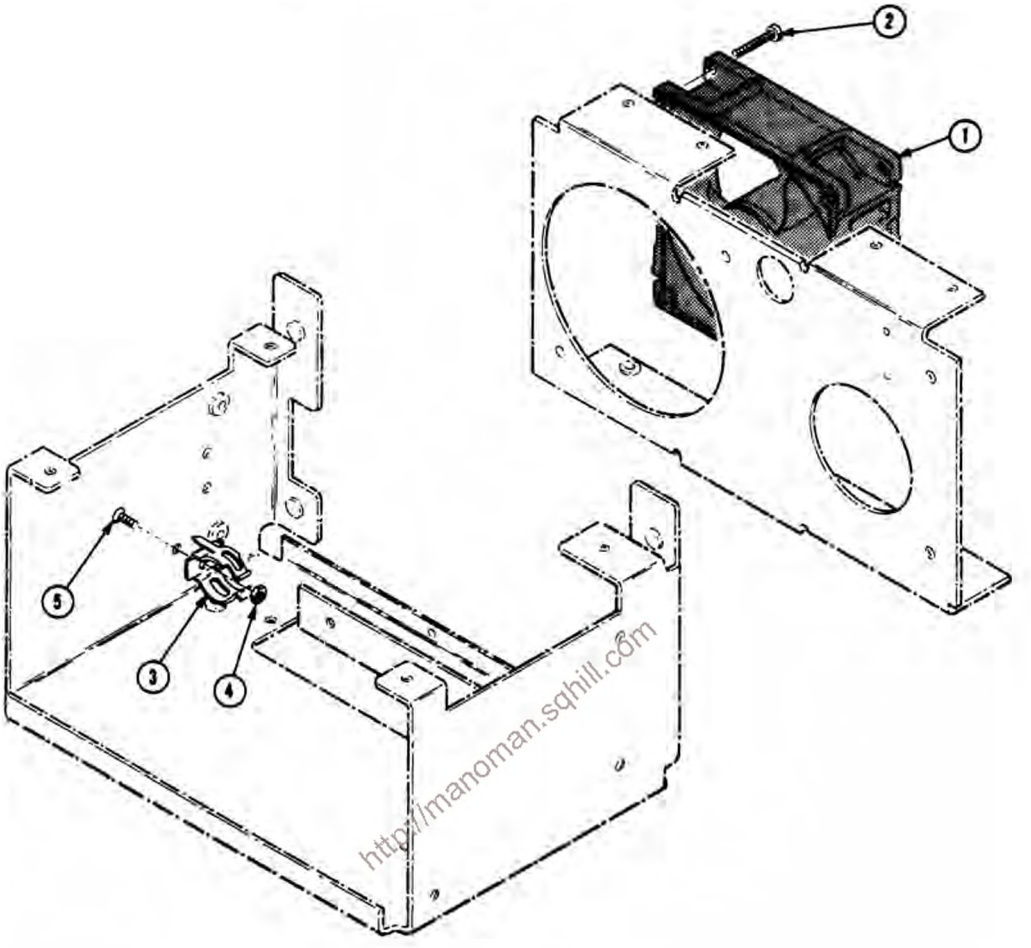
7603 OPTION 5



http://manoman.sqhv.com

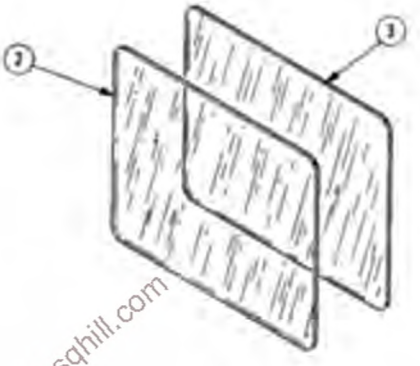
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Numbe
-1	----- -----			1		FAN,TUBE AXIAL:50-400HZ,115V,AC(SEE B1001 EPL)		
						(ATTACHING PARTS)		
-2	211-0530-00			4		SCREW,MACHINE:6-32 X 1.75 INCH,PNH STL	83385	OBD
						- - - * - - -		
-3	131-0761-00			3		TERMINAL STUD:SCREW MTD,FLAT TAB	71279	4897-1-0516
						(ATTACHING PARTS FOR EACH)		
-4	211-0504-00			1		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-5	344-0116-00			1		RTNR,CAPACITOR:	TH-17	90210
						(ATTACHING PARTS)		
-6	211-0008-00			1		SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-7	378-0050-00			1		BAFFLE,AIR:	80009	378-0050-00
						(ATTACHING PARTS)		
-8	211-0507-00			4		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-9	441-1201-00			1		CHAS,ELEC EQPT:	80009	441-1201-00

R7603 OPTION 5



http://manoman.sqhill.com

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		FAN,TUBE AXIAL:50-400HZ,115V,AC(SEE B1001 EPL)		
						(ATTACHING PARTS)		
-2	211-0530-00			4		SCREW,MACHINE:6-32 X 1.75 INCH,PNH STL	83385	OBD
						- - - * - - -		
-3	344-0116-00			1		TRNT,CAPACITOR:	TH-17	90210
						(ATTACHING PARTS)		
-4	210-0407-00			1		NUT,PLAIN,HEX:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
-5	211-0541-00			1		SCREW,MACHINE:6-32 X 0.25 INCH,100 DEG,FLH STL	83385	OBD
						- - - * - - -		



http://manoman.sqhill.com

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	175-1178-00			1		CABLE,SP ELECT:	80009	175-1178-00
-2	337-1700-01			1		SHIELD,ELEC:BLUE	80009	337-1700-01
-3	337-1700-04			1		SHLD,IMPLOSION:CLEAR	80009	337-1700-04
	070-1429-00			1		MANUAL,TECH:INSTRUCTION	80009	070-1429-00
	070-1310-00			1		MANUAL,TECH:OPERATORS	80009	070-1310-00

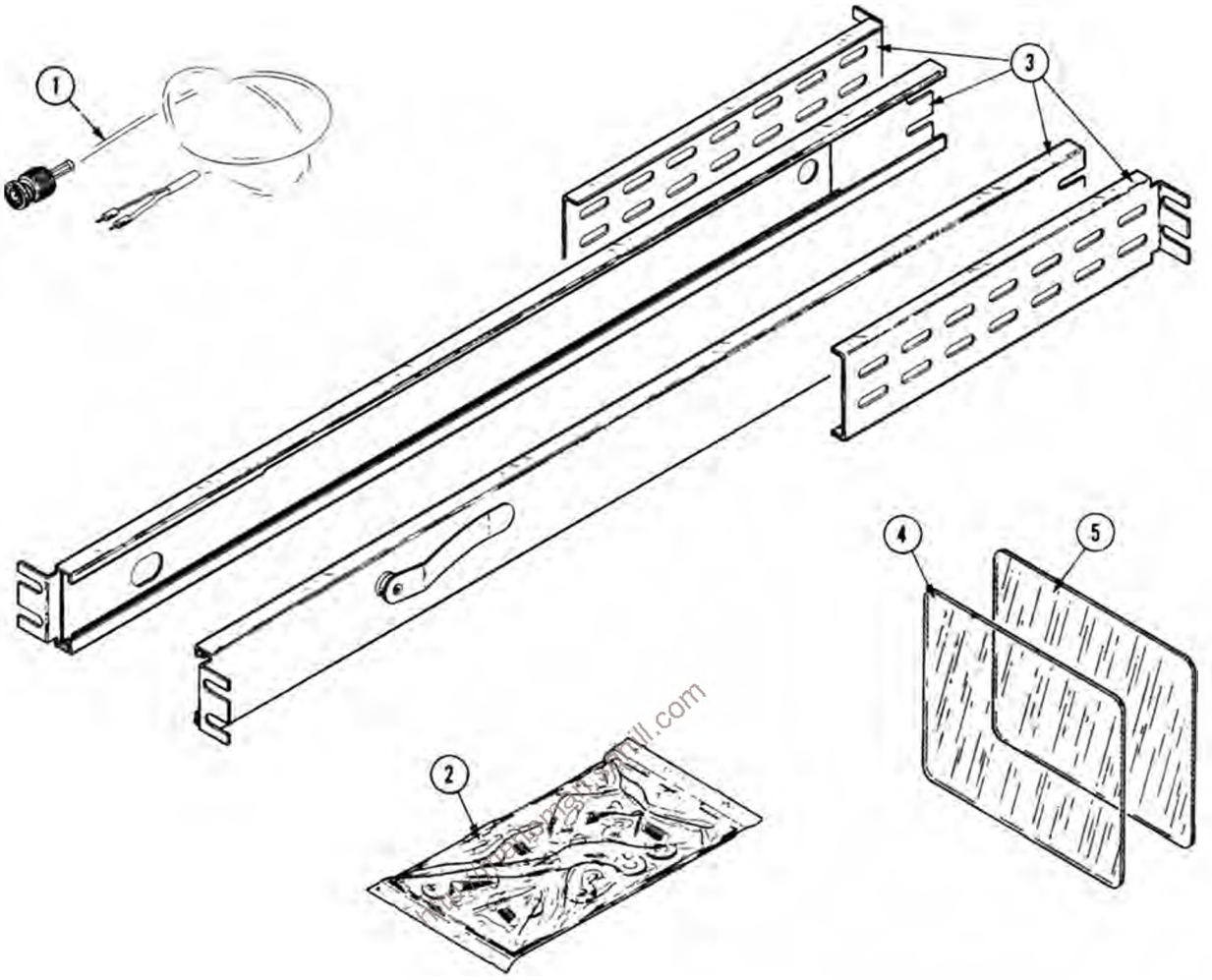


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-1	175-1178-00			1		CABLE,SP ELECT:	80009	175-1178-00
-2	016-0131-00			1		HDW,KIT,ELEK EQ:RACK MOUNTING HARDWARE	80009	016-0131-00
-3	351-0314-00			1		SLIDE,DWR,EXT:19.25 INCH LONG	80009	351-0314-00
-4	337-1700-01			1		SHIELD,ELEC:BLUE	80009	337-1700-01
-5	337-1700-04			1		SHLD,IMPLOSION:CLEAR	80009	337-1700-04
	070-1429-00			1		MANUAL,TECH:INSTRUCTION	80009	070-1429-00
	070-1310-00			1		MANUAL,TECH:OPERATORS	80009	070-1310-00

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.

www.tekmanuals.mhill.com

SERVICE NOTE

Because of the universal parts procurement problem, some electrical parts in your instrument may be different from those described in the Replaceable Electrical Parts List. The parts used will in no way alter or compromise the performance or reliability of this instrument. They are installed when necessary to ensure prompt delivery to the customer. Order replacement parts from the Replaceable Electrical Parts List.

CALIBRATION TEST EQUIPMENT REPLACEMENT

Calibration Test Equipment Chart

This chart compares TM 500 product performance to that of older Tektronix equipment. Only those characteristics where significant specification differences occur, are listed. In some cases the new instrument may not be a total functional replacement. Additional support instrumentation may be needed or a change in calibration procedure may be necessary.

Comparison of Main Characteristics

DM 501 replaces 7D13		
PG 501 replaces 107	PG 501 - Risetime less than 3.5 ns into 50 Ω.	107 - Risetime less than 3.0 ns into 50 Ω.
108	PG 501 - 5 V output pulse; 3.5 ns Risetime.	108 - 10 V output pulse; 1 ns Risetime.
111	PG 501 - Risetime less than 3.5 ns; 8 ns Pretrigger pulse delay.	111 - Risetime 0.5 ns; 30 to 250 ns Pretrigger Pulse delay.
114	PG 501 - ±5 V output.	114 - ±10 V output. Short proof output.
115	PG 501 - Does not have Paired, Burst, Gated, or Delayed pulse mode; ±5 V dc Offset. Has ±5 V output.	115 - Paired, Burst, Gated, and Delayed pulse mode; ±10 V output. Short-proof output.
PG 502 replaces 107		
108	PG 502 - 5 V output	108 - 10 V output.
111	PG 502 - Risetime less than 1 ns; 10 ns Pretrigger pulse delay.	111 - Risetime 0.5 ns; 30 to 250 ns Pretrigger pulse delay.
114	PG 502 - ±5 V output	114 - ±10 V output. Short proof output.
115	PG 502 - Does not have Paired, Burst, Gated, Delayed & Undelayed pulse mode; Has ±5 V output.	115 - Paired, Burst, Gated, Delayed & Undelayed pulse mode; ±10 V output. Short-proof output.
2101	PG 502 - Does not have Paired or Delayed pulse. Has ±5 V output.	2101 - Paired and Delayed pulse; 10 V output.
PG 506 replaces 106	PG 506 - Positive-going trigger output signal at least 1 V; High Amplitude output, 60 V.	106 - Positive and Negative-going trigger output signal, 50 ns and 1 V; High Amplitude output, 100 V.
067-0502-01	PG 506 - Does not have chopped feature.	0502-01 - Comparator output can be alternately chopped to a reference voltage.
SG 503 replaces 190, 190A, 190B	SG 503 - Amplitude range 5 mV to 5.5 V p-p.	190B - Amplitude range 40 mV to 10 V p-p.
191	SG 503 - Frequency range 250 kHz to 250 MHz.	191 - Frequency range 350 kHz to 100 MHz.
067-0532-01	SG 503 - Frequency range 250 kHz to 250 MHz.	0532-01 - Frequency range 65 MHz to 500 MHz.
TG 501 replaces 180, 180A	TG 501 - Marker outputs, 5 sec to 1 ns. Sinewave available at 5, 2, and 1 ns. Trigger output - slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	180A - Marker outputs, 5 sec to 1 μs. Sinewave available at 20, 10, and 2 ns. Trigger pulses 1, 10, 100 Hz; 1, 10, and 100 kHz. Multiple time-marks can be generated simultaneously.
181	TG 501 - Marker outputs, 5 sec to 1 ns. Sinewave available at 5, 2, and 1 ns.	181 - Marker outputs, 1, 10, 100, 1000, and 10,000 μs, plus 10 ns sinewave.
184	TG 501 - Marker outputs, 5 sec to 1 ns. Sinewave available at 5, 2, and 1 ns. Trigger output - slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	184 - Marker outputs, 5 sec to 2 ns. Sinewave available at 50, 20, 10, 5, and 2 ns. Separate trigger pulses of 1 and .1 sec; 10, 1, and .1 ms; 10 and 1 μs. Marker amplifier provides positive or negative time marks of 25 V min. Marker intervals of 1 and .1 sec; 10, 1, and .1 ms; 10 and 1 μs.
2901	TG 501 - Marker outputs, 5 sec to 1 ns. Sinewave available at 5, 2, and 1 ns. Trigger output - slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	2901 - Marker outputs, 5 sec to 0.1 μs. Sinewave available to 50, 10, and 5 ns. Separate trigger pulses, from 5 sec to 0.1 μs. Multiple time-marks can be generated simultaneously.

NOTE: All TM 500 generator outputs are short-proof. All TM 500 plug-in instruments require TM 500-Series Power Module.

http://beanonline.mcgraw-hill.com

GENERAL: 7603 or R7603 instruments purchased with OPTION 4 (Maximum Brightness CRT) contain the following parts and circuitry that differ from those shown for the standard 7603/R7603. For OPTION 4 instruments the reference to -2975 volts in step 3 of the calibration section and elsewhere in this manual should be changed to read -3475 V.

ELECTRICAL PARTS LIST CHANGES

CHANGE TO:

A8	670-1951-02	Z AXIS AMPLIFIER Circuit Board Assembly
A9	670-2128-01	HV Circuit Board Assembly
U1230	119-0401-00	HV Multiplier
V1099	154-0672-00	CRT

Z AXIS AMPLIFIER Circuit Board Assembly

CHANGE TO:

R1139	323-0314-00	18.2 kΩ, 1/2 W, 1%
R1159	323-0317-00	19.6 kΩ, 1/2 W, 1%

http://manomanuals.mcgraw-hill.com

HV Circuit Board Assembly

CHANGE TO:

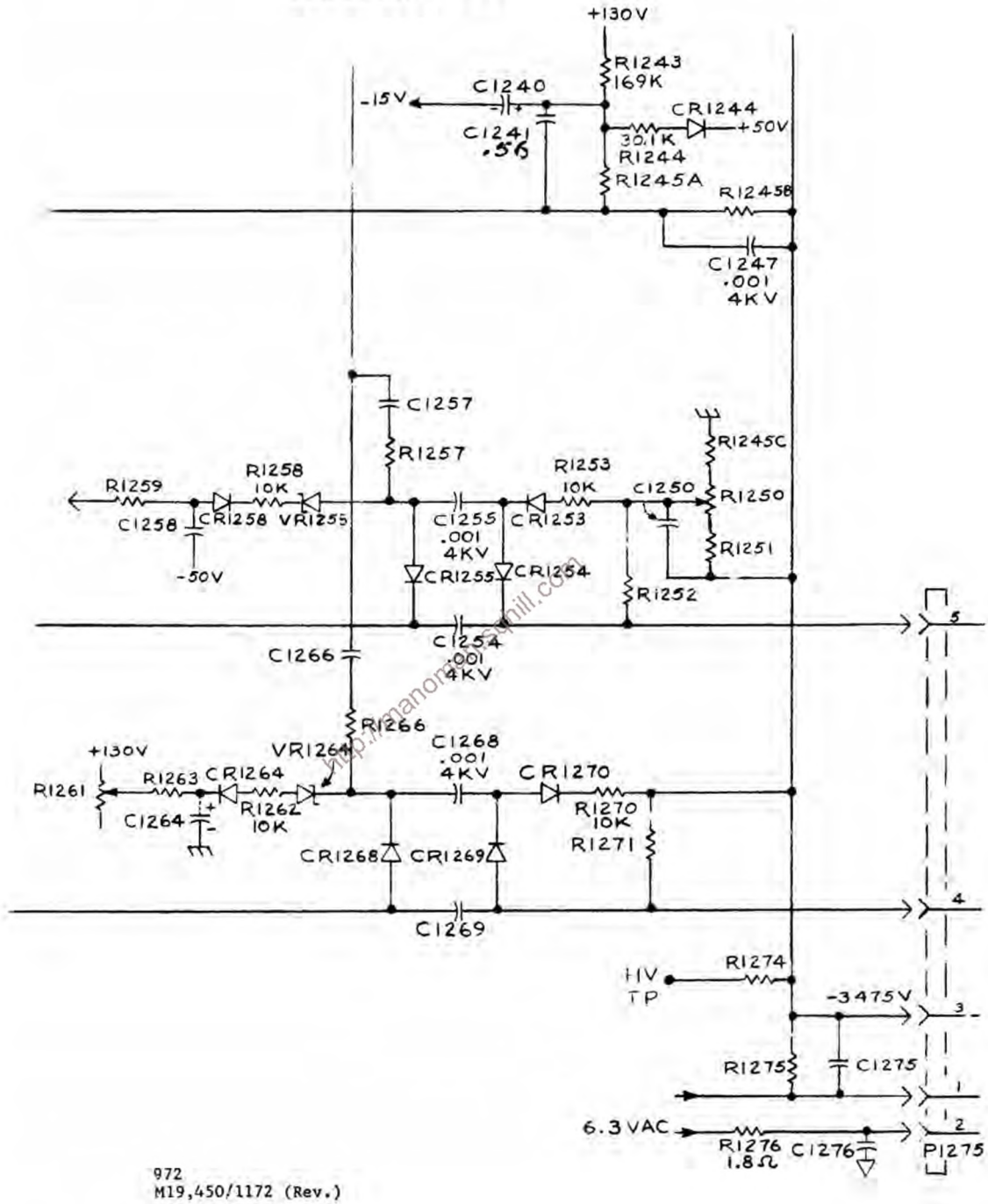
C1241	283-0129-00	0.56 µF Cer, 100 V (SN B112360-up)
C1247	283-0271-00	0.001 µF, Cer, 4 KV, 20%
C1254	283-0271-00	0.001 µF, Cer, 4 KV, 20%
C1255	283-0271-00	0.001 µF, Cer, 4 KV, 20%
C1268	283-0271-00	0.001 µF, Cer, 4 KV, 20%
C1276	283-0271-00	0.001 µF, Cer, 4 KV, 20%
R1243	321-0407-00	169 kΩ, 1/8 W, 1%

ADD:

R1244	321-0335-00	30.1 kΩ, 1/8 W, 1%
R1253	315-0103-00	10 kΩ, 1/4 W, 5%
R1258	315-0103-00	10 kΩ, 1/4 W, 5%
R1262	315-0103-00	10 kΩ, 1/4 W, 5%
R1270	315-0103-00	10 kΩ, 1/4 W, 5%
R1276	308-0703-00	1.8 Ω, 2 W, 5%

OPTION 4

SCHEMATIC CHANGES



972
M19,450/1172 (Rev.)

TEKTRONIX®
committed to technical excellence

MANUAL CHANGE INFORMATION

PRODUCT 7603/R7603
070-1429-00

CHANGE REFERENCE M30047
DATE 3-2-77

CHANGE:	DESCRIPTION

EFF SN B326489

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

C1124	283-0068-00	CAP.,FXD,CER DI:0.01UF,+100-0%,500V
C1131	283-0068-00	CAP.,FXD,CER DI:0.01UF,+100-0%,500V
C1144	283-0068-00	CAP.,FXD,CER DI:0.01UF,+100-0%,500V
C1151	283-0068-00	CAP.,FXD,CER DI:0.01UF,+100-0%,500V
C1196	283-0068-00	CAP.,FXD,CER DI:0.01UF,+100-0%,500V

The above parts are located on the Z AXIS AMPLIFIER circuit board and shown on diagram 8 CRT CIRCUIT.

http://manoman.sqhill.com

TEKTRONIX®
committed to technical excellence

MANUAL CHANGE INFORMATION

PRODUCT 7603/R7603
070-1429-00

CHANGE REFERENCE M30310 REV.
DATE 6-1-77

CHANGE:	DESCRIPTION

EFF SN B338312

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

A9	670-2128-08	CKT BOARD ASSY:HV
C1215	283-0341-00	CAP.,FXD,CER DI:0.047UF,10%,100V
C1222	290-0770-00	CAP.,FXD,ELCTLT:100UF,+50-10%,25V
C1232	283-0261-00	CAP.,FXD,CER DI:0.01UF,20%,4000V
C1240	290-0768-00	CAP.,FXD,ELCTLT:10UF,+50-10%,100V
C1247	283-0188-00	CAP.,FXD,CER DI:0.001UF,20%,6000V
C1250	283-0188-00	CAP.,FXD,CER DI:0.001UF,20%,6000V
C1264	290-0766-00	CAP.,FXD,ELCTLT:2.2UF,+50-10%,160V
C1275	281-0638-00	CAP.,FXD,CER DI:240PF,5%,500V
C1276	283-0034-00	CAP.,FXD,CER DI:0.005UF,20%,4000V
R1210	315-0152-00	RES.,FXD,CMPSN:1.5K OHM,5%,0.25W
R1234	315-0472-03	RES.,FXD,CMPSN:4.7K OHM,5%,0.25W
R1252	322-0524-01	RES.,FXD,FILM:2.8M OHM,1%,0.25W
R1275	315-0134-03	RES.,FXD,CMPSN:130K OHM,5%,0.25W
VR1258	152-0287-00	SEMICOND DEVICE:ZENER:0.4W,110V,5%,1N986B
T1225	120-1087-00	XFMR,PWR,STPDN:HV POWER

REMOVE:

C1254	283-0279-00	CAP.,FXD,CER DI:0.001UF,20%,3000V
C1255	283-0279-00	CAP.,FXD,CER DI:0.001UF,20%,3000V
C1268	283-0279-00	CAP.,FXD,CER DI:0.001UF,20%,3000V
C1269	283-0082-00	CAP.,FXD,CER DI:0.01UF,+80-20%,150V
CR1253	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1254	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1255	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1268	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1269	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1270	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
R1253	315-0103-00	RES.,FXD,CMPSN:10K OHM,5%,0.25W
R1254	315-0103-00	RES.,FXD,CMPSN:10K OHM,5%,0.25W
R1270	315-0103-00	RES.,FXD,CMPSN:10K OHM,5%,0.25W
R1271	315-0915-00	RES.,FXD,CMPSN:9.1M OHM,5%,0.25W

http://manuals.scopes.com

CHANGE:		DESCRIPTION
ADD:		
	670-4856-00	CKT BOARD ASSY:FOCUS DC RESTORER
	670-4856-01	CKT BOARD ASSY:Z AXIS DC RESTORER
C1310	283-0402-00	CAP.,FXD,CER DI:0.001UF,+80-20%,4000V
C1312	283-0402-00	CAP.,FXD,CER DI:0.001UF,+80-20%,4000V
C1410	283-0402-00	CAP.,FXD,CER DI:0.001UF,+80-20%,4000V
C1411	283-0402-00	CAP.,FXD,CER DI:0.001UF,+80-20%,4000V
C1412	283-0402-00	CAP.,FXD,CER DI:0.001UF,_80-20%,4000V
CR1262	152-0586-00	SEMICOND DEVICE:SILICON,600V,0.5A,RMP5060
CR1263	152-0586-00	SEMICOND DEVICE:SILICON,600V,0.5A,RMP5060
CR1313	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1315	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1317	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1413	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1415	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
CR1417	152-0242-00	SEMICOND DEVICE:SILICON,225V,200MA,NDP341
DS1270	150-0030-00	LAMP,GLOW:90V-50V
DS1271	150-0030-00	LAMP,GLOW:90V-50V
DS1272	150-0030-00	LAMP,GLOW:90V-50V
DS1273	150-0030-00	LAMP,GLOW:90V-50V
DS1274	150-0030-00	LAMP,GLOW:90V-50V
R1205	315-0202-00	RES.,FXD,CMPSN:2K OHM,5%,0.25W
R1217	315-0470-03	RES.,FXD,CMPSN:47 OHM,5%,0.25W
R1235	315-0470-03	RES.,FXD,CMPSN:47 OHM,5%,0.25W
R1260	315-0103-00	RES.,FXD,CMPSN:10K OHM,5%,0.25W
R1278	315-0470-03	RES.,FXD,CMPSN:47 OHM,5%,0.25W
R1313	315-0243-03	RES.,FXD,CMPSN:24K OHM,5%,0.25W
R1315	315-0103-00	RES.,FXD,CMPSN:10K OHM,5%,0.25W
R1317	315-0206-01	RES.,FXD,CMPSN:20M OHM,5%,0.25W
R1319	315-0103-03	RES.,FXD,CMPSN:10K OHM,5%,0.25W
R1413	315-0243-00	RES.,FXD,CMPSN:24K OHM,5%,0.25W
R1415	315-0103-03	RES.,FXD,CMPSN:10K OHM,5%,0.25W
R1417	315-0206-01	RES.,FXD,CMPSN:20M OHM,5%,0.25W
R1419	315-0824-02	RES.,FXD,CMPSN:820K OHM,5%,0.25W
VR1262	152-0428-00	SEMICOND DEVICE:ZENER,0.4W,120V,5%,1N987B

CHANGE:	DESCRIPTION

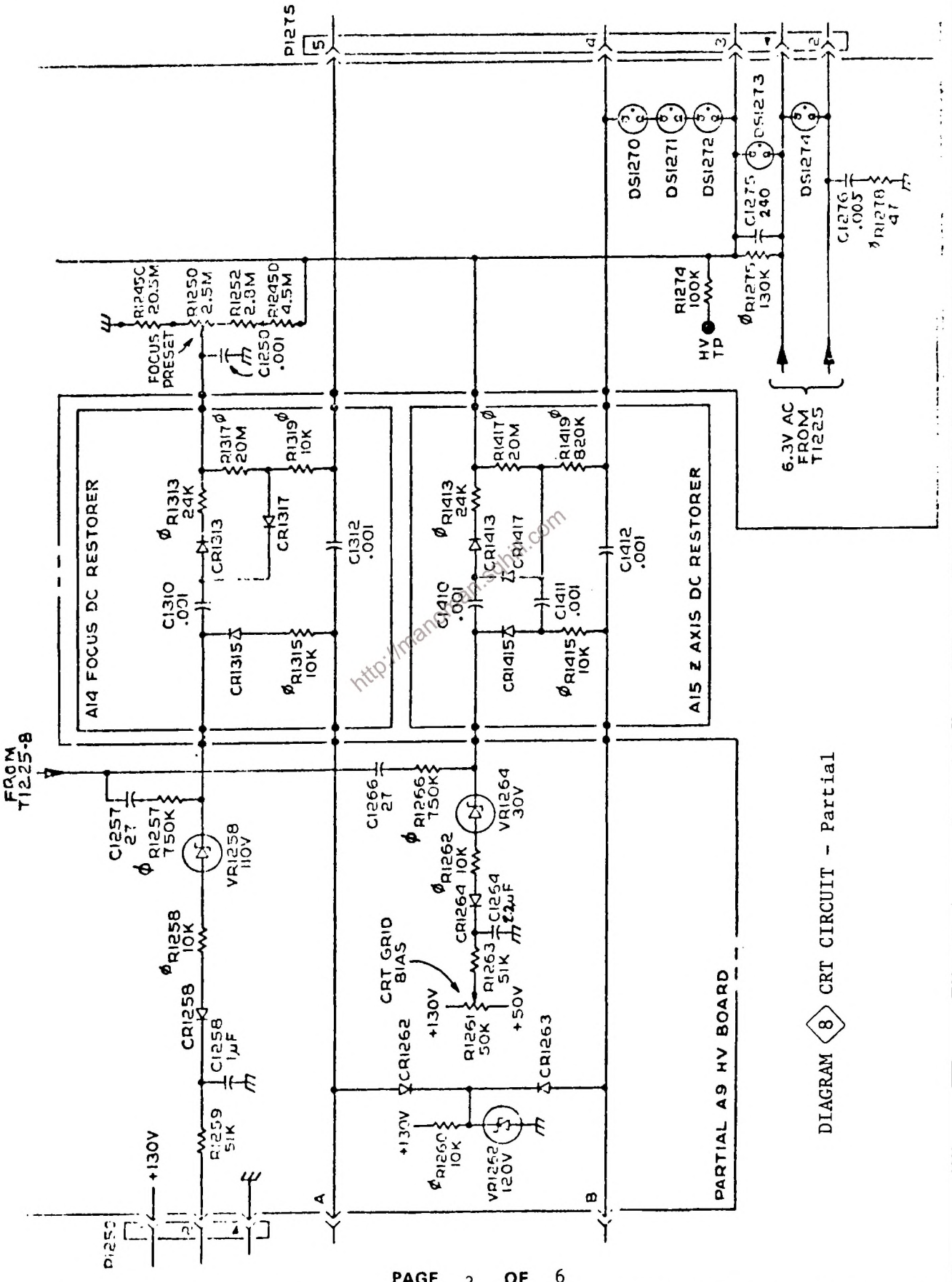


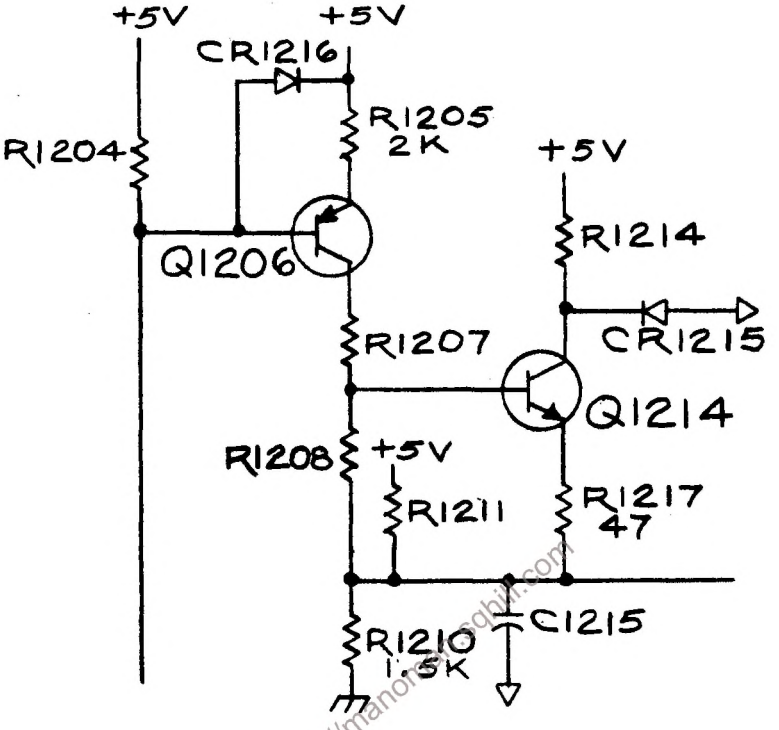
DIAGRAM 8 CRT CIRCUIT - Partial

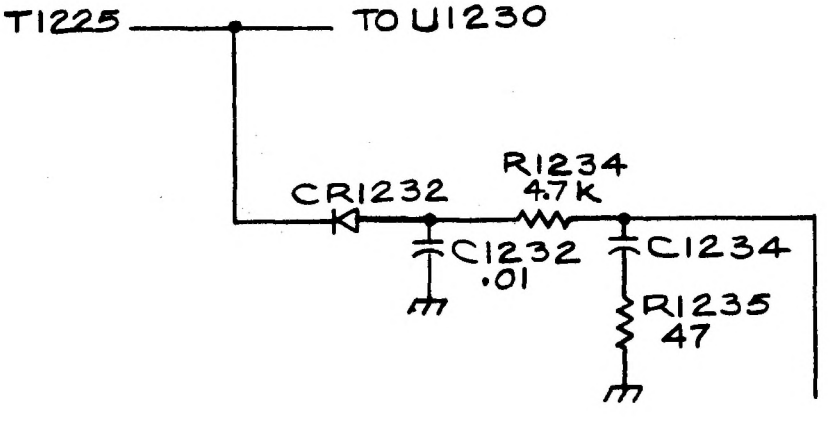
http://manuals.hpi.com

CHANGE:	DESCRIPTION

SCHEMATIC CHANGES

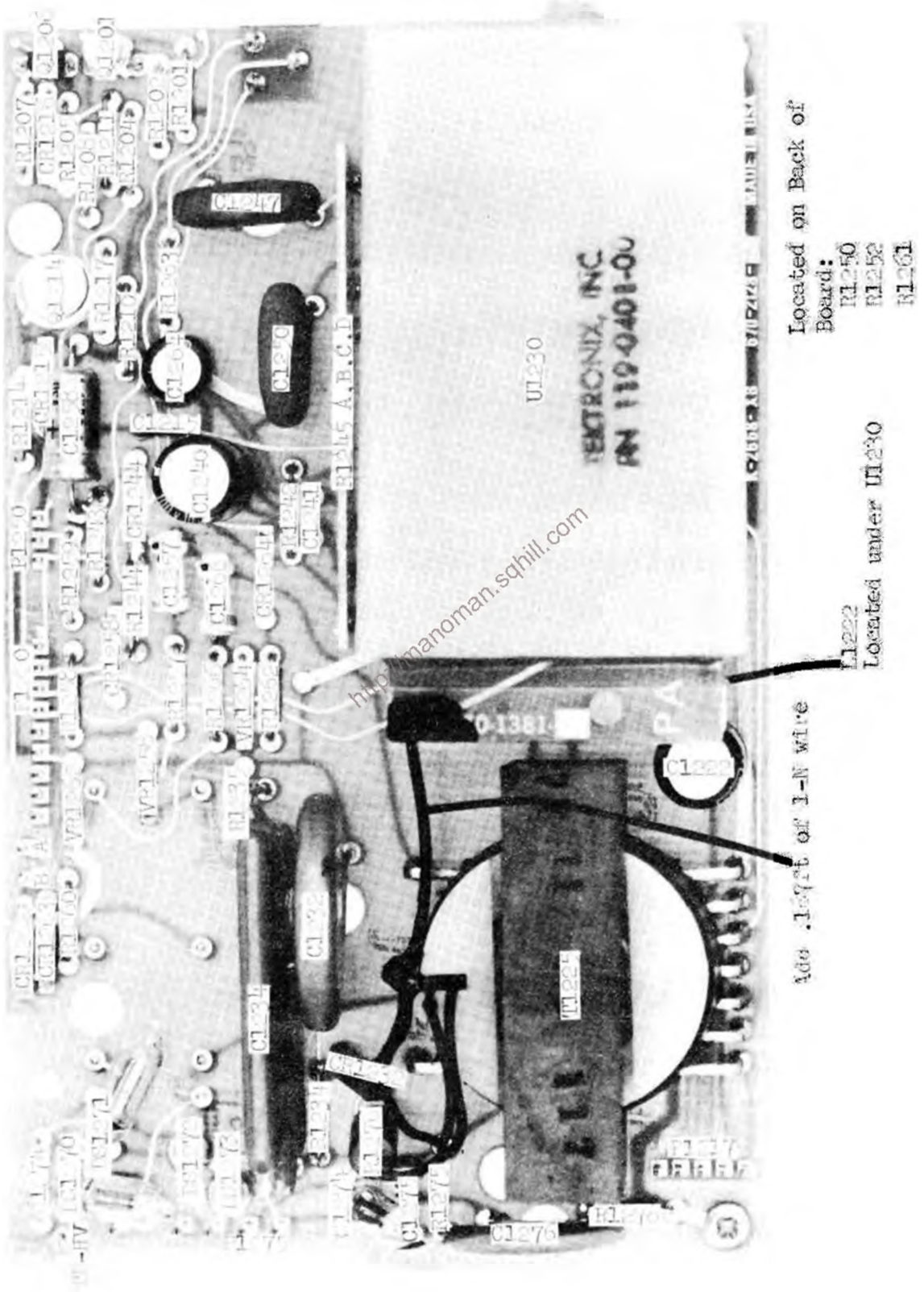
DIAGRAM 8 CRT CIRCUIT - Partial





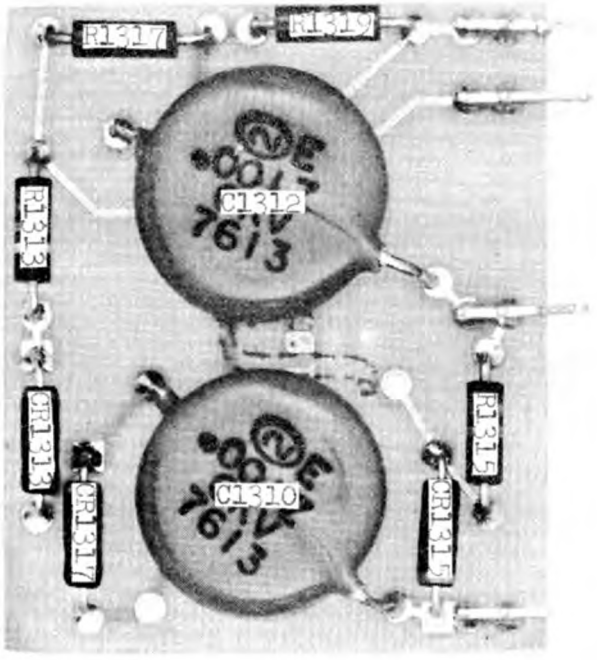
CHANGE:	DESCRIPTION

HIGH VOLTAGE CIRCUIT BOARD (670-2128-08)



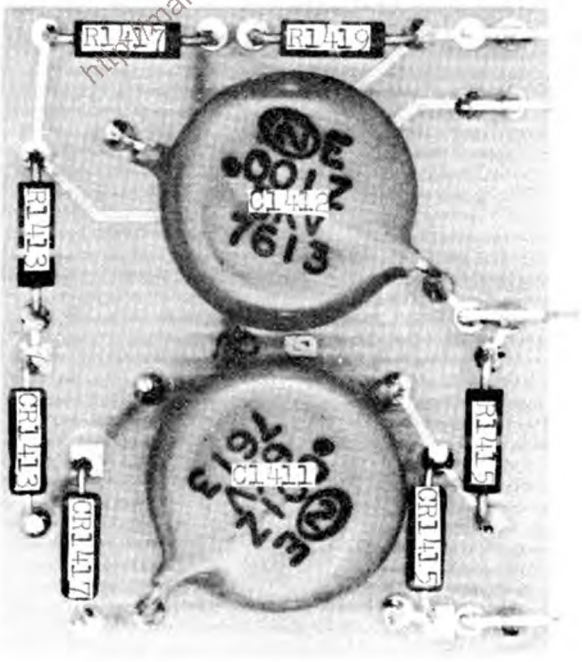
http://manoman.sqhill.com

CHANGE:	DESCRIPTION



Focus DC Restorer circuit board (670-4856-00)

http://manoman.sqhill.com



C1410 mounted on back of board.

Z Axis DC Restorer circuit board (670-4856-01)