Tektronix®

R7903
OSCILLOSCOPE

SERVICE

INSTRUCTION MANUAL

Tektronix®
COMMITTED TO EXCELLENCE

WARNING

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

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

R7903
OSCILLOSCOPE

SERVICE

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
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070-1464-00
Product Group 42

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SAFETY SUMMARY

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

TERMS

IN THIS MANUAL

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

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

AS MARKED ON EQUIPMENT

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

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

SYMBOLS

IN THIS MANUAL

Static-Sensitive Devices

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

AS MARKED ON EQUIPMENT

DANGER—High voltage.

Protective ground (earth) terminal.

ATTENTION—refer to manual.

WARNINGS

POWER SOURCE

This product is intended to operate from a power source that will not apply mare than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your product. Use only a power cord that is in good condition.

GROUNDING THE PRODUCT

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

DANGER ARISING FROM LOSS OF GROUND

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

USE THE PROPER FUSE

To avoid hazard, use only the fuse specified in the parts list for your product, and which is identical in type, voltage rating, and current rating.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

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

DO NOT SERVICE ALONE

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

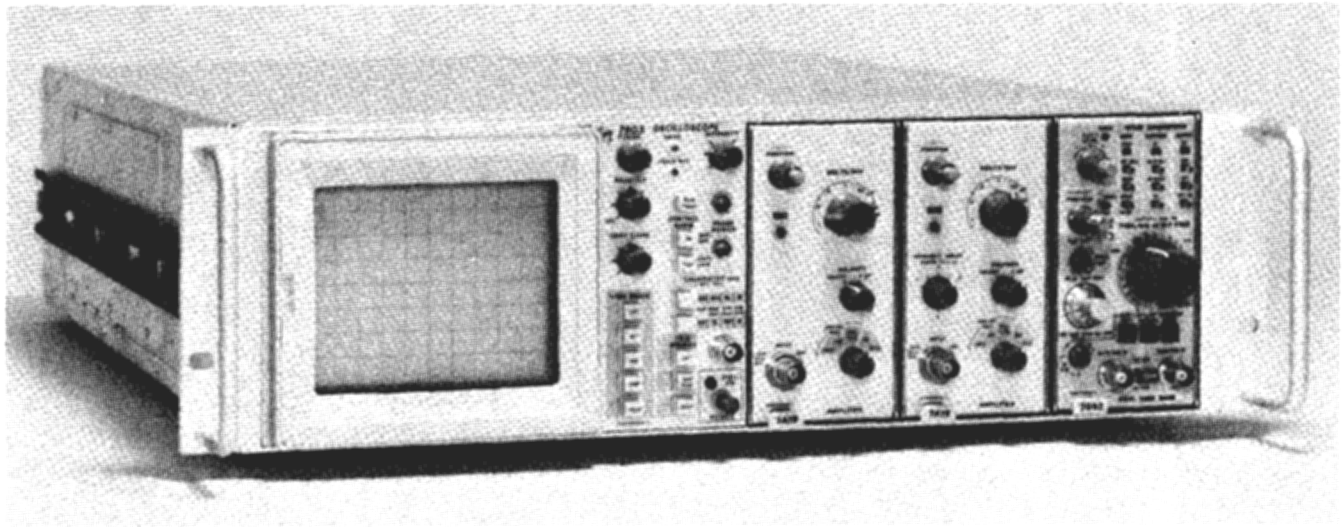
USE CARE WHEN SERVICING WITH POWER ON

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

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

SILICONE GREASE HANDLING

Handle silicone grease with care. Avoid getting the silicone grease in your eyes. Wash hands thoroughly after using silicone grease.



The TEKTRONIX R7903 Oscilloscope is a solid state, high performance instrument designed for general-purpose applications. This instrument includes a readout system which provides alphanumeric information; encoded by the plug-ins, to be displayed on the cathode-ray tube. This instrument accepts TEKTRONIX 7-series plug-in units to form a complete measurement system.

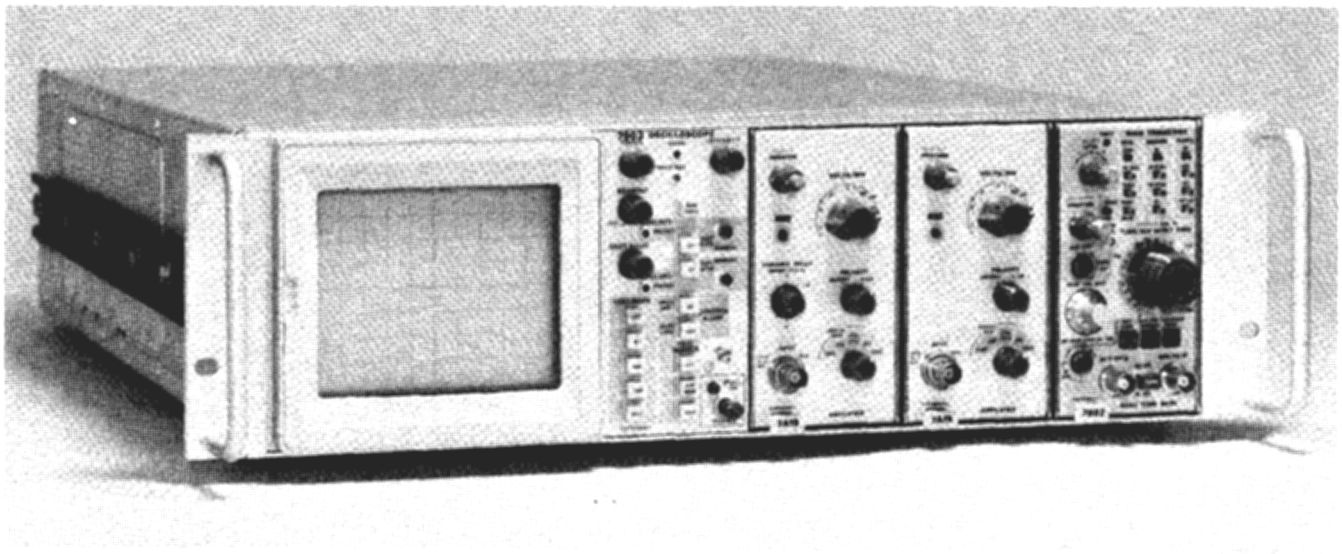
The two compartments on the left are connected to the vertical deflection system. Electronic switching between the vertical plug-in compartments allows a multi-trace vertical display. The right plug-in compartment is connected to the horizontal deflection system. The flexibility of this plug-in feature and the variety of plug-in units available allow this system to be used for many measurement applications.

The R7903 features a Cathode-ray tube with a fast writing rate and small spot size. The graticule size is 8 X 10 centimeters. An option is available for a pulsed readout display and pulsed graticule lights. This provides maximum use of the photographic speed of the film in the single shot mode. On the rear panel are four signal out connectors (SIG OUT, SAWTOOTH, GATE (MAIN & AUX) and SINGLE SWEEP READY INDICATOR), and four input connector (Z-AXIS INPUT, READOUT SS, SINGLE SWEEP RESET and READOUT INHIBIT).

WARNING

During rackmount installation, interchanging the left and right slide-out track assemblies defeats the extension stop (safety latch) feature of the tracks. Equipment could, when extended, come out of the slides and fall from the rack, possibly causing personal injury and equipment damage.

When mounting the supplied slide-out tracks, inspect both assemblies to find the LH (left hand) and RH (right hand) designations to determine correct placement. Install the LH assembly to your left side as you face the front of the rack and install the RH assembly to your right side.



OPERATING INFORMATION

The R7903 can be operated from either a 115 Volt or 230 Volt nominal line voltage source. The Line Selector assembly on the rear panel converts this instrument from one operating voltage to the other. This assembly also includes the Line Fuse, and the Inverter Fuse. See Fig. 1-1 for Line Selector details. The instrument is designed to be used with a three-wire system (neutral wire is a separate safety-earth conductor). If a three to two-wire adapter is used to connect this instrument to an AC source, 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, posing a shock hazard.

INSTALLATION OF PLUG-IN UNITS

CAUTION

Plug-in units should not be installed or removed without first turning the instrument power off, to prevent instrument damage.

The R7903 is designed to accept up to three Tektronix 7-Series plug-in units. 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 unit 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 the plug-in unit, pull the release latch on the plug-in unit to disengage it and pull the unit out of the plug-in compartment.

OPERATING SET-UP INFORMATION

1. Set the front panel controls as follows:

INTENSITY	Midrange
READOUT	Midrange
FOCUS	Midrange
BEAM FINDER	Out
GRAT ILLUM	As desired
VERT MODE	LEFT
TRIG SOURCE	VERT MODE
POWER	ON
CONTROL ILLUM	As desired
CALIBRATOR	Both buttons in (0.4 V)

2. Connect the R7903 to a power source which meets the voltage and frequency requirements of the instrument.

3. Install a Tektronix 7A-Series vertical amplifier plug-in unit in the left vertical compartment. Install a 7B-Series time-base plug-in unit in the horizontal compartment.

4. Set the vertical amplifier plug-in unit for a deflection factor of 0.1 Volt/division and center the vertical position controls. A trace should be present on the CRT screen.

5. Set the time-base plug-in unit for a sweep rate of one millisecond/division in the Auto, Internal Trigger mode.

6. Connect the 0.4 V calibrator signal to the input of the left vertical amplifier plug-in unit with the BNC patch cord cable (supplied accessory). To use the right vertical channel, push the RIGHT VERT MODE button. Install the vertical amplifier plug-in unit in the right vertical compartment.

An external calibrator signal is required for the R7903 with Option 10.

CONTROLS AND CONNECTORS

The major controls for operation of the R7903 are located on the front panel. Figs. 1-2, 1-3, and 1-4 provide a brief description of each control and connector. More detailed operating information is given under General Operating Information.

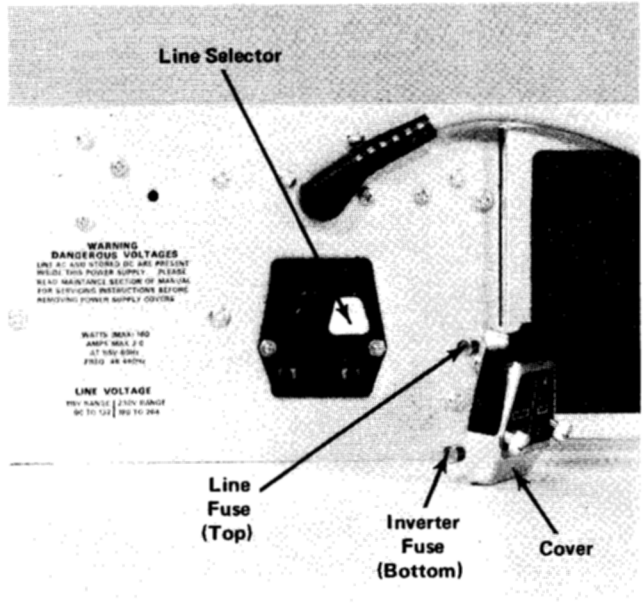
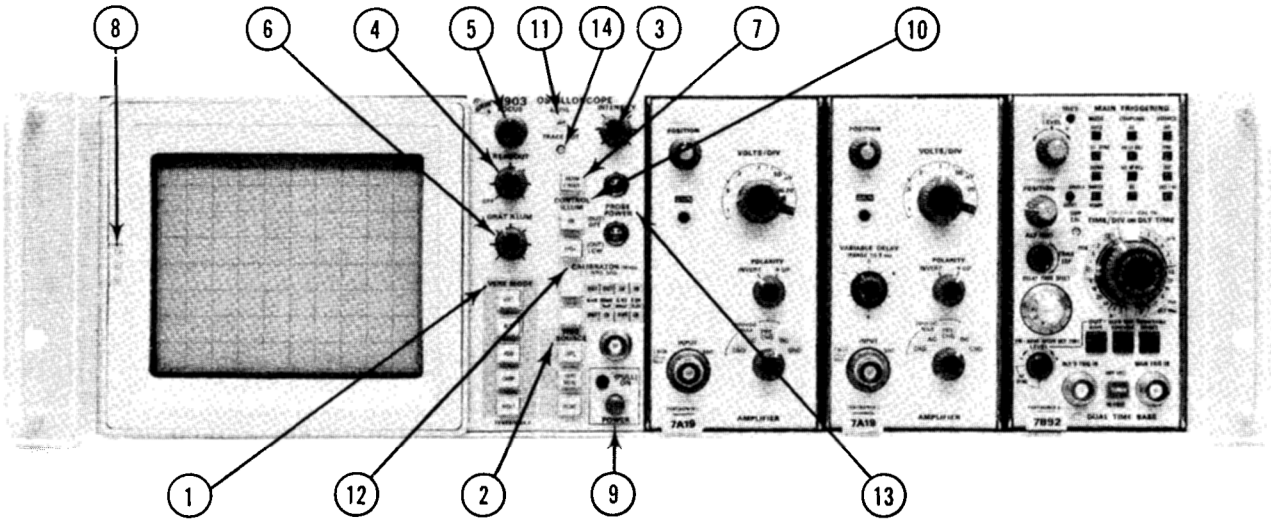


Fig. 1-1. Line selector assembly on rear panel (shown with cover removed).

R7903 FUNCTIONS OF CONTROLS AND CONNECTORS



1. VERT MODE—Selects vertical mode of operations.

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

   ALT: Signals from both vertical plug-in compartments are displayed (dual trace). Display is switched from one vertical to the other after each sweep.

   ADD: Signals from both vertical plug-in compartments are algebraically added, and the sum is displayed.

   CHOP: Signals from both vertical compartments are displayed (dual trace). Display switches from the left vertical compartment signal to the right vertical compartment signal at a one megahertz rate.

   RIGHT: Signals from the right plug-in compartment are displayed.

2. TRIG SOURCE—Selects the source of the internal trigger signals for the horizontal compartment.

   LEFT: Trigger signals are from the left vertical plug-in compartment only.

   VERT MODE: Trigger signals are from the vertical plug-in compartment being displayed except in the CHOP mode; then the trigger is automatically switched to the left plug-in compartment.

   RIGHT: Trigger signals are from the right vertical plug-in compartment only.

3. INTENSITY—Controls the brightness of the display.

4. READOUT—Turns on the Readout display, and controls the brightness of the Readout display.

5. FOCUS—Provides adjustment for optimum display definition.

6. GRATICULE ILLUM—Controls graticule illumination.

7. BEAM FINDER—When pressed in the display is limited to within the graticule area. Display is returned to normal when Beam Finder button is out (pressed and released).

8. Camera Power—Three pin connector on the CRT bezel, (top) +15 volt power source, (middle) receives remote signal sweep reset signal from compatible camera system, and (bottom) ground pin.

9. POWER—Switch and indicator; switch turns on instrument, and the indicator is on when the instrument is connected to a power source and turned on.

10. CONTROL-ILLUM—Controls illumination level of the push-button switches of the associated plug-in units. (Top button on-off, button high or low.)

11. ASTIG—Screwdriver adjustment used in conjunction with the FOCUS control to obtain a well-defined display.

12. CALIBRATOR—Positive-going square-wave. Output selected by pushbuttons.

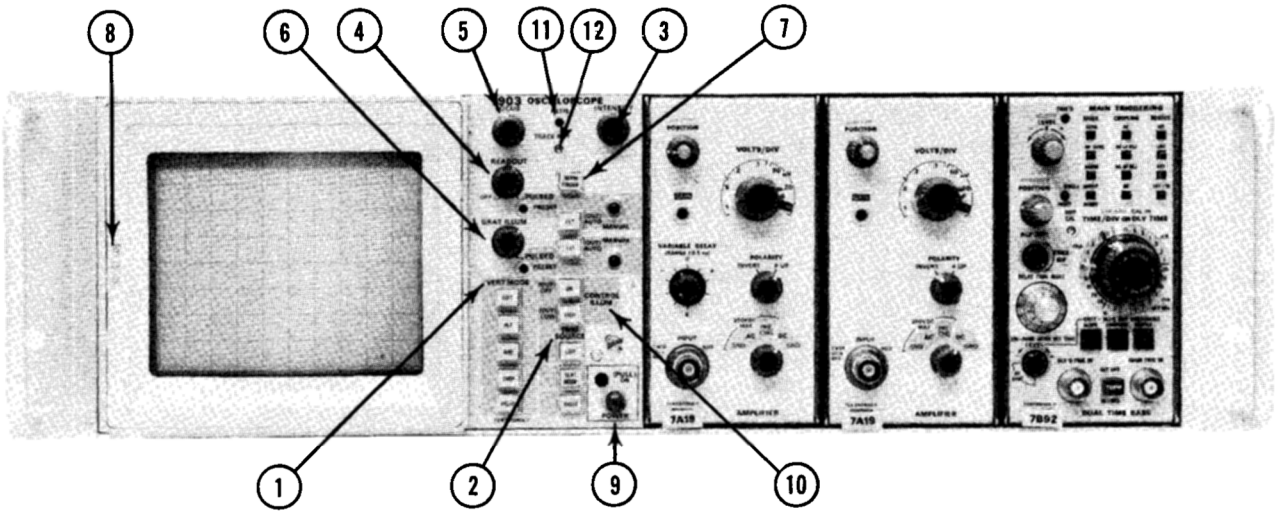
Top button	In	In	Out	Out
Bottom button	Out	In	Out	In
Output	4 mV	40 mV	0.4 V	4.0 V

13. PROBE POWER—Two power source plugs for active probe system.

14. TRACE ROT—Adjusts alignment of the trace with the horizontal graticule line.

Fig. 1-2

OPTION 10 R7903 FUNCTIONS OF CONTROLS AND CONNECTORS



1. VERT MODE—Selects vertical mode of operation.

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

   ALT: Signals from both vertical plug-in compartments are displayed (dual trace). Display is switched from one vertical to the other after each sweep.

   ADD: Signals from both vertical plug-in compartments are algebraically added; and the sum is displayed.

   CHOP: Signals from both vertical compartments are displayed (dual trace). Display switches from the left vertical compartment signal to the right vertical compartment signal at a one megahertz rate.

   RIGHT: Signals from the right plug-in compartment are displayed.

2. TRIG SOURCE—Selects the source of the internal trigger signals for the horizontal compartment.

   LEFT: Trigger signals are from the left vertical plug-in compartment only.

   VERT MODE: Trigger signals are from the vertical plug-in compartment being displayed except in the CHOP mode; then the trigger is automatically switched to the left plug-in compartment.

   RIGHT: Trigger signals are from the right vertical plug-in compartment only.

3. INTENSITY—Controls the brightness of the display.

4. READOUT—Turns on readout character generator and controls the intensity of the readout display. In the clockwise detent the readout system is in the pulsed mode.

   Pulsed Modes

   a. MANUAL—When pressed, one readout frame will be displayed on the CRT screen.

   b. EXT/AUTO

      AUTO—Displays one frame of characters at the end of each sweep.

      EXT—A remote input to the GRAT/READOUT BNC connector on the rear panel will display one frame of characters.

   c. PRESET—(Screwdriver adjustment) controls the readout intensity in the pulsed mode.

5. FOCUS—Provides adjustment for optimum display definition.

6. GRAT ILLUM—Controls graticule illumination. In the clockwise detent the graticule is in the pulsed mode.

   a. MANUAL—When pressed the graticule will be illuminated for a predetermined period of time.

   b. EXT/AUTO

      AUTO—Graticule will be illuminated for a predetermined period of time at the end of each sweep.

      EXT—A remote input to GRAT/READOUT BNC connector on the rear panel will illuminate the graticule for a predetermined period of time.

   c. PRESET—(Screwdriver adjustment) controls the illumination of the graticule in the pulsed mode.

7. BEAM FINDER—When pressed the display is limited to within the graticule area. Display is returned to normal when BEAM FINDER button is out (pressed and released).

8. Camera Power—Three pin connector on the CRT bezel (top) +15 volt power source, (middle) receives remote single sweep reset signal from compatible camera system, and (bottom) ground pin.

9. POWER—Switch and indicator; switch turns on instrument, and the indicator is on when the instrument is connected to a power source and turned on.

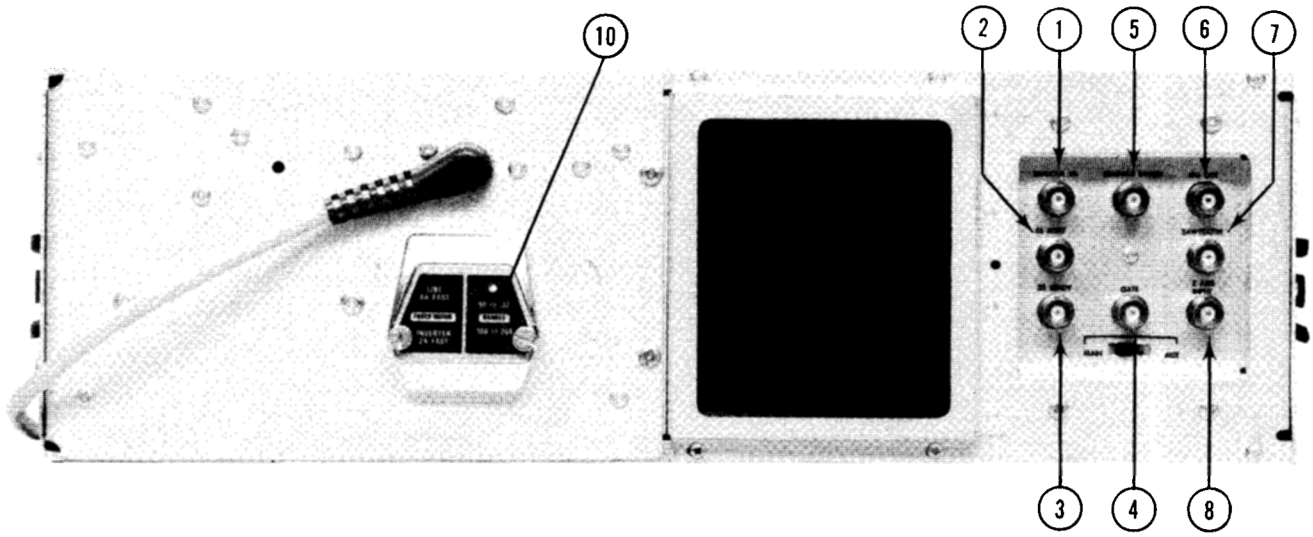
10. CONTROL-ILLUM—Controls illumination level of the push-button switches of the associated plug-in units. (Top button on-off, button high or low.)

11. ASTIG—Screwdriver adjustment used in conjunction with the FOCUS control to obtain a well-defined display.

12. TRACE ROT—Adjusts alignment of the trace with the horizontal graticule line.

Fig. 1-3

REAR PANEL R7903 CONTROLS AND CONNECTORS



1. READOUT SS

   Remote input provides one readout frame.

2. SS RESET

   Remote input to reset single sweep function of the time-base unit.

3. SS READY

   Provides an external single sweep ready indicator signal after single sweep function has been reset.

4. +GATE

   Positive-going gate signal coincident with the respective sweep. Switching allows selection of one of 2 possible gate signals (Main Gate, Aux Gate) from the time-base plug-in unit.

5. READOUT INHIBIT

   Inhibits readout display.

6. SIG OUT

   Provides output signal from the vertical plug-ins. Source of the output signal at the SIG OUT connector is selected by the TRIG SOURCE switch. (Left vert is output when vert mode is in chop and the TRIG SOURCE switch is in VERT MODE.)

7. +SAWTOOTH

   Positive-going sample of the sawtooth signal from the time-base unit in the horizontal compartment.

8. Z-AXIS INPUT

   Input connector for intensity modulation of the CRT display.

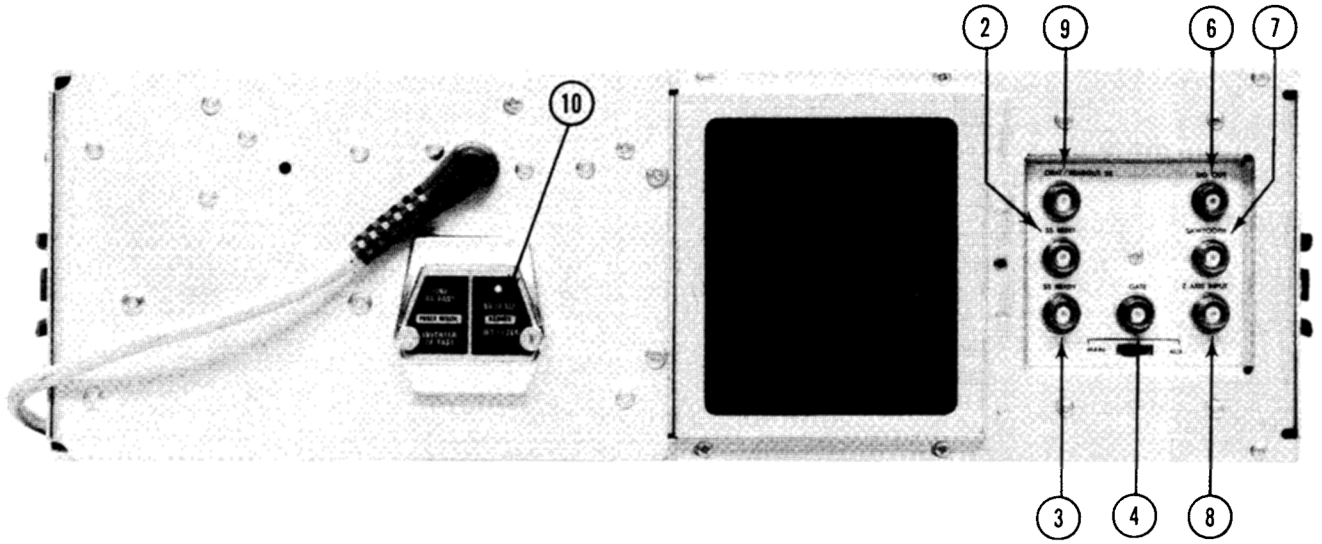
9. GRAT/READOUT SS (OPTION 10)

   Remote input provides one readout frame and turns on graticule lights for predetermined time. (If appropriate Auto/Ext in Ext.)

10. Line Selector on all instruments (not labeled)

    Line Selector on all instruments (not labeled)

    Switching assembly to select the nominal operating voltage (115 or 230 volts). The assembly also includes the line and inverter fuses.



OPTION 10 REAR PANEL CONTROLS AND CONNECTORS

Fig. 1-4

DISPLAY MODES

Left or Right

A display of a single plot produced by one vertical signal. Selected by VERT MODE switch for (LEFT or RIGHT) and one sweep.

Alternate Mode

A time-sharing method of displaying two or more signals. The vertical signals are alternately displayed, switching occurs at the end of each sweep. Selected by VERT MODE switch (ALT).

Chopped Mode

A time-sharing method of displaying two or more signals. The vertical signals are displayed sequentially, switching from one vertical signal to the other occurs at a rate determined by an internal clock generator.

Add Mode

The vertical signals from both vertical plug-in units are algebraically added.

Intensified Sweep

The delaying sweep (main) is intensified for a period of time determined by the delayed sweep setting. The intensified portion may be set to any point on the delaying sweep by the Delay Time Multiplier.

Delayed Sweep

The intensified segment of the delaying sweep is displayed over the full 10 divisions of the graticule (Dual Time base only).

Mixed Sweep

This is a combination of a slow and a fast sweep combined. The main sweep is displayed at a slower sweep; at a selectable point on the main sweep, a faster sweep rate is displayed.

Alternate Sweep

The sweep will alternate between main sweep and delayed sweep. The repetition rate is determined by the duration of the delaying sweep.

CALIBRATION

Calibration Interval

To ensure instrument accuracy, check the calibration of the R7903 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 of the manual.

Tektronix Field Services

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

The following features are provided to aid in Calibrating the R7903:

Index. An index is given preceding the Calibration procedure to aid in locating steps.

Performance Check. The performance of this instrument can be checked by performing only the √ CHECK steps. The √ preceding a step indicates that performing this step checks the instrument against the tolerances listed as a Performance Requirement (see Specification section in Operators manual). Limits and tolerances given in other check steps are calibration guides and should not be interpreted as instrument specifications. Operator front-panel adjustments are adjusted as part of the Performance Check procedure.

Partial Calibration. A partial calibration is often desirable after replacing components, or, between major recalibrations, to touch up the adjustment of a portion of the instrument. 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 complete Calibration procedure ensures that this instrument is correctly adjusted and performing within all given tolerances.

NOTE

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

TEST EQUIPMENT REQUIRED

The following test equipment and accessories, or its equivalent, is required for complete calibration of the R7903. 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 specifications. 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. The calibration of the plug-in units should first be checked according to the procedure given in their respective service manuals before performing the R7903 calibration.

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, or its equivalent, is required to completely check and adjust this instrument. The 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 list is not available, first check the Specifica-

tions column carefully to see if any other equipment is available that 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 that 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 R7903 to the Performance Requirements given in the Operators Manual and to allow interchangeability of 7000-series plug-in units between 7000-series mainframes without the need to completely recalibrate the instruments each time. If the applications for which you will use the R7903 do not require the full available performance from the R7903 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 just checking vertical deflection accuracy and basic horizontal timing with 7000-series real-time plug-in units and the R7903 Calibrator signal. Also, if the R7903 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 amplifier plug-in units and applicable test signals for the 067-0587-01 Signal 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 0.2%.	Calibrator output voltage adjustment. Low-voltage power supply adjustment and check.	a. Tektronix DM 501 Digital Multimeter[1] (either test oscilloscope or R7903 under calibration must have Readout System). b. Fluke Model 825A Differential DC Voltmeter.
2. DC voltmeter (VOM) With Test Leads	Range, zero to 150 volts; accuracy, within 3%.	Auto-focus adjustment.	a. Valhalla Model 4500 H.V. Digital Multimeter Tektronix part number 003-0120-00
3. Time-mark generator	Marker outputs, two nanoseconds to 0.5 second; marker accuracy, within 0.1% trigger output, one millisecond.	CRT geometry adjustment. Horizontal timing adjustment. Horizontal amplifier adjustment. Calibrator 1 kHz repetition rate adjustment. CRT edge-focus adjustment.	a. Tektronix TG 501 Time-Mark Generator.[1] b. Tektronix 2901 Time-Mark Generator.
4. Medium-frequency constant amplitude signal generator	Frequency, 500 kilohertz to two megahertz; reference frequency, 50 kilohertz; output amplitude, variable from 50 millivolts to two volts peak to peak into 50 ohms; amplitude accuracy, constant within 3% of reference frequency as output frequency changes.	Horizontal bandwidth check.	a. Tektronix SG 503 Sine-Wave Generator.[1] b. Tektronix Type 191 Constant Amplitude Signal Generator.
5. High-frequency constant-amplitude signal generator	Frequency, 220 megahertz to 500 megahertz; reference frequency, 10 megahertz or lower; output amplitude, variable from 0.5 to 4 volts; amplitude accuracy, constant within 1% of reference as output frequency changes.	Vertical bandwidth check. Vertical channel isolation check.	a. Tektronix SG 504 Leveled Sine-Wave Generator.[1] b. Wavetek 1002 Sweep/Signal Generator. c. General Radio 1362 UHF Oscillator with 1263-C Amplitude-Regulating Power Supply. d. Wiltron Model 610B Swept Frequency Generator with Model 61083, 10 to 1220 megahertz plug-in.

[1] Requires a TM 500-Series Power Module.

TEST EQUIPMENT (cont)

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
6. Test-oscilloscope system (dual-trace)	Bandwidth, DC to 75 megahertz; minimum deflection factor; 10 millivolts/division; accuracy, within 3%.	Z-Axis DC Level adjustments. Z-Axis transient response adjustment. Horizontal DC limit centering adjustment. Trigger selector adjustment.	a. Tektronix 7704A Oscilloscope with two 7A15A Amplifier units, 7B50 or 7B70 Time Base, and two P6053 Probes. b. Tektronix 454A Oscilloscope with two P6054 Probes.
7. Amplifier plug-in unit	Tektronix 7A-series. 80 megahertz bandwidth required for complete procedure as written.	Used throughout procedure to provide vertical input to R7903 under calibration.	a. Tektronix 7A15A or 7A16A 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 are used).
8. Wide-band amplifier plug-in unit	Tektronix 7A-Series. 500 megahertz bandwidth required for complete procedure as written.	Vertical amplifier bandwidth and isolation checks. Horizontal timing adjustment.	a. Tektronix 7A19 Amplifier.
9. Time-base plug-in unit	Tektronix 7B-series. 0.5 nanosecond sweep rate required for complete procedure.	Used throughout procedure to provide sweep. 0.5 nanosecond sweep required only for high-frequency horizontal timing (one unit only).	a. Tektronix 7B92A Time Base. May be shared with 7000-series test oscilloscope. b. Any 7B-series plug-in unit (high-frequency timing cannot be adjusted if 0.5 nanosecond sweep is not available).
10. Signal standardizer calibration fixture	Produces gain-check and pulse-response waveforms.	Used through procedure to standardize instrument so plug-in units can be interchanged without complete recalibration.	a. Tektronix 067-0587-01 Calibration Fixture. b. Calibrated 7000-series plug-in units with suitable signal sources may be substituted if lower preformance is acceptable.
11. Plug-in extender	Provides connection to internal trigger system outputs.	Trigger selector adjustments.	a. Tektronix 067-0589-00 Calibration Fixture.
12. Pulse generator	Risetime, 70 picoseconds or less; pulse width, at least 350 nanoseconds; aberrations, less than ±3%, 3% total peak-to-peak within first 2 nanoseconds after step; amplitude, at least 200 millivolts into 50-ohm load.	Vertical high-frequency compensation.	a. Tektronix Type 284 Pulse Generator. b. Tektronix S-52 Pulse Generator Head used with 7S12 TDR/Sampler or Type 285 Power Supply.
13. 2X Attenuator	Impedance, 50 ohms; attenuation, 2X; connectors, GR874.	Vertical high-freqency compensation.	a. Tektronix Part No. 017-0080-00.
14. 5X Attenuator	Impedance, 50 ohms; attenuation, 5X; connectors, GR874.	Vertical amplifier bandwidth bandwidth check. Vertical channel isolation check.	a. Tektronix Part No. 017-0079-00.
15. T Connector	Connectors, BNC.	External Z-Axis check.	a. Tektronix Part No. 103-0030-00.
16. Termination (two required)	Impedance, 50 ohms; accuracy, ±2%; connectors, BNC.	Calibrator 1 kHz repetition rate adjustment. Trigger selector adjustments. Also used for SIG OUT +GATE SAWTOOTH OUT CALIBRATOR.	a. Tektronix Part No. 011-0049-01.

TEST EQUIPMENT (cont)

Description	Minimum Specifications	Usage	Examples of Applicable Test Equipment
17. Cable (two required)	Impedance, 50 ohms; type RG-58/U; length 42-inches; connectors, BNC.	Used throughout procedure for signal interconnection. Two required for trigger selector adjustments.	a. Tektronix Part No. 012-0057-01.
18. Cable	Impedance, 50 ohms; type, RG-58/U; length 18-inches; connectors, BNC.	Used throughout procedure for signal interconnection.	a. Tektronix Part No. 012-0076-00.
19. GR in-line termination	Impedance, 50 ohms; accuracy, ±2%; connectors, GR874 input with BNC male output.	External Z-Axis check. Horizontal bandwidth check.	a. Tektronix Part No. 017-0083-00.
20. Cable	Impedance, 50 ohms; type, RG-213/U; electrical length, five nanoseconds; connectors, GR874.	External Z-Axis check. Horizontal bandwidth check. Vertical high-frequency compensation.	a. Tektronix Part No. 017-0502-00.
21. Adapter	Connectors, GR874 and BNC male.	Vertical bandwidth check. Vertical amplifier isolation check.	a. Tektronix Part No. 017-0064-00.
22. BNC post jack	Adapts BNC connector to clip post.	Calibrator output voltage adjustment Calibrator 4.0 V risetime check.	a. Tektronix Part No. 012-0092-00 (one supplied as standard accessory).
23. BNC to alligator clip adapter	Connectors, BNC female and two alligator clips.	Readout System adjustment.	a. Tektronix Part No. 013-0076-00.
24. 10X passive probe	Compatible with 7A-series used in test oscilloscope. Combined risetime of vertical unit and probe must be less than two microseconds.	Calibrator 4.0 V risetime check.	a. Tektronix P6053 Probe.
25. Screwdriver	Three-inch shaft, 3/32-inch bit.	Used throughout to adjust variable resistors.	a. Xcelite R-3323.
26. Low-capacitance screwdriver	1-1/2-inch shaft.	Used throughout procedure to adjust variable capacitors.	a. Tektronix Part No. 003-0000-00.
27. Nylon tuning tool	Fits 5/64-inch (ID) hex cores.	Vertical high-frequency compensation.	a. Handle and insert, Tektronix Part No. 003-0307-00 and 003-0310-00.
28. Time-base unit	TEKTRONIX dual time-base with Aux Z-axis output.	Used to check Aux Z-axis circuitry.	TEKTRONIX 7B53A or 7B92A Time-Base.

INDEX TO CALIBRATION PROCEDURE

CALIBRATION PROCEDURE

R7903, Serial No. _____

Calibration Date _____

Elapsed-Time Reading _____

Calibrated by _____

Introduction

The completion of the following procedure returns the R7903 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 as a Performance Requirement in the Operator's Manual.

NOTE

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

1. Remove the covers from the R7903.

2. Connect the R7903 to a power source that meets the voltage and frequency requirements of this instrument. The applied voltage should be near the center of the voltage range selected by the Line Selector assembly (see Operators manual 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 the 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., Vertical Amplifier Gain).

Preliminary Control Settings

Set the R7903 as follows:

Display Controls

INTENSITY	Midrange (As desired)
FOCUS	Adjusted for well-defined display
BEAM FINDER	Out
READOUT	Off (Counterclockwise)
CONTROL ILLUM	As desired
GRAT ILLUM	As desired
POWER	On

Mode Selectors

VERT MODE	LEFT
TRIG SOURCE	VERT MODE
CALIBRATOR	4 V (0.4 into 50 ohms)
OPTION 10	
READOUT (CW detent)	Midrange (As desired)
GRAT ILLUM (CW detent)	Midrange (As desired)

NOTE

There is no Calibrator Signal provided for Option 10 instruments. An external Calibrator signal is required.

POWER SUPPLY CALIBRATION

Equipment Required

1. Precision DC Voltmeter
2. Three-inch screwdriver

Control Settings

Set the controls as given in the Preliminary Control Settings. Leave all plug-in compartments vacant.

1. Check/Adjust Inverter Control

a. Connect the precision DC voltmeter between TP1625 (Cap-Rectifier board; see Fig. 2-1) and chassis ground.

b. CHECK—Meter reading; +55 volts ±25 volts. If the meter reading is in the given tolerance, proceed to step 2.

c. ADJUST—Inverter control R1293 (Cap-Rectifier board; see Fig. 2-1) for a meter reading of +55 volts ±25 volts. Any change in this adjustment may affect operation of all circuits within the instrument.

2. Adjust –50 Volt Power Supply

a. Connect the precision DC voltmeter between TP –50 V and TP GND SENS on the Z-Axis circuit board (see Fig. 2-2).

b. CHECK—Meter reading; –50 volts ±0.2 volt.

c. ADJUST—–50 volts adjustment R1513 for a meter reading of –50 volts within 0.2 volt.

d. INTERACTION—Check steps 1 and 2. Any change in R1513 (–50 volts adjustment) may change the voltage at TP1625 (Inverter control test point). A change in this adjustment may also affect operation of all circuits within the R7903.

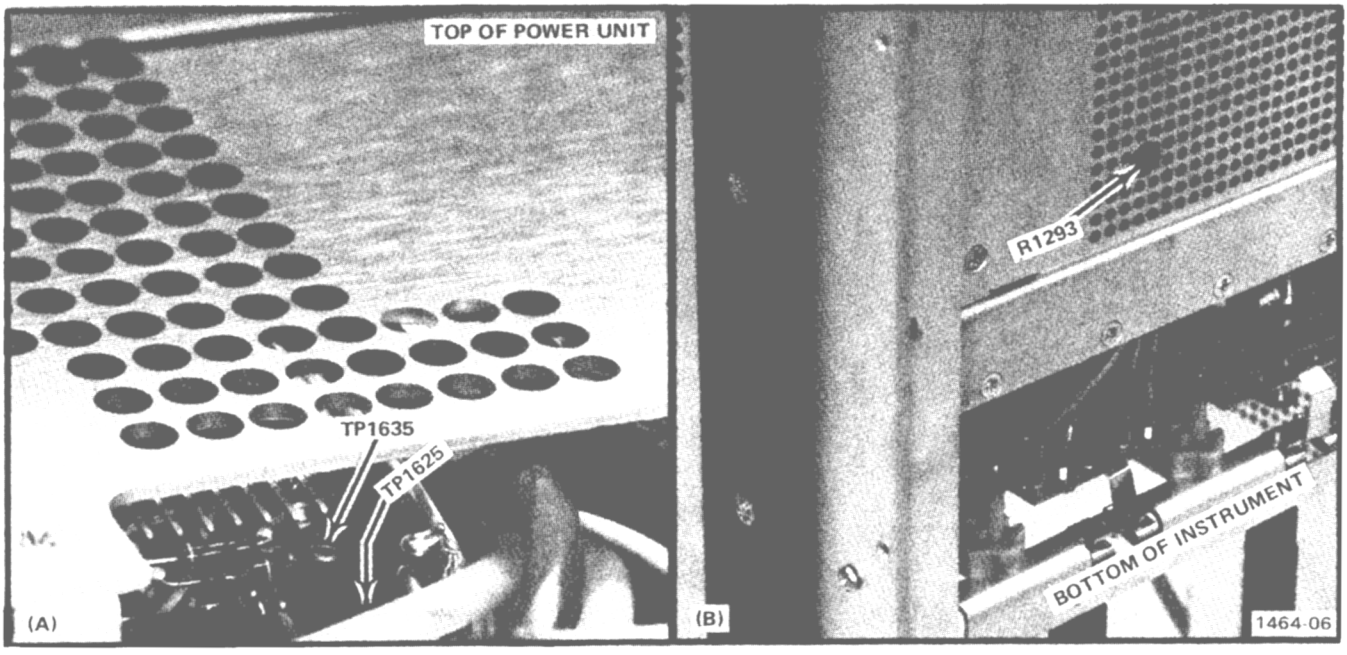


Fig. 2-1. (A) Location of Test Point 1625, (B) Location of R1293 Inverter control adjustments.

3. Check Remaining Power Supply Voltages

Check—Table 2-1 lists the low voltage supplies and their tolerances. Check each supply with the precision DC voltmeter for voltage output within the given tolerance. Connect meter ground lead to GND (Pin 1) P1896. The low-voltage supplies may also be checked at locations as shown in Fig. 2-2.

4. Check Protection Circuit (For Instruments SN B180000-up)

a. Connect the precision DC voltmeter between the emitter of Q785 (vertical amplifier) and chassis ground.

b. CHECK—Meter reading for approximately +49 volts.

c. With the voltmeter probe lead still attached to the emitter of Q785, momentarily short across TP 786 (vertical amplifier) while reading the voltage. The meter reading should be approximately +31 volts. (If meter reading is correct, the protection circuit will operate properly.)

d. Disconnect the precision DC voltmeter.

5. Aux. Z-Axis Check

a. Install a dual time-base unit into the horizontal compartment.

b. Set the time-base as follows:

Time/Div	1 ms
Dly'd Time/Div	.1 ms
Delay Time Mult	5.0
Dly'd Trig Level	Runs After Delay Time

c. CHECK—for approximately 1 division of intensified trace in the middle of the screen.

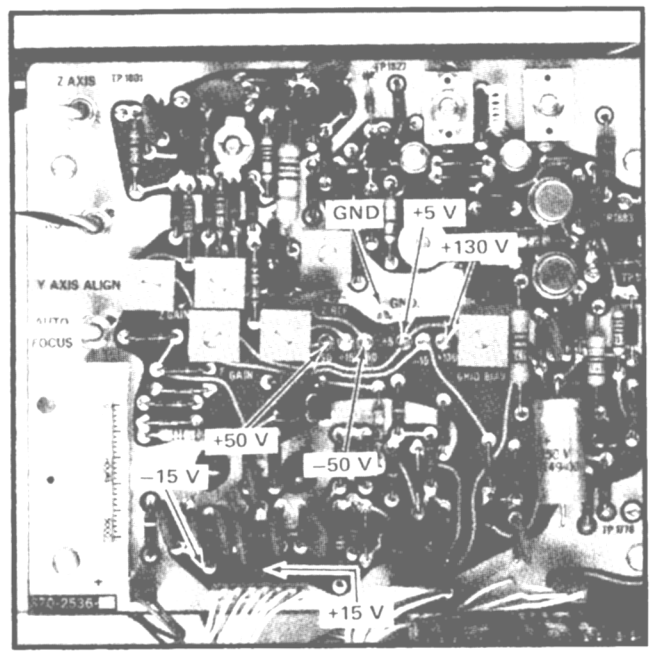


Fig. 2-2. Location of the Low Voltage Test Points

TABLE 2-1

SUPPLIES AND TOLERANCE

P1896 Test Point	Supply	Tolerance
Pin 7	−50 Volts	±0.20 Volt
Pin 6	−15 Volts	±0.15 Volt
Pin 5	+5 Volts	±0.10 Volt
Pin 4	+15 Volts	±0.15 Volt
Pin 3	+50 Volts	±0.50 Volt
Pin 2	+130 Volts	±5.2 Volts
	Control Illum (+5 lights)	+0.2 to −0.5 Volts

NOTE

+15 V and −15 V supplies must be measured at either P1896 or the pin side of their indicated decoupling resistors. Otherwise, if measured at the test points located at the center of the board, these supplies will measure low.

Z-AXIS AND DISPLAY CALIBRATION

Equipment Required

1. Signal standardizer calibration fixture
2. 7B92 time-base plug-in unit
3. DC voltmeter (VOM)
4. Test oscilloscope system with 10X probe
5. 7A19 vertical amplifier plug-in unit
6. Time mark generator
7. Medium-frequency constant-amplitude signal generator
8. 18-inch 50-ohm BNC cable
9. 42-inch 50-ohm BNC cable
10. Five nanosecond GR cable
11. BNC T-connector
12. GR to BNC male adapter
13. Three-inch screwdriver
14. Low-capacitance screwdriver

Control Settings

Set the controls as given in the Preliminary Control Settings. See Fig. 2-3 for adjustment and Test Point locations.

4. Adjust Z-Axis DC Levels

a. Install the vertical amplifier plug-in unit in the vertical compartment and install the time-base plug-in unit in the horizontal compartment.

b. Set the time-base plug-in unit for a free running sweep at 50 μs/div.

c. Set the INTENSITY control fully counterclockwise. Turn READOUT control off.

d. Connect the 10X probe to the input of the test oscilloscope. Check the probe compensation. Set the test oscilloscope for a vertical deflection factor of 0.2 volt/division (two volts/division at probe tip) and a sweep rate of one millisecond/division.

e. Establish a ground reference for the test oscilloscope by either grounding the probe tip or setting the vertical amplifier plug-in unit input coupling switch to ground. Then, position the test oscilloscope trace to the bottom horizontal graticule line. Do not change the test-oscilloscope position control after setting this ground reference.

f. Connect the probe tip to TP1876; connect the probe ground to chassis ground with a short grounding strap.

g. CHECK—Test oscilloscope display for a DC level of +9 volts ±1.0 volt (4.5 divisions within 0.5 division) above ground reference level.

h. ADJUST—Z REF adjustment R1817 for a DC level of exactly +9 volts (4.5 divisions) above ground reference level.

i. Set the vertical amplifier-unit position control fully clockwise. This positions the trace off screen and the beam limit circuit is bypassed.

j. Set the test oscilloscope for a deflection factor of 1 volt/division (ten volts/division at the probe tip).

k. Set the INTENSITY control fully clockwise.

l. CHECK—Test oscilloscope display for a pulse waveform having a peak amplitude of 74 volts ±3 volts (7.4 divisions ±0.3 division) above ground reference level.

m. ADJUST—Z GAIN adjustment R1810 for a pulse waveform with a peak amplitude of 74 volts ±3 volts (7.4 divisions ±0.3 division) above ground reference level.

n. Set the INTENSITY control fully counterclockwise, and repeat part g of this step. Repeat parts g through n as necessary to obtain proper voltage levels.

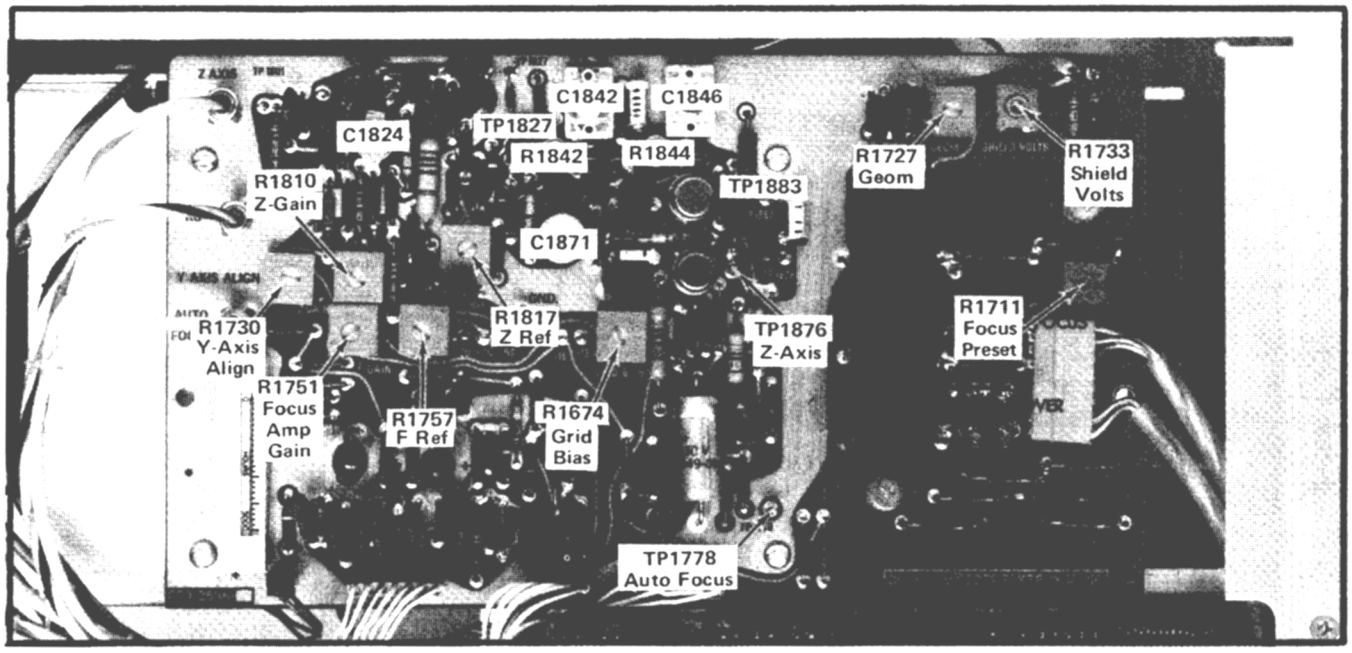


Fig. 2-3. Location of Z-axis adjustments and Z-axis Test Points.

o. Remove the vertical amplifier plug-in unit and the time-base plug-in unit. Place the time-base plug-in unit in the left vertical compartment and place the vertical amplifier plug-in unit in the horizontal compartment.

p. Set the INTENSITY control for midrange. Use the position control of the vertical amplifier plug-in to move the dot onto the crt screen. Then set the INTENSITY control fully counterclockwise.

q. Set the test oscilloscope for a vertical deflection factor of 0.2 volt/division (two volts/division at probe tip).

r. Set the INTENSITY control for a DC level of +14 volts ±0.5 volt (7.0 divisions ±0.25 division above ground reference level).

s. CHECK—That the dot on the crt screen is just visible.

t. ADJUST—CRT Grid Bias adjustment R1674 so that the dot on the crt screen is just visible.

5. Adjust Z-Axis Compensation

a. Set the test oscilloscope for a sweep rate of 0.1 μs/div and trigger on the negative slope. Set the vertical deflection factor for one volt/division. Connect the probe to TP1827 and connect the probe ground to the closest circuit board ground with a short grounding strap.

b. Set the INTENSITY control for approximately 75% of the intensity range. Set the time-base plug-in unit for a sweep rate of 2 ns.

c. CHECK/ADJUST—C1824 for best front corner level of the negative pulse.

d. Connect the probe to TP1883.

e. Set the test oscilloscope vertical deflection factor for 20 millivolts/division (200 millivolts/division at probe tip). Set the time-base plug-in unit for positive slope triggering.

f. Adjust the INTENSITY control for approximately 40% of the intensity range.

g. CHECK—Test oscilloscope display for optimum square corner and flat top on the display pulse.

h. ADJUST—C1871 for flat top; change the adjustment setting to determine if adjustment is needed or return to original setting. If adjustment is not needed, adjust C1842 and R1842 for optimum square corner on displayed pulse (use low capacitance screwdriver to adjust variable capacitors).

i. Set the test oscilloscope for a vertical deflection factor of 0.1 volt/division (one volt/division at probe tip).

j. ADJUST—The INTENSITY control fully clockwise.

k. CHECK/ADJUST—Check the test oscilloscope display for optimum square corner. Adjust R1844 and C1846 for optimum square corner.

l. Disconnect all test equipment.

6. Adjust Auto Focus

a. Set INTENSITY control counterclockwise.

b. Connect the DC voltmeter between TP1778 and chassis ground.

c. CHECK—Meter reading; +123 volts ±2 volts.

d. ADJUST—F Ref. adjustment R1757 for +123 volts ±2 volts.

e. Disconnect voltmeter.

f. Set INTENSITY and FOCUS controls to midrange.

g. Set the time-base plug-in unit for a sweep rate of 10 nanoseconds/division.

h. Connect the time-mark output of the time-mark generator to the vertical amplifier plug-in unit input connector through a 50-ohm termination. (If the input impedance is 50 ohms, no termination is required). Set the marker output for 10 nanoseconds.

i. Set the vertical amplifier plug-in unit for a deflection factor of 0.1 volt/division, and position the trace to the center of the screen.

j. ADJUST—ASTIG and Focus Preset adjustment R1711 for the thinnest displayed markers in the first and tenth horizontal divisions of the graticule area, and Shield Volts adjustment R1733 for uniform width of the individual markers. Repeat the adjustments until no interaction is noted.

k. Set INTENSITY control fully clockwise. Use the position control of the vertical amplifier plug-in unit to position the top of the waveform just above the graticule horizontal center line.

l. ADJUST—Focus Amp. Gain R1751 so that the peaks of the waveform appear to have uniform rounded dots at the peaks.

m. Disconnect all test equipment and remove all plug-in units.

7. Adjust Y-Axis Alignment

a. Install the vertical amplifier plug-unit in the horizontal compartment and install the time-base plug-in unit in the left vertical compartment.

b. Set the time-base plug-in unit for a sweep rate of 0.1 millisecond/division.

c. Set the INTENSITY control for a low-intensity display.

d. Use the position control of the vertical amplifier plug-in unit to position the trace to the center vertical graticule line.

e. CHECK—That the trace aligns with the center vertical graticule line within 0.1 division.

f. ADJUST—Y-Axis Align adjustment R1730 so that the trace is aligned with the center vertical graticule line.

g. Remove all plug-in units.

8. Adjust Trace Rotation

a. Install the vertical amplifier plug-in unit in the left vertical compartment and install the time-base plug-in unit in the horizontal compartment.

b. Use the position control of the vertical amplifier plug-in to position the trace to the horizontal center line.

c. CHECK—That the horizontal trace aligns with the center horizontal graticule line within 0.1 division.

d. ADJUST—Trace Rotation adjustment (front panel), so the trace aligns with the graticule line.

9. Adjust Geometry

a. Connect the marker output of the time-mark generator to the vertical amplifier plug-in unit input

connector through a 50-ohm termination. (If the input impedance is 50-ohms, no termination is required).

b. Set the time-mark generator for 0.1 millisecond markers.

c. Set the time-base for a triggered display at 0.1 millisecond/division sweep rate. Use the variable time/division control to obtain one marker for each major graticule division.

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

e. Set the vertical deflection factor and the position control of the vertical amplifier plug-in unit so that the markers extend above and below the top and bottom graticule lines.

f. CHECK—Vertical bowing and tilt of the marker display is less than 0.1 division (each one microsecond marker represents 0.1 division).

g. ADJUST—Geom. adjustment R1727 for minimum bowing of the time markers. Adjustment might have to be compromised to obtain less than 0.1 division bowing and tilt within the entire graticule area.

h. Disconnect all test equipment.

10. Adjust Auto Focus Operation

a. Set INTENSITY and READOUT controls counter-clockwise.

b. Connect the DC voltmeter (VOM) between TP1778 and chassis ground (see Fig. 2-3).

c. CHECK—Meter reading; +123 volts ±2 volts.

d. Set INTENISTY, READOUT, and FOCUS controls to midrange.

e. ADJUST—ASTIG and Focus Preset for a well defined readout display (the square-wave calibrator signal can be used instead of the readout display).

f. Set the time-base plug-in unit sweep rate control for 0.02 μs with X10 mag, or 2 ns/division.

g. Set INTENSITY control fully clockwise.

h. ADJUST—Focus Preset Gain for thinnest trace.

i. Reduce the INTENSITY control setting to midrange.

j. ADJUST—ASTIG Adjustment for a well-defined display.

√ 11. Check External Z-Axis Operation

a. Connect the medium-frequncy constant-amplitude signal generator to the vertical amplifier plug-in unit through the five-nanosecond GR cable, GR to BNC male adapter and BNC-T-connector.

b. Set the vertical amplifier plug-in unit for a deflection factor of one volt.

c. Set the time-base plug-in unit for a sweep rate of 10 microseconds/division.

d. Set the medium-frequency generator for a two-division display at 50 kilohertz.

e. Remove the cover from the Z-Axis input connector on the rear panel. Connect the output of the BNC T-connector to the Z-Axis input connector with the 42-inch 50-ohm BNC cable.

f. CHECK—Top portion of displayed waveform is blanked out.

g. Disconnect all test equipment and replace cover on Z-Axis input connector.

VERTICAL SYSTEM CALIBRATION

Equipment Required

1. Time-base plug-in unit
2. Calibration Fixture (Signal Standardizer)
3. High-frequency constant-amplitude signal generator
4. Vertical amplifier plug-in unit
5. GR to BNC adapter
6. Pulse generator
7. 2X GR attenuator
8. 5X GR attenuator
9. Five-nanosecond GR cable
10. Three-inch screwdriver
11. Low-capacitance screwdriver
12. Nylon tuning tool

Control Settings

Set the controls as given under the Preliminary Control Settings.

Location of Adjustments

The vertical system adjustments are located on the Vertical Amplifier board (on left side of instrument). See Fig. 2-4 for location of adjustments.

NOTE

If this instrument does not contain a Readout System (Option 1), omit step 12A and proceed with step 12B.

12A. Adjust Vertical Centering (For Instruments With Readout Only)

a. Remove Q2225 (see Fig. 2-10B) from its socket on the Readout System board.

b. Install the time-base unit in the horizontal compartment.

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

d. Set the READOUT intensity control for a visible display of readout characters at the top and bottom of the display area.

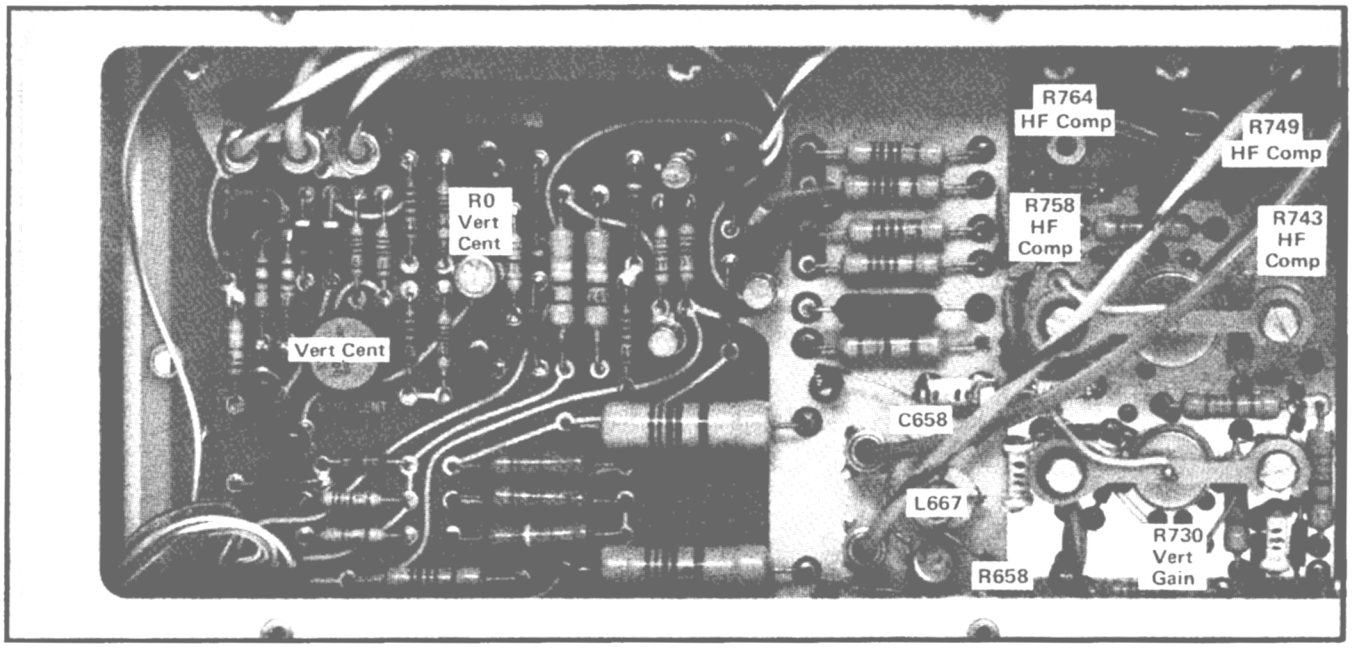


Fig. 2-4. Location of Vertical adjustments.

e. Set the VERT MODE switch to ALT.

f. CHECK—Displayed readout characters should be equally spaced above and below the center horizontal graticule line and the traces should be within 0.5 division of the center line.

g. ADJUST—Vertical Centering, R712, for equal spacing of the alternating traces from the graticule center line. (If the alternating traces appear as a single trace, adjust R712 to position the trace to the center line.) Adjust Readout Vertical Centering adjustment R707 for equal spacing of the displayed readout characters from the graticule center line. Repeat the adjustments until no interaction is noted.

h. Set the READOUT intensity control to OFF and replace Q2225.

NOTE

If step 12A was performed, omit step 12B and proceed with step 13A.

12B. Adjust Vertical Centering (For Instruments Without Readout)

a. Install the time-base unit in the horizontal compartment.

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

c. Set the VERT MODE switch to ALT.

d. CHECK—The alternating traces (may appear as a single trace) should be within 0.5 division of the graticule center line.

e. ADJUST—Vertical Centering, R712, for equal spacing of the alternating traces from the graticule center line. (If the alternating traces appear as a single trace, adjust R712 to position the trace to the graticule center line.)

f. Set the VERT MODE switch to ADD.

g. CHECK—Trace should be within 0.5 division of the graticule center line.

√ 13A. Check/Adjust Vertical Amplifier Gain (For instruments SN B160000-up)

a. Install the Calibration Fixture in the right vertical compartment.

b. Set the VERT MODE switch to RIGHT.

c. Set the Calibration Fixture Test switch to Vert or Horiz Gain with the Rep Rate switch set to 100 kHz.

d. Position the display to align the bright center trace with the center horizontal line of the graticule.

√ e. CHECK—Deflection between the second and eighth traces should be six divisions ±0.06 division. Note the exact deflection for part i of this step.

f. ADJUST—Vertical Gain, R730, for exactly six divisions of deflection between the second and eighth traces.

g. Remove the Calibration Fixture from the right vertical compartment and install it in the left vertical compartment.

h. Set the VERT MODE switch to LEFT.

√ i. CHECK—Deflection between the second and eighth traces should be the same as step 13A part e ±1% (six divisions ±0.06 division if R730 was adjusted in step 13A part f).

j. ADJUST—Vertical Interface, R4619, for exactly six divisions of deflection between the second and eighth traces.

k. Remove the Calibration Fixture from the left compartment and install it in the right vertical compartment.

l. Set the VERT MODE switch to RIGHT.

√ 13B.Check/Adjust Vertical Amplifier Gain (For instruments SN B159999-below)

a. Install the Calibration Fixture in the vertical compartment.

b. Set the VERT MODE switch to LEFT.

c. Set the Calibration Fixture Test switch to Vert or Horiz Gain with the Rep Rate switch set to 100 kHz.

d. Position the display to align the bright center trace with the center horizontal line of the graticule.

√ e. CHECK—Deflection between the second and eight traces should be six divisions ±0.06 divisions. Note the exact deflection for part i of this step.

f. ADJUST—Vertical Gain, R730, for exactly six divisions of deflection between the second and eighth traces.

g. Remove the Calibration Fixture from the left vertical compartment and install it in the right vertical compartment.

h. Set the VERT MODE switch to RIGHT.

√ i. CHECK—Deflection between the second and eighth traces should be the same as step 13B part e ±1% (six divisions ±0.06 division if R730 was adjusted in step 13B part f).

j. ADJUST—If necessary, compromise the setting of R730 for optimum gain for both vertical compartments. If re-adjustment is necessary, recheck parts e through i.

√ 14. Check Low-Frequency Linearity

a. Set the Calibration Fixture Test switch to Vert or Horiz ±Step Resp with the Rep Rate switch set to 1 kHz.

b. Set the Calibration Fixture Amplitude control so the display is exactly two divisions in amplitude in the center of the graticule area.

√ c. CHECK—Position the two-division display vertically and check for not more than 0.1 division of compression or expansion anywhere within the graticule area.

√ 15. Check/Adjust Vertical High-Frequency Compensation

a. Set the Calibration Fixture Test switch to Vert or Horiz ±Step Resp, Rep Rate switch to 100 Hz, and adjust the Amplitude control for a six-division display.

b. Set the time-base unit for auto, internal triggering at a sweep rate of one millisecond/division. Set the triggering and position controls 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 ±0.42 or −0.42 division.

d. ADJUST—R764 for flat top within limits given in part c.

e. Set the Calibration Fixture Rep Rate switch to 1 MHz and the time-base unit for a sweep rate of 10 nanoseconds/division.

√ f. CHECK—For optimum square corner and flat top on displayed pulse with aberrations not to exceed +0.42 or −0.42 division with total peak-to-peak aberrations not to exceed 0.42 division.

g. ADJUST—High-frequency compensation as given in Table 2-2 for optimum square leading corner and flat top with minimum aberrations within limits given in part f. Location of the adjustments is shown in Fig. 2-4. Use the low-capacitance screwdriver to adjust variable capacitors. Repeat the complete adjustment procedure as necessary to obtain optimum adjustment.

TABLE 2-2

High-Frequency Compensation

Adjustment	Primary Area of Pulse Affected	Best Sweep Rate
R758	First 100 nanoseconds	10 nanoseconds/division
R743	First 25 nanoseconds	5 nanoseconds/division
CRT leads to termination resistor	First 5 nanoseconds	10 nanoseconds/division
C658, R658	Leading Edge	2 nanoseconds/division
L667	First 3 nanoseconds	2 nanoseconds/division
R751, C751 (SN B180000 - above)	First 3 nanoseconds	2 nanoseconds/division

h. Remove the Calibration Fixture from the right vertical compartment and install the vertical amplifier unit in this compartment.

NOTE

For optimum high-frequency performance, install the vertical amplifier unit normally used with the R7903 being calibrated.

i. Set the vertical amplifier unit for a vertical deflection factor of 20 millivolts/division with dc input coupling.

j. Connect the pulse generator output to the vertical amplifier unit with the five-nanosecond GR cable, 2X GR attenuator, and GR to bnc female adapter.

k. Set the time-base unit sweep rate to display several cycles of the pulse and note the peak-to-peak pulse amplitude. Vertically center the display.

l. Set the time-base unit for a sweep rate of 10 nanoseconds/division. Set the trigger controls for a stable display, triggered on the positive slope.

√ m. CHECK—For optimum square corner and flat top on displayed pulse. Aberrations should not exceed 7% of the pulse amplitude noted in part k. (For example: If the pulse amplitude noted in part k is six divisions, the aberrations should not exceed +0.42 or −0.42 division with total peak-to-peak aberrations 0.42 division or less.)

n. ADJUST—High-frequency compensation adjustments given in Table 2-2 that affect the first five nanoseconds of the pulse.

o. Remove the vertical amplifier unit from the right vertical compartment and install it in the left vertical compartment (leave signal connected).

p. Set the VERT MODE switch to LEFT.

√ q. CHECK—For optimum square corner and flat top on displayed pulse. Aberrations should not exceed 7% of the pulse amplitude noted in part k. (For example: If the pulse amplitude noted in part k is six divisions, the aberrations should not exceed +0.42 or −0.42 division with total peak-to-peak aberrations 0.42 division or less.)

NOTE

(For instruments SN B120000-up) L4661 and L4681 (located at bottom of vertical interface) may be shortened or lengthened to match the initial transient response overshoot to the Left Vert compartment. Larger loops cause more overshoot. Both loops on both sides of the vertical interface may be changed as needed to gain more or less overshoot.

r. ADJUST—If necessary, compromise the high-frequency compensation adjustments for optimum pulse response for both vertical compartments. If re-adjustment is necessary, recheck parts h through n.

s. Disconnect all test equipment.

t. INTERACTION—Check step 16.

√ 16. Check Vertical Amplifier Bandwidth

a. Connect the high-frequency constant-amplitude signal generator to the vertical amplifier unit with the 5X GR attenuator and GR to bnc male adapter.

b. Set the time-base unit for a free-running sweep at a sweep rate of 0.2 microsecond/division.

c. Set the high-frequency generator for six divisions of deflection, centered on the graticule, at its reference frequency.

d. 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).

√ e. CHECK—Output frequency must be 500 megahertz or higher (400 megahertz if checked outside the +20°C to +30°C temperature range). Note actual frequency (left vertical).

f. Remove the vertical amplifier unit from the left vertical compartment and install it in the right vertical compartment (leave signal connected).

g. Set the VERT MODE switch to RIGHT.

h. Repeat parts c through e, noting actual frequency (right vertical).

√ 17. Check Vertical Channel Isolation

a. Set the vertical amplifier unit for a deflection factor of 0.1 volts/division.

b. Set the high-frequency generator for eight divisions of deflection at 500 megahertz.

c. Set the VERT MODE switch to LEFT.

√ d. CHECK—Crt display for not more than 0.1 division of 500 megahertz signal (channel isolation at least 100:1).

e. Remove the vertical amplifier unit from the right vertical compartment and install it in the left vertical compartment (leave signal connected).

f. Set the high-frequency generator for eight divisions of deflection at 500 megahertz.

g. Set the VERT MODE switch to RIGHT.

√ h. CHECK—Crt display for not more than 0.2 division of 500 megahertz signal.

i. Disconnect all test equipment.

√ 18. Check Vertical Display Modes

a. Position the trace to the upper half of the graticule area with the vertical amplifier unit Position control.

b. Install the vertical amplifier unit in the right vertical compartment.

c. Position the trace to the lower half of the graticule area with the vertical amplifier unit Position control.

√ d. CHECK—Crt display for two traces in the ALT and CHOP positions of the VERT MODE switch.

e. Set the VERT MODE switch to ADD.

√ f. CHECK—CRT display for a single trace that can be positioned vertically with either vertical unit position control.

TRIGGER SYSTEM CALIBRATION

Equipment Required

1. Calibration Fixture (Signal Standardizer)
2. Time-base plug-in unit
3. Vertical amplifier plug-in unit
4. Plug-in extender calibration fixture
5. Precision dc voltmeter
6. Test-oscilloscope (dual trace)
7. Two 42-inch 50-ohm bnc cables
8. Two 50-ohm terminations
9. Seven-inch screwdriver

Control Settings

Set the controls as given under the Preliminary Control Settings.

19. Adjust Trigger Selector DC Centering

a. Remove all plug-in units. Install the plug-in extender fixture in the horizontal compartment.

b. Connect the trigger lines from the plug-in extender (A20 and B20) to the test-oscilloscope. Use one 50-ohm bnc cable and 50-ohm termination from each trigger line to the test-oscilloscope vertical channels.

c. Set both test-oscilloscope vertical channels for a deflection factor 50 millivolts/division ground input coupling. Set the test oscilloscope for differential operation between the two channels (added display mode with one channel inverted) at a sweep rate of 20 microseconds/division. Set input coupling to dc.

d. CHECK—The test-oscilloscope display for a dc level within 0.5 division (25 millivolts) of the ground reference level in the LEFT, RIGHT, and ADD positions of the VERT MODE switch.

NOTE

Refer to instrument serial number for appropriate adjustment procedure for parts e, f, and g of this step.

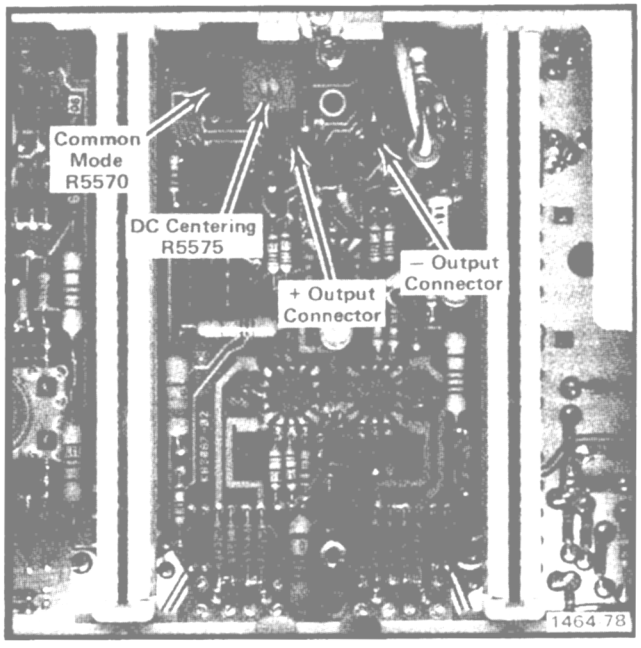


Fig. 2-5A. Location of Trigger Selector adjustments (SN B130525-above).

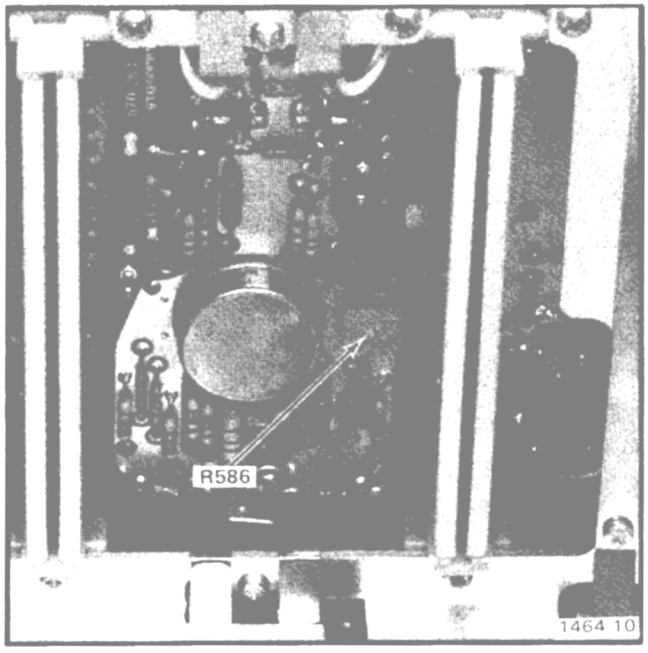


Fig. 2-5B. Location of Trigger Selector adjustments (SN B130524-below).

e. ADJUST—(SN B140585-above)

1. Set digital voltmeter to the two volt scale.

2. Connect the negative lead of the digital voltmeter to chassis ground.

3. Connect the positive lead of the digital voltmeter to the plus (+) output connector on the Trigger board.

4. CHECK—For less than ±0.05 volts.

5. ADJUST—Trig Common Mode, R5570, for approximately zero volts, ±0.05 volts. See Fig. 2-5A.

6. ADJUST—Trigger DC Centering, R5575, for a display DC level within 0.5 division (25 millivolts) of ground reference level in the LEFT, RIGHT, and ADD positions of the VERT MODE switch. See Fig. 2-5A for adjustment location.

f. ADJUST—(SN B130525-SN B140584) Trigger DC Centering, R5575, for a display dc level within 0.5 division (25 millivolts) of ground reference level in the LEFT, RIGHT, and ADD positions of the VERT MODE switch. See Fig. 2-5A for adjustment location.

g. ADJUST—(SN B130524-below) Trigger DC Centering, R586, for a display dc level within 0.5 division (25 millivolts) of ground reference level in the LEFT, RIGHT, and ADD positions of the VERT MODE switch. See Fig. 2-5B for adjustment location.

h. Install the Calibration Fixture in the left vertical compartment. Set the Calibration Fixture to triggering gain.

i. Set the VERT MODE switch to LEFT.

j. CHECK—Test-oscilloscope display for nine traces with the deflection between the second and eighth traces of six divisions ±0.2 division (300 millivolts within 45 millivolts). Install the Calibration Fixture in the right vertical compartment. Set the VERT MODE switch to RIGHT.

k. CHECK—Trigger gain of the right vertical compartment.

√ 20. Check Trigger Selector Operation

a. Install the time-base plug-in unit in the horizontal compartment and the vertical amplifier plug-in unit in the left vertical compartment.

b. Set the left vertical amplifier plug-in for a deflection factor of 0.2 volt/division.

c. Connect the 0.4 calibrator signal to input connector of the left vertical amplifier plug-in unit.

d. Set the Calibration Fixture test switch to Vert or Horiz + Step Resp, and the Rep Rate switch to 1 kHz. Set the amplitude control for a two-division display.

e. Set the VERT MODE switch to ALT position, the left vertical display to bottom half of the graticule. Position the right vertical display to the upper half of the graticule.

f. Set the time-base plug-in unit for a sweep rate of 0.2 millisecond/division.

√ g. CHECK—That both displays are triggered (stable display).

√ h. CHECK—Press, in sequence, the VERT MODE switch pushbuttons. Check that a stable display is obtained in all switch positions. Except the CHOP MODE, then only the left vertical display is triggered.

i. Press the LEFT TRIG SOURCE button.

√ j. CHECK—Press, in sequence, the VERT MODE switch pushbuttons. Check that only the right vertical display is triggered.

k. Press the RIGHT TRIG SOURCE button.

√ l. CHECK—Press, in sequence, the VERT MODE switch pushbuttons. Check that only the right vertical display is triggered.

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

HORIZONTAL SYSTEM CALIBRATION

Equipment Required

1. Vertical amplifier plug-in unit
2. Time-base plug-in unit
3. Calibration Fixture (Signal Standardizer)
4. Time-mark generator
5. Test-oscilloscope system with two 10X probes
6. Medium-frequency signal generator
7. 42-inch 50-ohm bnc cable
8. Five-nanosecond GR cable
9. 50-ohm bnc termination
10. 50-ohm GR in-line termination
11. 12-inch jumper cable
12. Three-inch screwdriver
13. Low-capacitance screwdriver

Location of Adjustments

The horizontal system adjustments are located on the main Horizontal Amplifier board (top of instrument). See Fig. 2-6A and Fig. 2-6B for location of adjustments.

21A. Adjust Limit Centering (For Instruments SN B150000-Above)

a. Install the time-base unit in the left vertical compartment.

b. Install the Calibration Fixture in the horizontal compartment.

c. Set the time-base unit for auto, internal triggering at a sweep rate of five microseconds/division.

d. Set the Test Switch on the Calibration Fixture to Triggering Gain.

e. Short TP4901 and TP4911 with a 12-inch jumper cable. See Fig. 2-6A for location.

f. CHECK—Vertical trace is aligned with the vertical center line of the graticule, within 0.5 division.

g. ADJUST—Limit Ctr, R4925, to position the trace to the vertical center line.

h. Remove the 12-inch jumper cable.

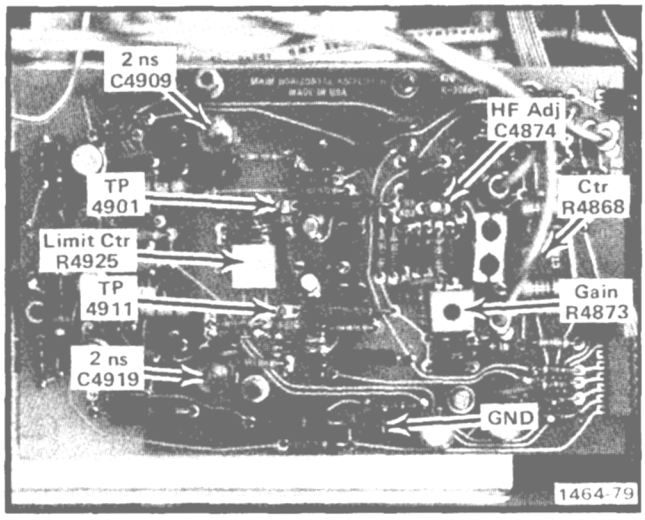


Fig. 2-6A. Location of Horizontal adjustments (SN B150000-above).

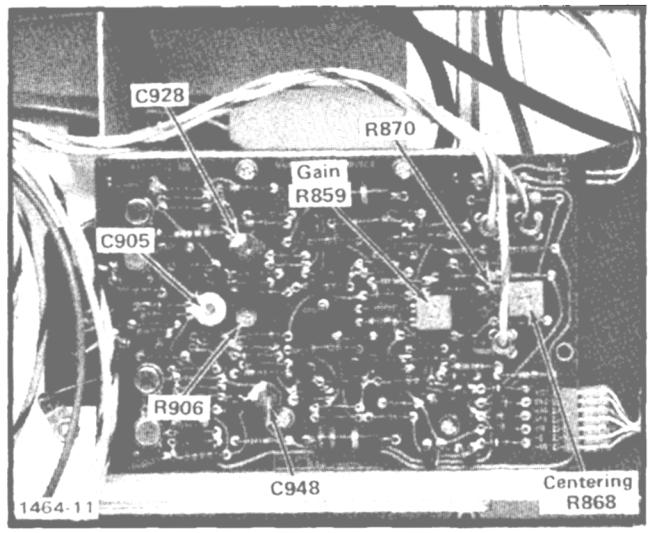


Fig. 2-6B. Location of Horizontal adjustments (SN B149999-below).

21B. Adjust Amplifier Centering (For Instruments SN B150000-Above)

a. CHECK—Vertical trace is aligned with the vertical center line of the graticule, within 0.5 division.

b. ADJUST—Ctr, R4868, to position the trace to the vertical center line.

21C. Adjust Amplifier Centering (For Instruments SN B149999-Below)

a. Install the time-base unit in the left vertical compartment.

b. Install the Calibration Fixture in the horizontal compartment.

c. Set the Test switch on the Calibration Fixture to Triggering Gain.

d. CHECK—Vertical trace aligns with the vertical center line of the graticule, within 0.5 division.

e. ADJUST—Centering, R868, to position the trace to the vertical center line.

22A. Adjust Gain and Check Low-Frequency Linearity (For Instruments SN B150000-Above)

a. Set the Calibration Fixture Test switch to Vert or Horiz Gain with the Rep Rate switch set to 1 MHz. Align the bright vertical trace with the center vertical graticule line using the Calibration Fixture Position control.

b. CHECK—That the second and tenth vertical traces align with the second and tenth graticule lines, within 0.5 division.

c. ADJUST—Gain, R4873, for eight divisions of deflection between the second and tenth traces.

22B. Adjust Gain and Check Low-Frequency Linearity (For Instruments SN B149999-Below)

a. Set the Calibration Fixture Test switch to Vert or Horiz Gain with the Rep Rate switch set to 1 MHz. Align the bright vertical trace with the center vertical graticule line using the Calibration Fixture Position control.

b. CHECK—That the second and tenth vertical traces align with the second and tenth graticule lines, within 0.08 division.

c. ADJUST—Gain, R872, for eight divisions of deflection between the second and tenth traces.

d. CHECK—That the other vertical traces align with their respective graticule lines, within 0.05 division.

e. Remove all plug-ins.

23. Adjust High-Frequency Timing (For Instruments SN B150000-Above)

a. Install the time-base unit in the horizontal compartment.

b. Install the vertical amplifier unit in the left vertical compartment.

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

d. Connect the time-mark generator to the input of the vertical amplifier unit.

e. Set the time-mark generator for one-millisecond markers. Set the vertical amplifier deflection factor so the markers are at least two divisions in amplitude.

f. Position the first marker to the extreme left line on the graticule.

g. Set the time-base unit sweep-calibration adjustment for one marker at each major graticule division between the second and tenth graticule lines (center eight divisions).

h. Set the time-mark generator for two nanosecond markers and the time-base unit sweep rate to two nanosecond/division. If necessary, change the deflection factor of the vertical amplifier to maintain a vertical display of at least two divisions.

i. CHECK—For one cycle/division and timing over the center eight divisions, within 4% (0.32 division).

j. ADJUST—2NS, C4909 and C4919, equally for one cycle/division over the center eight divisions.

k. Set the time-base unit sweep rate to 0.5 nanosecond/division.

l. CHECK—For one cycle every four divisions and timing over the center eight divisions, within 5% (0.40 division).

m. ADJUST—HF Adj, C4874, for one cycle every four divisions over the center eight divisions.

n. INTERACTION—Repeat parts h through m of this step.

o. Disconnect all test equipment and remove all plug-in units.

24. Check High-Frequency Timing (For Instruments SN B149999-Below)

a. Install a time-base unit in the horizontal compartment.

b. Install a vertical amplifier unit in the left vertical compartment.

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

d. Connect the time-mark generator to the input of the vertical amplifier unit.

e. Set the time-mark generator for one-millisecond markers. Set the vertical amplifier deflection factor so the markers are at least two divisions in amplitude.

f. Position the first marker to the extreme left line on the graticule.

g. Set the time-base unit sweep-calibration adjustment for one marker at each major graticule division between the second and tenth graticule lines (center eight divisions).

h. CHECK—Refer to the time-base instruction manual for performance check or calibration procedures for checking high-frequency timing and linearity. Use the procedures and limits given for the three fastest sweep rates that do not exceed one nanosecond/division. If the given limits are met, omit the remainder of this step.

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

j. Set the sweep rate of the time-base unit to 10 nanosecond/division.

k. CHECK—One cycle/division ±0.32 division.

l. Set the time-mark generator for five nanosecond markers.

m. Set the sweep rate of the time-base unit to five nanosecond/division.

n. CHECK—One cycle/division ±0.32 division.

o. Set the time-mark generator for two nanosecond markers.

p. Set the sweep rate of the time-base unit to two nanosecond/division.

q. CHECK—One cycle/division ±0.32 division.

r. Set the sweep rate of the time-base unit to one nanosecond/division.

s. CHECK—One cycle/two divisions ±0.32 division.

t. Set the sweep rate of the time-base unit to 0.5 nanosecond/division.

u. CHECK—One cycle/four divisions ±0.4 division.

v. If the high-frequency timing is within the given tolerance, the high-frequency compensation step can be omitted.

25. Adjust High-Frequency Compensation (For Instruments SN B149999-Below)

a. Install the time-base unit in the left vertical compartment and the Calibration Fixture in the horizontal compartment.

b. Set the Calibration Fixture Test switch to Vert or Horiz +Step Resp, and the Rep Rate switch to 1 MHz. Set the Amplitude and Position controls for a three-division display, centered on the graticule area.

c. Set the time-base unit for auto, external triggering on the negative slope at a sweep rate of 200 nanoseconds/division.

d. Connect the Calibration Fixture trigger output to the time-base unit external trigger input.

e. Check for optimum square corner and flat top on the displayed pulse. Aberrations in the first 50 nanoseconds after the step should not exceed 0.42 division peak-to-peak. Aberrations from 50 nanoseconds after the step should not exceed 0.06 division peak-to-peak; except allow 0.12 division of aberrations for delay-line termination at approximately 125 nanoseconds from step.

f. ADJUST—High-frequency compensation as given in Table 2-4 for optimum square leading corner and flat top with minimum aberrations within limits given in part e of this step. Use low-capacitance screwdriver to adjust variable capacitors. Repeat part e and f as necessary to obtain optimum response.

Table 2-4

High-Frequency Compensation (For Instruments SN B149999-Below)

Adjustment (see Fig. 2-6B)	Primary Area of Pulse Affected
R906	First 100 ns
R870	First 200 ns
C905	First 500 ns
C928	First 1 μs
C948	First 1 μs

26. Check Horizontal Bandwidth

a. Remove the Calibration Fixture from the horizontal compartment and install a vertical amplifier in this compartment.

b. Set the VERT MODE switch to LEFT.

c. Set the time-base unit for auto triggering at a sweep rate of one millisecond/division. (Disconnect the external trigger input; display will drift).

d. Connect the medium-frequency generator to the input of the vertical amplifier with a five-nanosecond GR cable and a 50-ohm GR in-line termination.

e. Set the medium-frequency generator for ten divisions of horizontal deflection at its reference frequency of 50 kHz.

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

g. CHECK—The crt display for 7.1 divisions or more horizontal deflection.

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

i. This completes the calibration procedure of the horizontal system.

CALIBRATOR SIGNAL AND OUTPUT SIGNALS CALIBRATION

Equipment Required

1. Precision DC voltmeter
2. Vertical amplifier plug-in unit
3. Time-mark generator
4. Time-base plug-in unit
5. 10X probe
6. BNC post jack
7. 18-inch 50-ohm BNC cable
8. 42-inch 50-ohm BNC cable
9. Three-inch screwdriver
10. Low-capacitance screwdriver

Control Settings

Set the controls as given under the Preliminary Control Settings.

Location of Adjustments

The calibrator and output signals adjustments are located on the Calibrator board (on right side of instrument). The location of these adjustments is shown in Fig. 2-8.

√ 27. Check/Adjust Calibrator Output Voltage

a. Connect the precision DC voltmeter between the center pin of the CAL VOLTS connector (use BNC post jack) and chassis ground.

b. Set the CALIBRATOR for 0.4 V.

c. Remove transistors Q1115 and Q1119 (A DC level is present at CAL VOLTS connector).

√ d. 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).

e. ADJUST—0.4 volt adjustment R1101 for a meter reading of exactly 0.4 volt.

f. Disconnect the precision DC voltmeter, and replace transistors Q1115 and Q1119.

√ 28. Check/Adjust Calibrator 1 kHz Repetition Rate

NOTE

If a frequency counter with an accuracy of at least 0.1% is available (such as Tektronix 7D14 Digital Counter), it can be used to adjust calibrator repetition rate.

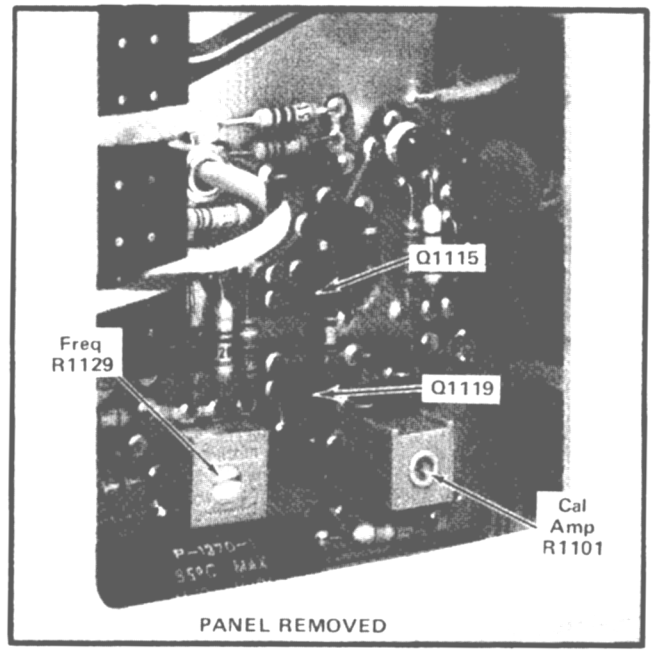


Fig. 2-8. Location of Calibrator Adjustments and Transistors.

a. Install two vertical amplifier plug-in units in the vertical compartments. Install the time-base plug-in unit in the horizontal compartment.

b. Connect the CAL VOLTS connector to the right vertical plug-in unit with the 18-inch 50-ohm BNC cable.

c. Set the vertical amplifier plug-in unit for a deflection factor of 100 millivolts/division.

d. Connect the marker output of the time-mark generator to the left vertical amplifier plug-in unit with the 42-inch 50-ohm BNC cable.

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

f. Set the deflection factor of the left vertical amplifier plug-in unit so that the markers are at least two divisions in amplitude.

g. Set the time-base plug-in unit for a stable display of both waveforms in the normal, internal triggering mode at a sweep rate of one millisecond/division.

h. Position the markers with the Position control of the left vertical amplifier plug-in unit so that the tips of the markers fall just below the bottom of the square wave.

i. ADJUST—1 kHz adjustment R1101 to align the leading edges of the calibrator square wave with the markers over the entire display area (preliminary adjustment).

j. Change the following control settings:

VERTICAL MODE	ADD
TRIGGER SOURCE	RIGHT VERT

k. Set the time-base plug-in unit for a sweep rate of 0.2 millisecond/division.

l. ADJUST—1 kHz adjustment for minimum drift of the time markers across the calibrator square wave.

m. Set the TRIGGER SOURCE switch to VERT MODE.

n. Adjust the time-base plug-in unit triggering so that a triggered trace is presented only when the time markers occur during the positive portion of the calibrator square wave.

o. Set the time-base plug-in unit for AC low-frequency reject coupling at a sweep rate of 0.2 second/division.

√ p. CHECK—The amount of time required for a time mark to drift across the positive level of the calibrator square wave, to the negative level and back to the positive level, must be at least 0.4 second (0.2 second if outside the +15°C to +35°C temperature range). This time can be measured directly from the display by observing the number of divisions that the marker moves across the display area before it returns to the positive level. If the above time is not met, repeat parts i through p.

q. Disconnect the time-mark generator.

√ 29. Check Calibrator Risetime, Falltime, and Duty Cycle

a. Change the following control settings:

VERTICAL MODE	LEFT
CALIBRATOR	4.0 V

b. Set the left vertical amplifier plug-in unit for a deflection factor of 0.5 volt/division; then set the variable control for exactly six divisions of vertical deflection.

c. Set the time-base plug-in unit for a sweep rate of one millisecond/division.

d. Position the display to the center vertical line of the graticule.

e. Set the time-base plug-in unit for a stable display triggered on the rising portion of the waveform at a sweep rate of 0.1 microsecond/division.

√ f. CHECK—Displayed waveform for not more than 2.5 divisions between the 10% and 90% points (risetime 0.25 microsecond or less).

g. Set the time-base plug-in unit for a stable display triggered on the falling portion of the waveform.

√h. CHECK—Displayed waveform for not more than 2.5 divisions between the 90% and 10% points (falltime 0.25 microsecond or less).

i. Set the left vertical amplifier plug-in unit for a calibrated deflection factor of two volts/division.

j. Set the time-base plug-in unit for auto, internal triggering controls so that the display starts at the 50% point on the rising edge of the waveform.

k. Set the time-base plug-in unit X10 magnifier on. Then position the display horizontally so that the falling edge of the waveform aligns with the vertical center line.

l. Set the left vertical amplifer plug-in unit to invert the display. (NOTE: The display is triggered on the opposite slope, even though the display appears the same.)

√m. CHECK—50% point on falling edge of the waveform now displayed is within 0.5 division of the center line (indicates duty cycle of 50% ±10%).

n. Disconnect the calibrator signal.

√ 30. Check Sawtooth Output Signal

a. Connect the + Sawtooth output connector to the left vertical amplifier plug-in unit with the 18-inch 50-ohm BNC cable.

b. Set the vertical amplifier plug-in unit for a deflection factor of two volts/division with DC coupling.

c. Set the time-base plug-in unit for a sweep rate of two milliseconds/division.

√d. CHECK—CRT display for a sawtooth waveform about five divisions in amplitude with a duration of at least 10 divisions.

√ 31. Check Gate Output Signals

a. Remove the cable from the + SAWTOOTH connector and connect it to the + GATE connector.

b. Set the Gate Selector Switch (Rear Panel) to main.

c. Install a dual sweep time-base plug-in unit in the horizontal compartment.

d. Set the time-base plug-in unit for a sweep rate of 10 μs/division. Set the intensifying sweep for 1 μs/division.

√e. CHECK—CRT display for an intensified pulse about one division long.

f. Set the Gate Selector switch (Rear Panel) to AUX.

√g. CHECK—CRT display for an intensified trace about one division long.

32. Adjust Vertical Signal Centering

a. Change the TRIG SOURCE control setting to RIGHT.

b. Remove the vertical amplifier plug-in unit from the left vertical compartment.

c. Set the right vertical amplifier plug-in unit for a deflection factor of one volt/division with DC input coupling.

d. Set the time-base plug-in unit for auto, internal triggering at a sweep rate of 10 microseconds/division.

e. Establish a zero-volt reference level at the center horizontal graticule line with the vertical amplifier plug-in unit Position control.

f. Connect the SIG OUT connector to the vertical amplifier plug-in unit with the 18-inch 50-ohm BNC cable.

√g. CHECK—Display for DC level of zero volt within one division (zero volt ± one volt).

h. ADJUST—Vertical Signal DC centering adjustment R1013 for a DC level of zero volt within one volt (see Fig. 2-9).

√33. Check Vertical Signal Output

a. Install a vertical amplifier plug-in unit in the left vertical compartment.

b. Change the following control settings:

VERTICAL MODE	LEFT
CALIBRATOR	4.0 V (0.4 V into 50-ohms)

c. Set the vertical amplifier plug-in unit for a deflection factor of 2.0 volts/division and the time-base plug-in unit for auto triggering at a sweep rate of 0.5 millisecond/division.

d. Connect the CAL VOLTS connector to the left vertical amplifier plug-in unit with the 42-inch 50-ohm BNC cable.

e. Set the vertical amplifier plug-in unit for a deflection of eight divisions and center the display vertically.

f. Set the VERT MODE switch to RIGHT.

√g. CHECK—CRT display for a waveform of four divisions amplitude, within one division.

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

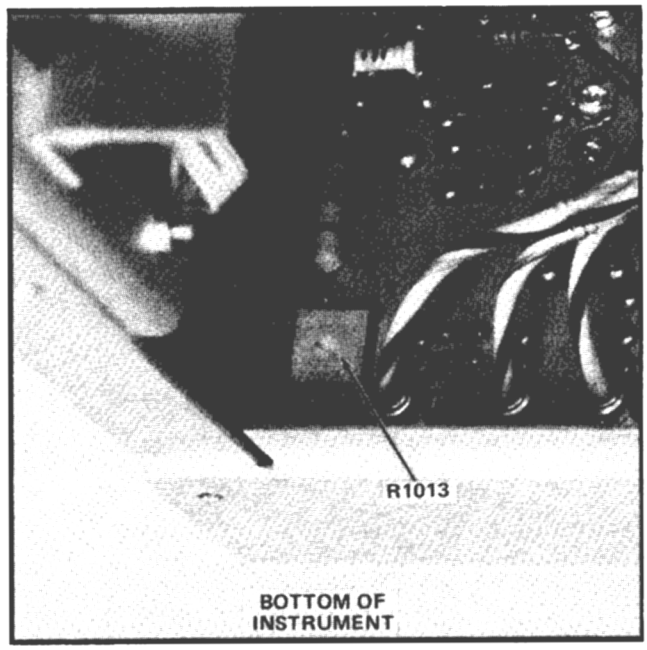


Fig. 2-9. Location of Vertical Sig Out Centering Adjustment.

READOUT SYSTEM CALIBRATION

SN B0202641 & Below

Equipment Required

1. Vertical amplifier plug-in unit
2. Time-base plug-in unit
3. 18-inch 50-ohm BNC cable
4. BNC to clip-lead adapter
5. 0.1 μF 25-volt capacitor
6. 10 kilohm 5% resistor
7. Three-inch screwdriver

Control Settings

Set the controls as given under the Preliminary Control Settings.

Location of Adjustments

The location of the readout system adjustments on the Readout System board is shown in Fig. 2-10A (right side of instrument).

34. Adjust Readout System Operation

a. Set the POWER switch to off and remove Q2225 (see Fig. 2-10A) from its socket; return the POWER switch to on.

b. Set the READOUT intensity control for visible characters (all zeros).

c. CHECK—CRT display for two rows of zeros, 30 zeros to a row with no overlap. Total length of each row of characters should be between 9.5 and 10.5 divisions. The two rows of zeros should be located vertically in the middle of the top and bottom divisions of the graticule (see Fig. 2-10B).

NOTE

These tolerances are provided as guides to correct instrument operation and are not instrument specifications.

d. ADJUST—Vertical Separation adjustment R2291 to position the two rows of readout characters to the middle of the top and bottom divisions of the graticule.

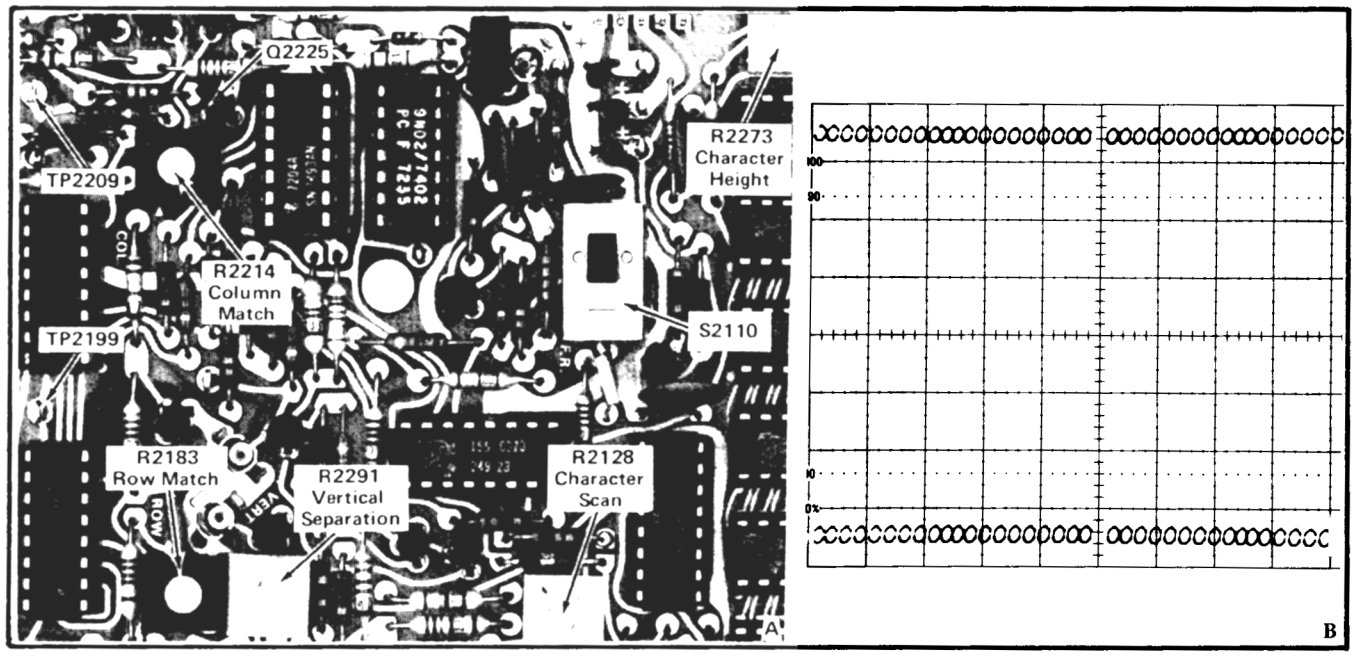


Fig. 2-10. (A) Location of Readout Adjustments, Q2225 and Test Point 2199 and 2209, (B) Readout Display.

NOTE

Readout Vertical Centering adjustment must be correct before making this adjustment; see step 12.

e. Set the POWER switch to off and replace Q2225 in its socket; return the POWER switch to on.

f. Install the vertical amplifier plug-in unit in the left vertical compartment.

g. Set the vertical amplifier plug-in unit for a deflection factor of 50 millivolts/division.

h. CHECK—Displayed characters for completeness.

i. ADJUST—Full Character Scan adjustment R2128 for fully scanned characters. The m and the 5 will show the most change.

j. Install the time-base plug-in unit in the HORIZ compartment.

k. Set the time-base plug-in unit in the HORIZ compartment.

l. Set the Readout Mode switch, S2110 to Free Run-Remote. See Fig. 2-10.

m. CHECK—Turn the time-base plug-in unit time/division switch throughout its complete range. Check that the readout characters are presented on a free-run basis, independent of the sweep rate.

n. Set the Readout Mode switch, S2110 to Gate Trig'd.

o. Set the time-base plug-in unit for a sweep rate of 0.1 second/division.

p. CHECK—Readout characters are blanked out while the sweep is running, and are displayed immediately after the end of the sweep; each character encoded by the plug-in units is displayed only once for each sweep.

q. Return the Readout Mode switch, S2110 to Free Run-Remote.

NOTE

Two methods of adjustment follow. If digital plug-in units such as the Tektronix 7D13 or 7D14 are to be used in this instruments, parts r through z must be used to ensure correct readout operation. However, with other types of plug-in units, the alternative procedure given in parts aa through ac will provide correct operation in most cases.

r. Set the CALIBRATOR switch to 0.4 V.

s. Connect the calibrator signal to TP2199 with the 18-inch BNC cable, BNC to clip-lead adapter (use red lead), 0.1 μF, 25-volt capacitor, and a 10-kilohm 5% resistor, in given order. The resistor can either be temporarily soldered in place or a minialligator clip can be added to the resistor to clip it in place.

t. Press and hold the Identify button on the vertical amplifier plug-in unit.

u. CHECK—Readout display for correct indication of "IDENTIFY". If the readout display either blinks or is incorrect, adjustment is required.

v. ADJUST—Column Match adjustment R2214 for the correct readout indication. Set R2214 to the center of the adjustment range which provides correct readout indication. Release the Identify button.

w. Disconnect the 10 kilohm resistor and reconnect it to TP2209.

x. Press and hold the Identify button on the vertical amplifier plug-in unit.

y. CHECK—Readout display for correct indication of "IDENTIFY". If the readout display either blinks or is incorrect, adjustment is required.

z. ADJUST—Row Match adjustment R2183 for correct readout indication. Set R2183 to the center of the adjustment range which provides correct readout indication. Release the Identify button and disconnect the 10 kilohm resistor.

Alternative Procedure

aa. Press and hold the Identify button on the vertical amplifier plug-in unit.

ab. CHECK—Readout display for correct indication of "IDENTIFY".

ac. ADJUST—Column Match adjustment R2214 and Row Match Adjustment R2183 for correct readout indication. Set these adjustments to the center of the adjustment range which provides correct readout indication. Release Identify button.

This completes the Calibration procedure for the R7903. Disconnect all test equipment and replace the side panels.

Continue to the next step for R7903 Option 10 adjustments.

√35. Check Pulse Grat and Readout (Option 10 Only)

a. Change GRAT ILLUM and READOUT to clockwise detent. Select AUTO for both GRAT ILLUM and READOUT modes.

b. ADJUST—The GRAT ILLUM PRESET adjustment for the desired graticule illumination.

c. ADJUST—The READOUT PRESET adjustment for the desired readout intensity.

d. Change the time-base plug-in unit sweep rate switch to 0.2 second/division.

√e. CHECK—That the graticule illuminates after each sweep and that the readout display is turned on after each sweep.

f. Press the GRAT ILLUM and READOUT AUTO EXT in (EXT position).

g. Press the MANUAL buttons.

√h. CHECK—For one frame of characters and that the graticule is illuminated for a short period of time.

√i. CHECK—That graticule is illuminated and the readout displayed is turned on when the center pin of the GRAT/READOUT connector is grounded (Rear Panel).

READOUT SYSTEM CALIBRATION

SN B0202642 & Above

Equipment Required

1. Vertical Amplifier plug-in unit
2. Time-Base Plug-in unit
3. 18-inch 50 Ω BNC cable
4. BNC to clip-lead adapter
5. 0.1 μF 25-volt capacitor
6. 10 KΩ, 5% resistor
7. Three-inch screwdriver

Control Settings

Set the controls as given under the Preliminary Control Settings.

Location of Adjustments

The location of the Readout System adjustments are shown on the Readout System component locator diagram in Section 6 of this manual.

34. Adjust Readout System Operation

a. Set the POWER switch to OFF and move plug P2184 to Pins 2 and 3. Return the POWER switch to ON.

b. Set the READOUT intensity control for visible characters (all zeros).

c. CHECK—the crt display for two rows of zeros, 30 zeros to a row with no character overlap. The two rows of zeros should be located vertically in the middle of the top and bottom divisions of the graticule and total length of each row of characters should be between 9.5 and 10.5 divisions.

NOTE

These tolerances are provided as guides to correct instrument operation and are not instrument specifications.

d. ADJUST—Vertical Separation adjustment, R2260 on the A21 Readout System Board to position the two rows of readout characters to the middle of the top and bottom divisions of the graticule.

NOTE

Readout Vertical Centering adjustment must be correct before making this adjustment; see step 12.

e. Set the POWER switch to OFF and move plug P2184 to pins 1 and 2. Return the POWER switch to ON.

f. Install the vertical amplifier plug-in unit in the left vertical compartment.

g. Set the vertical amplifier plug-in unit for a deflection factor of 50 millivolts/division.

h. CHECK—Displayed characters for completeness.

i. Connect test oscilloscope Channel 1 to pin 12 of U2202.

j. Set the test oscilloscope time base sweep rate for 5 mS/div, negative triggers.

k. Set the test oscilloscope amplifier unit Trigger Source to CH 1 and connect Channel 2 to pin 13 of U2202.

l. ADJUST—C2155 (on A21 Readout System Board) for seventeen positive pulses on the test oscilloscope.

m. Install the time-base plug-in unit in the HORIZ compartment.

n. Move the Readout Mode plug P2112 (on A21 Readout System Board) to FREE RUN (pins 1 and 2).

o. CHECK—Turn the time-base plug-in unit Time/Division switch throughout its complete range. Check that the readout characters are presented on a free-run basis, independent of the sweep.

p. Move the Readout Mode plug P2112 (on A21 Readout System Board) to GATE TRIG'D (pins 2 and 3).

q. Set the time-base plug-in unit for a sweep rate of 0.1 second/division.

r. CHECK—Readout characters are blanked out while the sweep is running, and are displayed immediately after the end of the sweep; each character encoded by the plug-in units is displayed only once for each sweep.

s. Return the Readout Mode plug P2112 (on A21 Readout System Board) to FREE RUN (pins 1 and 2).

NOTE

Two methods of adjustment follow. If digital plug-in units such as the 7D13A or 7D14 are to be used in this instrument, parts p through z must be used to insure correct readout operation. However, with other types of plug-in units, the alternative procedure given in parts aa through ac will provide correct operation in most cases.

t. Set the CALIBRATOR switch to 0.4 V.

u. Connect the calibrator signal to any one of the eight resistor leads connected to pin 8 of U2190 (R2191-R2199) on the A21 Readout System Board with an 18-inch BNC cable, BNC to clip-lead adapter (use red lead), 0.1 μF 25 V capacitor, and a 10 KΩ 5% resistor, in the order given. The resistor can be temporarily soldered in place.

v. Press and hold the IDENTIFY button on the vertical amplifier plug-in unit.

w. CHECK—the readout display for correct indication of "IDENTIFY". If the readout display is incorrect, adjustment is required.

x. ADJUST—Column Match adjustment R2214, and Row Match adjustment, R2183 (on the A21 Readout System board), for correct readout of "IDENTIFY". Set these adjustments to the center of the range which provides correct readout indication. Release the amplifier trace-identify button.

y. Disconnect the 10 KΩ resistor from the Readout circuit.

Alternate Procedure

aa. Press and hold the IDENTIFY button on the vertical amplifier plug-in unit.

ab. CHECK—the readout display for correct indication of "IDENTIFY". If the readout display is incorrect, adjustment is required.

ac. ADJUST—Column Match adjustment R2214, and Row Match adjustment, R2183 (on the A21 Readout System board), for correct readout of "IDENTIFY". Set these adjustments to the center of the range which provides correct readout indication. Release the amplifier trace-identify button.

CIRCUIT DESCRIPTION

Introduction

This section of the manual contains a description of the circuitry used in the R7903 Oscilloscope. The description begins with a discussion of the instrument using the basic block diagram shown in Fig. 3-1. 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 rear 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 to overall concept of the R7903 before the individual circuits are discussed in detail. A basic block diagram of the R7903 is shown in Fig. 3-1. 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 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 the CRT are connected to the Horizontal Amplifier circuit from the horizontal plug-in compartment. The Horizontal Amplifier circuit amplifies the signals to provide the horizontal deflection for the CRT.

The internal trigger signals from the Vertical Amplifier plug-in units are connected to the Trigger Selector circuit. This circuit selects which trigger signal is to be 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 or selected, plug-in control settings, and R7903 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 R7903. The theory of operation for circuits unique to this instrument is described in detail in this discussion. Circuits that are commonly used in the electronics industry are not described in detail.

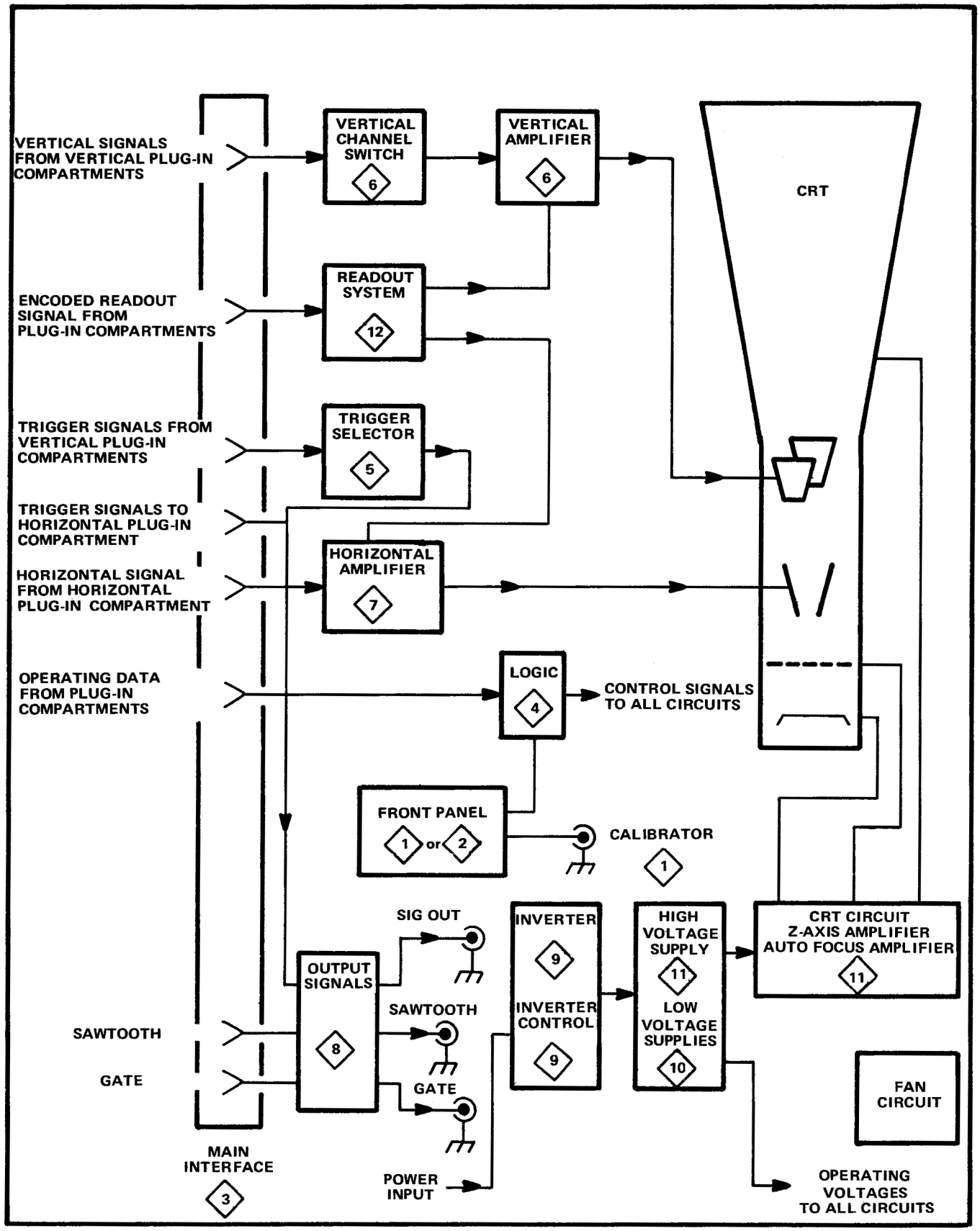


Fig. 3-1. Basic Block Diagram of the R7903.

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.

Digital logic techniques are used to perform many functions within this instrument. The function and operation of the logic circuits are described using standard logic symbology and terminology. The logic symbology and terminology are set forth in the Military Standard Manual MIL-STD-806B. Any deviations from the standard symbology, or devices not defined by this standard, will be described in the circuit description for the applicable device.

Main Interface

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

Logic Circuit

Diagram 4 shows the Logic Circuit. The Logic Circuit develops the control signals for use in other circuits within this instrument, and in the associated plug-in units. These control signals automatically determine the correct instrument operation in relation to the plug-in installed or selected, plug-in control settings, and the control settings of this instrument.

Logic Block Diagram. The block diagram of the Logic Circuit is shown in Fig. 3-2. This diagram shows the source of the input control signals, the output signals produced by logic 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.

The operation of each of these stages is discussed by relating the input signals 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 on input conditions that are of importance to perform the prescribed function of an individual stage.

Clock Generator. One half of integrated circuit U230, along with the external components shown in Fig. 3-3A, make up the Clock Generator stage. R1, Q1, Q2, and Q3 represent an equivalent circuit contained within U230A. This circuit and discrete components C231, R231, R233, and R235 compose a two-megahertz free-running oscillator to provide a timing signal (clock) for mainframe vertical and plug-in chopping, and blanking.

The stage operates as follows: Assume that Q2 is ocnducting 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. 3-3B at time T_0). Since there is no current through Q1, C231 begins to charge towards −15 volts through R231-R233. The emitter of Q1 goes negative as C231 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 C231 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 15 (see time T_1 on the waveforms).

Now, conditions are reversed. Q2 is reverse biased, so it does not conduct. Therefore, C231 can begin to discharge through R235. The emitter level of Q2 follows the discharge of C231 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, C231 begins to charge through R231-R233 to start the second cycle.

Two outputs are provided from this oscillator. The Delay Ramp signal from the junction of R231-R233 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 R231-R233. A square-wave output is provided at pin 14. The frequency of this square wave is determined by the RC relationship between C231 and R1. The duty cycle is determined by the ratio of R231-R233 to R235.

The square wave at pin 14 is connected to pin 16 through C237. C237, along with the internal resistance of U230A, 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

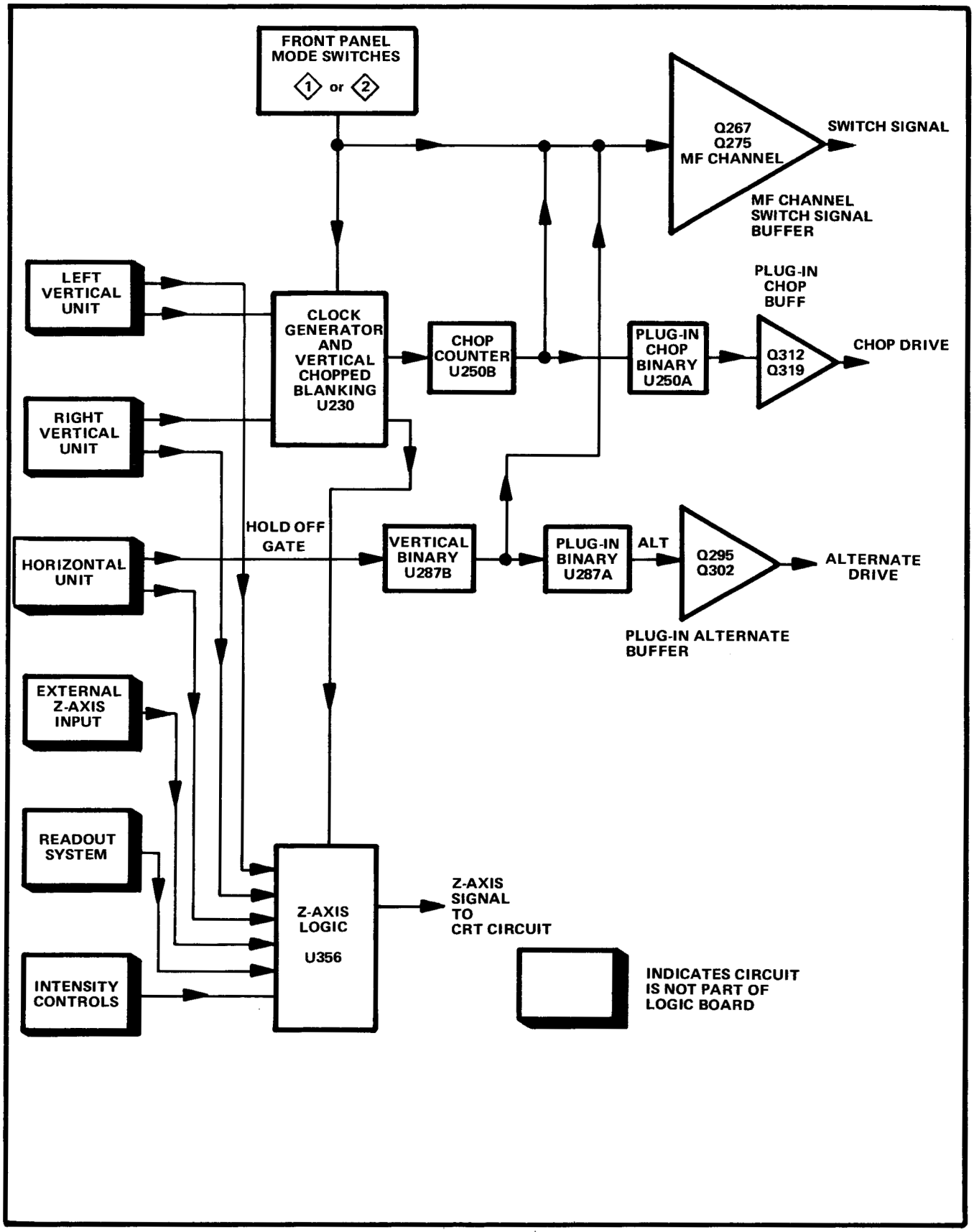


Fig. 3-2. Logic Block Diagram.

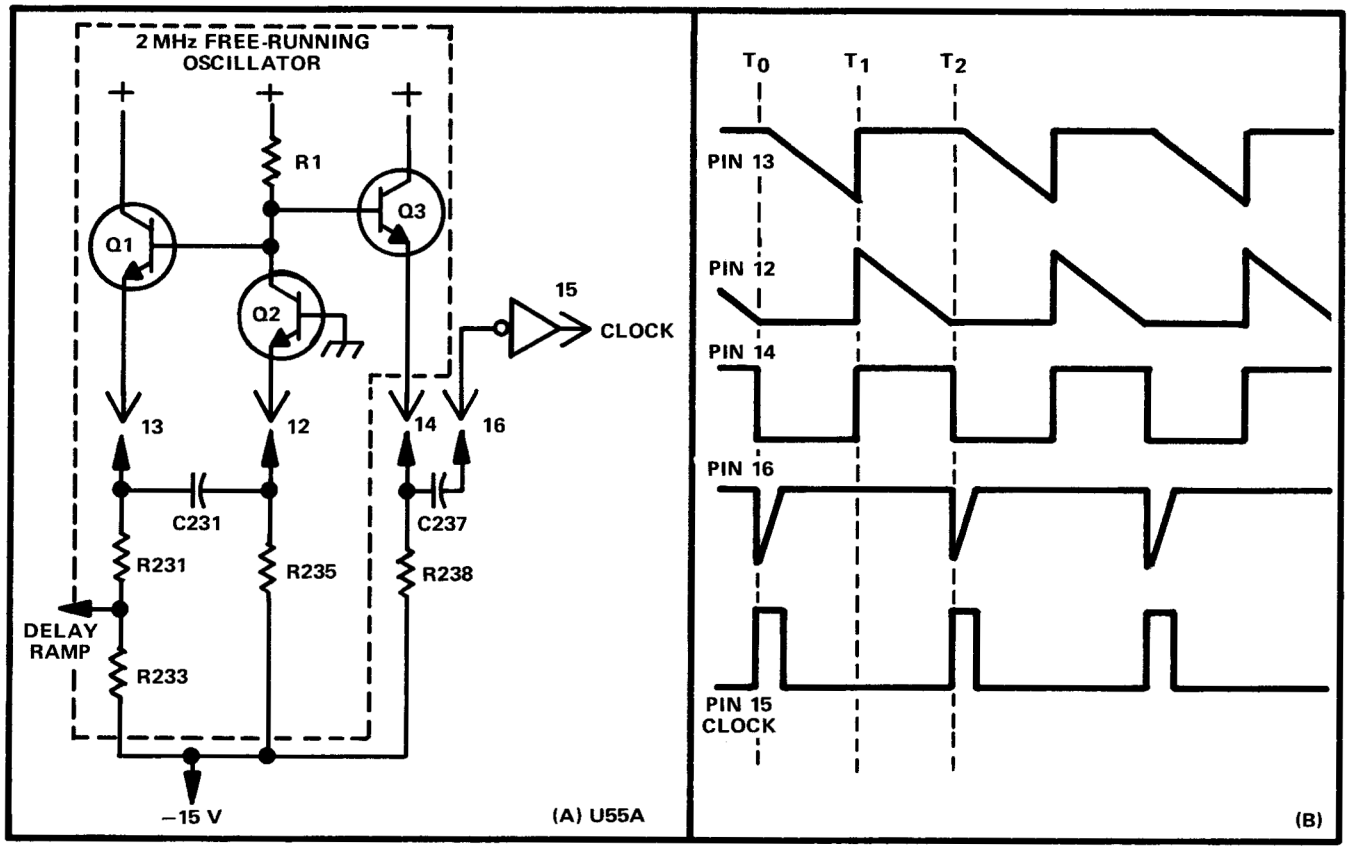


Fig. 3-3. (A) Diagram of Clock Generator stage. (B) Idealized waveforms from Clock Generator stage.

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 U230A. The output at pin 15 is a positive-going Clock pulse having a frequency of about two megahertz.

Vertical Chopped Blanking. The Vertical Chopped Blanking stage is made up of the remaining half of integrated circuit U230B; see Fig. 3-5A. 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 frequency 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. 3-4B). 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 U230A and the leading edge of the Vertical Chopped Blanking pulses (see Fig. 3-4B). 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 display 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).

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 U230B are at the correct levels. The following discussions give the operating conditions which produce Vertical Chopped

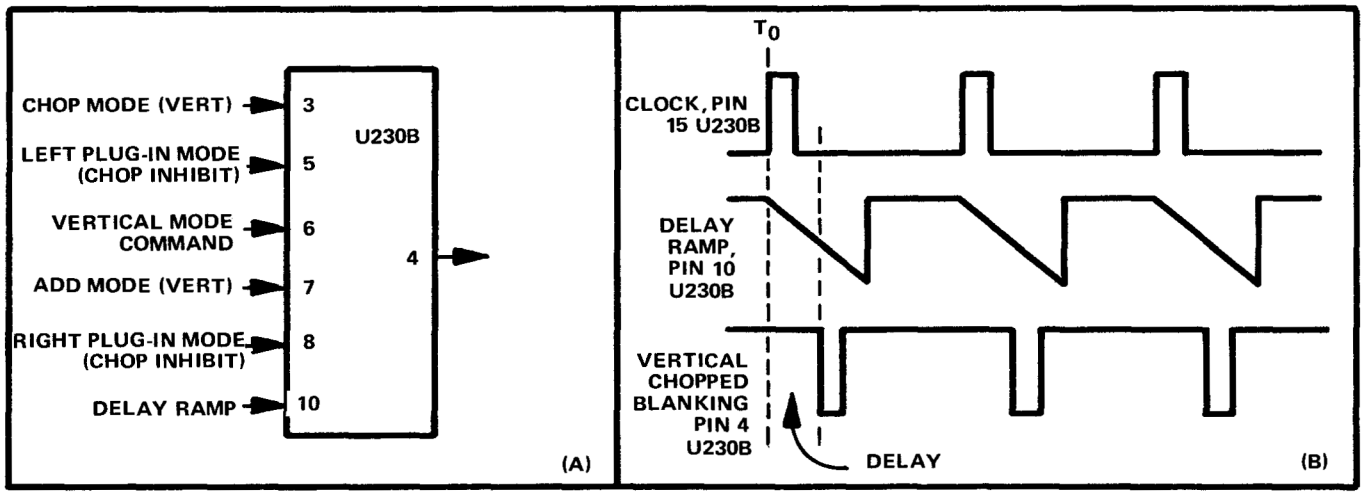


Fig. 3-4. (A) Input and Output pins for Vertical Chopped Blanking stage. (B) Idealized waveforms for Vertical Chopped Blanking stage.

Blanking pulses to blank the CRT during vertical trace switching. Fig. 3-4A identifies the functions of the pins of U230B.

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 the 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:

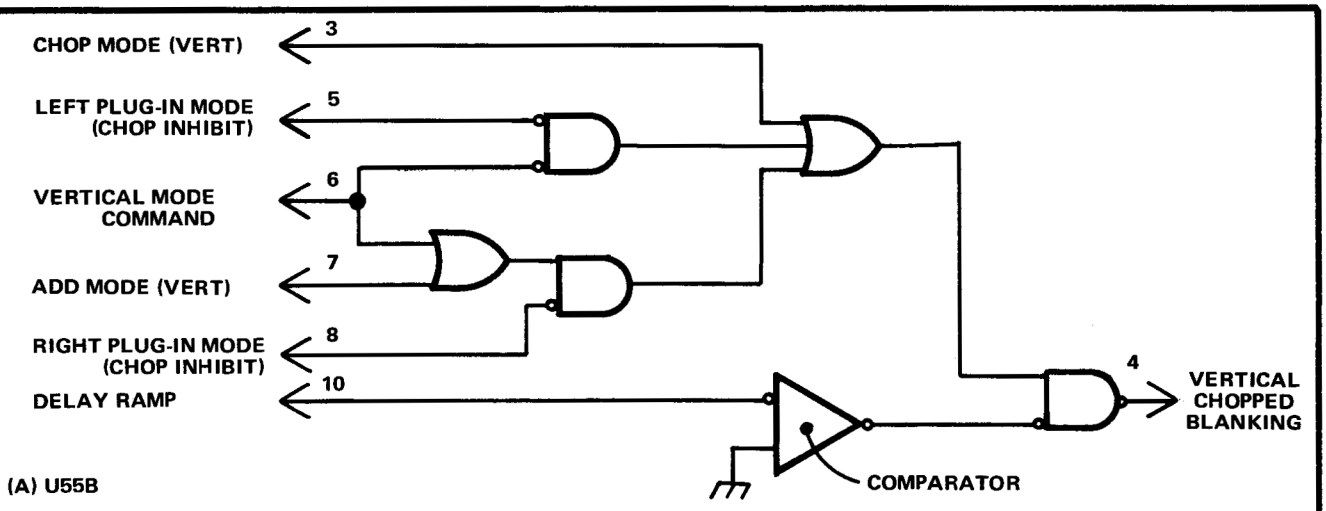
PIN 3 LO - VERT MODE switch set to any position except CHOP.

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.



(A) U55B

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.

(B)

Fig. 3-5. (A) Logic Diagram for Vertical Chopped Blanking stage. (B) Table of input/output combinations for Vertical Chopped Blanking stage.

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. 3-5A 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. 3-5B.

Chop Counter. The Chop Counter stage produces the Mainframe Chop Signal and the Vertical Plug-in Chop Signal. The Clock pulses 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. 3-6.

The Chop Counter stage consists of integrated circuit U250, a dual D flip-flop with direct-set, direct-clear inputs (see Table 3-1 for operation of D flip-flop). As connected in this circuit, these D 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 U250B. As connected, U250B changes output states with each positive-going Clock pulse, and the signal at its "1" output is a square wave that 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 U250A. U250A 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 U250A provides the Vertical Plug-in Chop Signal to the Plug-in Chop Buffer stage. Idealized waveforms showing the timing relationships between the input and output signals for this stage are shown in Fig. 3-7.

Vertical Mode Control. The Vertical Mode Control stage is made up of discrete components CR249, CR256, CR257, CR262, CR263 and buffer amplifier Q267-Q275. These components develop the Mainframe Channel Switch Signal, which is connected to the Main Interface circuit (vertical plug-in compartments and trigger selection circuitry) and

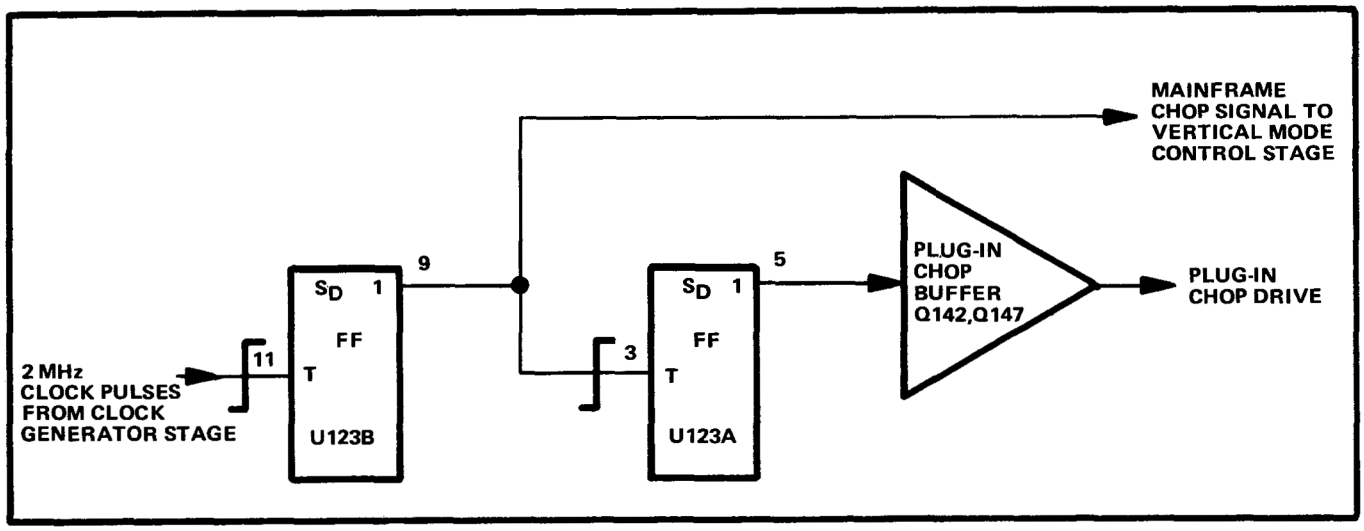


Fig. 3-6. Detailed Logic Diagram of Chop Counter stage.

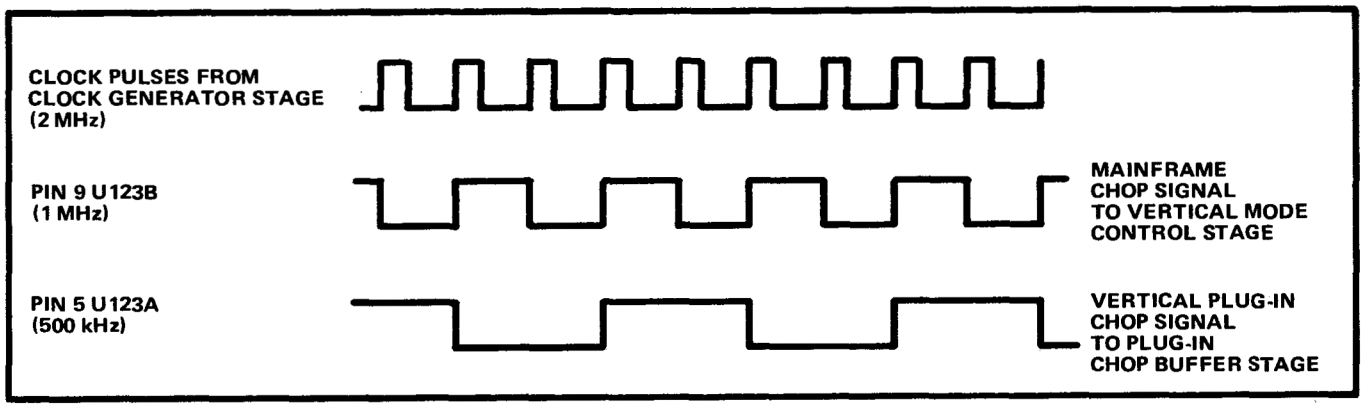


Fig. 3-7. Idealized input and output waveforms for Chop Counter stage.

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 diagrams 1 and 2 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 three 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:

1. Right. When the VERT MODE switch is set to RIGHT, a HI level is connected to the Buffer Amplifier through R257 and CR257. The LO level at the anodes of diodes CR256 and CR263 holds them reverse-biased. The resultant output from the Vertical Mode Buffer Amplifier is a HI level to indicate that the right vertical unit is to be displayed.

2. Chop. In the CHOP position of the VERT MODE switch, a HI level is applied to the anodes of diodes CR249-CR256 through R255. Both diodes are forward biased so the Vertical Chop Signal from pin 9 of U250B can pass to the emitter of Q267. This signal switches between the HI and LO levels at a one-megahertz rate and it produces a corresponding Mainframe Channel Switch Signal output at the emitter of Q275. When this output is HI, the right vertical unit is displayed; when it switches to LO, the left vertical unit is displayed.

3. Alt. In the ALT mode, the VERT MODE switch applies a HI level to the anodes of diodes CR263, CR262, through R260. These diodes are forward-biased so the Display Right Command from pin 9 of U287B can pass to the emitter of Q267 to determine the Mainframe Channel Switch signal. The Display Right Command switches between its HI and LO levels at a rate determined by the Vertical Binary stage.

4. 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 the LO level when either LEFT or ADD are selected. Therefore, the emitter of Q132 remains LO to produce a LO Mainframe Channel Switch signal. 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. 3-8. The discrete components that 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 U287B and transistor Q283. U287B is a D flip-flop with direct-set and direct-clear inputs (see Table 3-1 for operating details). The connection between the "O" 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. 3-9.

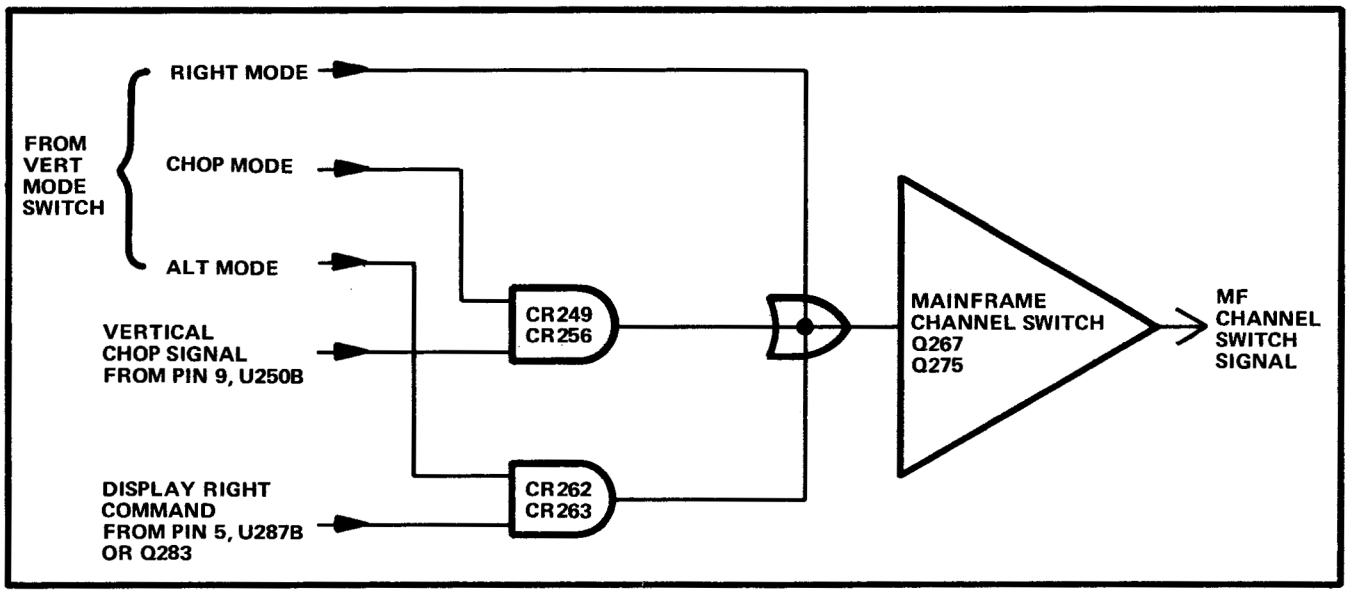


Fig. 3-8. Logic Diagram of Mainframe Vertical Mode Control and Mainframe Channel Switch Buffer Amplifier stage.

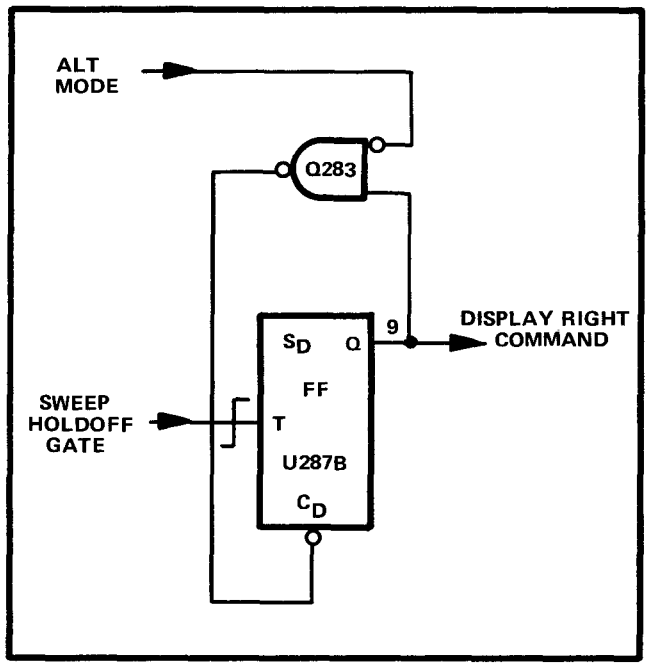


Fig. 3-9. Logic Diagram of Vertical Binary stage.

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 coneected to the emitter of Q283 through R282. This HI level disables Q283 so its collector remains HI. As a result, Q283 has no effect upon operation of the Vertical Binary stage and the direct-clear input of U287B remains HI, so it does not affect the operation of U287B. Therefore, U287B operates as a basic triggered flip-flop which changes output states with each positive-going Sweep Hold-off 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 U287B switches between the HI and LO level at one-half the rate of the Sweep Holdoff signal from the horizontal plug-in unit. Fig. 3-10 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 Q283 is pulled LO by the ALT Mode command from the VERT MODE switch. This enables Q283, but it does not change output state unless the level at the 1 output of U287B is HI. Quiescently, the output of Q283 is LO. Therefore, when the positive-going Sweep Hold-off pulse is received at the end of the sweep, the 1 output of U287B goes HI. This activates Q283 and is output goes LO to provide a

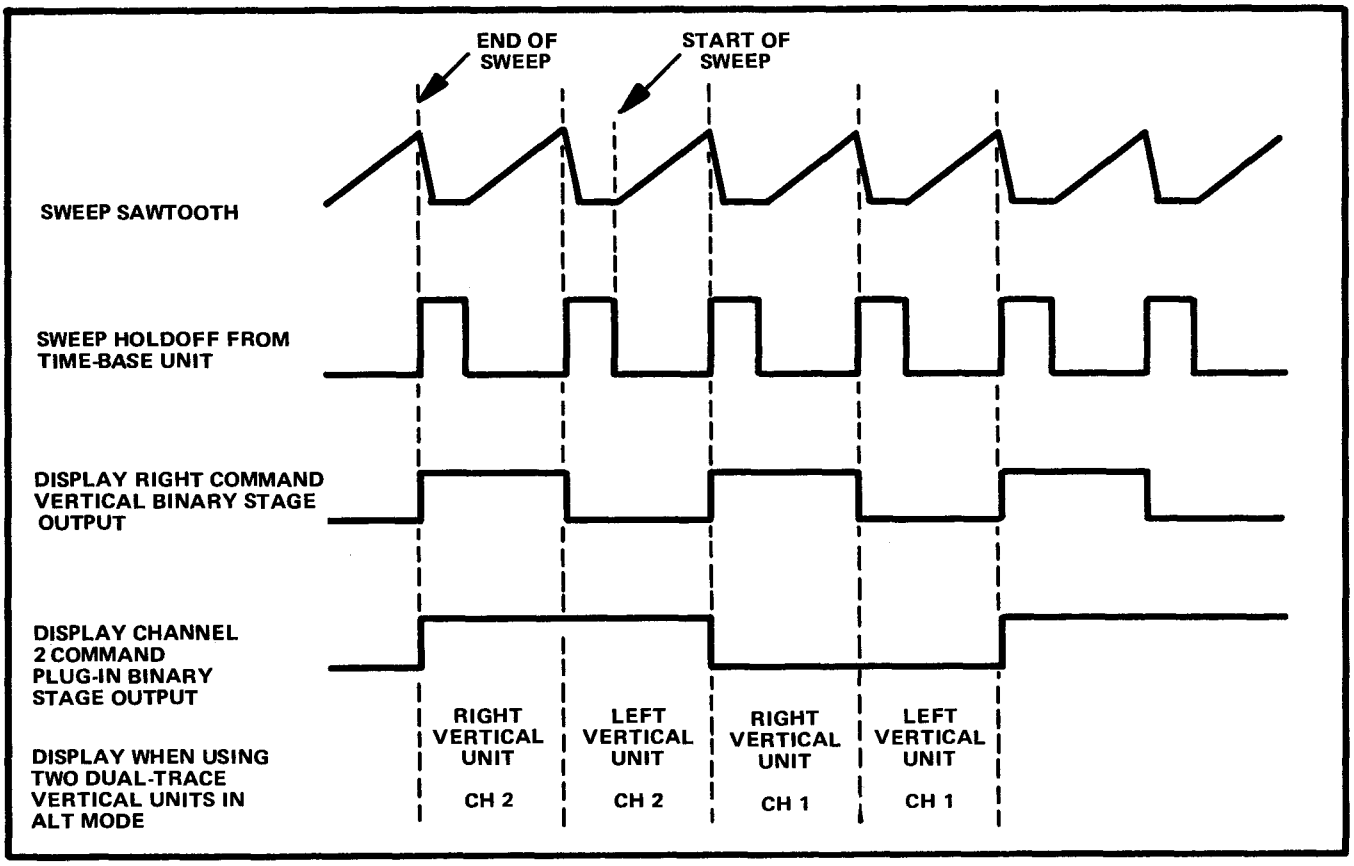


Fig. 3-10. Idealized waveforms showing relationship between input and output waveforms for the Vertical Binary and Plug-in stages when operating in the ALT mode.

direct-clear reset to U287B. The 1 output of U287B is reset to its LO level, and Q283 is again disabled, so its output returns to the HI level. The stage is now ready for 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 Hold-off input. Therefore, this stage is now operating as a divide-by-one counter instead of the divide-by-two counter 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 is 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 U287A, 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 Hold-off input (see waveforms in Fig. 3-10). 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 Hold-off input. A logic diagram of the Plug-In Binary stage is shown in Fig. 3-11.

Output Buffers. The output switching commands from the logic circuits are provided through buffer stages Q267-Q275, Q295-Q302, and Q312-Q319. Each of these stages includes a common-base input transistor to provide a low-impedance load for the associated driving stages. The output transistors are connected as emitter-followers to provide isolation between the Logic circuits, and other circuits within this instrument or the plug-in units.

Z-Axis Logic. The Z-Axis stage produces an output current that sets the intensity of the display on the CRT. The level of this output is determined by the setting of the front-panel INTENSITY control, or an external signal form the rear-panel EXT Z-AXIS input connector, or signals from the plug-in compartments. The Vertical Chopped Blanking from U230 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, or if the horizontal compartment is left vacant.

The Z-Axis Logic stage consists of transistors Q335 and Q342, plus integrated circuit U356, which serves as a signal conditioner for the main Z-Axis amplifier (see Fig. 3-12).

The Sweep Gate signal at pin 14 of U356 provides the unblanking signal for the sweep. The (AUX) Z-Axis input at pin 9 U356 increases or decreases the intensity level,

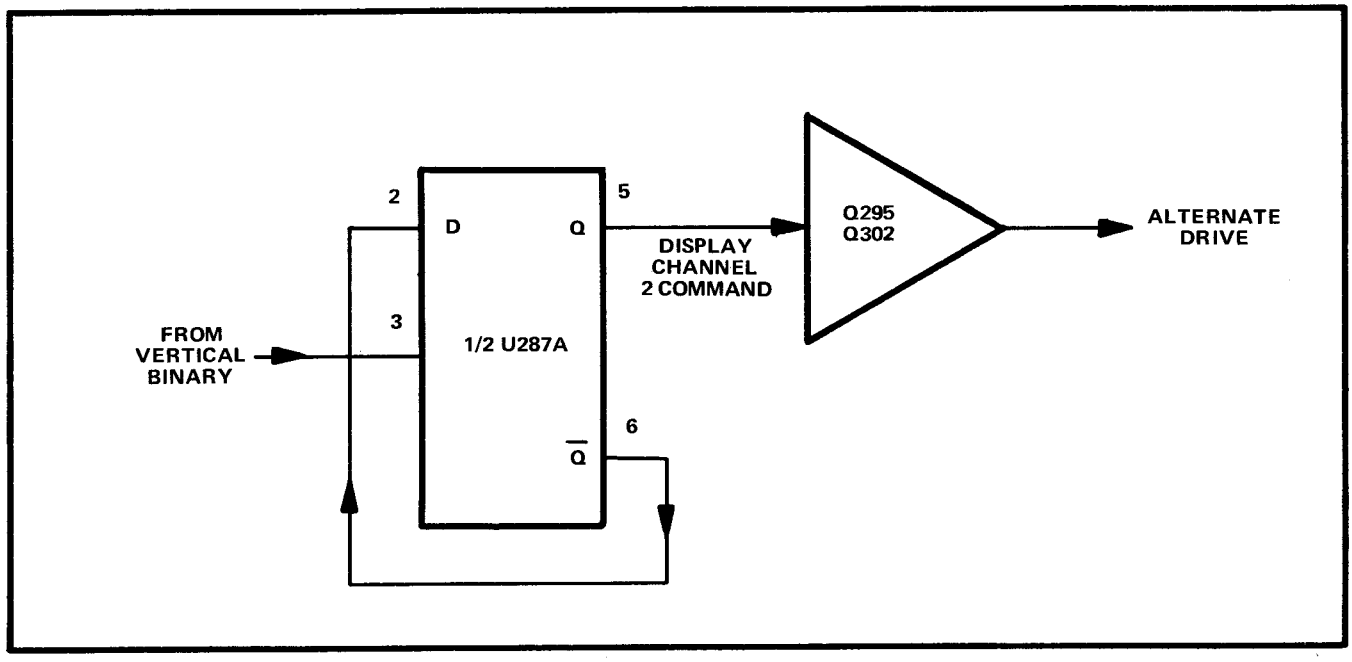


Fig. 3-11. Plug-In binary stage.

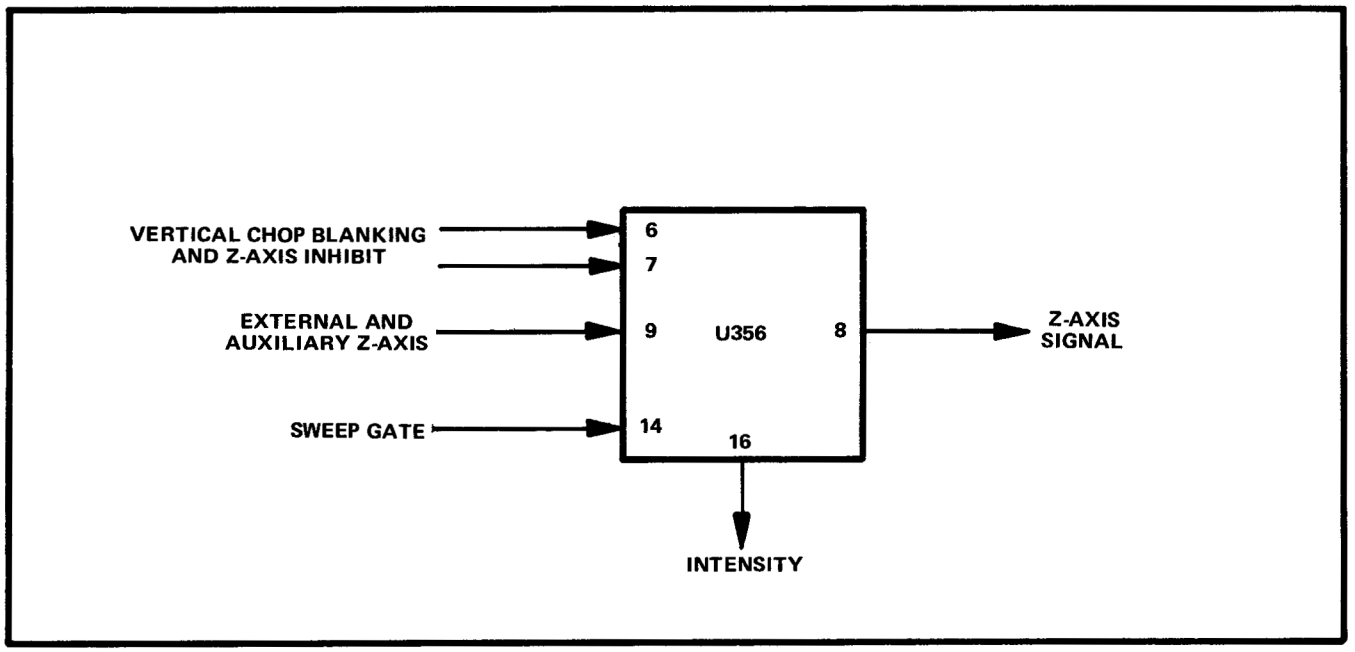


Fig. 3-12. Z-Axis Block Diagram.

depending upon the input signal at the Z-Axis input connector on the rear-panel, or Aux Z-Axis input from the plug-in compartments allows trace intensification. The intensity Limit decreases the Z-Axis output at slow sweep rates to protect the CRT phosphor. When the beam current is too high, the Beam I Sens command line and Q342 will blank the trace to prevent damage to the CRT phosphor. The Z-Axis inhibit signal turns U356 off during the readout display time. Then the READOUT (INTENSITY) controls the intensity of the readout display. When an X/Y Inhibit signal is generated by the Readout system, Q370 is turned on, allowing the READOUT control in the emitter circuit to control the collector current in Q370. The collector circuit of Q370 controls the intensity of the Readout display.

Power Supply Inverter Regulator

General. The Power Inverter/Regulator circuit provides the operating power for this instrument from a line voltage source or DC voltage source. This circuit also includes the Line Voltage Selector switch to allow for selection of a 115 V or 230 V nominal operating voltage. Fig. 3-13 shows a block diagram of the Power Inverter/Regulator circuit. A schematic is shown on diagram 9 at the rear of this manual.

Line Filter. The purpose of the Line Filter is to prevent the instrument from injecting power supply frequency interference into the power line, or power-line interference from entering the instrument. L1201 and L1203 provide both common-mode and differential filtering, using R1201 and R1203 as damping resistors and C1201 and C1203 as common-mode filters.

Line Input Circuit. Thermal cutout S1201 provides thermal protection for this instrument. If the temperature exceeds a safe operating level, S1201 opens to interrupt the applied power. When the temperature returns to a safe operating level, S1201 automatically closes to re-apply the power.

CR1215 contains the main power rectifiers for the Line Input circuit. C1216 and C1217 are the line-storage capacitors. With S1212 in the 115 V position, the circuit acts as a full-wave voltage doubler so that the voltage across the series combination of C1215 and C1217 will be the peak-to-peak value of the line voltage. In the 230 V position, CR1215 acts as a full-wave bridge rectifier. Therefore, the voltage developed across C1216 and C1217 will be approximately the same for either 115 V or 230 V operation.

RT1209 is a thermistor that limits the charging currents during turn-on. When the POWER switch is turned off, the Line Stop circuit stops the Inverter and C1216 and C1217 discharge through R1221.

WARNING

Because the discharge is slow, dangerous potentials will exist across capacitors C1216, C1217 and other connected components for several minutes after the POWER switch is turned off. The presence of voltage in the circuit is indicated by relaxation oscillator R1219, C1219, and DS1219. Neon bulb DS1219 blinks until the potential drops to approximately 100 V.

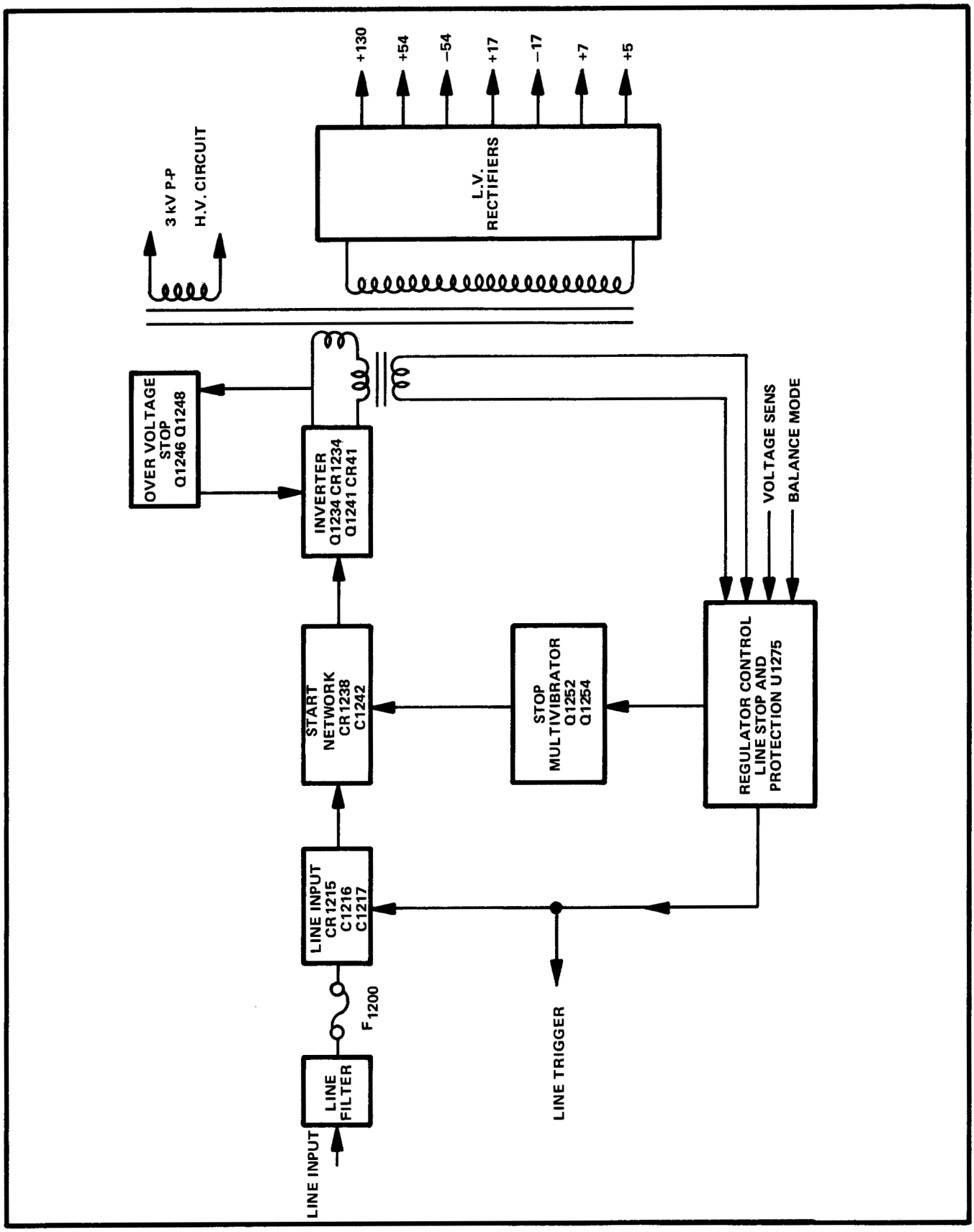


Fig. 3-13. Inverter/Regulator Power Supply Block Diagram.

DS1213 and DS1208 are line voltage transient protectors. With S1212 in the 115 V position, only DS1208 is connected across the line. If a peak voltage surge in excess of approximately 230 V is present on the line, DS1208 will breakdown and conduct producing sufficient current to open the line fuse F1801. In the 230 V position, DS1213 and DS1208 are in series across the line to protect against voltage surges exceeding 460 V.

Transformer T1208 provides a sample of the line voltage for triggering at line frequencies. It also provides a signal to the Line Stop circuit to indicate the presence of Line Voltage at the input to this circuit. T1225, C1227, and C1228 provide common-mode filtering. C1229 and L1229 act as a differential filter.

Start Network. Resistive divider R1210 and R1242 is connected between the input line and the negative side of C1217. When the line voltage goes positive, C1214 charges. At the same time CR1242 conducts charging C1237. When the voltage on C1242 reaches approximately 32 V, CR1238 conducts discharging C1242 through the base of Q1241. As Q1241 turns on, current flows through C1237, L1237 and the one turn primary of T1230 to start the Inverter. After operation has begun, CR1242 discharges C1242 with each cycle of the inverter. This disables the start network.

Inverter. Refer to the simplified schematic shown in Fig. 3-14. In normal operation the Inverter is self-oscillating. Feedback required for oscillation is provided by regeneration of the base-drive transformer T1230. The turns ratio of T1230 causes the base current to be one-fourth the collector current; i.e., Q1234 and Q1241 operate with a forced beta of four.

Polarity of the base-drive windings causes Q1234 and Q1241 to switch alternately on and off. This generates a square-wave voltage at the emitter of Q1234. The amplitude is approximately equal to the DC voltage at the input of this stage. The switching action of Q1234 and Q1241 supplies the drive necessary to maintain a sine-wave current in the series resonant circuit L1237 and C1237. This sine-wave current also drives the primary of T1310 and the one turn primary of T1230. Since the primary current in T1310 is a sine wave, the secondary currents at the cathodes of the diodes will be half sine waves; each diode conducts for half of the cycle. Q1252 is the regulator transistor, controlled by the regulator amplifier. Whenever

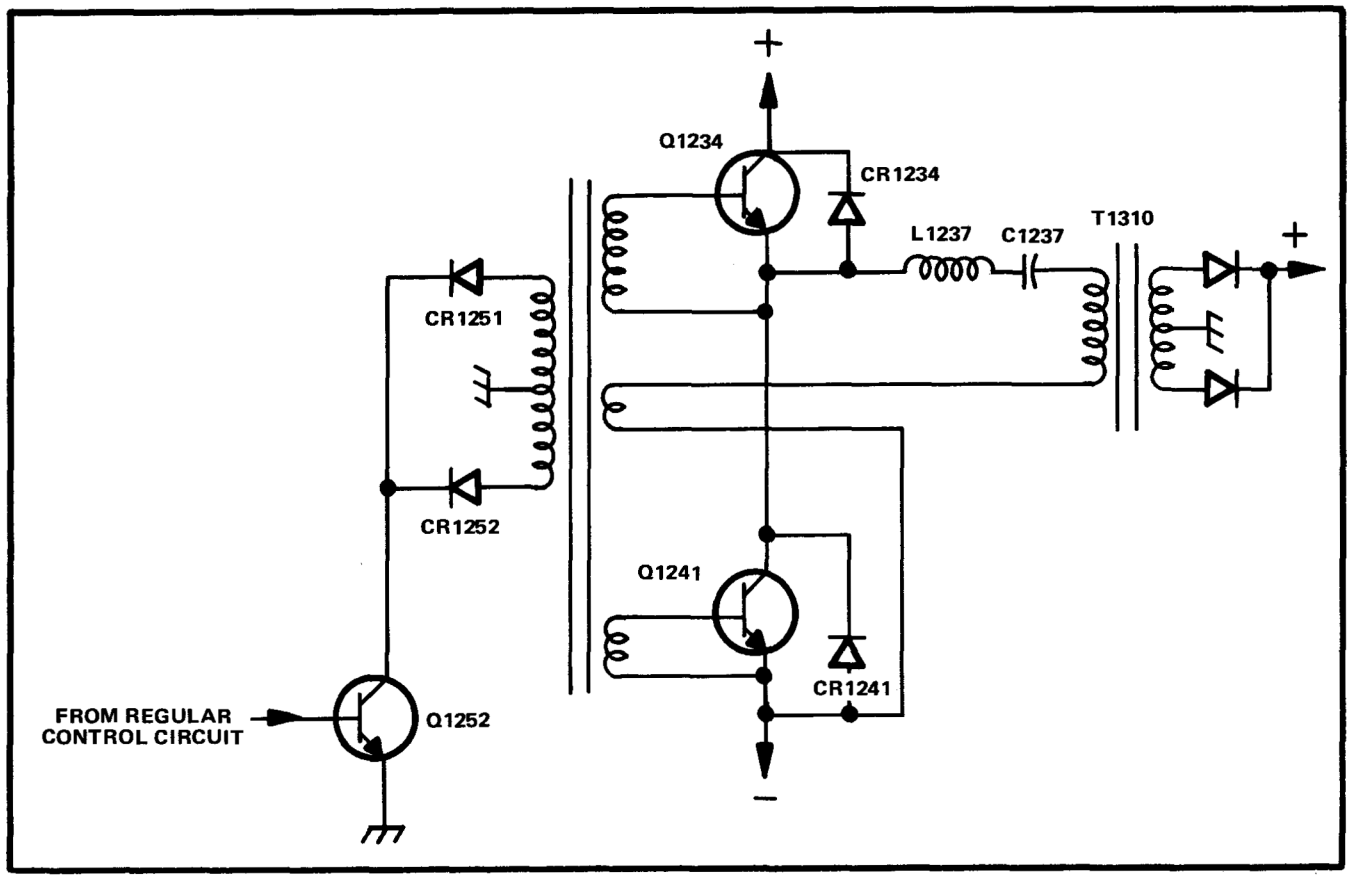


Fig. 3-14. Simplified Schematic of the Inverter Circuit.

Q1252 is on, the voltage on all secondaries of T1230 will be zero, therefore both Q1241 and Q1234 must be off when Q1252 is on. Current in the resonant circuit conducts through diodes CR1234 and CR1241 when Q1234 and Q1241 are off.

In normal operation the sequence of events is as follows: assume that the current in the series resonant circuit is passing through zero and is increasing in the direction to cause conduction in CR1234. At zero crossing, Q1252 turns on, holding Q1241 off. CR1234 conducts as long as Q1241 is off. At a controlled time after zero crossing, Q1252 is turned off by the regulator amplifier, or by regeneration developed by T1230. Q1241 then turns on, causing CR1234 to be reverse biased. Q1241 conducts as the current goes through its peak and back to zero. At zero crossing, with current increasing in the opposite direction, Q1252 turns on, holding Q1234 off. During the regulator control time, CR1241 conducts while Q1234 is off. When the regulator turns Q1252 off, Q1234 turns on, causing CR1241 to be reverse biased. Q1234 conducts as the current goes through its peak and back to zero. The cycle is then repeated.

Inverter Control

The Inverter Control circuit schematic is located in diagram 9 at the rear of this manual. The purpose of the Inverter Control circuit is to maintain constant voltages at the semi-regulated supply outputs. This is accomplished by varying the inverter frequency. The nominal resonant frequency of L1237 and C1237 is 28 kHz. Regulation is achieved by operating on the low side of resonance, in the range of 20 to 28 kHz. At the lowest line voltage and highest load, the inverter operates at a frequency close to resonance. If either the line voltage increases or the load reduces, the inverter frequency decreases.

Power and phase information to the regulator circuit is provided by transformer T1235. CR1280, CR1281, CR1282, and CR1283 are connected as a bridge rectifier to deliver both positive and negative voltages. The +7.5 V at pin 6 of U1275 is internally shunt regulated. The –2 V at pin 7 is unregulated. VR1297 provides a stable reference for the sensing divider string consisting of R1292, R1293, R1296 and R1924.

U1275 contains the regulator circuit, consisting of a voltage amplifier and a variable pulse-width monostable multivibrator. Pin 15 (normally near ground potential) is the input to the voltage amplifier. The charging ramp of the monostable is available at pin 12. Inputs that trigger the monostable appears at pins 10 and 11. The output at pin 9 drives the regulator transistor Q1252. Circuit operation is as follows: In the stable state of the multivibrator, pin 9 will be near ground, holding Q1252 off. As the inverter current goes through zero, either pin 10 or pin 11 will go positive, depending on polarity. This positive pulse sets the multivibrator into its unstable state. During the unstable state, pin 9 will be positive holding Q1252 on. The duration of the unstable state is determined by the voltage sensed at pin 15. If the voltage is low, the duration will be short. As the voltage increases, the duration becomes longer.

The unstable state pulse width controls the inverter frequency because when Q1252 is on, both Q1234 and Q1241 are off. Power delivered to T1230 varies with inverter frequency because the impedance of the series resonant circuit L1237 and C1237 varies with frequency.

Inverter Current Limiting Circuit. U1275 also contains the Inverter Current Limiting circuit. Circuit operation is similar to voltage regulation, except that the pulse width of the multivibrator is varied so that the inverter current never exceeds a safe operating level. The current limit circuit takes over control of the multivibrator during the turn-on surge or whenever an overload on a semi-regulated supply causes the inverter current to reach the limit value. R1287 is the current sensing resistor. Voltage at the junction of R1287 and R1286 will be the negative rectified inverter current, at a scale of approximately 0.7 volt/ampere. The current sense input at pin 13 is normally held positive by R1285. During current limit, the negative voltage at the junction of R1287 and R1286 pulls pin 13 toward ground. Multivibrator pulse width then increases until the current limits at a value that holds pin 13 near ground. If the circuit remains in current limit for more than approximately 30 ms, pin 8 goes positive, tripping the stop monostable, which stops the inverter (see protection circuit description).

Overvoltage Stop Circuit. Transistors Q1246 and Q1248 provide a circuit to stop the inverter whenever the voltage across the primary of T1310 exceeds a safe level. CR1242 charges C1242 to peak of the voltages across T1310. If this voltage exceeds a safe level, VR1246 condusts turning on Q1248. Capacitor C1242 then discharges through Q1248 into the base of Q1246. When Q1246 is on, Q1241 is held off, stopping the inverter. The inverter cannot restart until CR1272 has charged C1242 to the breakdown voltage of CR1238.

Line Stop Circuit and Surge Limiting. The Line Stop Circuit stops the inverter when the POWER switch is turned off, or the AC line voltage falls below a minimum value. This circuit function is necessary to limit the turn-on surge current and thereby protect the POWER switch, Line Fuse, and Line Bridge Rectifier.

When the instrument is first turned on, thermistor RT1209 has a value of approximately 5 ohms. The ther-

mistor limits line current charging of C1216 and C1217. As the instrument continues to operate, the thermistor warms up and drops in resistance. When the instrument is turned off, the Line Stop circuit stops the inverter, leaving C1216 and C1217 charged. The line storage capacitors now discharge through R1221 at a rate approximately equal to the thermal recovery of the thermistors. This rate ensures enough thermistor resistance to limit surge current whenever the instrument is turned back on.

A simplified schematic of the Line Stop circuit is shown in Fig. 3-15. Line Trigger transformer T1208 generates a ground reference Line Frequency signal of approximately 1 V peak-to-peak. This signal is biased to +0.4 V by R1270 and R1269. Under normal operation, C1267 charges toward +7.5 V through R1267 until a positive-going signal from T1208 turns Q1, on discharging C1267. This repeats each line cycle. When the POWER switch is turned off. Q1 stays off, allowing C1267 to charge. When the voltage at pin 3 of U1275 reaches approximately +0.7 V, the inverter control circuit inside U1275 allows pin 8 to go positive, triggering the stop monostable, which stops the inverter. For trouble shooting at low voltage, the line stop circuit may be disabled by grounding the Line Stop Time pin 3.

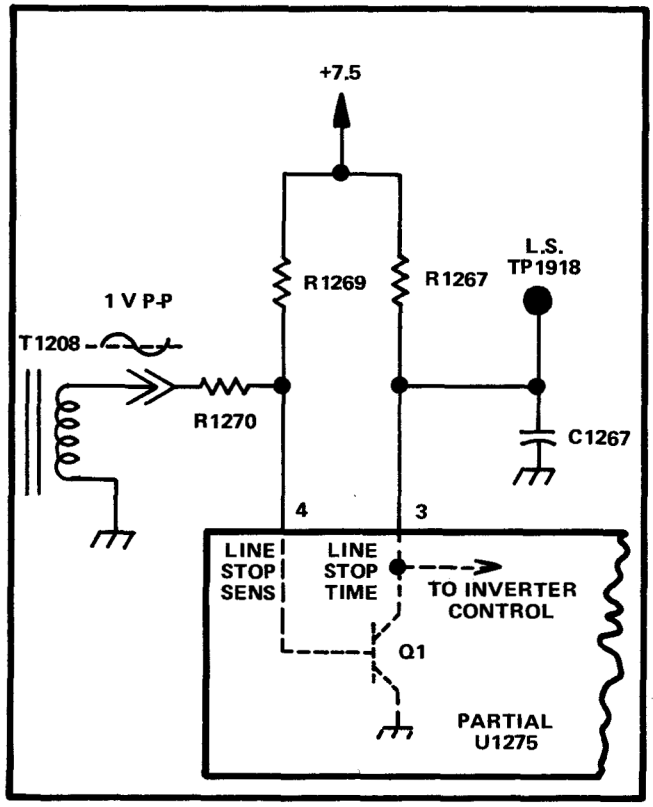


Fig. 3-15. Line Stop Circuit simplified schematic.

Power Supply Protection Circuit. The power supply protection circuit provides fault protection for the inverter, low voltage, and high voltage power circuits. Fig. 3-16 shows a simplified block diagram of the power supply protection circuit. A schematic of this circuit is shown on diagram 13 at the rear of this manual.

Power supply protection is accomplished by operating the inverter in a pulse mode. When a fault is present, the inverter will come on for a short period of time, then shut off for a longer period of time. The cycle repeats until the fault is removed.

Stop Monostable. Q1252 and Q1254 form a monostable multivibrator, which acts to stop the inverter when a fault is detected by U1275. During the start period T1230 supplies current to charge C1259 and C1256 through CR1251, CR1256, CR1252 and CR1259. At the same time T1235 supplies power to U1275. As U1275 becomes active, pin 8 acts as a current sink, holding Q1254 off. Pin 8 of U1275 will remain at ground during the start period and sampling period. If a fault exists at the end of the sampling period, pin 8 of U1275 stops conducting, allowing Q1252 and Q1254 to turn on. When these transistors turn on, the voltage on all secondaries of T1230 will go to zero, stopping the inverter. Once triggered on, the stop monostable will stay on while C1259 discharges through R1261 into the base of Q1254. If U1275 is removed from its socket or is otherwise nonfunctional, the monostable stops the inverter after the first few cycles of operation. In this mode, the duty cycle is much shorter because C1259 does not have sufficient time to charge.

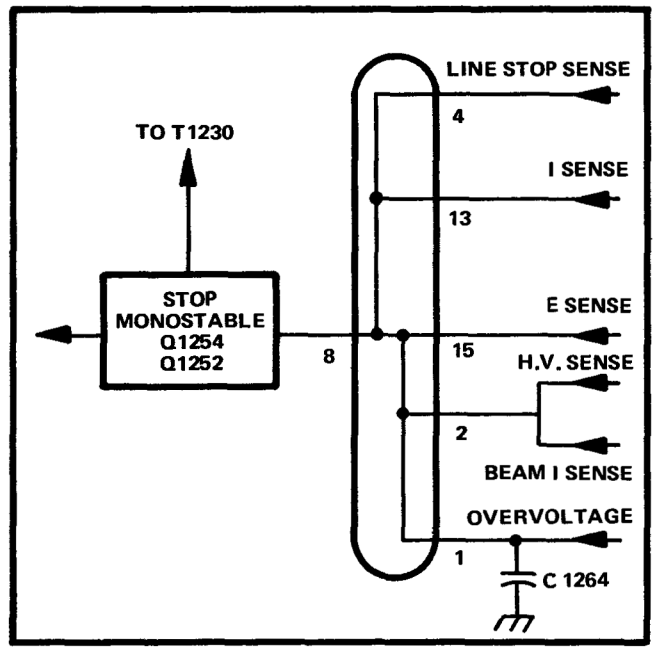


Fig. 3-16. Power Supply Protection Circuit Block Diagram.

Balance Mode. The Balance Mode provides short-circuit protection for all semi-regulated and regulated DC voltages. It also provides over-current protection for the CRT. Pin 2 of U1275 is the input to the voltage balance amplifier. If the voltage at pin 2 of U1275 is more positive than +200 mV or more negative than −200 mV, the output will generate an error to stop the inverter. Under normal operating conditions, the current from the +5 L to the Balance Mode pin equals the current from the −17 supply, allowing pin 2 to shift into the error region. Shorting a positive supply moves the Balance Mode negative and vice versa. Normally, the BEAM I sense signal does not have sufficient amplitude to cause conduction in CR1378; therefore it has no effect on the Balance Mode. If excessive current is drawn from the cathode multiplier or the H.V. winding in T1310, the amplitude of the BEAM I sense signal increases, causing CR1378 to conduct, and producing an error that stops the inverter. This will only occur when the normal beam limit circuit is inoperative.

Overcurrent Protection. Pin 13 of U1275 is the input to the Inverter Current Regulator circuit. If a semi-regulated supply is shorted, the regulator circuit allows the inverter current to increase to the limit value and remain there throughout the sampling period. At the end of the sampling period, pin 8 of U1275 goes positive, stopping the inverter.

Low Line Voltage Protection. If the line voltage drops significantly below the minimum specified value, the inverter cannot maintain the correct voltages at the semi-regulated supply outputs. When this occurs, an error is generated by the voltage regulator, causing pin 8 of U1275 to go positive and stopping the inverter. The Line Stop Circuit also stops the inverter if the line voltage is low (see Line Stop Circuit Description).

Sampling Period Timer and Overvoltage Protection. When an error is present at the input to the circuit a current is generated which charges C1264 through pin 1 of U1275. When pin 1 reaches +0.7 V, pin 8 of U1275 will go positive and stop the inverter.

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 and the Auto-Focus amplifier. Figure 3-17 shows a detailed block diagram of the CRT circuit. A schematic of this circuit is shown on diagram 11 in the rear of this manual.

Filament Voltage. Filament voltage for the CRT heaters is provided by a separate winding on T1310. The filament voltage is not elevated to cathode potential.

High Voltage Supplies. A semi-regulated voltage for operation of the high voltage supplies is provided by the high voltage winding of T1310. One end of T1310 is connected to ground through high-voltage current-sensing resistor R1604. A 3 kV peak-to-peak square wave is generated and provides the power necessary to operate the Anode Supply, Cathode Supply, and DC Restorer Circuits.

1. ANODE SUPPLY. The Anode Supply consists of 7X multiplier assembly U1615.

2. CATHODE SUPPLY. The CRT cathode voltage (3 kV) is generated by a 2X multiplier consisting of CR1607, CR1608, C1607 and C1608. R1609 and C1609 provide high frequency filtering. R1612 and C1612 provide high frequency filtering and an AC coupling path for the cathode regulator.

3. CATHODE REGULATOR. The cathode regulator maintains the cathode at 3 kV and reduces AC ripple. U1635 is a noninverting preamplifier and Q1627 and Q1631 form an inverting output amplifier. A DC charge at U1635 input, sensed by R1640B and R1640A (thick film resistors) starts the regulator action. If the voltage at U1635 input goes positive, the output at TP1625 goes negative. This causes the voltage on C1606 to increase during the positive voltage cycle of T1310. Note that the voltage on C1606 is the difference between the positive voltage on T1310 and the voltage at TP1625.

During the negative half of the voltage cycle, the increased voltage on C1606 increases the voltage at the output of the cathode multiplier, thus correcting the original error. R1642 and C1642 provide a low impedance coupling path or AC changes to the input of U1635. The output correction is AC-coupled through C1612 directly to the cathode. CR1625, CR1632, CR1638 and CR1639 provide short circuit protection.

Grid DC Restorer. The purpose of the DC restorer circuit is to elevate the output of the Z-Axis amplifier to a potential more negative than the cathode, thereby allowing the grid to control the beam current of the CRT. The circuits are short-circuit protected by R1719, DS1718 and DS1719; R1682, DS1687 and DS1688.

The DC Restorers are current driven from the square wave at the high voltage winding through R1618, R1619, R1651, R1652, R1671 and R1672. When R1674 goes positive, CR1676 conducts at the grid bias voltage potential. This clamping action establishes the positive swing of the DC Restorer drive. On the negative swing of T1310, CR1680 conducts at the voltage established by the Z-Axis output. This clamping action establishes the negative swing

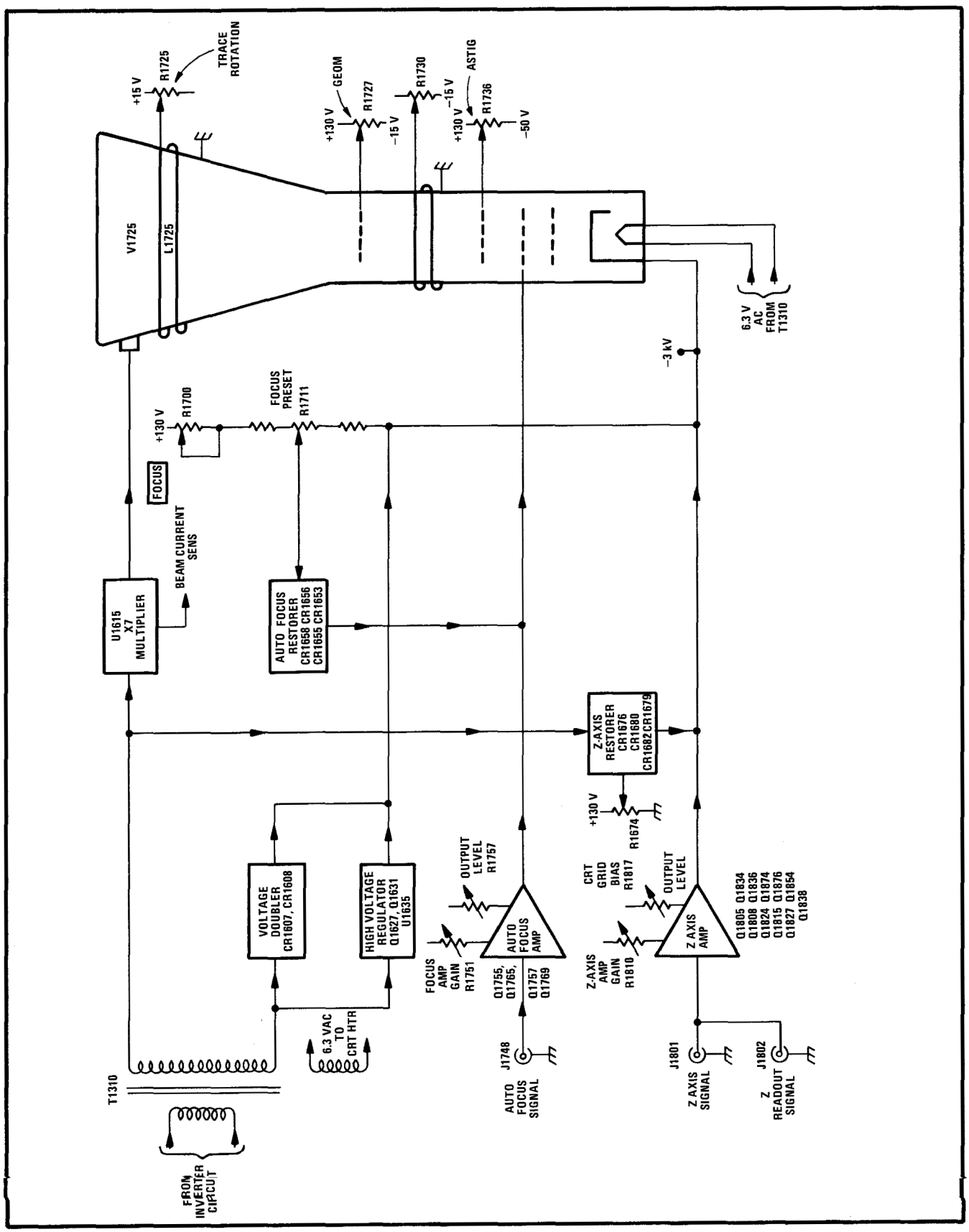


Fig. 3-17. Detailed Block Diagram CRT Circuit.

of the DC Restorer drive. The AC swing of the DC Restorer drive is coupled from the low-voltage section to the high-voltage section by C1678. On the positive swing of the DC Restorer drive, the high voltage end of C1678 is clamped to the cathode voltage by CR1682. During the negative swing of the DC Restorer drive, CR1679 charges C1680 to a voltage more negative than the cathode by an amount equal to the difference between the grid bias setting and the voltage at the output of the Z-Axis amplifier. Fast AC coupling between the Z-Axis and the CRT grid is provided by C1684. A slower AC path is by way of R1686 and C1680.

Focus DC Restorer. The operation of the Focus DC Restorer circuit is similar to the operation of the Grid DC Restorer. The AC swing of the DC Restorer drive is coupled from the low-voltage circuit to the high-voltage circuit by C1654. The positive swing is established when CR1653 clamps at the Focus DC Restorer level voltage. This voltage is approximately 130 V. The negative swing is established when CR1656 clamps at the output voltage of the Auto-Focus amplifier. During the positive swing of the Focus DC Restorer drive, the high voltage end of C1654 is clamped to the focus potentiometer voltage by CR1658. During the negative swing of the Focus DC Restorer drive, CR1655 charges C1656 and thereby establishes the proper level at the focus electrode. The focus adjustment R1700 is set for optimum focus at low intensity level.

Auto-Focus Circuit. The Auto-Focus circuit provides an output voltage that keeps the display focused for all settings of INTENSITY control. Transistors Q1755, Q1757, Q1765 and Q1769 form a noninverting operational amplifier. Resistors R1751, R1752, R1753 and R1754, combined with diodes CR1753 and CR1754, form a waveshaping circuit. This circuit provides non-linear amplification to conform to the requirements of the CRT focus electrode.

Z-Axis Amplifier. The Z-Axis signal from the logic circuitry is connected to Q1805 through R1801 or R1802. Transistor Q1805 provides impedance matching between the logic circuitry output and Q1808. Transistors Q1808, Q1824, Q1815 and Q1827 form a noninverting current-driven operational amplifier. The gain and output level is set in this stage. The output stage consists of Q1874, Q1876, Q1854, Q1836, Q1834 and Q1838, a high speed operational amplifier. Transistor Q1838 is a constant current source for transistors Q1834 and Q1836. Transistors Q1834 and Q1836 force current into the emitter of Q1854 to provide a fast rising pulse at the output. Transistors Q1874 and Q1876 maintain the output pulse level. The Z-Axis amplifier is compensated in this stage by R1842, R1844, C1842 and C1846, to provide a fast rising pulse with optimum square corner.

Beam Current Limit. For sweep speeds 50 ms/div and slower or for the X-Y mode, the beam current is limited to 5 μA, to protect the CRT phosphor. The Intensity Limit provides this function. For sweep speeds faster than 50 ms/div, the Beam current sense allows 20 μA. The Beam current sense line is connected to Q342 (Z-Axis logic) and to Q1373. The collector circuit of Q1373 provides an input to the Balance sense input (pin 2 U1275). When the input is greater than 20 μA, an error is developed, causing the inverter to stop. Power supply shutdown in caused by excessive beam current. When the control circuits are unable to keep the average beam current within the 5 μA or the 20 μA limit, the voltage at CR1306 causes an error. To prevent shutdown from being signaled during the first 200 ms of instrument turn-on, capacitor C1371 and resistor R1371 provides a delay to compensate for charging currents in the CRT supply. At this time, a higher beam current limit (approximately 30 μA) is required to stop the inverter.

CRT Control Circuits. The ASTIG adjustment (R1736) is used in conjunction with the FOCUS adjustment (R1700) to obtain a well-defined display. R1736 varies the positive level on the astigmatism grid. Geometry adjustment R1727 varies the positive potential on the mesh to control the overall geometry of the display.

Two adjustments control the trace alignment by varying the magnetic field around the CRT. Y Axis Align adjustment R1730 controls the current through L1730, which affects the CRT beam after vertical deflection but before horizontal deflection. Therefore, it affects only the vertical (Y) components of the display. TRACE ROTATION adjustment R1725 controls current through L1725, which affects both the vertical and horizontal rotation of the beam. See the Calibration procedure for Focus Preset and Shields Volt adjustment.

Low-Voltage Supplies

The secondary windings of T1310 provide the source voltage for the low-voltage rectifiers and regulators. Each supply is full-wave rectified, then sent through pi filters. A schematic is shown on diagram 10 at the rear of this manual of each regulator. The regulators are series type; the –50 V supply is used as the reference supply.

The basic operation of all the regulators is the same as the +50 V regulator. Thus, only the +50 V regulator is discussed here. See Fig. 3-18 for the Low-Voltage block diagram. Transistors Q1409A and Q1409B form a comparator between the –50 V supply and the +50 V SENS line. Figure 3-19 illustrates the reason for using SENS lines. The inherent resistance of the interconnecting wire between the supply and load produces a voltage drop that is equal to the output current multiplied by the resistance of the

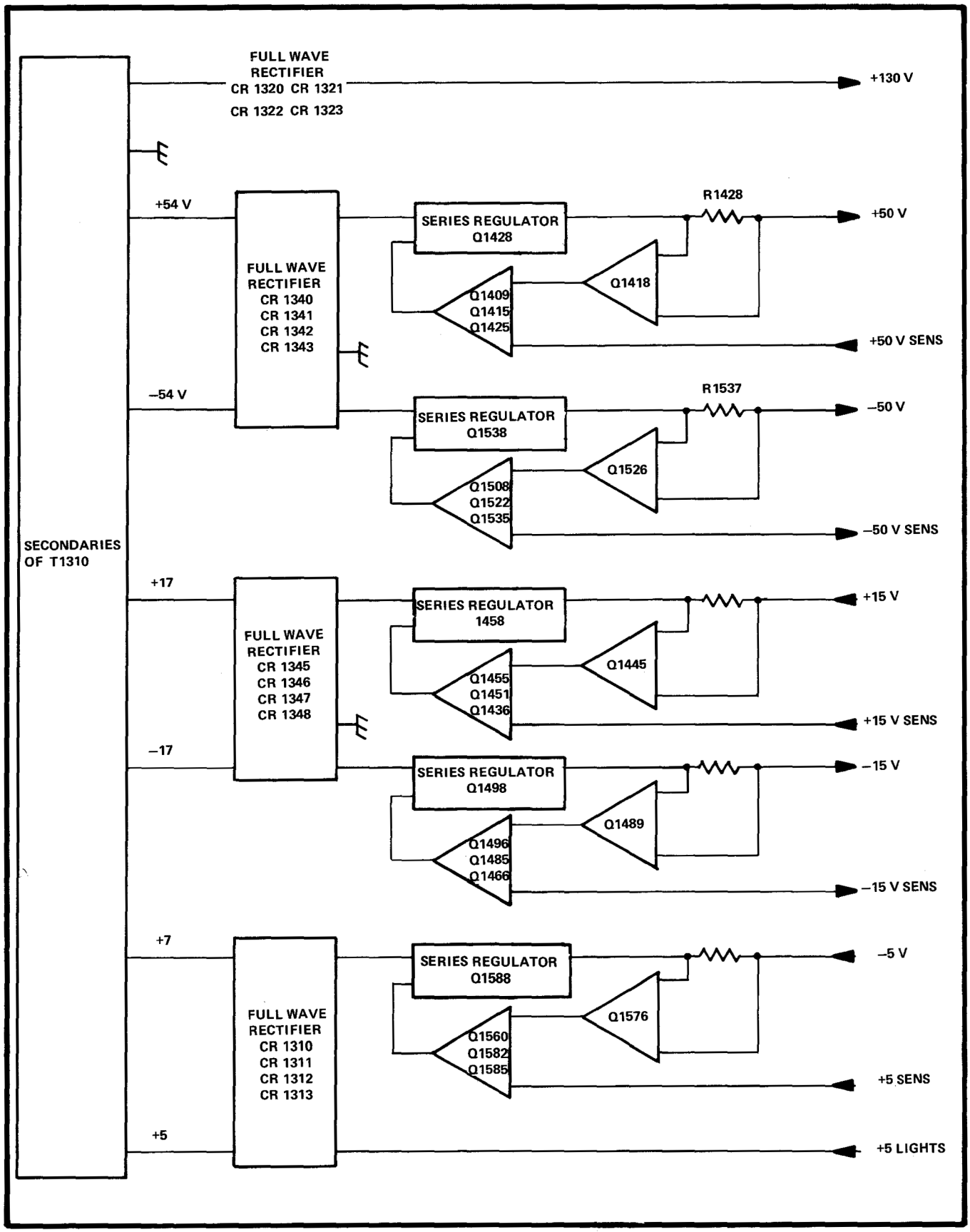


Fig. 3-18. Low-Voltage Power Supplies.

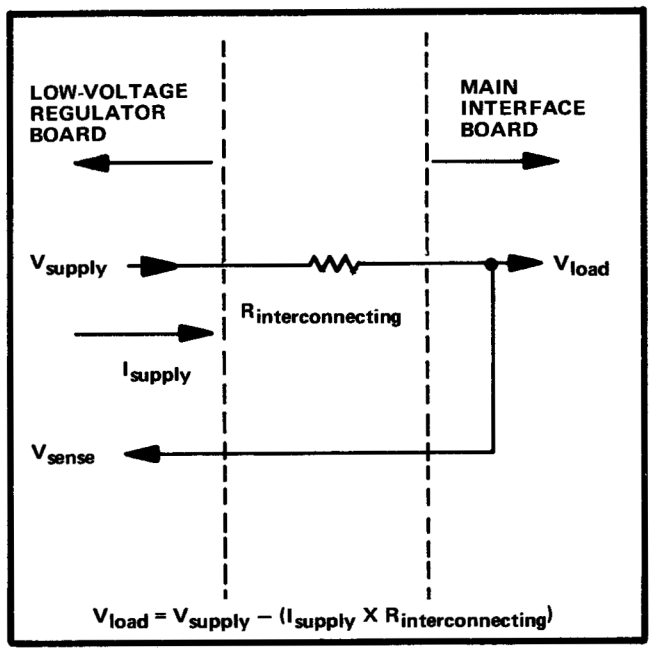


Fig. 3-19. Schematic illustrating the voltage drop between power supply Output and Load due to resistance of the interconnecting wire.

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, the SENS voltage is taken from a point as close to the load as possible. Transistor Q1415 is an error amplifier that drives Q1425, which in turn drives series regulating transistor Q1428. Transistor Q1418 provides overload protection. When the output voltage of the +50 V supply is greater than +50 V, Q1409B is turned on and Q1409A is turned off. When this occurs, Q1415 reduces the conduction of Q1425 and Q1428 to limit the output voltage. When the +50 V supply decreases, Q1409A is turned on, which provides Q1415 with an error signal to turn Q1425 and Q1428 on harder, increasing the output voltage.

Vertical System

Introduction. The Vertical System circuit includes the vertical channel switch, a delay line, and the vertical output amplifier. The channel switch determines which vertical signal is displayed (or turns off both vertical channels), and allows the encode readout data to be displayed. The delay line provides approximately 60 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 delay allows the vertical amplifier to display the leading edge of the signal originating the trigger for the sweep. The vertical output amplifier stage provides the final amplification of the vertical signal to drive the vertical deflection plates. Figure 3-20 shows a detailed block diagram of the Vertical System.

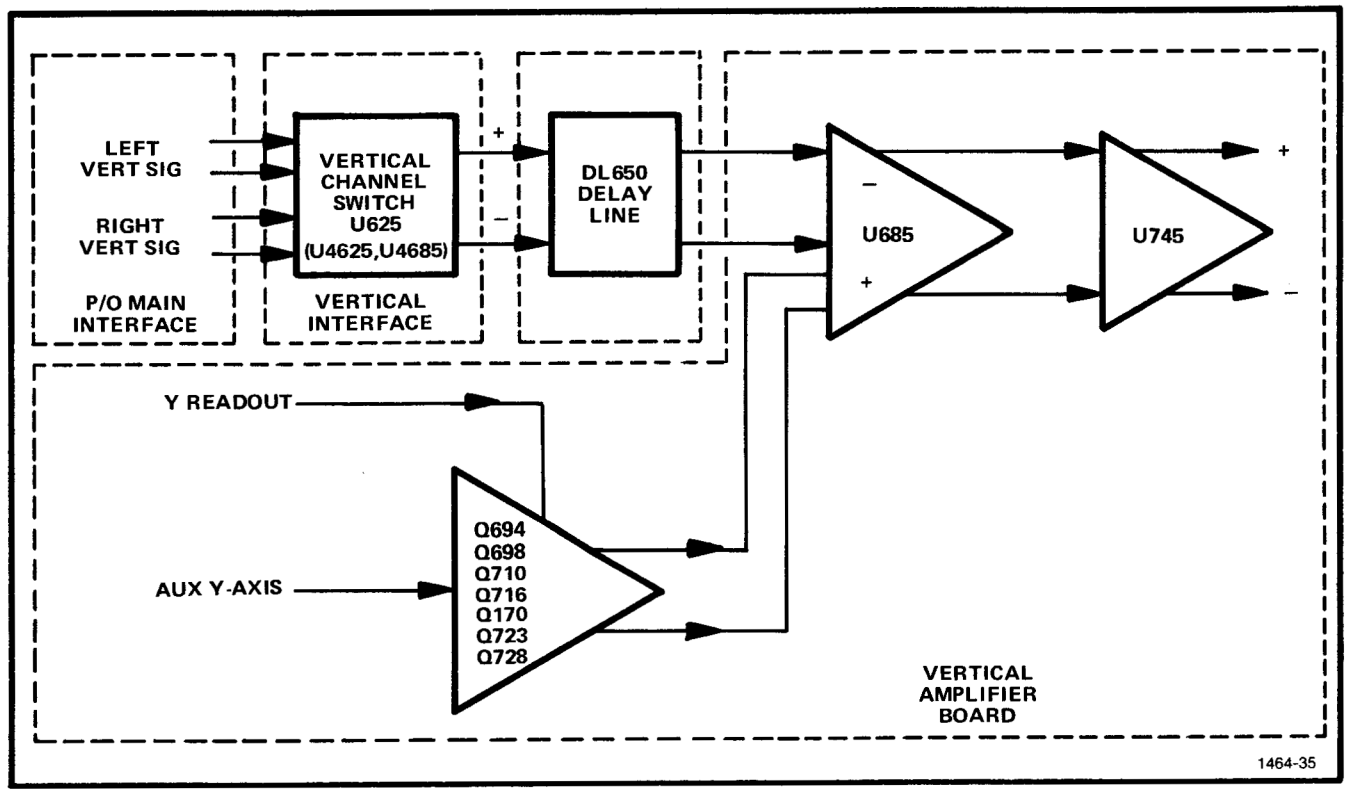


Fig. 3-20. Vertical Output Amplifier Block Diagram.

Vertical Channel Switch. The main component is integrated circuit U625. It provides high-impedance differential inputs for both vertical plug-in compartments. The output signal at pins 1 and 2 is a push-pull signal, which is connected to the delay line. The sum of the DC currents at the output is always equal to the sum of the DC currents at the bias inputs (pins 10, 11, 12 and 17) in all modes. This provides a constant DC bias to the following stage as the VERT MODE switch is changed. The X/Y inhibit signal stops both vertical channels from reaching the output. The X/Y inhibit signal also lowers the supply voltage by turning Q616 on and reducing the conduction of Q617, limiting the voltage on pin 3 of U625. For SN B119999 and below.

Vertical Amplifier. The main components of this stage are integrated circuits U685, associated vertical centering circuitry, and U745. Integrated circuit U685 provides a low input impedance to permit accurate delay line termination. Pins 5, 6, 11, and 12 permit the quiescent operating level, gain and balance to be set by discrete components. The balance of the stage is maintained by a paraphase amplifier (Q723, Q728, Q710, Q716, Q698 and Q694) and the Vert Cent adjustment (R712), the RO Vert Cent adjustment (R676) or the Aux Y Axis input signal. The Aux Y Axis input is used by dual trace vertical plug-in units for vertical trace separation. When the readout data is ready to be displayed, the Y Readout signal is connected to the base of Q723 through R719. The signal is a single-ended signal that is converted to a push-pull signal by transistors Q723 and Q728. Since the signal from the vertical plug-in unit is blocked, only the Readout signal provides the vertical deflection. The X/Y inhibit signal turns on Q705, allowing the RO Vert Cent adjustment to control the DC balance of the stage. Vert Gain adjustment R730 and thermistor RT731 controls the current gain of the Vertical system. The thermistor provides thermal compensation. Integrated circuit U745 provides final amplification for the vertical signal to drive the CRT vertical deflection plates. Pins 12, 1, 7 and 6 of U745 permit the quiescent operating level, gain and frequency compensation to be set by discrete components. The series RC networks in parallel with R741 and R756 provide frequency compensation. The current for U745 is supplied from ground through the BEAM FINDER switch (S125). When the BEAM FINDER switch is actuated, the only current source for U745 is through R771. This limits the dynamic range of this stage by limiting its current, so the display is compressed vertically. When an X/Y inhibit signal is applied to the base of Q776, it is turned off and Q773 is turned on, providing a current source for U745 even if the BEAM FINDER switch is actuated. The output signal of U745 is connected directly to the vertical deflection plates of the CRT. A distributed deflection plate system is used for maximum frequency response and sensitivity. For SN B120000 and up.

Horizontal System

Introduction. The Horizontal System includes the Horizontal Channel switch and the Horizontal Amplifier. The Horizontal Amplifier circuit amplifies the push-pull horizontal signal from the Horizontal Channel switch and connects it to the horizontal deflection plates of the CRT. The single-ended Readout signal is converted to a push-pull signal in this stage, and amplified for the X portion of the Readout display. Figures 3-21A and B show a detailed block diagram of the horizontal system. A schematic diagram of this circuit is shown on diagram 7 at the rear of this manual.

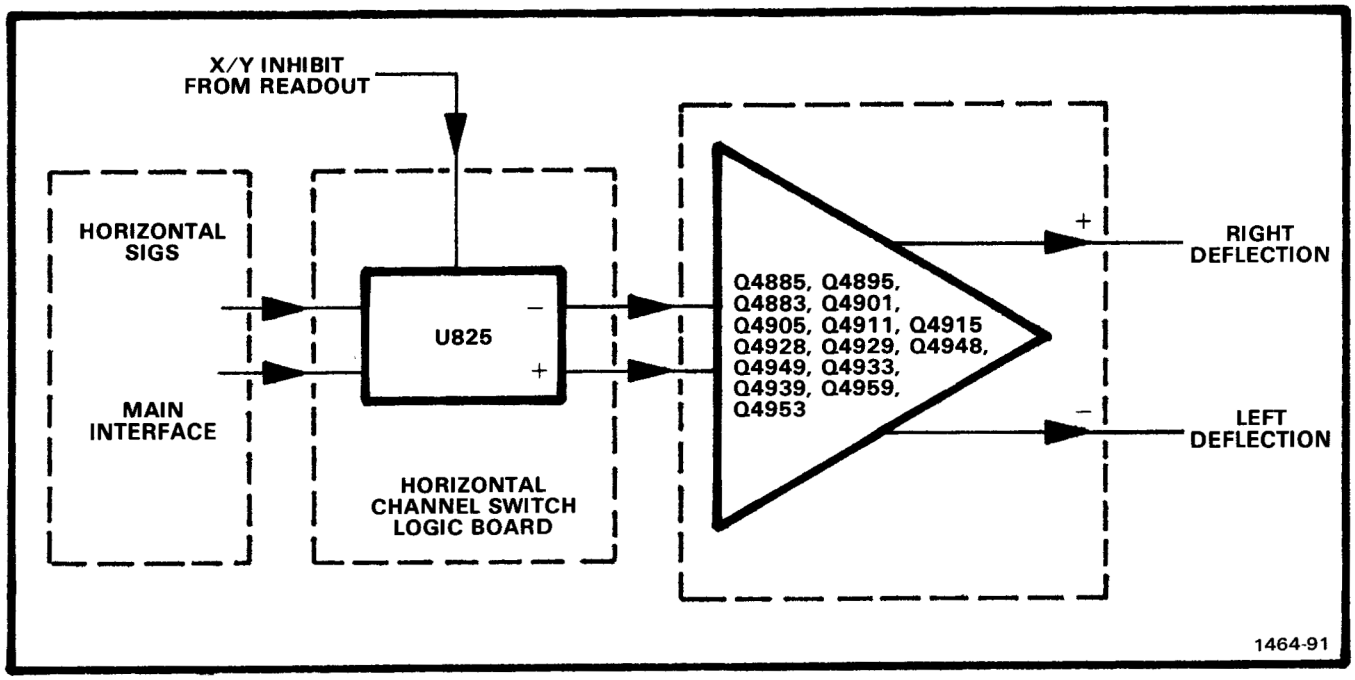


Fig. 3-21A. (SN B150000—above). Horizontal Detailed Block Diagram.

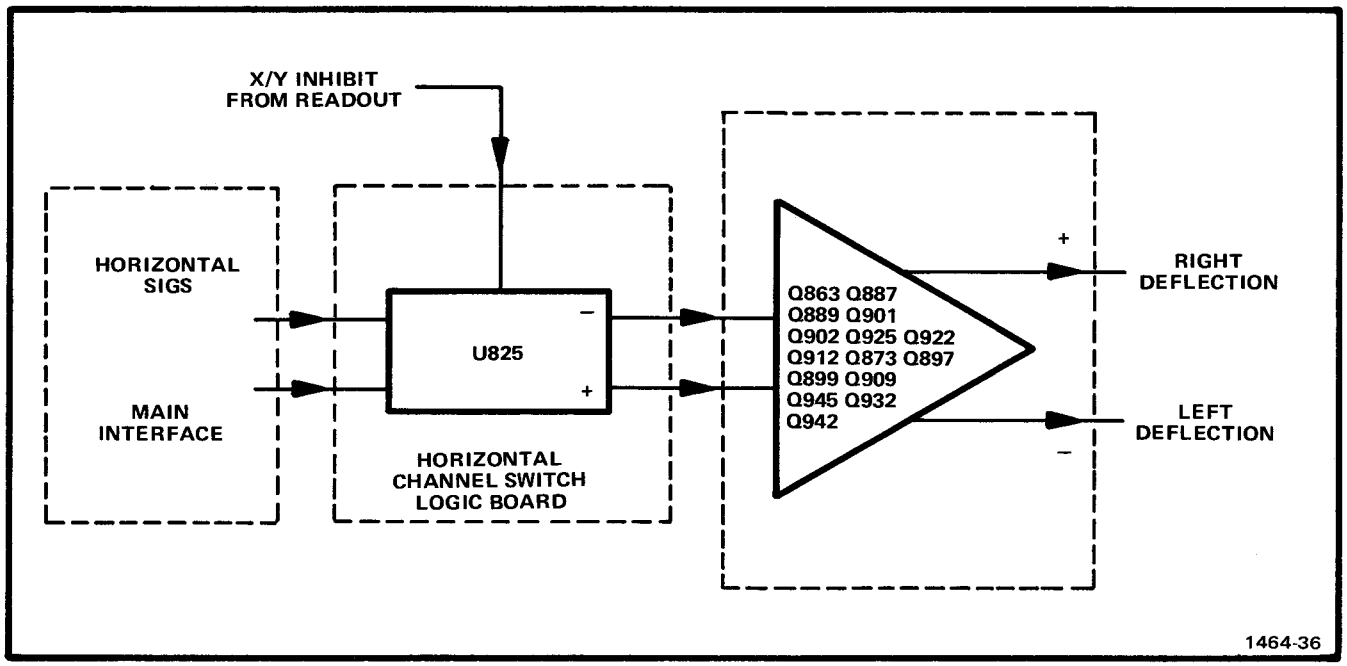


Fig. 3-21B. (SN B149999—below). Horizontal Detailed Block Diagram.

Horizontal Switch. Integrated circuit U825 is the main component of this stage. U825 provides a high-impedance differential input for the horizontal plug-in unit. The output signal at pins 12 and 13 is a differential signal that is connected to the Horizontal Amplifier. The X/Y inhibit signal blocks the horizontal signal from reaching the output. At this time, the X Readout signal is provided as an input to the Horizontal Amplifier. A constant DC output current level is provided by the Channel Switch in all modes (horizontal signal or X Readout Signal).

Horizontal Amplifier (for instruments SN B150000—above).

Input Amplifier. The Input Amplifier stage is a paraphase amplifier consisting of Q4885 and Q4895. Overall gain for the Horizontal Amplifier is determined by Gain adjustment R4873. Thermal compensation for the horizontal system is provided by the thermistor network, RT4877 and R4877. The Display Center adjustment, R4867, compensates for centering error in the channel switch and input amplifier circuit. Capacitor C4874 increases the gain of the input stage at high frequency and provides adjustment for the 0.5 ns/div timing.

The Input Amplifier emitter current source is normally supplied from the +15 Volt Supply through R4882 and R4881, with Q4883 off. When the BEAM FINDER switch is actuated the emitter current to Q4885 and Q4895 is supplied only through R4881. This reduces the dynamic range of the input stage by limiting its current source. Transistor Q4883 is forward biased and supplies the required current to the Driver and Output Amplifiers. This action reduces the dynamic range of the horizontal system to keep the display within the horizontal limits of the graticule, regardless of the setting of the positioning controls or signal amplitude.

Left and Right Driver Amplifiers

The Left and Right Driver Amplifiers are current-driven shunt-feedback amplifiers, consisting of Q4901 and Q4911 and feedback resistors R4889 and R4899. Transistors Q4905 and Q4915 are emitter followers that drive the capacitive load that is presented by the output stage.

Left Output Amplifier

The Left Output Amplifier is an operational amplifier consisting of common-emitter transistors Q4948 and Q4949, and common-base transistor Q4953. R4912 is the input resistor and R4955 is the feedback resistor. To provide higher speed, the input resistor is paralleled by input capacitors C4918 and C4919, and the feedback resistor is paralleled by C4955. C4919 also provides the 2 ns/div timing adjustment. Q4959 acts as a current source for the output stage.

Right Output Amplifier

Basic operation of the Right Output Amplifier is similar as just described for the Left Output Amplifier. However, Q4939 in addition to serving as a collector current source for the output amplifier Q4933 is also the high-frequency signal path from the collectors of Q4928 and Q4929 to the crt deflection plates.

Horizontal Amplifier (SN B149999—below). The Horizontal Amplifier provides the necessary amplification for the horizontal deflection system. When the BEAM FINDER switch is actuated, resistor R864 is added to the emitter circuitry of Q863 and Q873 to limit the current source. The +15 V supply is also connected to the input of the next stage, reducing the amplification of the remaining stages. In normal operation, adjustment R868 provides DC centering and adjustment R872 provides the gain adjustment. Adjustments R906, R870, C905, C928 and C948 provide the high-frequency compensation for the Horizontal Amplifier.

Output Signals

The SIG OUT, SAWTOOTH, and GATE amplifier schematics are shown on diagram 8 at the rear of this manual. These output signals are either generated within the instrument or are signals taken from the associated plug-in units. See Fig. 3-22, a detailed block diagram of the Output Amplifiers.

Sig Out Amplifier. The vertical signal is selected by the TRIG SOURCE switch (see Trigger Selector Circuit descrip-

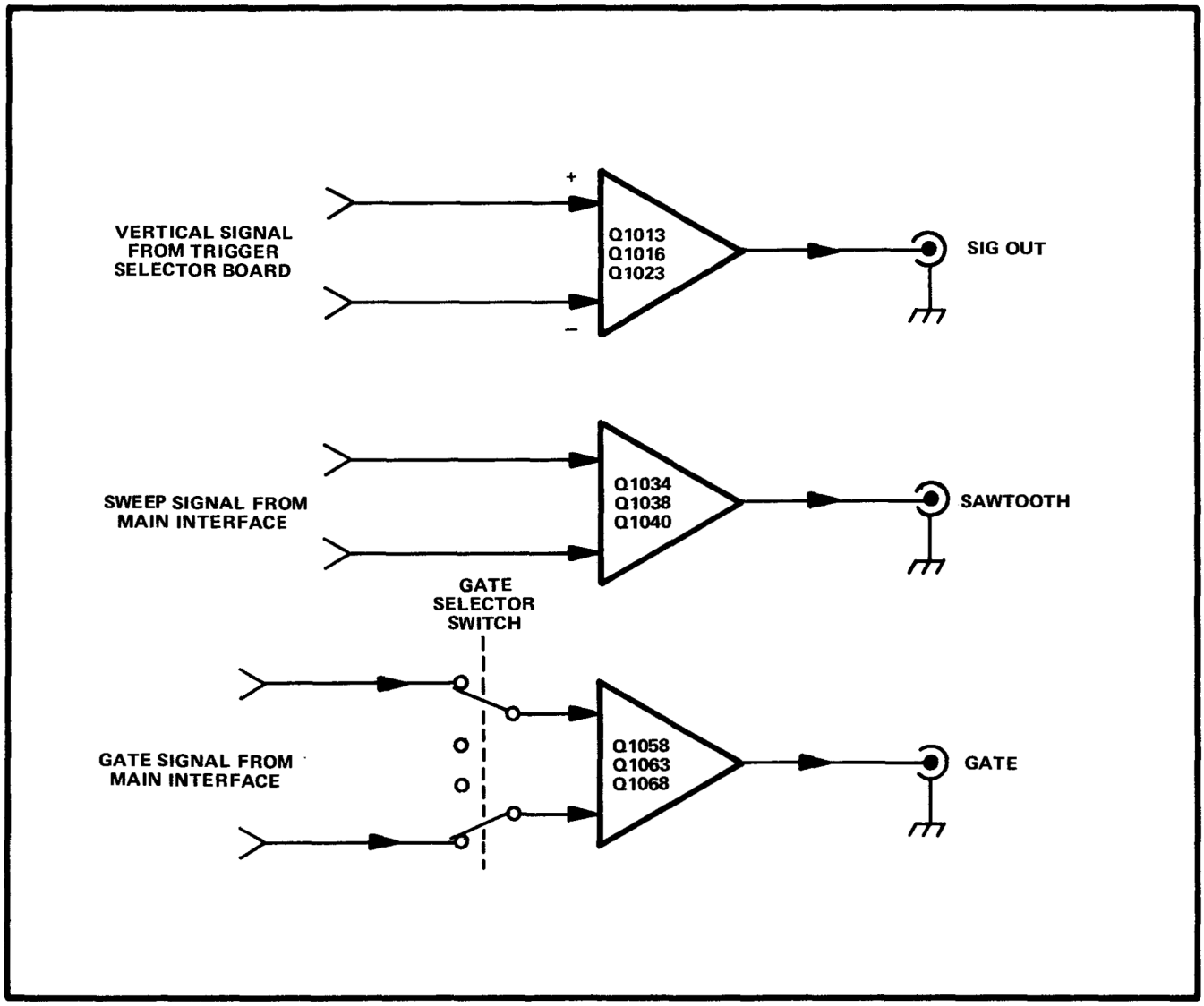


Fig. 3-22. Output Signal Amplifier.

tion for more information). The Vertical signal DC centering adjustment R1013 is set for a 0 V level when the vertical input is at a 0 V level. The push-pull Vertical signal is converted to a single-ended signal and connected to the SIG OUT connector on the rear panel.

Sawtooth Amplifier. The sweep signals from the time-base plug-in unit are connected to the Sawtooth Amplifier input. The output of the Sawtooth Amplifier is connected to the SAWTOOTH connector on the rear panel.

Gate Amplifier. The gate signals from the time-base plug-in unit are connected to the input of the Gate Amplifier. Switch S1050 selects the MAIN GATE signal or the AUX GATE signal. The output of the Gate Amplifier is connected to the GATE connector on the rear panel. The MAIN GATE signal is generated from the sweep that is being displayed. The AUX GATE signal is generated from the delaying sweep.

Calibrator

The Calibrator circuit provides a voltage output in calibrated steps from 4 mV to 4 V at the CAL OUT connector. Transistors Q1128 and Q1123 are connected as a square-wave oscillator. Adjustment R1129 is used to set the frequency to 1 kHz. See Fig. 3-23 a detailed block diagram of the calibrator circuit.

Transistors Q1111 and Q1115 are connected as a comparator. The reference level at the base of Q1111 is determined by network R1101, R1102, R1103 and R1105. The square-wave signal is connected to the base of Q1115 through Q1119. When the voltage level at Q1115 decreases below the reference level, transistor Q1115 turns on, and Q1111 turns off. When Q1111 is on, a positive signal is developed across the output voltage divider, and there is an output at the CAL OUT connector. When Q1111 is off, no voltage is applied to the output voltage divider, and there is no signal at the CAL OUT connector.

Option 10 Description

Option 10 for this instrument provides a pulsed graticule circuit, and a pulsed readout circuit, in addition to the normal graticule and readout circuits. The main circuit (U1124 and Q1148) is a monostable multivibrator that controls the time that the graticule lights are on, or the time that the readout display is on. In the clockwise detent of both the GRAT ILLUM and the READOUT INTENSITY, a preset adjustment controls the intensity of the readout display or the graticule illumination. In the pulsed graticule circuit the timing components are C1124 and R1124. In the pulsed readout circuit, C1148 is the timing component. The sweep gate signal is amplified by Q1104 and Q1106, and applied to the input of the monostable multivibrator in the AUTO mode. When the MANUAL switch is pressed, a negative pulse to pin 5 of U1148 triggers the multivibrator, or a ground closure to pin 5 of U1124 triggers the multivibrator. In the EXT mode, a ground closure to the REMOTE connector applies a negative trigger pulse to pin 5 of the multivibrator. See Fig. 3-24 a detailed block diagram of Option 10 pulsed GRATICULE and READOUT circuitry.

DC Fan (SN B209999 & Below)

The DC fan uses a brushless, Hall-effect motor. The Hall-effect devices, located inside the motor housing, control the base current to motor-driving transistors Q2536A-Q2536B-Q2436C-Q2536D 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.

The −17 V supply provides a current source for the Hall-effect devices, responding to voltage changes at the base of the driving transistors, thus controlling the motor current. Transistor Q2512, along with R2533 and R2335 provides a biasing arrangement to make the Hall-effect devices compatible with the silicon driving transistors.

DC Fan (SN B210000 & Above)

Current for the fan is provided by the −17 V supply via P1598 on Low Voltage Regulator board A16. The fan's 12 volt operating level is achieved by dropping approximately 5 volts across R1598 and R2536.

READOUT SYSTEM

SN B0202641 & Below

The Readout System in the R7903 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.

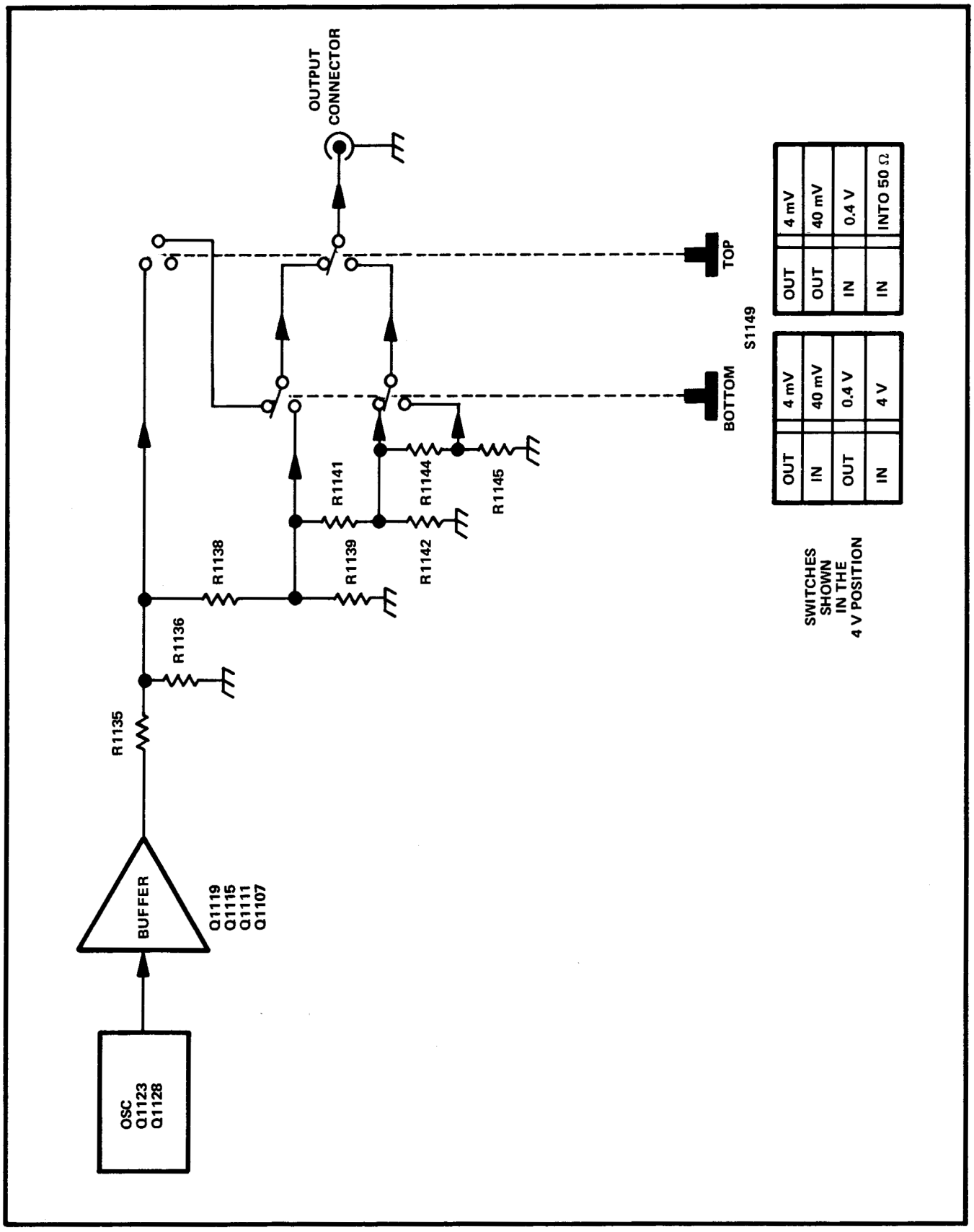


Fig. 3-23. Detailed Block Diagram of the Calibrator Circuit.

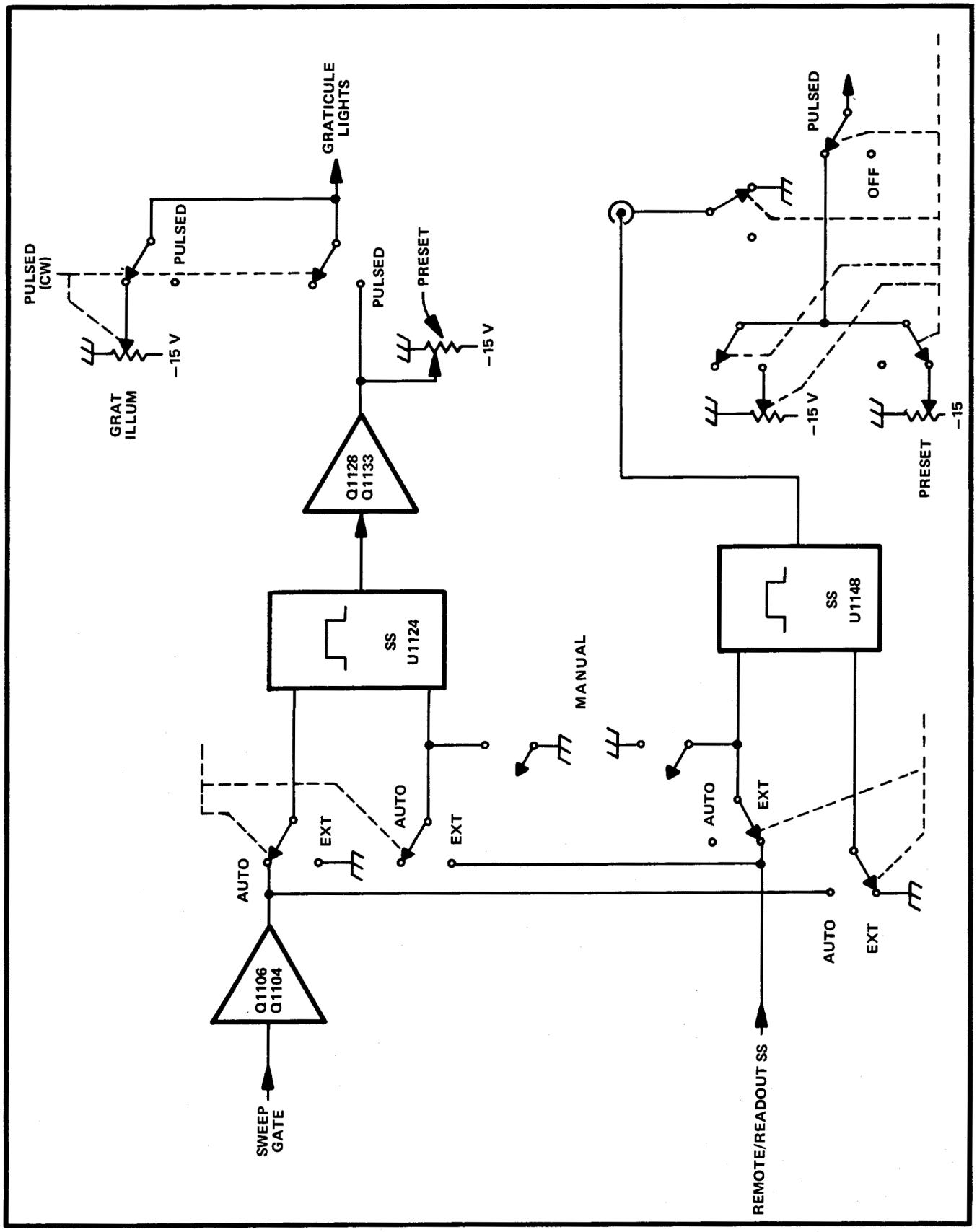


Fig. 3-24. Detailed Block Diagram of the Option 10 Front Panel.

Word—A word is made up of a related group of characters. In the 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. 3-25 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. 3-26). Columns C-0 (columns zero) to C-10 (column 10) can be addressed in the Readout System.

Row—One of the horizontal lines in the Character Selection Matrix (Fig. 3-26). Rows R-1 (row 1) to R-10 (row 10) can be addressed in the R7903 system.

Time-slot—A location in a pulse train. In the 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 CRT. The position of each word is fixed and is directly related to the plug-in unit from which it originated. Fig. 3-25 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. 3-27 shows a typical display.

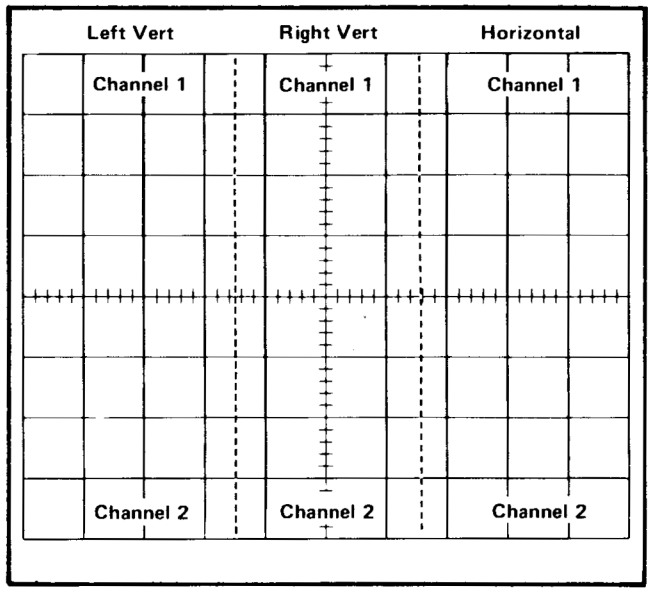


Fig. 3-25. Location of readout words on the CRT identifying the originating plug-in unit and channel (one complete frame shown, simulated readout).

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. 3-26. 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. 3-28. 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.

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[a]	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
R-2	0.1		*f*	*<*	*I*	*/*	*+*	*–*	*+*	*C*	*Δ*	*>*
R-3	0.2		ADD[a] ONE ZERO	ADD[a] TWO ZEROS	SHIFT[a] PREFIX ←	SHIFT[a] PREFIX ← AND ADD ONE ZERO						*IDENTIFY*[a]
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[a] POINT LOCATION NO. 3	DECIMAL[a] POINT LOCATION NO. 4	DECIMAL[a] POINT LOCATION NO. 5	DECIMAL[a] POINT LOCATION NO. 6	DECIMAL[a] POINT LOCATION NO. 7			
R-8	0.7										DECIMAL[b] POINT	
R-9	0.8											
R-10	0.9	ADD SPACE IN DISPLAY[a]										

Fig. 3-26. Character Selection Matrix for the Readout System (SN B202641 & Below).

UNUSED LOCATIONS. AVAILABLE FOR FUTURE EXPANSION OF READOUT SYSTEM

[a]OPERATIONAL ADDRESS.

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

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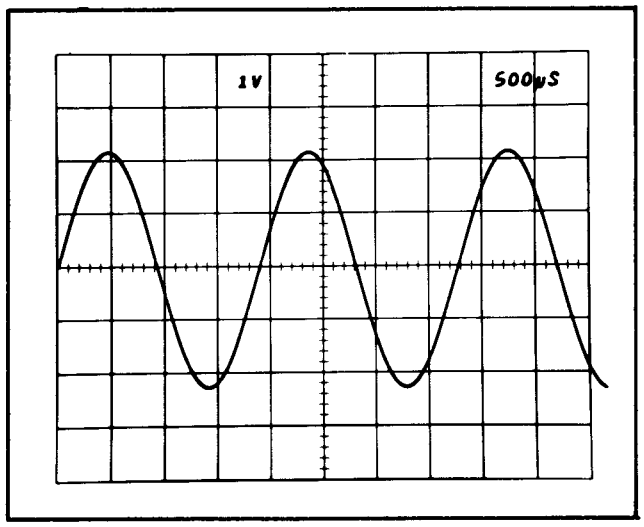


Fig. 3-27. Typical readout display where only channel 1 of the Right Vertical and Horizontal units is displayed.

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. 3-26. The standard format in which information is encoded onto the output lines is given in Table 3-1 (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 3-1). 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.

TABLE 3-1

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. 3-26 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. 3-25). 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 12 at the rear 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. 3-29). 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. 3-30). 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

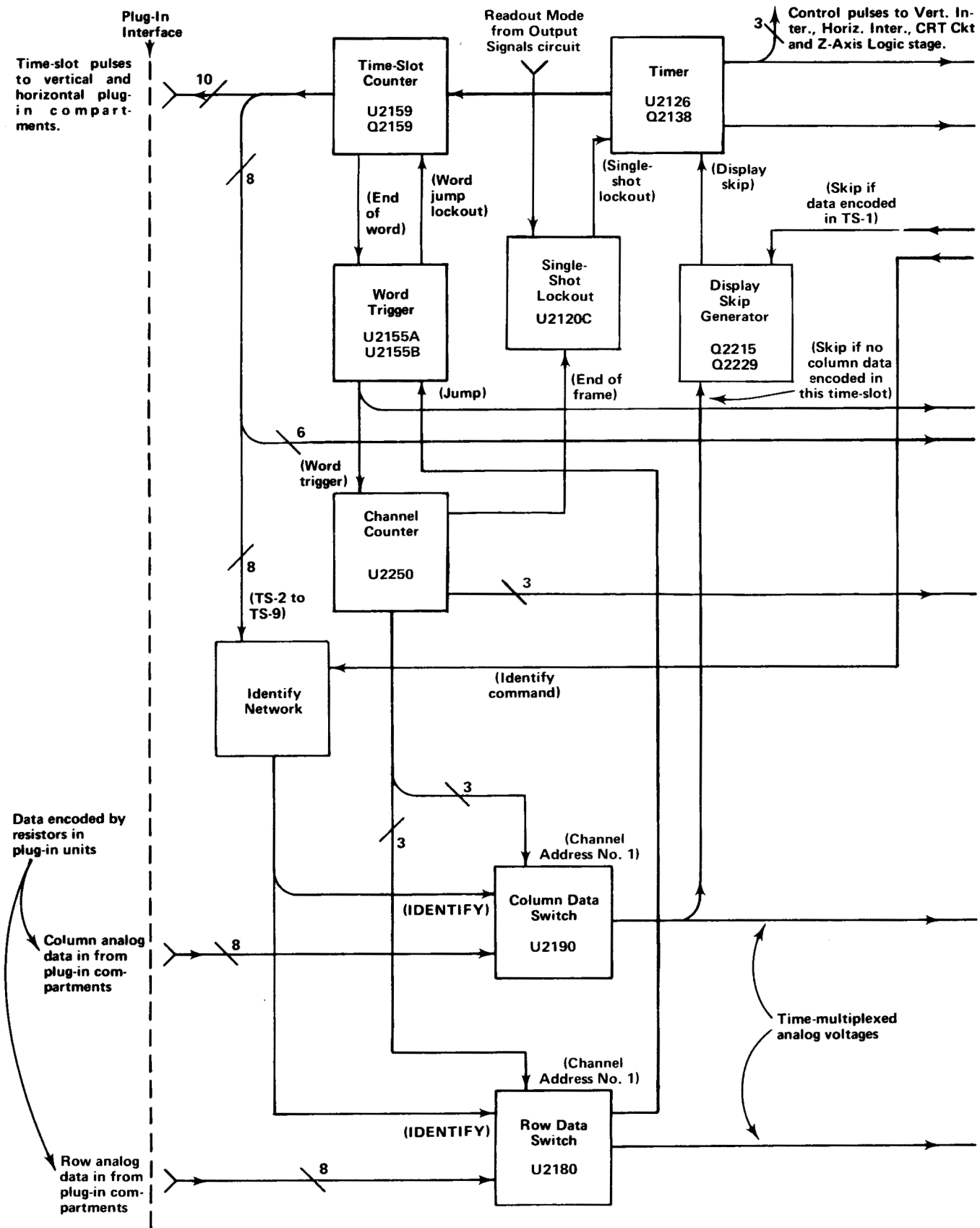


Fig. 3-28. Detailed block diagram of Readout System (SN B202641 & Below).

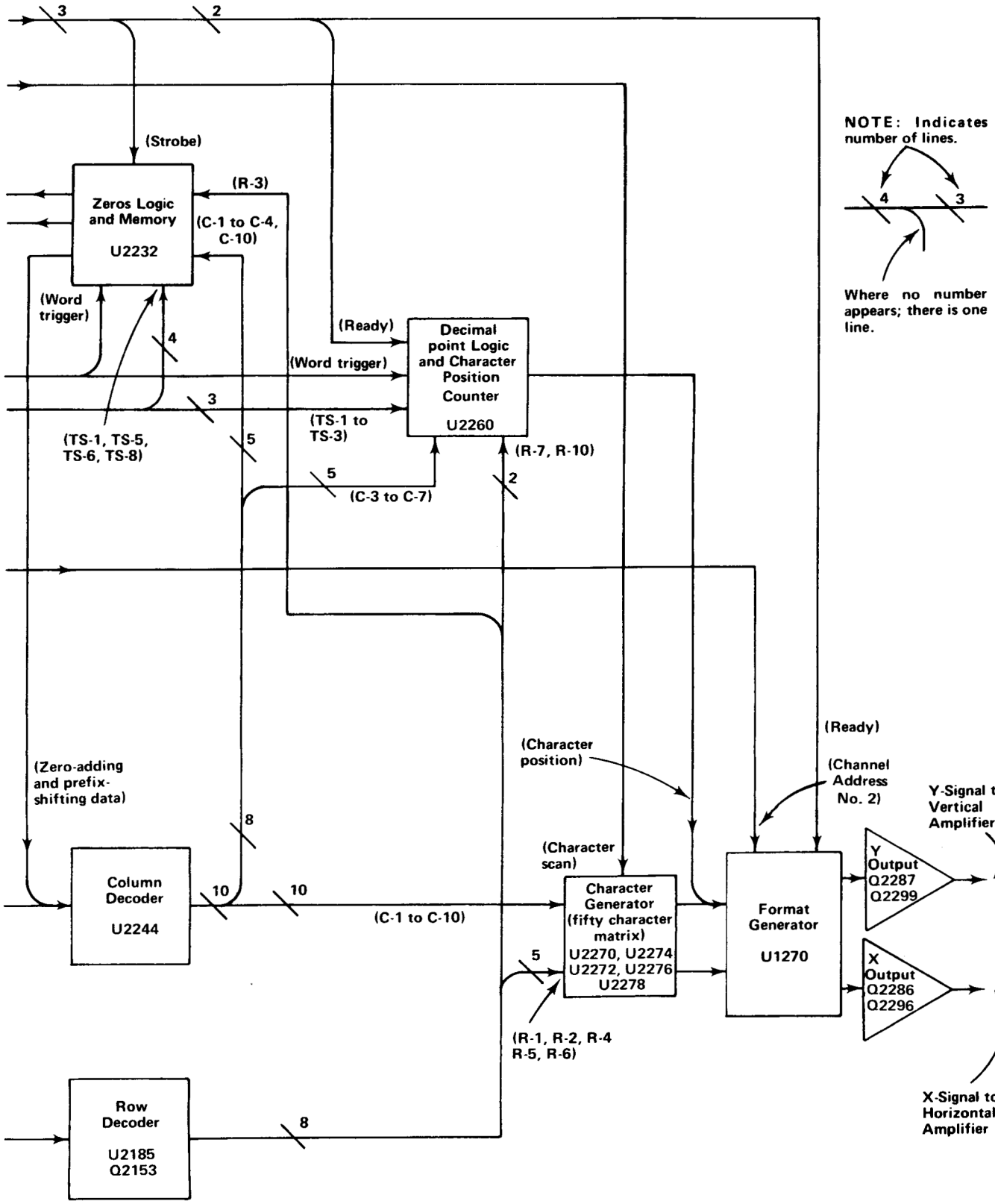


Fig. 3-28. Detailed block diagram of Readout System (cont). (SN B202641 & Below).

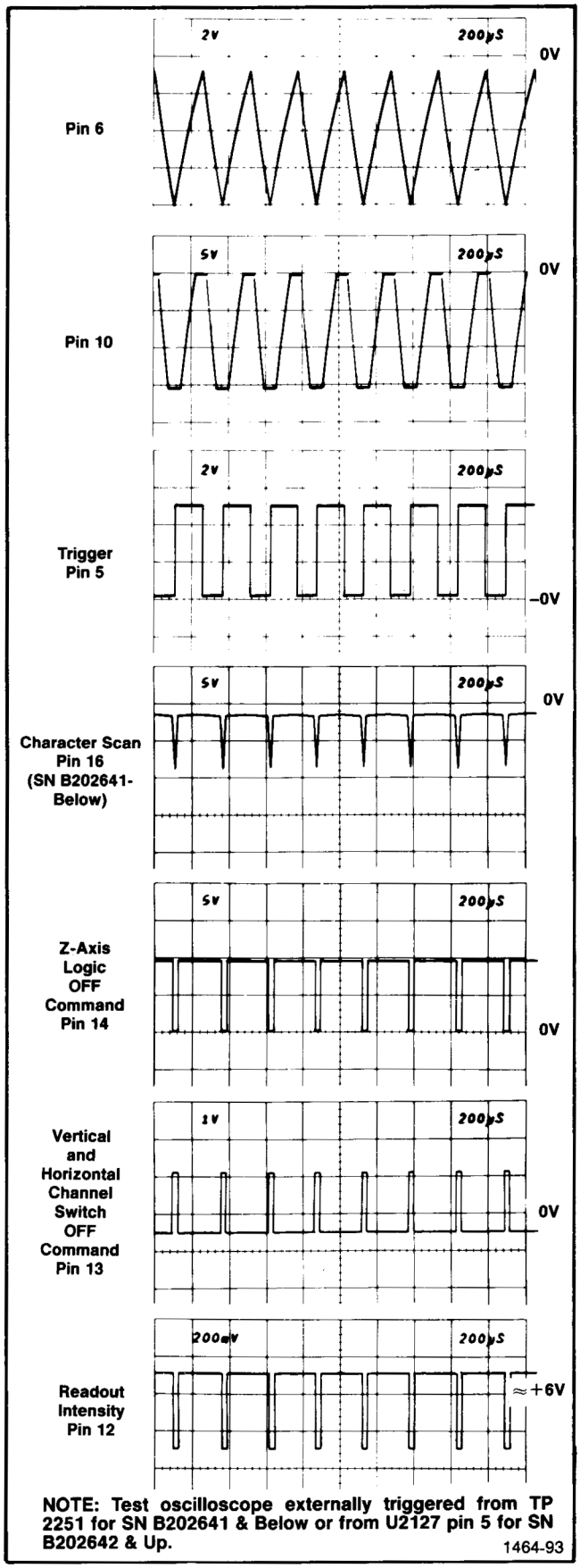


Fig. 3-29. Output waveforms of Timer stage.

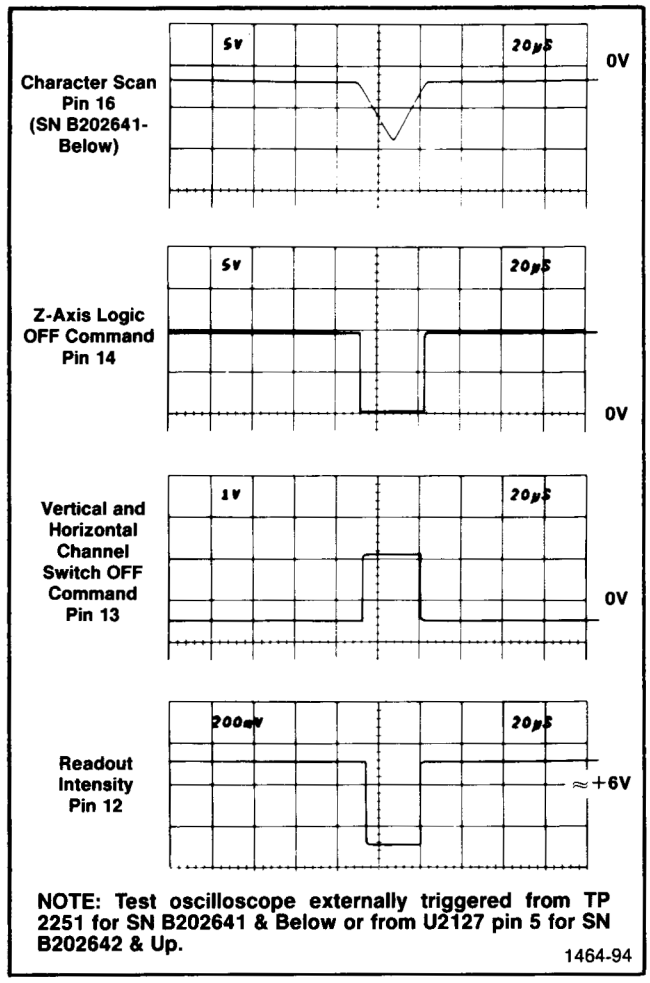


Fig. 3-30. Detail of outputs at pins 12, 13, 14, and 16 of U2126.

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 12). 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

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 12). 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. 3-31 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.

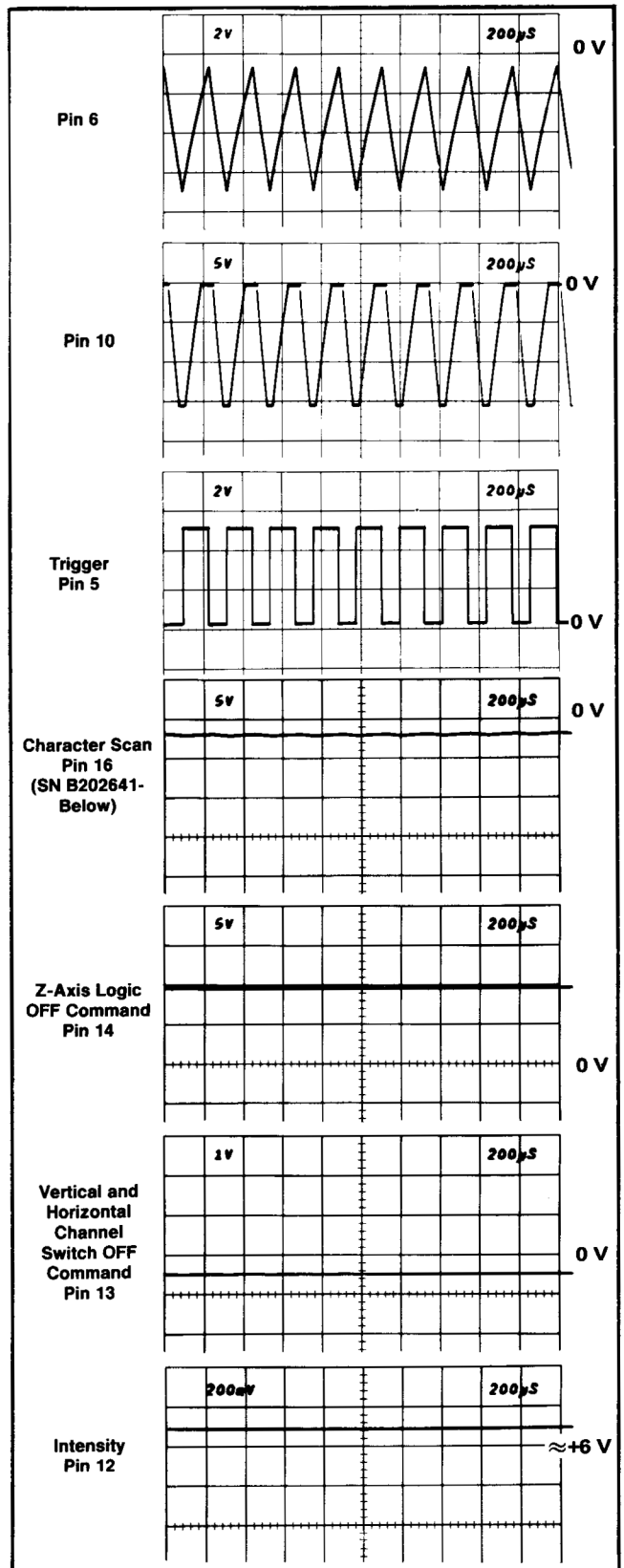


Fig. 3-31. Timer stage operation when Display-Skip condition occurs.

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. 3-32 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

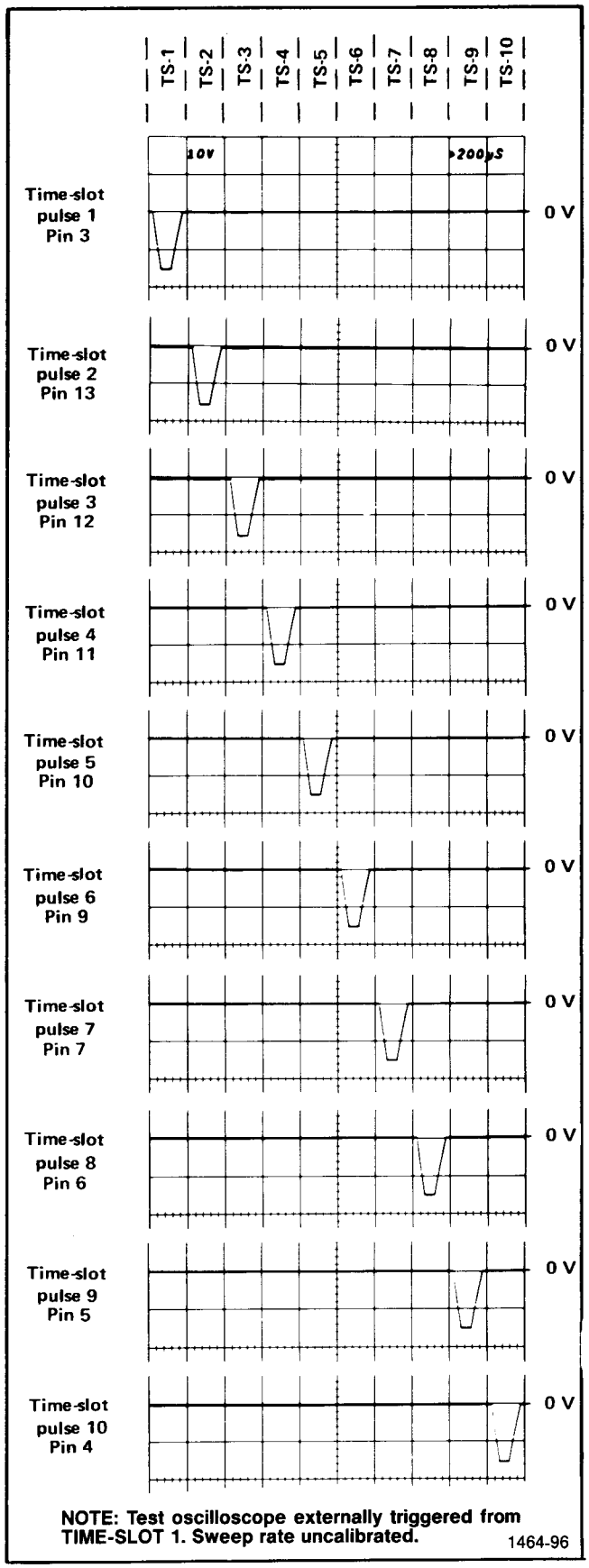


Fig. 3-32. Time relationship of the time-slot (TS) pulses produced by U2126.

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. 3-26). 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. 3-33 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 3-1 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. 3-33, 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. 3-34A 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. 3-26. 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. 3-33 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. 3-34 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

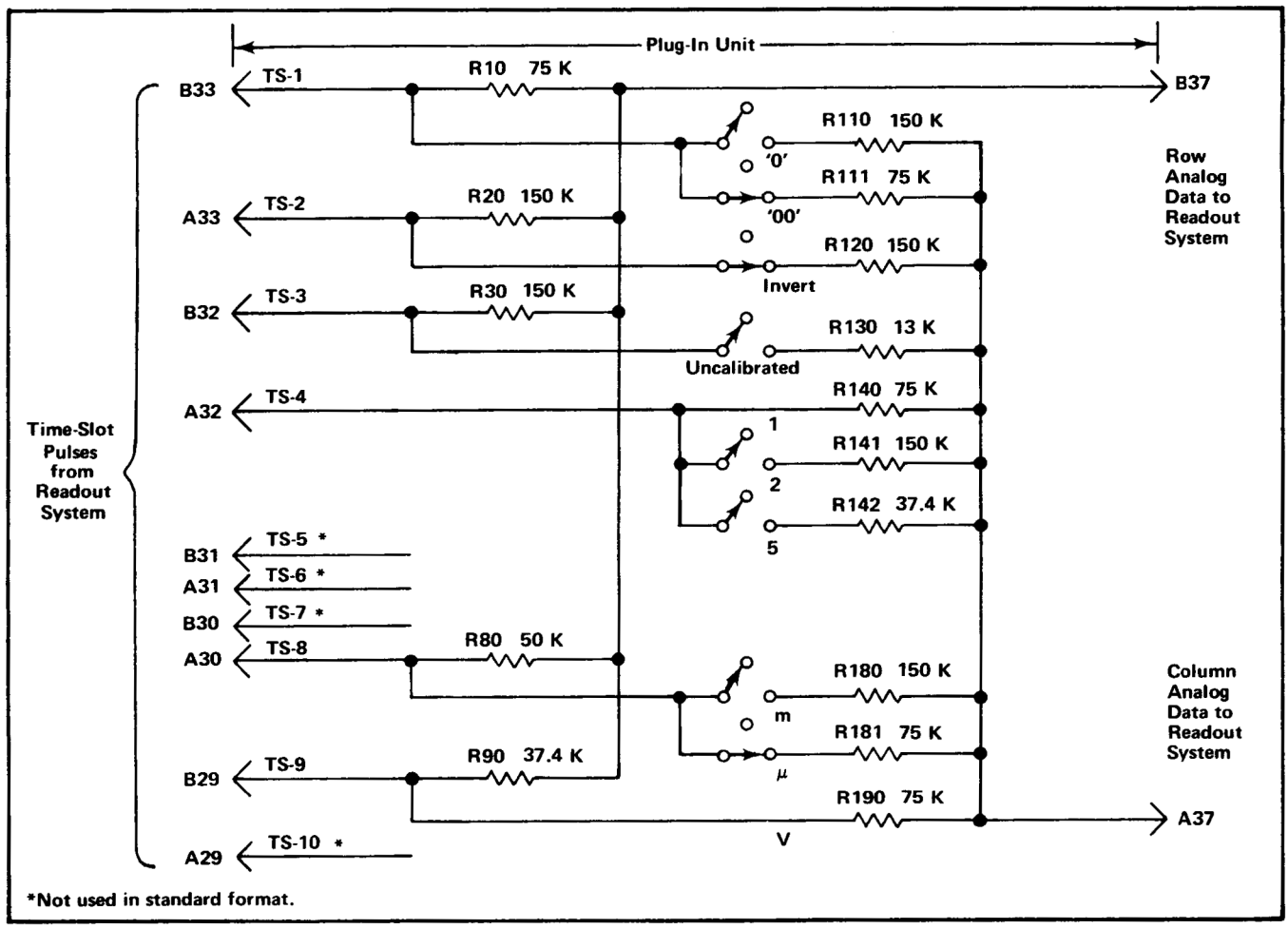


Fig. 3-33. Typical encoding scheme for voltage-sensing amplifier plug-in unit. Coding shown for deflection factor of 100 microvolts.

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 $\downarrow$ 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. 3-34B). 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 $\downarrow$ $>$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

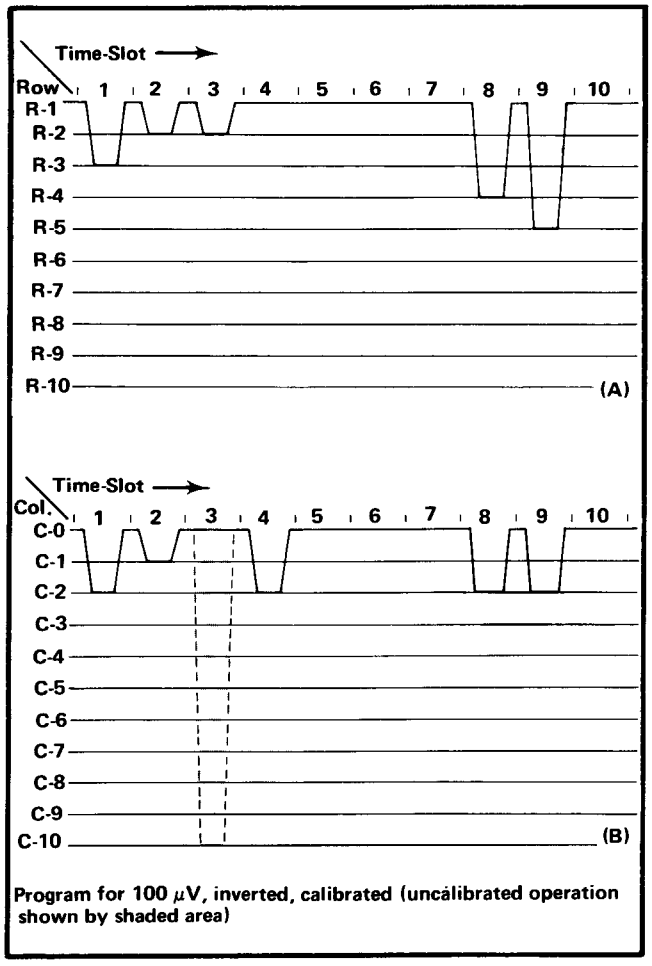


Fig. 3-34. Idealized current waveforms of: (A) Row analog data, (B) Column analog data.

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. 3-33, 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. 3-33), 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 3-2
Channel Address Code
SN B202641 & Below

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 3-2

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 12) 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. 3-35. Typical output waveforms for the five possible input conditions that can occur are shown in Fig. 3-36. When time-slot 1 occurs, a store command is given to all of the

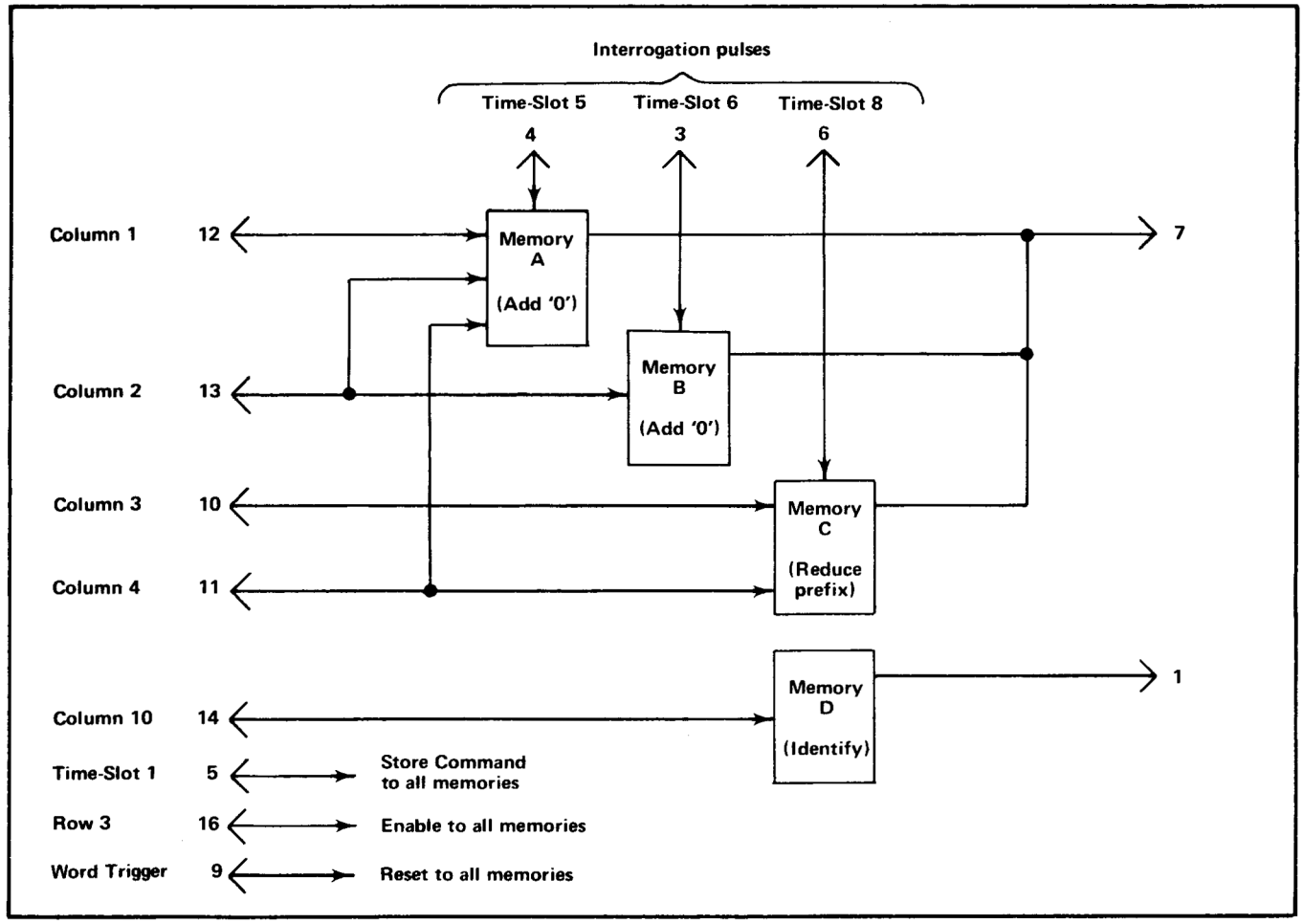


Fig. 3-35. Block representation of memory sequence in U2232.

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. 3-26 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. 3-33, 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

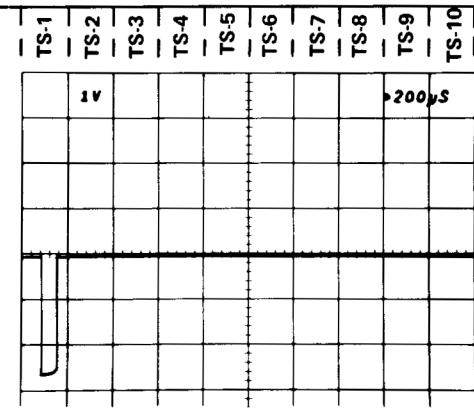
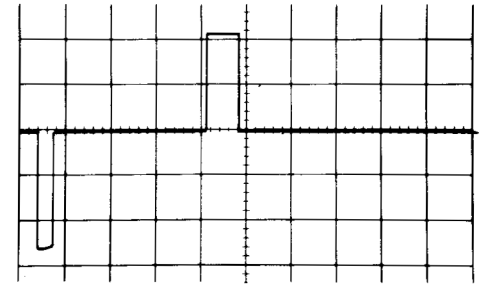
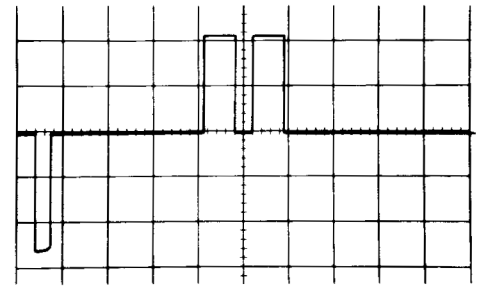
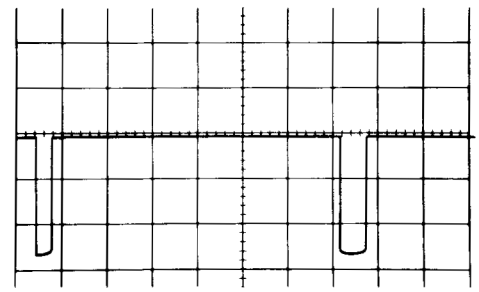
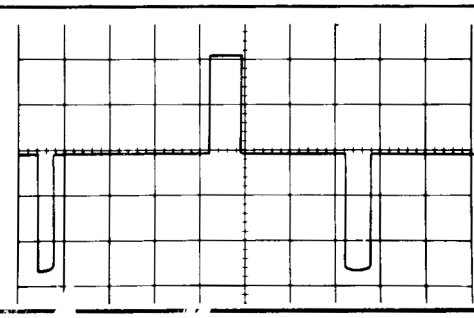
Input Pins of Zeros Logic & Memory	Command	Time Slot
14	IDENTIFY	 0 V
12	Add one zero	 0 V
13	Add two zeros	 0 V
10	Decrease prefix	 0 V
11	Decrease prefix and add one zero	 0 V

Fig. 3-36. 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. 3-26). 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. 3-26). 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. 3-37). 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. 3-37, 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

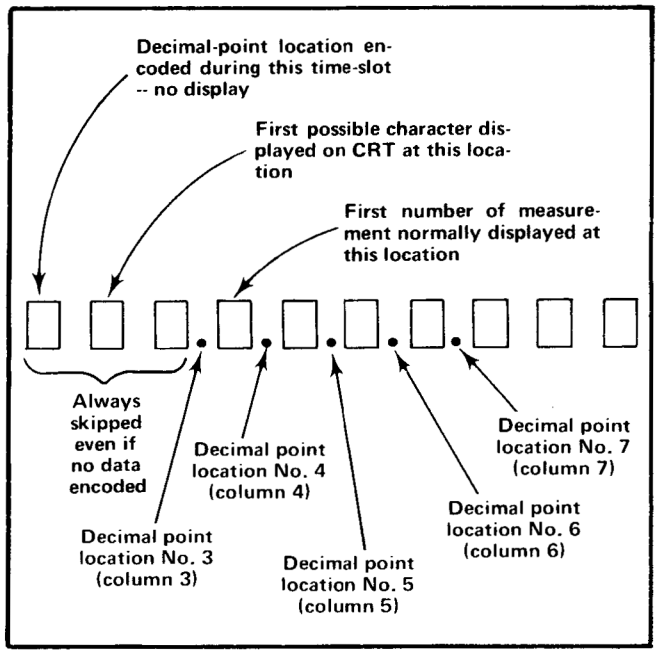


Fig. 3-37. Readout word relating 10 possible character locations to the decimal-point instructions that can be encoded and the resulting display.

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. 3-26). The Channel Address No. 2 Code and the resultant word positions are shown in Table 3-3. 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 3-3
Channel Address Code
SN B202641 & Below

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

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. 3-38 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.

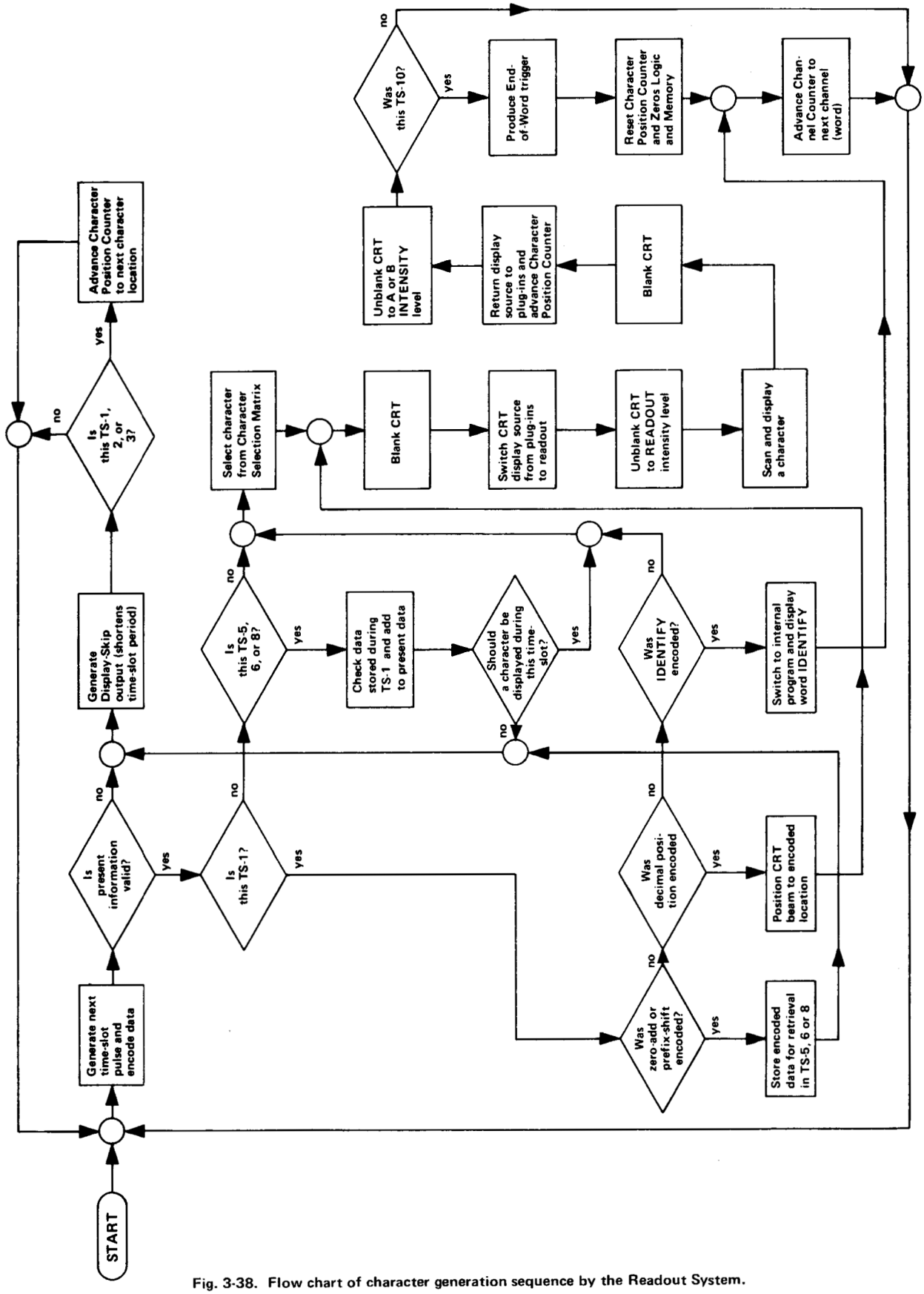


Fig. 3-38. Flow chart of character generation sequence by the Readout System.

READOUT SYSTEM

SN B0202642 & Above

The Readout System provides an 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 shared basis with the analog waveform display.

The following terms are used to describe the Readout System:

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

Word—A group of related characters. In the Readout System, a word can consist of up to 10 characters.

Frame—A display of all words for a given operating mode and plug-in combination. Up to 6 words can be displayed in one frame. Figure 3-25 shows the position of each word in a complete frame.

Column—One of the vertical lines in the Character Selection Matrix (see Fig. 3-39). Columns C-0 (column zero) through C-10 (column 10) can be addressed by the system.

Row—One of the horizontal lines in the Character Selection matrix. Rows R-1 (row 1) through R-10 (row 10) and R-14 (row 14) can be addressed by the system.

Time-Slot—A location in a pulse train. In the Readout System, the pulse train consists of 10 negative-going pulses. Each time-slot pulse is assigned a number between 1 and 10. 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.

Hexidecimal—The hexidecimal numbering system uses the numerals 0 through 9 and the letters A through F to represent the sixteen possible cominations of four binary digits.

Octal—The octal numbering system uses the numerals 0 through 7 to represent the eight possible combinations of three binary digits.

Binary Coded Decimal—The Binary Coded Decimal system uses ten unique combinations of four binary digits to represent the decimal numbers 0 through 9.

NOTE

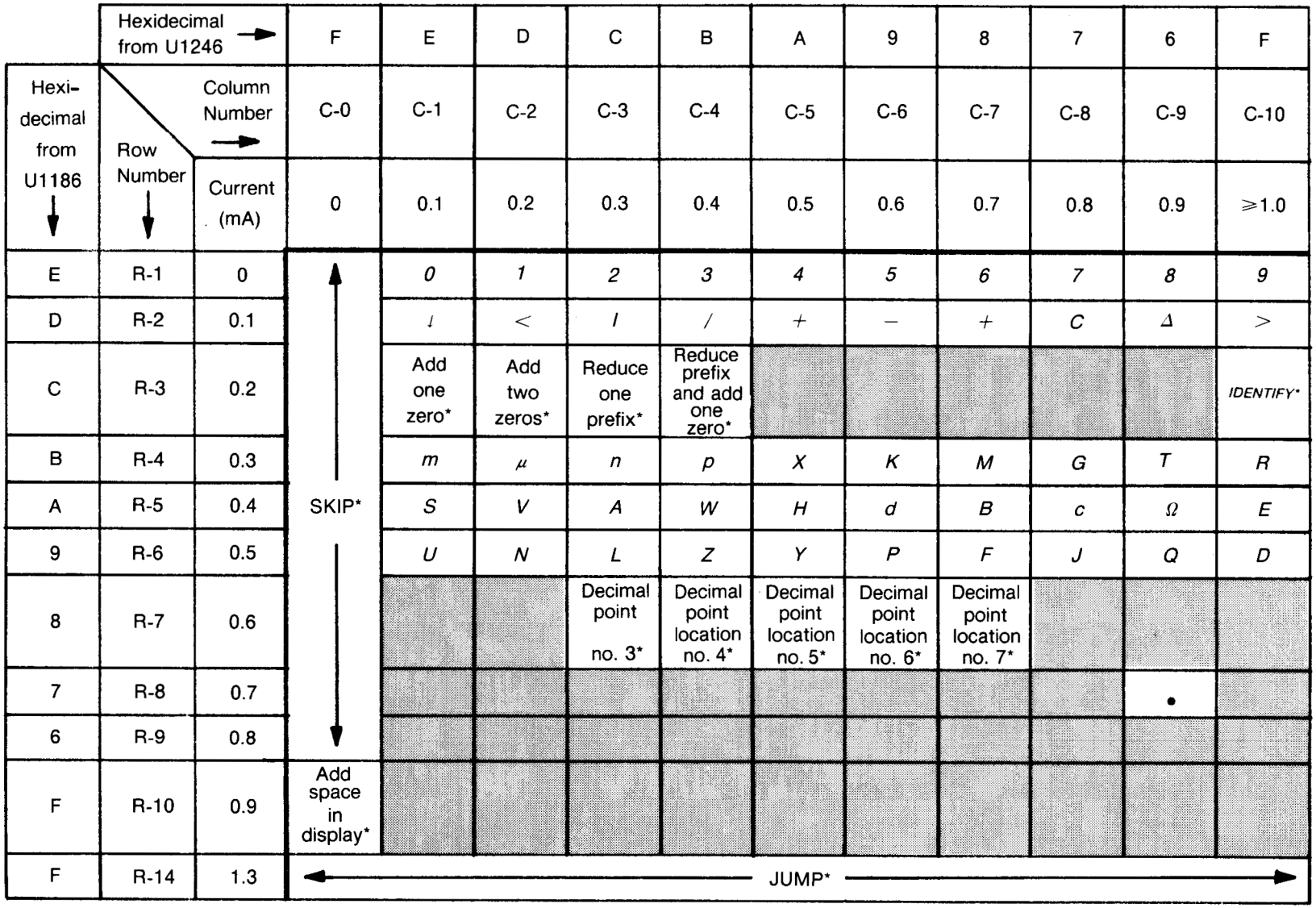
The 7000-series Readout System is compatible with both three- and four-compartment mainframes. However, since three-compartment mainframes do not have a B Horizontal plug-in compartment, the B Horizontal channels are not used. In these instruments, a Jump command is encoded on the Main Interface for this compartment during time-slot one (see the discussion for Jump in the Column and Row Decoder portion of this Circuit Description). The Jump command (Row 13 current) is applied to pins 16 and 15 (B Horizontal channels 1 and 2 respectively) of U2180. Column data current is not required for a Jump command. This allows the Readout System to sense a "jump" during time-slot one at channel 2, which causes it to "jump" the remaining nine time slots for that channel and go to channel 1, where it again senses a "Jump" command during time-slot one. This permits it to "jump" the remaining nine time-slots in channel 1 and the Readout System begins a new frame. The unused horizontal channels will be ignored in the following discussions.

Display Format. Up to 6 words of readout information can be displayed on the CRT. The position of each word is fixed and is directly related to the plug-in unit from which it originated. Figure 3-25 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. Figure 3-27 shows a typical display where only Channel 1 of the Right Vertical and Horizontal units are selected for display.

Each word in the readout display can contain up to 10 characters, although the typical display will contain between 2 and 7 characters per word. The characters are selected from the Character Selection Matrix shown in Figure 3-39. In addition, 13 operational addresses are provided for special instructions to the Readout System. The unused locations in the Matrix (shaded area) 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. 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.

The key block in the Readout System is the Timer Stage (see schematic). This stage produces the basic signals that establish the timing sequences within the Readout System. The period of the timing signal is about 250 microseconds (it drops to about 210 microseconds when Display-Skip is received; see detailed description of Timer stage for further information). This stage also produces control signals for other stages within this circuit, and inhibit signals to the Vertical Amplifier, Horizontal Amplifier, and Logic circuits, 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 1 through 10) 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. After the Time-Slot Counter stage has counted time-slot 10, it produces an End-of-Word pulse which advances the system to the next channel.



Hexi-decimal from U1186	Row Number	Column Number / Current (mA)	F C-0 0	E C-1 0.1	D C-2 0.2	C C-3 0.3	B C-4 0.4	A C-5 0.5	9 C-6 0.6	8 C-7 0.7	7 C-8 0.8	6 C-9 0.9	F C-10 ≥1.0
E	R-1	0	SKIP*	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
D	R-2	0.1		↓	<	*I*	/	+	−	+	*C*	Δ	>
C	R-3	0.2		Add one zero*	Add two zeros*	Reduce one prefix*	Reduce prefix and add one zero*						*IDENTIFY**
B	R-4	0.3		*m*	*μ*	*n*	*p*	*X*	*K*	*M*	*G*	*T*	*R*
A	R-5	0.4		*S*	*V*	*A*	*W*	*H*	*d*	*B*	*c*	Ω	*E*
9	R-6	0.5		*U*	*N*	*L*	*Z*	*Y*	*P*	*F*	*J*	*Q*	*D*
8	R-7	0.6				Decimal point no. 3*	Decimal point location no. 4*	Decimal point location no. 5*	Decimal point location no. 6*	Decimal point location no. 7*			
7	R-8	0.7										•	
6	R-9	0.8											
F	R-10	0.9	Add space in display*										
F	R-14	1.3	JUMP*										

* Operational address.

Unused locations. Available for future expansion of Readout System.

Fig. 3-39. Character Selection Matrix for the Readout System (SN B202642 & Above).

Two output lines (row and column) are connected from each channel of the plug-in unit back to the Readout System. Data is typically encoded on these output lines by connecting resistors between them and the time-slot input lines. The resultant output is a sequence of 10 analog current levels that range from 0 to 1 millampere (100 microamperes/step) on the row and column output lines. This row and column corresponds to the row and column of the Character Selection Matrix in Figure 3-39. The standard format for encoding information onto the output lines is given in Table 3-1 (Special-purpose plug-in units may have their own format for readout and 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 current from the 6 data lines (2 channels from each of the 3 plug-in compartments) and produce a time-multiplexed analog voltage output containing all of the column and row information from the plug-ins. The Column Data Switch and Row Data Switch are sequenced by the binary Channel Address 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 that 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 that 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 through C-10 (column 1 through 10) corresponding to the encoded column information. Likewise, the outputs of the Row Decoder stage are identified as R-1 through R-10 (row 1 through 10) corresponding to the encoded row information. The row and column outputs are then converted to Binary Coded Decimal and used to address memory locations within the Character Generator. 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 the memory until time-slots 5, 6, or 8. After storing this information, it triggers the Display-Skip Generator stage so that there is no display during time-slot 1 (as defined by Standard Readout Format; see Table 3-1). When time-slots 5, 6, and 8 occur, the memory is addressed and any information stored there during time-slot 1 is transferred to the input of the Column Decoder stage to modify the analog data during the applicable time-slot.

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 connected with the Row Decimal-to-BCD Converter and the Row and Column Data Switches. This output level connects the Column Data Switch with a coding network within the Readout system to produce an analog current during time-slots 2 through 9. The current is then converted to Binary Coded Decimal and combined with the Row Decimal-to-BCD Converter output to address locations within the Character Generator necessary to display "IDENTIFY" on the CRT. The Zeros Logic and Memory stage is reset after each word by the End-of-Word pulse.

Each character displayed on the CRT consists of a series of connected points within an 8-point by 8-point grid. The Character Generator contains grid locations of the points required to create any of the 50 possible characters shown in the Character Selection Matrix of Figure 3-39. The row and column data encoded during a time-slot are converted to BCD and used to address a location within the Character Generator containing the first grid point of the character to be displayed. The 4-bit binary output from the Lower Order Address Generator is combined with the address created by the row and column data to provide the other grid points necessary to complete the character.

Only one character is addressable in any one time-slot or a space can be added into the displayed word by the Horizontal Character Position Counter stage, when encoded by the plug-in. The latter stage counts the number of characters 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 1, 2, or 3 preceding 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 the appropriate row and column (See Character Selection Matrix for location of decimal points). The Horizontal Character Position Counter stage is reset after each word by the Word Trigger pulse.

The Character Generators binary output is shaped by the X and Y Vector Generators into the appropriate X and Y-Axis signals to create characters. The Vector Amplifier outputs are amplified by the X and Y Output Amplifiers for use by the instruments horizontal and vertical deflection systems. The Channel Counter output is also used by these stages so 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. 3-25). The character positioning current or decimal positioning current generated by the Horizontal Character Position Counter or Decimal Point Logic stages is added to the X (horizontal) signal at the input to the X Output Amplifier, providing horizontal positioning of the characters within each word.

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. This 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 Data Switch stage.

Timer

The Timer stage produces the timing sequence for all circuits within the Readout System. This stage produces six time-related output waveforms (see Fig. 3-29). 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 R2135 and C2135. The triangle waveform is clipped and amplified by U2126 to form the trapezoidal output signal at pin 10. The amplitude of this output signal is exactly 15 volts, as determined by U2126 (exact amplitude is 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.

The signals at pin 12, 13, and 14 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 important to the operation of the Readout System (see expanded waveforms in Fig. 3-30). The Z-Axis inhibit command at pin 14 is produced first. This negative-going signal provides a blanking pulse to the Z-Axis Logic stage to blank the CRT before the display is switched to the Readout System. It also produces the strobe pulse through Q2138 and CR2139 which is connected to pin 15 of U2232.

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, CR2139 is reverse biased to disconnect Q2138 and allow U2232 to operate in the normal manner.

The next signal to be produced is the X-Y Inhibit Command at pin 13. This positive-going signal disconnects the plug-in signals from the vertical and horizontal deflection systems. The Ready signal is also derived from this output and connected to the Character Generator stage and the two Output Amplifier stages.

The Z Readout 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 the voltage on the Readout Intensity line.

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 that 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 in Figure 3-31 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 pins 12, 13, and 14 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 Timer operation is also controlled by the Single-Shot Lockout level at pin 2. 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).

A negative voltage on the readout intensity line sets the intensity of the readout display independently of the A or B INTENSITY controls. The Readout Intensity line also provides a means of turning the Readout System off when a readout display is not desired. When the Readout Intensity line is left open, the current from pin 11 of U2126 is interrupted, and at the same time, a positive voltage is applied to pin 4 through CR2124. The 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 pulses continue to be generated.

Time-Slot Counter

Time-Slot Counter U2159 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, causing the output signal to be sequenced consecutively from time-slot 1 through time-slot 10. Figure 3-32 shows the time relationship of the time-slot pulses. Notice that only one line 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.

Word Trigger

The Word Trigger U2127B is a single-shot multivibrator that provides a reset pulse for the Horizontal Character Position Counter stage. The negative-going end-of-word pulse from pin 2 of U2159 triggers the single shot and causes its output to go high at pin 11.

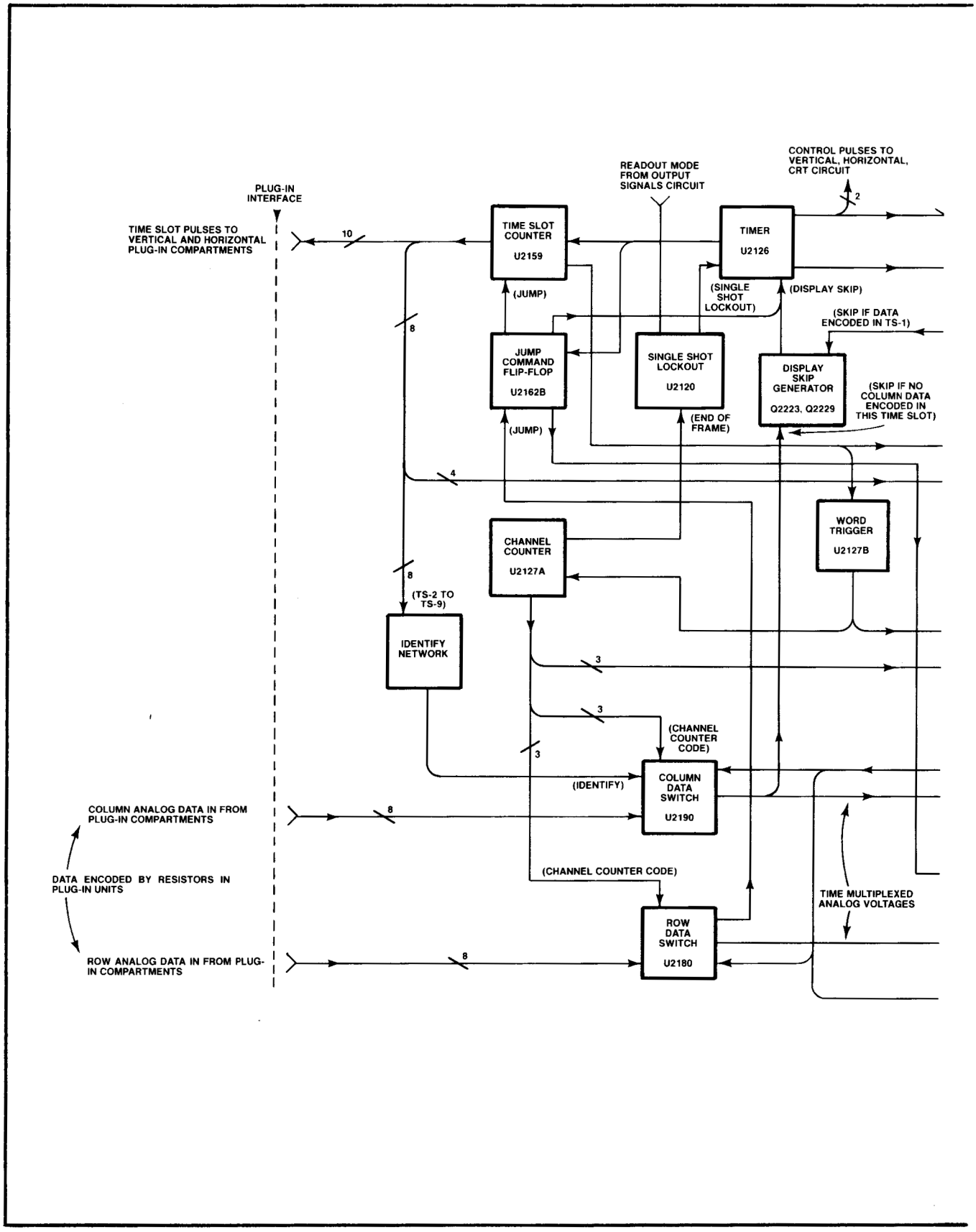


Fig. 3-40. Detailed block diagram of Readout System (SN B202642 & Above).

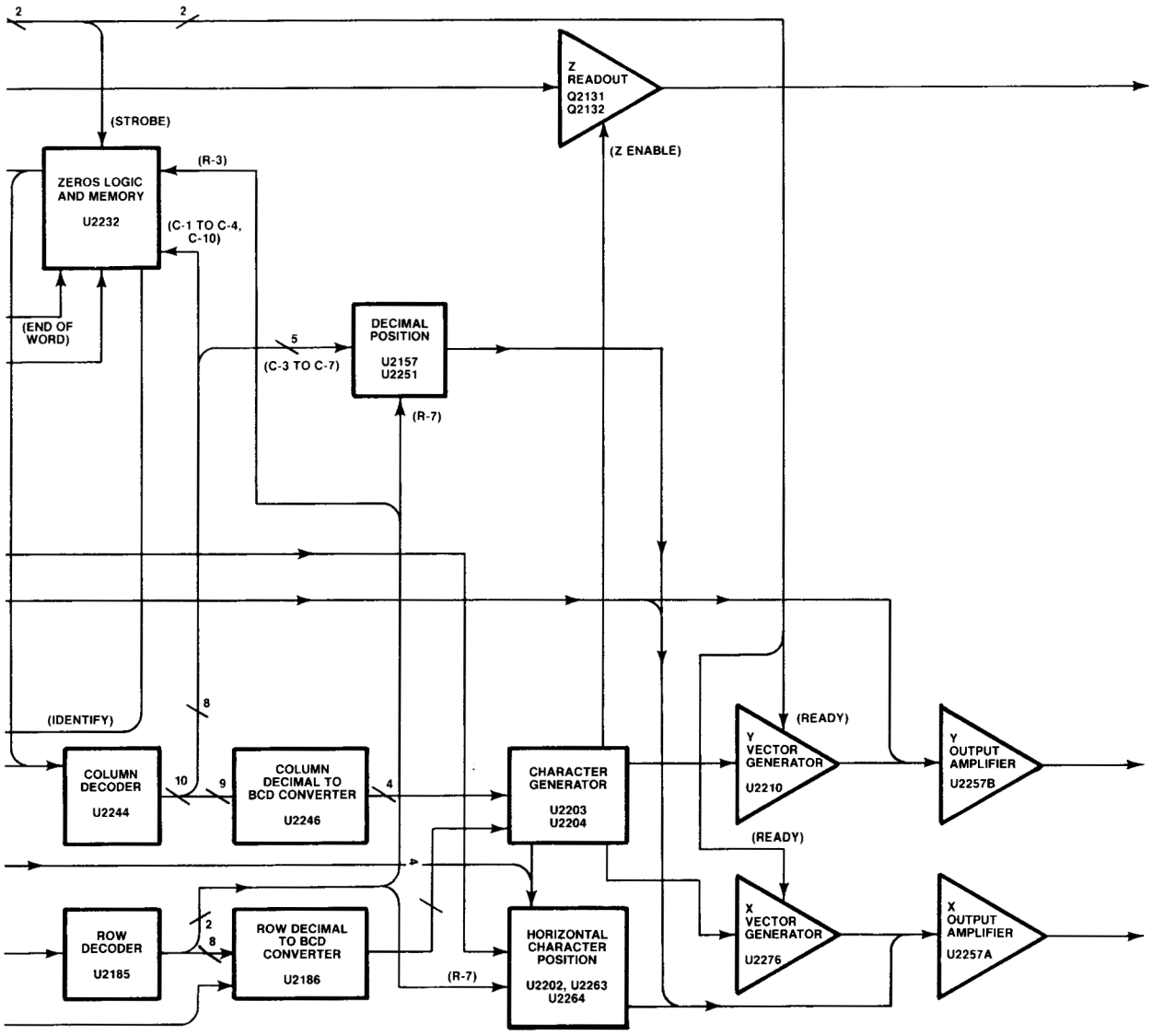


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Fig. 3-40. Detailed block diagram of Readout System (cont). (SN B202642 & Above).

Channel Counter

Channel Counter U2127A is a binary counter that produces the Channel Address Code for the Column and Row Decoder stages and the Output Amplifier stages. This code instructs these stages to sequentially select and display the 6 channels of data from the plug-ins. Table 3-4 gives the 6 combinations of the Channel Address Code and the resultant channel selected with each combination.

TABLE 3-4
Channel Address Code
SN B0202642 & Above

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

Single-Shot Lockout

The Single-Shot Lockout stage allows a single readout frame (6 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. Integrated circuit U2120C and U2120B are connected to form a bistable flip-flop. For free-run operation, pin 8 of U2120C is held HI. This activates U2120C and results in a LO output level at pin 10, enabling the Timer stage to operate in a free-running manner.

The output of the Single-Shot Lockout 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 Single Shot Lockout circuit is now enabled.

If the Channel Counter has not completed word 6, the Readout System continues to operate in the normal manner. When word 6 is completed, the negative-going end-of-frame pulse is produced at pin 5 of U2127A as the Channel Counter shifts to the code necessary to display word one. This pulse is applied to pin 8 of U2120C, which produces a HI at pin 6 of U2120B because of the momentary LO at pin 9. The HI at pin 6 produces a LO at pin 4, which causes pin 3 of U2120A to go LO. Because pin 2 is already LO, pin 1 goes HI. This disables the Timer stage, so it operates in the Display-Skip mode.

The Single-Shot Lockout stage remains in this condition until a positive-going trigger pulse is applied to pin 2 of U2120A. This trigger pulse produces a LO at pin 1 of U2120A to enable U2126 and disable U2120B. Now, the Timer stage can operate in the normal manner for another complete frame. When word 6 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 (current level) code. The characters that can be selected by the encoded data are shown on the Character Selection Matrix (see Fig. 3-39). Each character or special function requires two currents to define it (except Jump, which requires only one). These currents are identified as the column current and the row current, corresponding to the column and row of the matrix. The column and row data is encoded by programming the plug-in units. Figure 3-33 shows a typical encoding scheme using resistors for a voltage-sensing amplifier plug-in unit. Notice that the 10 TS (time slot) pulses produced by the Time-Slot Counter stage are connected to the plug-in unit. However, time-slots 5, 6, and 10 are not used by the plug-in unit to encode data when using the Standard Readout Format (See Table 3-1 for Standard Readout Format). The amplitude of the time-slot pulse 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 Figure 3-33 resistors R10 through R90 control the row analog data, which is connected back to the Readout System. Figure 3-34 shows an idealized output current waveform of row analog data resulting from the time-slot pulses. Each of the row-current levels shown in these waveforms correspond 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 (see Fig. 3-39). 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 Figure 3-33, indicates a 100 microvolt sensitivity, with the CRT display showing inverted and calibrated deflection factors. This results in the idealized output current waveforms shown in Figure 3-34 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 Character Selection Matrix, Figure 3-39, two units of column current, along with the two units of row current encoded by resistor 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. Resistor R130 is not connected to the time-slot 3 line, since the deflection factor is calibrated. Therefore, there is no display on the CRT during TS-3. (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, resulting 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 two units of column current and four units of row current to cause a V (volts) symbol 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 line. This encodes 10 units of column current (see shaded area in time-slot 3 of the waveform shown in Fig. 3-34). Since one unit of row current is also encoded during this time-slot by R30, a $>$ (greater than) symbol is added to the display. The crt readout will now show $>$ 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 most plug-in units can be modified by attenuator probes connected to the input connectors of amplifier 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-encoded probes only). The probe contains a circuit that provides additional column current. For example, if a 10X attenuator probe is connected to a plug-in unit encoded for 100 microvolts as shown in Figure 3-34, 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, 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 shifted one column to the left. Since this instruction occurs in the same time-slot that 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).

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 and the 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 manuals.

Column and Row Data Switches

The encoding data from the plug-in units is connected to the Column and Row Data Switch stages. A column-data line and a row-data line convey analog data from each of the 6 data sources (2 channels from each of the 3 plug-in compartments).

The Column Data Switch U2190 and the Row Data Switch U2180 receive the Channel Address Code from the Channel Counter. This binary code directs the Column Data Switch and the Row Data Switch to the channel which should be the source of the encoding data. Table 3-4 gives the six combinations of the Channel Address Code and the resultant channel selected with each combination. These stages have nine inputs and provide a 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 and the ninth input to U2190 comes from a special data-encoding network composed of resistors R2191 through R2199. (See Zeros Logic and Memory description for further information on ninth channel).

In addition to the encoding data inputs from the plug-in units, inputs are provided to the Column Data Switch from the VERTICAL MODE switch to inhibit the readout for any plug-in unit(s) not selected for display. When a unit is not selected, the line corresponding to the opposite channel is HI to forward bias the associated diodes: CR2162 and CR2163, CR2166 and CR2167, CR2170 and CR2171, or CR2174 and CR2175. The forward-biased diodes cause the channel switches to bypass the encoded data from the inhibited channel. However, since it may be desired to display information from special-purpose plug-in units (even through they do not produce a normal waveform display on the CRT), a feature is provided to override the channel inhibit. This is done by applying a LO to the associated Force Readout 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 switch.

Row Match adjustment, R2183, sets the gain of the Row Data Switch to match the gain of the Row Decoder for correct output. Column Match adjustment, R2243 performs the same function for the Column Data Switch stage.

Display-Skip Generator

The Display-Skip Generator is made up of Q2223, Q2226, Q2227 and Q2229. This stage monitors the time-multiplexed column data at the output of the Column Data Switch during each time-slot to determine if the information is valid data that should result in a CRT display. Quiescently, about 100 microamperes of current flows through R2242 from Q2243 and the Zeros Logic and Memory stage. (The purpose of this quiescent current will be discussed in connection with the Zeros Logic and Memory stage). This current biases Q2223A so that its base is about 0.2 volt more positive than the base of Q2223B in the absence of column data. Therefore, since Q2223A and Q2223B are connected as a comparator, Q2223A will remain on unless its base is pulled more negative than the base of Q2223B.

The analog data output from the Column Data Switch produces a 0.5 volt (approximately) change for each unit of column current that has been encoded by the plug-in unit. Whenever any information appears at the output of the Column Data Switch, the base of Q2223A is pulled more negative than the base of Q2223B, resulting in a negative (LO) Display-Skip output to the Timer stage through Q2229. 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.

Transistors Q2226 and Q2227 also provide Display-Skip action. The end-of-word level connected to their emitters is LO only during time-slot 1. This means they are enabled only during this time-slot. These transistors allow the Zeros Logic and Memory stage to generate a Display-Skip signal during time-slot 1 when information that is not to be displayed on the CRT has been stored in memory (further information is given under Zeros Logic and Memory).

Column and Row Decoders

The Column Decoder U2244 and Row Decoder U2185 sense the magnitude of the analog voltages at their inputs (pin 10) and produce a binary output on one of ten lines corresponding to the column or row data encoded by the plug-in unit. These outputs provide the Column Digital Data and Row Digital Data, which is encoded by the Decimal-to-BCD converters to create the address used by the Character Generator in determining which character will be displayed. The column and row data is also used throughout the Readout Sysfem 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. When a Display-Skip signal is present (collector of Q2229 HI), pin 9 is pulled HI through CR2229. 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 Q2181 and its associated components, is a Row-14 detector that 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 14 (13 units of row current, or 1.3 millamperes) is encoded, the base of Q2181 pulled negative enough so that this transistor is forward biased to produce a LO Jump Command output at its emitter. The Jump Command is connected to the set input of RS flip-flop U2162B, whose reset input is connected to the Trigger Signal from pin 5 of the Timer. When the Jump Command and Trigger inputs are low, U2162B produces a LO output to reset the time-slot Counter as well as advancing the Horizontal Character Position Counter and the Channel Counter. U2162B also produces a HI output to signal Display Skip at pin 4 of the Timer.

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 that it can store the encoded data.

Typical output waveforms of the five possible input conditions that can occur are shown in Figure 3-36. When time-slot 1 occurs, a store command is given to all of the memories. If the plug-in units 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 while 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 encoded during time-slot 1 was only provided to set the memories and 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, a memory within U2232 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 Q2243 to add one unit of current at the input of the Column Decoder. This produces a zero after the character displayed during time-slot 4. During time-slot 6, another memory within U2232 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 0 in the CRT display.

Finally, another memory within U2232 is interrogated during time-slot 8 to determine whether the prefix should be changed, or left at the value that was encoded. If data has been encoded that calls for a shift 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 Figure 3-39, that when row 4 is programmed, a reduction of one column results in a one-column shift of the prefix. For example, with the 100 μV program shown in Figure 3-34. If the data received from the plug-in called for a shift 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 R2242 provided by Q2243 (see Display-Skip Generator) allows the prefix to be shifted from m (100 microamperes of column current, column 1) to no prefix (0 column current, column 0) 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 to switch 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 through R2199 for column data and enable pin 10 of U2186. This provides the addresses necessary to display the word IDENTIFY in the word position allotted to the channel that 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 end-of-word signal from the Time-Slot Counter is connected to pin 9 of U2232 through C2239. 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 Generator

Each character to be displayed on the instrument CRT consists of a series of connecting points developed on a possible 8-point by 8-point grid (see Fig. 3-41). The 8-bit binary output from the Character Generator is used to determine the location of points within the grid, whether or not to provide a trace connecting two points, and the point at which a character has been completed. The Character Generator stage consists of an oscillator, the Lower Order Address Generator, and an EPROM connected to a latch.

Q2151 and Q2152 form a square-wave oscillator whose frequency is adjustable with C2155 to provide 16 cycles within the time allotted for developing a character. The base of Q2152 goes LO when the Timer produces a negative going Ready pulse at pin 13. This starts the oscillator by turning Q2152 on. The emitter of Q2151 becomes more negative as C2154 and C2155 discharge through R2154. The capacitors continue to discharge until the emitter-base junction of Q2151 becomes forward biased. Q2151 then begins to conduct and causes the oscillator to begin changing states. As Q2151 conducts, the discharge through C2154 and C2155 stops and causes a collector current reduction in Q2152. The current reduction causes the emitter and base of Q2152 to rise positive which pulls the emitter of Q2151 along with them through C2154 and C2155. This positive shift on the emitter of Q2151 turns it off. Now with C2151 conducting and Q2152 turned off, the voltage on the emitter of Q2152 begins to go negative with C2154 and C2155 beginning to charge through R2155. When the emitter-base junction of Q2152 becomes forward biased, the oscillator again changes states and completes one cycle.

The signal produced by the oscillator at the collector of Q2152 switches Q2153 on and off to create the clock pulses used by the Lower Order Address Generator and the EPROM latch. The oscillator will continue to run until the Timer Ready output at pin 13 goes positive and pulls up the base of Q2152.

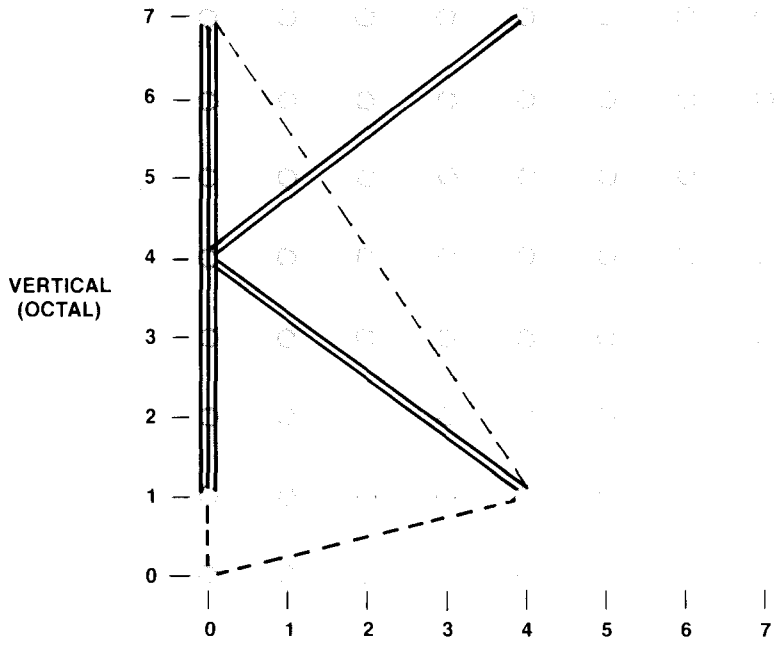
The Lower Order Address Generator is a 4-bit binary counter and consists of U2202B. The negative going Timer Ready pulse is inverted by Q2142 and used to reset U2202B. The oscillator is also enabled by the Ready signal and begins providing the clock input at pin 13. The counter then begins at "0000" and counts at the frequency of the oscillator, continuing to do so until the Ready signal goes positive. The Lower Order Address Generator's 4-bit output is connected to the four lower order address inputs on the Character Generator, U2203.

U2204 is an octal D-type flip-flop used as a latch to stabilize and synchronize the Character Generator EPROM output. It is reset by the same signal that starts the oscillator and is clocked at pin 11 by the oscillator output from Q2153. Q2204 will be considered to be part of the Character Generator in the discussion that follows.

The Character Generator U2203 is a 4k X 8-bit EPROM which contains the binary words used by the output stages in creating the signals necessary to form readout characters. There are twelve address inputs, with the lower four coming from the Lower Order Address Generator, the center four from the Column Decimal-to-BCD Converter, and the upper four from the Row Decimal-to-BCD Converter. As previously mentioned, each character is developed on an 8-point by 8-point grid (see Fig. 3-41 for a typical character). The Character Generator's 8-bit output provides the information necessary to move the instrument beam around within the grid, to turn the beam on and off, and to indicate when a character is complete.

The row and column data cause a 4-bit binary code to be generated at the outputs of the Row and Column Decimal-to-BCD Converters when a readout character is to be displayed. The Lower Order Address Generator is enabled and also provides a 4-bit binary code. These twelve bits are combined to form the EPROM address containing the 8-bit binary word which will locate the instrument beam at the character's starting grid location.

The 8-bit word can be broken down into four parts. The lower three bits are the horizontal grid coordinate, bits 4



"K" CHARACTER				
CHARACTER GENERATOR ADDRESS (HEXIDECIMAL)	CHARACTER GENERATOR OUTPUT		BIT 7 MOVE - - - - DRAW ———	BIT 8 END OF CHARACTER?
	BINARY 8 7 6 5 4 3 2 1	OCTAL		
B90	00000000	000	MOVE	NO
B91	00001000	010	MOVE	NO
B92	01111000	170	DRAW	NO
B93	01001000	110	DRAW	NO
B94	01111000	170	DRAW	NO
B95	00001100	014	MOVE	NO
B96	01100000	140	DRAW	NO
B97	01111100	174	DRAW	NO
B98	01100000	140	DRAW	NO
B99	01001100	114	DRAW	NO
B9A	10000000	200	MOVE	YES

Fig. 3-41. Developing a typical character on the crt (SN B202642 & Above).

through 6 are the vertical coordinate, bit 7 turns the Z Readout on and off, and bit 8 indicates whether or not the character is complete.

The character grid (Fig. 3-41) can be thought of as having vertical and horizontal coordinates numbered 0 through 7, with location "0,0" in the lower left corner. The 8-bit binary word from the Character Generator is converted to octal to easier recognize the vertical and horizontal coordinates. A binary "00001010" becomes octal "012". This number would cause the instrument CRT beam to point at grid coordinates vertical "1" and horizontal "2". The fact that the first octal digit is "0" indicates two things. First it shows that bit 7 of the binary word is LO which turns off Q2132 and the Z Readout signal to the instrument. It also shows that bit 8 is LO so the character is not complete. When bit 7 is HI, it advances the Horizontal Character Position Counter for the next character within the readout word.

The 4-bit outputs from the Row and Column Decimal-to-BCD Converters remain the same until the character is complete. However, the Lower Order Address Generator keeps counting and combines with the Row and Column Decimal-to-BCD Converter's outputs to address all the EPROM locations necessary to form the readout character.

Suppose the next address produces a Character Generator output of "01111010" or octal "172". The octal digit "1" indicates binary bit 7 is high which will turn on Q2132 and the Z Readout output to the instrument. The instrument will now provide a trace from the previous vertical and horizontal coordinates to the new ones, vertical "7" and horizontal "2". Thus the character is formed by a series of binary words causing the instrument CRT beam to move or draw between points.

Horizontal Character Position Counter

The Horizontal Character Position Counter U2202A is a 4-bit binary counter. Its output is converted to current by R2266 through R2269 and added to the X (horizontal) signal for spacing readout characters horizontally on the CRT. The counter is reset to "0000" with a Word Trigger pulse from U2127B and is advanced with inputs from two possible sources. The first is a HI End-of-Character signal from pin 19 of U2204. The counter can also be advanced when a Space instruction is encoded by the plug-in unit to cause a space to be left between two characters on the CRT. A Space instruction occurs when row 10 from the Row Decoder goes LO and is inverted by U2157D to advance the Horizontal Character Position Counter. No character could be displayed in this situation as no character information is stored at the Character Generator addresses formed using row 10.

Time slots 1, 2, and 3 are also connected to the Space instruction through VR2185, VR2186, and VR2187 respectively. This configuration adds a space to the displayed word during time slots 1, 2, and 3, even if information is not encoded 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 positions as normal/invert or cal/uncal information is encoded by the plug-in.

Decimal Position Logic

The Decimal Position Logic stage allows decimal points to be displayed at five possible locations within a readout word (see Fig. 3-37). The decimal location encoded by a plug-in during time-slot one is achieved by adding positioning current to the X (horizontal) readout signal. Circuitry for this stage includes five 2-input NOR gates in U2157 and U2251 with precision resistors connected to their outputs. One input of each NOR gate is connected to row 7 on the Row Decoder and the other to one of columns 3 through 7 on the Column Decoder. When a decimal is to be displayed, row 7 goes LO and disables the Horizontal Character Position Counter by keeping the four outputs of U2264 LO. It also sets one input of each of the five NOR gates to LO. One of columns 3 through 7 also goes LO, depending on which decimal position is encoded, causing the NOR gate to which it's connected to go HI. This high adds current to the X (horizontal) signal in the amount determined by the resistor connected to the NOR gate's output. Each Character Generator location addressed by row 7 and column 3 through 7 contains information necessary to form a decimal point on the CRT in the position indicated. The Horizontal Character Position Counter resumes normal operation and the Decimal Position Logic is disabled when row 7 goes back up at the end of the time-slot.

Some plug-ins require decimal points at locations in the readout word other than the five provided by the Decimal Position Logic stage. An additional decimal point can be displayed in any position normally available to characters by encoding row 8 with column 9. The Horizontal Character Position Counter provides positioning current in this mode and the Decimal Position Logic stage is disabled.

Vector Generators

The Y Vector Generator is in two stages and consists of U2210A and B. Vertical character size adjustment is provided with R2210 as a variable feedback resistor for U2210A. Input to the Vector Generator is provided by the three bits of vertical character information from pins 9, 12, and 15 of the Character Generator latch U2204. The digital highs and lows across R2206, R2207 and R2208 are mixed as stepped current levels at pin 2 of U2210A. These sudden analog steps are converted into a smooth transition from one level to the next by RCL network R2212, C2212, and L2212. U2210B current buffers the resulting signal to be mixed with the Channel Counter vertical information at the input of the Y Output Amplifier.

The X Vector Generator operates similarly to the Y Vector Generator. Gain for the stage is fixed by the circuit components and its output is current buffered to be mixed at the input of the X Output Amplifier.

Output Amplifiers

The Y Output Amplifier provides the Y (vertical) signal to the instrument by combining the signal from the Y Vector Generator with the channel 1 or 2 information from the Channel Counter. The amplifier consists of U2257B with Q2255 in its input circuit. Amplifier gain is adjustable with R2260 to control the vertical separation between readout words displayed at the top and bottom of the graticule area. Q2255 switches the amplifier input on and off with the Timer Ready signal, using Q2250 to provide impedance matching. The channel 1 or 2 information from pin 3 of the Channel Counter U2127A is inverted by U2251A and converted to current by R2252 and R2253. The Channel Counter produces a LO at pin 3 when the readout word is to be displayed at the top of the graticule. The LO is inverted to HI by U2251A and adds current to the Y (vertical) readout signal.

The X Output Amplifier consists of U2257A and Q2296. It operates similarly to the Y Output Amplifier to provide the X (horizontal) signal to the instrument. Input to the amplifier is a combination of outputs from the X Vector Generator, Horizontal Character Position Counter, Decimal Position Logic, and horizontal word position information from the Channel Counter. The gain of this stage is fixed by the resistor values in the circuit.

MAINTENANCE

This section of the manual contains information for use in preventive maintenance, troubleshooting, or corrective maintenance of the R7903.

PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning, visual inspection, lubrication, etc. Preventive maintenance performed on a regular basis may prevent instrument breakdown, and will improve the reliability of this instrument. The severity of the environment to which the R7903 is subjected determines the frequency of maintenance. A convenient time to perform preventive maintenance is preceding recalibration of the instrument.

General Cleaning Instructions

The R7903 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 dissipaiton. Also, dirt provides an electrical conduction path which may result in instrument failure. The top and bottom 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, zylene, acetone or similar solvents.

Cleaning the Exterior

Loose dust accumulated on the outside of the R7903 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 that remains can be removed with a soft cloth dampened in a mild detergent and water solution. Abrasive cleaners should not be used.

Cleaning the 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.

Cover Removal

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.

Cleaning the 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 acumulated 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.

WARNING

During rackmount installation, interchanging the left and right slide-out track assemblies defeats the extension stop (safety latch) feature of the tracks. Equipment could, when extended, come out of the slides and fall from the rack, possibly causing personal injury and equipment damage.

When mounting the supplied slide-out tracks, inspect both assemblies to find the LH (left hand) and RH (right-hand) designations to determine correct placement. Install the LH assembly to your left side as you face the front of the rack and install the RH assembly to your right side.

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 harmful 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 R7903 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 R7903 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 ensure 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 or corrected by recalibration.

TROUBLESHOOTING

Introduction

The following information is provided to facilitate troubleshooting the R7903. 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 4-1 lists the main circuits in the R7903 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. Pictures of the circuit boards are shown in Fig. 6-1 through 6-10. 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.

TABLE 4-1

Component Numbers

Component numbers on diagram	Diagram number	Circuit
1100 to 1199	1	STANDARD FRONT PANEL
1100 to 1199	2	OPTIONAL PULSE FRONT PANEL
1 to 99	3	MAIN INTERFACE
200 to 399	4	LOGIC
500 to 599	5	TRIGGER SELECTOR
600 to 799	6	VERTICAL AMPLIFIER
800 to 999	7	HORIZONTAL AMPLIFIER
1000 to 1099	8	OUTPUT SIGNALS
1200 to 1399	9	CONVERTER RECTIFIERS
1400 to 1599	10	LV REGULATORS
1600 to 1899	11	CRT CIRCUIT
2100 to 2299	12	READOUT
2500 to 2599	13	FAN CIRCUIT

Multi-Pin Connector Color-Code. The multi-pin connectors used for interconnection between circuit boards are color-coded to aid in circuit tracing. The color of the connector body matches the resistor color-code for the last digit of the circuit number, e.g., P601 is brown, P603 is orange, etc.

Wiring Color-Code. All insulated wire and cable used in the R7903 is color-coded to facilitate circuit tracing.

Power Cord Conductor Identification

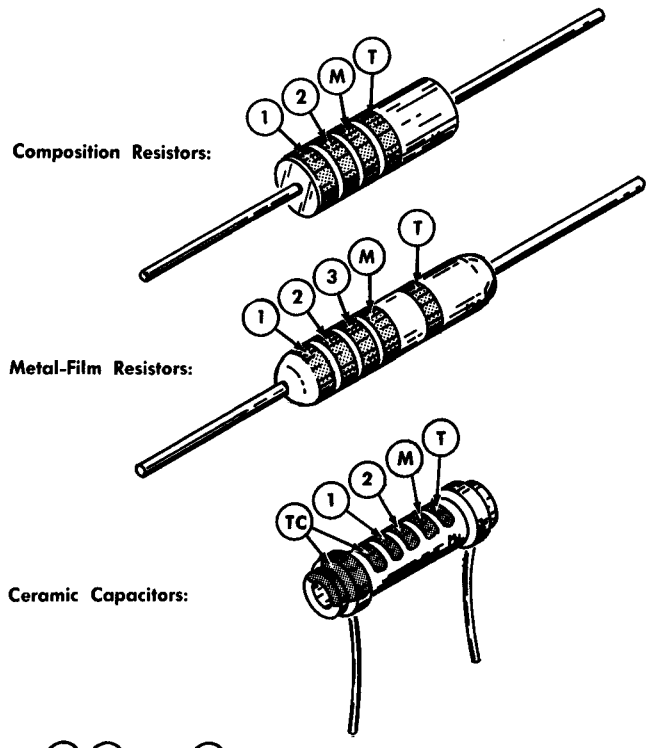
Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Blue	White
Grounding (Earthing)	Green-Yellow	Green-Yellow

Resistor Color-Code. In addition to the brown composition resistors, some metal-film resistors and some wire-wound resistors are used in the R7903. 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. 4-1). Metal-film resistors have five stripes consisting of three significant figures, a multiplier, and a tolerance value.

Capacitor Markings. 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 R7903 are color-coded in picofarads, using a modified EIA code (see Fig. 4-1).

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. 4-2 shows the lead configuration for the semiconductors used in this instrument, as viewed from the bottom of the semiconductors.



(1) (2) and (3) —1st, 2nd and 3rd significant figures;
(M) —multiplier; (T) —tolerance;
(TC) —temperature coefficient.

Resistor and Capacitor Color Code

Color	Significant Figures	Multiplier: Resistors	Multiplier: Capacitors	Tolerance: Resistors	Tolerance: 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.

NOTE: (T) and/or (TC) color code for capacitors depends upon manufacturer and capacitor type. May not be present in some cases.

Fig. 4-1. Color Code for resistors and ceramic capacitors.

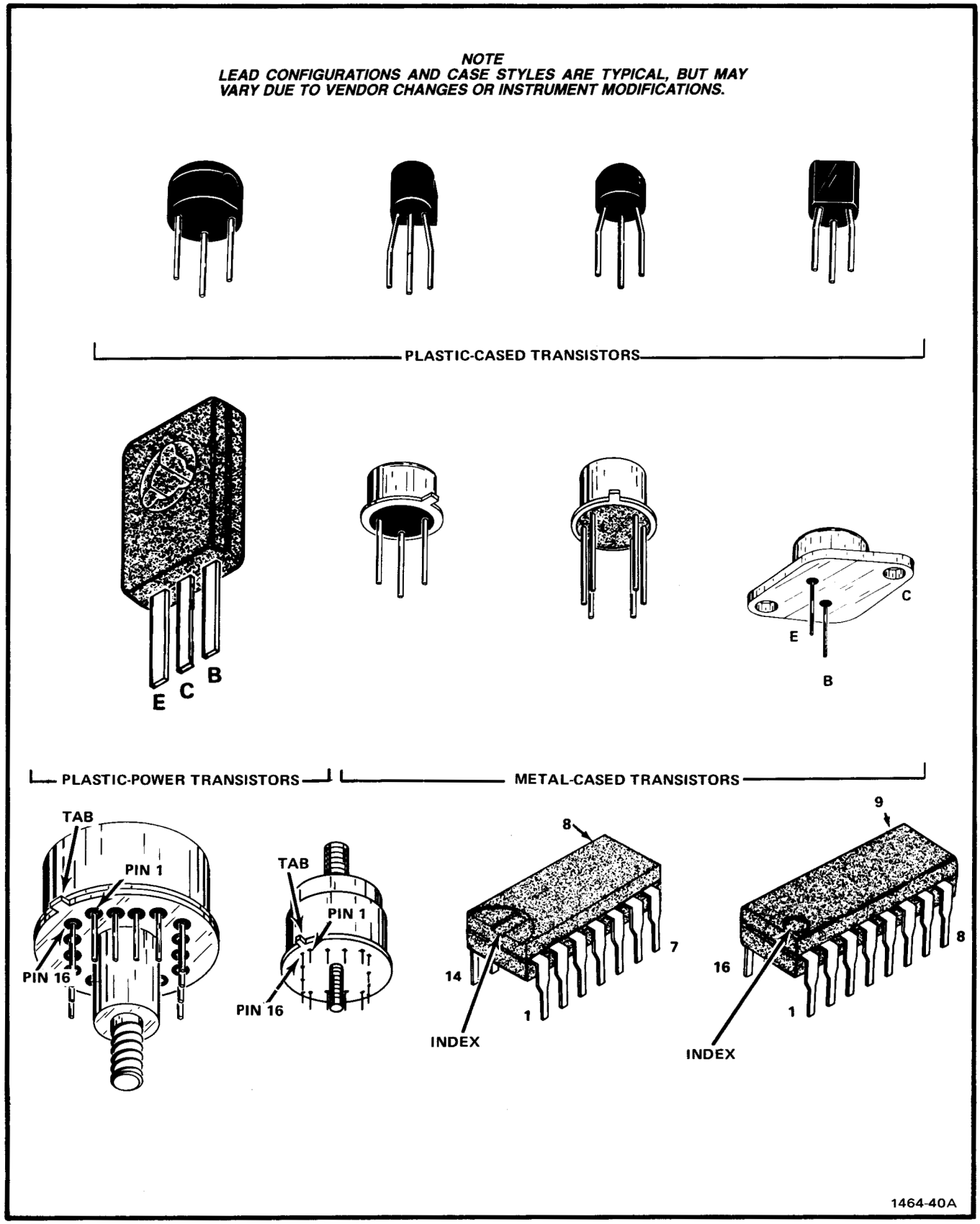


Fig. 4-2. Semiconductor Lead configuration used in this instrument.

Troubleshooting Equipment

The following equipment is useful for troubleshooting the R7903:

1. Transistor Tester

Description: Tektronix Type 576 Transistor-Curve Tracer or equivalent.

Purpose: To test the semiconductors used in this instrument.

2. Multimeter

Description: Digital voltmeter, 10 megohm input impedance and 0 to 500 volts range; ohmmeter, 0 to 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.

4. Variable Autotransformer

Description: Output variable from 0 to 140 V, 10 A minimum rating. Must have three-wire power cord, plug, and receptacle.

Purpose: Vary input line voltage when troubleshooting in the power supply.

Recommended type: General Radio W10MT3W Variac Autotransformer modified with three-wire power cord.

5. Isolation Transformer

Description: 1:1 turns ratio, 500 volt-amperes minimum rating, 50-60 cycle. Must have three-wire power cord, plug, and receptacle with ground connection carried through from input to output.

Purpose: To isolate R7903 from line potential when troubleshooting power supply.

Recommended type: Stancor #P6298 (for 115-volt line only) modified to include three-wire power cord, plug, and receptacle.

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 ensure 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 Information section.

2. Check Associated Equipment. Before proceeding with troubleshooting of the R7903, check that the equipment used with this instrument is operating correctly. 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 R7903 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, and damaged components.

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, which can 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 the 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 4-2 lists the tolerances of the power supplies in this instrument. These voltages are measured between the power supply test points (see Fig. 4-3 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.

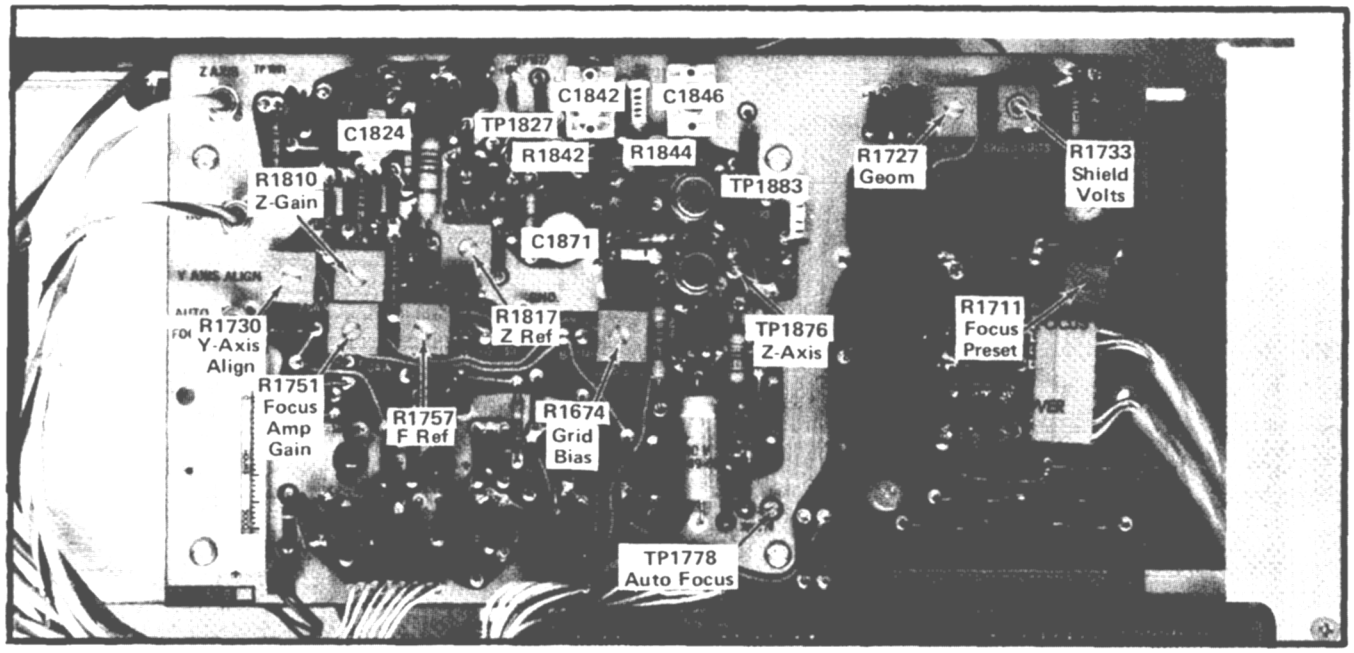


Fig. 4-3. Location of Power-Supply test points on Z-Axis.

Fig. 4-4 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 that does not produce the indicated results. Further checks and the circuit in which the trouble is probably located are listed to the right of this step.

TABLE 4-2

Power Supply	Voltage Tolerance	Maximum Ripple (peak to peak)
–50 V	Adjustable	2 mV
–15 V	0.15 V	1 mV
+5 V	0.1 V	1 mV
+15 V	0.15 V	1 mV
+50 V	0.5 V	3 mV
+130 V	5.2 V	500 mV
Control Illum (+5 V)	+0.2 V –0.5 V	25 mV

If incorrect operation of the power supplies is suspected, connect the R7903 to a variable autotransformer. Then, check for correct regulation with a DC voltmeter (0.1% accuracy) and check 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 R7903. 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.

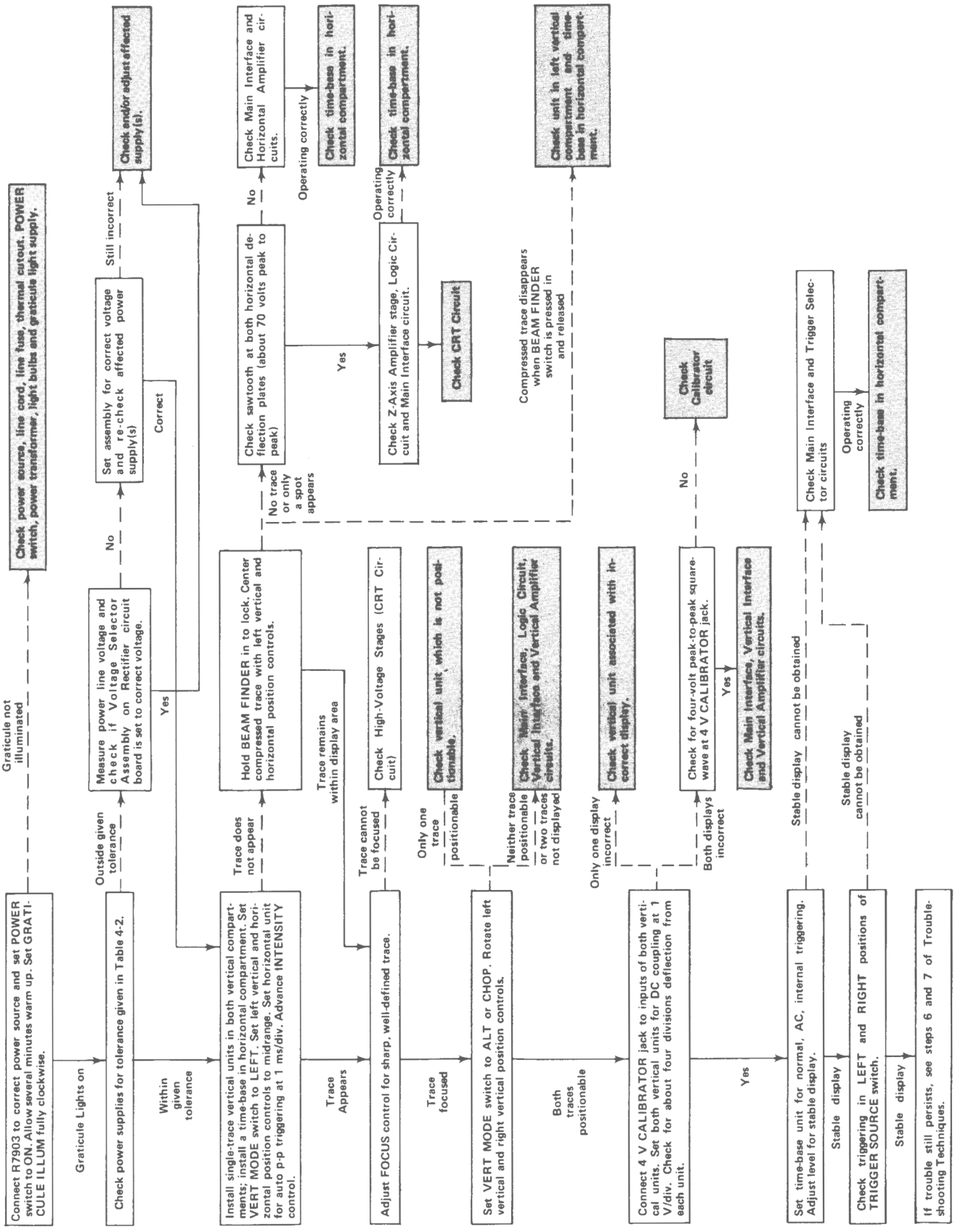


Fig. 4-4. Troubleshooting Chart.

A good check of transistor operation is acutal performance under operating condiditons. A transistor can most effectively be checked by substituting a new component (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 troubleshooting 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 that adjacent leads are not shorted together. A convenient means of clipping a test probe to the 14- and 16-pin integrated circuit 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 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 the 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 an 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

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 R7903 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 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 R7903. 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 Tektronx 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 that 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 an 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, and potentiometers) a high wattage-rating soldering iron may be required. For example, if the component is connected to the chassis or other large heat-radiating surface, a 75-watt or larger soldering iron may be required. 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 printed information.

COMPONENT REPLACEMENT

WARNING

Disconnect the instrument from the power source before replacing components.

The exploded-view drawings that accompany the Mechanical Parts List (located at rear of the manual) may be helpful in removal or disassembly of individual components or sub-assemblies.

To gain access to the boards in the rear of the instrument, the power unit must first be removed as explained below:

Power-Unit Removal.

The power unit can be slide out of the back of the R7903 to gain access to the Logic and Low-Voltage boards, or for power-unit maintenance. The power unit can be operated in this position for easy troubleshooting. To remove the power unit, use the following procedure:

WARNING

Extreme caution must be used when troubleshooting in the power unit, due to the presence of line voltage and high voltage.

1. Remove the two screws that secure the power unit to the side of the instrument, and the two screws on the rear panel.

2. 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 components or parts of the instrument).

WARNING

Disconnect the instrument from the power source before removing the power-unit cover. The primary storage capacitors, C1216 and C1217, remain charged with high voltage DC for several minutes after the line power is disconnected. A warning indicator (neon bulb), located on the Power Supply Inverter board, flashes when this stored voltage exceeds about 80 volts. Do not remove the power-unit cover while this light is flashing.

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 the completely wired (670-XXXX-XX) board.

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).

Chassis-Mounted Boards Replacement.

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.

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, and disconnect the coaxial connectors located on the board.

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 that 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 and connectors.

Logic Circuit Board Replacement.

1. Slide out the power unit as described previously.

2. Remove the screws that secure 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 that 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. Replace the screws securing the board.

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 (inside each plug-in compartment) that hold the plug-in interface connectors to the chassis (total of nine screws). Also remove the screws that 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.

Low-Voltage Regulator Circuit Board Replacement.

1. Slide the power unit out of the rear of the instrument as described previously. Remove the top cover (remove six screws on top and two screws on rear panel).

2. Disconnect the multi-pin connector from the board.

3. Remove the bolts securing the power transistors to the bottom of the heat radiator. Remove the screws securing the board to the power unit.

4. To replace the Low-Voltage Regulator board, reverse the order of removal. Apply a thin coat of silicone grease on the back (mounting surface) of each plastic transistor before securing it to the heat radiator.

Cap Rectifier Board Replacement.

To replace the Cap Rectifier board, proceed as follows:

1. Slide out the power unit as described previously. Remove the top cover.

2. Remove the screws holding the top corners and bottom of the Low Voltage board heat-radiator to the power unit and slide the heat-radiator forward.

3. Disconnect the multi-pin connectors that connect the Low Voltage board to the Cap Rectifier board.

4. Remove the screws securing the Cap Recifier board to the power unit. Unsolder the 12 transformer leads from the board. Pull the board forward.

5. To replace the Cap Rectifier board, reverse the removal procedure.

High Voltage Board Replacement or Line Filter Replacement.

Slide out the Power Unit as described previously, then remove the top cover.

To replace the High-Voltage Board, remove the screws that secure the board; unsolder the five transformer leads; disconnect all cables (leave the cables soldered to the board, and remove the end with the multi-pin connector).

To replace the Line Filter, remove the two screws that secure the Line Filter shield assembly to the rear panel; disconnect the input and output leads; lift the Line Filter assembly out of the instrument.

Power Supply Inverter Board Replacement.

To remove and replace the Power Supply Inverter board, use the following procedure. An exploded-view drawing of the power unit is shown in Fig. 4-5 and also at the rear of the Manual in the Mechanical section. Several critical parts are identified in Fig. 4-5; there are several different ways to disassemble the power-unit, but to ensure safe operation follow the procedure.

WARNING

The power-unit assembly has been tested at the factory to ensure safe operation. Do not remove the plate insulator, block insulator, or transistor shield from the rear panel. Improper disassembly or assembly of this unit can result in hazardous voltages on the chassis of this instrument.

1. Disconnect the instrument from the power source.

2. Slide the power unit out as described previously, and remove the top cover. Remove the Low-Voltage assembly (Low-Voltage board and heat-radiator). See Low-Voltage Board Replacement.

3. Remove the two plastic screws securing the power transistor protective cover on the Inverter board. Unsolder the three transformer leads from the Inverter board. Remove the excess solder from the board with a vacuum-type desoldering tool.

4. Remove the Cap-Rectifier board and the High-Voltage compartment as a unit. See Cap-Rectifier and High-Voltage Board Replacement.

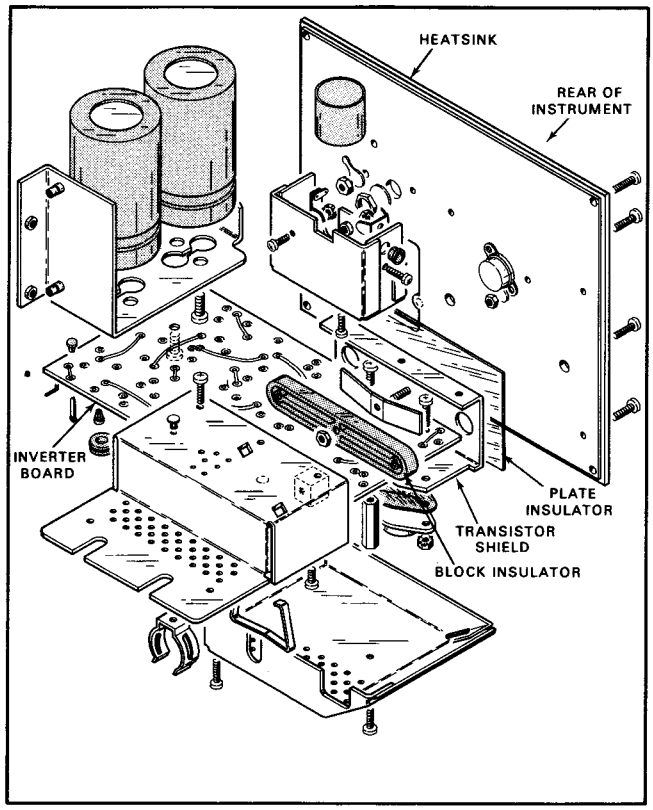


Fig. 4-5. Exploded-view drawing of the Power Supply Inverter Unit identifying several critical parts.

5. Remove the right side panel of the power unit (one screw on Inverter board and two screws on the rear panel).

6. Unsolder the line input leads on the inverter board from the Line Selector assembly.

7. Remove the Line Filter shield (two screws securing shield to the rear panel. It is not necessary to disconnect the Line Filter leads. To gain access to the three screws securing the inverter shield to the transistor heat shield, push the Line Filter assembly away from the rear panel. See warning and Fig. 4-5.

8. Remove the three screws securing the inverter shield to the transistor heat shield. See Fig. 4-5.

9. Remove the four nuts securing the inverter power transistors to the inverter board and remove the transistors. Remove the four screws securing the two storage capacitors to the inverter board.

10. Slide the inverter board and inverter shield away from the transistor shield until the mounting studs clear the heat shield. Remove the Power Supply Inverter board and inverter shield as a unit.

11. To replace the Power Supply Inverter board, reverse the removal procedure.

Fan Assembly Replacement.

1. Remove Readout board.

2. Slide out the power unit as described previously.

3. Remove the two screws securing Fan bracket, disconnect all connectors, and slide Fan assembly forward and out.

4. To replace Fan assembly, reverse the removal procedure.

Calibrator and Front Panel Switch Board Replacement.

1. Remove all knobs from the front-panel controls. Remove all the bolts securing controls or switches to the front panel. Remove the one screw securing the front panel and remove the front panel.

2. Remove the remaining screws securing sub-panel (front and sides) to instrument. Slide Calibrator board back and out.

3. To replace the Calibrator board, reverse the removal procedure.

Plug-In Interface Board 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 that was replaced is aligned with the other contacts.

6. Replace the Main Interface board.

Semiconductor Replacement.

A semiconductor should not be replaced unless it is actually defective. If a semiconductor is removed from its socket during routine maintenance, return it to the original socket. Unnecessary replacement of semiconductors may affect the calibration of this instrument. When semiconductors are replaced, check the operation of the part of the instrument that 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. 4-2 shows the lead configuration of the semiconductors used in this instrument. Some plastic case transistors have lead configurations that do not agree with those shown here. If a replacement transistor is made by a different manufacturer than the original, check the manufacturer's basing diagram 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 th chassis use silicone grease to increase heat transfer. Replace the silicone grease when replacing these transistors.

WARNING

Handle silicon 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.

Vertical Amplifier IC Replacement.

1. Remove the left side cover to expose the A10 Vertical Amplifier board.

Replace U685 as follows:

2. Pivot the plastic retaining bar away.

3. With an extracting tool (the one mentioned in the previous discussion may be used), pull the IC up until it clears its socket.

If the code number (see Figure 4-6) of the replacement IC does not match that of the defective IC, the shunt resistance must be changed (see Table 4-3).

4. To replace the IC, reverse the order of removal.

Replace U745 as follows:

5. Remove the A10 Vertical Amplifier board (follow the procedure for Chassis Mounted Board Replacement).

6. Unsolder the neck pin connectors from the defective IC and solder them to the replacement IC.

If the code number (see Figure 4-6) of the replacement IC does not match that of the defective IC, the shunt resistance must be changed (see Table 4-3).

7. Remove the IC securing hardware.

8. With an extracting tool, pull the IC up until it clears its socket.

9. To replace the IC, reverse the order of removal.

Vertical Interface IC Replacement.

U4625 and U4685 are a matched pair and must be replaced as such.

1. Remove the A9 Vertical Interface board (follow the Procedure for Trigger Selector and Vertical Interface Circuit Board Replacement).

2. Remove the IC securing hardware.

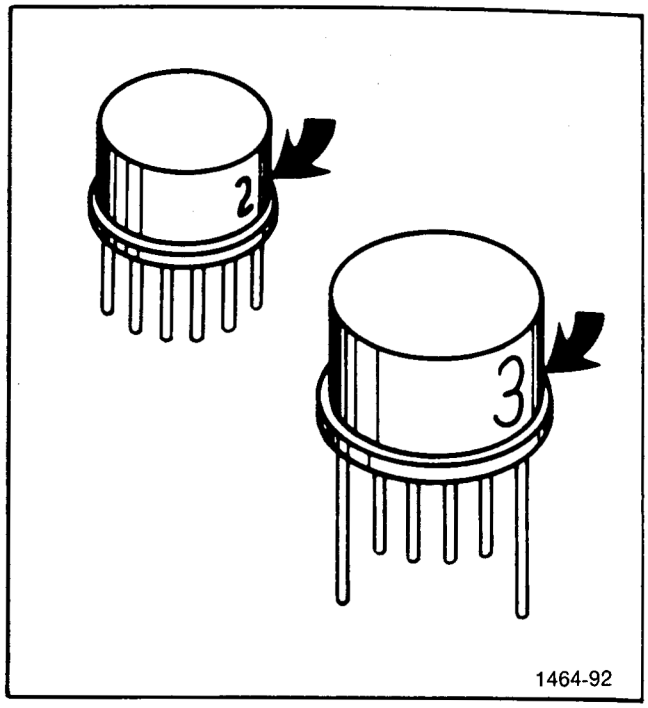


Figure 4-6. IC code number locations.

3. With an extracting tool, pull each IC up until it clears its socket.

If the code number (see Figure 4-6) on the side of the replacement IC's do not match those of the defective IC's, the shunt resistance must be changed (see Table 4-3).

4. To replace the IC's reverse the order of removal.

TABLE 4-3
IC Code/Shunt Resistor Replacement Values

IC CODE (See Fig. 4-6)	CIRCUIT BOARD		
	A10 VERTICAL AMPLIFIER		A9 VERTICAL INTERFACE
	U685 R684,R688 (Ohms)	U745 R741,R756 (Ohms)	U4625/U4685 R4689 (Ohms)
1	91	110	1.6 k
2	100	130	1.2 k
3	110	160	1 k
4	130	220	820
5	160	300	820
6	220	510	560
7	300	1 k	560
8	510		430
9			430
10			430

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 Removal.

WARNING

The crt may retain a dangerous electrical charge. Before removing the crt, the anode must be fully discharged by shorting the anode lead from the crt to the chassis. Wait approximately ten minutes and again firmly short this lead to the chassis. Then remove the crt. After removal, short the anode lead to the silvered patch on the funnel portion of the crt just prior to further handling.

Use care when handling a CRT. Protective clothing and safety glasses should be worn. Avoid striking it on any object which may 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.

1. Remove the rear-panel signal out circuit board assembly, or use an offset screwdriver for step number three.

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 plastic CRT mask, light filter, and metal light filter shield. Remove the four screws securing CRT bezel to front chassis. Disconnect the multi-pin connector from the rear of bezel.

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.

Cathode-Ray Tube Replacement.

1. Insert the CRT into the shield. Guide the anode lead through the hole in the shield.

2. Clean the CRT faceplate, plastic faceplate protector, and light filter with denatured alcohol.

3. Re-install the CRT bezel, faceplate protector and light filter. Firmly tighten the four 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. Replace the CRT base socket.

6. Reconnect the CRT anode plug.

7. Re-install the rear-panel signal out circuit board assembly.

8. 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.

9. Check the calibration of the complete instrument. Calibration procedure is given in Section 2.

Switch Replacement.

The pushbutton switches used in the R7903 are not repairable and should be replaced as a unit if defective.

Graticule Bulb Replacement (For SN B191892 & Below).

Remove the plastic CRT mask, light filter and metal light shield. Pull the white tabs to remove the graticule light assembly. Slide the lamp retaining strip from the base of the bulb (turn to the side). Pull the bulb out of the assembly. Reverse the order of removal for replacement.

Graticule Bulb Replacement (For SN B191893 & Up).

To remove or replace the graticule light bulbs, first remove the plastic crt mask, light filter and metal shield. Pull on the white tabs to remove the graticule lamp assembly. Next unsolder the leads of the damaged bulb and pull the bulb out of the circuit board. Preform the leads of the replacement bulb and insert it into the circuit board and resolder. Now reverse the order of removal for replacement of the entire crt graticule lamp assembly.

Fuse Replacement.

Table 4-4 gives the rating, location, and function of the fuses used in this instrument.

TABLE 4-4
Fuse Rating

Circuit Number	Rating	Location	Function
F1201	15 A Fast	Line Filter	Line
F1200	4 A Fast	Line Selector	Line
F1223	2 A Fast	Assembly	Inverter

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.

Instrument Repackaging.

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. Include 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 to 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 275 pounds.

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

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00213	NYTRONICS COMPONENTS GROUP INC SUBSIDIARY OF NYTRONICS INC	ORANGE ST	DARLINGTON SC 29532
00853	SANGAMO WESTON INC SANGAMO CAPACITOR DIV	SANGAMO RD P O BOX 128	PICKENS SC 29671
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPRESSWAY P O BOX 225012 M/S 49	DALLAS TX 75265
02111	SPECTROL ELECTRONICS CORP SUB OF CARRIER CORP	17070 E GALE AVE P O BOX 1220	CITY OF INDUSTRY CA 91749
02114	AMPEREX ELECTRONIC CORP FERROXCUBE DIV	5083 KINGS HWY	SAUGERTIES NY 12477
02735	RCA CORP SOLID STATE DIVISION	ROUTE 202	SOMERVILLE NJ 08876
02777	HOPKINS ENGINEERING CO	12900 FOOTHILL BLVD	SAN FERNANDO CA 91342
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
03888	KDI PYROFILM CORP	60 S JEFFERSON RD	WHIPPANY NJ 07981
04099	CAPCO INC	FORESIGHT INDUSTRIAL PARK P O BOX 2164	GRAND JUNCTION CO 81501
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR GROUP	5005 E MCDOWELL RD	PHOENIX AZ 85008
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV	464 ELLIS ST	MOUNTAIN VIEW CA 94042
07716	TRW INC TRW ELECTRONICS COMPONENTS TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
09023	CORNELL-DUBILIER ELECTRONICS DIV FEDERAL PACIFIC ELECTRIC CO	2652 DALRYMPLE ST	SANFORD NC 27330
11236	CTS OF BERNE INC	406 PARR ROAD	BERNE IN 46711
12954	MICROSEMI CORP	8700 E THOMAS RD P O BOX 1390	SCOTTSDALE AZ 85252
12969	UNITRODE CORP	580 PLEASANT ST	WATERTOWN MA 02172
13511	AMPHENOL CADRE DIV BUNKER RAMO CORP		LOS GATOS CA
14193	CAL-R INC	1601 OLYMPIC BLVD	SANTA MONICA CA 90404
14298	AMERICAN COMPONENTS INC DIV OF DALE ELECTRONICS	8TH AVE AT HARRY ST	CONSHOHOCKEN PA 19428
14433	ITT SEMICONDUCTORS DIV		WEST PALM BEACH FL
14552	MICRO/SEMICONDUCTOR CORP	2830 S FAIRVIEW ST	SANTA ANA CA 92704
14859	TEXAS INSTRUMENTS INC CONTROL PRODUCTS DIV	300 NORTH MAIN	VERSAILLES KY 40383
14936	GENERAL INSTRUMENT CORP DISCRETE SEMI CONDUCTOR DIV	600 W JOHN ST	HICKSVILLE NY 11802
15238	ITT SEMICONDUCTORS A DIVISION OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORP	500 BROADWAY P O BOX 168	LAWRENCE MA 01841
15454	AMETEK INC RODAN DIV	2905 BLUE STAR ST	ANAHEIM CA 92806
18324	SIGNETICS CORP	811 E ARQUES	SUNNYVALE CA 94086
18583	CURTIS INSTRUMENTS INC	200 KISCO AVE	MOUNT KISCO NY 10549
19396	ILLINOIS TOOL WORKS INC PAKTRON DIVISION	900 FOLLIN LANE S E	VIENNA VA 22180
19701	MEPCO/ELECTRA INC A NORTH AMERICAN PHILIPS CO	P O BOX 760	MINERAL WELLS TX 76067
24546	CORNING GLASS WORKS	550 HIGH ST	BRADFORD PA 16701
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
25088	SIEMENS CORP	186 WOOD AVE S	ISELIN NJ 08830
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051
27193	EATON CORP CUTLER-HAMMER GROUP SPECIALTY PRODUCTS DIV	4201 N 27TH ST	MILWAUKEE WI 53216
31918	ITT SCHADOW INC	8081 WALLACE RD	EDEN PRAIRIE MN 55343

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507
33095	SPECTRUM CONTROL INC	8061 AVONIA RD	FAIRVIEW PA 16415
44655	OHMITE MFG CO	3601 M HOWARD ST	SKOKIE IL 60076
50434	HEWLETT-PACKARD CO OPTOELECTRONICS DIV	640 PAGE MILL RD	PALO ALTO CA 94304
50558	ELECTRONIC CONCEPTS INC	526 INDUSTRIAL WAY WEST	EATONTOWN NJ 07724
51406	MURATA ERIE NORTH AMERICA INC GEORGIA OPERATIONS	1148 FRANKLIN RD SE	MARIETTA GA 30067
51642	CENTRE ENGINEERING INC	2820 E COLLEGE AVE	STATE COLLEGE PA 16801
52763	STETTNER ELECTRONICS INC	6135 AIRWAYS BLVD PO BOX 21947	CHATTANOOGA TN 37421
52769	SPRAGUE-GOODMAN ELECTRONICS INC	134 FULTON AVE	GARDEN CITY PARK NY 11040
54473	MATSUSHITA ELECTRIC CORP OF AMERICA	ONE PANASONIC WAY	SECAUCUS NJ 07094
55292	LEDCO DIV WILBRECHT ELECTRONICS INC	240 E PLATO BLVD	ST PAUL MN 55107
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195
56289	SPRAGUE ELECTRIC CO	87 MARSHALL ST	NORTH ADAMS MA 01247
57668	ROHM CORP	16931 WILLIKEN AVE	IRVINE CA 92713
58854	GTE PRODUCTS CORP LIGHTING PRODUCTS GROUP	60 BOSTON ST	SALEM MA 01970
59660	TUSONIX INC	2155 N FORBES BLVD	TUCSON, ARIZONA 85705
59821	CENTRALAB INC SUB NORTH AMERICAN PHILIPS CORP	7158 MERCHANT AVE	EL PASO TX 79915
60211	VOLTAGE MULTIPLIERS INC	8711 WEST ROOSEVELT	VISALIA CA 93291
60705	CERA-MITE CORPORATION	1327 6TH AVE	GRAFTON WI 53024
71400	BUSSMANN MFG CO MCGRAW EDISION CO	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
71590	GLOBE-UNION INC CENTRALAB ELECTRONICS DIV	HWY 20 W P O BOX 858	FORT DODGE IA 50501
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 INC TRW ELECTRONIC COMPONENTS IRC FIXED RESISTORS PHILADELPHIA DIV	401 N BROAD ST	PHILADELPHIA PA 19108
76493	BELL INDUSTRIES INC MILLER J W DIV	19070 REYES AVE P O BOX 5825	COMPTON CA 90224
79727	C-W INDUSTRIES	550 DAVISVILLE RD P O BOX 96	WARMINSTER PA 18974
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
81073	GRAYHILL INC	561 HILLGROVE AVE P O BOX 373	LA GRANGE IL 60525
83003	VARO INC	2203 WALNUT ST P O BOX 401426	GARLAND TX 75040
83777	E-SYSTEMS INC MEMCOR DIV	41 E PARK DR P O BOX 549	HUNTINGTON IN 46750
84171	ARCO ELECTRONICS	400 MORELAND ROAD	COMMACK NY 11725
90201	MALLORY CAPACITOR CO DIV P R MALLORY AND CO INC	4760 KENTUCKY AVE P O BOX 372	INDIANAPOLIS IN 46206
91637	DALE ELECTRONICS INC	P O BOX 609	COLUMBUS NE 68601
91836	KINGS ELECTRONICS CO INC	40 MARBLEDALE ROAD	TUCKAHOE NY 10707
92966	GTE PRODUCTS CORP LIGHTING PRODUCTS GROUP HILLSBORO MINIATURE LAMP PLANT	WEST MAIN ST	HILLSBORO NH 03244
TK0213	TOPTRON CORP	TOKYO	JAPAN
TK1345	ZWAN AND ASSOCIATES	7633 S 180TH	KENT WA 98032
TK1450	TOKYO COSMOS ELECTRIC CO LTD	2-268 SOBUDAI ZAMA	KANAGAWA 228 JAPAN
TK2042	ZWAN & ASSOCIATES	7633 SO. 180TH	KENT, WA 98032

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-2537-00			CIRCUIT BD ASSY:FRONT PANEL CALIBRATOR (STANDARD ONLY)	80009	670-2537-00
A2	670-2538-00	B010100	B039999	CIRCUIT BD ASSY:FRONT PANEL PULSER (OPTION 10 ONLY)	80009	670-2538-00
A2	670-2538-01	B040000	B202662	CIRCUIT BD ASSY:FRONT PANEL PULSER (OPTION 10 ONLY)	80009	670-2538-01
A2	670-2538-03	B202663		CIRCUIT BD ASSY:FRONT PANEL PULSER (OPTION 10 ONLY)	80009	670-2538-03
A3	670-0702-03	B010100	B191892	CIRCUIT BD ASSY:GRATICULE LAMPS	80009	670-0702-03
A3	670-0702-06	B191893		CIRCUIT BD ASSY:GRATICULE LAMPS	80009	670-0702-06
A4	670-2535-00	B010100	B181282	CIRCUIT BD ASSY:MAIN INTERFACE	80009	670-2535-00
A4	670-2535-01	B181283	B192149	CIRCUIT BD ASSY:INTERFACE	80009	670-2535-01
A4	670-2535-02	B192150		CIRCUIT BD ASSY:MAIN INTERFACE	80009	670-2535-02
A5	670-2553-00			CIRCUIT BD ASSY:50 OHM FOLLOWER	80009	670-2553-00
A6	670-2534-00			CIRCUIT BD ASSY:LOGIC	80009	670-2534-00
A7	670-2533-00	B010100	B100473	CIRCUIT BD ASSY:TRIGGER SELECTOR	80009	670-2533-00
A7	670-2533-02	B100474	B129999	CIRCUIT BD ASSY:TRIGGER SELECTOR	80009	670-2533-02
A7	670-2533-03	B130000	B139999	CIRCUIT BD ASSY:TRIGGER SELECTOR	80009	670-2533-03
A7	670-2533-04	B140000	B169999	CIRCUIT BD ASSY:TRIGGER SELECTOR	80009	670-2533-04
A7	670-2533-05	B170000	B180988	CIRCUIT BD ASSY:TRIGGER SELECTOR	80009	670-2533-05
A7	670-2533-06	B180989	B181039	CIRCUIT BD ASSY:TRIGGER SELECTOR	80009	670-2533-06
A7	670-2533-07	B181040		CIRCUIT BD ASSY:TRIGGER SELECTOR	80009	670-2533-07
A8	388-3098-01			CIRCUIT BOARD:TRIGGER INTERCONNECT	80009	388-3098-01
A9	670-1625-01	B010100	B100473	CIRCUIT BD ASSY:VERTICAL INTERFACE	80009	670-1625-01
A9	670-1625-02	B100474	B119999	CIRCUIT BD ASSY:VERTICAL INTERFACE	80009	670-1625-02
A9	670-1625-03	B120000	B139999	CIRCUIT BD ASSY:VERTICAL INTERFACE	80009	670-1625-03
A9	670-1625-05	B140000	B159999	CIRCUIT BD ASSY:VERTICAL INTERFACE	80009	670-1625-05
A9	670-1625-06	B160000		CIRCUIT BD ASSY:VERTICAL INTERFACE	80009	670-1625-06
A10	670-1630-01	B010100	B099999	CIRCUIT BD ASSY:VERTICAL AMPLIFIER	80009	670-1630-01
A10	670-1630-02	B100000	B179999	CIRCUIT BD ASSY:MAIN VERTICAL AMPLIFIER	80009	670-1630-02
A10	670-1630-04	B180000	B192279	CIRCUIT BD ASSY:VERTICAL AMPLIFIER	80009	670-1630-04
A10	670-1630-06	B192280		CIRCUIT BD ASSY:VERTICAL AMP	80009	670-1630-06
A11	670-2532-00	B010100	B149999	CIRCUIT BD ASSY:MAIN HORIZONTAL AMP	80009	670-2532-00
A11	670-2532-02	B150000	B191394	CIRCUIT BD ASSY:HORIZ AMPL	80009	670-2532-02
A11	670-2532-04	B191395		CIRCUIT BD ASSY:HORIZ AMPL	80009	670-2532-04
A12	670-2684-00	B010100	B129999	CIRCUIT BD ASSY:SIGNAL	80009	670-2684-00
A12	670-2684-01	B130000	B160809	CIRCUIT BD ASSY:SIGNAL	80009	670-2684-01
A12	670-2684-02	B160810		CIRCUIT BD ASSY:SIGNAL	80009	670-2684-02
A13	670-2685-00	B010100	B129999	CIRCUIT BD ASSY:SIGNAL	80009	670-2685-00
A13	670-2685-01	B130000	B160809	CIRCUIT BD ASSY:SIGNAL	80009	670-2685-01
A13	670-2685-02	B160810		CIRCUIT BD ASSY:SIGNAL	80009	670-2685-02
A14	670-1610-01	B010100	B140694	CIRCUIT BD ASSY:POWER SUPPLY INVERT	80009	670-1610-01
A14	670-1610-05	B140695	B181129	CIRCUIT BD ASSY:POWER SUPPLY INVERT	80009	670-1610-05
A14	670-1610-08	B181130	B191599	CIRCUIT BD ASSY:POWER SUPPLY INVERT	80009	670-1610-08
A14	670-1610-12	B191600	B192115	CIRCUIT BD ASSY:POWER SUPPLY INVERT	80009	670-1610-12
A14	670-1610-14	B192116	B192240	CIRCUIT BD ASSY:POWER SUPPLY INVERT	80009	670-1610-14
A14	670-1610-16	B192241		CIRCUIT BD ASSY:POWER SUPPLY INVERTER	80009	670-1610-16
A15	670-1612-01	B010100	B140649	CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-01
A15	670-1612-04	B140650	B140694	CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-04
A15	670-1612-06	B140695	B181089	CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-06
A15	670-1612-09	B181090	B181090	CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-09
A15	670-1612-11	B181091	B181159	CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-11
A15	670-1612-14	B181160	B181294	CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-14
A15	670-1612-18	B181295	B181309	CIRCUIT BD ASSY:CAPACITOR/RECTIFIER	80009	670-1612-18
A15	670-1612-20	B181310	B191474	CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-20
A15	670-1612-21	B191475	B192115	CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-21
A15	670-1612-24	B192116		CIRCUIT BD ASSY:CAPACITOR RECTIFIER	80009	670-1612-24
A16	670-2540-00	B010100	B039999	CIRCUIT BD ASSY:LOW VOLTAGE REGULATOR	80009	670-2540-00
A16	670-2540-02	B040000	B049999	CIRCUIT BD ASSY:LOW VOLTAGE REGULATOR	80009	670-2540-02
A16	670-2540-03	B050000	B191494	CIRCUIT BD ASSY:LOW VOLTAGE REGULATOR	80009	670-2540-03
A16	670-2540-04	B191495		CIRCUIT BD ASSY:LOW VOLTAGE REGULATOR	80009	670-2540-04

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A17	670-2539-00	B010100	B049999	CIRCUIT BD ASSY:FAN MOTOR	80009	670-2539-00
A17	670-2539-01	B050000	B089999	CIRCUIT BD ASSY:FAN MOTOR	80009	670-2539-01
A17	670-2539-02	B900000		CIRCUIT BD ASSY:FAN MOTOR	80009	670-2539-02
A18	670-1613-00			CIRCUIT BD ASSY:HIGH VOLTAGE	80009	670-1613-00
A19	670-1622-00			CIRCUIT BD ASSY:AUTO FOCUS	80009	670-1622-00
A20	670-2536-00	B010100	B192158	CIRCUIT BD ASSY:Z AXIS	80009	670-2536-00
A20	670-2536-01	B192159		CIRCUIT BD ASSY:Z AXIS	80009	670-2536-01
A21	670-1900-02	B010100	B049999	CIRCUIT BD ASSY:	80009	670-1900-02
A21	670-1900-03	B050000	B181239	CIRCUIT BD ASSY:READOUT	80009	670-1900-03
A21	670-1900-04	B181240	B191727	CIRCUIT BD ASSY:READOUT	80009	670-1900-04
A21	670-1900-05	B191728	B192041	CIRCUIT BD ASSY:READOUT 388-2459-XX WIRED	80009	670-1900-05
A21	670-1900-06	B192042	B199999	CIRCUIT BD ASSY:READOUT	80009	670-1900-06
A21	670-8620-00	B200000	B202660	CIRCUIT BD ASSY:READOUT	80009	670-8620-00
A21	670-8620-01	B202661	B212704	CIRCUIT BD ASSY:READOUT	80009	670-8620-01
A21	670-8620-04	B212705		CIRCUIT BD ASSY:READOUT	80009	670-8620-04
A21	670-2018-00			CIRCUIT BD ASSY:READOUT DUMMY (OPTION 01 ONLY)	80009	670-2018-00
A22	670-4346-00	B110000		CIRCUIT BD ASSY:READOUT PROTECTION #1	80009	670-4346-00
B2536	147-0035-00			MOTOR,DC:BRUSHLESS,3000 RPM,10-15V (B2536 WITHOUT CONTROL UNIT)	25088	1AD3001-0A
C21	283-0003-00	B010100	B029999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C21	283-0024-00	B030000		CAP,FXD,CER DI:0.1UF,+80-20%,50V	04222	SR215C104MAA
C24	283-0003-00	B010100	B029999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C24	283-0024-00	B030000		CAP,FXD,CER DI:0.1UF,+80-20%,50V	04222	SR215C104MAA
C27	283-0003-00	B010100	B029999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C60	290-0529-00			CAP,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C62	290-0270-00	B010100	B070304	CAP,FXD,ELCTLT:8.2UF,20%,60V	56289	150D825X0060R2
C62	290-0716-00	B070305	B181282	CAP,FXD,ELCTLT:8.2UF,20%,75V	05397	T110C825M075AS
C62	290-0769-00	B181283	B192149	CAP,FXD,ELCTLT:10UF,+50-10%,100VDC	54473	ECEB2AV100S
C62	290-0969-00	B192150		CAP,FXD,ELCTLT:22UF,+50-10%,100V	55680	TLB2A220TCAANA
C64	290-0270-00	B010100	B070304	CAP,FXD,ELCTLT:8.2UF,20%,60V	56289	150D825X0060R2
C64	290-0716-00	B070305	B181282	CAP,FXD,ELCTLT:8.2UF,20%,75V	05397	T110C825M075AS
C64	290-0769-00	B181283	B192149	CAP,FXD,ELCTLT:10UF,+50-10%,100VDC	54473	ECEB2AV100S
C64	290-0969-00	B192150		CAP,FXD,ELCTLT:22UF,+50-10%,100V	55680	TLB2A220TCAANA
C66	290-0529-00			CAP,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C68	290-0529-00			CAP,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C229	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V (C229 STANDARD ONLY)	04222	SR302E105ZAATR
C229	283-0023-00	B010100	B010104	CAP,FXD,CER DI:0.1UF,+80-20%,12V (C229 OPTION 10 ONLY)	71590	2DDU66B104Z
C229	283-0177-00	B010105		CAP,FXD,CER DI:1UF,+80-20%,25V (C229 OPTION 10 ONLY)	04222	SR302E105ZAATR
C231	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	00853	D155F2010F0
C237	281-0603-00			CAP,FXD,CER DI:39PF,5%,500V	52763	2RDPLZ007 39P0JC
C240	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C271	281-0547-00			CAP,FXD,CER DI:2.7PF,+/-0.25PF,500V	52763	2RDPLZ007 2P70CC
C273	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C276	281-0503-00			CAP,FXD,CER DI:8PF,+/-0.5PF,500V	52763	2RDPLZ007 8P00DC
C282	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C300	281-0547-00			CAP,FXD,CER DI:2.7PF,+/-0.25PF,500V	52763	2RDPLZ007 2P70CC
C302	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C304	281-0503-00			CAP,FXD,CER DI:8PF,+/-0.5PF,500V	52763	2RDPLZ007 8P00DC
C317	281-0547-00			CAP,FXD,CER DI:2.7PF,+/-0.25PF,500V	52763	2RDPLZ007 2P70CC
C319	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C322	281-0503-00			CAP,FXD,CER DI:8PF,+/-0.5PF,500V	52763	2RDPLZ007 8P00DC
C345	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C350	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C356	283-0023-00			CAP,FXD,CER DI:0.1UF,+80-20%,12V	71590	2DDU66B104Z
C360	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P

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C390	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C392	283-0023-00			CAP,FXD,CER DI:0.1UF,+80-20%,12V	71590	2DDU668104Z
C394	283-0023-00			CAP,FXD,CER DI:0.1UF,+80-20%,12V	71590	2DDU668104Z
C397	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR302E105ZAATR
C560	283-0160-00	B010100	B129999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C562	283-0160-00	B010100	B129999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C564	283-0160-00	B010100	B129999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C566	283-0160-00	B010100	B129999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C584	283-0160-00	B010100	B129999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V (C584 STANDARD ONLY)	51642	100050NP0159B
C584	283-0160-00	B010105	B129999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V (C584 OPTION 10 ONLY)	51642	100050NP0159B
C592	283-0219-00	B010100	B129999	CAP,FXD,CER DI:1500PF,20%,50V	51642	RB100050Z5U152M
C596	283-0219-00	B010100	B129999	CAP,FXD,CER DI:1500PF,20%,50V	51642	RB100050Z5U152M
C603	283-0160-00	B010100	B119999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V (NOMINAL VALUE,SELECTED)	51642	100050NP0159B
C606	283-0160-00	B010100	B119999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V (NOMINAL VALUE,SELECTED)	51642	100050NP0159B
C609	283-0160-00	B010100	B119999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V (NOMINAL VALUE,SELECTED)	51642	100050NP0159B
C612	283-0160-00	B010100	B119999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V (NOMINAL VALUE,SELECTED)	51642	100050NP0159B
C620	283-0203-00	B010100	B119999	CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305SC474MAA
C623	283-0180-00	B010100	B119999	CAP,FXD,CER DI:5600PF,20%,200V	04222	3429 200E 562M
C626	283-0187-00	B010100	B029999	CAP,FXD,CER DI:0.047UF,10%,400V	04222	SR308C473KAA
C626	283-0341-00	B030000	B119999	CAP,FXD,CER DI:0.047UF,10%,100V	04222	SR301C473KAA
C629	281-0638-00	B010100	B119999	CAP,FXD,CER DI:240PF,5%,500V (NOMINAL VALUE,SELECTED)	52763	2RDPLZ007 240PM0
C632	283-0187-00	B010100	B029999	CAP,FXD,CER DI:0.047UF,10%,400V	04222	SR308C473KAA
C632	283-0341-00	B030000	B119999	CAP,FXD,CER DI:0.047UF,10%,100V	04222	SR301C473KAA
C635	281-0638-00	B010100	B119999	CAP,FXD,CER DI:240PF,5%,500V (NOMINAL VALUE,SELECTED)	52763	2RDPLZ007 240PM0
C638	283-0203-00	B010100	B119999	CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305SC474MAA
C641	283-0180-00	B010100	B119999	CAP,FXD,CER DI:5600PF,20%,200V	04222	3429 200E 562M
C644	283-0160-00	B040000	B119999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C645	283-0114-00	B010100	B030174	CAP,FXD,CER DI:1500PF,5%,200V	59660	805-534-Y5D0152J
C645	283-0000-00	B030175	B119999	CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C657	283-0185-00			CAP,FXD,CER DI:2.5PF,0.5%,50V	51642	100-050-NP0-259B
C658	281-0151-00	B010100	B179999	CAP,VAR,CER DI:1-3PF,100V	59660	518 000 A 1.0 3
C658	281-0218-00	B180000		CAP,VAR,CER DI:1-5PF,+2 -2.5%,100V	59660	513-011A1-5
C659	283-0185-00			CAP,FXD,CER DI:2.5PF,0.5%,50V	51642	100-050-NP0-259B
C662	281-0603-00			CAP,FXD,CER DI:39PF,5%,500V	52763	2RDPLZ007 39POJC
C663	281-0603-00			CAP,FXD,CER DI:39PF,5%,500V	52763	2RDPLZ007 39POJC
C670	281-0543-00			CAP,FXD,CER DI:270PF,10%,500V	52763	2RDPLZ007 27POM0
C672	281-0543-00			CAP,FXD,CER DI:270PF,10%,500V	52763	2RDPLZ007 27POM0
C675	283-0160-00			CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C676	283-0181-00			CAP,FXD,CER DI:1.8PF,+/-0.1%,100V	51642	100 100NP0189B
C680	283-0181-00			CAP,FXD,CER DI:1.8PF,+/-0.1%,100V	51642	100 100NP0189B
C681	283-0160-00			CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C685	281-0543-00			CAP,FXD,CER DI:270PF,10%,500V	52763	2RDPLZ007 27POM0
C689	281-0543-00			CAP,FXD,CER DI:270PF,10%,500V	52763	2RDPLZ007 27POM0
C733	283-0160-00			CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C734	283-0181-00			CAP,FXD,CER DI:1.8PF,+/-0.1%,100V	51642	100 100NP0189B
C736	283-0160-00	B070000		CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C738	283-0181-00			CAP,FXD,CER DI:1.8PF,+/-0.1%,100V	51642	100 100NP0189B
C739	283-0160-00			CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V	51642	100050NP0159B
C743	283-0128-00			CAP,FXD,CER DI:100PF,5%,500V	59660	871-536T2H101J
C745	283-0114-00			CAP,FXD,CER DI:1500PF,5%,200V	59660	805-534-Y5D0152J
C747	283-0239-00			CAP,FXD,CER DI:0.022UF,10%,50V	04222	3439-050C-223K
C749	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305SC474MAA

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C751	281-0214-00	B180000		CAP,VAR,CER DI:0.6-3PF,400V	52763	313613-140
C758	283-0047-00			CAP,FXD,CER DI:270PF,5%,500V (NOMINAL VALUE,SELECTED)	59660	0831604Z5F0271J
C760	283-0180-00			CAP,FXD,CER DI:5600PF,20%,200V	04222	3429 200E 562M
C762	283-0211-00			CAP,FXD,CER DI:0.1UF,10%,200V	04222	SR406C104KAA
C764	283-0212-00			CAP,FXD,CER DI:2UF,20%,50V	04222	SR405E205MAA
C770	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	200H61L502P
C783	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	200H61L502P
C787	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	200H61L502P
C789	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	200H61L502P
C791	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	200H61L502P
C794	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	200H61L502P
C796	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	200H61L502P
C798	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	200H61L502P
C837	281-0508-00			CAP,FXD,CER DI:12PF,+/-0.6PF,500V	52763	2R0PLZ007 12P0JC
C862	283-0674-00	B010100	B149999	CAP,FXD,MICA DI:85PF,1%,500V	00853	D155F850F0
C865	290-0522-00	B010100	B149999	CAP,FXD,ELCTLT:1UF,20%,50V	05397	T368A105M050AZ
C870	283-0615-00	B010100	B149999	CAP,FXD,MICA DI:33PF,5%,500V	00853	D155E330J0
C875	283-0615-00	B010100	B149999	CAP,FXD,MICA DI:33PF,5%,500V	00853	D155E330J0
C905	281-0092-00	B010100	B149999	CAP,VAR,CER DI:9-35PF,200V	33095	53-717-001 D9-35
C906	283-0616-00	B010100	B149999	CAP,FXD,MICA DI:75PF,5%,500V	00853	D155E750J0
C912	283-0003-00	B010100	B149999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C915	283-0003-00	B010100	B149999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C921	283-0003-00	B010100	B149999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C926	----- -----			(PART OF CIRCUIT BOARD)		
C928	281-0168-00	B010100	B149999	CAP,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-005
C934	283-0003-00	B010100	B149999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C940	283-0003-00	B010100	B149999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C943	283-0003-00	B010100	B149999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C946	----- -----			(PART OF CIRCUIT BOARD)		
C948	281-0168-00	B010100	B149999	CAP,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-005
C990	283-0178-00	B010100	B149999	CAP,FXD,CER DI:0.1UF,+80-20%,100V (C990 STANDARD ONLY)	05397	C330C104Z1U1CA
C990	290-0572-00	B010100	B010104	CAP,FXD,ELCTLT:0.1UF,20%,50V (C990 OPTION 10 ONLY)	05397	T368A104050AZ
C990	283-0178-00	B010105	B149999	CAP,FXD,CER DI:0.1UF,+80-20%,100V (C990 OPTION 10 ONLY)	05397	C330C104Z1U1CA
C992	290-0527-00	B010100	B149999	CAP,FXD,ELCTLT:15UF,20%,20V	05397	T368B156M020AS
C994	290-0527-00	B010100	B149999	CAP,FXD,ELCTLT:15UF,20%,20V	05397	T368B156M020AS
C996	290-0527-00	B010100	B149999	CAP,FXD,ELCTLT:15UF,20%,20V	05397	T368B156M020AS
C998	283-0178-00	B010100	B149999	CAP,FXD,CER DI:0.1UF,+80-20%,100V (C998 STANDARD ONLY)	05397	C330C104Z1U1CA
C998	290-0572-00	B010100	B010104	CAP,FXD,ELCTLT:0.1UF,20%,50V (C998 OPTION 10 ONLY)	05397	T368A104050AZ
C998	283-0178-00	B010105	B149999	CAP,FXD,CER DI:0.1UF,+80-20%,100V (C998 OPTION 10 ONLY)	05397	C330C104Z1U1CA
C1001	----- -----	B010100	B129999	(PART OF CIRCUIT BOARD)		
C1008	283-0208-00	B010100	B129999	CAP,FXD,CER DI:0.22UF,10%,200V	04222	SR506C224KAA
C1019	283-0072-01	B010100	B129999	CAP,FXD,CER DI:0.01UF,+80-20%,200V	59660	8300-201Z5V0103M
C1021	----- -----	B010100	B129999	(PART OF CIRCUIT BOARD)		
C1023	283-0072-01	B010100	B070304	CAP,FXD,CER DI:0.01UF,+80-20%,200V	59660	8300-201Z5V0103M
C1023	283-0253-00	B070305	B129999	CAP,FXD,CER DI:0.01UF,10%,100V	04222	15051C103KZT6C
C1024	283-0160-00	B010100	B129999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V (C1024 STANDARD ONLY)	51642	100050NP0150D
C1024	283-0160-00	B010105	B129999	CAP,FXD,CER DI:1.5PF,+/-0.1PF,50V (C1024 OPTION 10 ONLY)	51642	100050NP0159B
C1026	283-0000-00	B010100	B129999	CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C1031	281-0547-00			CAP,FXD,CER DI:2.7PF,+/-0.25PF,500V	52763	2R0PLZ007 2P70CC
C1032	281-0540-00			CAP,FXD,CER DI:51PF,5%,500V	59660	301-000U2J0510J
C1036	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX

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C1038	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1041	281-0547-00			CAP,FXD,CER DI:2.7PF,+/-0.25PF,500V	52763	2RDPLZ007 2P7DCC
C1046	281-0509-00			CAP,FXD,CER DI:15PF,+/-1.5PF,500V	59660	301-000C0G0-150K
C1061	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1062	281-0638-00			CAP,FXD,CER DI:240PF,5%,500V (C1062 STANDARD ONLY)	52763	2RDPLZ007 240PM0
C1062	281-0622-00	B010100	B010104	CAP,FXD,CER DI:47PF,1%,500V (C1062 OPTION 10 ONLY)	52763	2RDPLZ007 47P0LC
C1062	281-0638-00	B010105		CAP,FXD,CER DI:240PF,5%,500V (C1062 OPTION 10 ONLY)	52763	2RDPLZ007 240PM0
C1101	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V (C1101 STANDARD ONLY)	59660	0801 547X5F0102M
C1104	281-0524-00			CAP,FXD,CER DI:150PF,+/-30PF,500V (C1104 OPTION 10 ONLY)	52763	2RDPLZ007 150PM0
C1107	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V (C1107 STANDARD ONLY)	59821	D103Z40Z5UJDCEX
C1114	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V (C1114 OPTION 10 ONLY)	59821	D103Z40Z5UJDCEX
C1115	283-0104-00	B010100	B010104	CAP,FXD,CER DI:2000PF,5%,500V (C1115 OPTION 10 ONLY)	59660	811-565-B202J
C1115	283-0001-00	B010105		CAP,FXD,CER DI:0.005UF,+100-0%,500V (C1115 OPTION 10 ONLY)	59821	2DDH61L502P
C1119	283-0023-00	B010119		CAP,FXD,CER DI:0.1UF,+80-20%,12V (C1119 OPTION 10 ONLY)	71590	2DDU668104Z
C1124	290-0535-00			CAP,FXD,ELCTLT:33UF,20%,10V TANTALUM (C1124 OPTION 10 ONLY)	56289	196D336X0010KA1
C1126	285-0595-00			CAP,FXD,PLASTIC:0.1UF,1%,100V (C1126 STANDARD ONLY)	84171	P1270-1
C1141	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V (C1141 OPTION 10 ONLY)	59821	D103Z40Z5UJDCEX
C1142	283-0104-00			CAP,FXD,CER DI:2000PF,5%,500V (C1142 OPTION 10 ONLY)	59660	811-565-B202J
C1147	283-0651-00			CAP,FXD,MICA DI:430PF,1%,500V (C1147 STANDARD ONLY)	00853	D155F431F0
C1148	290-0572-00	B010100	B029999	CAP,FXD,ELCTLT:0.1UF,20%,50V (C1148 STANDARD ONLY)	05397	T368A104050AZ
C1148	283-0198-00	B030000		CAP,FXD,CER DI:0.22UF,20%,50V (C1148 STANDARD ONLY)	05397	C330C224M5U1CA
C1167	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V (C1167 STANDARD ONLY)	59660	0801 547X5F0102M
C1171	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V (C1171 STANDARD ONLY)	59660	0801 547X5F0102M
C1172	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V (C1172 STANDARD ONLY)	59660	0801 547X5F0102M
C1185	283-0067-00	B010105		CAP,FXD,CER DI:0.001UF,10%,200V (C1185 OPTION 10 ONLY)	59660	835-515-Y5E0102K
C1195	283-0178-00			CAP,FXD,CER DI:0.1UF,+80-20%,100V (C1195 OPTION 10 ONLY)	05397	C330C104Z1U1CA
C1201	283-0279-00	B010100	B189999	CAP,FXD,CER DI:0.001UF,20%,3000V	51406	DHR12Y5S102M3KV
C1203	283-0279-00	B010100	B189999	CAP,FXD,CER DI:0.001UF,20%,3000V	51406	DHR12Y5S102M3KV
C1205	283-0022-00			CAP,FXD,CER DI:0.02UF,+100-0%,1400V	59660	3888531Z5U0203Z
C1206	283-0022-00			CAP,FXD,CER DI:0.02UF,+100-0%,1400V	59660	3888531Z5U0203Z
C1216	290-0628-00			CAP,FXD,ELCTLT:950UF,+50-10%,200V	56289	36D7560
C1217	290-0628-00			CAP,FXD,ELCTLT:950UF,+50-10%,200V	56289	36D7560
C1219	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR306E104ZAA
C1227	283-0280-00			CAP,FXD,CER DI:2200PF,10%,2000V	60705	564CBA202EH222
C1228	283-0280-00			CAP,FXD,CER DI:2200PF,10%,2000V	60705	564CBA202EH222
C1229	285-0939-00			CAP,FXD,PLASTIC:3UF,5%,400V	04099	TEK13-17
C1231	290-0395-00	B010100	B192115	CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T110B475M050AS
C1231	290-0748-00	B192116		CAP,FXD,ELCTLT:10UF,+50-10%,25V	54473	ECE-B1EV100S
C1235	283-0078-00	B010100	B181069	CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1235	283-0060-00	B181070	B191599	CAP,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J

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C1235	283-0078-00	B191600		CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1236	283-0280-00			CAP,FXD,CER DI:2200PF,10%,2000V	60705	564CBA202EH222
C1237	285-0938-00			CAP,FXD,PLASTIC:0.03UF,5%,900V	50558	PA6-0738J
C1238	283-0279-00			CAP,FXD,CER DI:0.001UF,20%,3000V	51406	DHR12Y5S102M3KV
C1239	290-0395-00	B010100	B192115	CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T110B475M050AS
C1239	290-0748-00	B192116		CAP,FXD,ELCTLT:10UF,+50-10%,25V	54473	ECE-B1EV100S
C1242	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	2DDH61L502P
C1243	290-0159-00	B010100	B192240	CAP,FXD,ELCTLT:2UF,+50-10%,150V	56289	30D205F150BB2
C1243	290-0658-00	B192241		CAP,FXD,ELCTLT:4UF,+50-10,200V	09023	UHL 1095
C1245	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1249	290-0164-00			CAP,FXD,ELCTLT:1UF,+50-10%,150V	56289	500D105F150BA2R2
C1253	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1254	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1256	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1259	290-0523-00	B010100	B192115	CAP,FXD,ELCTLT:2.2UF,20%,20V	05397	T368A225M020AS
C1259	290-0782-00	B192116		CAP,FXD,ELCTLT:4.7UF,+75-10%,35VDC	55680	ULB1V4R7TAAANA
C1264	290-0573-00			CAP,FXD,ELCTLT:2.7UF,20%,50V	05397	T368B275M050AS
C1267	290-0523-00			CAP,FXD,ELCTLT:2.2UF,20%,20V	05397	T368A225M020AS
C1275	283-0060-00	B010100	B181100	CAP,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
C1275	283-0076-00	B181101	B181159	CAP,FXD,CER DI:27PF,10%,500V	59660	831-500S2L270K
C1275	283-0060-00	B181160		CAP,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
C1276	283-0060-00	B010100	B181100	CAP,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
C1276	283-0076-00	B181101	B181159	CAP,FXD,CER DI:27PF,10%,500V	59660	831-500S2L270K
C1276	283-0060-00	B181160		CAP,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
C1277	290-0572-00	B010100	B181089	CAP,FXD,ELCTLT:0.1UF,20%,50V	05397	T368A104050AZ
C1277	290-0523-00	B181090	B181294	CAP,FXD,ELCTLT:2.2UF,20%,20V	05397	T368A225M020AS
C1277	290-0522-00	B181295	B192115	CAP,FXD,ELCTLT:1UF,20%,50V	05397	T368A105M050AZ
C1277	290-0891-00	B192116		CAP,FXD,ELCTLT:1UF,+75 -10%,50V	55680	ULA1H010TEA
C1278	290-0572-00	B010100	B181089	CAP,FXD,ELCTLT:0.1UF,20%,50V	05397	T368A104050AZ
C1278	290-0523-00	B181090	B181294	CAP,FXD,ELCTLT:2.2UF,20%,20V	05397	T368A225M020AS
C1278	290-0522-00	B181295	B192115	CAP,FXD,ELCTLT:1UF,20%,50V	05397	T368A105M050AZ
C1278	290-0891-00	B192116		CAP,FXD,ELCTLT:1UF,+75 -10%,50V	55680	ULA1H010TEA
C1285	283-0092-00			CAP,FXD,CER DI:0.03UF,+80-20%,200V	59660	845-534Z5U0303Z
C1298	283-0023-00			CAP,FXD,CER DI:0.1UF,+80-20%,12V	71590	2DDU66B104Z
C1300	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1301	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1302	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1313	290-0425-00	B010100	B192115	CAP,FXD,ELCTLT:100UF,20%,20V	90201	THF107M020P1G
C1313	290-0966-00	B192116		CAP,FXD,ELCTLT:220UF,+50-10%,25V	55680	TLB1E221TCAANA
C1314	290-0529-00	B010100	B192115	CAP,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C1314	290-0973-00	B192116		CAP,FXD,ELCTLT:100UF,20%,25VDC	55680	ULB1E101MEA
C1316	290-0425-00	B010100	B192115	CAP,FXD,ELCTLT:100UF,20%,20V	90201	THF107M020P1G
C1316	290-0966-00	B192116		CAP,FXD,ELCTLT:220UF,+50-10%,25V	55680	TLB1E221TCAANA
C1317	290-0519-00	B010100	B192115	CAP,FXD,ELCTLT:100UF,20%,20V	90201	TDC107M020MLD
C1317	290-0973-00	B192116		CAP,FXD,ELCTLT:100UF,20%,25VDC	55680	ULB1E101MEA
C1318	290-0519-00	B010100	B192115	CAP,FXD,ELCTLT:100UF,20%,20V	90201	TDC107M020MLD
C1318	290-0973-00	B192116		CAP,FXD,ELCTLT:100UF,20%,25VDC	55680	ULB1E101MEA
C1326	283-0211-00	B010100	B181309	CAP,FXD,CER DI:0.1UF,10%,200V	04222	SR406C104KAA
C1326	283-0208-00	B181310		CAP,FXD,CER DI:0.22UF,10%,200V	04222	SR506C224KAA
C1328	290-0582-00			CAP,FXD,ELCTLT:5UF,+75-10%,150V	56289	30D2876
C1330	290-0582-00			CAP,FXD,ELCTLT:5UF,+75-10%,150V	56289	30D2876
C1331	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR306E104ZAA
C1350	290-0425-00	B010100	B192115	CAP,FXD,ELCTLT:100UF,20%,20V	90201	THF107M020P1G
C1350	290-0966-00	B192116		CAP,FXD,ELCTLT:220UF,+50-10%,25V	55680	TLB1E221TCAANA
C1351	290-0425-00	B010100	B192115	CAP,FXD,ELCTLT:100UF,20%,20V	90201	THF107M020P1G
C1351	290-0966-00	B192116		CAP,FXD,ELCTLT:220UF,+50-10%,25V	55680	TLB1E221TCAANA
C1353	290-0529-00	B010100	B192115	CAP,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C1353	290-0973-00	B192116		CAP,FXD,ELCTLT:100UF,20%,25VDC	55680	ULB1E101MEA
C1354	290-0529-00	B010100	B192115	CAP,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS

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C1354	290-0973-00	B192116		CAP,FXD,ELCTLT:100UF,20%,25VDC	55680	ULB1E101MEA
C1358	290-0194-00	B010100	B192115	CAP,FXD,ELCTLT:10UF,+50-10%,100V	00853	556DC100T100B
C1358	290-0975-00	B192116		CAP,FXD,ELCTLT:33UF,20%,100VDC	55680	TLB2A330MCA
C1360	290-0270-00	B010100	B070304	CAP,FXD,ELCTLT:8.2UF,20%,60V	56289	1500825X0060R2
C1360	290-0716-00	B070305	B192115	CAP,FXD,ELCTLT:8.2UF,20%,75V	05397	T110C825M075AS
C1360	290-0975-00	B192116		CAP,FXD,ELCTLT:33UF,20%,100VDC	55680	TLB2A330MCA
C1362	290-0194-00	B010100	B192115	CAP,FXD,ELCTLT:10UF,+50-10%,100V	00853	556DC100T100B
C1362	290-0975-00	B192116		CAP,FXD,ELCTLT:33UF,20%,100VDC	55680	TLB2A330MCA
C1364	290-0270-00	B010100	B070304	CAP,FXD,ELCTLT:8.2UF,20%,60V	56289	1500825X0060R2
C1364	290-0716-00	B070305	B192115	CAP,FXD,ELCTLT:8.2UF,20%,75V	05397	T110C825M075AS
C1364	290-0975-00	B192116		CAP,FXD,ELCTLT:33UF,20%,100VDC	55680	TLB2A330MCA
C1371	290-0572-00	B010100	B140694	CAP,FXD,ELCTLT:0.1UF,20%,50V	05397	T368A104050AZ
C1371	290-0580-00	B140695		CAP,FXD,ELCTLT:0.27UF,20%,50V	05397	T368A274M050AZ
C1392	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR306E104ZAA
C1395	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1397	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1413	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1416	283-0084-00			CAP,FXD,CER DI:270PF,5%,1000V	59660	838533X5F02715
C1436	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1441	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1451	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1463	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1481	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1493	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V (C1493 STANDARD ONLY)	59660	0801 547X5F0102M
C1493	283-0078-00	B010105		CAP,FXD,CER DI:0.001UF,20%,500V (C1493 OPTION 10 ONLY)	59660	0801 547X5F0102M
C1495	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1506	283-0068-00			CAP,FXD,CER DI:0.01UF,+100-0%,500V	59660	871-533E103P
C1511	290-0572-00			CAP,FXD,ELCTLT:0.1UF,20%,50V	05397	T368A104050AZ
C1518	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1524	283-0068-00	B191495		CAP,FXD,CER DI:0.01UF,+100-0%,500V	59660	871-533E103P
C1533	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1571	283-0128-00			CAP,FXD,CER DI:100PF,5%,500V	59660	871-536T2H101J
C1605	283-0006-00			CAP,FXD,CER DI:0.02UF,+80-20%,500V	59660	0841545Z5V00203Z
C1606	283-0105-00			CAP,FXD,CER DI:0.01UF,+80-20%,2000V	60705	564CBA202IP203ZA
C1607	283-0105-00			CAP,FXD,CER DI:0.01UF,+80-20%,2000V	60705	564CBA202IP203ZA
C1608	283-0272-00			CAP,FXD,CER DI:0.0068UF,30%,4000V	51406	DHR28Y5S682M-4
C1609	283-0272-00			CAP,FXD,CER DI:0.0068UF,30%,4000V	51406	DHR28Y5S682M-4
C1612	283-0272-00			CAP,FXD,CER DI:0.0068UF,30%,4000V	51406	DHR28Y5S682M-4
C1629	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C1634	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1635	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1637	283-0000-00			CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C1642	283-0271-00			CAP,FXD,CER DI:0.001UF,20%,4000V	51406	DHR15Y5S102M-4KV
C1653	283-0079-00			CAP,FXD,CER DI:0.01UF,20%,250V	04222	SR503C103MAA
C1654	283-0279-00			CAP,FXD,CER DI:0.001UF,20%,3000V	51406	DHR12Y5S102M3KV
C1656	283-0279-00			CAP,FXD,CER DI:0.001UF,20%,3000V	51406	DHR12Y5S102M3KV
C1657	283-0078-00			CAP,FXD,CER DI:0.001UF,20%,500V	59660	0801 547X5F0102M
C1659	283-0279-00			CAP,FXD,CER DI:0.001UF,20%,3000V	51406	DHR12Y5S102M3KV
C1676	283-0092-00			CAP,FXD,CER DI:0.03UF,+80-20%,200V	59660	845-534Z5U0303Z
C1678	283-0271-00			CAP,FXD,CER DI:0.001UF,20%,4000V	51406	DHR15Y5S102M-4KV
C1680	283-0271-00			CAP,FXD,CER DI:0.001UF,20%,4000V	51406	DHR15Y5S102M-4KV
C1681	283-0104-00			CAP,FXD,CER DI:2000PF,5%,500V	59660	811-565-B202J
C1716	283-0272-00			CAP,FXD,CER DI:0.0068UF,30%,4000V	51406	DHR28Y5S682M-4
C1727	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1729	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1733	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1736	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX

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C1762	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	2DDH61L502P
C1765	283-0001-00			CAP,FXD,CER DI:0.005UF,+100-0%,500V	59821	2DDH61L502P
C1770	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1778	283-0271-00			CAP,FXD,CER DI:0.001UF,20%,4000V	51406	DHR15Y5S102M-4KV
C1805	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1817	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1820	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1824	281-0168-00			CAP,VAR,AIR DI:1.3-5.4PF,250V	74970	187-0103-005
C1830	283-0178-00	B010100	B170874	CAP,FXD,CER DI:0.1UF,+80-20%,100V	05397	C330C104Z1U1CA
C1830	283-0211-00	B170875		CAP,FXD,CER DI:0.1UF,10%,200V	04222	SR406C104KAA
C1841	281-0523-00			CAP,FXD,CER DI:100PF,20%,350V (C1841 STANDARD ONLY)	52763	2RDPLZ007 100PMU
C1841	281-0523-00	B010105		CAP,FXD,CER DI:100PF,20%,350V (C1841 OPTION 10 ONLY)	52763	2RDPLZ007 100PMU
C1842	281-0118-00			CAP,VAR,MICA DI:8-90PF,175V	52769	GSM231
C1844	281-0528-00			CAP,FXD,CER DI:82PF,+/-8.2PF,500V (C1844 STANDARD ONLY)	59660	301-000U2M0820K
C1844	281-0524-00	B010100	B010104	CAP,FXD,CER DI:150PF,+/-30PF,500V (C1844 OPTION 10 ONLY)	52763	2RDPLZ007 150PM0
C1844	281-0528-00	B010105		CAP,FXD,CER DI:82PF,+/-8.2PF,500V (C1844 OPTION 10 ONLY)	59660	301-000U2M0820K
C1846	281-0118-00			CAP,VAR,MICA DI:8-90PF,175V	52769	GSM231
C1856	283-0600-00			CAP,FXD,MICA DI:43PF,5%,500V	00853	D105E430J0
C1864	290-0149-00			CAP,FXD,ELCTLT:5UF,+75-10%,150V	00853	556D0050U150B
C1871	281-0092-00			CAP,VAR,CER DI:9-35PF,200V	33095	53-717-001 D9-35
C1873	281-0619-00			CAP,FXD,CER DI:1.2PF,+/-0.1PF,500V	52763	2RDPLZ007 1P208C
C1877	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1883	281-0627-00			CAP,FXD,CER DI:1PF,+/-0.25PF,500V	52763	2RDPLZ007 1P00CC
C1884	283-0271-00			CAP,FXD,CER DI:0.001UF,20%,4000V	51406	DHR15Y5S102M-4KV
C1890	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1891	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1892	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1893	290-0529-00	B010100	B192115	CAP,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C1893	290-0966-00	B192116		CAP,FXD,ELCTLT:220UF,+50-10%,25V	55680	TLB1E221TCAANA
C1894	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1895	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1896	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1897	290-0529-00	B010100	B192115	CAP,FXD,ELCTLT:47UF,20%,20V	05397	T362C476M020AS
C1897	290-0966-00	B192116		CAP,FXD,ELCTLT:220UF,+50-10%,25V	55680	TLB1E221TCAANA
C1898	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C1899	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C2101	283-0004-00	B010100	B199999	CAP,FXD,CER DI:0.02UF,+80-20%,150V	59660	855-558Z5V0203Z
C2101	281-0774-00	B200000		CAP,FXD,CER DI:0.022MFD,20%,100V	04222	MA201E223MAA
C2109	283-0003-00	B010100	B199999	CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C2109	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2112	283-0077-00	B010100	B199999	CAP,FXD,CER DI:330PF,5%,500V	59660	831-500B331J
C2112	281-0767-00	B200000		CAP,FXD,CER DI:330PF,20%,100V	04222	MA106C331MAA
C2115	290-0534-00	B010100	B191727	CAP,FXD,ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
C2115	290-0782-00	B191728	B199999	CAP,FXD,ELCTLT:4.7UF,+75-10%,35VDC	55680	ULB1V4R7TAAANA
C2115	290-0804-00	B200000		CAP,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
C2117	290-0534-00	B010100	B191727	CAP,FXD,ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
C2117	290-0782-00	B191728	B199999	CAP,FXD,ELCTLT:4.7UF,+75-10%,35VDC	55680	ULB1V4R7TAAANA
C2117	290-0920-00	B200000		CAP,FXD,ELCTLT:33UF,+50-10%,35V	55680	ULB1V330TEAANA
C2118	290-0804-00	B200000		CAP,FXD,ELCTLT:10UF,+50-10%,25V	55680	ULA1E100TEA
C2119	290-0534-00	B010100	B191727	CAP,FXD,ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
C2119	290-0782-00	B191728	B199999	CAP,FXD,ELCTLT:4.7UF,+75-10%,35VDC	55680	ULB1V4R7TAAANA
C2120	281-0862-00	B200000		CAP,FXD,CER DI:0.001UF,+80-20%,100V	04222	MA101C102MAA
C2121	283-0594-00	B010100	B199999	CAP,FXD,MICA DI:0.001UF,1%,100V	00853	D151F102F0
C2121	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA

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C2127	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2135	285-0698-00			CAP,FXD,PLASTIC:0.0082UF,5%,100V	19396	DU490/74-28217
C2140	283-0103-00	B010100	B199999	CAP,FXD,CER DI:180PF,5%,500V	59821	2DDH73L181J
C2141	281-0767-00	B212705		CAP,FXD,CER DI:330PF,20%,100V	04222	MA106C331MAA
C2144	281-0544-00	B010100	B191727	CAP,FXD,CER DI:5.6PF,+/0.5PF,500V	52763	2RDPLZ007 270PM0
C2144	290-0810-00	B191728		CAP,FXD,ELCTLT:18000UF,+100-10%,25V	56289	68010973
C2145	290-0534-00	B010100	B191727	CAP,FXD,ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
C2145	290-0782-00	B191728	B199999	CAP,FXD,ELCTLT:4.7UF,+75-10%,35VDC	55680	ULB1V4R7TAAANA
C2154	283-0630-00	B200000		CAP,FXD,MICA DI:110PF,1%,100V (SELECTABLE)	00853	D155F111F0
C2154	283-0728-00	B200000		CAP,FXD,MICA DI:120PF,1%,500V	00853	D155F121F0
C2154	283-0796-00	B200000		CAP,FXD,MICA DI:100PF,5%,500V (SELECTABLE)	00853	D105F101J0
C2155	283-0103-00	B010100	B199999	CAP,FXD,CER DI:180PF,5%,500V	59821	2DDH73L181J
C2155	281-0158-00	B200000		CAP,VAR,CER DI:7-45PF,25V	59660	518-006 G 7-45
C2157	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2161	281-0765-00	B200000		CAP,FXD,CER DI:100PF,5%,100V	04222	MA101A101JAA
C2180	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2183	283-0032-00	B010100	B199999	CAP,FXD,CER DI:470PF,5%,500V	59660	831-000-Z5ED471J
C2183	281-0788-00	B200000		CAP,FXD,CER DI:470PF,10%,100V	04222	MA101C471KAA
C2185	283-0004-00	B010100	B199999	CAP,FXD,CER DI:0.02UF,+80-20%,150V	59660	855-558Z5V0203Z
C2185	281-0774-00	B200000		CAP,FXD,CER DI:0.022MFD,20%,100V	04222	MA201E223MAA
C2186	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2187	281-0862-00	B200000		CAP,FXD,CER DI:0.001UF,+80-20%,100V	04222	MA101C102MAA
C2190	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2201	283-0114-00	B200000		CAP,FXD,CER DI:1500PF,5%,200V	59660	805-534-Y5D0152J
C2202	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2203	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2204	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2211	281-0762-00	B200000		CAP,FXD,CER DI:27PF,20%,100V	04222	MA101A270MAA
C2212	283-0666-00	B200000		CAP,FXD,MICA DI:890PF,2%,100V	00853	D151F891G0
C2213	283-0640-00	B200000		CAP,FXD,MICA DI:160PF,1%,100V	00853	D155F161F0
C2214	283-0032-00	B010100	B199999	CAP,FXD,CER DI:470PF,5%,500V	59660	831-000-Z5ED471J
C2221	281-0788-00	B200000		CAP,FXD,CER DI:470PF,10%,100V	04222	MA101C471KAA
C2239	281-0788-00	B200000		CAP,FXD,CER DI:470PF,10%,100V	04222	MA101C471KAA
C2242	283-0000-00	B010100	B199999	CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C2243	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2244	283-0004-00	B010100	B199999	CAP,FXD,CER DI:0.02UF,+80-20%,150V	59660	855-558Z5V0203Z
C2244	281-0774-00	B200000		CAP,FXD,CER DI:0.022MFD,20%,100V	04222	MA201E223MAA
C2245	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2246	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2251	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2255	283-0000-00	B010100	B199999	CAP,FXD,CER DI:0.001UF,+100-0%,500V	59660	831-610-Y5U0102P
C2259	281-0762-00	B212705		CAP,FXD,CER DI:27PF,20%,100V	04222	MA101A270MAA
C2263	281-0773-00	B200000		CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
C2276	281-0762-00	B200000		CAP,FXD,CER DI:27PF,20%,100V	04222	MA101A270MAA
C2277	283-0666-00	B200000		CAP,FXD,MICA DI:890PF,2%,100V	00853	D151F891G0
C2279	283-0640-00	B200000		CAP,FXD,MICA DI:160PF,1%,100V	00853	D155F161F0
C2281	283-0054-00	B060000		CAP,FXD,CER DI:150PF,5%,200V	59660	855-535 U2J0151J
C2284	283-0251-00	B192042		CAP,FXD,CER DI:87 PF,5%,100V	04222	3418 100A 870J
C2297	281-0762-00	B212705		CAP,FXD,CER DI:27PF,20%,100V	04222	MA101A270MAA
C2508	290-0534-00			CAP,FXD,ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
C2511	290-0536-00			CAP,FXD,ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
C3440	281-0816-00	B202661		CAP,FXD,CER DI:82 PF,5%,100V	04222	MA106A820JAA
C4605	281-0788-00	B120000		CAP,FXD,CER DI:470PF,10%,100V	04222	MA101C471KAA
C4610	283-0114-00	B120000		CAP,FXD,CER DI:1500PF,5%,200V (NOMINAL VALUE,SELECTED)	59660	805-534-Y5D0152J
C4611	283-0268-00	B120000		CAP,FXD,CER DI:0.015UF,20%,50V (NOMINAL VALUE,SELECTED)	04222	3439-050C-153K
C4613	281-0788-00	B120000		CAP,FXD,CER DI:470PF,10%,100V	04222	MA101C471KAA

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C4615	281-0615-00	B160768		CAP,FXD,CER DI:3.9PF,+/-0.5PF,200V	52763	2RDPLZ007 3P90DC
C4665	281-0788-00	B120000		CAP,FXD,CER DI:470PF,10%,100V	04222	MA101C471KAA
C4673	281-0788-00	B120000		CAP,FXD,CER DI:470PF,10%,100V	04222	MA101C471KAA
C4677	283-0114-00	B120000		CAP,FXD,CER DI:1500PF,5%,200V (NOMINAL VALUE,SELECTED)	59660	805-534-Y5D0152J
C4678	283-0268-00	B120000		CAP,FXD,CER DI:0.015UF,20%,50V (NOMINAL VALUE,SELECTED)	04222	3439-050C-153K
C4874	281-0219-00	B150000	B191394	CAP,VAR,CER DI:5-35PF,+2 -2.5%,100V	59660	513-011 A 5-35
C4874	281-0158-00	B191395		CAP,VAR,CER DI:7-45PF,25V	59660	518-006 G 7-45
C4876	283-0080-00	B150000		CAP,FXD,CER DI:0.022UF,+80-20%,25V	59821	2DDU60E223Z
C4882	290-0534-00	B150000		CAP,FXD,ELCTLT:1UF,20%,35V	05397	T368A105M035AZ
C4886	283-0604-00	B150000		CAP,FXD,MICA DI:304PF,2%,500V	00853	D155F3040G0
C4896	283-0604-00	B150000		CAP,FXD,MICA DI:304PF,2%,500V	00853	D155F3040G0
C4908	283-0647-00	B150000		CAP,FXD,MICA DI:70PF,1%,100V	00853	D155E700F0
C4909	281-0166-00	B150000		CAP,VAR,AIR DI:1.9-15.7 PF,250V	74970	187-0109-055
C4918	283-0647-00	B150000		CAP,FXD,MICA DI:70PF,1%,100V	00853	D155E700F0
C4919	281-0166-00	B150000		CAP,VAR,AIR DI:1.9-15.7 PF,250V	74970	187-0109-055
C4920	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4933	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4935	281-0659-00	B150000		CAP,FXD,CER DI:4.3PF,+/-0.25PF,500V	52763	2RDPLZ007 4P30CC
C4937	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4941	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4950	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4953	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4955	281-0659-00	B150000		CAP,FXD,CER DI:4.3PF,+/-0.25PF,500V	52763	2RDPLZ007 4P30CC
C4957	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4990	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4992	283-0003-00	B150000		CAP,FXD,CER DI:0.01UF,+80-20%,150V	59821	D103Z40Z5UJDCEX
C4994	290-0745-00	B150000		CAP,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
C4996	290-0745-00	B150000		CAP,FXD,ELCTLT:22UF,+50-10%,25V	54473	ECE-A25V22L
C4997	283-0067-00	B150000		CAP,FXD,CER DI:0.001UF,10%,200V	59660	835-515-YSE0102K
C5508	----- -----	B130000		(PART OF CIRCUIT BOARD)		
C5511	283-0158-00	B181040		CAP,FXD,CER DI:1PF,+/-0.1PF,50V (NOMINAL VALUE,SELECTED)	51642	100-050-NP0-109B
C5514	----- -----	B130000		(PART OF CIRCUIT BOARD)		
C5516	283-0156-00	B130000		CAP,FXD,CER DI:0.001 UF,+80-20%,200V	05397	C315C102Z2R5CA
C5528	----- -----	B130000		(PART OF CIRCUIT BOARD)		
C5531	283-0158-00	B181040		CAP,FXD,CER DI:1PF,+/-0.1PF,50V (NOMINAL VALUE,SELECTED)	51642	100-050-NP0-109B
C5534	----- -----	B130000		(PART OF CIRCUIT BOARD)		
C5536	283-0156-00	B130000		CAP,FXD,CER DI:0.001 UF,+80-20%,200V	05397	C315C102Z2R5CA
C5540	----- -----	B130000		(SELECTED AND ADDED IF NECESSARY)		
C5550	----- -----	B130000		(PART OF CIRCUIT BOARD)		
C5553	281-0613-00	B130000	B139999	CAP,FXD,CER DI:10PF,1%,500V	59660	374-018C0G0100F
C5553	281-0617-00	B140000	B181039	CAP,FXD,CER DI:15PF,10%,200V (NOMINAL VALUE,SELECTED)	52763	2RDPLZ007 15P0KC
C5553	281-0797-00	B181040		CAP,FXD,CER DI:15PF,10%,100V (NOMINAL VALUE,SELECTED)	04222	MA106A150KAA
C5556	----- -----	B130000		(PART OF CIRCUIT BOARD)		
C5563	283-0110-00	B130000		CAP,FXD,CER DI:0.005UF,+80-20%,150V	59660	855-547-E-502Z
C5567	283-0110-00	B130000		CAP,FXD,CER DI:0.005UF,+80-20%,150V	59660	855-547-E-502Z
C5569	281-0772-00	B181040		CAP,FXD,CER DI:4700PF,10%,100V	04222	MA201C472KAA
C5580	281-0525-00	B130000		CAP,FXD,CER DI:470PF,+/-94PF,500V	52763	2RDPLZ007 470PM0
C5588	283-0110-00	B130000		CAP,FXD,CER DI:0.005UF,+80-20%,150V	59660	855-547-E-502Z
C5590	281-0618-00	B130000	B139999	CAP,FXD,CER DI:4.7PF,+/-0.5PF,500V	52763	2RDPLZ007 4P70DC
C5590	281-0616-00	B140000	B169999	CAP,FXD,CER DI:6.8PF,+/-0.5PF,200V (NOMINAL VALUE,SELECTED)	52763	2RDPLZ007 6P80DC
C5590	281-0645-00	B170000	B181039	CAP,FXD,CER DI:8.2PF,+/-0.25PF,500V (NOMINAL VALUE,SELECTED)	52763	2RDPLZ007 8P20CC
C5590	281-0811-00	B181040		CAP,FXD,CER DI:10PF,10%,100V (NOMINAL VALUE,SELECTED)	04222	MA101A100KAA

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CR20	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR23	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR28	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR29	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR34	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR36	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR201	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR203	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR210	152-0075-00	B010100	B202662	SEMICOND DVC,DI:SM,GE,22V,80MM,DO-7 (OPTION 10 ONLY)	14433	G866
CR210	152-0664-00	B202663		SEMICOND DVC,DI:SCHOTTKY,SM,SI,70V,DO-35 (OPTION 10 ONLY)	80009	152-0664-00
CR212	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR217	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR249	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR256	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR257	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR262	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR263	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR291	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR306	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR348	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR349	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR359	152-0075-00	B010100	B202662	SEMICOND DVC,DI:SM,GE,22V,80MM,DO-7 (OPTION 10 ONLY)	14433	G866
CR359	152-0664-00	B202663		SEMICOND DVC,DI:SCHOTTKY,SM,SI,70V,DO-35 (OPTION 10 ONLY)	80009	152-0664-00
CR371	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR569	152-0141-02	B010100	B129999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR583	152-0141-02	B010100	B129999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR584	152-0141-02	B010100	B129999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR615	152-0141-02	B010100	B119999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR787	152-0141-02	B080000	B099999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR859	152-0141-02	B010100	B149999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR882	152-0322-00	B010100	B149999	SEMICOND DVC,DI:SCHOTTKY BARRIER,SI,15V	50434	5082-2672
CR887	152-0322-00	B010100	B149999	SEMICOND DVC,DI:SCHOTTKY BARRIER,SI,15V	50434	5082-2672
CR889	152-0141-02	B010100	B149999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR890	152-0141-02	B010100	B149999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR892	152-0322-00	B010100	B149999	SEMICOND DVC,DI:SCHOTTKY BARRIER,SI,15V	50434	5082-2672
CR896	152-0141-02	B010100	B149999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR897	152-0322-00	B010100	B149999	SEMICOND DVC,DI:SCHOTTKY BARRIER,SI,15V	50434	5082-2672
CR898	152-0141-02	B010100	B149999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR902	152-0141-02	B010100	B149999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR908	152-0141-02	B010100	B149999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1023	152-0141-02	B010100	B129999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1026	152-0141-02	B010100	B129999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1036	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1038	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1066	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1068	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1069	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1101	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V (CR1101 OPTION 10 ONLY)	03508	DA2527 (1N4152)
CR1112	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V (CR1112 OPTION 10 ONLY)	03508	DA2527 (1N4152)
CR1115	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V (CR1115 OPTION 10 ONLY)	03508	DA2527 (1N4152)
CR1118	152-0075-00	B010100	B202662	SEMICOND DVC,DI:SM,GE,22V,80MM,DO-7 (OPTION 10 ONLY)	14433	G866
CR1118	152-0141-02	B202663		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
				(OPTION 10 ONLY)		
CR1119	152-0075-00	B010119	B202662	SEMICOND DVC,DI:SW,GE,22V,80MW,DO-7	14433	G866
				(OPTION 10 ONLY)		
CR1119	152-0664-00	B202663		SEMICOND DVC,DI:SCHOTTKY,SW,SI,70V,DO-35	80009	152-0664-00
				(OPTION 10 ONLY)		
CR1134	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
				(CR1134 OPTION 10 ONLY)		
CR1138	152-0075-00	B010100	B202662	SEMICOND DVC,DI:SW,GE,22V,80MW,DO-7	14433	G866
				(OPTION 10 ONLY)		
CR1138	152-0141-02	B202663		SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
				(OPTION 10 ONLY)		
CR1142	152-0075-00	B010100	B202662	SEMICOND DVC,DI:SW,GE,22V,80MW,DO-7	14433	G866
				(OPTION 10 ONLY)		
CR1142	152-0141-02	B202663		SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
				(OPTION 10 ONLY)		
CR1152	152-0141-02	B060300		SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
				(CR1152 OPTION 10 ONLY)		
CR1167	152-0141-02	B010105		SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
				(CR1167 OPTION 10 ONLY)		
CR1190	152-0423-00			SEMICOND DVC,DI:RECT,SI,400V,3A,M176A	04713	1N5000
CR1192	152-0423-00			SEMICOND DVC,DI:RECT,SI,400V,3A,M176A	04713	1N5000
CR1215	152-0396-01			SEMICOND DVC,DI:RECT,SI,400V,3A	14936	KBPC604-1
CR1232	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR1234	152-0400-00			SEMICOND DVC,DI:RECT,SI,400V,1A	04713	SR1977K
CR1238	152-0401-00	B010100	B181129	SEMICOND DVC,DI:SCHOTTKY,SI,32V,2A,TO-92	04713	SPT32K
CR1240	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR1241	152-0400-00			SEMICOND DVC,DI:RECT,SI,400V,1A	04713	SR1977K
CR1242	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR1243	152-0400-00	B191600		SEMICOND DVC,DI:RECT,SI,400V,1A	04713	SR1977K
CR1244	152-0107-00			SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR1245	152-0400-00	B191600		SEMICOND DVC,DI:RECT,SI,400V,1A	04713	SR1977K
CR1249	152-0061-00			SEMICOND DVC,DI:SW,SI,175V,0.1A,DO-35	07263	FDH2161
CR1251	152-0061-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,175V,0.1A,DO-35	07263	FDH2161
CR1252	152-0061-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,175V,0.1A,DO-35	07263	FDH2161
CR1253	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1256	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1259	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1280	152-0333-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR1281	152-0333-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR1282	152-0333-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR1283	152-0333-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR1288	152-0333-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR1289	152-0333-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR1290	152-0333-00	B010100	B191474	SEMICOND DVC,DI:SW,SI,55V,200MA,DO-35	07263	FDH-6012
CR1294	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1306	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1310	152-0397-00			SEMICOND DVC,DI:RECT,SI,500V,12A	80009	152-0397-00
CR1311	152-0502-00	B010100	B181090	SEMICOND DVC,DI:RECT,SI,20V,5A,A179C	04713	1N5823
CR1311	152-0686-00	B181091		SEMICOND DVC,DI:RECT,SI,100V,5A,A264	04713	SR3273
CR1312	152-0502-00	B010100	B181090	SEMICOND DVC,DI:RECT,SI,20V,5A,A179C	04713	1N5823
CR1312	152-0686-00	B181091		SEMICOND DVC,DI:RECT,SI,100V,5A,A264	04713	SR3273
CR1313	152-0397-00			SEMICOND DVC,DI:RECT,SI,500V,12A	80009	152-0397-00
CR1320	153-0052-00	B010100	B140649	SEMICOND DVC SE:RECTIFIER,FOUR MATCHED	80009	153-0052-00
CR1320	152-0400-00	B140650	B191474	SEMICOND DVC,DI:RECT,SI,400V,1A	04713	SR1977K
CR1321	----- -----			(PART OF CR1320)		
CR1321	152-0400-00	B140650	B191474	SEMICOND DVC,DI:RECT,SI,400V,1A	04713	SR1977K
CR1322	----- -----			(PART OF CR1320)		
CR1322	152-0400-00	B140650		SEMICOND DVC,DI:RECT,SI,400V,1A	04713	SR1977K
CR1323	----- -----			(PART OF CR1320)		
CR1323	152-0400-00	B140650		SEMICOND DVC,DI:RECT,SI,400V,1A	04713	SR1977K

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
CR1325	152-0061-00	B010100	B191474	SEMICOND OVC,DI:SM,SI,175V,0.1A,DO-35	07263	FDH2161
CR1326	152-0061-00	B010100	B191474	SEMICOND OVC,DI:SM,SI,175V,0.1A,DO-35	07263	FDH2161
CR1340	152-0413-00			SEMICOND OVC,DI:RECT,SI,400V,1.0A,A59	04713	SR2046KRL
CR1341	152-0413-00			SEMICOND OVC,DI:RECT,SI,400V,1.0A,A59	04713	SR2046KRL
CR1342	152-0413-00			SEMICOND OVC,DI:RECT,SI,400V,1.0A,A59	04713	SR2046KRL
CR1343	152-0413-00			SEMICOND OVC,DI:RECT,SI,400V,1.0A,A59	04713	SR2046KRL
CR1345	152-0397-00			SEMICOND OVC,DI:RECT,SI,500V,12A	80009	152-0397-00
CR1346	152-0397-00			SEMICOND OVC,DI:RECT,SI,500V,12A	80009	152-0397-00
CR1347	152-0397-00			SEMICOND OVC,DI:RECT,SI,500V,12A	80009	152-0397-00
CR1348	152-0397-00			SEMICOND OVC,DI:RECT,SI,500V,12A	80009	152-0397-00
CR1376	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1378	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1402	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1410	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1429	152-0066-01			SEMICOND OVC,DI:SELECTED	80009	152-0066-01
CR1431	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1439	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1445	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1459	152-0066-01			SEMICOND OVC,DI:SELECTED	80009	152-0066-01
CR1468	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1469	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1482	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1483	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1489	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1499	152-0066-01			SEMICOND OVC,DI:SELECTED	80009	152-0066-01
CR1502	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1503	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1506	152-0233-00			SEMICOND OVC,DI:SM,SI,80V,75MA,DO-7	03508	DA2737
CR1510	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1520	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1521	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1523	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1539	152-0066-01			SEMICOND OVC,DI:SELECTED	80009	152-0066-01
CR1543	152-0075-00	B010100	B202662	SEMICOND OVC,DI:SM,GE,22V,80MW,DO-7 (OPTION 10 ONLY)	14433	G866
CR1543	152-0664-00	B202663		SEMICOND OVC,DI:SCHOTTKY,SM,SI,70V,DO-35 (OPTION 10 ONLY)	80009	152-0664-00
CR1549	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1576	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1589	152-0066-01			SEMICOND OVC,DI:SELECTED	80009	152-0066-01
CR1607	152-0409-00			SEMICOND OVC,DI:RECT,SI,12K,5MA,A298J	83003	VG12X-1
CR1608	152-0409-00			SEMICOND OVC,DI:RECT,SI,12K,5MA,A298J	83003	VG12X-1
CR1625	152-0066-01	B010100	B191474	SEMICOND OVC,DI:SELECTED	80009	152-0066-01
CR1632	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1635	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1638	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1639	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1653	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1655	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1656	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1658	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1676	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1679	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1680	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1682	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1701	152-0242-00			SEMICOND OVC,DI:SIG,SI,225V,0.2A,DO-7	07263	FDH5004
CR1753	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1754	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1764	152-0141-02			SEMICOND OVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
CR1768	152-0066-01			SEMICOND DVC,DI:SELECTED	80009	152-0066-01
CR1771	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1822	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1828	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1844	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1845	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1855	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR1862	152-0233-00			SEMICOND DVC,DI:SM,SI,80V,75MA,DO-7	03508	DA2737
CR1864	152-0233-00			SEMICOND DVC,DI:SM,SI,80V,75MA,DO-7	03508	DA2737
CR2124	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2125	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2127	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2137	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2139	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2140	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2141	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2142	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2145	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2146	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2153	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2156	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2157	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2160	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2161	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2162	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2163	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2166	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2167	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2170	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2171	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2174	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2175	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2187	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2192	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2193	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2196	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2198	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V (THRU)	03508	DA2527 (1N4152)
CR2226	152-0141-02	B010100	B199999	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2229	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2235	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2266	152-0333-00	B110000		SEMICOND DVC,DI:SM,SI,55V,200MA,DO-35	07263	FDH-6012
CR2267	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2270	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2271	152-0141-02	B200000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2528	152-0107-00	B050000		SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR2531	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2532	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2534	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2537	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR2538	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR4653	152-0075-00	B120000		SEMICOND DVC,DI:SM,GE,22V,80MW,DO-7	14433	G866
CR4654	152-0075-00	B120000		SEMICOND DVC,DI:SM,GE,22V,80MW,DO-7	14433	G866
CR4905	152-0141-02	B150000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR4915	152-0141-02	B150000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR4921	152-0141-02	B150000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR4922	152-0141-02	B150000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR4923	152-0141-02	B150000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR4924	152-0141-02	B150000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
CR5520	152-0141-02	B130000		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR5569	152-0321-00	B181040		SEMICOND DVC,DI:SM,SI,30V,0.1A,DO-7S	07263	FSA1480
CR5572	152-0107-00	B140000		SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR5574	152-0107-00	B140000		SEMICOND DVC,DI:RECT,SI,400 V,400MA,A1	12969	"G727"
CR5582	152-0141-02	B181040		SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
CR5584	152-0141-02	B130000	B181039	SEMICOND DVC,DI:SM,SI,30V,150MA,30V	03508	DA2527 (1N4152)
DL650	119-0385-00			DELAY LINE,ELEC:62NS,100 OHM	80009	119-0385-00
DS1164	150-0121-02			LAMP,CARTRIDGE:5V,0.06A,GREEN LENS	55292	71320-03
DS1187	150-0029-00	B010100	B191892	LAMP,INCAND:6.3V,0.2A,#349,MIDGET FLG	58854	349
DS1187	150-0097-00	B191893		LAMP,INCAND:6.3V,0.2A,#7381,WIRE LEADS	92966	7381
DS1188	150-0029-00	B010100	B191892	LAMP,INCAND:6.3V,0.2A,#349,MIDGET FLG	58854	349
DS1188	150-0097-00	B191893		LAMP,INCAND:6.3V,0.2A,#7381,WIRE LEADS	92966	7381
DS1189	150-0029-00	B010100	B191892	LAMP,INCAND:6.3V,0.2A,#349,MIDGET FLG	58854	349
DS1189	150-0097-00	B191893		LAMP,INCAND:6.3V,0.2A,#7381,WIRE LEADS	92966	7381
DS1208	119-0181-00			ARSR,ELEC SURGE:230,GAS FILLED	25088	B1-A230
DS1213	119-0181-00			ARSR,ELEC SURGE:230,GAS FILLED	25088	B1-A230
DS1219	150-0035-00			LAMP,GLOW:90V MAX,0.3MA,AID-T,WIRE LD	TK0213	JH005/3011JA
DS1687	150-0035-00			LAMP,GLOW:90V MAX,0.3MA,AID-T,WIRE LD	TK0213	JH005/3011JA
DS1688	150-0035-00			LAMP,GLOW:90V MAX,0.3MA,AID-T,WIRE LD	TK0213	JH005/3011JA
DS1718	150-0035-00			LAMP,GLOW:90V MAX,0.3MA,AID-T,WIRE LD	TK0213	JH005/3011JA
DS1719	150-0035-00			LAMP,GLOW:90V MAX,0.3MA,AID-T,WIRE LD	TK0213	JH005/3011JA
E2132	276-0532-00	B202661		SHLD BEAD,ELEK:FERRITE	02114	56-590-65/4A6
E5579	276-0528-00	B181040		SHLD BEAD,ELEK:FERRAMIC	02114	56-0590-65C/38
F1200	159-0017-00			FUSE,CARTRIDGE:4A,3AG,250V,FAST BLOW	71400	MTH-CM-4
F1201	159-0082-00	B010100	B189999	FUSE,CARTRIDGE:1AG,15A,32V,2SEC,1.5INRADLD	71400	GKN-15
F1223	159-0021-00			FUSE,CARTRIDGE:3AG,2A,250V,FAST BLOW	71400	AGC-CM-2
FL1200	119-0420-01	B190000		FILTER,RFI:6A,250 VAC,48-440 HZ	02777	F12034-6
J7	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J8	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J9	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J17	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J18	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J19	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J30	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J60	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J61	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J75	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J98	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J550	131-1003-00	B010100	B129999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J553	131-1003-00	B010100	B129999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J556	131-1003-00	B010100	B129999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J558	131-1003-00	B010100	B129999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J583	131-1003-00	B010100	B129999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J584	131-1003-00	B010100	B129999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J601	131-1003-00	B010100	B119999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J604	131-1003-00	B010100	B119999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J607	131-1003-00	B010100	B119999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J610	131-1003-00	B010100	B119999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J643	131-1003-00	B010100	B119999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J645	131-1003-00	B010100	B119999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J660	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J661	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J690	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J704	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J719	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J848	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J849	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J850	131-1003-00	B010100	B149999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J853	131-1003-00	B010100	B149999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
J857	131-1003-00	B010100	B149999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1005	131-1003-00	B010100	B129999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1006	131-1003-00	B010100	B129999	CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1029	131-1097-00	B010100	B129999	CONN,RCPT,ELEC:BNC,FEMALE,CKT BOARD MT	24931	28JR220-2
J1029	131-1315-01	B130000		CONN,RCPT,ELEC:BNC,FEMALE	80009	131-1315-01
J1032	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1049	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J1051	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1054	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1062	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1069	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J1073	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1091	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J1093	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J1095	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J1097	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE (J1097 STANDARD ONLY)	13511	31-279
J1099	131-0955-00			CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
J1101	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG (J1101 OPTION 10 ONLY)	80009	131-1003-00
J1109	131-0771-00			CONN,RCPT,ELEC:2 MALE,2 FEM,PNL MT W/O HDW (J1109 STANDARD ONLY)	91836	1904-2M58
J1110	131-0771-00			CONN,RCPT,ELEC:2 MALE,2 FEM,PNL MT W/O HDW (J1110 STANDARD ONLY)	91836	1904-2M58
J1111	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG (J1111 OPTION 10 ONLY)	80009	131-1003-00
J1149	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1150	131-0106-02			CONN,RCPT,ELEC:BNC,FEMALE (J1150 STANDARD ONLY)	24931	28JR178-1
J1748	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1801	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J1802	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J2132	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J2138	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J2139	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J2192	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J2296	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J2299	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J4850	131-1003-00	B150000		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J4853	131-1003-00	B150000		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J4854	131-1003-00	B150000		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J5512	131-1003-00	B130000		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J5516	131-1003-00	B130000		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J5530	131-1003-00	B130000		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J5534	131-1003-00	B130000		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
J5590	131-1003-00	B130000		CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
L229	108-0245-00			CHOKE,RF:FIXED,3.9UH (L229 STANDARD ONLY)	76493	B6310-1
L229	108-0245-00	B010105		CHOKE,RF:FIXED,3.9UH (L229 OPTION 10 ONLY)	76493	B6310-1
L240	108-0245-00			CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L356	108-0245-00			CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L390	108-0245-00			CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L392	108-0245-00			CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L397	108-0245-00			CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L603	----- -----			(WIRE LEAD)		
L606	----- -----			(WIRE LEAD)		
L609	----- -----			(WIRE LEAD)		
L612	----- -----			(WIRE LEAD)		
L657	195-8673-00	B191992		LEAD,ELECTRICAL:0.0203 DIA,1.625 L,BARE	80009	195-8673-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
L657	195-8673-00	B191992		LEAD,ELECTRICAL:0.0203 DIA,1.625 L,BARE	80009	195-8673-00
L659	195-8673-00	B191992		LEAD,ELECTRICAL:0.0203 DIA,1.625 L,BARE	80009	195-8673-00
L659	195-8673-00	B191992		LEAD,ELECTRICAL:0.0203 DIA,1.625 L,BARE	80009	195-8673-00
L660	108-0369-00			COIL,RF:FIXED,120NH	80009	108-0369-00
L661	108-0369-00			COIL,RF:FIXED,120NH	80009	108-0369-00
L667	114-0220-00	B010100	B070304	COIL,RF:VARIABLE,1-3UH	80009	114-0220-00
L667	114-0222-00	B070305		COIL,RF:VARIABLE,2-6UH	80009	114-0222-00
L676	----- -----			(PART OF CIRCUIT BOARD)		
L680	----- -----			(PART OF CIRCUIT BOARD)		
L730	195-8673-00	B191992		LEAD,ELECTRICAL:0.0203 DIA,1.625 L,BARE	80009	195-8673-00
L730	195-8673-00	B191992		LEAD,ELECTRICAL:0.0203 DIA,1.625 L,BARE	80009	195-8673-00
L731	195-8673-00	B191992		LEAD,ELECTRICAL:0.0203 DIA,1.625 L,BARE	80009	195-8673-00
L731	195-8673-00	B191992		LEAD,ELECTRICAL:0.0203 DIA,1.625 L,BARE	80009	195-8673-00
L733	----- -----			(PART OF CIRCUIT BOARD)		
L734	----- -----			(PART OF CIRCUIT BOARD)		
L738	----- -----			(PART OF CIRCUIT BOARD)		
L739	----- -----			(PART OF CIRCUIT BOARD)		
L992	108-0245-00	B010100	B149999	CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L994	108-0245-00	B010100	B149999	CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L996	108-0245-00	B010100	B149999	CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L1201	108-0686-00	B010100	B189999	COIL,RF:FIXED,116UH	80009	108-0686-00
L1203	108-0686-00	B010100	B189999	COIL,RF:FIXED,116UH	80009	108-0686-00
L1229	108-0681-00			COIL,RF:FIXED,140UH	TK1345	108-0681-00
L1237	108-0678-00			COIL,RF:FIXED,1MH	80009	108-0678-00
L1313	108-0679-00			COIL,RF:FIXED,12UH	80009	108-0679-00
L1316	108-0679-00			COIL,RF:FIXED,12UH	80009	108-0679-00
L1318	108-0554-00			COIL,RF:FIXED,5UH,+/-20%	TK1345	108-0554-00
L1329	108-0646-00			COIL,RF:FIXED,80UH	TK1345	108-0646-00
L1352	108-0680-00			COIL,RF:FIXED,27UH	80009	108-0680-00
L1355	108-0680-00			COIL,RF:FIXED,27UH	80009	108-0680-00
L1359	108-0646-00			COIL,RF:FIXED,80UH	TK1345	108-0646-00
L1363	108-0646-00			COIL,RF:FIXED,80UH	TK1345	108-0646-00
L1725	108-0544-00	B010100	B192278	COIL,TUBE DEFL:TRACE ROTATOR	80009	108-0544-00
L1725	108-0544-01	B192279		COIL,TUBE DEFL:TRACE ROTATOR	80009	108-0544-01
L1730	108-0546-00	B010100	B192278	COIL,TUBE DEFL:Y ALIGNMENT	80009	108-0546-00
L1730	108-0605-00	B192279		COIL,TUBE DEFL:TRACE ROTATOR	80009	108-0605-00
L1856	276-0507-00			SHLD BEAD,ELEK:FERRITE	02114	56-590-658/38
L2212	108-0800-00	B200000		COIL,RF:FIXED,820MH	04072	9230-90
L2277	108-0800-00	B200000		COIL,RF:FIXED,820MH	04072	9230-90
L2283	108-0331-00	B010100	B199999	COIL,RF:FIXED,750NH	TK1345	108-0331-00
L4915	276-0507-00	B150000		SHLD BEAD,ELEK:FERRITE	02114	56-590-658/38
L4994	108-0245-00	B150000		CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L4996	108-0245-00	B150000		CHOKE,RF:FIXED,3.9UH	76493	B6310-1
L5565	108-0474-00	B140000	B181039	COIL,RF:FIXED,2UH	80009	108-0474-00
L5565	108-0409-00	B181040		COIL,RF:FIXED,17.5UH	TK1345	108-0409-00
L5567	108-0474-00	B140000	B181039	COIL,RF:FIXED,2UH	80009	108-0474-00
L5567	108-0409-00	B181040		COIL,RF:FIXED,17.5UH	TK1345	108-0409-00
LR394	108-0329-00			COIL,RF:FIXED,2,45UH	TK2042	ORDER BY DESCR
LR780	108-0685-00			COIL,RF:FIXED,62NH	TK1345	108-0685-00
LR784	108-0685-00			COIL,RF:FIXED,62NH	TK1345	108-0685-00
LR787	108-0330-00			COIL,RF:FIXED,395NH	TK2042	ORDER BY DESCR
LR789	108-0325-00			COIL,RF:FIXED,490NH	TK2042	ORDER BY DESCR
LR791	108-0325-00			COIL,RF:FIXED,490NH	TK2042	ORDER BY DESCR
LR794	108-0325-00			COIL,RF:FIXED,490NH	TK2042	ORDER BY DESCR
LR796	108-0325-00			COIL,RF:FIXED,490NH	TK2042	ORDER BY DESCR
LR798	108-0325-00			COIL,RF:FIXED,490NH	TK2042	ORDER BY DESCR
LR5502	108-0729-00	B130000		COIL,RF:FIXED,195NH	80009	108-0729-00
LR5505	108-0729-00	B130000		COIL,RF:FIXED,195NH	80009	108-0729-00
LR5522	108-0729-00	B130000		COIL,RF:FIXED,195NH	80009	108-0729-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
LR5525	108-0729-00	B130000		COIL,RF:FIXED,195NH	80009	108-0729-00
M1882	149-0030-00	B010100	B039999	METER,T TOTLZ:ELAPSED TIME,DC,CKT BD MT	18583	120 LC
Q216	151-0192-00			TRANSISTOR:SELECTED	04713	SPS8801
Q267	151-0199-00			TRANSISTOR:PNP,SI,TO-92	27014	ST65057
Q275	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q283	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q295	151-0199-00			TRANSISTOR:PNP,SI,TO-92	27014	ST65057
Q302	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q312	151-0199-00			TRANSISTOR:PNP,SI,TO-92	27014	ST65057
Q319	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q335	151-0199-00			TRANSISTOR:PNP,SI,TO-92	27014	ST65057
Q342	151-0192-00			TRANSISTOR:SELECTED	04713	SPS8801
Q370	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q373	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q377	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q571	151-0192-00	B010100	B129999	TRANSISTOR:SELECTED	04713	SPS8801
Q592	151-0362-00	B010100	B129999	TRANSISTOR:PNP,SI,U-43	04713	SMT1105
Q596	151-0362-00	B010100	B129999	TRANSISTOR:PNP,SI,U-43	04713	SMT1105
Q616	151-0192-00	B010100	B119999	TRANSISTOR:SELECTED	04713	SPS8801
Q617	151-0192-00	B010100	B119999	TRANSISTOR:SELECTED	04713	SPS8801
Q694	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q698	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q705	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q710	151-0188-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q716	151-0188-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q723	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q728	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q773	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q776	151-0188-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q785	151-0390-00	B100000		TRANSISTOR:NPN,SI,X-81	04713	SPS34140RMPSU45
Q786	151-1026-00	B100000		TRANSISTOR:FET,N-CHAN,SI,TO-106	04713	SPF3037
Q863	151-0221-00	B010100	B149999	TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q873	151-0221-00	B010100	B149999	TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q887	151-0367-00	B010100	B149999	TRANSISTOR:NPN,SI,X-55	04713	SPS 8811
Q889	151-0221-00	B010100	B149999	TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q897	151-0221-00	B010100	B149999	TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q899	151-0367-00	B010100	B149999	TRANSISTOR:NPN,SI,X-55	04713	SPS 8811
Q901	151-0369-00	B010100	B149999	TRANSISTOR:PNP,SI,X-55	04713	SPS8273
Q902	151-0369-00	B010100	B149999	TRANSISTOR:PNP,SI,X-55	04713	SPS8273
Q909	151-0424-00	B010100	B149999	TRANSISTOR:NPN,SI,TO-92F	04713	SPS8246
Q912	151-0270-00	B010100	B149999	TRANSISTOR:PNP,SI,TO-5	04713	ST919
Q922	151-0274-00	B010100	B149999	TRANSISTOR:NPN,SI,TO-5	04713	SS7394
Q925	151-0220-00	B010100	B149999	TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q932	151-0274-00	B010100	B149999	TRANSISTOR:NPN,SI,TO-5	04713	SS7394
Q942	151-0270-00	B010100	B149999	TRANSISTOR:PNP,SI,TO-5	04713	ST919
Q945	151-0190-00	B010100	B149999	TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q1013	151-0362-00	B010100	B129999	TRANSISTOR:PNP,SI,U-43	04713	SMT1105
Q1016	151-0362-00	B010100	B129999	TRANSISTOR:PNP,SI,U-43	04713	SMT1105
Q1023	151-0362-00	B010100	B129999	TRANSISTOR:PNP,SI,U-43	04713	SMT1105
Q1034	151-0224-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS6917
Q1038	151-0221-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q1040	151-0221-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q1058	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q1063	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q1068	151-0271-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS8236
Q1104	151-0190-00			TRANSISTOR:NPN,SI,TO-92 (Q1104 OPTION 10 ONLY)	80009	151-0190-00
Q1106	151-0220-00			TRANSISTOR:PNP,SI,TO-92 (Q1106 OPTION 10 ONLY)	80009	151-0220-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
Q1107	151-0190-00			TRANSISTOR:NPN,SI,TO-92 (Q1107 STANDARD ONLY)	80009	151-0190-00
Q1111	151-0216-00			TRANSISTOR:PNP,SI,TO-92 (Q1107 STANDARD ONLY)	04713	SPS8803
Q1115	151-0216-00			TRANSISTOR:PNP,SI,TO-92 (Q1115 STANDARD ONLY)	04713	SPS8803
Q1119	151-0188-00			TRANSISTOR:PNP,SI,TO-92 (Q1119 STANDARD ONLY)	80009	151-0188-00
Q1123	151-0192-00			TRANSISTOR:SELECTED (Q1123 STANDARD ONLY)	04713	SPS8801
Q1128	151-0192-00			TRANSISTOR:SELECTED (Q1128 STANDARD ONLY)	04713	SPS8801
Q1128	151-0220-00			TRANSISTOR:PNP,SI,TO-92 (Q1128 OPTION 10 ONLY)	80009	151-0220-00
Q1133	151-0190-00			TRANSISTOR:NPN,SI,TO-92 (Q1133 OPTION 10 ONLY)	80009	151-0190-00
Q1234	151-0368-00			TRANSISTOR:NPN,SI,TO-3	04713	SJ2754
Q1238	151-0508-00	B181130		TRANSISTOR:UJT,SI,TO-98	03508	X13T520
Q1241	151-0368-00			TRANSISTOR:NPN,SI,TO-3	04713	SJ2754
Q1246	151-0260-00			TRANSISTOR:NPN,SI,TO-39	04713	ST1083
Q1248	151-0519-00	B010100	B160809	SCR:SI,TO-92	80009	151-0519-00
Q1248	151-0529-00	B160810		SCR:200V,0.5A	04713	MCR206
Q1252	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q1254	151-0302-00	B010100	B181069	TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q1254	151-0273-00	B181070		TRANSISTOR:SELECTED	03508	X16E3616
Q1373	151-0216-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS8803
Q1409	151-0232-00			TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q1415	151-0292-00			TRANSISTOR:NPN,SI,X-55	80009	151-0292-00
Q1418	151-0228-00			TRANSISTOR:PNP,SI,TO-105	07263	S21862
Q1425	151-0136-00	B010100	B180919	TRANSISTOR:NPN,SI,TO-39	02735	35495
Q1425	151-0136-03	B180920		TRANSISTOR:SELETED	80009	151-0136-03
Q1428	151-0349-00			TRANSISTOR:NPN,SI,SELECTED,TO-127	04713	SJE924
Q1436	151-0232-00			TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q1445	151-0232-00			TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q1451	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q1455	151-0260-02			TRANSISTOR:NPN,SI,TO-39	04713	ST1149
Q1458	151-0349-00			TRANSISTOR:NPN,SI,SELECTED,TO-127	04713	SJE924
Q1466	151-0232-00			TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q1485	151-0216-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS8803
Q1489	151-0232-00			TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q1496	151-0260-02			TRANSISTOR:NPN,SI,TO-39	04713	ST1149
Q1498	151-0349-00			TRANSISTOR:NPN,SI,SELECTED,TO-127	04713	SJE924
Q1508	151-0232-00			TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q1522	151-0228-00			TRANSISTOR:PNP,SI,TO-105	07263	S21862
Q1526	151-0302-00			TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q1534	151-0136-00	B010100	B180919	TRANSISTOR:NPN,SI,TO-39	02735	35495
Q1534	151-0136-03	B180920		TRANSISTOR:SELETED	80009	151-0136-03
Q1538	151-0349-00			TRANSISTOR:NPN,SI,SELECTED,TO-127	04713	SJE924
Q1546	151-0192-00			TRANSISTOR:SELECTED	04713	SPS8801
Q1550	151-0324-00	B010100	B069999	TRANSISTOR:SELECTED	04713	SJE915
Q1550	151-0324-01	B070000		TRANSISTOR:PNP,TO-126	04713	SJE865
Q1560	151-0232-00			TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q1576	151-0232-00			TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q1582	151-0192-00			TRANSISTOR:SELECTED	04713	SPS8801
Q1585	151-0260-00			TRANSISTOR:NPN,SI,TO-39	04713	ST1083
Q1588	151-0349-00			TRANSISTOR:NPN,SI,SELECTED,TO-127	04713	SJE924
Q1627	151-0228-00			TRANSISTOR:PNP,SI,TO-105	07263	S21862
Q1631	151-0279-00			TRANSISTOR:SELECTED	04713	SS2821
Q1755	151-0220-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q1757	151-0220-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
Q1765	151-0228-00			TRANSISTOR:PNP,SI,TO-105	07263	S21862
Q1769	151-0292-00			TRANSISTOR:NPN,SI,X-55	80009	151-0292-00
Q1805	151-0220-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q1808	151-0220-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q1815	151-0220-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q1824	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q1827	151-0271-00	B010100	B100367	TRANSISTOR:PNP,SI,TO-92	04713	SPS8236
Q1827	151-0220-00	B100368		TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q1834	151-0271-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS8236
Q1836	151-0271-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS8236
Q1838	151-0220-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q1854	151-0270-00	B010100	B192279	TRANSISTOR:PNP,SI,TO-5	04713	ST919
Q1854	151-0270-03	B192280		TRANSISTOR:SCREENED	04713	ST919H
Q1859	151-0292-00			TRANSISTOR:NPN,SI,X-55	80009	151-0292-00
Q1874	151-0223-00	B010100	B039999	TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q1874	151-0192-00	B040000		TRANSISTOR:SELECTED	04713	SPS8801
Q1876	151-0274-00	B010100	B192279	TRANSISTOR:NPN,SI,TO-5	04713	SS7394
Q1876	151-0274-01	B192280		TRANSISTOR:SCREENED	04713	SS7394H
Q2108	151-0223-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS8026
Q2112	151-0221-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0221-00
Q2131	151-0190-00	B200000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2132	151-0190-00	B200000	B202660	TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2132	151-0432-00	B202661		TRANSISTOR:NPN,SI,TO-106	04713	SPS8512
Q2138	151-0188-00			TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2142	151-0190-00	B200000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2151	151-0190-00	B200000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2152	151-0190-00	B200000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2153	151-0192-00	B010100	B199999	TRANSISTOR:SELECTED	04713	SPS8801
Q2153	151-0190-00	B200000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2159	151-0190-00	B010100	B19999	TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2181	151-0188-00	B200000		TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2215	151-0232-00	B010100	B199999	TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q2223	151-0190-00	B010100	B19999	TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2223	151-0232-00	B200000		TRANSISTOR:NPN,SI,TO-78	07263	SP12141
Q2225	151-0188-00	B010100	B199999	TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2226	151-0190-00	B200000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2227	151-0190-00	B200000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2229	151-0190-00	B010100	B199999	TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2229	151-0188-00	B200000		TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2240	151-0190-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2243	151-0190-00	B200000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q2250	151-0188-00	B200000		TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2255	151-1021-00	B200000		TRANSISTOR:FET,N-CHAN,SI,TO-18	80009	151-1021-00
Q2286	151-0188-00	B010100	B199999	TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2287	151-0188-00	B010100	B199999	TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2296	151-0188-00	B010100	B199999	TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2296	151-1021-00	B200000		TRANSISTOR:FET,N-CHAN,SI,TO-18	80009	151-1021-00
Q2299	151-0188-00	B010100	B199999	TRANSISTOR:PNP,SI,TO-92	80009	151-0188-00
Q2512	151-0301-00			TRANSISTOR:PNP,SI,TO-18	04713	ST898
Q4633	151-0302-00	B120000		TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q4652	151-0341-00	B120000	B159999	TRANSISTOR:NPN,SI,TO-106	04713	SPS6919
Q4652	151-0302-00	B160000		TRANSISTOR:NPN,SI,TO-18	04713	ST899
Q4883	151-0220-00	B150000		TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q4885	151-0325-00	B150000		TRANSISTOR:PNP,SI,TO-92,SEL	80009	151-0325-00
Q4895	151-0325-00	B150000		TRANSISTOR:PNP,SI,TO-92,SEL	80009	151-0325-00
Q4901	151-0220-00	B150000		TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q4905	151-0434-00	B150000	B192279	TRANSISTOR:PNP,SI,TO-72	04713	SS7144
Q4905	151-0434-01	B192280		TRANSISTOR:SELECTED	04713	SS7144H
Q4911	151-0220-00	B150000		TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
Q4915	151-0442-00	B150000		TRANSISTOR:NPN,SI,TO-72	04713	SRF505
Q4928	151-0220-00	B150000		TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q4929	151-0220-00	B150000		TRANSISTOR:PNP,SI,TO-92	80009	151-0220-00
Q4933	151-0274-00	B150000	B192279	TRANSISTOR:NPN,SI,TO-5	04713	SS7394
Q4933	151-0274-01	B192280		TRANSISTOR:SCREENED	04713	SS7394H
Q4939	151-0270-00	B150000	B192279	TRANSISTOR:PNP,SI,TO-5	04713	ST919
Q4939	151-0270-03	B192280		TRANSISTOR:SCREENED	04713	ST919H
Q4948	151-0190-00	B150000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q4949	151-0190-00	B150000		TRANSISTOR:NPN,SI,TO-92	80009	151-0190-00
Q4953	151-0274-00	B150000	B192279	TRANSISTOR:NPN,SI,TO-5	04713	SS7394
Q4953	151-0274-01	B192280		TRANSISTOR:SCREENED	04713	SS7394H
Q4959	151-0270-00	B150000	B192279	TRANSISTOR:PNP,SI,TO-5	04713	ST919
Q4959	151-0270-03	B192280		TRANSISTOR:SCREENED	04713	ST919H
Q5569	151-0254-00	B130000		TRANSISTOR:DARLINGTON,NPN,SI	03508	X38L3118
Q5579	151-0434-00	B130000	B192279	TRANSISTOR:PNP,SI,TO-72	04713	SS7144
Q5579	151-0434-01	B192280		TRANSISTOR:SELECTED	04713	SS7144H
R1	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R2	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R3	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R5	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R6	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R12	321-0260-00			RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
R14	321-0260-00			RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
R20	315-0105-00	B010100	B029999	RES,FXD,FILM:1M OHM,5%,0.25W	19701	5043CX1M000J
R20	315-0104-00	B030000		RES,FXD,FILM:100K OHM,5%,0.25W	57668	NTR25J-E100K
R21	315-0334-00	B010100	B029999	RES,FXD,FILM:330K OHM,5%,0.25W	57668	NTR25J-E 330K
R23	315-0105-00	B010100	B029999	RES,FXD,FILM:1M OHM,5%,0.25W	19701	5043CX1M000J
R23	315-0104-00	B030000		RES,FXD,FILM:100K OHM,5%,0.25W	57668	NTR25J-E100K
R24	315-0334-00	B010100	B029999	RES,FXD,FILM:330K OHM,5%,0.25W	57668	NTR25J-E 330K
R26	315-0151-00	B010100	B029999	RES,FXD,FILM:150 OHM,5%,0.25W	57668	NTR25J-E150E
R26	315-0152-00	B030000		RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R27	315-0683-00	B010100	B029999	RES,FXD,FILM:68K OHM,5%,0.25W	57668	NTR25J-E68K0
R27	315-0243-00	B030000		RES,FXD,FILM:24K OHM,5%,0.25W	57668	NTR25J-E24K0
R34	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R36	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	57668	NTR25J-E06K8
R42	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R46	315-0132-00			RES,FXD,FILM:1.3K OHM,5%,0.25W	57668	NTR25J-E01K3
R47	315-0222-00			RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R48	321-0231-00			RES,FXD,FILM:2.49K OHM,1%,0.125W,TC=T0	19701	5033ED2K49F
R54	315-0132-00			RES,FXD,FILM:1.3K OHM,5%,0.25W	57668	NTR25J-E01K3
R56	321-0068-00			RES,FXD,FILM:49.9 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G49R90F
R58	321-0068-00			RES,FXD,FILM:49.9 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G49R90F
R205	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R207	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R209	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R213	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
R215	315-0433-00			RES,FXD,FILM:43K OHM,5%,0.25W	19701	5043CX43K00J
R218	315-0362-00			RES,FXD,FILM:3.6K OHM,5%,0.25W	19701	5043CX3K600J
R219	315-0163-00			RES,FXD,FILM:16K OHM,5%,0.25W	57668	NTR25J-E 16K
R221	315-0223-00			RES,FXD,FILM:22K OHM,5%,0.25W	19701	5043CX22K00J92U
R223	321-0193-00			RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R225	315-0223-00			RES,FXD,FILM:22K OHM,5%,0.25W	19701	5043CX22K00J92U
R227	321-0193-00			RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R229	315-0470-00	B010100	B010104	RES,FXD,FILM:47 OHM,5%,0.25W (R229 OPTION 10 ONLY)	57668	NTR25J-E47E0
R231	321-0147-00			RES,FXD,FILM:332 OHM,1%,0.125W,TC=T0	07716	CEAD332R0F
R233	321-0239-00			RES,FXD,FILM:3.01K OHM,1%,0.125W,TC=T0	19701	5043ED3K010F
R235	315-0912-00			RES,FXD,FILM:9.1K OHM,5%,0.25W	57668	NTR25J-E09K1
R238	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R240	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R242	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
R243	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	19701	5043CX51R00J
R245	321-0306-00			RES,FXD,FILM:15.0K OHM,1%,0.125W,TC=T0	19701	5033ED15J00F
R247	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R249	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R251	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R255	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R257	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R260	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R262	315-0391-00			RES,FXD,FILM:390 OHM,5%,0.25W	57668	NTR25J-E390E
R265	315-0222-00	B010100	B160819	RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R265	315-0272-00	B160820		RES,FXD,FILM:2.7K OHM,5%,0.25W	57668	NTR25J-E02K7
R266	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R268	315-0123-00			RES,FXD,FILM:12K OHM,5%,0.25W	57668	NTR25J-E12K0
R269	315-0821-00			RES,FXD,FILM:820 OHM,5%,0.25W	19701	5043CX820R0J
R271	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R273	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W	57668	NTR25J-E220E
R275	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R280	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R282	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R284	315-0223-00			RES,FXD,FILM:22K OHM,5%,0.25W	19701	5043CX22K00J92U
R285	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	19701	5043CX51R00J
R286	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R289	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R291	315-0391-00			RES,FXD,FILM:390 OHM,5%,0.25W	57668	NTR25J-E390E
R292	315-0122-00			RES,FXD,FILM:1.2K OHM,5%,0.25W	57668	NTR25J-E01K2
R293	315-0222-00			RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R294	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R297	315-0123-00			RES,FXD,FILM:12K OHM,5%,0.25W	57668	NTR25J-E12K0
R298	315-0821-00			RES,FXD,FILM:820 OHM,5%,0.25W	19701	5043CX820R0J
R300	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R302	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W	57668	NTR25J-E220E
R304	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R306	315-0391-00			RES,FXD,FILM:390 OHM,5%,0.25W	57668	NTR25J-E390E
R308	315-0122-00			RES,FXD,FILM:1.2K OHM,5%,0.25W	57668	NTR25J-E01K2
R310	315-0222-00			RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R311	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R314	315-0123-00			RES,FXD,FILM:12K OHM,5%,0.25W	57668	NTR25J-E12K0
R315	315-0821-00			RES,FXD,FILM:820 OHM,5%,0.25W	19701	5043CX820R0J
R317	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R319	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W	57668	NTR25J-E220E
R320	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R322	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R330	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R332	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R333	315-0273-00			RES,FXD,FILM:27K OHM,5%,0.25W	57668	NTR25J-E27K0
R335	321-0328-00			RES,FXD,FILM:25.5K OHM,1%,0.125W,TC=T0	19701	5043ED25K50F
R337	321-0224-00			RES,FXD,FILM:2.10K OHM,1%,0.125W,TC=T0	07716	CEAD21000F
R339	315-0820-00			RES,FXD,FILM:82 OHM,5%,0.25W	57668	NTR25J-E82E0
R341	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	19701	5043CX51R00J
R343	321-0114-00			RES,FXD,FILM:150 OHM,1%,0.125 W,TC=T0	19701	5033ED150R0F
R344	321-0150-00			RES,FXD,FILM:357 OHM,1%,0.125W,TC=T0	07716	CEAD357R0F
R345	321-0210-00			RES,FXD,FILM:1.50K OHM,1%,0.125W,TC=T0	19701	5033ED1K50F
R347	321-0226-00			RES,FXD,FILM:2.21K OHM,1%,0.125W,TC=T0	01121	RNK2211F
R349	321-0222-00			RES,FXD,FILM:2.00K OHM,1%,0.125W,TC=T0	19701	5033ED2K00F
R350	315-0151-00			RES,FXD,FILM:150 OHM,5%,0.25W	57668	NTR25J-E150E
R352	315-0622-00			RES,FXD,FILM:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R354	315-0622-00			RES,FXD,FILM:6.2K OHM,5%,0.25W	19701	5043CX6K200J

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R358	321-0205-00			RES,FXD,FILM:1.33K OHM,1%,0.125W,TC=T0	19701	5033ED1K330F
R361	321-0239-00			RES,FXD,FILM:3.01K OHM,1%,0.125W,TC=T0	19701	5043ED3K010F
R363	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	19701	5043CX15K00J
R365	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	19701	5043CX15K00J
R371	321-0322-00			RES,FXD,FILM:22.1K OHM,0.1%,0.125W,TC=T0	19701	5033ED22K10F
R372	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R375	321-0306-00			RES,FXD,FILM:15.0K OHM,1%,0.125W,TC=T0	19701	5033ED15J00F
R548	323-0075-00	B010100	B010104	RES,FXD,FILM:59.0 OHM,1%,0.5W,TC=T0 (R548 OPTION 10 ONLY)	91637	CMF65116G59R00F
R549	322-0043-00	B010100	B010104	RES,FXD,FILM:27.4 OHM,1%,0.25W,TC=T0 (R549 OPTION 10 ONLY)	91637	CMF55116
R550	321-0053-02	B010100	B129999	RES,FXD,FILM:34.8 OHM,0.5%,0.125W,TC=T2	91637	CMF55116D34R80D
R552	321-0104-01	B010100	B129999	RES,FXD,FILM:118 OHM,0.5%,0.125W,TC=T0	19701	5033RD118R00
R553	321-0053-02	B010100	B129999	RES,FXD,FILM:34.8 OHM,0.5%,0.125W,TC=T2	91637	CMF55116D34R80D
R554	321-0104-01	B010100	B129999	RES,FXD,FILM:118 OHM,0.5%,0.125W,TC=T0	19701	5033RD118R00
R556	321-0053-02	B010100	B129999	RES,FXD,FILM:34.8 OHM,0.5%,0.125W,TC=T2	91637	CMF55116D34R80D
R557	321-0104-01	B010100	B129999	RES,FXD,FILM:118 OHM,0.5%,0.125W,TC=T0	19701	5033RD118R00
R558	321-0053-02	B010100	B129999	RES,FXD,FILM:34.8 OHM,0.5%,0.125W,TC=T2	91637	CMF55116D34R80D
R559	321-0104-01	B010100	B129999	RES,FXD,FILM:118 OHM,0.5%,0.125W,TC=T0	19701	5033RD118R00
R560	325-0117-00	B010100	B129999	RES,FXD,FILM:52.1 OHM,0.5%,0.05W,TC=T0	14298	CMF50-G52R10D
R562	325-0117-00	B010100	B129999	RES,FXD,FILM:52.1 OHM,0.5%,0.05W,TC=T0	14298	CMF50-G52R10D
R564	325-0117-00	B010100	B129999	RES,FXD,FILM:52.1 OHM,0.5%,0.05W,TC=T0	14298	CMF50-G52R10D
R566	325-0117-00	B010100	B129999	RES,FXD,FILM:52.1 OHM,0.5%,0.05W,TC=T0	14298	CMF50-G52R10D
R567	----- -----	B010100	B129999	(SELECTED)		
R568	----- -----	B010100	B129999	(SELECTED)		
R569	----- -----	B010100	B129999	(SELECTED)		
R570	----- -----	B010100	B129999	(SELECTED)		
R571	321-0150-00	B010100	B129999	RES,FXD,FILM:357 OHM,1%,0.125W,TC=T0	07716	CEA0357R0F
R572	321-0165-00	B010100	B129999	RES,FXD,FILM:511 OHM,1%,0.125W,TC=T0	07716	CEA0511R0F
R573	322-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.25W,TC=T0	75042	CEBT0-9090F
R574	323-0073-00	B010100	B129999	RES,FXD,FILM:56.2 OHM,1%,0.5W,TC=T0	75042	CECT0-56R20F
R575	321-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R576	321-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R577	321-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R578	321-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R579	321-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R580	321-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R581	321-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R582	321-0189-00	B010100	B129999	RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R583	322-0163-00	B010100	B129999	RES,FXD,FILM:487 OHM,1%,0.25W,TC=T0	91637	MFF1421G487R0F
R584	322-0163-00	B010100	B129999	RES,FXD,FILM:487 OHM,1%,0.25W,TC=T0	91637	MFF1421G487R0F
R585	321-0065-00	B010100	B129999	RES,FXD,FILM:46.4 OHM,1%,0.125W,TC=T0	57668	RB14FXE 46E4
R586	311-1222-00	B010100	B129999	RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3386F-T04-101
R592	317-0201-00	B010100	B129999	RES,FXD,CMPSN:200 OHM,5%,0.125W	01121	BB2015
R593	321-0070-00	B010100	B129999	RES,FXD,FILM:52.3 OHM,1%,0.125W,TC=T0	91637	CMF55116G52R30F
R594	323-0193-00	B010100	B129999	RES,FXD,FILM:1K OHM,1%,0.5W,TC=T0	75042	CECT0-1001F
R596	317-0201-00	B010100	B129999	RES,FXD,CMPSN:200 OHM,5%,0.125W	01121	BB2015
R598	321-0070-00	B010100	B129999	RES,FXD,FILM:52.3 OHM,1%,0.125W,TC=T0	91637	CMF55116G52R30F
R599	323-0193-00	B010100	B129999	RES,FXD,FILM:1K OHM,1%,0.5W,TC=T0	75042	CECT0-1001F
R602	----- -----	B010100	B119999	(SELECTED)		
R603	325-0044-00	B010100	B119999	RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R605	----- -----	B010100	B119999	(SELECTED)		
R606	325-0044-00	B010100	B119999	RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R608	----- -----	B010100	B119999	(SELECTED)		
R609	325-0044-00	B010100	B119999	RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R611	----- -----	B010100	B119999	(SELECTED)		
R612	325-0044-00	B010100	B119999	RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R613	321-0150-00	B010100	B119999	RES,FXD,FILM:357 OHM,1%,0.125W,TC=T0	07716	CEA0357R0F
R614	321-0120-00	B010100	B119999	RES,FXD,FILM:174 OHM,1%,0.125W,TC=T0	07716	CEA0174R0F

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R615	321-0147-00	B010100	B119999	RES,FXD,FILM:332 OHM,1%,0.125M,TC=T0	07716	CEAD332R0F
R616	321-0210-00	B010100	B119999	RES,FXD,FILM:1.50K OHM,1%,0.125M,TC=T0	19701	5033ED1K50F
R618	315-0302-00	B010100	B119999	RES,FXD,FILM:3K OHM,5%,0.25M	57668	NTR25J-E03K0
R619	322-0189-00	B010100	B119999	RES,FXD,FILM:909 OHM,1%,0.25M,TC=T0	75042	CEBT0-9090F
R620	315-0102-00	B010100	B119999	RES,FXD,FILM:1K OHM,5%,0.25M (NOMINAL VALUE,SELECTED)	57668	NTR25JE01K0
R621	321-0133-00	B010100	B119999	RES,FXD,FILM:237 OHM,1%,0.125M,TC=T0	07716	CEAD237R0F
R622	----- -----	B010100	B119999	(SELECTED)		
R623	315-0431-00	B010100	B119999	RES,FXD,FILM:430 OHM,5%,0.25M (NOMINAL VALUE,SELECTED)	19701	5043CX430R0J
R624	321-0133-00	B010100	B119999	RES,FXD,FILM:237 OHM,1%,0.125M,TC=T0	07716	CEAD237R0F
R625	323-0131-00	B010100	B119999	RES,FXD,FILM:226 OHM,1%,0.5M,TC=T0	75042	CECT0-2260F
R626	315-0751-00	B010100	B119999	RES,FXD,FILM:750 OHM,5%,0.25M (NOMINAL VALUE,SELECTED)	57668	NTR25J-E750E
R627	321-0133-00	B010100	B119999	RES,FXD,FILM:237 OHM,1%,0.125M,TC=T0	07716	CEAD237R0F
R628	----- -----	B010100	B119999	(SELECTED)		
R629	315-0911-00	B010100	B119999	RES,FXD,FILM:910 OHM,5%,0.25M (NOMINAL VALUE,SELECTED)	57668	NTR25J-E910E
R630	321-0133-00	B010100	B119999	RES,FXD,FILM:237 OHM,1%,0.125M,TC=T0	07716	CEAD237R0F
R631	323-0131-00	B010100	B119999	RES,FXD,FILM:226 OHM,1%,0.5M,TC=T0	75042	CECT0-2260F
R632	315-0751-00	B010100	B119999	RES,FXD,FILM:750 OHM,5%,0.25M (NOMINAL VALUE,SELECTED)	57668	NTR25J-E750E
R633	321-0133-00	B010100	B119999	RES,FXD,FILM:237 OHM,1%,0.125M,TC=T0	07716	CEAD237R0F
R634	----- -----	B010100	B119999	(SELECTED)		
R635	315-0911-00	B010100	B119999	RES,FXD,FILM:910 OHM,5%,0.25M (NOMINAL VALUE,SELECTED)	57668	NTR25J-E910E
R636	321-0133-00	B010100	B119999	RES,FXD,FILM:237 OHM,1%,0.125M,TC=T0	07716	CEAD237R0F
R637	323-0131-00	B010100	B119999	RES,FXD,FILM:226 OHM,1%,0.5M,TC=T0	75042	CECT0-2260F
R638	315-0102-00	B010100	B119999	RES,FXD,FILM:1K OHM,5%,0.25M (NOMINAL VALUE,SELECTED)	57668	NTR25JE01K0
R639	321-0133-00	B010100	B119999	RES,FXD,FILM:237 OHM,1%,0.125M,TC=T0	07716	CEAD237R0F
R640	----- -----	B010100	B119999	(SELECTED)		
R641	315-0431-00	B010100	B119999	RES,FXD,FILM:430 OHM,5%,0.25M (NOMINAL VALUE,SELECTED)	19701	5043CX430R0J
R642	321-0133-00	B010100	B119999	RES,FXD,FILM:237 OHM,1%,0.125M,TC=T0	07716	CEAD237R0F
R643	323-0131-00	B010100	B119999	RES,FXD,FILM:226 OHM,1%,0.5M,TC=T0	75042	CECT0-2260F
R644	317-0101-00	B040000	B119999	RES,FXD,CMPSN:100 OHM,5%,0.125M (NOMINAL VALUE,SELECTED)	01121	BB1015
R646	----- -----	B010100	B119999	(SELECTED)		
R657	317-0270-00			RES,FXD,CMPSN:27 OHM,5%,0.125M	01121	BB2705
R658	311-0605-01			RES,VAR,NONWW:TRMR,200 OHM,0.5M	73138	82PR200-3D
R659	317-0270-00			RES,FXD,CMPSN:27 OHM,5%,0.125M	01121	BB2705
R660	324-0114-00			RES,FXD,FILM:150 OHM,1%,1M,TC=T0	91637	MFF114G150R0F
R661	324-0114-00			RES,FXD,FILM:150 OHM,1%,1M,TC=T0	91637	MFF114G150R0F
R662	321-0039-00			RES,FXD,FILM:24.9 OHM,1%,0.125M,TC=T0	91637	CMF55116G24R90F
R663	321-0039-00			RES,FXD,FILM:24.9 OHM,1%,0.125M,TC=T0	91637	CMF55116G24R90F
R667	315-0561-00	B010100	B179999	RES,FXD,FILM:560 OHM,5%,0.25M	19701	5043CX560R0J
R667	315-0911-00	B180000		RES,FXD,FILM:910 OHM,5%,0.25M	57668	NTR25J-E910E
R668	315-0561-00	B010100	B179999	RES,FXD,FILM:560 OHM,5%,0.25M	19701	5043CX560R0J
R668	315-0911-00	B180000		RES,FXD,FILM:910 OHM,5%,0.25M	57668	NTR25J-E910E
R670	317-0047-00			RES,FXD,CMPSN:4.7 OHM,5%,0.125M	01121	BB47G5
R672	317-0047-00			RES,FXD,CMPSN:4.7 OHM,5%,0.125M	01121	BB47G5
R676	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125M	01121	BB1015
R677	323-0069-00			RES,FXD,FILM:51.1 OHM,1%,0.5M,TC=T0	19701	5053R051R10F
R679	323-0069-00			RES,FXD,FILM:51.1 OHM,1%,0.5M,TC=T0	19701	5053R051R10F
R680	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125M	01121	BB1015
R682	323-0121-00			RES,FXD,FILM:178 OHM,1%,0.5M,TC=T0	19701	5053R0178R0F
R684	----- -----			(SELECTED)		
R685	315-0820-00			RES,FXD,FILM:82 OHM,5%,0.25M	57668	NTR25J-E82E0
R686	315-0820-00			RES,FXD,FILM:82 OHM,5%,0.25M	57668	NTR25J-E82E0

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R688	----- -----			(SELECTED)		
R689	323-0121-00			RES,FXD,FILM:178 OHM,1%,0.5W,TC=T0	19701	5053RD178R0F
R691	321-0068-00			RES,FXD,FILM:49.9 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G49R90F
R693	321-0126-00			RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R694	315-0911-00			RES,FXD,FILM:910 OHM,5%,0.25W	57668	NTR25J-E910E
R695	321-0058-00			RES,FXD,FILM:39.2 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G39R20F
R697	321-0058-00			RES,FXD,FILM:39.2 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G39R20F
R698	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	19701	5043CX51R00J
R700	315-0911-00			RES,FXD,FILM:910 OHM,5%,0.25W	57668	NTR25J-E910E
R701	321-0126-00			RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R703	315-0303-00			RES,FXD,FILM:30K OHM,5%,0.25W	19701	5043CX30K00J
R704	315-0621-00			RES,FXD,FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R706	321-0237-00			RES,FXD,FILM:2.87K OHM,1%,0.125W,TC=T0	07716	CEA0 28700F
R707	311-1259-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3329P-L58-101
R708	321-0114-00			RES,FXD,FILM:150 OHM,1%,0.125 W,TC=T0	19701	5033ED150R0F
R709	321-0114-00			RES,FXD,FILM:150 OHM,1%,0.125 W,TC=T0	19701	5033ED150R0F
R711	321-0201-00			RES,FXD,FILM:1.21K OHM,1%,0.125W,TC=T0	19701	5043ED1K210F
R712	311-0532-00			RES,VAR,MM:TRMR,1.5K OHM,1W	75042	100-0000-152
R713	321-0201-00			RES,FXD,FILM:1.21K OHM,1%,0.125W,TC=T0	19701	5043ED1K210F
R715	321-0123-00			RES,FXD,FILM:187 OHM,1%,0.125W, TC=T0	07716	CEAD187R0F
R717	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R718	321-0126-00			RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R719	321-0191-00			RES,FXD,FILM:953 OHM,1%,0.125W,TC=T0	07716	CEAD953R0F
R721	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R722	321-0117-00			RES,FXD,FILM:162 OHM,1%,0.125W,TC=T0	07716	CEAD162R0F
R724	323-0164-00	B010100	B179999	RES,FXD,FILM:499 OHM,1%,0.5W,TC=T0	75042	CECT0-4990F
R724	323-0147-00	B180000		RES,FXD,FILM:332 OHM,1%,0.5W,TC=T0	75042	CECT0-3320F
R725	323-0164-00	B010100	B179999	RES,FXD,FILM:499 OHM,1%,0.5W,TC=T0	75042	CECT0-4990F
R725	323-0147-00	B180000		RES,FXD,FILM:332 OHM,1%,0.5W,TC=T0	75042	CECT0-3320F
R726	323-0090-00	B180000		RES,FXD,FILM:84.5 OHM,1%,0.5W,TC=T0	91637	CMF65116G84R0F
R727	321-0055-00	B010100	B179999	RES,FXD,FILM:36.5 OHM,0.5%,0.125W,TC=T0 MI	57668	RB14FXE 36E5
R727	321-0056-00	B180000		RES,FXD,FILM:37.4 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G37R40F
R730	311-0622-01			RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3329H-K28-101
R732	317-0470-00			RES,FXD,CMPSN:47 OHM,5%,0.125W	01121	BB4705
R733	317-0470-00	B070000		RES,FXD,CMPSN:47 OHM,5%,0.125W	01121	BB4705
R734	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125W	01121	BB1015
R735	323-0069-00			RES,FXD,FILM:51.1 OHM,1%,0.5W,TC=T0	19701	5053RD51R10F
R736	317-0101-00	B070000		RES,FXD,CMPSN:100 OHM,5%,0.125W	01121	BB1015
R737	323-0069-00			RES,FXD,FILM:51.1 OHM,1%,0.5W,TC=T0	19701	5053RD51R10F
R738	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125W	01121	BB1015
R741				(SELECTED)		
R743	311-1261-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3329P-L58-501
R745	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W (NOMINAL VALUE,SELECTED)	57668	NTR25J-E470E
R747	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W (NOMINAL VALUE,SELECTED)	57668	NTR25J-E470E
R749	311-0635-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3329H-G48-102
R751	311-1265-00	B180000		RES,VAR,NONWW:TRMR,2K OHM,0.5W	32997	3329P-L58-202
R753	323-0097-00			RES,FXD,FILM:100 OHM,1%,0.5W,TC=T0	91637	CMF65116G100R0F
R754	323-0097-00			RES,FXD,FILM:100 OHM,1%,0.5W,TC=T0	91637	CMF65116G100R0F
R756	----- -----			(SELECTED)		
R758	311-1261-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3329P-L58-501
R760	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W (NOMINAL VALUE,SELECTED)	57668	NTR25J-E680E
R762	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W (NOMINAL VALUE,SELECTED)	57668	NTR25J-E470E
R764	311-1265-00			RES,VAR,NONWW:TRMR,2K OHM,0.5W	32997	3329P-L58-202
R767	323-0097-00			RES,FXD,FILM:100 OHM,1%,0.5W,TC=T0	91637	CMF65116G100R0F
R768	323-0097-00			RES,FXD,FILM:100 OHM,1%,0.5W,TC=T0	91637	CMF65116G100R0F

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R770	308-0692-00			RES,FXD,WW:44 OHM,1%,3W	00213	1240S 44 OHM 1
R771	323-0112-00	B010100	B192279	RES,FXD,FILM:143 OHM,1%,0.5W,TC=T0	19701	5033RD143R0F
R771	323-0119-00	B192280		RES,FXD,FILM:169 OHM,1%,0.5W,TC=T0	75042	CECT0-1690F
R775	315-0182-00			RES,FXD,FILM:1.8K OHM,5%,0.25W	57668	NTR25J-E1K8
R778	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W	57668	NTR25J-E470E
R782	307-0292-00			RES,FXD,FILM:182.5 OHM (R782 IS PART OF THE CRT ASSY AND IS SELECTED AT THE FACTORY TO MATCH THE IMPEDANCE OF THE CRT VERTICAL DEFLECTION PLATES. R782 MAY BE PURCHASED SEPARATELY. ORDER THE TEK P/N PRINTED ON THE RESISTOR.)	80009	307-0292-00
R783	321-0324-00	B100000		RES,FXD,FILM:23.2K OHM,1%,0.125W,TC=T0	07716	CEAD23201F
R784	321-0289-00	B100000		RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5033ED10K0F
R785	315-0472-00	B100000		RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R786	315-0362-00	B100000		RES,FXD,FILM:3.6K OHM,5%,0.25W	19701	5043CX3K600J
R788	315-0103-00	B080000	B099999	RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R789	315-0362-00	B180000		RES,FXD,FILM:3.6K OHM,5%,0.25W	19701	5043CX3K600J
R790	323-0064-00			RES,FXD,FILM:45.3 OHM,1%,0.5W,TC=T0	07716	CECD45R30F
R792	323-0064-00			RES,FXD,FILM:45.3 OHM,1%,0.5W,TC=T0	07716	CECD45R30F
R795	323-0077-00			RES,FXD,FILM:61.9 OHM,1%,0.5W,TC=T0	75042	CECT0-61R90F
R796	323-0143-00			RES,FXD,FILM:301 OHM,1%,0.5W,TC=T0	19701	5053RD301R0F
R797	321-0063-00			RES,FXD,FILM:44.2 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G44R20F
R799	308-0248-00			RES,FXD,WW:150 OHM,1%,5W	83777	BL5A-150PD
R821	321-1068-01			RES,FXD,FILM:50.5 OHM,0.5%,0.125W,TC=T0	57668	RB14 DXE 50E5
R823	321-1068-01			RES,FXD,FILM:50.5 OHM,0.5%,0.125W,TC=T0	57668	RB14 DXE 50E5
R835	321-0088-00			RES,FXD,FILM:80.6 OHM,1%,0.125W,TC=T0	91637	CMF55116G80R60F
R836	321-0088-00			RES,FXD,FILM:80.6 OHM,1%,0.125W,TC=T0	91637	CMF55116G80R60F
R837	323-0187-00			RES,FXD,FILM:866 OHM,1%,0.5W,TC=T0	19701	5053RD866R0F
R839	321-0218-00			RES,FXD,FILM:1.82K OHM,1%,0.125W,TC=T0	19701	5033ED1K82F
R846	315-0153-00	B010100	B149999	RES,FXD,FILM:15K OHM,5%,0.25W (R846 STANDARD ONLY)	19701	5043CX15K00J
R846	315-0203-00	B010100	B010104	RES,FXD,FILM:20K OHM,5%,0.25W (R846 OPTION 10 ONLY)	57668	NTR25J-E 20K
R846	315-0153-00	B010105	B149999	RES,FXD,FILM:15K OHM,5%,0.25W (R846 OPTION 10 ONLY)	19701	5043CX15K00J
R850	321-0248-00	B010100	B149999	RES,FXD,FILM:3.74K OHM,1%,0.125W,TC=T0 (R850 STANDARD ONLY)	19701	5043ED3K740F
R850	321-0253-00	B010100	B010104	RES,FXD,FILM:4.22K OHM,1%,0.125W,TC=T0 (R850 OPTION 10 ONLY)	19701	5033ED 4K 220F
R850	321-0248-00	B010105	B149999	RES,FXD,FILM:3.74K OHM,1%,0.125W,TC=T0 (R850 OPTION 10 ONLY)	19701	5043ED3K740F
R851	321-0202-00	B010100	B149999	RES,FXD,FILM:1.24K OHM,1%,0.125W,TC=T0 (R851 STANDARD ONLY)	24546	NA55D1241F
R851	321-0207-00	B010100	B010104	RES,FXD,FILM:1.40K OHM,1%,0.125W,TC=T0 (R851 OPTION 10 ONLY)	19701	5033ED1K400F
R851	321-0202-00	B010105	B149999	RES,FXD,FILM:1.24K OHM,1%,0.125W,TC=T0 (R851 OPTION 10 ONLY)	24546	NA55D1241F
R853	321-0073-00	B010100	B149999	RES,FXD,FILM:56.2 OHM,1%,0.125W,TC=T0 (R853 STANDARD ONLY)	57668	RB14FXE 56E2
R853	321-0072-00	B010100	B010104	RES,FXD,FILM:54.9 OHM,1%,0.125W,TC=T0 (R853 OPTION 10 ONLY)	91637	CMF55116G54R90F
R853	321-0073-00	B010105	B149999	RES,FXD,FILM:56.2 OHM,1%,0.125W,TC=T0 (R853 OPTION 10 ONLY)	57668	RB14FXE 56E2
R854	322-0187-00	B010100	B149999	RES,FXD,FILM:866 OHM,1%,0.25W,TC=T0 (R854 STANDARD ONLY)	19701	5043RD866R0F
R854	322-0189-00	B010100	B010104	RES,FXD,FILM:909 OHM,1%,0.25W,TC=T0 (R854 OPTION 10 ONLY)	75042	CEBT0-9090F
R854	322-0187-00	B010105	B149999	RES,FXD,FILM:866 OHM,1%,0.25W,TC=T0 (R854 OPTION 10 ONLY)	19701	5043RD866R0F
R855	321-0216-00	B010100	B149999	RES,FXD,FILM:1.74K OHM,1%,0.125W,TC=T0	07716	CEAD17400F
R856	321-0076-00	B010100	B149999	RES,FXD,FILM:60.4 OHM,1%,0.125W,TC=T0	91637	CMF55116G0R40F
R858	321-0151-00	B010100	B149999	RES,FXD,FILM:365 OHM,1%,0.125W,TC=T0	07716	CEAD365R0F

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R859	315-0242-00	B010100	B149999	RES,FXD,FILM:2.4K OHM,5%,0.25W	57668	NTR25J-E02K4
R860	322-0212-00	B010100	B149999	RES,FXD,FILM:1.5,K OHM,1%,0.25W,TC=T0	75042	CEBT0-1581F
R861	315-0100-00	B010100	B149999	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R862	315-0301-00	B010100	B149999	RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R864	315-0562-00	B010100	B149999	RES,FXD,FILM:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R865	315-0100-00	B010100	B149999	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R866	323-0175-00	B010100	B149999	RES,FXD,FILM:649 OHM,1%,0.5W,TC=T0	75042	CECT0-6490F
R867	321-0127-00	B010100	B149999	RES,FXD,FILM:205 OHM,1%,0.125W,TC=T0	07716	CEAD205R0F
R868	311-1221-00	B010100	B149999	RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3386F-T04-500
R869	321-0127-00	B010100	B149999	RES,FXD,FILM:205 OHM,1%,0.125W,TC=T0	07716	CEAD205R0F
R870	311-0635-00	B010100	B149999	RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3329H-G48-102
R871	321-0100-00	B010100	B039999	RES,FXD,FILM:107 OHM,1%,0.125W,TC=T0	07716	CEAD107R0F
R871	321-0106-00	B040000	B149999	RES,FXD,FILM:124 OHM 1%,0.125W,TC=T0	07716	CEAD124R0F
R872	311-1221-00	B010100	B149999	RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3386F-T04-500
R874	315-0511-00	B010100	B149999	RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R875	315-0100-00	B010100	B149999	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R876	321-0335-00	B010100	B149999	RES,FXD,FILM:30.1K OHM,1%,0.125W,TC=T0	57668	R814FXE30K1
R878	321-0237-00	B010100	B149999	RES,FXD,FILM:2.87K OHM,1%,0.125W,TC=T0	07716	CEAD 28700F
R879	321-0237-00	B010100	B149999	RES,FXD,FILM:2.87K OHM,1%,0.125W,TC=T0	07716	CEAD 28700F
R883	315-0473-00	B010100	B149999	RES,FXD,FILM:47K OHM,5%,0.25W	57668	NTR25J-E47K0
R884	315-0101-00	B010100	B149999	RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R885	322-0210-00	B010100	B149999	RES,FXD,FILM:1.50K OHM,1%,0.25W,TC=T0	75042	CEBT0-1501F
R887	301-0103-00	B010100	B149999	RES,FXD,FILM:10K OHM,5%,0.50W	19701	5053CX10K00J
R888	315-0100-00	B010100	B149999	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R889	306-0332-00	B010100	B149999	RES,FXD,CMPSN:3.3K OHM,10%,2W	01121	HB3321
R893	315-0473-00	B010100	B149999	RES,FXD,FILM:47K OHM,5%,0.25W	57668	NTR25J-E47K0
R894	315-0101-00	B010100	B149999	RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R895	322-0210-00	B010100	B149999	RES,FXD,FILM:1.50K OHM,1%,0.25W,TC=T0	75042	CEBT0-1501F
R897	301-0103-00	B010100	B149999	RES,FXD,FILM:10K OHM,5%,0.50W	19701	5053CX10K00J
R898	315-0100-00	B010100	B149999	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R899	306-0332-00	B010100	B149999	RES,FXD,CMPSN:3.3K OHM,10%,2W	01121	HB3321
R901	315-0470-00	B010100	B149999	RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R903	315-0162-00	B010100	B149999	RES,FXD,FILM:1.6K OHM,5%,0.25W	19701	5043CX1K600J
R905	301-0822-00	B010100	B149999	RES,FXD,FILM:8.2K OHM,5%,0.5W	19701	5053CX8K200J
R906	311-0643-00	B010100	B149999	RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3329H-L58-500
R907	301-0822-00	B010100	B149999	RES,FXD,FILM:8.2K OHM,5%,0.5W	19701	5053CX8K200J
R908	315-0470-00	B010100	B149999	RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R909	307-0103-00	B010100	B149999	RES,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R910	315-0332-00	B010100	B149999	RES,FXD,FILM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R912	307-0109-00	B010100	B149999	RES,FXD,CMPSN:8.2 OHM,5%,0.25W	80009	307-0109-00
R913	315-0432-00	B010100	B149999	RES,FXD,FILM:4.3K OHM,5%,0.25W	57668	NTR25J-E04K3
R914	315-0392-00	B010100	B149999	RES,FXD,FILM:3.9K OHM,5%,0.25W	57668	NTR25J-E03K9
R915	301-0333-00	B010100	B149999	RES,FXD,FILM:33K OHM,5%,0.5W	19701	5053CX33K00J
R917	315-0470-00	B010100	B149999	RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R920	315-0622-00	B010100	B149999	RES,FXD,FILM:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R921	315-0102-00	B010100	B149999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R924	315-0100-00	B010100	B149999	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R926	322-0356-00	B010100	B049999	RES,FXD,FILM:49.9K OHM,1%,0.25W,TC=T0	75042	CEBT0-4992F
R926	325-0176-00	B050000	B149999	RES,FXD,FILM:49.9K OHM,1%,0.25W,TC=T0	03888	PME60G49901F
R927	321-0260-00	B010100	B149999	RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
R928	315-0102-00	B010100	B149999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R929	321-0260-00	B010100	B149999	RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
R933	315-0622-00	B010100	B149999	RES,FXD,FILM:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R934	315-0102-00	B010100	B149999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R937	315-0470-00	B010100	B149999	RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R940	301-0333-00	B010100	B149999	RES,FXD,FILM:33K OHM,5%,0.5W	19701	5053CX33K00J
R941	315-0392-00	B010100	B149999	RES,FXD,FILM:3.9K OHM,5%,0.25W	57668	NTR25J-E03K9
R942	315-0432-00	B010100	B149999	RES,FXD,FILM:4.3K OHM,5%,0.25W	57668	NTR25J-E04K3
R943	315-0100-00	B010100	B149999	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J

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R944	315-0100-00	B010100	B149999	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R946	322-0356-00	B010100	B049999	RES,FXD,FILM:49.9K OHM,1%,0.25W,TC=T0	75042	CEBT0-4992F
R946	325-0176-00	B050000	B149999	RES,FXD,FILM:49.9K OHM,1%,0.25W,TC=T0	03888	PME60G49901F
R947	321-0339-00	B010100	B149999	RES,FXD,FILM:33.2K OHM,1%,0.125W,TC=T0	07716	CEAD33201F
R948	315-0102-00	B010100	B149999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R949	321-0260-00	B010100	B149999	RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
R990	315-0390-00	B010100	B149999	RES,FXD,FILM:39 OHM,5%,0.25W	57668	NTR25J-E39E0
R998	315-0390-00	B010100	B149999	RES,FXD,FILM:39 OHM,5%,0.25W	57668	NTR25J-E39E0
R1001	315-0910-00	B010100	B129999	RES,FXD,FILM:91 OHM,5%,0.25W	19701	5043CX91R00J
R1003	321-0064-00	B010100	B129999	RES,FXD,FILM:45.3 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G45R30F
R1005	321-0064-00	B010100	B129999	RES,FXD,FILM:45.3 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G45R30F
R1010	315-0680-00	B010100	B129999	RES,FXD,FILM:68 OHM,5%,0.25W	57668	NTR25J-E68E0
R1011	315-0470-00	B010100	B129999	RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R1012	315-0680-00	B010100	B129999	RES,FXD,FILM:68 OHM,5%,0.25W	57668	NTR25J-E68E0
R1013	311-1221-00	B010100	B129999	RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3386F-T04-500
R1014	315-0910-00	B010100	B129999	RES,FXD,FILM:91 OHM,5%,0.25W	19701	5043CX91R00J
R1017	321-0174-00	B010100	B129999	RES,FXD,FILM:634 OHM,1%,0.125W,TC=T0	07716	CEAD634R0F
R1018	315-0200-00	B010100	B129999	RES,FXD,FILM:20 OHM,5%,0.25W	19701	5043CX20R00J
R1019	321-0169-00	B010100	B129999	RES,FXD,FILM:562 OHM,1%,0.125W,TC=T0	07716	CEAD562R0F
R1021	315-0820-00	B010100	B129999	RES,FXD,FILM:82 OHM,5%,0.25W	57668	NTR25J-E82E0
R1022	315-0200-00	B010100	B129999	RES,FXD,FILM:20 OHM,5%,0.25W	19701	5043CX20R00J
R1023	315-0470-00	B010100	B129999	RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R1025	321-0220-00	B010100	B129999	RES,FXD,FILM:1.91K OHM,1%,0.125W,TC=T0	19701	5033ED1K91F
R1026	321-0220-00	B010100	B129999	RES,FXD,FILM:1.91K OHM,1%,0.125W,TC=T0	19701	5033ED1K91F
R1027	315-0470-00	B010100	B129999	RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R1031	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1032	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R1034	321-0269-00			RES,FXD,FILM:6.19K OHM,1%,0.125W,TC=T0	07716	CEAD61900F
R1036	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	57668	NTR25J-E06K8
R1037	322-0275-00			RES,FXD,FILM:7.15K OHM,1%,0.25W,TC=T0	75042	CEBT0-7151F
R1038	307-0103-00			RES,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
R1040	315-0150-00			RES,FXD,FILM:15 OHM,5%,0.25W	19701	5043CX15R00J
R1041	321-0265-00			RES,FXD,FILM:5.62K OHM,1%,0.125W,TC=T0 (R1041 STANDARD ONLY)	19701	5043ED5K620F
R1041	321-0264-00	B010100	B010104	RES,FXD,FILM:5.49K OHM,1%,0.125W,TC=T0 (R1041 OPTION 10 ONLY)	07716	CEAD54900C
R1041	321-0265-00	B010105		RES,FXD,FILM:5.62K OHM,1%,0.125W,TC=T0 (R1041 OPTION 10 ONLY)	19701	5043ED5K620F
R1043	315-0132-00			RES,FXD,FILM:1.3K OHM,5%,0.25W	57668	NTR25J-E01K3
R1044	315-0432-00			RES,FXD,FILM:4.3K OHM,5%,0.25W	57668	NTR25J-E04K3
R1045	321-0186-00			RES,FXD,FILM:845 OHM,1%,0.125W,TC=T0 (R1045 STANDARD ONLY)	19701	5043ED845R0F
R1045	321-0191-00	B010100	B010104	RES,FXD,FILM:953 OHM,1%,0.125W,TC=T0 (R1045 OPTION 10 ONLY)	07716	CEAD953R0F
R1045	321-0186-00	B010105		RES,FXD,FILM:845 OHM,1%,0.125W,TC=T0 (R1045 OPTION 10 ONLY)	19701	5043ED845R0F
R1046	315-0620-00			RES,FXD,FILM:62 OHM,5%,0.25W	19701	5043CX63R00J
R1047	301-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.5W	19701	5053CX1K500J
R1051	321-0141-00			RES,FXD,FILM:287 OHM,1%,0.125W,TC=T0	19701	5033ED287R0F
R1052	321-0303-00			RES,FXD,FILM:14.0K OHM,1%,0.125W,TC=T0	07716	CEAD 14001F
R1055	321-0141-00			RES,FXD,FILM:287 OHM,1%,0.125W,TC=T0	19701	5033ED287R0F
R1057	321-0303-00			RES,FXD,FILM:14.0K OHM,1%,0.125W,TC=T0	07716	CEAD 14001F
R1058	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1059	301-0470-00			RES,FXD,FILM:47 OHM,5%,0.5W	19701	5053CX47R00J
R1061	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	57668	NTR25J-E330E
R1063	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1064	321-0193-00			RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R1065	321-0138-00			RES,FXD,FILM:267 OHM,1%,0.125W,TC=T0	07716	CEAD267R0F
R1066	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R1067	315-0222-00			RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2

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R1068	315-0330-00			RES,FXD,FILM:33 OHM,5%,0.25W	19701	5043CX33R00J
R1069	321-0189-00			RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R1071	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	19701	5043CX22R00J
R1075	323-0160-00			RES,FXD,FILM:453 OHM,1%,0.5W,TC=T0	19701	5053RD453R0F
R1101	311-1251-00			RES,VAR,NONWW:TRMR,200K OHM,0.25W (R1101 STANDARD ONLY)	32997	3386F-T06-204
R1101	321-0364-00			RES,FXD,FILM:60.4K OHM,1%,0.125W,TC=T0 (R1101 OPTION 10 ONLY)	19701	5043ED60K40F
R1102	315-0273-00			RES,FXD,FILM:27K OHM,5%,0.25W (R1102 STANDARD ONLY)	57668	NTR25J-E27K0
R1102	321-0364-00			RES,FXD,FILM:60.4K OHM,1%,0.125W,TC=T0 (R1102 OPTION 10 ONLY)	19701	5043ED60K40F
R1103	321-0285-00			RES,FXD,FILM:9.09K OHM,1%,0.125W,TC=T0 (R1103 STANDARD ONLY)	07716	CEA090900F
R1103	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W (R1103 OPTION 10 ONLY)	57668	NTR25JE01K0
R1104	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W (R1104 OPTION 10 ONLY)	19701	5043CX10K00J
R1105	321-0273-00			RES,FXD,FILM:6.81K OHM,1%,0.125W,TC=T0 (R1105 STANDARD ONLY)	07716	CEA068100F
R1107	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W (R1107 STANDARD ONLY)	57668	NTR25JE01K0
R1107	316-0332-00	B010100	B192099	RES,FXD,CMPSN:3.3K OHM,10%,025W (R1107 OPTION 10 ONLY)	01121	CB3321
R1107	315-0332-00	B192100		RES,FXD,FILM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R1108	315-0681-00	B010100	B010104	RES,FXD,FILM:680 OHM,5%,0.25W (R1108 OPTION 10 ONLY)	57668	NTR25J-E680E
R1108	315-0432-00	B010105		RES,FXD,FILM:4.3K OHM,5%,0.25W (R1108 OPTION 10 ONLY)	57668	NTR25J-E04K3
R1109	315-0182-00			RES,FXD,FILM:1.8K OHM,5%,0.25W (R1109 STANDARD ONLY)	57668	NTR25J-E1K8
R1111	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W (R1111 OPTION 10 ONLY)	19701	5043CX10K00J
R1112	315-0101-00	B010100	B010104	RES,FXD,FILM:100 OHM,5%,0.25W (R1112 OPTION 10 ONLY)	57668	NTR25J-E 100E
R1112	307-0106-00	B010105		RES,FXD,CMPSN:4.7 OHM,5%,0.25W (R1112 OPTION 10 ONLY)	01121	CB 47G5
R1113	321-1188-06			RES,FXD,FILM:898 OHM,0.25%,0.125W,TC=T9 (R1113 STANDARD ONLY)	19701	5033RE898R0C
R1113	316-0106-00	B010100	B192099	RES,FXD,CMPSN:10M OHM,10%,0.25W (R1113 OPTION 10 ONLY)	01121	CB1061
R1113	315-0106-00	B192100		RES,FXD,FILM:10M OHM,5%,0.25W	01121	CB1065
R1115	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W (R1115 STANDARD ONLY)	57668	NTR25J-E470E
R1115	315-0184-00	B010100	B010104	RES,FXD,FILM:180K OHM,5%,0.25W (R1115 OPTION 10 ONLY)	19701	5043CX180K0J
R1115	316-0683-00	B010105	B192099	RES,FXD,CMPSN:68K OHM,10%,0.25W (R1115 OPTION 10 ONLY)	01121	CB6831
R1115	315-0683-00	B192100		RES,FXD,FILM:68K OHM,5%,0.25W	57668	NTR25J-E68K0
R1117	321-0197-00			RES,FXD,FILM:1.10K OHM,1%,0.125W,TC=T0 (R1117 STANDARD ONLY)	07716	CEA011000F
R1119	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W (R1119 STANDARD ONLY)	57668	NTR25JE01K0
R1120	316-0473-00	B010100	B192099	RES,FXD,CMPSN:47K OHM,10%,0.25W (R1120 OPTION 10 ONLY)	01121	CB4731
R1120	315-0473-00	B192100		RES,FXD,FILM:47K OHM,5%,0.25W	57668	NTR25J-E47K0
R1121	315-0822-00			RES,FXD,FILM:8.2K OHM,5%,0.25W (R1121 STANDARD ONLY)	19701	5043CX8K200J
R1122	316-0472-00	B010100	B192099	RES,FXD,CMPSN:4.7K OHM,10%,0.25W (R1122 OPTION 10 ONLY)	01121	CB4721
R1122	315-0472-00	B192100		RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R1123	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W (R1123 STANDARD ONLY)	57668	NTR25J-E01K5

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R1124	315-0223-00			RES,FXD,FILM:22K OHM,5%,0.25W (R1124 OPTION 10 ONLY)	19701	5043CX22K00J92U
R1125	321-0367-00			RES,FXD,FILM:64.9K OHM,1%,0.125W,TC=T0 (R1125 STANDARD ONLY)	07716	CEAD64901F
R1127	321-0372-00			RES,FXD,FILM:73.2K OHM,1%,0.125W,TC=T0 (R1127 STANDARD ONLY)	07716	CEAD73201F
R1127	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W (R1127 OPTION 10 ONLY)	57668	NTR25J-E 2K
R1128	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W (R1128 OPTION 10 ONLY)	57668	NTR25J-E 2K
R1129	311-1224-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W (R1129 STANDARD ONLY)	32997	3386F-T04-501
R1130	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W (R1130 OPTION 10 ONLY)	19701	5043CX15K00J
R1131	321-0245-00			RES,FXD,FILM:3.48K OHM,1%,0.125W,TC=T0 (R1131 STANDARD ONLY)	19701	5033ED3K48F
R1131	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W (R1131 OPTION 10 ONLY)	57668	NTR25JE01K0
R1132	321-0287-00			RES,FXD,FILM:9.53K OHM,1%,0.125W,TC=T0 (R1132 STANDARD ONLY)	19701	5033ED9K530F
R1134	311-1283-00	B010100	B039999	RES,VAR,NONWW:TRMR,10K OHM,0.5W (R1134 OPTION 10 ONLY)	32997	3329S-L58-103
R1134	311-1548-00	B040000		RES,VAR,NONWW:TRMR,5K OHM,0.75W (R1134 OPTION 10 ONLY)	02111	43P502T636
R1135	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W (R1135 STANDARD ONLY)	19701	5043CX27R00J
R1136	321-0815-07			RES,FXD,FILM:4.1K OHM,0.1%,0.125W,TC=T9 (R1136 STANDARD ONLY)	19701	5033RE4K100B
R1138	321-0812-07			RES,FXD,FILM:455 OHM,0.1%,0.125W,TC=T9 (R1138 STANDARD ONLY)	19701	5033RE455R0B
R1139	321-0811-07			RES,FXD,FILM:56.3 OHM,0.1%,0.125W,TC=T9 (R1139 STANDARD ONLY)	57668	RB14BZE 56E3
R1140	321-0773-03			RES,FXD,FILM:400 OHM,0.25%,0.125W,TC=T2 (R1140 STANDARD ONLY)	19701	5033RC400R0C
R1140	316-0100-00	B010100	B192099	RES,FXD,CMPSN:10 OHM,10%,0.25W (R1140 OPTION 10 ONLY)	01121	CB1001
R1140	315-0100-00	B192100		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R1141	321-0813-07			RES,FXD,FILM:495 OHM,0.1%,0.125W,TC=T9 (R1141 STANDARD ONLY)	19701	5033RE4950B
R1141	316-0106-00	B010100	B192099	RES,FXD,CMPSN:10M OHM,10%,0.25W	01121	CB1061
R1141	315-0106-00	B192100		RES,FXD,FILM:10M OHM,5%,0.25W (R1141 OPTION 10 ONLY)	01121	CB1065
R1142	321-0810-07			RES,FXD,FILM:55 OHM,0.1%,0.125W,TC=T9 (STANDARD ONLY)	57668	RB14BZE 55E
R1142	315-0105-00	B202663		RES,FXD,FILM:1M OHM,5%,0.25W (OPTION 10 ONLY)	19701	5043CX1M000J
R1143	321-0773-03			RES,FXD,FILM:400 OHM,0.25%,0.125W,TC=T2 (R1143 STANDARD ONLY)	19701	5033RC400R0C
R1144	321-0816-07			RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9 (R1144 STANDARD ONLY)	19701	5033RE5K000B
R1144	316-0473-00	B010100	B192099	RES,FXD,CMPSN:47K OHM,10%,0.25W	01121	CB4731
R1144	315-0473-00	B192100		RES,FXD,FILM:47K OHM,5%,0.25W (R1144 OPTION 10 ONLY)	57668	NTR25J-E47K0
R1145	321-1068-07			RES,FXD,FILM:50.5 OHM,0.1%,0.125W,TC=T9 (R1145 STANDARD ONLY)	57668	RB14 BZE 50E5
R1146	316-0472-00	B010100	B192099	RES,FXD,CMPSN:4.7K OHM,10%,0.25W	01121	CB4721
R1146	315-0472-00	B192100		RES,FXD,FILM:4.7K OHM,5%,0.25W (R1146 OPTION 10 ONLY)	57668	NTR25J-E04K7
R1147	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W (R1147 STANDARD ONLY)	19701	5043CX10RR00J
R1151	311-1282-00	B010100	B039999	RES,VAR,NONWW:TRMR,5K OHM,0.5W (R1151 OPTION 10 ONLY)	32997	3329S-L58-502
R1151	311-1548-00	B040000		RES,VAR,NONWW:TRMR,5K OHM,0.75W	02111	43P502T636

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				(R1151 OPTION 10 ONLY)		
R1164	315-0120-00			RES,FXD,FILM:12 OHM,5%,0.25W	57668	NTR25J-R12
				(R1164 STANDARD ONLY)		
R1164	315-0150-00	B010100	B010104	RES,FXD,FILM:15 OHM,5%,0.25W	19701	5043CX15R00J
				(R1164 OPTION 10 ONLY)		
R1164	315-0120-00	B010105		RES,FXD,FILM:12 OHM,5%,0.25W	57668	NTR25J-R12
				(R1164 OPTION 10 ONLY)		
R1167	311-1476-00			RES,VAR,NONWW:PNL,10K OHM,1W	80009	311-1476-00
				(R1167 STANDARD ONLY)		
R1167	311-1474-00			RES,VAR,NONWW:PNL,10K OHM,1W,W/SW	01121	11W084
				(R1167 OPT 10 ONLY. FURN AS A UNIT WITH S1)		
R1171	311-1479-00			RES,VAR,NONWW:PNL,5K OHM,1W,W/SW	01121	11W087
				(R1171 STANDARD ONLY. FURNISHED AS A UNIT WITH S1171.)		
R1171	311-1478-00			RES,VAR,NONWW:PNL,5K OHM,1W,W/SW	01121	11W086
				(R1171 OPT 10. FURN AS A UNIT WITH S1171)		
R1172	307-0103-00			RES,FXD,CMPSN:2.7 OHM,5%,0.25W	01121	CB27G5
				(R1172 STANDARD ONLY)		
R1174	311-1482-00			RES,VAR,NONWW:PNL,5K OHM,0.5W	01121	W-8070
R1189	303-0301-00	B040000		RES,FXD,CMPSN:300 OHM,5%,1W	01121	GB3015
				(R1189 OPTION 10 ONLY)		
R1190	315-0121-00	B181096		RES,FXD,FILM:120 OHM,5%,0.25W	19701	5043CX120R0J
R1195	307-0106-00			RES,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
				(R1195 OPTION 10 ONLY)		
R1198	303-0301-00			RES,FXD,CMPSN:300 OHM,5%,1W	01121	GB3015
				(R1198 OPTION 10 ONLY)		
R1200	303-0105-00	B192270		RES,FXD,CMPSN:1W OHM,5%,1W	01121	GB1055
R1201	302-0271-00	B010100	B189999	RES,FXD,CMPSN:270 OHM,10%,0.5W	01121	EB 2711
R1203	302-0271-00	B010100	B189999	RES,FXD,CMPSN:270 OHM,10%,0.5W	01121	EB 2711
R1205	304-0270-00			RES,FXD,CMPSN:27 OHM,10%,1W	01121	GB2701
R1208	304-0104-00	B010100	B140694	RES,FXD,CMPSN:100K OHM,10%,1W	01121	GB1041
R1208	304-0473-00	B140695		RES,FXD,CMPSN:47K OHM,10%,1W	01121	GB4731
R1210	303-0304-00			RES,FXD,CMPSN:300K OHM,5%,1W	01121	GB3045
R1213	304-0104-00	B010100	B140694	RES,FXD,CMPSN:100K OHM,10%,1W	01121	GB1041
R1213	304-0473-00	B140695		RES,FXD,CMPSN:47K OHM,10%,1W	01121	GB4731
R1219	302-0565-00			RES,FXD,CMPSN:5.6M OHM,10%,0.5W	01121	EB5651
R1221	304-0154-00			RES,FXD,CMPSN:150K OHM,10%,1W	01121	GB 1541
R1225	316-0471-00			RES,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R1231	307-0057-00			RES,FXD,CMPSN:5.1 OHM,5%,0.5W	01121	EB51G5
R1232	316-0220-00			RES,FXD,CMPSN:22 OHM,10%,0.25W	01121	CB2201
R1236	316-0103-00			RES,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R1238	315-0333-00	B181130	B181179	RES,FXD,FILM:33K OHM,5%,0.25W	57668	NTR25J-E33K0
R1238	315-0332-00	B181180		RES,FXD,FILM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R1239	307-0057-00			RES,FXD,CMPSN:5.1 OHM,5%,0.5W	01121	EB51G5
R1240	316-0220-00			RES,FXD,CMPSN:22 OHM,10%,0.25W	01121	CB2201
R1242	315-0753-00			RES,FXD,FILM:75K OHM,5%,0.25W	57668	NTR25J-E75K0
R1243	315-0274-00			RES,FXD,FILM:270K OHM,5%,0.25W	57668	NTR25J-E270K
R1244	316-0270-00			RES,FXD,CMPSN:27 OHM,10%,0.25W	01121	CB2701
R1245	316-0101-00			RES,FXD,CMPSN:100 OHM,10%,0.25W	01121	CB1011
R1246	315-0561-00	B010100	B140694	RES,FXD,FILM:560 OHM,5%,0.25W	19701	5043CX560R0J
R1246	315-0391-00	B140695		RES,FXD,FILM:390 OHM,5%,0.25W	57668	NTR25J-E390E
R1247	316-0684-00			RES,FXD,CMPSN:680K OHM,10%,0.25W	01121	CB6841
R1248	302-0332-00			RES,FXD,CMPSN:3.3K OHM,10%,0.5W	01121	EB 3321
R1249	316-0101-00			RES,FXD,CMPSN:100 OHM,10%,0.25W	01121	CB1011
R1253	315-0473-00			RES,FXD,FILM:47K OHM,5%,0.25W	57668	NTR25J-E47K0
R1256	315-0562-00			RES,FXD,FILM:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R1257	315-0223-00			RES,FXD,FILM:22K OHM,5%,0.25W	19701	5043CX22K00J92U
R1259	315-0562-00			RES,FXD,FILM:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R1261	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25W	57668	NTR25J-E100K
R1267	315-0154-00			RES,FXD,FILM:150K OHM,5%,0.25W	57668	NTR25J-E150K
R1269	315-0224-00			RES,FXD,FILM:220K OHM,5%,0.25W	57668	NTR25J-E220K

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R1270	315-0123-00			RES,FXD,FILM:12K OHM,5%,0.25W	57668	NTR25J-E12K0
R1271	315-0432-00	B010100	B140694	RES,FXD,FILM:4.3K OHM,5%,0.25W	57668	NTR25J-E04K3
R1271	315-0301-00	B140695		RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R1272	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R1277	315-0560-00			RES,FXD,FILM:56 OHM,5%,0.25W	57668	NTR25J-E56E0
R1279	315-0181-00	B010100	B181089	RES,FXD,FILM:180 OHM,5%,0.25W	57668	NTR25J-E180E
R1279	315-0560-00	B181090		RES,FXD,FILM:56 OHM,5%,0.25W	57668	NTR25J-E56E0
R1284	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W	57668	NTR25J-E470E
R1285	321-0313-00			RES,FXD,FILM:17.8K OHM,1%,0.125W,TC=T0	07716	CEAD17801F
R1286	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R1287	321-0005-00			RES,FXD,FILM:11.0 OHM,1%,0.125W,TC=T0	91637	CMF55116G11R00F
R1292	321-0425-00	B010100	B191474	RES,FXD,FILM:261K OHM,1%,0.125W,TC=T0	07716	CEAD26102F
R1293	311-1239-00			RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3386X-T07-252
R1294	321-0283-00			RES,FXD,FILM:8.66K OHM,1%,0.125W,TC=T0	19701	5043ED8K660F
R1296	321-0282-00			RES,FXD,FILM:8.45K OHM,1%,0.125W,TC=T0	07716	CFAD84500F
R1297	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R1300	321-0366-00			RES,FXD,FILM:63.4K OHM,1%,0.125W,TC=T0	19701	5043ED63K40F
R1301	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	19701	5043CX15K00J
R1302	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W (R1302 STANDARD ONLY)	57668	NTR25J-E05K1
R1302	316-0103-00	B010100	B010104	RES,FXD,CMPSN:10K OHM,10%,0.25W (R1302 OPTION 10 ONLY)	01121	CB1031
R1302	315-0512-00	B010105		RES,FXD,FILM:5.1K OHM,5%,0.25W (R1302 OPTION 10 ONLY)	57668	NTR25J-E05K1
R1304	321-0286-00	B010100	B181090	RES,FXD,FILM:9.31K OHM,1%,0.125W,TC=T0	19701	5033ED9K310F
R1304	321-0282-00	B181091		RES,FXD,FILM:8.45K OHM,1%,0.125W,TC=T0	07716	CFAD84500F
R1305	321-0339-00			RES,FXD,FILM:33.2K OHM,1%,0.125W,TC=T0	07716	CEAD33201F
R1326	302-0563-00	B010100	B191474	RES,FXD,CMPSN:56K OHM,10%,0.5W	01121	EB 5631
R1341	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R1371	315-0304-00			RES,FXD,FILM:300K OHM,5%,0.25W	57668	NTR25J-E300K
R1373	315-0113-00			RES,FXD,FILM:11K OHM,5%,0.25W	19701	5043CX11K00J
R1375	315-0362-00			RES,FXD,FILM:3.6K OHM,5%,0.25W	19701	5043CX3K600J
R1376	315-0911-00			RES,FXD,FILM:910 OHM,5%,0.25W	57668	NTR25J-E910E
R1378	315-0154-00			RES,FXD,FILM:150K OHM,5%,0.25W	57668	NTR25J-E150K
R1392	316-0100-00			RES,FXD,CMPSN:10 OHM,10%,0.25W	01121	CB1001
R1395	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	19701	5043CX22R00J
R1397	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	19701	5043CX22R00J
R1401	316-0471-00			RES,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R1402	316-0221-00			RES,FXD,CMPSN:220 OHM,10%,0.25W	01121	CB2211
R1404	316-0474-00			RES,FXD,CMPSN:470K OHM,10%,0.25W	01121	CB4741
R1406	315-0183-00			RES,FXD,FILM:18K OHM,5%,0.25W	19701	5043CX18K00J
R1408	316-0274-00			RES,FXD,CMPSN:270K OHM,10%,0.25W	01121	CB2741
R1412	321-0924-07			RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9	19701	5033RE40K00B
R1413	321-0924-07			RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9	19701	5033RE40K00B
R1415	316-0823-00			RES,FXD,CMPSN:82K OHM,10%,0.25W	01121	CB8231
R1416	315-0272-00	B010100	B181069	RES,FXD,FILM:2.7K OHM,5%,0.25W	57668	NTR25J-E02K7
R1416	315-0472-00	B181070		RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R1418	316-0472-00			RES,FXD,CMPSN:4.7K OHM,10%,0.25W	01121	CB4721
R1420	315-0433-00			RES,FXD,FILM:43K OHM,5%,0.25W	19701	5043CX43K00J
R1421	316-0823-00			RES,FXD,CMPSN:82K OHM,10%,0.25W	01121	CB8231
R1422	315-0181-00			RES,FXD,FILM:180 OHM,5%,0.25W	57668	NTR25J-E180E
R1424	316-0331-00			RES,FXD,CMPSN:330 OHM,10%,0.25W	01121	CB3311
R1428	308-0679-00			RES,FXD,MW:0.51 OHM,5%,2W	75042	BWH 0.51 OHM 5%
R1429	316-0471-00			RES,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R1431	316-0683-00			RES,FXD,CMPSN:68K OHM,10%,0.25W	01121	CB6831
R1432	316-0104-00			RES,FXD,CMPSN:100K OHM,10%,0.25W	01121	CB1041
R1434	316-0334-00			RES,FXD,CMPSN:330K OHM,10%,0.25W	01121	CB3341
R1436	316-0103-00			RES,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R1437	316-0274-00			RES,FXD,CMPSN:270K OHM,10%,0.25W	01121	CB2741
R1440	321-0924-07			RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9	19701	5033RE40K00B

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R1441	321-1296-07			RES,FXD,FILM:12.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE12K008
R1443	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R1444	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	19701	5043CX15K00J
R1446	316-0333-00			RES,FXD,CMPSN:33K OHM,10%,0.25W	01121	CB3331
R1448	315-0332-00			RES,FXD,FILM:3.3K OHM,5%,0.25W (R1448 STANDARD ONLY)	57668	NTR25J-E03K3
R1448	315-0512-00	B010100	B010104	RES,FXD,FILM:5.1K OHM,5%,0.25W (R1448 OPTION 10 ONLY)	57668	NTR25J-E05K1
R1448	315-0332-00	B010105		RES,FXD,FILM:3.3K OHM,5%,0.25W (R1448 OPTION 10 ONLY)	57668	NTR25J-E03K3
R1449	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1451	315-0103-00	B010100	B140684	RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R1451	302-0392-00	B140685		RES,FXD,CMPSN:3.9K OHM,10%,0.5W	01121	EB 3921
R1453	316-0153-00			RES,FXD,CMPSN:15K OHM,10%,0.25W	01121	CB1531
R1456	316-0681-00			RES,FXD,CMPSN:680 OHM,10%,0.25W	01121	CB6811
R1457	308-0701-00			RES,FXD,MM:0.12 OHM,5%,2W	75042	BWH-R1200J
R1459	316-0151-00			RES,FXD,CMPSN:150 OHM,10%,0.25W	01121	CB1511
R1461	316-0182-00			RES,FXD,CMPSN:1.8K OHM,10%,0.25W	01121	CB1821
R1463	321-1296-07			RES,FXD,FILM:12.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE12K008
R1464	321-0332-07			RES,FXD,FILM:28.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE28K008
R1467	316-0184-00			RES,FXD,CMPSN:5W 180K OHM,10%,0	01121	CB1841
R1480	316-0124-00			RES,FXD,CMPSN:120K OHM,10%,0.25W	01121	CB1241
R1481	316-0471-00			RES,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R1485	316-0272-00			RES,FXD,CMPSN:2.7K OHM,10%,0.25W	01121	CB2721
R1487	316-0222-00			RES,FXD,CMPSN:2.2K OHM,10%,0.25W	01121	CB2221
R1490	302-0822-00			RES,FXD,CMPSN:8.2K OHM,10%,0.5W	01121	EB 8221
R1492	316-0273-00			RES,FXD,CMPSN:27K OHM,10%,0.25W	01121	CB2731
R1493	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W (R1493 STANDARD ONLY)	57668	NTR25J-E300E
R1493	315-0391-00	B010100	B010104	RES,FXD,FILM:390 OHM,5%,0.25W (R1493 OPTION 10 ONLY)	57668	NTR25J-E390E
R1493	315-0301-00	B010105		RES,FXD,FILM:300 OHM,5%,0.25W (R1493 OPTION 10 ONLY)	57668	NTR25J-E300E
R1495	316-0222-00			RES,FXD,CMPSN:2.2K OHM,10%,0.25W	01121	CB2221
R1497	316-0681-00			RES,FXD,CMPSN:680 OHM,10%,0.25W	01121	CB6811
R1498	308-0701-00			RES,FXD,MM:0.12 OHM,5%,2W	75042	BWH-R1200J
R1499	316-0471-00			RES,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R1502	316-0393-00			RES,FXD,CMPSN:39K OHM,10%,0.25W	01121	CB3931
R1504	323-0264-00			RES,FXD,FILM:5.49K OHM,1%,0.5W,TC=T0	91637	MFF1226G54900F
R1506	315-0562-00			RES,FXD,FILM:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R1509	316-0224-00			RES,FXD,CMPSN:220K OHM,10%,0.25W	01121	CB2241
R1512	321-0272-00			RES,FXD,FILM:6.65K OHM,1%,0.125W,TC=T0	19701	5043ED6K650F
R1513	311-1237-00			RES,VAR,NONWW:1K OHM,10%,0.50W	32997	3386X-0Y6-102
R1514	321-0338-00			RES,FXD,FILM:32.4K OHM,1%,0.125W,TC=T0	19701	5033ED32K40F
R1517	316-0125-00			RES,FXD,CMPSN:1.2M OHM,10%,0.25W	01121	CB1251
R1518	315-0471-00	B010100	B181069	RES,FXD,FILM:470 OHM,5%,0.25W	57668	NTR25J-E470E
R1518	315-0202-00	B181070		RES,FXD,FILM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R1522	316-0472-00			RES,FXD,CMPSN:4.7K OHM,10%,0.25W	01121	CB4721
R1524	316-0102-00			RES,FXD,CMPSN:1K OHM,10%,0.25W	01121	CB1021
R1525	316-0331-00			RES,FXD,CMPSN:330 OHM,10%,0.25W	01121	CB3311
R1528	316-0123-00			RES,FXD,CMPSN:12K OHM,10%,0.25W	01121	CB1231
R1529	301-0123-00			RES,FXD,FILM:12K OHM,5%,0.5W	19701	5053CX12K00J
R1531	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1533	316-0222-00			RES,FXD,CMPSN:2.2K OHM,10%,0.25W	01121	CB2221
R1537	308-0703-00			RES,FXD,MM:1.8 OHM,5%,2W	75042	BWH 1.8 OHM 5%
R1539	316-0471-00			RES,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R1542	303-0301-00	B010100	B039999	RES,FXD,CMPSN:300 OHM,5%,1W (R1542 STANDARD ONLY)	01121	GB3015
R1542	303-0301-00	B010105	B039999	RES,FXD,CMPSN:300 OHM,5%,1W (R1542 OPTION 10 ONLY)	01121	GB3015

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R1543	321-0289-00			RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5033ED10K0F
R1544	315-0113-00			RES,FXD,FILM:11K OHM,5%,0.25W (R1544 STANDARD ONLY)	19701	5043CX11K00J
R1544	316-0103-00	B010100	B010104	RES,FXD,CMPSN:10K OHM,10%,0.25W (R1544 OPTION 10 ONLY)	01121	CB1031
R1544	315-0113-00	B010105		RES,FXD,FILM:11K OHM,5%,0.25W (R1544 OPTION 10 ONLY)	19701	5043CX11K00J
R1545	315-0243-00			RES,FXD,FILM:24K OHM,5%,0.25W	57668	NTR25J-E24K0
R1548	315-0562-00			RES,FXD,FILM:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R1549	316-0221-00			RES,FXD,CMPSN:220 OHM,10%,0.25W	01121	CB2211
R1551	308-0702-00			RES,FXD,MM:0.33 OHM,5%,2W	75042	BWH-R3300J
R1562	316-0274-00			RES,FXD,CMPSN:270K OHM,10%,0.25W	01121	CB2741
R1564	321-0924-07			RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9	19701	5033RE40K00B
R1565	321-0926-07			RES,FXD,FILM:4K OHM,0.1%,0.125W,TC=T9	19701	5033RE4K00B
R1566	315-0622-00			RES,FXD,FILM:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R1567	316-0273-00			RES,FXD,CMPSN:27K OHM,10%,0.25W	01121	CB2731
R1568	316-0473-00			RES,FXD,CMPSN:47K OHM,10%,0.25W	01121	CB4731
R1570	316-0334-00			RES,FXD,CMPSN:330K OHM,10%,0.25W	01121	CB3341
R1571	316-0103-00			RES,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R1573	316-0471-00			RES,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R1574	315-0562-00			RES,FXD,FILM:5.6K OHM,5%,0.25W	57668	NTR25J-E05K6
R1577	316-0223-00			RES,FXD,CMPSN:22K OHM,10%,0.25W	01121	CB2231
R1579	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R1580	315-0750-00			RES,FXD,FILM:75 OHM,5%,0.25W	57668	NTR25J-E75E0
R1583	316-0103-00			RES,FXD,CMPSN:10K OHM,10%,0.25W	01121	CB1031
R1586	316-0681-00			RES,FXD,CMPSN:680 OHM,10%,0.25W	01121	CB6811
R1587	308-0701-00			RES,FXD,MM:0.12 OHM,5%,2W	75042	BWH-R1200J
R1589	316-0470-00			RES,FXD,CMPSN:47 OHM,10%,0.25W	01121	CB4701
R1591	316-0470-00			RES,FXD,CMPSN:47 OHM,10%,0.25W	01121	CB4701
R1598	304-0100-00	B010145	B049999	RES,FXD,CMPSN:10 OHM,10%,1W	01121	GB1001
R1598	307-0036-00	B050000		RES,FXD,CMPSN:6.8 OHM,10%,1W	01121	GB68G1
R1603	302-0152-00	B010100	B180949	RES,FXD,CMPSN:1.5K OHM,10%,0.5W	01121	EB 1521
R1603	301-0222-00	B180950	B191969	RES,FXD,FILM:2.2K OHM,5%,0.5W (NOMINAL VALUE,SELECTED)	19701	5053CX2K200J
R1603	301-0222-01	B191970		RES,FXD,CMPSN:2.2K OHM,5%,0.5W	01121	EB2225
R1604	315-0130-00	B010100	B191969	RES,FXD,FILM:13 OHM,5%,0.25W	01121	CB1305
R1604	315-0130-02	B191970		RES,FXD,CMPSN:13 OHM,5%,0.25W	01121	CB1305
R1605	315-0560-00	B010100	B191969	RES,FXD,FILM:56 OHM,5%,0.25W	57668	NTR25J-E56E0
R1605	315-0560-02	B191970		RES,FXD,CMPSN:56 OHM,5%,0.25W	01121	CB5605 (CARD PK)
R1609	316-0472-00	B010100	B191969	RES,FXD,CMPSN:4.7K OHM,10%,0.25W	01121	CB4721
R1609	315-0472-03	B191970		RES,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1611	316-0472-00	B010100	B191969	RES,FXD,CMPSN:4.7K OHM,10%,0.25W	01121	CB4721
R1611	315-0472-03	B191970		RES,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1612	316-0472-00	B010100	B191969	RES,FXD,CMPSN:4.7K OHM,10%,0.25W	01121	CB4721
R1612	315-0472-03	B191970		RES,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R1614	302-0331-00	B010100	B191969	RES,FXD,CMPSN:330 OHM,10%,0.5W	01121	EB 3311
R1614	315-0331-03	B191970		RES,FXD,CMPSN:330 OHM 5%,0.25W	01121	CB3315
R1616	316-0471-00	B010100	B191969	RES,FXD,CMPSN:470 OHM,10%,0.25W	01121	CB4711
R1616	315-0471-03	B191970		RES,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R1618	301-0135-00	B010100	B191969	RES,FXD,FILM:1.3M OHM,5%,0.50W	01121	EB1355
R1618	301-0135-02	B191970		RES,FXD,CMPSN:1.3M OHM,5%,0.5W	01121	EB1355
R1619	301-0135-00	B010100	B191969	RES,FXD,FILM:1.3M OHM,5%,0.50W	01121	EB1355
R1619	301-0135-02	B191970		RES,FXD,CMPSN:1.3M OHM,5%,0.5W	01121	EB1355
R1625	302-0563-00	B010100	B191474	RES,FXD,CMPSN:56K OHM,10%,0.5W	01121	EB 5631
R1627	315-0821-00			RES,FXD,FILM:820 OHM,5%,0.25W	19701	5043CX820R0J
R1629	315-0332-00	B010100	B181069	RES,FXD,FILM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R1629	315-0112-00	B181070		RES,FXD,FILM:1.1K OHM,5%,0.25W	19701	5043CX1K100J
R1631	315-0150-00			RES,FXD,FILM:15 OHM,5%,0.25W	19701	5043CX15R00J
R1632	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R1633	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	57668	NTR25J-E330E
R1634	315-0392-00			RES,FXD,FILM:3.9K OHM,5%,0.25W	57668	NTR25J-E03K9
R1635	315-0244-00			RES,FXD,FILM:240K OHM,5%,0.25W	19701	5043CX240K0J
R1637	315-0474-00			RES,FXD,FILM:470K OHM,5%,0.25W	19701	5043CX470K0J92U
R1640	307-0290-01			RES,FXD,FILM:500 OHM/29.65W OHM	80009	307-0290-01
R1642	302-0102-00	B010100	B191969	RES,FXD,CMPSN:1K OHM,10%,0.5W	01121	EB 1021
R1642	302-0102-03	B191970		RES,FXD,CMPSN:1K OHM,10%,0.5W	01121	EB1021 (CD PACK)
R1651	301-0225-00	B010100	B191969	RES,FXD,FILM:2.2M OHM,5%,0.5W	19701	5053CX2M200J
R1651	301-0225-02	B191970		RES,FXD,CMPSN:2.2M OHM,5%,0.5W	01121	EB2255
R1652	301-0225-00	B010100	B191969	RES,FXD,FILM:2.2M OHM,5%,0.5W	19701	5053CX2M200J
R1652	301-0225-02	B191970		RES,FXD,CMPSN:2.2M OHM,5%,0.5W	01121	EB2255
R1658	302-0183-00	B010100	B191969	RES,FXD,CMPSN:18K OHM,10%,0.5W	01121	EB 1831
R1658	302-0183-01	B191970		RES,FXD,CMPSN:	80009	302-0183-01
R1659	316-0226-00	B010100	B191969	RES,FXD,CMPSN:22M OHM,10%,0.25W	01121	CB2261
R1659	316-0226-01	B191970		RES,FXD,CMPSN:22M OHM,10%,0.25W	80009	316-0226-01
R1661	302-0104-00	B010100	B191969	RES,FXD,CMPSN:100K OHM,10%,0.5W	01121	EB 1041
R1661	302-0104-02	B191970		RES,FXD,CMPSN:100K OHM,10%,0.5W	01121	EB1041
R1671	301-0305-00	B010100	B191969	RES,FXD,FILM:3M OHM,5%,0.5W	57668	TR50J 3 M OHM
R1671	301-0305-01	B191970		RES,FXD,CMPSN:3M OHM,5%,0.5W	01121	EB3055
R1672	301-0305-00	B010100	B191969	RES,FXD,FILM:3M OHM,5%,0.5W	57668	TR50J 3 M OHM
R1672	301-0305-01	B191970		RES,FXD,CMPSN:3M OHM,5%,0.5W	01121	EB3055
R1674	311-1230-00			RES,VAR,NONWW:TRMR,20K OHM,0.5W	32997	3386F-T04-203
R1675	315-0123-00			RES,FXD,FILM:12K OHM,5%,0.25W	57668	NTR25J-E12K0
R1682	316-0183-00	B010100	B191969	RES,FXD,CMPSN:18K OHM,10%,0.25W	01121	CB1831
R1682	315-0183-03	B191970		RES,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R1684	316-0226-00	B010100	B191969	RES,FXD,CMPSN:22M OHM,10%,0.25W	01121	CB2261
R1684	316-0226-01	B191970		RES,FXD,CMPSN:22M OHM,10%,0.25W	80009	316-0226-01
R1686	316-0104-00	B010100	B191969	RES,FXD,CMPSN:100K OHM,10%,0.25W	01121	CB1041
R1686	315-0104-03	B191970		RES,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1690	316-0104-00	B010100	B191969	RES,FXD,CMPSN:100K OHM,10%,0.25W	01121	CB1041
R1690	315-0104-03	B191970		RES,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R1700	311-1477-00			RES,VAR,NONWW:PNL,1M OHM,1W	32997	81C1DE288A0352
R1704	301-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
R1704	301-0105-01	B191970		RES,FXD,CMPSN:1M OHM,5%,0.5W	01121	EB1055
R1705	301-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
R1705	301-0105-01	B191970		RES,FXD,CMPSN:1M OHM,5%,0.5W	01121	EB1055
R1706	301-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
R1706	301-0105-01	B191970		RES,FXD,CMPSN:1M OHM,5%,0.5W	01121	EB1055
R1707	301-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
R1707	301-0105-01	B191970		RES,FXD,CMPSN:1M OHM,5%,0.5W	01121	EB1055
R1708	301-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
R1708	301-0105-01	B191970		RES,FXD,CMPSN:1M OHM,5%,0.5W	01121	EB1055
R1709	301-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
R1709	301-0105-01	B191970		RES,FXD,CMPSN:1M OHM,5%,0.5W	01121	EB1055
R1711	311-1255-00	B010100	B191969	RES,VAR,NONWW:TRMR,2M OHM,0.5W	32997	3386F-T04-205
R1712	301-0205-00	B010100	B191969	RES,FXD,FILM:2M OHM,5%,0.5W	19701	5053CX2M000J
R1712	301-0205-01	B191970		RES,FXD,CMPSN:2M OHM,5%,0.5W	01121	EB2055
R1713	301-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
R1713	301-0105-01	B191970		RES,FXD,CMPSN:1M OHM,5%,0.5W	01121	EB1055
R1714	301-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
R1714	301-0105-01	B191970		RES,FXD,CMPSN:1M OHM,5%,0.5W	01121	EB1055
R1716	315-0101-00	B010100	B191969	RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1716	315-0101-03	B191970		RES,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R1717	315-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.25W	19701	5043CX1M000J
R1717	315-0105-03	B191970		RES,FXD,CMPSN:1M OHM,5%,0.25W	80009	315-0105-03
R1719	315-0105-00	B010100	B191969	RES,FXD,FILM:1M OHM,5%,0.25W	19701	5043CX1M000J
R1719	315-0105-03	B191970		RES,FXD,CMPSN:1M OHM,5%,0.25W	80009	315-0105-03
R1725	311-1298-00			RES,VAR,NONWW:PNL,10K OHM,0.5W	01121	N-7909
R1727	311-1235-00			RES,VAR,NONWW:100K OHM,0.5W	32997	3386F-T04-104

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R1730	311-1227-00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3386F-T04-502
R1732	321-0271-00			RES,FXD,FILM:6.49K OHM,1%,0.125W,TC=T0	07716	CEAD64900F
R1733	311-1226-00			RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3386F-T04-252
R1734	321-0310-00			RES,FXD,FILM:16.5K OHM,1%,0.125W,TC=T0	19701	5033ED16K50F
R1736	311-1475-00			RES,VAR,NONWW:PNL,100K OHM,0.5W	01121	M-8064A
R1748	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1749	315-0203-00			RES,FXD,FILM:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R1751	311-1227-00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3386F-T04-502
R1752	315-0222-00			RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R1753	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1754	321-0254-00			RES,FXD,FILM:4.32K OHM,1%,0.125W,TC=T0	07716	CEAD43200F
R1756	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R1757	311-1227-00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3386F-T04-502
R1758	315-0303-00			RES,FXD,FILM:30K OHM,5%,0.25W	19701	5043CX30K00J
R1759	321-0231-00			RES,FXD,FILM:2.49K OHM,1%,0.125W,TC=T0	19701	5033ED2K49F
R1760	315-0184-00			RES,FXD,FILM:180K OHM,5%,0.25W	19701	5043CX180K0J
R1762	315-0753-00			RES,FXD,FILM:75K OHM,5%,0.25W	57668	NTR25J-E75K0
R1763	321-0260-00			RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
R1765	315-0911-00			RES,FXD,FILM:910 OHM,5%,0.25W	57668	NTR25J-E910E
R1767	315-0473-00			RES,FXD,FILM:47K OHM,5%,0.25W	57668	NTR25J-E47K0
R1770	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1772	315-0391-00			RES,FXD,FILM:390 OHM,5%,0.25W	57668	NTR25J-E390E
R1774	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R1777	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25W	57668	NTR25J-E100K
R1778	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R1801	321-0066-00			RES,FXD,FILM:47.5 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G47R50F
R1802	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W (R1802 STANDARD ONLY)	57668	NTR25J-E200E
R1802	315-0510-00	B010100	B010104	RES,FXD,FILM:51 OHM,5%,0.25W (R1802 OPTION 10 ONLY)	19701	5043CX51R00J
R1802	315-0201-00	B010105		RES,FXD,FILM:200 OHM,5%,0.25W (R1802 OPTION 10 ONLY)	57668	NTR25J-E200E
R1803	321-0193-00			RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R1805	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1806	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	57668	NTR25J-E200E
R1808	321-0206-00			RES,FXD,FILM:1.37K OHM,1%,0.125W,TC=T0	07716	CEAD13700F
R1809	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	57668	NTR25J-E200E
R1810	311-1225-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-T04-102
R1812	321-0206-00			RES,FXD,FILM:1.37K OHM,1%,0.125W,TC=T0	07716	CEAD13700F
R1814	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	57668	NTR25J-E200E
R1815	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1816	315-0561-00			RES,FXD,FILM:560 OHM,5%,0.25W	19701	5043CX560R0J
R1817	311-1223-00			RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3386F-T04-251
R1818	315-0271-00			RES,FXD,FILM:270 OHM,5%,0.25W	57668	NTR25J-E270E
R1820	315-0272-00			RES,FXD,FILM:2.7K OHM,5%,0.25W	57668	NTR25J-E02K7
R1822	323-0275-00			RES,FXD,FILM:7.15K OHM,1%,0.5W,TC=T0	75042	CECT0-7151F
R1824	321-0193-00			RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R1827	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R1831	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W	57668	NTR25J-E680E
R1832	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
R1833	315-0391-00			RES,FXD,FILM:390 OHM,5%,0.25W	57668	NTR25J-E390E
R1838	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R1839	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1842	311-1258-00			RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3329P-L58-500
R1844	311-1258-00			RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3329P-L58-500
R1846	315-0105-00			RES,FXD,FILM:1M OHM,5%,0.25W	19701	5043CX1M000J
R1851	301-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.5W	19701	5053CX6K800J
R1852	301-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.5W	19701	5053CX6K800J
R1854	323-0256-00			RES,FXD,FILM:4.53K OHM,1%,0.5W,TC=T0	19701	5053RD4K530F

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R1856	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	19701	5043CX51R00J
R1858	321-0310-00			RES,FXD,FILM:16.5K OHM,1%,0.125W,TC=T0	19701	5033ED16K50F
R1859	322-0341-00			RES,FXD,FILM:34.8K OHM,1%,0.25W,TC=T0	75042	CEBT0-3482F
R1861	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
R1863	315-0134-00			RES,FXD,FILM:130K OHM,5%,0.25W	57668	NTR25J-E130K
R1871	321-0260-00			RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
R1873	322-0356-00			RES,FXD,FILM:49.9K OHM,1%,0.25W,TC=T0	75042	CEBT0-4992F
R1877	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1880	315-0223-00			RES,FXD,FILM:22K OHM,5%,0.25W	19701	5043CX22K00J92U
R1882	315-0395-00	B010100	B039999	RES,FXD,FILM:3.9M OHM,5%,0.25W	01121	CB3955
R1883	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R1887	315-0100-00	B010100	B191969	RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R1887	315-0100-02	B191970	B192158	RES,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R1887	315-0160-00	B192159		RES,FXD,FILM:16 OHM,5%,0.25W	19701	5043CX16R00J
R1891	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R1894	307-0106-00			RES,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
R1897	307-0106-00			RES,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
R2101	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	57668	NTR25J-E06K8
R2102	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R2104	315-0333-00			RES,FXD,FILM:33K OHM,5%,0.25W	57668	NTR25J-E33K0
R2105	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	19701	5043CX15K00J
R2107	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	19701	5043CX51R00J
R2108	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
R2109	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W	57668	NTR25J-E220E
R2112	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2113	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R2122	315-0432-00			RES,FXD,FILM:4.3K OHM,5%,0.25W	57668	NTR25J-E04K3
R2123	315-0683-00			RES,FXD,FILM:68K OHM,5%,0.25W	57668	NTR25J-E68K0
R2127	315-0302-00	B010100	B199999	RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
R2127	315-0102-00	B200000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2128	311-1225-00	B010100	B049999	RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-T04-102
R2128	311-1263-00	B050000	B199999	RES,VAR,NONWW:1K OHM,10%,0.50W	32997	3329P-L58-102
R2129	315-0183-00	B010100	B199999	RES,FXD,FILM:18K OHM,5%,0.25W	19701	5043CX18K00J
R2131	315-0472-00	B200000		RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R2132	315-0222-00	B200000		RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R2134	315-0302-00	B200000		RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
R2135	315-0393-00			RES,FXD,FILM:39K OHM,5%,0.25W	57668	NTR25J-E39K0
R2137	315-0752-00			RES,FXD,FILM:7.5K OHM,5%,0.25W	57668	NTR25J-E07K5
R2139	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	57668	NTR25J-E02K4
R2140	315-0103-00	B200000		RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R2141	315-0102-00	B200000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2144	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25W	57668	NTR25J-E100K
R2146	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R2148	315-0103-00	B010100	B199999	RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R2150	321-0403-00	B010100	B199999	RES,FXD,FILM:154K OHM,1%,0.125W,TC=T0	07716	CEA015402F
R2150	315-0183-00	B200000		RES,FXD,FILM:18K OHM,5%,0.25W	19701	5043CX18K00J
R2151	321-0372-00	B010100	B199999	RES,FXD,FILM:73.2K OHM,1%,0.125W,TC=T0	07716	CEA073201F
R2151	315-0362-00	B200000		RES,FXD,FILM:3.6K OHM,5%,0.25W	19701	5043CX3K600J
R2152	315-0622-00	B200000		RES,FXD,FILM:6.2K OHM,5%,0.25W	19701	5043CX6K200J
R2153	315-0103-00	B010100	B199999	RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R2153	315-0301-00	B200000		RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R2154	321-0350-00	B200000		RES,FXD,FILM:43.2K OHM,1%,0.125W,TC=T0	19701	5043ED43K20F
R2155	315-0512-00	B010100	B199999	RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
R2155	321-0350-00	B200000		RES,FXD,FILM:43.2K OHM,1%,0.125W,TC=T0	19701	5043ED43K20F
R2157	315-0222-00	B200000	B212704	RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R2157	315-0621-00	B212705		RES,FXD,FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R2158	315-0152-00	B010100	B199999	RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R2161	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2162	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E

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R2163	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2165	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2166	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2167	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2169	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2170	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2171	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2173	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2174	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2175	315-0751-00			RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2177	315-0511-00	B010100	B199999	RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R2178	315-0511-00	B010100	B199999	RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R2179	315-0511-00	B010100	B199999	RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R2181	321-0396-00	B200000		RES,FXD,FILM:130K OHM,1%,0.125W,TC=T0	07716	CEAD13002F
R2182	321-0262-00	B010100	B199999	RES,FXD,FILM:5.23K OHM,1,0.125W,TC=T0	19701	5033ED5K230F
R2182	321-0361-00	B200000		RES,FXD,FILM:56.2K OHM,1%,0.125W,TC=T0	07716	CEAD56201F
R2183	311-1224-00	B010100	B199999	RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3386F-T04-501
R2183	311-2230-00	B200000		RES,VAR,NONWW:TRMR,500 OHM,20%,0.50 LINEAR	TK1450	GF06UT 500
R2184	321-0262-00	B200000		RES,FXD,FILM:5.23K OHM,1,0.125W,TC=T0	19701	5033ED5K230F
R2185	307-0445-00	B200000		RES NTWK,FXD,FI:4.7K OHM,20%,(9)RES	32997	4310R-101-472
R2187	315-0102-00	B200000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2191	315-0513-00	B010100	B199999	RES,FXD,FILM:51K OHM,5%,0.25W	57668	NTR25J-E51K0
R2191	321-0356-00	B200000		RES,FXD,FILM:49.9K OHM,1%,0.125W,TC=T0	19701	5033ED49K90F
R2192	315-0133-00	B010100	B199999	RES,FXD,FILM:13K OHM,5%,0.25W	19701	5043CX13K00J
R2192	321-0344-00	B200000		RES,FXD,FILM:37.4K OHM,1%,0.125W,TC=T0	19701	5033ED 37K40F
R2193	315-0133-00	B010100	B199999	RES,FXD,FILM:13K OHM,5%,0.25W	19701	5043CX13K00J
R2193	321-0306-00	B200000		RES,FXD,FILM:15.0K OHM,1%,0.125W,TC=T0	19701	5033ED15J00F
R2194	315-0753-00	B010100	B199999	RES,FXD,FILM:75K OHM,5%,0.25W	57668	NTR25J-E75K0
R2194	321-0373-00	B200000		RES,FXD,FILM:75.0K OHM,1%,0.125W,TC=T0	19701	5033ED75K00F
R2196	321-0308-00	B010100	B199999	RES,FXD,FILM:15.8K OHM,1%,0.125W,TC=T0	07716	CEAD 15801F
R2196	321-0311-00	B200000		RES,FXD,FILM:16.9K OHM,1%,0.125W,TC=T0	07716	CEAC16901F
R2197	315-0513-00	B010100	B199999	RES,FXD,FILM:51K OHM,5%,0.25W	57668	NTR25J-E51K0
R2197	321-0356-00	B200000		RES,FXD,FILM:49.9K OHM,1%,0.125W,TC=T0	19701	5033ED49K90F
R2198	321-0319-00	B010100	B199999	RES,FXD,FILM:20.5K OHM,1%,0.125W,TC=T0	19701	5033ED20K50F
R2198	321-0321-00	B200000		RES,FXD,FILM:21.5K OHM,1%,0.125W,TC=T0	07716	CEAD21501F
R2199	321-0335-00			RES,FXD,FILM:30.1K OHM,1%,0.125W,TC=T0	57668	RB14FXE30K1
R2201	315-0154-00	B010100	B199999	RES,FXD,FILM:150K OHM,5%,0.25W	57668	NTR25J-E150K
R2201	315-0471-00	B200000		RES,FXD,FILM:470 OHM,5%,0.25W	57668	NTR25J-E470E
R2202	321-0335-00	B010100	B199999	RES,FXD,FILM:30.1K OHM,1%,0.125W,TC=T0	57668	RB14FXE30K1
R2202	315-0182-00	B200000		RES,FXD,FILM:1.8K OHM,5%,0.25W	57668	NTR25J-E1K8
R2203	321-0344-00	B010100	B199999	RES,FXD,FILM:37.4K OHM,1%,0.125W,TC=T0	19701	5033ED 37K40F
R2203	315-0511-00	B200000		RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R2204	321-0335-00	B010100	B199999	RES,FXD,FILM:30.1K OHM,1%,0.125W,TC=T0	57668	RB14FXE30K1
R2204	307-0446-00	B200000		RES NTWK,FXD,FI:10K OHM,20%,(9)RES	11236	750-101-R10K
R2206	315-0513-00	B010100	B199999	RES,FXD,FILM:51K OHM,5%,0.25W	57668	NTR25J-E51K0
R2206	321-0376-00	B200000		RES,FXD,FILM:80.6K OHM,1%,0.125W,TC=T0	19701	5043ED80K60F
R2207	315-0154-00	B010100	B199999	RES,FXD,FILM:150K OHM,5%,0.25W	57668	NTR25J-E150K
R2207	321-0405-00	B200000		RES,FXD,FILM:162K OHM,1%,0.125W,TC=T0	07716	CEAD16202F
R2208	321-0335-00	B010100	B199999	RES,FXD,FILM:30.1K OHM,1%,0.125W,TC=T0	57668	RB14FXE30K1
R2208	321-0434-00	B200000		RES,FXD,FILM:324K OHM,1%,0.125W,TC=T0	07716	CEAD32402F
R2209	321-0335-00	B010100	B199999	RES,FXD,FILM:30.1K OHM,1%,0.125W,TC=T0	57668	RB14FXE30K1
R2210	311-2232-00	B200000		RES,VAR,NONWW:TRMR,2K OHM,20%,0.5W LINEAR	TK1450	GF06UT 2K
R2211	315-0752-00	B010100	B199999	RES,FXD,FILM:7.5K OHM,5%,0.25W	57668	NTR25J-E07K5
R2211	315-0332-00	B200000		RES,FXD,FILM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R2212	321-0218-00	B200000		RES,FXD,FILM:1.82K OHM,1%,0.125W,TC=T0	19701	5033ED1K82F
R2213	321-0259-00	B010100	B199999	RES,FXD,FILM:4.87K OHM,1%,0.125W,TC=T0	07716	CEAD48700F
R2213	321-0221-00	B200000		RES,FXD,FILM:1.96K OHM,1%,0.125W,TC=T0	19701	5043ED1K960F
R2214	311-1224-00	B010100	B199999	RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3386F-T04-501
R2215	315-0133-00	B010100	B199999	RES,FXD,FILM:13K OHM,5%,0.25W	19701	5043CX13K00J

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R2216	321-0452-00	B200000		RES,FXD,FILM:499K OHM,1%,0.125W,TC=T0	19701	5043ED499K0F
R2217	315-0124-00	B010100	B199999	RES,FXD,FILM:120K OHM,5%,0.25W	19701	5043CX120K0J
R2217	321-0425-00	B200000		RES,FXD,FILM:261K OHM,1%,0.125W,TC=T0	07716	CEAD26102F
R2218	321-0396-00	B200000		RES,FXD,FILM:130K OHM,1%,0.125W,TC=T0	07716	CEAD13002F
R2219	315-0751-00	B010100	B199999	RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2220	321-0299-00	B010100	B199999	RES,FXD,FILM:12.7K OHM,1%,0.125W,TC=T0	19701	5033ED12K70F
R2221	321-0212-00	B010100	B199999	RES,FXD,FILM:1.58K OHM,1%,0.125W,TC=70	19701	5033ED1K58F
R2221	315-0752-00	B200000		RES,FXD,FILM:7.5K OHM,5%,0.25W	57668	NTR25J-E07K5
R2222	315-0133-00	B200000		RES,FXD,FILM:13K OHM,5%,0.25W	19701	5043CX13K00J
R2223	315-0124-00	B200000		RES,FXD,FILM:120K OHM,5%,0.25W	19701	5043CX120K0J
R2224	315-0751-00	B200000		RES,FXD,FILM:750 OHM,5%,0.25W	57668	NTR25J-E750E
R2225	321-0299-00	B200000		RES,FXD,FILM:12.7K OHM,1%,0.125W,TC=T0	19701	5033ED12K70F
R2226	315-0222-00	B010100	B199999	RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R2226	321-0212-00	B200000		RES,FXD,FILM:1.58K OHM,1%,0.125W,TC=70	19701	5033ED1K58F
R2227	321-0268-00	B010100	B199999	RES,FXD,FILM:6.04K OHM,1%,0.125W,TC=T0	19701	5043ED6K040F
R2227	315-0152-00	B200000		RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R2229	321-0210-00	B010100	B199999	RES,FXD,FILM:1.50K OHM,1%,0.125W,TC=T0	19701	5033ED1K50F
R2229	315-0512-00	B200000		RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
R2230	315-0103-00	B200000		RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R2231	315-0303-00	B010100	B199999	RES,FXD,FILM:30K OHM,5%,0.25W	19701	5043CX30K00J
R2235	315-0203-00			RES,FXD,FILM:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R2236	315-0203-00			RES,FXD,FILM:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R2237	315-0203-00			RES,FXD,FILM:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R2238	315-0203-00			RES,FXD,FILM:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R2239	315-0303-00	B200000		RES,FXD,FILM:30K OHM,5%,0.25W	19701	5043CX30K00J
R2241	321-0326-00	B010100	B199999	RES,FXD,FILM:24.3K OHM,1%,0.125W,TC=T0	19701	5043ED24K30F
R2242	321-0259-00	B200000		RES,FXD,FILM:4.87K OHM,1%,0.125W,TC=T0	07716	CEAD48700F
R2243	311-2230-00	B200000		RES,VAR,NONWM:TRMR,500 OHM,20%,0.50 LINEAR	TK1450	GF06UT 500
R2244	321-0326-00	B200000		RES,FXD,FILM:24.3K OHM,1%,0.125W,TC=T0	19701	5043ED24K30F
R2245	315-0472-00	B200000		RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R2246	307-0445-00	B200000		RES NTWK,FXD,FI:4.7K OHM,20%,(9)RES	32997	4310R-101-472
R2247	315-0472-00	B200000		RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R2250	315-0222-00	B200000	B212704	RES,FXD,FILM:2.2K OHM,5%,0.25W	57668	NTR25J-E02K2
R2250	315-0621-00	B212705		RES,FXD,FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R2251	315-0102-00	B010100	B199999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2251	315-0203-00	B200000	B212704	RES,FXD,FILM:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R2251	315-0472-00	B212705		RES,FXD,FILM:4.7K OHM,5%,0.25W	57668	NTR25J-E04K7
R2252	315-0102-00	B010100	B199999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2252	321-0202-00	B200000		RES,FXD,FILM:1.24K OHM,1%,0.125W,TC=T0	24546	NA55D1241F
R2253	315-0102-00	B010100	B199999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2253	321-0202-00	B200000		RES,FXD,FILM:1.24K OHM,1%,0.125W,TC=T0	24546	NA55D1241F
R2254	315-0303-00	B050000	B199999	RES,FXD,FILM:30K OHM,5%,0.25W	19701	5043CX30K00J
R2254	321-0254-00	B200000		RES,FXD,FILM:4.32K OHM,1%,0.125W,TC=T0	07716	CEAD43200F
R2255	321-0302-00	B200000		RES,FXD,FILM:13.7K OHM,1%,0.125W,TC=T0	07716	CEAD 13701F
R2257	321-0251-00	B200000		RES,FXD,FILM:4.02K OHM,1%,0.125W,TC=T0	19701	5033ED4K020F
R2258	315-0203-00	B200000		RES,FXD,FILM:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R2259	315-0303-00	B200000		RES,FXD,FILM:30K OHM,5%,0.25W	19701	5043CX30K00J
R2260	311-2232-00	B200000		RES,VAR,NONWM:TRMR,2K OHM,20%,0.5W LINEAR	TK1450	GF06UT 2K
R2261	315-0272-00	B010100	B199999	RES,FXD,FILM:2.7K OHM,5%,0.25W	57668	NTR25J-E02K7
R2262	315-0102-00	B010100	B199999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2263	307-0696-00	B200000		RES NTWK,FXD,FI:7,10K OHM,2%,0.15W	01121	108A103
R2264	321-0318-00	B200000		RES,FXD,FILM:20.0K OHM,1%,0.125W,TC=T0	19701	5033ED20K00F
R2265	315-0512-00	B010100	B199999	RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
R2265	321-0259-00	B200000		RES,FXD,FILM:4.87K OHM,1%,0.125W,TC=T0	07716	CEAD48700F
R2266	315-0912-00	B010100	B199999	RES,FXD,FILM:9.1K OHM,5%,0.25W	57668	NTR25J-E09K1
R2266	321-0430-00	B200000		RES,FXD,FILM:294K OHM,1%,0.125W,TC=T0	07716	CEAD29402F
R2267	321-0399-00	B200000		RES,FXD,FILM:140K OHM,1%,0.125W,TC=T0	07716	CEAD14002F
R2268	321-0296-00	B010100	B181239	RES,FXD,FILM:11.8K OHM,1%,0.125W,TC=T0	07716	CEAD11801F
R2268	321-0297-00	B181240	B199999	RES,FXD,FILM:12.1K OHM,1%,0.125W,TC=T0	07716	CEAD12101F

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R2268	321-0294-00	B192480	B199999	RES,FXD,FILM:11.3K OHM,1%,0.125W,TC=T0 (SELECTED)	19701	5043ED11K30F
R2268	321-0295-00	B192480	B199999	RES,FXD,FILM:11.5K OHM,1%,0.125W,TC=T0 (SELECTED)	07716	CEAD11501F
R2268	321-0296-00	B192480	B199999	RES,FXD,FILM:11.8K OHM,1%,0.125W,TC=T0 (SELECTED)	07716	CEAD11801F
R2268	321-0298-00	B192480	B199999	RES,FXD,FILM:12.4K OHM,1%,0.125W,TC=T0 (SELECTED)	07716	CEAD12401F
R2268	321-0299-00	B192480	B199999	RES,FXD,FILM:12.7K OHM,1%,0.125W,TC=T0 (SELECTED)	19701	5033ED12K70F
R2268	321-0631-00	B192480	B199999	RES,FXD,FILM:12.5K OHM,1%,0.125W,TC=T0 (SELECTED)	91637	MFF1816G12501F
R2268	321-0367-00	B200000		RES,FXD,FILM:64.9K OHM,1%,0.125W,TC=T0	07716	CEAD64901F
R2269	321-0331-00	B200000		RES,FXD,FILM:27.4K OHM,1%,0.125W,TC=T0	19701	5043ED27K40F
R2271	315-0183-00	B200000		RES,FXD,FILM:18K OHM,5%,0.25W	19701	5043CX18K00J
R2273	311-1226-00	B010100	B199999	RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3386F-T04-252
R2274	321-0153-00	B010100	B199999	RES,FXD,FILM:383 OHM,1%,0.125W,TC=T0	07716	CEAD383R0F
R2275	321-0170-00	B010100	B199999	RES,FXD,FILM:576 OHM,1%,0.125W,TC=T0	07716	CEAD576R0F
R2276	315-0223-00	B010100	B199999	RES,FXD,FILM:22K OHM,5%,0.25W	19701	5043CX22K00J92U
R2276	321-0251-00	B200000		RES,FXD,FILM:4.02K OHM,1%,0.125W,TC=T0	19701	5033ED4K020F
R2277	321-0250-00	B010100	B199999	RES,FXD,FILM:3.92K OHM,1%,0.125W,TC=T0	07716	CEAD39200F
R2277	321-0218-00	B200000		RES,FXD,FILM:1.82K OHM,1%,0.125W,TC=T0	19701	5033ED1K82F
R2278	315-0823-00	B050000	B199999	RES,FXD,FILM:82K OHM,5%,0.25W	57668	NTR25J-E82K
R2279	321-0222-00	B010100	B199999	RES,FXD,FILM:2.00K OHM,1%,0.125W,TC=T0	19701	5033ED2K00F
R2279	321-0221-00	B200000		RES,FXD,FILM:1.96K OHM,1%,0.125W,TC=T0	19701	5043ED1K960F
R2280	315-0823-00	B010100	B199999	RES,FXD,FILM:82K OHM,5%,0.25W	57668	NTR25J-E82K
R2280	321-0254-00	B200000		RES,FXD,FILM:4.32K OHM,1%,0.125W,TC=T0	07716	CEAD43200F
R2281	315-0101-00	B060000	B199999	RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R2282	315-0332-00	B010100	B199999	RES,FXD,FILM:3.3K OHM,5%,0.25W	57668	NTR25J-E03K3
R2283	315-0753-00	B050000	B199999	RES,FXD,FILM:75K OHM,5%,0.25W	57668	NTR25J-E75K0
R2284	321-0216-00	B010100	B199999	RES,FXD,FILM:1.74K OHM,1%,0.125W,TC=T0	07716	CEAD17400F
R2285	321-0245-00	B010100	B199999	RES,FXD,FILM:3.48K OHM,1%,0.125W,TC=T0	19701	5033ED3K48F
R2285	321-0242-00	B192480	B199999	RES,FXD,FILM:3.24K OHM,1%,0.125W,TC=T0 (SELECTED)	19701	5043ED3K240F
R2285	321-0243-00	B192480	B199999	RES,FXD,FILM:3.32K OHM,1%,0.125W,TC=T0 (SELECTED)	19701	5033ED3K32F
R2285	321-0244-00	B192480	B199999	RES,FXD,FILM:3.40K OHM,1%,0.125W,TC=T0 (SELECTED)	19701	5043ED3K400F
R2285	321-0246-00	B192480	B199999	RES,FXD,FILM:3.57K OHM,1%,0.125W,TC=T0 (SELECTED)	19701	5043ED3K570F
R2285	321-0247-00	B192480	B199999	RES,FXD,FILM:3.65K OHM,1%,0.125W,TC=T0 (SELECTED)	19701	5043ED3K650F
R2285	321-0248-00	B192480	B199999	RES,FXD,FILM:3.74K OHM,1%,0.125W,TC=T0 (SELECTED)	19701	5043ED3K740F
R2286	321-0209-00	B010100	B160804	RES,FXD,FILM:1.47K OHM,1%,0.125W,TC=T0	19701	5033ED1K47F
R2286	321-0210-00	B160805	B199999	RES,FXD,FILM:1.50K OHM,1%,0.125W,TC=T0	19701	5033ED1K50F
R2286	307-0651-00	B200000		RES NTWK,FXD,FI:5,3.3K OHM,5%,0.150W	11236	750-61-R3.3K OHM
R2287	321-0199-00	B010100	B199999	RES,FXD,FILM:1.15K OHM,1%,0.125W,TC=T0	07716	CEAD11500F
R2288	321-0273-00	B010100	B199999	RES,FXD,FILM:6.81K OHM,1%,0.125W,TC=T0	07716	CEAD68100F
R2288	321-0353-00	B200000		RES,FXD,FILM:46.4K OHM,1%,0.125W,TC=T0	07716	CEAD46401F
R2289	321-0193-00	B010100	B199999	RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R2289	321-0335-00	B200000		RES,FXD,FILM:30.1K OHM,1%,0.125W,TC=T0	57668	RB14FXE30K1
R2290	321-0321-00	B200000		RES,FXD,FILM:21.5K OHM,1%,0.125W,TC=T0	07716	CEAD21501F
R2291	311-1225-00	B010100	B199999	RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-T04-102
R2291	321-0310-00	B200000		RES,FXD,FILM:16.5K OHM,1%,0.125W,TC=T0	19701	5033ED16K50F
R2292	315-0132-00	B010100	B199999	RES,FXD,FILM:1.3K OHM,5%,0.25W	57668	NTR25J-E01K3
R2292	321-0301-00	B200000		RES,FXD,FILM:13.3K OHM,1%,0.125W,TC=T0	07716	CEAD13301F
R2293	321-0245-00	B010100	B199999	RES,FXD,FILM:3.48K OHM,1%,0.125W,TC=T0	19701	5033ED3K48F
R2293	321-0302-00	B200000		RES,FXD,FILM:13.7K OHM,1%,0.125W,TC=T0	07716	CEAD 13701F
R2294	321-0255-00	B010100	B199999	RES,FXD,FILM:4.42K OHM,1%,0.125W,TC=T0	19701	5033ED4K420F
R2295	321-0241-00	B010100	B199999	RES,FXD,FILM:3.16K OHM,1%,0.125W,TC=T0	07716	CEAD31600F
R2296	321-0251-00	B200000		RES,FXD,FILM:4.02K OHM,1%,0.125W,TC=T0	19701	5033ED4K020F

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R2297	315-0152-00	B010100	B199999	RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R2297	321-0254-00	B200000		RES,FXD,FILM:4.32K OHM,1%,0.125W,TC=T0	07716	CEA043200F
R2298	315-0102-00	B010100	B199999	RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R2298	315-0203-00	B200000		RES,FXD,FILM:20K OHM,5%,0.25W	57668	NTR25J-E 20K
R2299	315-0511-00	B010100	B049999	RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R2299	315-0431-00	B050000	B199999	RES,FXD,FILM:430 OHM,5%,0.25W	19701	5043CX430R0J
R2523	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R2525	321-0239-00			RES,FXD,FILM:3.01K OHM,1%,0.125W,TC=T0	19701	5043ED3K010F
R2527	321-0201-00			RES,FXD,FILM:1.21K OHM,1%,0.125W,TC=T0	19701	5043ED1K210F
R2529	321-0022-00			RES,FXD,FILM:16.5 OHM,1%,0.125W,TC=T0 (R2529 STANDARD ONLY)	57668	RB14FXE 16E5
R2529	321-0062-00	B010100	B010104	RES,FXD,FILM:43.2 OHM,0.5%,0.125W,TC=T0 (R2529 OPTION 10 ONLY)	57668	CRB14 FXE 43.2
R2529	321-0022-00	B010105		RES,FXD,FILM:16.5 OHM,1%,0.125W,TC=T0 (R2529 OPTION 10 ONLY)	57668	RB14FXE 16E5
R2531	307-0059-00			RES,FXD,CMPSN:6.2 OHM,5%,0.5W (R2531 STANDARD ONLY)	01121	EB62G5
R2531	301-0160-00	B010100	B010104	RES,FXD,FILM:16 OHM,5%,0.50W (R2531 OPTION 10 ONLY)	57668	TR50J-E 16E
R2531	307-0059-00	B010105		RES,FXD,CMPSN:6.2 OHM,5%,0.5W (R2531 OPTION 10 ONLY)	01121	EB62G5
R2533	301-0271-00			RES,FXD,FILM:270 OHM,5%,0.5W	19701	5053CX270R0J
R2535	301-0271-00			RES,FXD,FILM:270 OHM,5%,0.5W	19701	5053CX270R0J
R3486	315-0241-00	B202661		RES,FXD,FILM:240 OHM,5%,0.25W	19701	5043CX240R0J
R4602	325-0044-00	B120000		RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R4603	325-0114-00	B120000		RES,FXD,FILM:105 OHM,0.5%,0.05W,TC=T0	03888	PME50 105 0.5%
R4605	323-0134-00	B120000		RES,FXD,FILM:243 OHM,1%,0.5W,TC=T0	07716	CECD243R0F
R4607	321-0126-00	B120000		RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R4608	321-0126-00	B120000		RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R4610	315-0621-00	B120000		RES,FXD,FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R4611	315-0561-00	B120000		RES,FXD,FILM:560 OHM,5%,0.25W	19701	5043CX560R0J
R4613	323-0134-00	B120000		RES,FXD,FILM:243 OHM,1%,0.5W,TC=T0	07716	CECD243R0F
R4615	321-0126-00	B120000	B159999	RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R4615	321-0119-00	B160000		RES,FXD,FILM:169 OHM,1%,0.125W,TC=T0	07716	CEA0169R0F
R4616	321-0126-00	B120000	B159999	RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R4616	321-0119-00	B160000		RES,FXD,FILM:169 OHM,1%,0.125W,TC=T0	07716	CEA0169R0F
R4617	321-0048-00	B160000		RES,FXD,FILM:30.9 OHM,1%,0.125W,TC=T0	57668	RB14 FXE 30E9
R4618	321-0048-00	B160000		RES,FXD,FILM:30.9 OHM,1%,0.125W,TC=T0	57668	RB14 FXE 30E9
R4619	311-1259-00	B160000		RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3329P-L58-101
R4620	325-0114-00	B120000		RES,FXD,FILM:105 OHM,0.5%,0.05W,TC=T0 (NOMINAL VALUE,SELECTED)	03888	PME50 105 0.5%
R4621	325-0044-00	B120000		RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R4622	317-0560-00	B160768		RES,FXD,CMPSN:56 OHM,5%,0.125W	01121	BB5605
R4623	315-0102-00	B120000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R4625	325-0044-00	B120000		RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R4627	325-0044-00	B120000		RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R4630	321-0097-00	B120000		RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0	91637	CMF55116G100R0F
R4632	315-0301-00	B120000		RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R4634	315-0121-00	B120000		RES,FXD,FILM:120 OHM,5%,0.25W	19701	5043CX120R0J
R4636	315-0132-00	B120000		RES,FXD,FILM:1.3K OHM,5%,0.25W	57668	NTR25J-E01K3
R4638	315-0121-00	B120000		RES,FXD,FILM:120 OHM,5%,0.25W	19701	5043CX120R0J
R4640	315-0511-00	B120000		RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R4642	315-0132-00	B120000		RES,FXD,FILM:1.3K OHM,5%,0.25W	57668	NTR25J-E01K3
R4643	315-0181-00	B120000		RES,FXD,FILM:180 OHM,5%,0.25W	57668	NTR25J-E180E
R4645	315-0121-00	B120000		RES,FXD,FILM:120 OHM,5%,0.25W	19701	5043CX120R0J
R4647	315-0132-00	B120000		RES,FXD,FILM:1.3K OHM,5%,0.25W	57668	NTR25J-E01K3
R4649	315-0121-00	B120000		RES,FXD,FILM:120 OHM,5%,0.25W	19701	5043CX120R0J
R4650	315-0102-00	B120000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R4652	315-0161-00	B120000		RES,FXD,FILM:160 OHM,5%,0.25W	57668	NTR25J-E 160E
R4656	315-0362-00	B120000		RES,FXD,FILM:3.6K OHM,5%,0.25W	19701	5043CX3K600J

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R4657	315-0102-00	B120000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R4662	325-0044-00	B120000		RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R4663	325-0114-00	B120000		RES,FXD,FILM:105 OHM,0.5%,0.05W,TC=T0 (NOMINAL VALUE,SELECTED)	03888	PME50 105 0.5%
R4665	323-0134-00	B120000		RES,FXD,FILM:243 OHM,1%,0.5W,TC=T0	07716	CECD243R0F
R4667	321-0126-00	B120000		RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R4668	321-0126-00	B120000		RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R4669	317-0101-00	B160000		RES,FXD,CMPSN:100 OHM,5%,0.125W	01121	BB1015
R4673	323-0134-00	B120000		RES,FXD,FILM:243 OHM,1%,0.5W,TC=T0	07716	CECD243R0F
R4675	321-0126-00	B120000		RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R4676	321-0126-00	B120000		RES,FXD,FILM:200 OHM,1%,0.125W,TC=T0	19701	5033ED200R0F
R4677	315-0621-00	B120000		RES,FXD,FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R4678	315-0561-00	B120000		RES,FXD,FILM:560 OHM,5%,0.25W	19701	5043CX560R0J
R4680	325-0114-00	B120000		RES,FXD,FILM:105 OHM,0.5%,0.05W,TC=T0 (NOMINAL VALUE,SELECTED)	03888	PME50 105 0.5%
R4681	325-0044-00	B120000		RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R4683	315-0102-00	B120000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R4685	325-0044-00	B120000		RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R4687	325-0044-00	B120000		RES,FXD,FILM:100 OHM,0.5%,0.05W,TC=150PPM	91637	CMF50G100R0D
R4689	----- -----	B120000		(SELECTED)		
R4850	315-0101-00	B150000		RES,FXD,FILM:100 OHM,5%,0.25W	57668	NTR25J-E 100E
R4851	321-0242-00	B150000		RES,FXD,FILM:3.24K OHM,1%,0.125W,TC=T0	19701	5043ED3K240F
R4852	321-0197-00	B150000		RES,FXD,FILM:1.10K OHM,1%,0.125W,TC=T0	07716	CEAD11000F
R4853	321-0076-00	B150000		RES,FXD,FILM:60.4 OHM,1%,0.125W,TC=T0	91637	CMF55116G0R40F
R4854	323-0187-00	B150000		RES,FXD,FILM:866 OHM,1%,0.5W,TC=T0	19701	5053RD866R0F
R4862	323-0187-00	B150000		RES,FXD,FILM:866 OHM,1%,0.5W,TC=T0	19701	5053RD866R0F
R4863	321-0076-00	B150000		RES,FXD,FILM:60.4 OHM,1%,0.125W,TC=T0	91637	CMF55116G0R40F
R4865	321-0197-00	B150000		RES,FXD,FILM:1.10K OHM,1%,0.125W,TC=T0	07716	CEAD11000F
R4867	315-0822-00	B150000		RES,FXD,FILM:8.2K OHM,5%,0.25W	19701	5043CX8K200J
R4868	311-1466-00	B150000		RES,VAR,NONWW:TRMR,2K OHM,0.5W	32997	3386F-T04-202
R4870	321-0131-00	B150000		RES,FXD,FILM:226 OHM,1%,0.125W,TC=T0	19701	5043ED226R0F
R4872	321-0114-00	B150000		RES,FXD,FILM:150 OHM,1%,0.125 W,TC=T0	19701	5033ED150R0F
R4873	311-1222-00	B150000		RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3386F-T04-101
R4874	315-0620-00	B150000	B191394	RES,FXD,FILM:62 OHM,5%,0.25W	19701	5043CX63R00J
R4874	311-0978-00	B191395		RES,VAR,NONWW:TRMR,250 OHM,0.5W	73138	82-4-2
R4876	315-0513-00	B150000		RES,FXD,FILM:51K OHM,5%,0.25W	57668	NTR25J-E51K0
R4877	315-0152-00	B150000		RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R4878	321-0199-06	B150000		RES,FXD,FILM:1.15K OHM,0.25%,0.125W,TC=T9	07716	CEAE11500C
R4879	321-0199-06	B150000		RES,FXD,FILM:1.15K OHM,0.25%,0.125W,TC=T9	07716	CEAE11500C
R4881	315-0432-00	B150000		RES,FXD,FILM:4.3K OHM,5%,0.25W	57668	NTR25J-E04K3
R4882	315-0100-00	B150000		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R4883	321-0167-00	B150000		RES,FXD,FILM:536 OHM,1%,0.125W,TC=T0	07716	CEAD536R0F
R4885	315-0391-00	B150000		RES,FXD,FILM:390 OHM,5%,0.25W	57668	NTR25J-E390E
R4886	315-0270-00	B150000		RES,FXD,FILM:27 OHM,5%,0.25W	19701	5043CX27R00J
R4888	321-0193-00	B150000		RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R4889	323-0706-01	B150000		RES,FXD,FILM:800 OHM,0.5%,0.5W,TC=T0	07716	CECD800R0D
R4895	315-0391-00	B150000		RES,FXD,FILM:390 OHM,5%,0.25W	57668	NTR25J-E390E
R4896	315-0270-00	B150000		RES,FXD,FILM:27 OHM,5%,0.25W	19701	5043CX27R00J
R4898	321-0193-00	B150000		RES,FXD,FILM:1K OHM,1%,0.125W,TC=T0	19701	5033ED1K00F
R4899	323-0706-01	B150000		RES,FXD,FILM:800 OHM,0.5%,0.5W,TC=T0	07716	CECD800R0D
R4902	321-0205-00	B150000		RES,FXD,FILM:1.33K OHM,1%,0.125W,TC=T0	19701	5033ED1K330F
R4904	308-0304-00	B150000		RES,FXD,WW:1.5K OHM,1%,3W	44655	43F1K5
R4905	315-0102-00	B150000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R4906	315-0220-00	B150000		RES,FXD,FILM:22 OHM,5%,0.25W	19701	5043CX22R00J
R4908	321-0066-00	B150000		RES,FXD,FILM:47.5 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G47R50F
R4912	321-0205-00	B150000		RES,FXD,FILM:1.33K OHM,1%,0.125W,TC=T0	19701	5033ED1K330F
R4914	308-0304-00	B150000		RES,FXD,WW:1.5K OHM,1%,3W	44655	43F1K5
R4915	315-0102-00	B150000		RES,FXD,FILM:1K OHM,5%,0.25W	57668	NTR25JE01K0
R4916	315-0220-00	B150000		RES,FXD,FILM:22 OHM,5%,0.25W	19701	5043CX22R00J

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
R4918	321-0066-00	B150000		RES,FXD,FILM:47.5 OHM,0.5%,0.125W,TC=T0	91637	CMF55116G47R50F
R4921	315-0123-00	B150000		RES,FXD,FILM:12K OHM,5%,0.25W	57668	NTR25J-E12K0
R4923	321-0260-00	B150000		RES,FXD,FILM:4.99K OHM,1%,0.125W,TC=T0	19701	5033ED4K990F
R4925	311-1225-00	B150000		RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-T04-102
R4926	321-0258-00	B150000		RES,FXD,FILM:4.75K OHM,1%,0.125W,TC=T0	19701	5033ED4K750F
R4930	315-0271-00	B150000		RES,FXD,FILM:270 OHM,5%,0.25W	57668	NTR25J-E270E
R4931	303-0332-00	B150000		RES,FXD,CMPSN:3.3K OHM,5%,1W	01121	GB3325
R4933	315-0100-00	B150000		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R4935	323-0327-00	B150000		RES,FXD,FILM:24.9K OHM,1%,0.5W,TC=T0	91637	MFF1226G24901F
R4936	315-0680-00	B150000		RES,FXD,FILM:68 OHM,5%,0.25W	57668	NTR25J-E68E0
R4937	315-0150-00	B150000		RES,FXD,FILM:15 OHM,5%,0.25W	19701	5043CX15R00J
R4938	321-0218-00	B150000		RES,FXD,FILM:1.82K OHM,1%,0.125W,TC=T0	19701	5033ED1K82F
R4939	301-0563-00	B150000		RES,FXD,FILM:56K OHM,5%,0.5W	19701	5053CX56K00J
R4943	301-0333-00	B150000		RES,FXD,FILM:33K OHM,5%,0.5W	19701	5053CX33K00J
R4949	303-0222-00	B150000		RES,FXD,CMPSN:2.2K OHM,5%,1W	01121	GB2225
R4951	303-0272-00	B150000		RES,FXD,CMPSN:2.7 OHM,5%,1W	01121	GB2725
R4953	315-0100-00	B150000		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
R4955	323-0327-00	B150000		RES,FXD,FILM:24.9K OHM,1%,0.5W,TC=T0	91637	MFF1226G24901F
R4956	315-0680-00	B150000		RES,FXD,FILM:68 OHM,5%,0.25W	57668	NTR25J-E68E0
R4957	315-0270-00	B150000		RES,FXD,FILM:27 OHM,5%,0.25W	19701	5043CX27R00J
R4958	321-0205-00	B150000		RES,FXD,FILM:1.33K OHM,1%,0.125W,TC=T0	19701	5033ED1K330F
R4959	303-0273-00	B150000		RES,FXD,CMPSN:27K OHM,5%,1W	01121	GB2735
R4990	307-0106-00	B150000		RES,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
R4992	307-0106-00	B150000		RES,FXD,CMPSN:4.7 OHM,5%,0.25W	01121	CB 47G5
R5501	315-0301-00	B130000		RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R5502	315-0151-00	B130000		RES,FXD,FILM:150 OHM,5%,0.25W	57668	NTR25J-E150E
R5504	315-0202-00	B130000		RES,FXD,FILM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R5505	315-0151-00	B130000		RES,FXD,FILM:150 OHM,5%,0.25W	57668	NTR25J-E150E
R5506	321-0104-01	B130000		RES,FXD,FILM:118 OHM,0.5%,0.125W,TC=T0	19701	5033RD118R0D
R5507	321-0053-02	B130000		RES,FXD,FILM:34.8 OHM,0.5%,0.125W,TC=T2	91637	CMF55116D34R80D
R5508	325-0117-00	B130000		RES,FXD,FILM:52.1 OHM,0.5%,0.05W,TC=T0	14298	CMF50-G52R10D
R5510	321-0135-00	B130000		RES,FXD,FILM:249 OHM,1%,0.125W,TC=T0	07716	CEA0249R0F
R5511	317-0101-03	B181040		RES,FXD,CMPSN:100 OHM,5%,0.125 W	01121	BB1015
R5512	321-0135-00	B130000		RES,FXD,FILM:249 OHM,1%,0.125W,TC=T0	07716	CEA0249R0F
R5513	321-0104-01	B130000		RES,FXD,FILM:118 OHM,0.5%,0.125W,TC=T0	19701	5033RD118R0D
R5514	325-0117-00	B130000		RES,FXD,FILM:52.1 OHM,0.5%,0.05W,TC=T0	14298	CMF50-G52R10D
R5515	321-0053-02	B130000		RES,FXD,FILM:34.8 OHM,0.5%,0.125W,TC=T2	91637	CMF55116D34R80D
R5516	315-0103-00	B130000		RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R5520	315-0433-00	B130000		RES,FXD,FILM:43K OHM,5%,0.25W	19701	5043CX43K00J
R5522	315-0151-00	B130000		RES,FXD,FILM:150 OHM,5%,0.25W	57668	NTR25J-E150E
R5524	315-0202-00	B130000		RES,FXD,FILM:2K OHM,5%,0.25W	57668	NTR25J-E 2K
R5525	315-0151-00	B130000		RES,FXD,FILM:150 OHM,5%,0.25W	57668	NTR25J-E150E
R5526	321-0104-01	B130000		RES,FXD,FILM:118 OHM,0.5%,0.125W,TC=T0	19701	5033RD118R0D
R5527	321-0053-02	B130000		RES,FXD,FILM:34.8 OHM,0.5%,0.125W,TC=T2	91637	CMF55116D34R80D
R5528	325-0117-00	B130000		RES,FXD,FILM:52.1 OHM,0.5%,0.05W,TC=T0	14298	CMF50-G52R10D
R5530	321-0135-00	B130000		RES,FXD,FILM:249 OHM,1%,0.125W,TC=T0	07716	CEA0249R0F
R5531	317-0101-03	B181040		RES,FXD,CMPSN:100 OHM,5%,0.125 W	01121	BB1015
R5532	321-0135-00	B130000		RES,FXD,FILM:249 OHM,1%,0.125W,TC=T0	07716	CEA0249R0F
R5533	321-0104-01	B130000		RES,FXD,FILM:118 OHM,0.5%,0.125W,TC=T0	19701	5033RD118R0D
R5534	325-0117-00	B130000		RES,FXD,FILM:52.1 OHM,0.5%,0.05W,TC=T0	14298	CMF50-G52R10D
R5535	321-0053-02	B130000		RES,FXD,FILM:34.8 OHM,0.5%,0.125W,TC=T2	91637	CMF55116D34R80D
R5536	315-0103-00	B130000		RES,FXD,FILM:10K OHM,5%,0.25W	19701	5043CX10K00J
R5538	317-0750-00	B130000	B139999	RES,FXD,CMPSN:75 OHM,5%,0.125W	01121	BB7505
R5538	321-0085-00	B140000		RES,FXD,FILM:75 OHM,1%,0.125W,TC=T0	57668	CRB14FXE 75 OHM
R5539	317-0750-00	B130000	B139999	RES,FXD,CMPSN:75 OHM,5%,0.125W	01121	BB7505
R5539	321-0085-00	B140000		RES,FXD,FILM:75 OHM,1%,0.125W,TC=T0	57668	CRB14FXE 75 OHM
R5540	317-0101-03	B130000		RES,FXD,CMPSN:100 OHM,5%,0.125 W	01121	BB1015
R5541	323-0071-00	B130000	B169999	RES,FXD,FILM:53.6 OHM,1%,0.5W,TC=T0	91637	CMF65116C53R60F
R5542	323-0626-00	B130000	B169999	RES,FXD,FILM:50 OHM,1%,0.5W,TC=T0	91637	MFF1226G50R00F

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R5543	315-0750-02	B170000	B181039	RES,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505 CDPK ONLY
R5543	322-0085-00	B181040		RES,FXD,FILM:75.0 OHM,1%,0.25W,TC=T0	75042	CEBT0-75R00F
R5544	315-0750-02	B130000	B169999	RES,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505 CDPK ONLY
R5545	315-0750-02	B130000	B169999	RES,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505 CDPK ONLY
R5546	315-0750-02	B170000	B181039	RES,FXD,CMPSN:75 OHM,5%,0.25W	01121	CB7505 CDPK ONLY
R5546	322-0085-00	B181040		RES,FXD,FILM:75.0 OHM,1%,0.25W,TC=T0	75042	CEBT0-75R00F
R5547	311-1262-00	B130000		RES,VAR,NONWW:TRMR,750 OHM,0.5W	32997	3329P-L58-751
R5548	308-0756-00	B170000		RES,FXD,MM:100 OHM,1%,3W	14193	SA31-1000F
R5552	321-0109-00	B130000		RES,FXD,FILM:133 OHM,1%,0.125W,TC=T0	07716	CEAD133R0F
R5553	317-0131-00	B130000	B139999	RES,FXD,CMPSN:130 OHM,5%,0.125W	01121	BB1315
R5553	317-0620-00	B140000	B181039	RES,FXD,CMPSN:62 OHM,5%,0.125W (NOMINAL VALUE,SELECTED)	01121	BB6205
R5553	317-0101-00	B181040		RES,FXD,CMPSN:100 OHM,5%,0.125W (NOMINAL VALUE,SELECTED)	01121	BB1015
R5554	321-0109-00	B130000		RES,FXD,FILM:133 OHM,1%,0.125W,TC=T0	07716	CEAD133R0F
R5558	321-0276-00	B130000	B169999	RES,FXD,FILM:7.32K OHM,1%,0.125W,TC=T0	19701	5043ED7K320F
R5558	321-0278-00	B170000	B181039	RES,FXD,FILM:7.68K OHM,1%,0.125W,TC=T0 (NOMINAL VALUE,SELECTED)	07716	CEAD76800F
R5558	321-0275-00	B181040		RES,FXD,FILM:7.15K OHM,1%,0.125W,TC=T0 (NOMINAL VALUE,SELECTED)	07716	CEAD71500F
R5559	321-0234-00	B130000	B169999	RES,FXD,FILM:2.67K OHM,1%,0.125W,TC=T0	19701	5033ED2K67F
R5559	321-0232-00	B170000	B181039	RES,FXD,FILM:2.55K OHM,1%,0.125W,TC=T0 (NOMINAL VALUE,SELECTED)	19701	5043ED2K550F
R5559	321-0238-00	B181040		RES,FXD,FILM:2.94K OHM,1%,0.125W,TC=T0 (NOMINAL VALUE,SELECTED)	07716	CEAD29400F
R5561	321-0189-00	B130000		RES,FXD,FILM:909 OHM,1%,0.125W,TC=T2	19701	5033ED909R0F
R5563	315-0470-00	B130000		RES,FXD,FILM:47 OHM,5%,0.25W	57668	NTR25J-E47E0
R5565	321-0069-00	B130000		RES,FXD,FILM:51.1 OHM,1%,0.125W,TC=T0	91637	CMF55116G51R10F
R5566	321-0069-00	B130000		RES,FXD,FILM:51.1 OHM,1%,0.125W,TC=T0	91637	CMF55116G51R10F
R5567	315-0430-00	B130000		RES,FXD,FILM:43 OHM,5%,0.25W	19701	5043CX43R00J
R5568	317-0682-00	B140000	B169999	RES,FXD,CMPSN:6.8K OHM,5%,0.125W	01121	BB6825
R5568	315-0682-00	B170000	B181039	RES,FXD,FILM:6.8K OHM,5%,0.25W	57668	NTR25J-E06K8
R5568	317-0912-00	B181040		RES,FXD,CMPSN:9.1K OHM,5%,0.125W	01121	BB9125
R5569	315-0430-00	B130000	B139999	RES,FXD,FILM:43 OHM,5%,0.25W	19701	5043CX43R00J
R5569	315-0270-00	B140000		RES,FXD,FILM:27 OHM,5%,0.25W	19701	5043CX27R00J
R5570	311-1560-00	B140000	B169999	RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3352T-1-502
R5570	311-1227-00	B170000	B181039	RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3386F-T04-502
R5570	311-1226-00	B181040		RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	32997	3386F-T04-252
R5571	321-0289-00	B130000	B139999	RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5033ED10K0F
R5572	321-0289-00	B130000	B139999	RES,FXD,FILM:10.0K OHM,1%,0.125W,TC=T0	19701	5033ED10K0F
R5573	315-0152-00	B170000		RES,FXD,FILM:1.5K OHM,5%,0.25W	57668	NTR25J-E01K5
R5574	315-0821-00	B130000		RES,FXD,FILM:820 OHM,5%,0.25W	19701	5043CX820R0J
R5575	311-1223-00	B130000		RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3386F-T04-251
R5576	315-0821-00	B130000		RES,FXD,FILM:820 OHM,5%,0.25W	19701	5043CX820R0J
R5578	315-0511-00	B130000		RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R5580	315-0301-00	B130000		RES,FXD,FILM:300 OHM,5%,0.25W	57668	NTR25J-E300E
R5582	315-0511-00	B130000	B181039	RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R5582	315-0471-00	B181040		RES,FXD,FILM:470 OHM,5%,0.25W	57668	NTR25J-E470E
R5583	311-1261-00	B130000		RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3329P-L58-501
R5584	315-0511-00	B130000	B181039	RES,FXD,FILM:510 OHM,5%,0.25W	19701	5043CX510R0J
R5584	315-0621-00	B181040		RES,FXD,FILM:620 OHM,5%,0.25W	57668	NTR25J-E620E
R5586	321-0220-00	B130000		RES,FXD,FILM:1.91K OHM,1%,0.125W,TC=T0	19701	5033ED1K91F
R5587	321-0220-00	B130000		RES,FXD,FILM:1.91K OHM,1%,0.125W,TC=T0	19701	5033ED1K91F
R5588	315-0200-00	B130000		RES,FXD,FILM:20 OHM,5%,0.25W	19701	5043CX20R00J
R5590	317-0820-00	B130000	B139999	RES,FXD,CMPSN:82 OHM,5%,0.125W (NOMINAL VALUE,SELECTED)	01121	BB8205
R5590	317-0560-00	B140000	B181039	RES,FXD,CMPSN:56 OHM,5%,0.125W (NOMINAL VALUE,SELECTED)	01121	BB5605
R5590	317-0101-00	B181040		RES,FXD,CMPSN:100 OHM,5%,0.125W (NOMINAL VALUE,SELECTED)	01121	BB1015

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R5595	321-0122-00	B130000		RES,FXD,FILM:182 OHM,1%,0.125M,TC=T0	19701	5033ED182R0F
R5597	323-0132-00	B130000		RES,FXD,FILM:232 OHM,1%,0.5M,TC=T0	19701	5053R0232R0F
R5598	323-0132-00	B130000		RES,FXD,FILM:232 OHM,1%,0.5M,TC=T0	19701	5053R0232R0F
RT731	307-0364-00			RES,THERMAL:50 OHM,5%,0.125M	01295	T8 1/8 500J
RT1209	307-0350-00			RES,THERMAL:7.5 OHM,10%,3.9%/DEG C	80009	307-0350-00
RT4877	307-0124-00	B150000		RES,THERMAL:5K OHM,10%,NTC	15454	1DC502K-220-EC
S1050	260-0723-00			SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
S1117	260-1353-00			SWITCH,PUSH:2 BTN,2 POLE,POLARITY & VOLT RANGE (S1117B OPTION 10 ONLY)	80009	260-1353-00
S1119	260-0247-00			SWITCH,PUSH:SPST,1A,115VAC	81073	30YY1009
S1139	260-0247-00			SWITCH,PUSH:SPST,1A,115VAC	81073	30YY1009
S1149	260-1353-00			SWITCH,PUSH:2 BTN,2 POLE,POLARITY & VOLT RANGE (S1149 STANDARD ONLY)	80009	260-1353-00
S1167	----- -----			(OPTION 10 ONLY. FURN AS A UNIT WITH R1167)		
S1171	----- -----			(STANDARD ONLY. FURN AS A UNIT WITH R1171) (OPTION 10 ONLY. FURN AS A UNIT WITH R1171)		
S1180	260-1472-00			SWITCH,PUSH:2 BTN,2 POLE,VERTICAL MODE	80009	260-1472-00
S1185	260-1208-00			SWITCH,PUSH:DPDT,28VDC,PUSH-PUSH	31918	ORDER BY DESCR
S1187	260-1471-00			SWITCH,PUSH:3 BUTTON,2 POLE,TRIGGER SEL	80009	260-1471-00
S1190	260-1353-00			SWITCH,PUSH:2 BTN,2 POLE,POLARITY & VOLT RANGE	80009	260-1353-00
S1200	260-1102-00	B010100	B029999	SWITCH,TOGGLE:DPST,15A,125VAC	27193	8906K-1667
S1200	260-1060-01	B030000		SWITCH,TOGGLE:DPST,15A,125VAC	27193	8906K-2507
S1201	260-0638-00			SWITCH,THRMSTC:NC,OPEN 75,CL 55,10A,240V (S1201 STANDARD ONLY)	14859	20700 LA506-2042
S1201	260-0879-00	B010100	B010104	SW,THRMSTC:NC,OPEN 88.0,CL 71.1,10A,240V (S1201 OPTION 10 ONLY)	14859	20700L66-321
S1201	260-0638-00	B010105		SWITCH,THRMSTC:NC,OPEN 75,CL 55,10A,240V (S1201 OPTION 10 ONLY)	14859	20700 LA506-2042
S1212	----- -----			(SEE RMPL, LINE VOLTAGE SELECTOR)		
S2110	260-0723-00	B010100	B199999	SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
T1208	120-0636-00			XFMR,PWR,STPDN:LINE TRIGGER	80009	120-0636-00
T1225	120-0743-00			XFMR,TOROID:	80009	120-0743-00
T1230	120-0744-00			XFMR,TOROID:5 WINDINGS	TK1345	120-0744-00
T1235	120-0747-00			XFMR,TOROID:	TK1345	120-0747-00
T1310	120-0742-00	B010100	B181129	XFMR,PWR,SDN&SU:HV	80009	120-0742-00
T1310	120-1250-00	B181130		XFMR,PWR,SDN&SU:	80009	120-1250-00
U230	155-0011-00			MICROCKT,DGTL:CLOCK & CHOP BLANKING	80009	155-0011-00
U250	156-0041-05			MICROCKT,DGTL:DUAL D FLIP FLOP SCRN	01295	SN7474NP3
U287	156-0041-05			MICROCKT,DGTL:DUAL D FLIP FLOP SCRN	01295	SN7474NP3
U356	155-0012-00			MICROCKT,DGTL:Z-AXIS AMPLIFIER	80009	155-0012-00
U575	155-0060-00	B010100	B039999	MICROCKT,DGTL:VERT CHANNEL SW	80009	155-0060-00
U575	155-0060-01	B040000	B129999	MICROCKT,DGTL:VERT CHANNEL SW	80009	155-0060-01
U625	155-0060-00	B010100	B119999	MICROCKT,DGTL:VERT CHANNEL SW (U625 FOR REPLACEMENT ORDER 670-1625-01)	80009	155-0060-00
U685	155-0059-00			MICROCKT,LINEAR:HF AMPLIFIER	80009	155-0059-00
U745	155-0065-00	B010100	B179999	MICROCKT,LINEAR:OUTPUT AMPL	80009	155-0065-00
U745	155-0064-00	B180000		MICROCKT,LINEAR:OUTPUT AMPL	80009	155-0064-00
U825	155-0022-00			MICROCKT,DGTL:CHANNEL SWITCH	80009	155-0022-00
U1124	156-0072-02			MICROCKT,DGTL:MONOSTABLE MV,SCRN (U1124 OPTION 10 ONLY)	18324	N74121(NB OR FB)
U1148	156-0072-02			MICROCKT,DGTL:MONOSTABLE MV,SCRN (U1148 OPTION 10 ONLY)	18324	N74121(NB OR FB)
U1275	155-0067-02			MICROCKT,DGTL:POWER SPLY RGLTR	80009	155-0067-02
U1615	152-0493-00			SEMICOND DVC,DI:V MULTR,3KV IN,21KV OUT	60211	VM173
U1635	156-0067-00			MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
U2120	156-0043-03			MICROCKT,DGTL:QUAD 2-INP NOR GATE,SCRN	18324	N7402(NB OR FB)
U2126	155-0021-00	B010100	B060274	MICROCKT,DGTL:SCAN OSCILLATOR & LOGIC	80009	155-0021-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
U2126	155-0021-01	B060275		MICROCKT,DGTL:SCAN OSCILLATOR & LOGIC	80009	155-0021-01
U2127	156-1172-01	B200000		MICROCKT,DGTL:DUAL 4 BIT BIN CNTR	01295	SN74LS393NP3
U2155	156-0043-03			MICROCKT,DGTL:QUAD 2-INP NOR GATE,SCRN	18324	N7402(NB OR FB)
U2157	156-0730-02	B200000		MICROCKT,DGTL:QUAD 2-INP NOR BFR,SCRN	01295	SN74LS33NP3
U2159	155-0017-00			MICROCKT,DGTL:BCD DECIMAL	80009	155-0017-00
U2162	156-0388-03	B200000		MICROCKT,DGTL:DUAL D FLIP-FLOP	01295	SN74LS74ANP3
U2180	155-0015-01			MICROCKT,DGTL:ANALOG DATA SWITCH	80009	155-0015-01
U2185	155-0014-01			MICROCKT,DGTL:A-D CONVERTER	80009	155-0014-01
U2186	156-1177-01	B200000		MICROCKT,DGTL:STET LINE PRIORITY ENCODER	01295	SN74LS147NP3
U2190	155-0015-01			MICROCKT,DGTL:ANALOG DATA SWITCH	80009	155-0015-01
U2202	156-1172-01	B200000		MICROCKT,DGTL:DUAL 4 BIT BIN CNTR	01295	SN74LS393NP3
U2203	160-2997-00	B200000		MICROCKT,DGTL:4096 X 8 EPROM,PRGM	80009	160-2997-00
U2204	156-0865-02	B200000		MICROCKT,DGTL:OCTAL D FF W/CLEAR	01295	SN74LS273NP3
U2210	156-1191-00	B200000		MICROCKT,LINEAR:DUAL BI-FET OPNL AMPL	01295	TL072CP
U2232	155-0018-00			MICROCKT,DGTL:ZERO LOGIC	80009	155-0018-00
U2244	155-0014-01			MICROCKT,DGTL:A-D CONVERTER	80009	155-0014-01
U2246	156-1177-01	B200000		MICROCKT,DGTL:STET LINE PRIORITY ENCODER	01295	SN74LS147NP3
U2250	156-0032-03	B010100	B199999	MICROCKT,DGTL:4 BIT BINARY COUNTER	01295	SN7493NP3
U2251	156-0730-02	B200000		MICROCKT,DGTL:QUAD 2-INP NOR BFR,SCRN	01295	SN74LS33NP3
U2257	156-1191-00	B200000		MICROCKT,LINEAR:DUAL BI-FET OPNL AMPL	01295	TL072CP
U2260	155-0019-00	B010100	B199999	MICROCKT,DGTL:DECIMAL POINT & SPACE	80009	155-0019-00
U2263	156-0140-02	B200000		MICROCKT,DGTL:HEX BUFFERS W/OC HV OUT,	18324	N7417(NB OR FB)
U2264	156-0480-02	B200000		MICROCKT,DGTL:QUAD 2-INP & GATE	01295	SN74LS08NP3
U2270	155-0023-00	B010100	B199999	MICROCKT,DGTL:CHARACTER GENERATOR,NUM	80009	155-0023-00
U2272	155-0024-00	B010100	B199999	MICROCKT,DGTL:CHAR GEN SPCL SYMBOLS	80009	155-0024-00
U2274	155-0025-00	B010100	B199999	MICROCKT,DGTL:CHAR GEN PREFIXES	80009	155-0025-00
U2276	155-0026-00	B010100	B199999	MICROCKT,DGTL:CHARACTER GENERATOR LETTERS	80009	155-0026-00
U2276	156-1191-00	B200000		MICROCKT,LINEAR:DUAL BI-FET OPNL AMPL	01295	TL072CP
U2278	155-0027-00	B010100	B199999	MICROCKT,DGTL:CHAR GEN SPECIAL ALPHA	80009	155-0027-00
U2284	155-0020-00	B010100	B199999	MICROCKT,DGTL:CHANNEL SW OUTPUT ASSY	80009	155-0020-00
U2536	156-0281-00			MICROCKT,LINEAR:4-XSTR,HIGH CUR ARRAY	02735	89164
U4625	155-0095-01	B120000	B180964	MICROCKT,LINEAR:HF DIFFERENTIAL AMPLIFIER, PAIR	80009	155-0095-01
U4625	155-0095-03	B180965		MICROCKT,LINEAR:HF DIFF AMPL,TESTED PAIR	80009	155-0095-03
U4641	156-0048-00	B120000		MICROCKT,LINEAR:5 XSTR ARRAY	02735	CA3046
U4685	----- -----			(PART OF U4625)		
U5502	156-0048-00	B130000		MICROCKT,LINEAR:5 XSTR ARRAY	02735	CA3046
U5510	155-0078-03	B130000	B180988	MICROCKT,LINEAR:SELECTED	80009	155-0078-03
U5510	155-0078-10	B180989		MICROCKT,LINEAR:VERTICAL AMPLIFIER ML	80009	155-0078-10
U5530	155-0078-03	B130000	B180988	MICROCKT,LINEAR:SELECTED	80009	155-0078-03
U5530	155-0078-10	B180989		MICROCKT,LINEAR:VERTICAL AMPLIFIER ML	80009	155-0078-10
U5550	155-0078-03	B130000	B180988	MICROCKT,LINEAR:SELECTED	80009	155-0078-03
U5550	155-0078-10	B180989		MICROCKT,LINEAR:VERTICAL AMPLIFIER ML	80009	155-0078-10
U5570	156-0067-00	B130000	B139999	MICROCKT,LINEAR:OPNL AMPL,SEL	04713	MC1741CP1
V1725	154-0644-05	B010100	B202653	ELECTRON TUBE:CRT,P31,INT SC	80009	154-0644-05
V1725	154-0893-05	B202654		ELECTRON TUBE:FINISHED T7900-31-2	80009	154-0893-05
V1725	154-0661-05			ELECTRON TUBE:CRT,P31,INT SC (OPTION 04 ONLY)	80009	154-0661-05
V1725	154-0661-09			ELECTRON TUBE:CRT,P11,INT SC (OPTION 13 ONLY)	80009	154-0661-09
V1725	154-0644-09			ELECTRON TUBE:CRT,P11,INT SC (OPTION 78 ONLY)	80009	154-0644-09
VR884	152-0306-00	B010100	B049999	SEMICOND DVC,DI:ZEN,SI,9.1V,5%,0.4W,DO-7	12954	1N960B
VR884	152-0611-00	B050000	B149999	SEMICOND DVC,DI:ZEN,SI,9V,2%,0.4W,DO-7	04713	SZ14347
VR894	152-0306-00	B010100	B049999	SEMICOND DVC,DI:ZEN,SI,9.1V,5%,0.4W,DO-7	12954	1N960B
VR894	152-0611-00	B050000	B149999	SEMICOND DVC,DI:ZEN,SI,9V,2%,0.4W,DO-7	04713	SZ14347
VR1239	152-0241-00	B181130		SEMICOND DVC,DI:ZEN,SI,33V,5%,0.4W,DO-7	14552	1N973B
VR1246	152-0287-00	B010100	B140694	SEMICOND DVC,DI:ZEN,SI,110V,5%,0.4W,DO-7	04713	SZG275K2RL
VR1246	152-0428-00	B140695		SEMICOND DVC,DI:ZEN,SI,120V,5%,0.4W,DO-7	04713	SZ13202 (1N987B)

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
VR1253	152-0149-00			SEMICOND OVC,DI:ZEN,SI,10V,5%,0.4W,DO-7	15238	Z5406
VR1279	152-0243-00	B010100	B029999	SEMICOND OVC,DI:ZEN,SI,15V,5%,0.4W,DO-7	04713	SZ13203 (1N9658)
VR1279	152-0304-00	B030000		SEMICOND OVC,DI:ZEN,SI,20V,5%,0.4W,DO-7	15238	Z5411
VR1297	152-0212-00			SEMICOND OVC,DI:ZEN,SI,9V,5%,0.5W,DO-7	04713	SZ50646RL
VR1401	152-0226-00			SEMICOND OVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	04713	SZ12262RL
VR1461	152-0226-00			SEMICOND OVC,DI:ZEN,SI,5.1V,5%,0.4W,DO-7	04713	SZ12262RL
VR1501	152-0127-00			SEMICOND OVC,DI:ZEN,SI,7.5V,5%,0.4W,DO-7	14433	Z5347 (1N9588)
VR1505	152-0212-00			SEMICOND OVC,DI:ZEN,SI,9V,5%,0.5W,DO-7	04713	SZ50646RL
VR1635	152-0255-00			SEMICOND OVC,DI:ZEN,SI,51V,5%,0.4W,DO-7	04713	SZG35009K7
VR1701	152-0247-00			SEMICOND OVC,DI:ZEN,SI,150V,5%,0.4W,DO-7	04713	SZG275K1RL
VR2185	152-0405-00	B200000		SEMICOND OVC,DI:ZEN,SI,15V,5%,1W,TO-41	12954	DZB41205A
VR2186	152-0405-00	B200000		SEMICOND OVC,DI:ZEN,SI,15V,5%,1W,TO-41	12954	DZB41205A
VR2187	152-0405-00	B200000		SEMICOND OVC,DI:ZEN,SI,15V,5%,1W,TO-41	12954	DZB41205A
VR2262	152-0405-00	B010100	B199999	SEMICOND OVC,DI:ZEN,SI,15V,5%,1W,TO-41	12954	DZB41205A
VR2263	152-0405-00	B010100	B199999	SEMICOND OVC,DI:ZEN,SI,15V,5%,1W,TO-41	12954	DZB41205A
VR2264	152-0405-00	B010100	B199999	SEMICOND OVC,DI:ZEN,SI,15V,5%,1W,TO-41	12954	DZB41205A
VR4943	152-0149-00	B150000		SEMICOND OVC,DI:ZEN,SI,10V,5%,0.4W,DO-7	15238	Z5406
VR4950	152-0282-00	B150000		SEMICOND OVC,DI:ZEN,SI,30V,5%,0.4W,DO-7	04713	SZG35009K13
VR5563	152-0217-00	B130000		SEMICOND OVC,DI:ZEN,SI,8.2V,5%,0.4W,DO-7	04713	SZG20
VR5565	152-0337-00	B130000	B139999	SEMICOND OVC,DI:ZEN,SI,6.3V,3.2%,0.4W,DO-7/DO-35	04713	SZG210K
VR5565	153-0030-00	B140000		SEMICOND OVC SE:ZENER,PR	04713	SZG179
VR5566	152-0337-00	B130000	B139999	SEMICOND OVC,DI:ZEN,SI,6.3V,3.2%,0.4W,DO-7/DO-35	04713	SZG210K
VR5566	153-0030-00	B140000		SEMICOND OVC SE:ZENER,PR	04713	SZG179
W5584	131-0566-00	B181040		BUS,COND:DUMMY RES,0.094 OD X 0.225L	24546	OMA 07

OPTION INFORMATION

Your instrument may be equipped with one or more options. This section describes those options, or directs the reader to where the option is documented.

Option 1	W/O CRT Readout:	Described in this section.
Option 3	EMI Modification:	Described in this section.
Option 4	Maximum Brightness CRT:	Described in this section.
Option 10	Pulsed Graticule:	Described in this section.
Option 13	Maximum Brightness CRT with Type P11 Phosphor	Described in this section.
Option 78	P11 Phosphor, CRT:	Described in this section.

OPTION 1

Without CRT Readout

This option deletes the Readout System. Operation of the instrument is unchanged except there is no alpha-numeric display on the CRT and the READOUT control is non-functional. The Readout board A21 has been replaced with a DUMMY READOUT Circuit Board Assembly, to maintain continuity of the remaining circuitry. The components shown on Readout board photo, Fig. 6-16, and schematic diagram 12 are not present in the Option 1 products. DUMMY READOUT board parts list information is located in this section.

Parts List Changes

DELETE:

A21	670-1900-02	Readout Circuit Board Assembly

ADD

	670-2018-00	Dummy Readout Circuit Board Assembly

OPTION 3

This option adds special shielding and equipment to the instrument for EMI protection when operated in most severe EMI environments. Also, in order to meet the EMI specifications, any unused plug-in compartment must be covered with an EMI shielded blank plug-in panel. One is required for each unused compartment. Order or use only Tektronix Part No. 016-0155-00 blank plug-in panel for this purpose.

EMI specifications may be found in Table 2-2 of the R7903 Operators manual.

Option 3 information may be located in the following sections of this manual:

Mechanical Parts Illustrations	Section 7, Fig. 4
Mechanical Parts List	Page 7-13 and 7-14

OPTION 4

Maximum Brightness CRT

This option changes the standard CRT to a 4 x 5-cm type that provides maximum trace brightness.

Parts List Changes

DELETE:

V1725	154-0644-05	Standard 8 x 10-cm CRT, P31 phosphor
	331-0245-00	Mask, CRT

ADD

V1725	154-0661-05	4 x 5-cm CRT, P31 phosphor
	331-0318-00	Mask, CRT (4 x 5)

After installation of the 4 x 5-cm CRT, perform calibration steps 4 through 15 and steps 21 through 24 as outlined in Section 2 of this manual.

OPTION 10
Pulsed Graticule

This option provides a pulsed graticule circuit, and a pulsed readout circuit, in addition to the normal graticule and readout circuits.

Option 10 information may be located in the following sections of this manual:

OPTION 13

Maximum Brightness CRT with Type P11 Phosphor

This option changes the standard CRT to a 4 x 5-cm type that provides maximum trace brightness and optimum photographic writing speed.

Parts List Changes

DELETE:

V1725	154-0644-05	Standard 8 x 10-cm CRT, P31 phosphor
	331-0245-00	Mask,CRT

ADD:

V1725	154-0661-09	4 x 5-cm CRT,P11 phosphor
	331-0318-00	Mask,CRT (4 x 5)

After installation of the 4 x 5-cm CRT perform calibration steps 4 through 15 and steps 21 through 24 as outlined in Section 2 of this manual.

OPTION 78

Type P11 Phosphor CRT

This option changes the standard CRT to a type P11 phosphor CRT for optimum photographic writing speed.

Parts List Changes

DELETE:

V1725	154-0644-05	Standard 8 x 10-cm CRT, P31 phosphor

ADD:

V1725	154-0644-09	8 x 10-cm CRT,P11 phosphor

After installation of the CRT, perform calibration steps 4 through 15 and steps 21 through 24 as outlined in Section 2 of this manual.

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

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	P O BOX 3608	HARRISBURG PA 17105
00866	GOE ENGINEERING COMPANY, INC.	P O BOX 3485, 250 S 9TH AVE.	CITY OF INDUSTRY, CA 91746
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
02768	ILLINOIS TOOL WORKS INC FASTEX DIVISION	195 ALGONQUIN ROAD	DES PLAINES IL 60016
04963	MINNESOTA MINING AND MFG CO ADHESIVES COATINGS AND SEALERS DIV	3M CENTER	ST PAUL MN 55101
05820	EG AND G WAKEFIELD ENGINEERING	60 AUDUBON RD	WAKEFIELD MA 01880
06229	ELECTROVERT INC	86 HARTFORD AVE	MOUNT VERNON NY 10553
06383	PANDUIT CORP	17301 RIDGELAND	TINLEY PARK IL 60477
06540	WITE CORP AMATOM ELECTRONIC HARDWARE DIV	446 BLAKE ST	NEW HAVEN CT 06515
06666	GENERAL DEVICES CO INC	1410 S POST RD P O BOX 39100	INDIANAPOLIS IN 46239
06950	VSI CORP SCREWCORP DIVISION	13001 E TEMPLE AVE	CITY OF INDUSTRY CA 91746
07700	TECHNICAL WIRE PRODUCTS INC DBA TECKNIT INC	129 DERWOOD ST	CRANFORD NJ 07016
07707	USM CORP SUB OF EMHART INDUSTRIES INC USM FASTENER DIV	510 RIVER RD	SHELTON CT 06484
08261	SPECTRA-STRIP AN ELTRA CO	7100 LAMPSON AVE	GARDEN GROVE CA 92642
08530	RELIANCE MICA CORP	341-39TH ST	BROOKLYN NY 11232
09422	PLASTIC STAMPING CORP	2216 N ARMITAGE AVE	CHICAGO IL 60647
09772	WEST COAST LOCKWASHER CO INC	16730 E JOHNSON DRIVE P O BOX 3588	CITY OF INDUSTRY CA 91744
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
12014	CHICAGO RIVET AND MACHINE CO	950 S 25TH AVE	BELLWOOD IL 60104
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125
12697	CLAROSTAT MFG CO INC	LOWER WASHINGTON ST	DOVER NH 03820
13511	AMPHENOL CADRE DIV BUNKER RAMO CORP		LOS GATOS CA
16428	BELDEN CORP ELECTRONIC DIV	2200 US HWY 27 SOUTH P O BOX 1980	RICHMOND IN 47374
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT CONNECTOR SYSTEMS	30 HUNTER LANE	CAMP HILL PA 17011
23050	PRODUCT COMPONENTS CORP	30 LORRAINE AVE	MT VERNON NY 10553
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
25088	SIEMENS CORP	186 WOOD AVE S	ISELIN NJ 08830
26365	GRIES REPRODUCER CO DIV OF COATS AND CLARK INC	125 BEECHWOOD AVE	NEW ROCHELLE NY 10802
30817	INSTRUMENT SPECIALTIES COMPANY, INC.		LITTLE FALLS, NJ 07424
52792	THORGREN TOOL AND MOLDING CO INC	1100 EVANS AVE P O BOX 362	VALPARAISO IN 46383
70485	ATLANTIC INDIA RUBBER WORKS INC	571 W POLK ST	CHICAGO IL 60607
70903	BELDEN CORP	2000 S BATAVIA AVE	GENEVA IL 60134
71279	MIDLAND-ROSS CORP CAMBION DIV	ONE ALEWIFE PLACE	CAMBRIDGE MA 02138
71785	TRW INC TRW CINCH CONNECTORS	1501 WORSE AVE	ELK GROVE VILLAGE IL 60007
73743	FISCHER SPECIAL MFG CO	446 MORGAN ST	CINCINNATI OH 45206
77900	SHAKEPROOF DIV OF ILLINOIS TOOL WORKS	SAINT CHARLES RD	ELGIN IL 60120
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIVISION	ST CHARLES ROAD	ELGIN IL 60120
79727	C-W INDUSTRIES	550 DAVISVILLE RD P O BOX 96	WARMINSTER PA 18974
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
80033	MICRODOT MANUFACTURING INC PRESTOLE EVERLOCK DIV	1345 MIAMI ST P O BOX 278	TOLEDO OH 43605
81312	WINCHESTER ELECTRONICS DIVISION LITTON SYSTEMS INC	MAIN STREET AND HILLSIDE AVENUE	OAKVILLE CT 06779

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
81350	JOINT ARMY-NAVY SPECIFICATIONS, PROMULGATED BY MILITARY DEPARTMENTS UNDER AUTHORITY OF DEFENSE STANDARDIZATION MANUAL 4120 3-M		
83385	MICRODOT MANUFACTURING INC GREER-CENTRAL DIV	3221 N BIG BEAVER RD	TROY MI 48098
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
85471	BOYD INDUSTRIAL RUBBER DIV OF A B BOYD CO	2527 GRANT AVE	SAN LEANDRO CA 94579
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201
88245	LITTON SYSTEMS INC USECO DIV	13536 SATICOY ST	VAN NUYS CA 91409
91500	ASHEVILLE-SCHOONMAKER MICA CO	910 JEFFERSON AVE P O BOX 318	NEWPORT NEWS VA 23607
91836	KINGS ELECTRONICS CO INC	40 MARBLEDALE ROAD	TUCKAHOE NY 10707
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61101
95987	NECKESSER CO INC	4444 WEST IRVING PARK RD	CHICAGO IL 60641
98159	RUBBER TECK, INC.	19115 HAMILTON AVE., P O BOX 389	GARDENA, CA 90247
98410	ETC DIV OF INTERNATIONAL TELEPHONE AND TELEGRAPH CO	29000 AURORA RD	SOLON OH 44139
S3109	FELLER ASA ADOLF AG C/O PANEL COMPONENTS CORP	355 TESCONI CIRCLE	SANTA ROSA CA 95401
TK0392	NORTHWEST FASTENER SALES INC	7923 SW CIRRUS DRIVE	BEAVERTON OR 97005
TK0435	LEWIS SCREW CO	4114 S PEORIA	CHICAGO IL 60609
TK1072	ADVANCE ELECTRICAL SALES INC	1145 ANDOVER PARK WEST	SEATTLE WA 98188
TK1316	BOYD CORP	6136 NE 87-TH AVE	PORTLAND OR 97220
TK1373	PATELEC-CEM (ITALY)	10156 TORINO	VAICENTALLO 62/45S ITALY
TK1452	SHELLY-RAGON INC	8219 SW CIRRUS	BEAVERTON OR 97005

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	426-0514-00			1	FRAME,MASK:	80009	426-0514-00
-2	378-0625-00			1	FILTER,LT,CRT:BLUE,5.15 X 4.4 X 0.03	80009	378-0625-00
-3	331-0258-03			1	MASK,CRT SCALE:	80009	331-0258-03
-4	200-0939-01			1	RTNR,CRT SCALE:5.55 X 5.068 X 0.475	80009	200-0939-01
					(ATTACHING PARTS)		
-5	212-0023-00	B010100	B246362	4	SCREW,MACHINE:8-32 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
	212-0008-00	B246363		4	SCREW,MACHINE:8-32 X 0.5,PNH,STL	83385	ORDER BY DESCR
					(END ATTACHING PARTS)		
	131-1022-00	B010100		2	CONTACT,ELEC:GROUNDING,SST	80009	131-1022-00
-6	337-1159-00	B010100	B181014	1	SHLD,IMPLOSION:4.78 X 3.95 X .070 PLASTIC	80009	337-1159-00
	337-1159-03	B181015		1	SHLD,IMPLOSION:4.75 X 3.93 X 0.7 THK,PLSTC	80009	337-1159-03
					SAFETY CONTROLLED		
-7	331-0245-00			1	MASK,CRT SCALE:	80009	331-0245-00
	331-0318-00			1	MASK,CRT SCALE:	80009	331-0318-00
					(OPTION 04 ONLY)		
-8	333-1691-00			1	PANEL,FRONT:LEFT	80009	333-1691-00
-9	386-1884-04			1	SUPPORT,CRT:FRONT	80009	386-1884-04
-10	386-1517-00			4	.SUPPORT,CRT:FRONT	80009	386-1517-00
					.(ATTACHING PARTS)		
-11	212-0040-00			4	SCREW,MACHINE:8-32 X 0.375,FLH,100 DEG,STL	83486	ORDER BY DESCR
					(END ATTACHING PARTS)		
-12	131-0765-01			3	TERM,FEEDTHRU:0.584 L X 0.625 OD,BRS	80009	131-0765-01
-13	204-0380-00			1	BODY,TERMINAL:	80009	204-0380-00
-14	134-0119-00			1	BUTTON,PLUG:0.17 OD X 0.144,PLASTIC	80009	134-0119-00
-15	348-0216-00			1	SHLD GSKT,ELEK:MESH TYPE,RING,5.25 ID	07700	30-900 42
-16	----- -----			1	CKT BOARD ASSY:GRATICULE LAMPS(SEE A3 REPL)		
-17	378-0614-00	B010100	B181189	1	.REFLECTOR,LIGHT:INT SCALE ILLUMINATION	80009	378-0614-00
	378-0614-01	B181190		1	.REFLECTOR,LIGHT:INT SCALE ILLUMINATION	80009	378-0614-01
-18	211-0062-00			2	.SCREW,MACHINE:2-56 X 0.312,PNH,STL	06950	ORDER BY DESCR
-19	344-0179-00			2	.CLIP,REFL RTNG:ACETAL,NAT	80009	344-0179-00
-20	348-0355-00			2	GASKET:LIGHT SEAL	80009	348-0355-00
-21	390-0344-00			2	COVER,SCOPE:TOP & BOTTOM	80009	390-0344-00
					(ATTACHING PARTS)		
-22	211-0007-00			16	SCREW,MACHINE:4-40 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
					(END ATTACHING PARTS)		
-23	351-0313-00			1	GUIDE,RACKMOUNT:19.218 L,PAIR	06666	ORDER BY DESCR
					(ATTACHING PARTS)		
-24	210-0458-00			12	NUT,PL,ASSEM WA:8-32 X 0.344,STL CD PL	78189	511-081800-00
					(END ATTACHING PARTS)		
-25	200-1477-00			1	COVER,ACCESS:10.8 X 3.88,ALUMINUM	80009	200-1477-00
					(ATTACHING PARTS)		
-26	211-0007-00			6	SCREW,MACHINE:4-40 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
					(END ATTACHING PARTS)		
-27	200-1490-00			1	COVER,ACCESS:4.4 X 2.4,ALUMINUM	80009	200-1490-00
					(ATTACHING PARTS)		
-28	211-0101-00			2	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
					(END ATTACHING PARTS)		
-29	367-0138-00	B010100	B191840	2	HANDLE,BOW:4.562 L,AL CRPL	06540	14053-A-1032-1B
	367-0022-00	B191841		2	HANDLE,BOW:4.579 L,BRS CRPL	88245	15986
					(ATTACHING PARTS)		
-30	212-0507-00			4	SCREW,MACHINE:10-32 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
					(END ATTACHING PARTS)		
-31	129-0441-00	B020000		2	SPCR,POST:5.045 L,2-56 TAP ENDS,0.125 OD	80009	129-0441-00
					(ATTACHING PARTS)		
-32	211-0087-01	B020000		4	SCREW,MACHINE:2-56 X 0.188,FLH,STL	TK0435	ORDER BY DESCR
					(END ATTACHING PARTS)		
-33	366-0494-00			2	KNOB:GRAY WITH SETSCREW	80009	366-0494-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCR
-34	366-0494-00			2	KNOB:GRAY WITH SETSCREW	80009	366-0494-00
	213-0153-00			2	.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCR
-35	366-1257-14			1	PUSH BUTTON:SIL GY,ON	80009	366-1257-14
-36	366-1402-43			1	PUSH BUTTON:SIL GY,HIGH	80009	366-1402-43
-37	366-1257-00			2	PUSH BUTTON:SIL GY,0.43 X 0.32 X 0.253	80009	366-1257-00
-38	366-1402-02			2	PUSH BUTTON:SIL GY,LEFT	80009	366-1402-02
-39	366-1402-07			1	PUSH BUTTON:SIL GY,VERT MODE	80009	366-1402-07
-40	366-1402-06			2	PUSH BUTTON:SIL GY,RIGHT	80009	366-1402-06
-41	366-1402-06			1	PUSH BUTTON:SIL GY,RIGHT	80009	366-1402-06

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-42	366-1402-04			1	PUSH BUTTON:SIL GY,ADD	80009	366-1402-04
-43	366-1257-31			1	PUSH BUTTON:SIL GY,CHOP	80009	366-1257-31
-44	366-1402-42			1	PUSH BUTTON:SIL GY,BEAM FINDER	80009	366-1402-42
-45	426-0681-00			13	FRAME,PUSH BTN:	80009	426-0681-00
-46	358-0378-00			5	BUSHING,SLEEVE:0.131 ID X 0.18 OD X 0.125 L	80009	358-0378-00
-47	384-1081-00			1	KNOB:10.47 L X 0.125 OD,AL	80009	384-1081-00
-48	376-0029-00			1	CPLG,SHAFT,RGD:0.128 ID X 0.312 OD,AL	80009	376-0029-00
-49	384-1186-00			1	EXTENSION SHAFT:6.5 L X 0.125 OD,AL (ATTACHING PARTS)	80009	384-1186-00
-50	214-0863-00			1	PIN,STR,HEADED:0.062 DIA X 0.375 L,SST (END ATTACHING PARTS)	80009	214-0863-00
-51	358-0216-00			1	GROMMET,PLASTIC:GRAY,ROUND,0.257 ID	80009	358-0216-00
-52	131-0771-00			2	CONN,RCPT,ELEC:2 MALE,2 FEM,PNL MT W/O HDW	91836	1904-2M58
-53	210-0012-00			2	WASHER,LOCK:0.384 ID,INTL,0.022 THK,STL	09772	ORDER BY DESCR
-54	131-0106-02			1	CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR178-1
-55	210-0255-00			1	TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL	12327	ORDER BY DESCR
-56	----- -----			1	RESISTOR,VAR:(SEE R1174 REPL) (ATTACHING PARTS)		
-57	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-58	210-0940-00			1	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL (END ATTACHING PARTS)	12327	ORDER BY DESCR
-59	333-1690-00			1	PANEL,FRONT:	80009	333-1690-00
-60	384-1136-00			5	EXTENSION SHAFT:0.95 INCH LONG	80009	384-1136-00
-61	384-1099-00			1	EXTENSION SHAFT:1.58 L X 0.187 SQ,PLSTC	80009	384-1099-00
-62	----- -----			1	CKT BOARD ASSY:FRONT PANEL CAL(SEE A1 REPL) (ATTACHING PARTS)		
-63	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-64	129-0415-00			1	SPACER,POST:1.46 L,4-40 ENDS,AL,0.188 OD	80009	129-0415-00
-65	220-0663-00			2	NUT BLOCK:4-40 X 0.312 X 0.75 X 3.3,AL	80009	220-0663-00
-66	211-0101-00			3	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	TK0435	ORDER BY DESCR
-67	131-0608-00			46	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-68	131-1003-00			1	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-69	136-0252-04	B010100	B050314	18	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0220-00	B050315	B181235	6	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
	136-0252-07	B181236		18	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-70	----- -----			1	.SWITCH,PUSH:(SEE S1185 REPL)		
-71	----- -----			2	.SWITCH,PUSH:(SEE S1117 REPL)		
-72	----- -----			1	.SWITCH,PUSH:(SEE S1187 REPL)		
-73	----- -----			1	.SWITCH,PUSH:(SEE S1180 REPL)		
-74	361-0382-00			20	.SPACER,PB SW:0.275 L,BROWN POLYCARBONATE	80009	361-0382-00
-75	----- -----			3	.RESISTOR,VAR:FOCUS(SEE R1700 REPL) .RESISTOR,VAR:READOUT(SEE R1171 REPL) .RESISTOR,VAR:GRAT/ALLUM(SEE R1167 REPL)		
-76	351-0305-01			3	GUIDE,PL-IN UNI:UPPER,ZAMAK (ATTACHING PARTS)	80009	351-0305-01
-77	211-0101-00			3	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-78	351-0295-02			3	GUIDE,SLIDE:PLUG-IN,UNR (ATTACHING PARTS)	80009	351-0295-02
-79	211-0105-00			3	SCREW,MACHINE:4-40 X 0.188,FLH,100 DEG	TK0435	ORDER BY DESCR
	211-0101-00			3	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-80	385-0099-00			1	INSULATOR,STOF:0.625 L W/6-32 THD ONE END (ATTACHING PARTS)	80009	385-0099-00
-81	211-0541-00			1	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-82	348-0354-00	B010100	B181179	2	SHLD GSKT,ELEK:8.10 INCH LONG	80009	348-0354-00
	348-0625-00	B181180		2	SHLD GSKT,ELEK:8.1 L (ATTACHING PARTS)	80009	348-0625-00
-83	210-0632-00			3	EYELET,METALLIC:0.089 OD X 0.125 L,BRS GOLD PL (END ATTACHING PARTS)	80009	210-0632-00
-84	386-2469-00			1	SUBPANEL,FRONT: (ATTACHING PARTS)	80009	386-2469-00

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-85	213-0227-00			4	SCREW,TPG,TF:6-32 X 0.5,SPCL TYPE,FLH,100 DEG,STL (END ATTACHING PARTS)	83486	ORDER BY DESCR
-86	378-0041-01			1	FILTER ELEM,AIR:	80009	378-0041-01
-87	386-2471-00			1	PANEL,REAR: (ATTACHING PARTS)	80009	386-2471-00
-88	211-0008-00			9	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	93907	ORDER BY DESCR
-89	----- -----			1	CKT BOARD ASSY:SIGNAL(SEE A12 REPL) (ATTACHING PARTS)		
-90	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-91	129-0182-00			1	SPACER,POST:0.34 L,4-40 THRU,BRS,SI PL,0.25 HEX (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	80009	129-0182-00
-92	131-0608-00			7	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-93	131-1003-00	B010100	B129999	7	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
	131-1003-00	B130000		5	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-94	136-0252-04	B010100	B050314	24	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-04	B050315	B129999	6	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-07	B130000		4	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
	136-0220-00	B050315	B181235	6	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
	136-0252-07	B181236		18	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-95	260-0723-00			1	.SWITCH,SLIDE:DPDT,0.5A,125VAC	79727	GF126-0028
-96	131-1097-00	B010100	B129999	1	CONN,RCPT,ELEC:BNC,FEMALE,CKT BOARD MT	24931	28JR220-2
	131-1315-01	B130000	B181044	1	CONN,RCPT,ELEC:BNC,FEMALE	80009	131-1315-01
	131-1315-01	B181045		1	CONN,RCPT,ELEC:BNC,FEMALE	80009	131-1315-01
-97	131-0955-00			2	CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
-98	210-0207-00			2	TERMINAL,LUG:0.385 OD,PLAIN,BRS CD PL	12697	01136902
-99	131-0955-00			5	CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
-100	220-0662-00			1	NUT BAR:0.75 X 0.312 X 3.3,(2)8-32 THRU,(2) 8-32 X 0.3,AL (ATTACHING PARTS)	80009	220-0662-00
-101	212-0023-00			2	SCREW,MACHINE:8-32 X 0.375,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-102	407-1233-00	B010100	B129999	1	BRACKET,CONN:ALUMINUM	80009	407-1233-00
	407-1233-01	B130000		1	BRACKET,CONN:ALUMINUM (ATTACHING PARTS)	80009	407-1233-01
-103	211-0504-00			4	SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
-104	210-0457-00			4	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL (END ATTACHING PARTS)	78189	511-061800-00
-105	378-0810-00			1	SHROUD,FAN: (ATTACHING PARTS)	80009	378-0810-00
-106	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-107	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL (END ATTACHING PARTS)	78189	211-041800-00
-108	369-0035-00			1	IMPLR,FAN,AXIAL:3.5DIA BL,CCW,0.080ID,PLSTC SAFETY CONTROLLED	52792	3500-CCW .080W
-109	343-0411-00			2	STRAP,RETAINING:2.494 X 0.8,STL TIN PL (ATTACHING PARTS)	80009	343-0411-00
-110	211-0510-00			2	SCREW,MACHINE:6-32 X 0.375,PNH,STL	83385	ORDER BY DESCR
-111	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL (END ATTACHING PARTS)	78189	511-061800-00
-112	407-1235-00			1	BRACKET,FAN:ALUMINUM (ATTACHING PARTS)	80009	407-1235-00
-113	211-0504-00			2	SCREW,MACHINE:6-32 X 0.250,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-114	----- -----			1	CKT BOARD ASSY:FAN MOTOR(SEE A17 REPL)		
-115	131-0608-00			2	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-116	136-0252-07	B010100	B150314	17	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
	136-0220-00	B050315		1	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
	136-0269-00	B050315		1	.SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,PCB MT	71785	133-51-02-073
-117	147-0035-00			1	.MOTOR,DC:BRUSHLESS,3000 RPM,10-15V	25088	1A03001-0A
-118	----- -----			1	SWITCH,TOGGLE:(SEE S1200 REPL) (ATTACHING PARTS)		
-119	210-0414-00			1	NUT,PLAIN,HEX:0.469-32 X 0.562,BRS CD PL	73743	3167-402
-120	210-0021-00			2	WASHER,LOCK:0.476 ID,INTL,0.018 THK,STL	78189	1222-01

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-					(END ATTACHING PARTS)		
-121	214-0526-02			1	ADAPTER,SW ACTR:POWER	80009	214-0526-02
-122	407-1232-00			1	BRACKET,PWR SW:ALUMINUM (ATTACHING PARTS)	80009	407-1232-00
-123	211-0504-00			2	SCREW,MACHINE:6-32 X 0.250,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-124	426-0991-01	B181084		1	FRAME SECT,CAB.:TOP FRONT (ATTACHING PARTS)	80009	426-0991-01
-125	211-0502-00	B181084		3	SCREW,MACHINE:6-32 X 0.188,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
-126	211-0538-00	B181084		1	SCREW,MACHINE:6-32 X 0.312,FLH,100 DEG	93907	ORDER BY DESCR
-127	210-1083-00	B181084		2	WASHER,SPR TNSN:0.161 ID X 0.25 OD X 0.006 THK,STL (ADD WHEN NEEDED) (END ATTACHING PARTS)	09772	3502-08-14-0541C
-128	407-1225-01	B181084		1	BRACKET,ANGLE:RACKMOUNT,LEFT,ALUMINUM (ATTACHING PARTS)	80009	407-1225-01
-129	211-0503-00	B181084		2	SCREW,MACHINE:6-32 X 0.188,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-130	407-1224-01	B181084		1	BRACKET,ANGLE:RACKMOUNT,RIGHT,ALUMINUM (ATTACHING PARTS)	80009	407-1224-01
-131	211-0501-00	B181084		2	SCREW,MACHINE:6-32 X 0.125,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-132	426-0992-01	B181084		1	FRAME SECT,CAB.:TOP REAR (ATTACHING PARTS)	80009	426-0992-01
-133	211-0502-00	B181084		6	SCREW,MACHINE:6-32 X 0.188,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-134	437-0150-00	B010100	B181083	1	CABINET,SCOPE:	80009	437-0150-00
	437-0150-01	B181084		1	CABINET,SCOPE:	80009	437-0150-01

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-1	----- -----			1	CKT BOARD ASSY:LOGIC(SEE A6 REPL)		
-2	136-0252-04	B010100	B050314	39	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0220-00	B050315	B181235	13	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
	136-0252-07	B181236		39	.SOCKET,PIN CONN:M/O DIMPLE	22526	75060-012
-3	136-0260-02	B010100	B191969	3	.SKT,PL-IN ELEK:MICROCKT,16 DIP,LOW CL	09922	DILB16P-108T
	136-0729-00	B191970		3	.SKT,PL-IN ELEK:MICROCKT,16 CONTACT	09922	DILB16P-108T
-4	136-0269-02	B010100	B191969	2	.SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP	09922	DILB14P-108T
	136-0728-00	B191970		2	.SKT,PL-IN ELEK:MICROCKT,14 CONTACT	09922	DILB14P-108
-5	211-0155-00			4	.SCREW,EXT RLV:4-40 X 0.375,PNH,SST,POZ	80009	211-0155-00
-6	214-0579-00			17	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-7	361-0238-00			4	.SPACER,POST:0.433 L,0.25 OD	80009	361-0238-00
-8	136-0263-03	B010100	B140644	34	.SOCKET,PIN TERM:U/M 0.025 SQ PINS	00779	85864-2
	136-0263-04	B140645		34	.SOCKET,PIN TERM:U/M 0.025 SQ PIN	22526	75377-001
	672-0054-00			1	CIRCUIT BD ASSY:INTERFACE	80009	672-0054-00
					(ATTACHING PARTS)		
-9	213-0263-00	B010100	B181054	9	SCREW,TPG,TF:4-24 X 0.375,SPCL TYPE,PNH,STL CD PL,POZ	83385	ORDER BY DESCR
	213-0119-00	B181055		9	SCREW,TPG,TF:4-24 X 0.375,TYPE B,PNH,STL	83385	ORDER BY DESCR
					(END ATTACHING PARTS)		
					CKT BOARD ASSY INCLUDES:		
-10	----- -----			1	.CKT BOARD ASSY:MAIN INTFC(SEE A4 REPL)		
-11	131-0608-00			100	..TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
	131-0590-00			34	..TERMINAL,PIN:0.71 L X 0.025 SQ PH BRZ	80009	131-0590-00
	131-0592-00			10	..TERMINAL,PIN:0.885 L X 0.025 SQ BRS	80009	131-0592-00
-12	136-0252-04			13	..SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
-13	131-1003-00			13	..CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-14	351-0185-00			2	..POST,CKT BD MTG:0.65 L X 0.25 OD BRS	80009	351-0185-00
-15	351-0188-00			2	..POST,CKT BD MTG:0.65 INCH LONG	80009	351-0188-00
-16	351-0227-00			4	..POST,CKT BD MTG:0.84 L X 0.25 OD,BRS	80009	351-0227-00
-17	351-0213-00			1	..POST,CKT BD MTG:0.285 L X 0.219 OD,BRS	80009	351-0213-00
	131-0767-05			2	..CONN,RCPT,ELEC:CKT BD,35/70 CONTACT	80009	131-0767-05
					..(ATTACHING PARTS)		
-18	213-0232-00			4	..SCREW,TPG,TF:2-32 X 0.312,TYPE B,PNH,STL	01536	ORDER BY DESCR
					..(END ATTACHING PARTS)		
					..EACH CONNECTOR INCLUDES:		
-19	200-0950-00			2	...SHLD,ELEC CONN:PLUG-IN CKT BD,PLASTIC	80009	200-0950-00
-20	204-0365-02			1	...CONN BODY,RCPT:PLUG-IN CIRCUIT BOARD	80009	204-0365-02
-21	131-0726-00			35	...CONTACT,ELEC:CKT BD CONN,PH BRZ GOLD PL	80009	131-0726-00
	131-0727-00			35	...CONTACT,ELEC:CKT BD CONN,PH BRZ GOLD PL	80009	131-0727-00
	131-0767-03			1	..CONN,RCPT,ELEC:CKT BD,38/76 CONTACT	80009	131-0767-03
					..(ATTACHING PARTS)		
-22	213-0232-00			2	..SCREW,TPG,TF:2-32 X 0.312,TYPE B,PNH,STL	01536	ORDER BY DESCR
					..(END ATTACHING PARTS)		
					..CONNECTOR INCLUDES:		
-23	200-0950-00			2	...SHLD,ELEC CONN:PLUG-IN CKT BD,PLASTIC	80009	200-0950-00
-24	204-0365-00			1	...CONN BODY,RCPT:PLUG-IN CIRCUIT BOARD	80009	204-0365-00
-25	131-0726-00			31	...CONTACT,ELEC:CKT BD CONN,PH BRZ GOLD PL	80009	131-0726-00
	131-0727-00			31	...CONTACT,ELEC:CKT BD CONN,PH BRZ GOLD PL	80009	131-0727-00
	131-0899-00			4	...CONTACT,ELEC:CK BD CONN,PH BRZ GOLD PL	80009	131-0899-00
-26	----- -----			1	..CKT BOARD ASSY:TRIG INTERCON(SEE A8 REPL)		
					..(ATTACHING PARTS)		
-27	211-0008-00	B010100	B129999	1	..SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
	211-0213-00	B130000		1	..SCREW,MACHINE:4-40 X 0.312,PNH,NYL	23050	ORDER BY DESCR
					..(END ATTACHING PARTS)		
					..CKT BOARD ASSY INCLUDES:		
-28	131-0787-00			2	...TERMINAL,PIN:0.64 L X 0.025 SQ PH BRZ	22526	47359-000
-29	----- -----			2	..CKT BOARD ASSY:DVM CONTROL(SEE A5 REPL)		
					..EACH CKT BOARD ASSY INCLUDES:		
-30	131-1149-00			6	...CONTACT,ELEC:CKT BD EDGE,PH BRZ SIL PL	80009	131-1149-00
-31	210-0657-01			1	...EYELET,METALLIC:0.089 OD X 0.218 L,BRS,	80009	210-0657-01
					...CD PL		
-32	210-0774-00			4	...EYELET,METALLIC:0.152 OD X 0.218 L	80009	210-0774-00
-33	210-0775-00			4	...EYELET,METALLIC:0.126 OD X 0.205 L	80009	210-0775-00
-34	----- -----			1	CKT BOARD ASSY:TRIG SELECTOR(SEE A7 REPL)		
-35	131-1003-00	B010100	B129999	6	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
	131-1003-00	B130000		5	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-36	136-0252-00	B010100	B129999	24	.SOCKET,PIN TERM:U/M 0.019 DIA PINS	00779	2-330808-7

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-	136-0252-04	B010100	B050314	9	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-04	B050315	B129999	6	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-07	B130000		50	.SOCKET,PIN CONN:M/O DIMPLE	22526	75060-012
	136-0220-00	B050315	B129999	1	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
-37	136-0263-04			7	.SOCKET,PIN TERM:U/M 0.025 SQ PIN	22526	75377-001
-38	211-0155-00			2	.SCREW,EXT RLV:4-40 X 0.375,PNH,SST,POZ	80009	211-0155-00
-39	361-0238-00			2	.SPACER,POST:0.433 L,0.25 OD	80009	361-0238-00
	136-0269-02	B130000	B191969	1	.SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP	09922	DILB14P-108T
	136-0728-00	B191970		1	.SKT,PL-IN ELEK:MICROCKT,14 CONTACT	09922	DILB14P-108
	136-0514-00	B130000	B139999	1	.SKT,PL-IN ELEK:MICROCIRCUIT,8 DIP	09922	DILB8P-108
-40	----- -----			1	CKT BOARD ASSY:VERT INTERFACE(SEE A9 REPL)		
-41	131-1003-00			6	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
	136-0252-00	B010100	B119999	28	.SOCKET,PIN TERM:U/M 0.019 DIA PINS	00779	2-330808-7
-42	136-0252-00	B120000		32	.SOCKET,PIN TERM:U/M 0.019 DIA PINS	00779	2-330808-7
	136-0252-04	B010100	B119999	2	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-07	B120000		12	.SOCKET,PIN CONN:M/O DIMPLE	22526	75060-012
-43	136-0263-03	B010100	B119999	5	.SOCKET,PIN TERM:U/M 0.025 SQ PINS	00779	85864-2
	136-0263-04	B120000		5	.SOCKET,PIN TERM:U/M 0.025 SQ PIN	22526	75377-001
-44	214-1690-00	B010100	B119999	1	.HEAT SINK,XSTR:VERT CKT BOARD,7904 .(ATTACHING PARTS)	80009	214-1690-00
-45	211-0008-00	B010100	B119999	3	.SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-46	210-0586-00	B010100	B119999	1	.NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
	210-0406-00	B010100	B119999	1	.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL	73743	12161-50
	210-0054-00	B010100	B119999	1	.WASHER,LOCK:#4 SPLIT,0.025 THK STL	78189	ORDER BY DESCR
-47	210-0599-00	B010100	B119999	1	.NUT,SLEEVE:4-40 X 0.219 OD X 0.599 L BRS	80009	210-0599-00
	210-1002-00	B010100	B119999	1	.WASHER,FLAT:0.125 ID X 0.25 OD X 0.022 .(END ATTACHING PARTS) .MICROCKT,LI:FREQ DIFF(SEE U4625, .U4685 REPL) .(ATTACHING PARTS)	86928	5714-147-20N
	210-0406-00	B120000		2	.NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL	73743	12161-50
	210-0906-00	B120000		2	.WASHER,FLAT:0.125 OD X 0.2 OD X 0.035,FBR .(END ATTACHING PARTS)	86928	56021932(BLACK)
-48	343-0342-01	B010100	B119999	1	.RTNR,MICROCKT:CU BE,CU-SN-ZN PL	80009	343-0342-01
-49	211-0155-00			2	.SCREW,EXT RLV:4-40 X 0.375,PNH,SST,POZ	80009	211-0155-00
-50	361-0238-00			2	.SPACER,POST:0.433 L,0.25 OD	80009	361-0238-00
	131-1429-00	B120000		1	.CONTACT,ELEC:MICROCKT GND,DUAL,BRS TIN PL	80009	131-1429-00
	136-0269-02	B120000	B191969	1	.SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP	09922	DILB14P-108T
	136-0728-00	B191970		1	.SKT,PL-IN ELEK:MICROCKT,14 CONTACT	09922	DILB14P-108
-51	131-0800-00	B010100	B191969	2	CONTACT,ELEC:PLUG-IN GND,BE NI HT TR	80009	131-0800-00
	131-0800-03	B191970		2	CONTACT,ELEC:PLUG-IN GND,BE NI HT TR (ATTACHING PARTS)	80009	131-0800-03
-52	211-0008-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-53	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL (END ATTACHING PARTS)	78189	211-041800-00
-54	131-0930-00			4	CONTACT,ELEC:PLUG-IN GND,CU BE HEAT TRTD (ATTACHING PARTS)	80009	131-0930-00
-55	211-0008-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-56	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL (END ATTACHING PARTS)	78189	211-041800-00
-57	131-0805-00			4	BUS,CONDUCTOR:J-SHAPE,BRS ALBALOY PL (ATTACHING PARTS)	80009	131-0805-00
-58	220-0561-00			4	NUT,PLAIN,HEX:10-32 X 0.25 HEX,BRS NP (END ATTACHING PARTS)	73743	16477-104
-59	407-0973-00			1	BRACKET,CONN:ALUMINUM (ATTACHING PARTS)	80009	407-0973-00
	211-0504-00			4	SCREW,MACHINE:6-32 X 0.250,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-60	214-0291-00			1	CONTACT,ELEC:CRT CONNECTOR,CU BE SIL PL (ATTACHING PARTS)	80009	214-0291-00
-61	211-0007-00			1	SCREW,MACHINE:4-40 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
-62	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL (END ATTACHING PARTS)	78189	211-041800-00
-63	348-0055-00			2	GROMMET,PLASTIC:GRAY,ROUND,0.207 ID	80009	348-0055-00
-64	343-0217-00			1	CLAMP,COIL:POLYPROPYLENE (ATTACHING PARTS)	80009	343-0217-00
-65	213-0138-00			2	SCREW,TPG,TF:4-24 X 0.188,TYPE B,PNH,STL	TK0435	ORDER BY DESCR

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-					(END ATTACHING PARTS)		
-66	210-0201-00			1	TERMINAL,LUG:0.12 ID,LOCKING,BRZ TIN PL	86928	A373-157-2
					(ATTACHING PARTS)		
-67	211-0007-00			1	SCREW,MACHINE:4-40 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
-68	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
					(END ATTACHING PARTS)		
-69	337-1460-00			1	SHIELD,CRT:	80009	337-1460-00
-70	195-0110-00	B010100	B179999	1	LEAD SET,ELEC:CRT DEFLECTION	80009	195-0110-00
	195-0093-00	B180000	B192189	2	LEAD SET,ELEC:CRT DEFLECTION	80009	195-0093-00
	195-0093-01	B192190		2	LEAD,ELECTRICAL:26 AWG,2.0 L,9-7	80009	195-0093-01
-71	136-0520-00			1	SKT,PL-IN ELEK:ELCTRN TUBE,14 CONT W/LEADS	80009	136-0520-00
-72	343-0254-00			1	.CLP,ELCTRN TUBE:DELRIN	80009	343-0254-00
-73	367-0117-00			1	.PULL,SOCKET:CRT,PLASTIC	80009	367-0117-00
-74	200-0917-01			1	.COVER,CRT SKT:2.052 OD X 0.291 H,PLASTIC	80009	200-0917-01
-75	136-0304-02	B010100	B181334	1	.SKT,PL-IN ELEK:ELECTRON TUBE,14 CONTACT	80009	136-0304-02
	136-0304-03	B181335		1	.SKT,PL-IN ELEK:ELECTRON TUBE,14 CONTACT	80009	136-0304-03
-76	352-0201-00			1	.HLDR,TERM CONN:5 WIRE,BLACK	80009	352-0201-00
-77	352-0204-00			1	.HLDR,TERM CONN:8 WIRE,BLACK	80009	352-0204-00
-78	131-0621-00			10	.CONN,TERM:22-26 AWG,BRS,CU BE GLD PL	22526	46231-000
-79	337-1746-00			1	SHIELD,ELEC:Z AXIS CKT BD	80009	337-1746-00
					(ATTACHING PARTS)		
-80	211-0101-00			2	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
-81	129-0120-00			2	SPACER,POST:0.47 L,4-40,NYLON,0.25 OD	80009	129-0120-00
-82	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
					(END ATTACHING PARTS)		
-83	----- -----			1	CKT BOARD ASSY:Z AXIS(SEE A20 REPL)		
					(ATTACHING PARTS)		
-84	211-0008-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
					(END ATTACHING PARTS)		
					CKT BOARD ASSY INCLUDES:		
-85	131-0608-00			17	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
	131-0589-00			16	.TERMINAL,PIN:0.46 L X 0.025 SQ PH BRZ	22526	48283-029
-86	131-1003-00			3	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-87	136-0252-04	B010100	B050314	51	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-04	B050315		3	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0220-00	B050315	B181235	13	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
	136-0183-00	B050315	B181235	3	.SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0183-00
	136-0252-07	B181236		42	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
-88	----- -----	B010100	B039999	1	.METER:(SEE M1882 REPL)		
					.(ATTACHING PARTS)		
-89	166-0292-00	B010100	B039999	2	.INSULATOR,MSHR:0.063 ID X 0.155 OD	80009	166-0292-00
					.(END ATTACHING PARTS)		
-90	214-0579-00			12	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-91	----- -----			1	CKT BOARD ASSY:HORIZ AMPL(SEE A11 REPL)		
					(ATTACHING PARTS)		
-92	211-0008-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
					(END ATTACHING PARTS)		
					CKT BOARD ASSY INCLUDES:		
-93	131-0589-00			9	.TERMINAL,PIN:0.46 L X 0.025 SQ PH BRZ	22526	48283-029
-94	131-1003-00			3	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-95	136-0252-04	B010100	B050314	48	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-07	B050315		3	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
	136-0183-00	B050315		4	.SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0183-00
	136-0220-00	B050315		11	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
-96	214-0579-00	B010100	B149999	1	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
	214-0579-00	B150000		4	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
	200-0945-01	B150000		1	.COVER HALF,XSTR:DUAL TO-18 W/2-56 THD AL	80009	200-0945-01
					.(ATTACHING PARTS)		
	211-0001-00	B150000		1	.SCREW,MACHINE:2-56 X 0.25,PNH,STL	TK0435	ORDER BY DESCR
	200-0945-00	B150000		1	.COVER HALF,XSTR:DUAL TO-18 ALUMINUM	80009	200-0945-00
					.(END ATTACHING PARTS)		
-97	----- -----			1	CKT BOARD ASSY:VERTICAL AMPL(SEE A10 REPL)		
					(ATTACHING PARTS)		
-98	211-0008-00	B010100	B179999	9	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
	211-0008-00	B180000		8	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
	211-0097-00	B180000		1	SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
					(END ATTACHING PARTS)		

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-					CKT BOARD ASSY INCLUDES:		
	214-0579-00	B180000		2	.TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-99	131-0608-00			7	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-100	131-1003-00			5	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-101	136-0252-04			32	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-00	B010100	B179999	26	.SOCKET,PIN TERM:U/M 0.019 DIA PINS	00779	2-330808-7
	136-0252-07	B180000		20	.SOCKET,PIN CONN:M/O DIMPLE	22526	75060-012
-102	343-0097-00	B010100	B179999	2	.RETAINER,XSTR:HEAT SINK,NYLON	80009	343-0097-00
	343-0097-00	B180000		1	.RETAINER,XSTR:HEAT SINK,NYLON .(ATTACHING PARTS)	80009	343-0097-00
-103	210-0599-00	B010100	B179999	2	.NUT,SLEEVE:4-40 X 0.219 OD X 0.599 L BRS	80009	210-0599-00
-104	214-0368-00	B010100	B179999	1	.SPRING,HLCPS:0.24 OD X 0.438 L,OPEN ENDS	80009	214-0368-00
-105	211-0097-00	B010100	B179999	2	.SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
-106	210-0551-00			2	.NUT,PLAIN,HEX:4-40 X 0.25,ST CD PL .(END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-107	210-0627-00	B010100	B179999	2	.RIVET,SOLID:0.25 L X 0.042 OD,SHLDR	80009	210-0627-00
-108	214-1683-00	B010100	B179999	1	.HEAT SINK,XSTR:VERT AMPL CKT BOARD	80009	214-1683-00
	214-1683-03	B180000		1	.HT SK,MICROCKT:VERTICAL AMPLIFIER,RIGHT	80009	214-1683-03
	214-2416-00	B180000		1	.HT SK,MICROCKT:VERTICAL AMPLIFIER,BACK .(ATTACHING PARTS)	80009	214-2416-00
	210-0407-00	B180000		3	.NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL	73743	3038-402
	348-0031-00	B180000		8	.GROMMET,PLASTIC:0.127 ID,GRAY ACETAL .(END ATTACHING PARTS)	80009	348-0031-00
	210-0055-00	B180000		1	.WASHER,LOCK:#6 SPLIT,0.031 THK,STL	81350	ORDER BY DESCR
	129-0303-00	B180000		2	.SPACER,POST:0.237 L,6-32 THRU,AL,0.25 HEX	80009	129-0303-00
	210-0698-00	B100368		1	.EYELET,METALLIC:0.047 OD X 0.062 L	07707	S-6123
	198-2781-00	B010100	B179999	1	WIRE SET,ELEC:	80009	198-2781-00
	198-2995-00	B180000		1	WIRE SET,ELEC:	80009	198-2995-00
	131-1963-00	B180000		1	.TERM,QIK DISC.:FOR 0.038 DIA CRT PIN	00779	42428-9
-109	----- -----			1	RESISTOR:(SEE R7824,8 REPL) (ATTACHING PARTS)		
-110	211-0507-00	B010100	B029999	2	SCREW,MACHINE:6-32 X 0.312,PNH,STL	83385	ORDER BY DESCR
	211-0511-00	B030000		2	SCREW,MACHINE:6-32 X 0.5,PNH,STL	TK0435	ORDER BY DESCR
	166-0107-00	B030000		2	SPACER,SLEEVE:0.219 L X 0.18 ID,AL	80009	166-0107-00
-111	210-0894-00			2	WASHER,FLAT:0.19 ID X 0.438 OD X 0.031 (END ATTACHING PARTS)	09422	ORDER BY DESCR
	210-0698-00	B100000		1	EYELET,METALLIC:0.047 OD X 0.062 L	07707	S-6123
-112	129-0006-00			1	TERMINAL,STUD:INSULATED (ATTACHING PARTS)	00866	1700P
-113	210-0457-00			1	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
-114	210-0202-00			1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL (END ATTACHING PARTS)	86928	A-373-158-2
-115	210-0201-00			1	TERMINAL,LUG:0.12 ID,LOCKING,BRZ TIN PL (ATTACHING PARTS)	86928	A373-157-2
-116	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL (END ATTACHING PARTS)	78189	211-041800-00
	672-0572-00	B110000	B199999	1	CIRCUIT BD ASSY:READOUT PROTECTION #1	80009	672-0572-00
	672-0572-01	B200000	B202660	1	CIRCUIT BD ASSY:READOUT PROTECTION #1	80009	672-0572-01
	672-0572-02	B202661	B212704	1	CIRCUIT BD ASSY:READOUT PROTECTION #1	80009	672-0572-02
	672-0572-05	B212705		1	CIRCUIT BD ASSY:READOUT PROTECTION #1	80009	672-0572-05
-117	----- -----	B110000		1	.CKT BOARD ASSY:PROTECTION(SEE A22 REPL)		
-118	131-0589-00	B110000		20	..TERMINAL,PIN:0.46 L X 0.025 SQ PH BRZ	22526	48283-029
-119	253-0162-00	B110000		AR	..TAPE,PRESS SENS:POLY SPONGE,0.125 X 0.062	04963	4116 TYPE A
-120	210-0702-00	B110000		2	.EYELET,METALLIC:0.047 OD X 0.125 L	07707	S-6127
-121	----- -----			1	.CKT BOARD ASSY:READOUT(SEE A21 REPL) .(ATTACHING PARTS)		
-122	351-0324-00			2	.GUIDE,CKT BOARD:DELRIN,3.023 L	80009	351-0324-00
-123	211-0205-00			1	.SCREW,MACHINE:4-40 X 0.42,ROH,SST	80009	211-0205-00
-124	361-0527-00			1	.SPACER,POST:0.2 L W/4-40 THD ONE END,AL, .0.188 OD .(END ATTACHING PARTS)	80009	361-0527-00
					.CKT BOARD ASSY INCLUDES:		
-125	131-0608-00			40	..TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-126	131-1003-00			6	..CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-127	136-0252-04	B010100	B050314	51	..SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-07	B050315	B199999	6	..SOCKET,PIN CONN:M/O DIMPLE	22526	7506
	136-0252-07	B200000		6	..SOCKET,PIN CONN:M/O DIMPLE	22526	7506

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-	136-0751-00	B200000		1	..SKT,PL-IN ELEK:MICROCKT,24 PIN	09922	DILB24P108
	136-0235-00	B050315	B199999	1	..SKT,PL-IN ELEK:TRANSISTOR,6 CONTACT	71785	133-96-12-062
	131-0993-00	B200000		3	..BUS,CONDUCTOR:SHUNT ASSEMBLY,BLACK	22526	65474-005
	136-0220-00	B050315		13	..SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
-128	136-0260-01	B010100	B191895	14	..SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,PCB MT	71785	133-51-02-075
	136-0729-00	B191896	B199999	14	..SKT,PL-IN ELEK:MICROCKT,16 CONTACT	09922	DILB16P-108T
-129	136-0269-02	B010100	B191895	1	..SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP	09922	DILB14P-108T
	136-0728-00	B191896	B199999	1	..SKT,PL-IN ELEK:MICROCKT,14 CONTACT	09922	DILB14P-108
-130	214-0579-00	B010100	B109999	21	..TERM,TEST POINT:BRS CD PL	80009	214-0579-00
	214-0579-00	B110000	B199999	20	..TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-131	----- -----			1	..SWITCH,SLIDE:DPDT,0.5A,125VAC ..(SEE S2110 REPL)		
-132					(ATTACHING PARTS)		
-133	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
-134	211-0101-00			4	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-135	343-0205-01			1	RTNR,ELCTRN TU:3.0 DIA X 1.5 L,DELRIN (ATTACHING PARTS)	80009	343-0205-01
-136	211-0504-00			4	SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
-137	210-0949-00			4	WASHER,FLAT:0.141 ID X 0.5 OD X 0.062,BRS (END ATTACHING PARTS)	12327	ORDER BY DESCR
-138	354-0347-00			1	RING,CRT CLAMP:2.127 ID X 2.595 OD X 0.563 (ATTACHING PARTS)	80009	354-0347-00
-139	211-0170-00			2	SCREW,MACHINE:4-40 X 2.25,PNH,SST	TK0435	ORDER BY DESCR
-140	214-1333-00			2	SPRING,HLCPS:0.213 OD X 0.375,CLE,CU-BE (END ATTACHING PARTS)	80009	214-1333-00
-141	386-2473-00			1	SUPPORT,CHASSIS:HORIZ & VERT AMPLIFIER (ATTACHING PARTS)	80009	386-2473-00
-142	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
	211-0101-00			2	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-143	378-0809-00			1	BAFFLE,AIR: (ATTACHING PARTS)	80009	378-0809-00
-144	211-0008-00			3	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	93907	ORDER BY DESCR
-145	----- -----			1	DLY LINE,ELEC:62NS,100 OHM(SEE DL650 REPL) (ATTACHING PARTS)		
-146	211-0025-00			4	SCREW,MACHINE:4-40 X 0.375,FLH,100 DEG (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
					DELAY LINE ASSY INCLUDES:		
-147	200-1460-00			1	.COVER,DLY LINE:TOP	80009	200-1460-00
-148	200-1461-00			1	.COVER,DLY LINE:BOTTOM .(ATTACHING PARTS)	80009	200-1461-00
-149	211-0101-00			3	.SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL .(END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-150	361-0529-00			2	.SPACER,DLY LINE:0.92 L W/6-32 THD ONE END .(ATTACHING PARTS)	80009	361-0529-00
-151	213-0068-00			4	.SCREW,TPG,TC:6-32 X 0.312,TYPE T,STL .(END ATTACHING PARTS)	83486	ORDER BY DESCR
-152	211-0507-00			1	.SCREW,MACHINE:6-32 X 0.312,PNH,STL	83385	ORDER BY DESCR
-153	210-0457-00			1	.NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
-154	441-1127-00	B010100	B179999	1	CHASSIS,SCOPE:HORIZONTAL & VERT	80009	441-1127-00
	441-1127-01	B180000		1	CHASSIS,SCOPE:VERT & HORIZONTAL (ATTACHING PARTS)	80009	441-1127-01
	211-0101-00			3	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-154.1	343-0089-00			1	CLAMP,CABLE:0.3 DIA,PLASTIC	80009	343-0089-00
-155	131-0707-00			240	CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	22526	47439-000
-156	175-0825-00			AR	CABLE,SP,ELEC:2,26 AWG,STRD,PVC JKT,RBN	80009	175-0825-00
-157	175-0826-00			AR	CABLE,SP,ELEC:3,26 AWG,STRD,PVC JKT,RBN	80009	175-0826-00
-158	175-0828-00			AR	CABLE,SP,ELEC:5,26 AWG,STRD,PVC JKT,RBN	08261	111-2699-955
-159	175-0829-00			AR	CABLE,SP,ELEC:6,26 AWG,STRD,PVC JKT,RBN	08261	111-2699-973
-160	175-0830-00			AR	CABLE,SP,ELEC:7,26 AWG,STRD,PVC JKT,RBN	08261	111-2699-972
-161	175-0831-00			AR	CABLE,SP,ELEC:8,26 AWG,STRD,PVC INSUL,RBN	08261	111-2699-971
-162	175-0833-00			AR	CABLE,SP,ELEC:10,26 AWG STRD,PVC JKT,RBN	08261	111-2699-970
	175-0855-00			AR	CABLE,SP,ELEC:10,22 AWG,STRD,PVC,RBN	08261	SS-1022(1061)0C
-163	352-0169-01			1	HLDR,TERM CONN:2 WIRE,BROWN	80009	352-0169-01

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-	352-0169-06			2	HLDR,TERM CONN:2 WIRE,BLUE	80009	352-0169-06
	352-0169-05			2	HLDR,TERM CONN:2 WIRE,GREEN	80009	352-0169-05
-164	352-0161-03			2	HLDR,TERM CONN:3 WIRE,ORANGE	80009	352-0161-03
-165	352-0163-01			2	HLDR,TERM CONN:5 WIRE,BROWN	80009	352-0163-01
	352-0163-02			2	HLDR,TERM CONN:5 WIRE,RED	80009	352-0163-02
	352-0163-04			1	HLDR,TERM CONN:5 WIRE,YELLOW	80009	352-0163-04
	352-0163-05			1	HLDR,TERM CONN:5 WIRE,GREEN	80009	352-0163-05
	352-0163-07			2	HLDR,TERM CONN:5 WIRE,VIOLET	80009	352-0163-07
-166	352-0164-00			2	HLDR,TERM CONN:6 WIRE,BLACK	80009	352-0164-00
	352-0164-01			2	HLDR,TERM CONN:6 WIRE,BROWN	80009	352-0164-01
	352-0164-05			1	HLDR,TERM CONN:6 WIRE,GREEN	80009	352-0164-05
-167	352-0165-02			2	HLDR,TERM CONN:7 WIRE,RED	80009	352-0165-02
	352-0165-03			2	HLDR,TERM CONN:7 WIRE,ORANGE	80009	352-0165-03
	352-0165-04			2	HLDR,TERM CONN:7 WIRE,YELLOW	80009	352-0165-04
	352-0165-06			4	HLDR,TERM CONN:7 WIRE,BLUE	80009	352-0165-06
	352-0165-07			2	HLDR,TERM CONN:7 WIRE,VIOLET	80009	352-0165-07
-168	352-0166-08			2	HLDR,TERM CONN:8 WIRE,GRAY	80009	352-0166-08
-169	352-0168-08			4	HLDR,TERM CONN:10 WIRE,GRAY	80009	352-0168-08
	352-0168-09			2	HLDR,TERM CONN:10 WIRE,WHITE	80009	352-0168-09
-170	179-1865-00			1	WIRING HARNESS:COAXIAL	80009	179-1865-00
	343-0549-00			15	.STRAP,TIEDOWN,E:0.091 W X 4.0 L,ZYTEL	06383	PLT1W
	346-0128-00			1	.STRAP,TIEDOWN,E:8.0 L X 0.1 W,NYLON	80009	346-0128-00
	179-1883-00	B010100	B129999	1	WIRING HARNESS:STANDARD	80009	179-1883-00
	179-1883-01	B130000		1	WIRING HARNESS:STANDARD	80009	179-1883-01
	343-0549-00			8	.STRAP,TIEDOWN,E:0.091 W X 4.0 L,ZYTEL	06383	PLT1W
-171	129-0149-00			1	SPACER,POST:3.406 L,6-32 INT BOTH ENDS,AL, 0.25 HEX	80009	129-0149-00
					(ATTACHING PARTS)		
-172	211-0504-00			1	SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
	211-0541-00			1	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
					(END ATTACHING PARTS)		

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3-	620-0462-00			1	POWER SUPPLY:	80009	620-0462-00
					(ATTACHING PARTS)		
	212-0023-00			6	SCREW,MACHINE:8-32 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
					(END ATTACHING PARTS)		
					POWER SUPPLY INCLUDES:		
-1	200-1478-00			1	.COVER,PWR SPLY:TOP	80009	200-1478-00
					.(ATTACHING PARTS)		
-2	211-0541-00			2	.SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
-3	211-0507-00			2	.SCREW,MACHINE:6-32 X 0.312,PNH,STL	83385	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-4	200-1263-00			1	.COVER,PWR SPLY:RIGHT SIDE	80009	200-1263-00
					.(ATTACHING PARTS)		
-5	211-0504-00			4	.SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
-6	211-0541-00			2	.SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-7	200-1262-00			1	.COVER,PWR SPLY:LEFT SIDE	80009	200-1262-00
					.(ATTACHING PARTS)		
-8	211-0504-00			7	.SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
-9	211-0541-00			2	.SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-10	----- -----			1	.CKT BOARD ASSY:LV REG(SEE A16 REPL)		
					.(ATTACHING PARTS)		
-11	211-0008-00			4	.SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
					.(END ATTACHING PARTS)		
					.CKT BOARD ASSY INCLUDES:		
-12	131-0608-00			50	..TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-13	136-0183-00			2	..SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0183-00
-14	214-1291-00			2	..HEAT SINK,XSTR:TO-5,SIL BRZ PTD BLACK	05820	207SB
-15	136-0252-04	B010100	B050314	81	..SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0220-00	B050315		3	..SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
	136-0235-00	B050315		8	..SKT,PL-IN ELEK:TRANSISTOR,6 CONTACT	71785	133-96-12-062
	136-0183-00	B050315		5	..SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0183-00
	136-0350-00	B050315		3	..SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0350-00
-16	214-0579-00			8	..TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-17	----- -----			1	..TRANSISTOR:(SEE Q1550 REPL)		
					..(ATTACHING PARTS)		
-18	210-0551-00			1	..NUT,PLAIN,HEX:4-40 X 0.25,ST CD PL	TK0435	ORDER BY DESCR
-19	211-0097-00			1	..SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
	210-1122-00			1	..WASHER,LOCK:0.12 ID,DISHED,0.025 THK,STL	86928	ORDER BY DESCR
					..(END ATTACHING PARTS)		
-20	441-1128-00			1	.CHASSIS,SCOPE:POST REGULATOR	80009	441-1128-00
-21	----- -----			5	.TRANSISTOR:(SEE Q1428,Q1458,Q1498,Q1538,		
					.Q1588 REPL)		
					.(ATTACHING PARTS)		
-22	211-0559-00			5	.SCREW,MACHINE:6-32 X 0.375,FLH,100 DEG	TK0435	1593-300
-23	342-0136-00			5	.INSLTR,MSHR:0.191D X 0.0025THK,MICA,0.812	91500	852600F013
-24	210-0071-00			5	.WASHER,SPR TNSN:0.148 ID X 0.025 THK,STL	78189	4706-05-01-0531
-25	210-0407-00			5	.NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL	73743	3038-402
					.(END ATTACHING PARTS)		
-26	----- -----			1	.CKT BOARD ASSY:CAP RECTIFIER(SEE A15 REPL)		
					.(ATTACHING PARTS)		
-27	211-0008-00			4	.SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-28	211-0504-00			1	.SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
					.CKT BOARD ASSY INCLUDES:		
-29	131-0608-00			29	..TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-30	136-0252-04	B010100	B050314	24	..SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-07	B050315		15	..SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
	136-0220-00	B050315		3	..SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
	136-0183-00	B050315		2	..SKT,PL-IN ELEK:TRANSISTOR,3 CONTACT	80009	136-0183-00
-31	136-0263-03	B010100	B130644	7	..SOCKET,PIN TERM:U/W 0.025 SQ PINS	00779	85864-2
	136-0263-07	B130645		7	..SOCKET,PIN TERM:U/W 0.025 SQ PIN	22526	ORDER BY DESCR
-32	136-0260-02	B010100	B192115	1	..SKT,PL-IN ELEK:MICROCKT,16 DIP,LOW CL	09922	DILB16P-108T
	136-0729-00	B192116		1	..SKT,PL-IN ELEK:MICROCKT,16 CONTACT	09922	DILB16P-108T
	136-0727-00	B192116		1	..SKT,PL-IN ELEK:MICROCKT,8 CONTACT	09922	DILB8P-108
-33	214-0579-00			4	..TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-34	----- -----			6	..DIODE:(SEE CR1310,CR1313,CR1345,CR1346,		

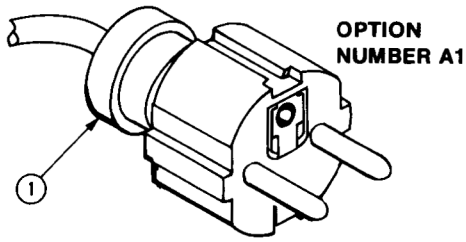
Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3-					..CR1347,CR1348 REPL)		
					..(ATTACHING PARTS)		
-35	210-0410-00			6	..NUT,PLAIN,HEX:10-32 X 0.312,BRS CD PL	73743	2X-2003-402
-36	210-0056-00			6	..WASHER,LOCK:#10 SPLIT,0.047 THK,SI BRZ	86928	ORDER BY DESCR
-37	210-1003-00			6	..WASHER,FLAT:0.2 ID X 0.438 OD X 0.036 BRS	86928	5714-50-32N
					..(END ATTACHING PARTS)		
-38	337-1487-00			1	.SHIELD,ELEC:HV SUPPLY	80009	337-1487-00
					.(ATTACHING PARTS)		
	211-0101-00			2	.SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
	211-0105-00			2	.SCREW,MACHINE:4-40 X 0.188,FLH,100 DEG	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-39	342-0105-00			1	.INSUL,HV SPLY:HV POWER,POLYMIDE	TK1316	ORDER BY DESCR
-40	386-1556-00			4	.SUPPORT,CKT BD:0.215 H,ACETAL	80009	386-1556-00
-41	348-0055-00			3	.GROMMET,PLASTIC:GRAY,ROUND,0.207 ID	80009	348-0055-00
-42	252-0562-00			AR	.PLASTIC EXTR:0.1 X 0.12,POLYETHYLENE	06229	GS2
-43	----- -----			1	.TRANSFORMER:(SEE T1310 REPL)		
					.(ATTACHING PARTS)		
-44	211-0008-00			4	.SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-45	348-0291-00			1	.PAD,CUSHIONING:0.925 SQ X 0.312,SPONGE RBR	85471	ORDER BY DESCR
	672-0030-00			1	.CIRCUIT BD ASSY:	80009	672-0030-00
					.(ATTACHING PARTS)		
-46	211-0008-00			1	.SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
					.(END ATTACHING PARTS)		
					.CKT BOARD ASSY INCLUDES:		
-47	131-0707-00			18	..CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	22526	47439-000
-48	175-0860-00			AR	..CABLE,SP,ELEC:5,22 AWG,STRD,PVC JKT,RBN	TK0846	05CF22M7-88T
-49	175-1278-00			AR	..CABLE,SP,ELEC:4,26 AWG,STRD,POLYETHYLENE	80009	175-1278-00
					..JACKET		
-50	175-1279-00			AR	..CABLE,SP,ELEC:2,26 AWG,STRD,POLYETHYLENE	80009	175-1279-00
					..JACKET		
-51	352-0163-05			1	..HLDR,TERM CONN:5 WIRE,GREEN	80009	352-0163-05
-52	352-0165-00			1	..HLDR,TERM CONN:7 WIRE,BLACK	80009	352-0165-00
-53	352-0167-04			1	..HLDR,TERM CONN:9 WIRE,YELLOW	80009	352-0167-04
-54	----- -----			1	..CKT BOARD ASSY:HIGH VOLT(SEE A18 REPL)		
-55	337-1492-00			1	...SHIELD,ELEC:HV CKT BD	80009	337-1492-00
-56	131-0809-00			1	...TERMINAL,STUD:0.546 L,4-40 INT THD	71279	5701510010519
					...(ATTACHING PARTS)		
-57	211-0005-00			1	...SCREW,MACHINE:4-40 X 0.125,PNH,STL	86060	ORDER BY DESCR
					...(END ATTACHING PARTS)		
-58	----- -----			1	..CKT BOARD ASSY:AUTO FOCUS(SEE A19 REPL)		
-59	343-0088-00			3	..CLAMP,CABLE:0.062 DIA,PLASTIC	80009	343-0088-00
-60	348-0023-00			2	..PLUG,HOLE:U/NO.14 DIA HOLE,NHT PLSTC	02768	207090201000101
-61	----- -----			1	..MULTIPLIER:(SEE U1615 REPL)		
					..(ATTACHING PARTS)		
-62	210-0409-00	B010100	B202701	2	..NUT,PLAIN,HEX:8-32 X 0.312,BRS CD PL	73743	3046-402
	220-0796-00	B202702		2	..NUT,PLAIN,HEX:8-32 X 0.375 HEX,NYLON	95987	N-832-X
					..(END ATTACHING PARTS)		
-63	337-1491-00			1	.SHIELD,ELEC:LINE INVERTER CKT BD	80009	337-1491-00
					.(ATTACHING PARTS)		
-64	211-0008-00			3	.SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
					.(END ATTACHING PARTS)		
					.SHIELD INCLUDES:		
	344-0118-00			2	..RTNR,CAPACITOR:1.0 DIA,STEEL	80033	E50008 -044
	210-0623-00			2	..RIVET,TUBULAR:0.156 L X 0.093 OD,TRH,BRS	12014	R-3682
-65	344-0230-00			1	.CLIP,SPR TNSN:CHOKE COIL,CU BE	80009	344-0230-00
-66	407-0964-01	B010100	B192093	1	.BRACKET,CAP.:ALUMINUM	80009	407-0964-01
	407-2111-00	B192094		1	.BRACKET,CAP.:ALUMINUM	80009	407-2111-00
					.(ATTACHING PARTS)		
-67	212-0518-00			4	.SCREW,MACHINE:10-32 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-68	----- -----			2	.CAPACITOR:(SEE C1216,C1217 REPL)		
					.(ATTACHING PARTS)		
-69	212-0518-00	B010100	B191474	8	.SCREW,MACHINE:10-32 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
	212-0518-00	B191475		4	.SCREW,MACHINE:10-32 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
	212-0561-00	B191475		4	.SCREW,MACHINE:12-24 X 0.5,OVH,STL	83385	ORDER BY DESCR

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3-	210-3057-00	B191475		4	.WASHER,FLAT:0.17 ID X 0.35 OD X 0.03,NYL	TK1452	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-70	337-1490-00	B010100	B181044	1	.SHIELD,ELEC:LINE INVERTER CKT BD	80009	337-1490-00
	337-1490-01	B181045	B181239	1	.SHIELD,ELEC:LINE INVERTER,CKT BD BOTTOM	80009	337-1490-01
	337-1490-02	B181240		1	.SHIELD,ELEC:LINE INVERTER,CKT BD BOTTOM	80009	337-1490-02
					.(ATTACHING PARTS)		
-71	211-0040-00			2	.SCREW,MACHINE:4-40 X 0.25,BDGH,NYL	26365	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-72	----- -----			1	.CKT BD ASSY:PWR SPLY INVERT(SEE A14 REPL)		
-73	131-0591-00			7	..TERMINAL,PIN:0.835 L X 0.025 SQ PH BRZ	22526	47332
-74	136-0254-01			4	..SOCKET,PIN TERM:U/M 0.031 TO 0.04 DIA PIN	00779	1-331892-8
-75	346-0032-00			1	..STRAP,RETAINING:0.075 DIA X 4.0 L	98159	2829-75-4
-76	348-0023-00			6	..PLUG,HOLE:U/MO.14 DIA HOLE,NHT PLSTC	02768	207090201000101
-77	348-0005-00			1	..GROMMET,RUBBER:BLACK,ROUND,0.375 ID	70485	230X-36017
-78	355-0518-00			4	..STUD,PRESSMOUNT:4-40 X 0.525,BRS CU-SN-ZN	80009	355-0518-00
-79	129-0323-00			2	..SPACER,POST:1.0 L,4-40 EA END,AL,0.25 HEX	80009	129-0323-00
					..(ATTACHING PARTS)		
-80	211-0097-00			2	..SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
					..(END ATTACHING PARTS)		
-81	214-0579-00			3	..TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-82	220-0623-00			1	.NUT BLOCK:6-32 X 0.375 X 0.5 X 0.448	80009	220-0623-00
					.(ATTACHING PARTS)		
-83	211-0504-00			2	.SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-84	----- -----			2	.TRANSISTOR:(SEE Q1234,Q1241 REPL)		
					.(ATTACHING PARTS)		
-85	210-0586-00			4	.NUT,PL,ASSEM MA:4-40 X 0.25,STL CD PL	78189	211-041800-00
-86	386-0978-00			2	.INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0978-00
					.(END ATTACHING PARTS)		
-87	214-1624-00			1	.HEAT SINK,XSTR:(2)TO-3,AL	80009	214-1624-00
					.(ATTACHING PARTS)		
-88	213-0041-00			2	.SCREW,TPG,TC:6-32 X 0.375,TYPE T,TRH,STL	93907	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-89	342-0103-00			1	.INSULATOR,BLOCK:HEAT-SINK SHIELD,NYLON	80009	342-0103-00
					.(ATTACHING PARTS)		
-90	211-0512-00			1	.SCREW,MACHINE:6-32 X 0.5,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
-91	210-0407-00			1	.NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL	73743	3038-402
-92	214-1625-00			1	.SPRING,FLAT:2.0 X 0.438,CU BE	80009	214-1625-00
					.(END ATTACHING PARTS)		
-93	342-0104-00			1	.INSULATOR,PLATE:POWER SUPPLY,POLYMIDE	08530	ORDER BY DESCR
-94	337-1551-00	B010100	B189999	1	.SHIELD,ELEC:LINE FILTER	80009	337-1551-00
					.(ATTACHING PARTS)		
-95	211-0507-00	B010100	B189999	2	.SCREW,MACHINE:6-32 X 0.312,PNH,STL	83385	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-96	131-0022-00	B010100	B189999	1	.TERMINAL BOARD:SINGLE CONTACT	71785	332-11-02-001
					.(ATTACHING PARTS)		
-97	211-0504-00	B010100	B189999	1	.SCREW,MACHINE:6-32 X 0.250,PNH,STL	TK0435	ORDER BY DESCR
-98	210-0586-00	B010100	B189999	1	.NUT,PL,ASSEM MA:4-40 X 0.25,STL CD PL	78189	211-041800-00
					.(END ATTACHING PARTS)		
-99	----- -----			1	.COIL:(SEE FL1200 REPL)		
					.(ATTACHING PARTS)		
-100	213-0138-00	B010100	B189999	1	.SCREW,TPG,TF:4-24 X 0.188,TYPE B,PNH,STL	TK0435	ORDER BY DESCR
	211-0012-00	B190000		2	.SCREW,MACHINE:4-40 X 0.375,PNH,STL	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-101	210-0201-00	B010100	B189999	1	.TERMINAL,LUG:0.12 ID,LOCKING,BRZ TIN PL	86928	A373-157-2
					.(ATTACHING PARTS)		
-102	211-0007-00	B010100	B189999	1	.SCREW,MACHINE:4-40 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
-103	210-0586-00	B010100	B189999	1	.NUT,PL,ASSEM MA:4-40 X 0.25,STL CD PL	78189	211-041800-00
					.(END ATTACHING PARTS)		
-104	----- -----			1	.SW,THERMOSTATIC:(SEE S1201 REPL)		
					.(ATTACHING PARTS)		
-105	211-0507-00			2	.SCREW,MACHINE:6-32 X 0.312,PNH,STL	83385	ORDER BY DESCR
	210-0006-00			2	.WASHER,LOCK:#6 INTL,0.018 THK,STL	77900	1206-00-00-0541C
-106	210-0407-00			2	.NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL	73743	3038-402
					.(END ATTACHING PARTS)		
-107	210-0202-00	B010100	B189999	1	.TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL	86928	A-373-158-2
	210-0202-00	B190000		2	.TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL	86928	A-373-158-2

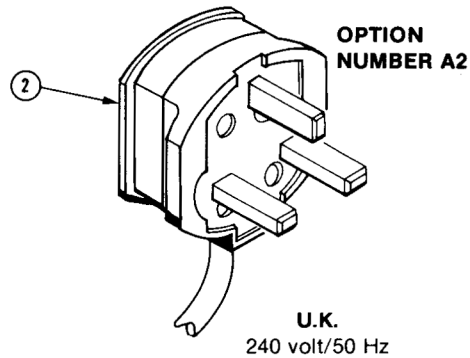
Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3-					.(ATTACHING PARTS)		
-108	211-0507-00	B010100	B189999	1	.SCREW,MACHINE:6-32 X 0.312,PNH,STL	83385	ORDER BY DESCR
	211-0513-00	B190000		1	.SCREW,MACHINE:6-32 X 0.625,PNH,STL	93907	880-00032-003
-109	210-0407-00	B010100	B189999	1	.NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL	73743	3038-402
	210-0407-00	B190000		2	.NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL	73743	3038-402
					.(END ATTACHING PARTS)		
-110	161-0033-06	B010100	B189999	1	.CABLE ASSY,PWR,:3,18 AWG,125V,72.0 L	80009	161-0033-06
	161-0066-00	B190000		1	.CABLE ASSY,PWR,:3,18AWG,115V,98.0 L	16428	CH8481, FH8481
					.(ATTACHING PARTS)		
-111	210-0590-00			1	.NUT,PLAIN,HEX:0.375-32 X 0.438 BRS CD PL	73743	28269-402
-112	210-0012-00			2	.WASHER,LOCK:0.384 ID,INTL,0.022 THK,STL	09772	ORDER BY DESCR
	361-1022-00	B190000		2	.SPCR,LINE FLTR:ALUMINUM	80009	361-1022-00
					.(ATTACHING PARTS)		
	210-0586-00	B190000		4	.NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
	211-0014-00	B190000		2	.SCREW,MACHINE:4-40 X 0.5,PNH,STL	TK0435	ORDER BY DESCR
					.(END ATTACHING PARTS)		
-113	200-0763-04			1	.COV,LINE V SEL:	80009	200-0763-04
-114	213-0088-00			4	..SCREW,TPG,TF:4-24 X 0.25,TYPE B,PNH	83385	ORDER BY DESCR
-115	352-0102-00			2	..FUSEHOLDER:(1)3AG	80009	352-0102-00
-116	204-0278-01			1	.BODY ASSY,LINE:W/CLIPS & CONTACTS	80009	204-0278-01
					.(ATTACHING PARTS)		
-117	210-0407-00			2	.NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL	73743	3038-402
					.(END ATTACHING PARTS)		
-118	----- -----			1	SWITCH,TOGGLE:(SEE S1200 REPL)		
-119	386-2439-00	B010100	B189999	1	PANEL,REAR:	80009	386-2439-00
	386-2439-01	B190000		1	PANEL,REAR:	80009	386-2439-01
-120	131-0707-00			44	CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	22526	47439-000
	214-0768-00			3	SOCKET,PIN TERM:U/W 0.062 DIA PIN	81312	100-0967S204
-121	175-0861-00			AR	CABLE,SP,ELEC:4,22 AWG,STRD,PVC JKT,RBN	TK1072	04CF22M7-88T
-122	175-0859-00			AR	CABLE,SP,ELEC:6,22 AWG,STRD,PVC JKT,RBN	TK0846	06CF22M7-88T
-123	175-0857-00			AR	CABLE,SP,ELEC:8,22 AWG,STRD,PVC JKT,RBN	TK0846	08CF22M7-88T
-124	210-0230-00			1	TERMINAL,LUG:#6 STUD,SOLDERLESS	98410	A-134-06
-125	352-0162-04			2	HLDR,TERM CONN:4 WIRE,YELLOW	80009	352-0162-04
	352-0162-05			2	HLDR,TERM CONN:4 WIRE,GREEN	80009	352-0162-05
-126	352-0164-02			2	HLDR,TERM CONN:6 WIRE,RED	80009	352-0164-02
-127	352-0166-01			2	HLDR,TERM CONN:8 WIRE,BROWN	80009	352-0166-01

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
4-					OPTION 1 WITHOUT CRT READOUT		
-1	670-2018-00			1	CIRCUIT BD ASSY:READOUT DUMMY	80009	670-2018-00
-2	131-0608-00			18	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-3	131-1003-00			6	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-4	136-0252-07			6	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
					OPTION 3 EMI MODIFICATION		
-5	200-0678-00			7	COVER,ELEC CONN:BNC,NON-SHORTING	91836	KC89-58TR5
-6	346-0045-00			7	STRAP,CONN COV:BNC ONE END,POLYPROPYLENE	80009	346-0045-00
-7	378-0603-00			1	FILTER,MESH:EMI	80009	378-0603-00
-8	390-0342-00			2	COVER,SCOPE:TOP & BOTTOM	80009	390-0342-00
					EACH CABINET BOTTOM INCLUDES:		
-9	348-0274-00			3	SHLD GSKT,ELEK:FINGER TYPE,24.0 L	30817	97-555COC
					OPTION 4 MAXIMUM BRIGHTNESS CRT		
-10	331-0318-00			1	MASK,CRT SCALE:	80009	331-0318-00
					OPTION 10 PULSED GRATICULE		
-11	366-0494-00			4	KNOB:GRAY WITH SETSCREW	80009	366-0494-00
					EACH KNOB INCLUDES:		
	213-0153-00			1	.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCR
-12	358-0378-00			5	BUSHING,SLEEVE:0.131 ID X 0.18 OD X 0.125 L	80009	358-0378-00
-13	----- -----			2	SWITCH,PUSH:SPST,1A,115VAC(SEE S1119, S1139 REPL)		
					(ATTACHING PARTS)		
-14	210-0583-00			2	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-15	210-0940-00			2	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL	12327	ORDER BY DESCR
					(END ATTACHING PARTS)		
-16	----- -----			1	RESISTOR,VAR:(SEE R1174 REPL)		
					(ATTACHING PARTS)		
-17	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-18	210-0940-00			1	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL	12327	ORDER BY DESCR
					(END ATTACHING PARTS)		
-19	366-1402-02			2	PUSH BUTTON:SIL GY,LEFT	80009	366-1402-02
-20	366-1402-03			1	PUSH BUTTON:SIL GY,ALT	80009	366-1402-03
-21	366-1402-04			1	PUSH BUTTON:SIL GY,ADD	80009	366-1402-04
-22	366-1257-31			1	PUSH BUTTON:SIL GY,CHOP	80009	366-1257-31
-23	366-1402-06			2	PUSH BUTTON:SIL GY,RIGHT	80009	366-1402-06
-24	366-1402-42			1	PUSH BUTTON:SIL GY,BEAM FINDER	80009	366-1402-42
-25	366-1402-71			2	PUSH BUTTON:SIL GY,EXT	80009	366-1402-71
-26	366-1257-14			1	PUSH BUTTON:SIL GY,ON	80009	366-1257-14
-27	366-1402-43			1	PUSH BUTTON:SIL GY,HIGH	80009	366-1402-43
-28	366-1402-07			1	PUSH BUTTON:SIL GY,VERT MODE	80009	366-1402-07
-29	426-0681-00			13	FRAME,PUSH BTN:	80009	426-0681-00
-30	333-1685-00			1	PANEL,FRONT:	80009	333-1685-00
					(ATTACHING PARTS)		
-31	211-0070-00			1	SCREW,MACHINE:2-56 X 0.25,OVH,STL	TK0435	ORDER BY DESCR
-32	210-0001-00			1	WASHER,LOCK:#2 INTL,0.013 THK,STL	77900	1202-00-00-0541C
-33	210-0405-00			1	NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL	73743	12157-50
					(END ATTACHING PARTS)		
-34	384-1136-00			5	EXTENSION SHAFT:0.95 INCH LONG	80009	384-1136-00
-35	384-1099-00			3	EXTENSION SHAFT:1.58 L X 0.187 SQ,PLSTC	80009	384-1099-00
-36	----- -----			1	CKT BD ASSY:FNT PANEL PULSER(SEE A2 REPL)		
-37	131-0608-00			38	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	22526	48283-036
-38	131-1003-00			3	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-39	136-0252-04	B010100	B050314	15	.SOCKET,PIN TERM:U/M 0.016-0.018 DIA PINS	22526	75060-007
	136-0252-07	B050315		3	.SOCKET,PIN CONN:W/O DIMPLE	22526	75060-012
	136-0220-00	B050315		4	.SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT	71785	133-23-11-034
-40	136-0269-02	B010100	B191969	2	.SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP	09922	DILB14P-108T
	136-0729-00	B191970		2	.SKT,PL-IN ELEK:MICROCKT,16 CONTACT	09922	DILB16P-108T
-41	----- -----			1	.SWITCH,PUSH:(SEE S1185 REPL)		
-42	----- -----			2	.SWITCH,PUSH:(SEE S1190 REPL)		
-43	----- -----			1	.SWITCH,PUSH:(SEE S1187 REPL)		

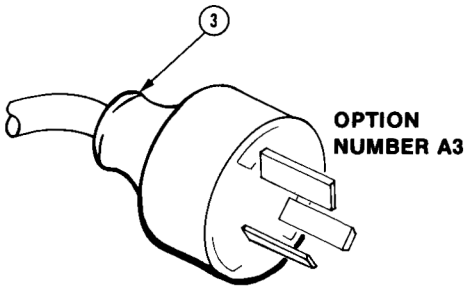
Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
4-44	----- -----			1	.SWITCH,PUSH:(SEE S1180 REPL)		
-45	361-0382-00			20	.SPACER,PB SW:0.275 L,BROWN POLYCARBONATE	80009	361-0382-00
-46	----- -----			1	.RESISTOR,VAR:FOCUS(SEE R1700 REPL) .RESISTOR,VAR:READOUT(SEE R1171 REPL) .RESISTOR,VAR:GRAT/ALLUM(SEE R1167 REPL)		
-47	129-0182-00			1	SPACER,POST:0.34 L,4-40 THRU,BRS,SI PL,0.25 HEX (ATTACHING PARTS)	80009	129-0182-00
-48	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	93907	ORDER BY DESCR
-49	220-0663-00			2	NUT BLOCK:4-40 X 0.312 X 0.75 X 3.3,AL (ATTACHING PARTS)	80009	220-0663-00
-50	211-0101-00			2	SCREW,MACHINE:4-40 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESCR
-51	211-0008-00			2	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	93907	ORDER BY DESCR
-52	200-1505-00			1	COVER,CONN BRKT:SEVEN CONNECTORS (ATTACHING PARTS)	80009	200-1505-00
	211-0008-00			1	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	93907	ORDER BY DESCR
	179-1884-00	B010100	B129999	1	WIRING HARNESS:950X OPTION NO 10	80009	179-1884-00
	179-1884-01	B130000		1	WIRING HARNESS:OPTION 10	80009	179-1884-01
-53	386-2469-00			1	SUBPANEL,FRONT:	80009	386-2469-00



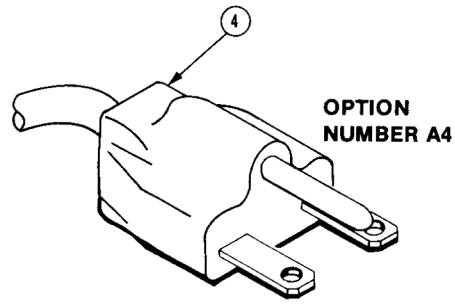
Universal Euro
220 volt/50 Hz
Rated 16 ampere



U.K.
240 volt/50 Hz
Rated 13 ampere



Australian
240 volt/50 Hz
Rated 10 ampere



North American
240 volt/60 Hz
Rated 15 ampere
(12 amp max; NEC)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
5-1	161-0066-09			1		CABLE ASSY,PWR:3,0.75MM SQ,220V,96.0 L	80126	OBD
	----- -----			-		(EUROPEAN)		
-2	161-0066-10			1		CABLE ASSY,PWR:3,0.75MM SQ,240V,96.0 L	80126	OBD
	----- -----			-		(UNITED KINGDOM)		
-3	161-0066-11			1		CABLE ASSY,PWR:3,0.75MM,240V,96.0 L	80126	OBD
	----- -----			-		(AUSTRALIAN)		
-4	161-0066-12			1		CABLE ASSY,PWR:3,18 AWG,240V,96.0 L	80126	OBD
	----- -----			-		(NORTH AMERICAN)		

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.

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MANUAL CHANGE INFORMATION

Date: 3-12-85 Change Reference: C51/0385/REV.

Product: R7903 Manual Part No.: 070-1464-00

DESCRIPTION PG 42

Effective for all serial numbers

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

CHANGE TO:

R684	317-0910-00	RES.,FXD,CMPSN:91 OHM,5%,0.125W
R684	317-0101-00	RES.,FXD,CMPSN:100 OHM,5%,0.125W
R684	317-0111-00	RES.,FXD,CMPSN:110 OHM,5%,0.125W
R684	317-0131-00	RES.,FXD,CMPSN:130 OHM,5%,0.125W
R684	317-0161-00	RES.,FXD,CMPSN:160 OHM,5%,0.125W
R684	317-0221-00	RES.,FXD,CMPSN:220 OHM,5%,0.125W
R684	317-0301-00	RES.,FXD,CMPSN:300 OHM,5%,0.125W
R684	317-0511-00	RES.,FXD,CMPSN:510 OHM,5%,0.125W
R684	----------	(R684 SELECTED)
R688	317-0910-00	RES.,FXD,CMPSN:91 OHM,5%,0.125W
R688	317-0101-00	RES.,FXD,CMPSN:100 OHM,5%,0.125W
R688	317-0111-00	RES.,FXD,CMPSN:110 OHM,5%,0.125W
R688	317-0131-00	RES.,FXD,CMPSN:130 OHM,5%,0.125W
R688	317-0161-00	RES.,FXD,CMPSN:160 OHM,5%,0.125W
R688	317-0221-00	RES.,FXD,CMPSN:220 OHM,5%,0.125W
R688	317-0301-00	RES.,FXD,CMPSN:300 OHM,5%,0.125W
R688	317-0511-00	RES.,FXD,CMPSN:510 OHM,5%,0.125W
R688	----------	(R688 SELECTED)
R741	317-0111-00	RES.,FXD,CMPSN:110 OHM,5%,0.125W
R741	317-0131-00	RES.,FXD,CMPSN:130 OHM,5%,0.125W
R741	317-0161-00	RES.,FXD,CMPSN:160 OHM,5%,0.125W
R741	317-0221-00	RES.,FXD,CMPSN:220 OHM,5%,0.125W
R741	317-0301-00	RES.,FXD,CMPSN:300 OHM,5%,0.125W
R741	317-0511-00	RES.,FXD,CMPSN:510 OHM,5%,0.125W
R741	317-0102-00	RES.,FXD,CMPSN:1K OHM,5%,0.125W
R741	----------	(R741 SELECTED)
R756	317-0111-00	RES.,FXD,CMPSN:110 OHM,5%,0.125W
R756	317-0131-00	RES.,FXD,CMPSN:130 OHM,5%,0.125W
R756	317-0161-00	RES.,FXD,CMPSN:160 OHM,5%,0.125W
R756	317-0221-00	RES.,FXD,CMPSN:220 OHM,5%,0.125W
R756	317-0301-00	RES.,FXD,CMPSN:300 OHM,5%,0.125W
R756	317-0511-00	RES.,FXD,CMPSN:510 OHM,5%,0.125W
R756	317-0102-00	RES.,FXD,CMPSN:1K OHM,5%,0.125W
R756	----------	(R756 SELECTED)
R4689	317-0431-00	RES.,FXD,CMPSN:430 OHM,5%,0.125W
R4689	317-0561-00	RES.,FXD,CMPSN:560 OHM,5%,0.125W
R4689	317-0821-00	RES.,FXD,CMPSN:820 OHM,5%,0.125W
R4689	317-0102-00	RES.,FXD,CMPSN:1K OHM,5%,0.125W
R4689	317-0122-00	RES.,FXD,CMPSN:1.2K OHM,5%,0.125W
R4689	317-0162-00	RES.,FXD,CMPSN:1.6K OHM,5%,0.125W
R4689	----------	(R4689 SELECTED)

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MANUAL CHANGE INFORMATION

Date: 2/10/1986 **Change Reference:** M56709 REV.

Product: R7903 Oscilloscope **Manual Part No.:** 070-1464-00

DESCRIPTION Manual Insert for Product Group 42

These changes are effective at serial number B210000.

The following changes to the R7903 Service Manual result from the utilization of a different ventilating fan in the R7903 Oscilloscope.

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

REMOVE:

A17	670-2539-02	CKT BOARD ASSY:FAN MOTOR
C2508	290-0534-00	CAP.,FXD,ELCTLT:1UF,20%,35V
C2511	290-0536-00	CAP.,FXD,ELCTLT:10UF,20%,25V
CR2528	152-0107-00	SEMICOND DEVICE:SILICON,400V,400MA
CR2531	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35
CR2532	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35
CR2534	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35
CR2537	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35
CR2538	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35
Q2512	151-0301-00	TRANSISTOR:SILICON,PNP
R2523	315-0470-00	RES.,FXD,CMPSN:47 OHM,5%,0.25W
R2525	321-0239-00	RES.,FXD,FILM:3.01K OHM,1%,0.125W
R2527	321-0201-00	RES.,FXD,FILM:1.21K OHM,1%,0.125W
R2529	321-0022-00	RES.,FXD,FILM:16.5 OHM,1%,0.125W
R2529	---- ----	(R2529 STANDARD ONLY)
R2529	321-0022-00	RES.,FXD,FILM:16.5 OHM,1%,0.125W
R2529	---- ----	(R2529 OPTION 10 ONLY)
R2531	307-0059-00	RES.,FXD,CMPSN:6.2 OHM,5%,0.50W
R2531	---- ----	(R2531 STANDARD ONLY)
R2531	307-0059-00	RES.,FXD,CMPSN:6.2 OHM,5%,0.50W
R2531	---- ----	(R2531 OPTION 10 ONLY)
R2533	301-0271-00	RES.,FXD,CMPSN:270 OHM,5%,0.5W
R2535	301-0271-00	RES.,FXD,CMPSN:270 OHM,5%,0.5W
U2536	156-0281-00	MICROCIRCUIT,LI:4 TRANSISTOR ARRAY

ADD:

R2536	308-0175-00	RES.,FXD,WW:10 OHM,5%,10W

CHANGE TO:

B2536	119-1545-01	FAN,TUBEAXIAL:12V,4.8W,RPM,35 CFM

DESCRIPTION

REPLACEABLE MECHANICAL PARTS LIST CHANGES

REMOVE:

Fig. 1-86	378-0041-01	1	FILTER ELEM,AIR:
Fig. 1-105	378-0810-00	1	SHROUD,FAN:
Fig. 1-106	211-0008-00	2	SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL
Fig. 1-107	210-0586-00	2	NUT,PL,ASSEM WA:4-40 X 0.25 STL CD PL
Fig. 1-108	369-0035-00	1	IMPLR,FAN AXIAL:PLASTIC
Fig. 1-109	343-0411-00	2	STRAP,RETAINING:2.494 X 0.8,STL TIN PL
Fig. 1-110	211-0510-00	2	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL
Fig. 1-111	210-0457-00	2	NUT,PL,ASSEM WA:6-32 X 0.312,STL,CD PL
Fig. 1-112	407-1235-00	1	BRACKET,FAN MTG:ALUMINUM
Fig. 1-113	211-0504-00	2	SCREW,MACHINE:6-32 X 0.250,PNH STL,CD PL
Fig. 1-114	----- -----	-	CKT BOARD ASSY:(SEE A17 REPL)
Fig. 1-115	131-0608-00	2	.TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD
Fig. 1-116	136-0269-00	1	.SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE
Fig. 1-117	147-0035-00	1	.MOTOR,DC:BRUSHLESS,10-15VDC,145MA

ADD:

Fig. 1-135	211-0530-00	4	SCREW,MACHINE:6-32 X 1.750,PNH,STL,CD PL,POZ
Fig. 1-136	378-0279-00	1	GRILL,FAN:3.125 DIA SQ
Fig. 1-137	119-1545-01	1	FAN,TUBEAXIAL:(SEE B2536 REPL)
Fig. 1-138	210-0457-00	4	NUT,PL,ASSEM WA:6-32 X 0.312,STL,CD PL
Fig. 1-139	211-0510-00	1	SCREW,MACHINE:6-32 X 0.375,PNH,STL,CD PL
Fig. 1-140	210-0202-00	1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ,TIN PL
Fig. 1-141	210-0478-00	1	SPACER,POST:0.66 L W/6-32 THD THRU,AL
Fig. 1-142	308-0175-00	1	RESISTOR:(SEE R2536 REPL)
Fig. 1-143	174-0085-00	1	CA ASSY,SP,ELEC:2,26 AWG,8.0 L,RIBBON
Fig. 1-144	210-0601-00	1	EYELET,METALLIC:0.183 OD X 0.192 L,BRASS
Fig. 1-145	211-0553-00	1	SCREW,MACHINE:6-32 X 1.5,PNH,STL,CD PL

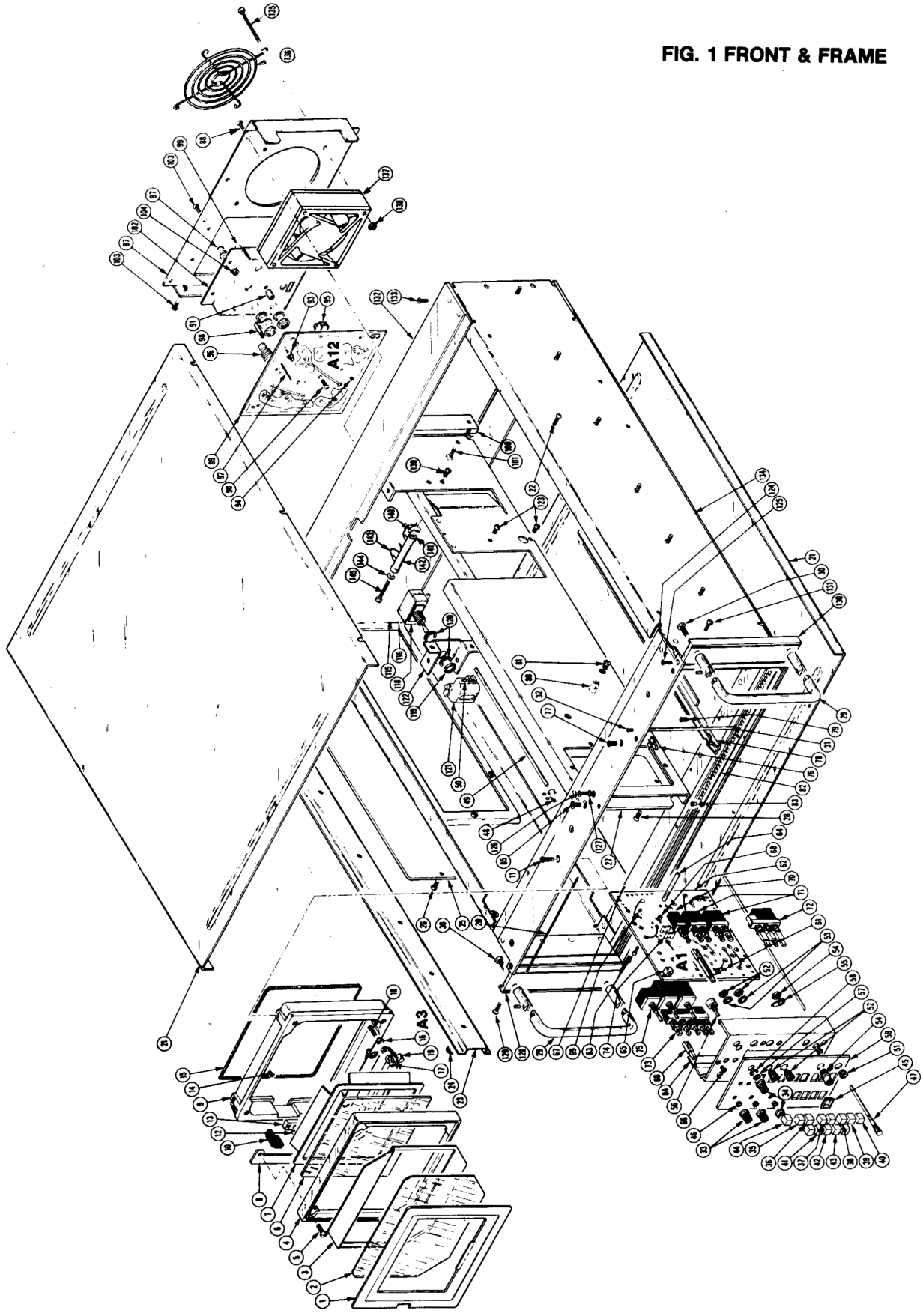
CHANGE TO:

Fig. 1-87	**386-2471-01**	1	PANEL,REAR:R7903

Section 7 — REPLACEABLE MECHANICAL PARTS

FIG. 1 FRONT & FRAME as given in Section 7 only applies to instruments with serial numbers below B210000. The following diagram applies to instruments with serial number B210000 or above.

FIG. 1 FRONT & FRAME



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MANUAL CHANGE INFORMATION

Date: 10-29-86 Change Reference: M58944

Product: R7903 OSCILLOSCOPE Manual Part No.: 070-1464-00

DESCRIPTION Product Group 42

These changes are effective at serial number B212774.

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

CHANGE TO:

U2127	156-1172-02	MICROCKT,DGTL:DUAL 4-STAGE BIN CNTR,SCRN,74LS393
U2202	156-1172-02	MICROCKT,DGTL:DUAL 4-STAGE BIN CNTR,SCRN,74LS393

These parts are located on the Readout circuit board assembly and are listed on a MANUAL CHANGE INFORMATION C53/786.

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MANUAL CHANGE INFORMATION

Date: 10/21/85 Change Reference: M59099/REV.

Product: R7903 Oscilloscope Manual Part No.: 070-1464-00

DESCRIPTION Manual insert for Product Gp. 42

These changes are effective at serial number B202661.

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

ADD:

C2140	281-0816-00	CAP.,FXD,CER DI:82PF,5%,100V
R2186	315-0241-00	RES.,FXD,CMPSN:240 OHM,5%,0.25W

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MANUAL CHANGE INFORMATION

Date: 11/26/85 **Change Reference:** M59522

Product: R7903 Oscilloscope **Manual Part No.:** 070-1464-00

DESCRIPTION Manual Insert for Product Group 42

These changes are effective at serial number B202667.

The following changes apply to the parts list and schematic diagram given in Manual Change Information M51684 for the A15 Readout circuit board assembly installed in instruments with serial number B202642 or above.

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

CHANGE TO:

R2239	315-0104-00	RES.,FXD,FILM:100K OHM,5%,0.25W

DIAGRAM CHANGES

READOUT SCHEMATIC

Change R2239 from 30K to 100K.

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MANUAL CHANGE INFORMATION

Date: 3/18/86 **Change Reference:** M60367

Product: R7903 Oscilloscope **Manual Part No.:** 070-1464-00

DESCRIPTION Manual Insert for Product Group 42

These changes are effective at serial number B212705.

The following changes are associated with a previous change to the A21 Readout circuit board assembly at serial number B202642.

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

If the components indicated for change cannot be found in the Replaceable Electrical Parts List section of your manual, check for related change information at the rear of the manual.

CHANGE TO:

	672-0572-05	CKT BOARD ASSY:READOUT PROTECTION #1(A21 & A22 WIRED)
A21	670-8620-04	CKT BOARD ASSY:READOUT
R2157	315-0621-00	RES.,FXD,FILM:620 OHM,5%,0.25W
R2250	315-0621-00	RES.,FXD,FILM:620 OHM,5%,0.25W
R2251	315-0472-00	RES.,FXD,FILM:4.7K OHM,5%,0.25W

ADD:

C2141	281-0767-00	CAP.,FXD,CER DI:330PF,20%,100V
C2259	281-0762-00	CAP.,FXD,CER DI:27PF,20%,100V
C2259	----- -----	(NOMINAL VALUE,SELECTED)
C2259	281-0808-00	CAP.,FXD,CER DI:7PF,20%,100V
C2259	----- -----	(C2259 SELECTABLE)
C2259	281-0811-00	CAP.,FXD,CER DI:10PF,10%,100V
C2259	----- -----	(C2259 SELECTABLE)
C2259	281-0797-00	CAP.,FXD,CER DI:15PF,10%,100V
C2259	----- -----	(C2259 SELECTABLE)
C2259	281-0759-00	CAP.,FXD,CER DI:22PF,10%,100V
C2259	----- -----	(C2259 SELECTABLE)
C2259	281-0819-00	CAP.,FXD,CER DI:33PF,5%,50V
C2259	----- -----	(C2259 SELECTABLE)
C2259	281-0763-00	CAP.,FXD,CER DI:47PF,10%,100V
C2259	----- -----	(C2259 SELECTABLE)
C2259	281-0798-00	CAP.,FXD,CER DI:51PF,1%,100V
C2259	----- -----	(C2259 SELECTABLE)
C2259	281-0799-00	CAP.,FXD,CER DI:62PF,2%,100V
C2259	----- -----	(C2259 SELECTABLE)
C2297	281-0762-00	CAP.,FXD,CER DI:27PF,20%,100V
C2297	----- -----	(NOMINAL VALUE,SELECTED)
C2297	281-0808-00	CAP.,FXD,CER DI:7PF,20%,100V
C2297	----- -----	(C2297 SELECTABLE)

DESCRIPTION

C2297	281-0811-00	CAP.,FXD,CER DI:10PF,10%,100V
C2297	----- -----	(C2297 SELECTABLE)
C2297	281-0797-00	CAP.,FXD,CER DI:15PF,10%,100V
C2297	----- -----	(C2297 SELECTABLE)
C2297	281-0759-00	CAP.,FXD,CER DI:22PF,10%,100V
C2297	----- -----	(C2297 SELECTABLE)
C2297	281-0819-00	CAP.,FXD,CER DI:33PF,5%,50V
C2297	----- -----	(C2297 SELECTABLE)
C2297	281-0763-00	CAP.,FXD,CER DI:47PF,10%,100V
C2297	----- -----	(C2297 SELECTABLE)
C2297	281-0798-00	CAP.,FXD,CER DI:51PF,1%,100V
C2297	----- -----	(C2297 SELECTABLE)
C2297	281-0799-00	CAP.,FXD,CER DI:62PF,2%,100V
C2297	----- -----	(C2297 SELECTABLE)

DIAGRAM CHANGES

If the diagrams indicated for change cannot be located in Section 6 of your manual, check for related change information at the rear of the manual.

READOUT SYSTEM (SN B202642 - UP)

A21 Readout circuit board assembly, SN B202642 - Up

Add C2141 across R2141 on the component locator diagram.

READOUT SYSTEM (SN B202642 & UP) 

Add 330 pF capacitor C2141 across resistor R2141.

Change R2157 and R2250 from 2.2k to 620.

Change R2251 from 20k to 4.7k.

Add **SEL** (selectable) as the value of C2259 and C2297.

Tektronix MANUAL CHANGE INFORMATION

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Manual Insert for Product Group 42

PRODUCT: R7903 Oscilloscope DATE: 7/11/86

CHANGE REFERENCE: M61302 MANUAL PART NO.: 070-1464-00

These changes are effective at serial number B212743.

NOTE: The following information details the addition of a washer between the Vertical Output IC and its heat sink. An exploded view of the affected area is given to identify components by number.

REPLACEABLE MECHANICAL PARTS LIST CHANGES

ADD:

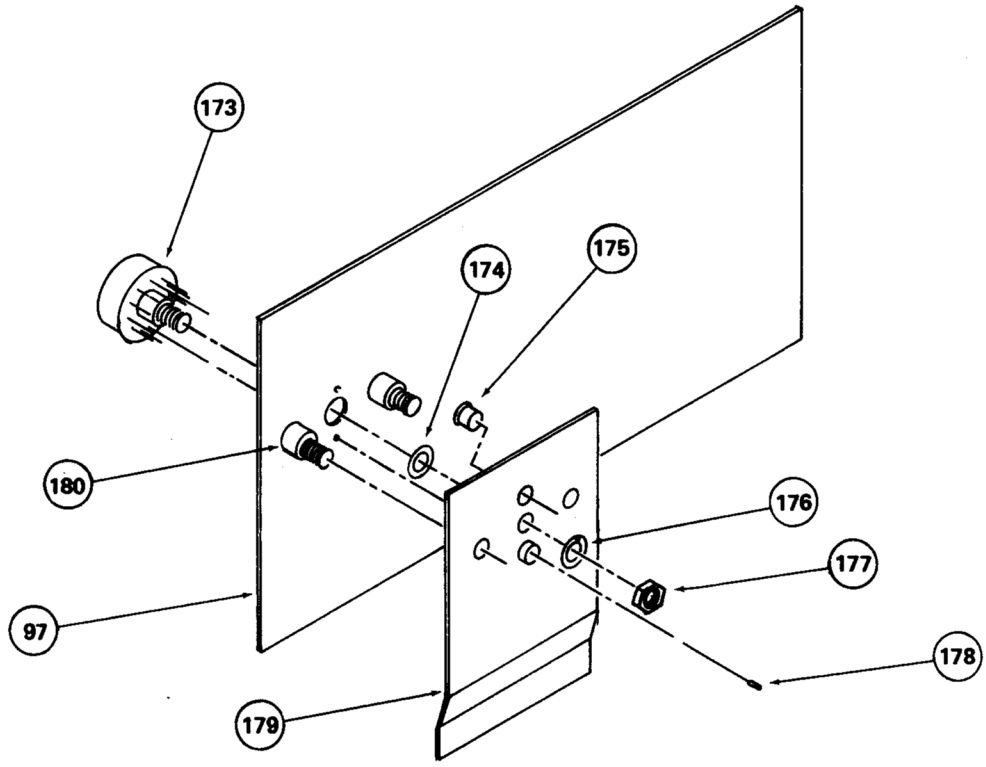
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff.	Dscont	Qty	12345	Name & Description
Fig. 2-173	----- -----	B180000		1		.VERTICAL OUTPUT IC:(SEE U745 REPL)
Fig. 2-174	210-0870-00	B212743		1		.WASHER,FLAT:0.141 ID X 0.312 OD X 0.05,STL CD PL
Fig. 2-175	348-0031-00	B180000		2		.GROMMET,PLASTIC:0.127 ID,GRAY ACETAL
Fig. 2-176	210-0055-00	B180000		1		.WASHER,LOCK:SPLIT,0.145 ID X 0.253 OD,S
Fig. 2-177	210-0407-00	B180000		3		.NUT,PLAIN,HEX:6-32 X 0.25 INCH,BRS
Fig. 2-178	198-2781-00	B010100	B179999	1		WIRE SET,ELEC:
	198-2995-00	B180000		1		WIRE SET,ELEC:
Fig. 2-179	214-2416-00	B180000		1		.HT SK MICROCKT:VERTICAL AMPLIFIER,BACK
Fig. 2-180	129-0303-00	B180000		2		.POST,ELEC-MECH:0.25 OD X 0.237 INCH LONG

NOTE: Figure 2-174 is the only component added by this modification. The other items are presently listed below item 2-108 in the Replaceable Mechanical Parts List. They are listed here with index numbers corresponding with the following exploded view as an aid in location of the added component.

DIAGRAM CHANGES

FIG. 2 CHASSIS

The following exploded view of the Vertical Output IC and related components applies to all instruments with serial number B180000 and up. The only exception to this is item 174, which applies only to instruments with serial number B212743 and up.



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MANUAL CHANGE INFORMATION

Date: 4-15-87 **Change Reference:** M61712

Product: R7903 Oscilloscope **Manual Part No.:** 070-1464-00

DESCRIPTION **PG.** 42

THESE CHANGES ARE EFFECTIVE AT SN B212866

MECHANICAL PARTS LIST CHANGES

CHANGE TO:

FIG. 1-136	378-2049-00	1	GRILL,FAN:3.07 DIA.

NOTE

THE ABOVE INFORMATION MAY NOT BE INCORPORATED INTO YOUR MANUAL. IF NOT, PLEASE NOTE CHANGE REFERENCE: M56709 (REV). THE FAN WAS ADDED AND INDEXED AS FIG. 1-136, PART NO. 378-0279-00. THIS PART NUMBER HAS NOW BEEN CHANGED TO 378-2049-00.

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MANUAL CHANGE INFORMATION

Date: 6-9-87 **Change Reference:** M56131

Product: R7903 Oscilloscope Service **Manual Part No.:** 070-1464-00

DESCRIPTION PG. 42

Effective serial number B212876*

ELECTRICAL PARTS LIST CHANGES

CHANGE TO:

A2	670-2538-03	CKT BOARD ASSY:FRONT PANEL PULSER (R7903 OPTION 10 ONLY)
CR210	152-0664-00	SEMICOND DVC,DI:SCHOTTKY,SW,SI,70V,DO-35 (R7903 OPTION 10 ONLY)
CR359	152-0664-00	SEMICOND DVC,DI:SCHOTTKY,SW,SI,70V,DO-35 (R7903 OPTION 10 ONLY)
CR1118	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35 (R7903 OPTION 10 ONLY)
CR1119	152-0664-00	SEMICOND DVC,DI:SCHOTTKY,SW,SI,70V,DO-351 (R7903 OPTION 10 ONLY)
CR1138	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35 (R7903 OPTION 10 ONLY)
CR1142	152-0141-02	SEMICOND DVC,DI:SW,SI,30V,150MA,30V,D0-35 (R7903 OPTION 10 ONLY)
CR1543	152-0664-00	SEMICOND DVC,DI:SCHOTTKY,SW,SI,70V,DO-35 (R7903 OPTION 10 ONLY)
R1142	3315-0105-00	RES,FXD,FILM:1M OHM,5%0.25W

The above changes are located on the OPTION 10 FRONT PANEL 

*Electrical Parts List reads SN B202663 for Option 10, it should read B212876.

Tektronix® MANUAL CHANGE INFORMATION

COMMITTED TO EXCELLENCE

Date: 10/22/87 **Change Reference:** M64956

Product: R7903 Oscilloscope **Manual Part No.:** 070-1464-00

PRODUCT GROUP CODE: 42

DESCRIPTION

These changes are effective at serial number B212922.

REPLACEABLE ELECTRICAL PARTS LIST CHANGES

If the components listed for this change cannot be found in the Replaceable Electrical Parts List section of your manual, check for related change information at the rear of the manual.

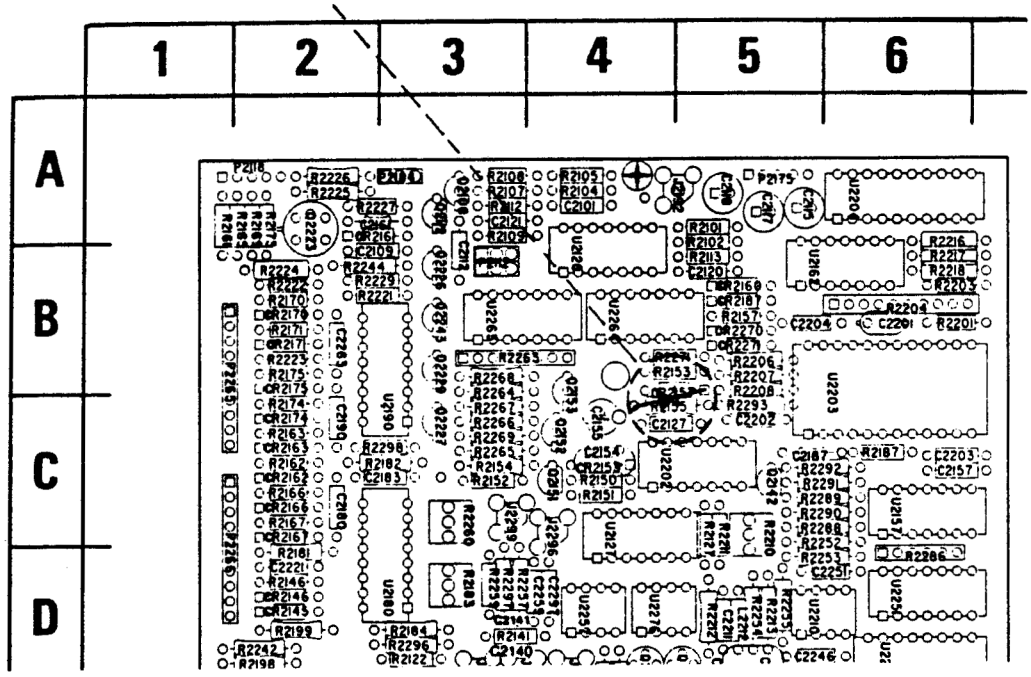
CHANGE TO:

A21	670-8620-06	CIRCUIT BD ASSY:READOUT
A22	672-0572-07	CIRCUIT BD ASSY:READOUT PROTECTION #1
CR2157	152-0322-00	SEMICOND DVC,DI:SCHOTTKY,SI,15V

DIAGRAM CHANGES

The above component is located in Assembly A21 and shown on diagram 12

CR2157
Change to: 152-0322-00
Move CR2157 anode to R2155



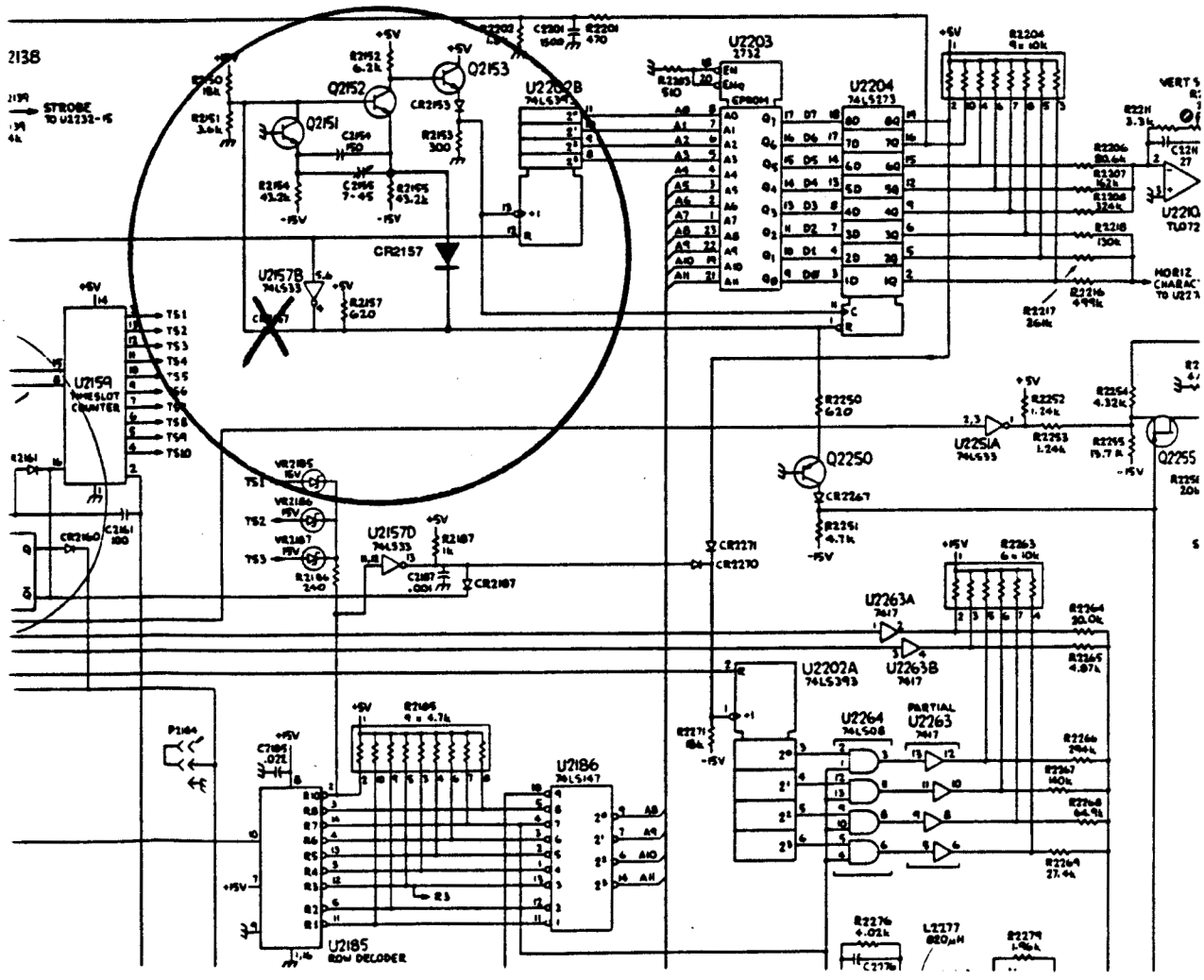
Product: R7903 Oscilloscope Date: 10/22/87 Change Reference: M64956

These changes are effective at serial number B212922.

SCHEMATIC CHANGES

If the schematics indicated for change cannot be found in Section 6 of your manual, check for other related change information at the rear of the manual.

READOUT SYSTEM
SN B202462 & UP 1 2



Tektronix
COMMITTED TO EXCELLENCE

MANUAL CHANGE INFORMATION

Date: 3/24/88 Change Reference: M66489

Product: R7903 SERVICE Manual Part No.: 070-1464-00

Product Group Code: 42

DESCRIPTION

This change is effective at serial number B212983.

REPLACEABLE ELECTRICAL PARTS LIST AND DIAGRAM CHANGES

If the components listed for this change cannot be found in the Replaceable Electrical Parts List section of your manual, check for related change information at the rear of the manual.

CHANGE TO:

Component No.	Tektronix Part No.	Name & Description
A21	670-8620-07	CIRCUIT BD ASSY: READOUT
C2161	281-0812-00	CAP,FXD,CER DI:1000PF,10%,100V
C2239	281-0812-00	CAP,FXD,CER DI:1000PF,10%,100V
CR2161	152-0322-00	SEMICOND DVC,DI:SCHOTTKY,SI,15V,DO-35

REMOVE:

C2127	281-0773-00	CAP,FXD,CER DI:0.01UF,10%,100V

ADD:

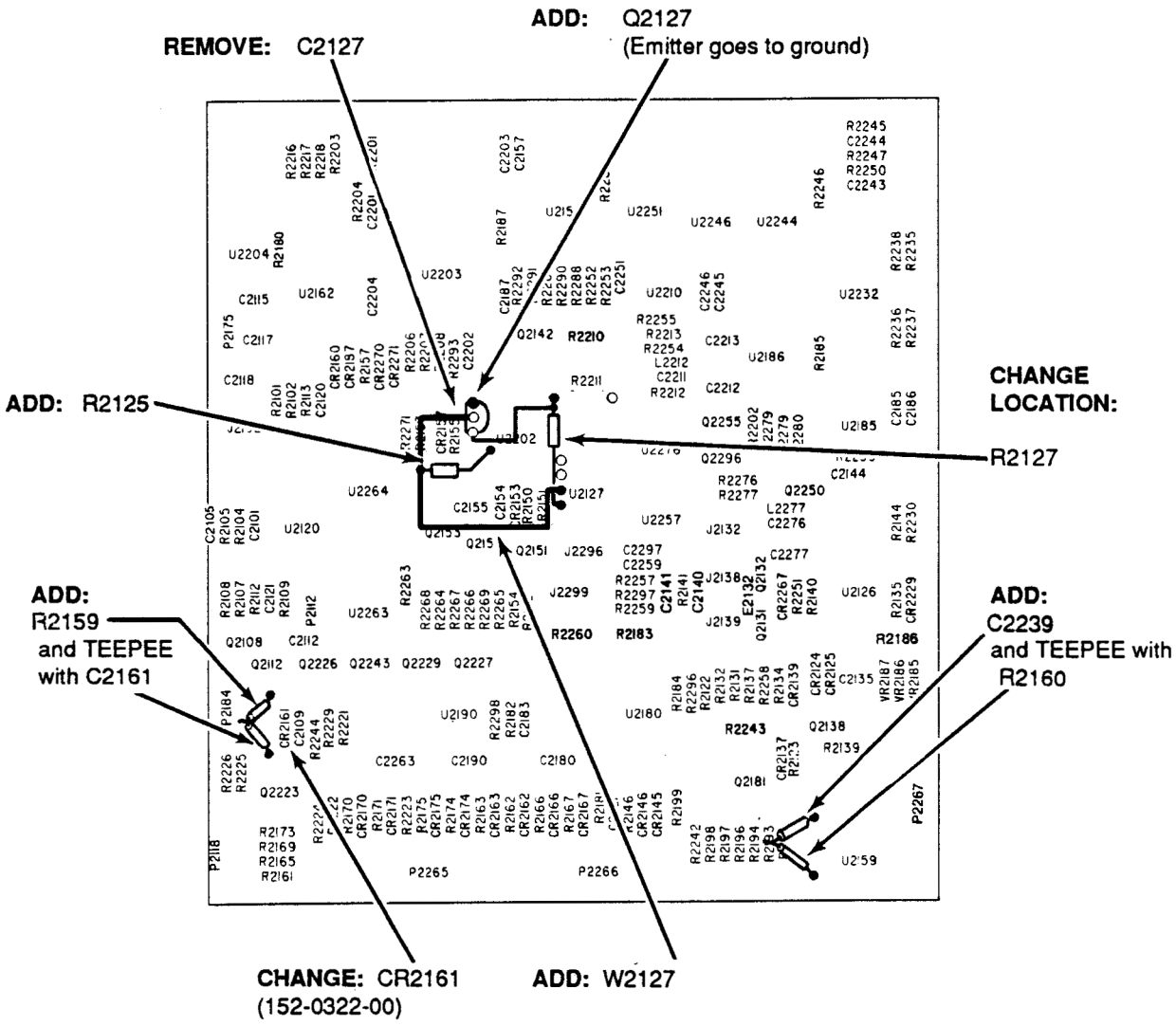
Q2127	151-0190-00	TRANSISTOR:NPN,SI,TO-92
R2125	315-0103-00	RES,FXD,FILM:10K OHM,5%,0.25W
R2159	315-0102-00	RES,FXD,FILM:1K OHM,5%,0.25W
R2160	315-0102-00	RES,FXD,FILM:1K OHM,5%,0.25W

SCHEMATIC, DIAGRAM AND MECHANICAL PARTS LIST CHANGES FOLLOW

Product: R7903 - SERVICE Date: 3/24/88 Change Reference: M66489

DIAGRAM CHANGES

READOUT SYSTEM
SN B202462 & UP

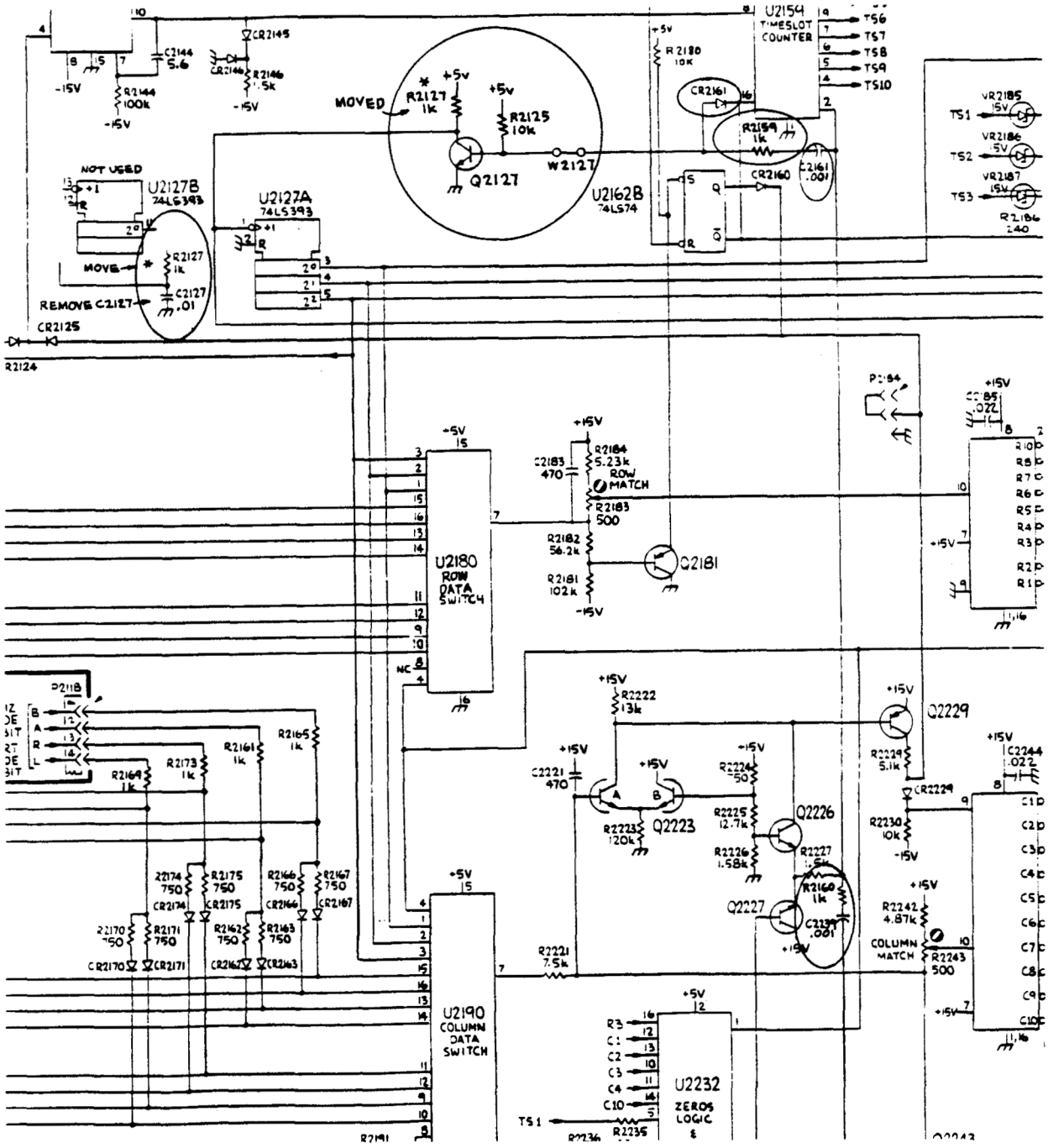


Product: R7903 SERVICE Date: 3/24/88 Change Reference: M66489

SCHEMATIC CHANGES

READOUT SYSTEM (12)

SN B202462 & Up



Product: R7903 - SERVICE Date: 3/24/88 Change Reference: M66489

MECHANICAL PARTS LIST CHANGES

If the components listed for change cannot be located in the Replaceable MechanicalParts List of your manual, check for related change information at the rear of the manual.

Fig. & Index No.	Tektronix Part No.	Qty	Name & Description
2-121	------ ----------	1	.CKT BOARD ASSY:READOUT(SEE A21 REPL)
			(ATTACHING PARTS)
	195-2256-00	1	LEAD ELECTRICAL:26 AWG,1.5L,O-N

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).

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

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

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

Abbreviations are based on ANSI Y1.1-1972.

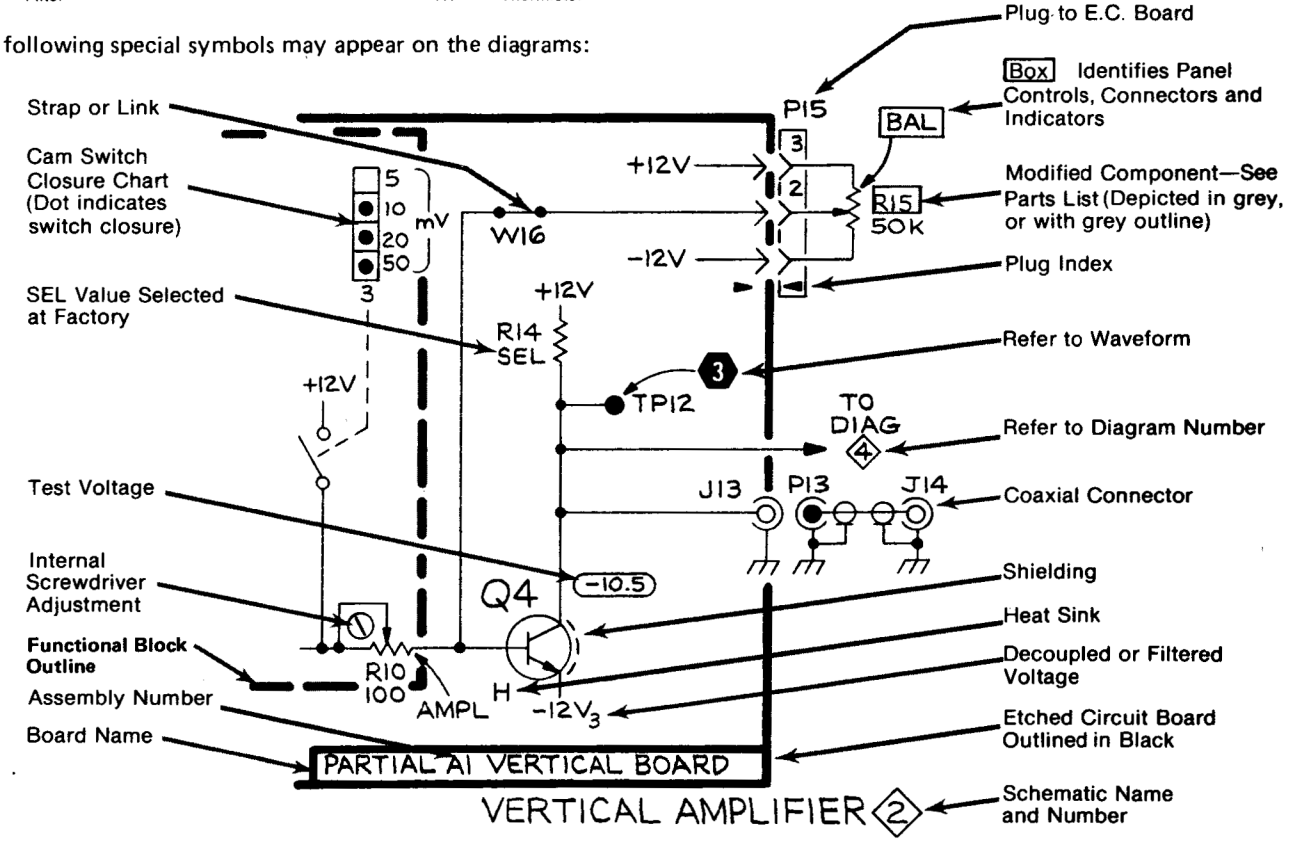
Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

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

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

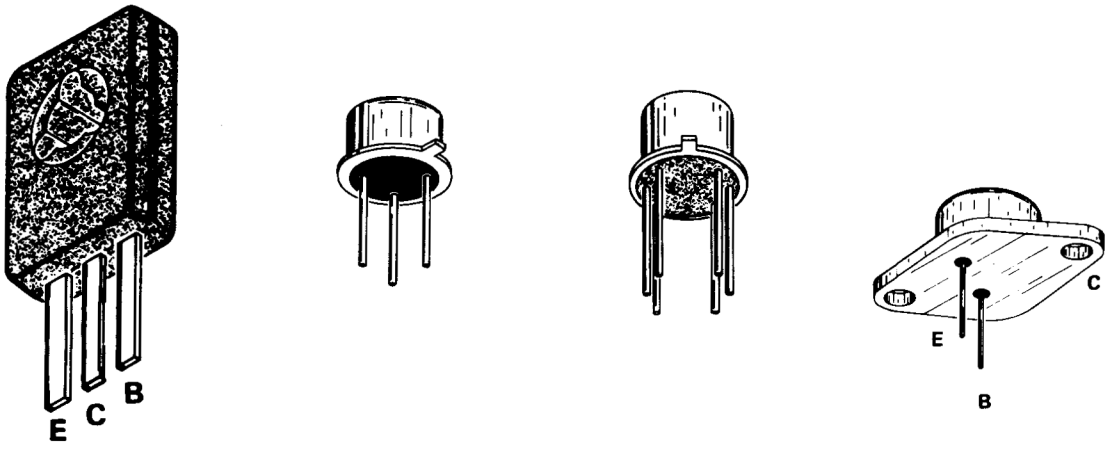
A	Assembly, separable or repairable (circuit board, etc)	H	Heat dissipating device (heat sink, heat radiator, etc)	S	Switch or contactor
AT	Attenuator, fixed or variable	HR	Heater	T	Transformer
B	Motor	HY	Hybrid circuit	TC	Thermocouple
BT	Battery	J	Connector, stationary portion	TP	Test point
C	Capacitor, fixed or variable	K	Relay	U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
CB	Circuit breaker	L	Inductor, fixed or variable	V	Electron tube
CR	Diode, signal or rectifier	M	Meter	VR	Voltage regulator (zener diode, etc.)
DL	Delay line	P	Connector, movable portion	W	Wirestrap or cable
DS	Indicating device (lamp)	Q	Transistor or silicon-controlled rectifier	Y	Crystal
E	Spark Gap, Ferrite bead	R	Resistor, fixed or variable	Z	Phase shifter
F	Fuse	RT	Thermistor		
FL	Filter				

The following special symbols may appear on the diagrams:



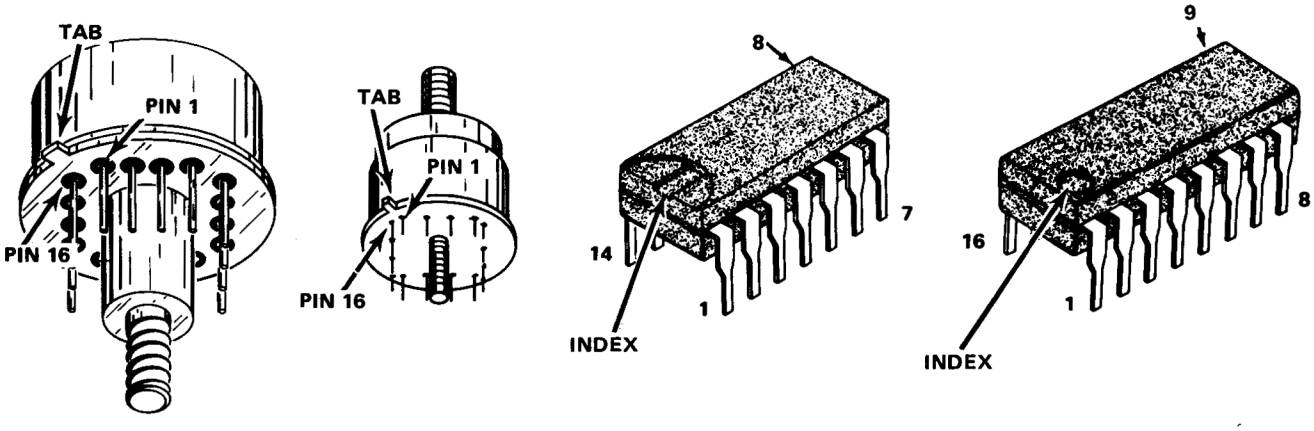
NOTE
LEAD CONFIGURATIONS AND CASE STYLES ARE TYPICAL, BUT MAY VARY DUE TO VENDOR CHANGES OR INSTRUMENT MODIFICATIONS.

PLASTIC-CASED TRANSISTORS



PLASTIC-POWER TRANSISTORS

METAL-CASED TRANSISTORS



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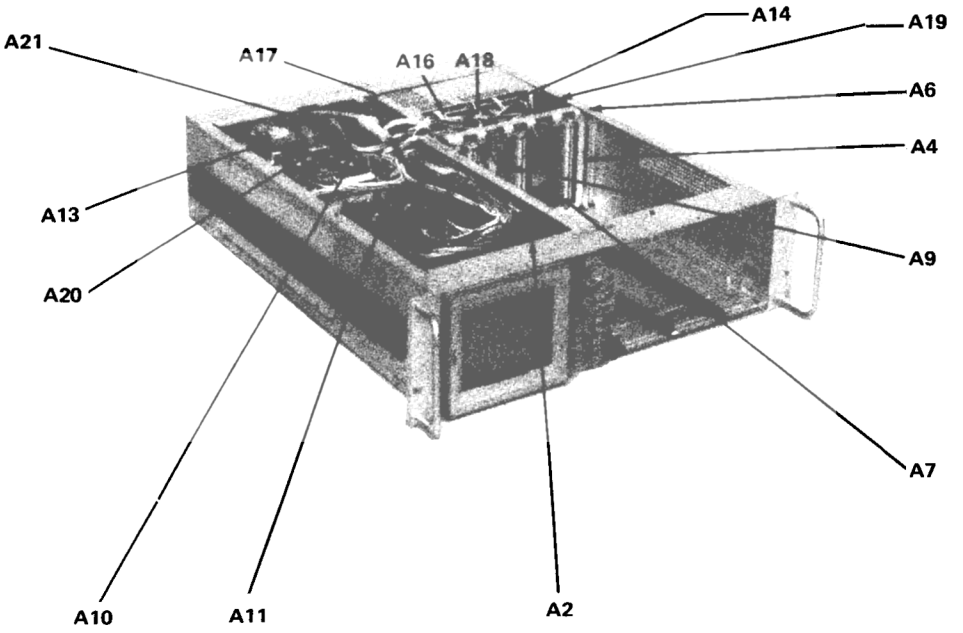
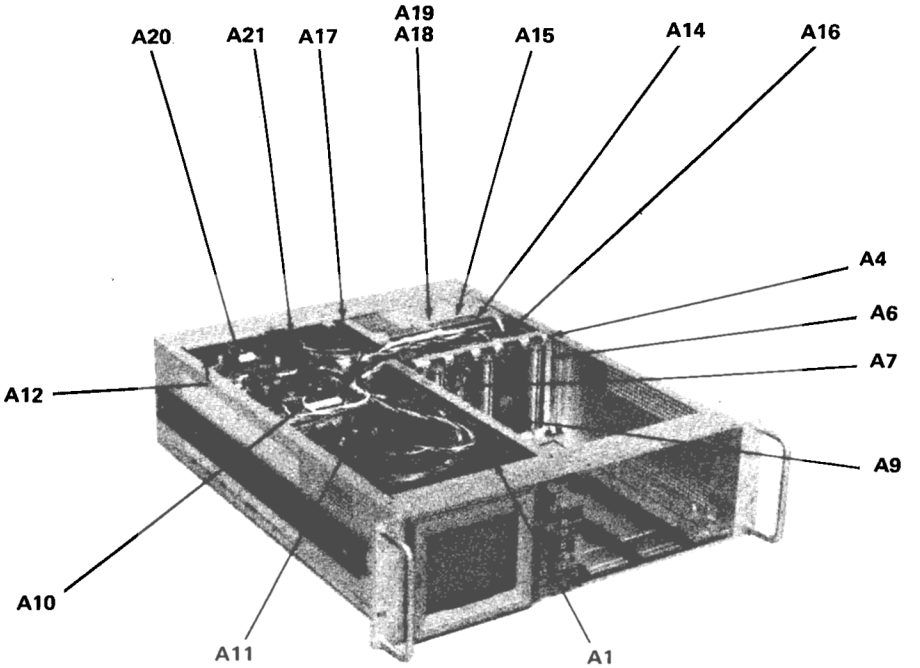


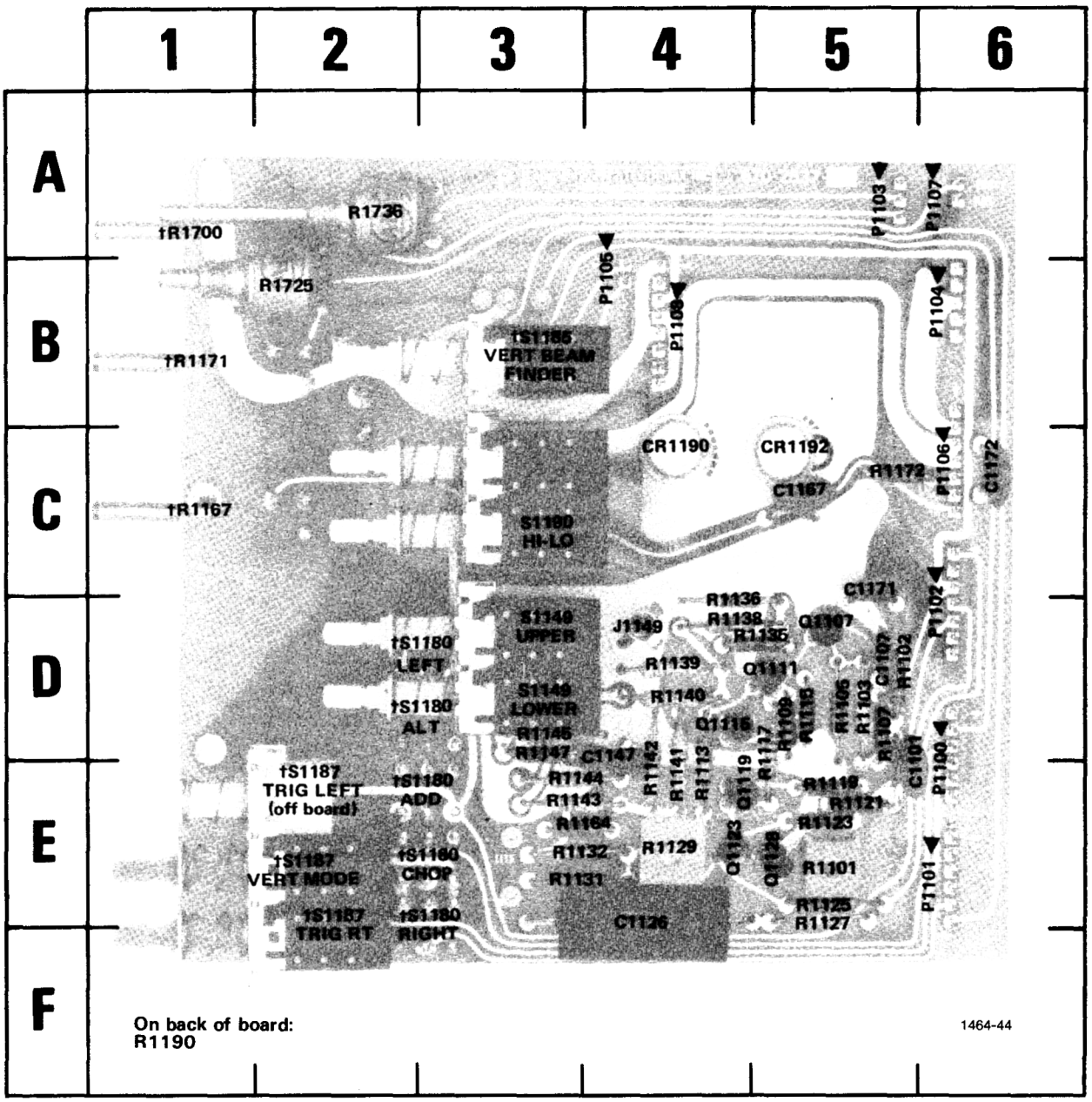
STANDARD R7903

A1	FRONT PANEL Circuit Board	A13	OUTPUT SIGNALS Circuit Board
A2	FRONT PANEL Circuit Board	A14	LINE INVERTER Circuit Board
A4	MAIN INTERFACE Circuit Board	A15	CAP. RECTIFIER Circuit Board
A6	LOGIC Circuit Board	A16	POST REGULATOR Circuit Board
A7	TRIGGER SELECTOR Circuit Board	A17	FAN MOTOR Circuit Board
A9	VERTICAL INTERFACE Circuit Board	A18	HIGH VOLTAGE Circuit Board
A10	VERTICAL AMP, Circuit Board	A19	AUTO FOCUS Circuit Board
A11	HORIZONTAL AMP. Circuit Board	A20	Z AXIS Circuit Board
A12	OUTPUT SIGNALS Circuit Board	A21	READOUT Circuit Board



OPTION 10 R7903

1464-43



†Furnished as a unit.

A1 Front Panel circuit board (Standard).

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1101	5E	P1100	6D	Q1107	5D	R1109	5D	R1135	4D	R1167	1C
C1107	5D	P1101	6E	Q1111	5D	R1113	4E	R1136	4D	R1171	1B
C1126	4E	P1102	6D	Q1115	4D	R1115	5D	R1138	4D	R1172	5C
C1147	4D	P1103	5A	Q1119	4E	R1117	5D	R1139	4D	R1700	1A
C1167	5C	P1104	6B	Q1123	4E	R1119	5E	R1140	4D	R1725	2A
C1171	5C	P1105	4B	Q1128	5E	R1121	5E	R1141	4E	R1736	2A
C1172	6C	P1106	6C			R1123	5E	R1142	4E		
		P1107	6A	R1101	5E	R1125	5E	R1143	3E	S1149	3D
CR1190	4C	P1108	4B	R1102	5D	R1127	5E	R1144	3E	S1180	2D-E
CR1192	5C			R1103	5D	R1129	4E	R1145	3D	S1185	3B
				R1105	5D	R1131	3E	R1147	3D	S1187	2E
J1149	4D			R1107	5D	R1132	3E	R1164	3E	S1190	3C

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.

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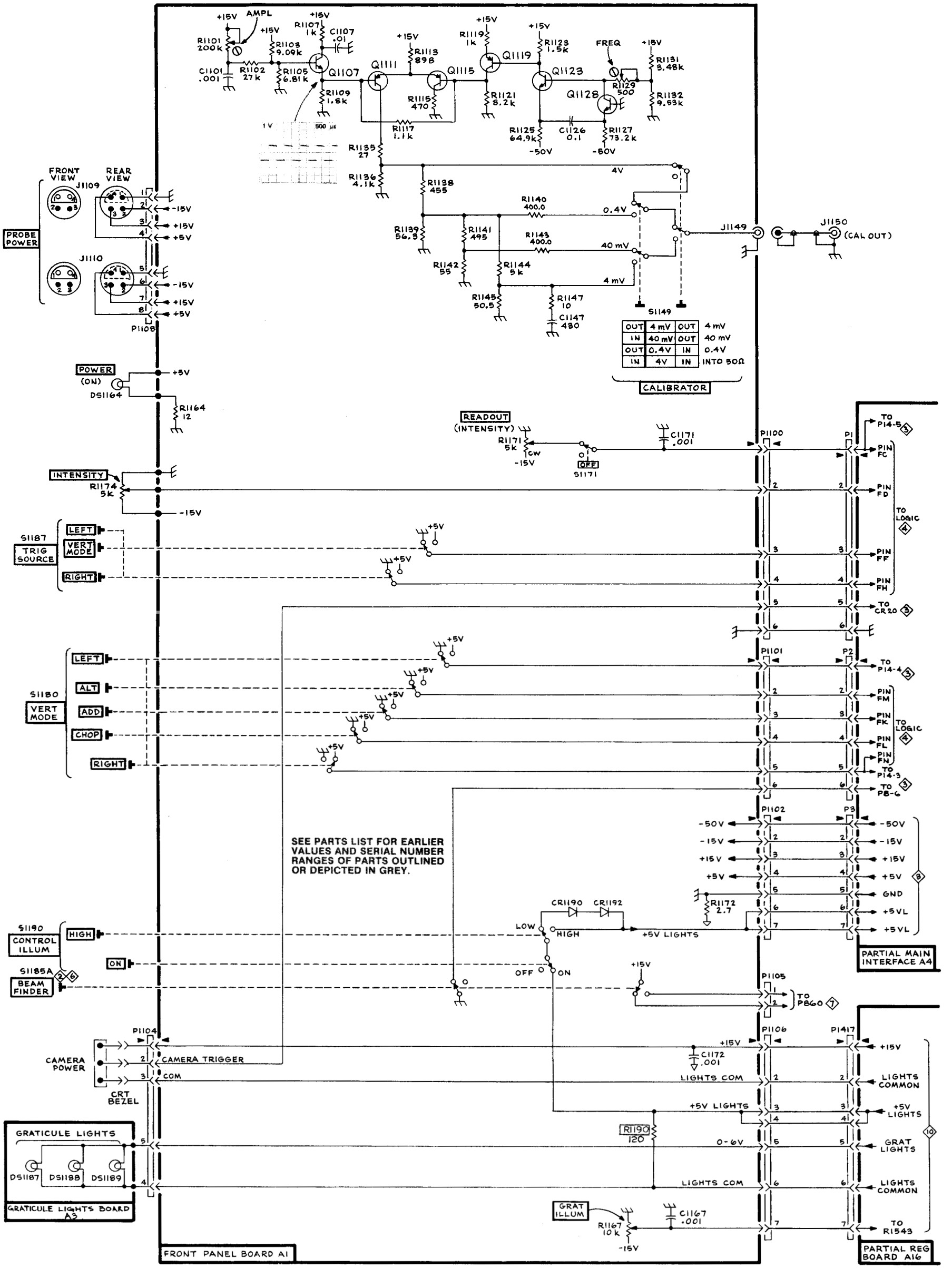
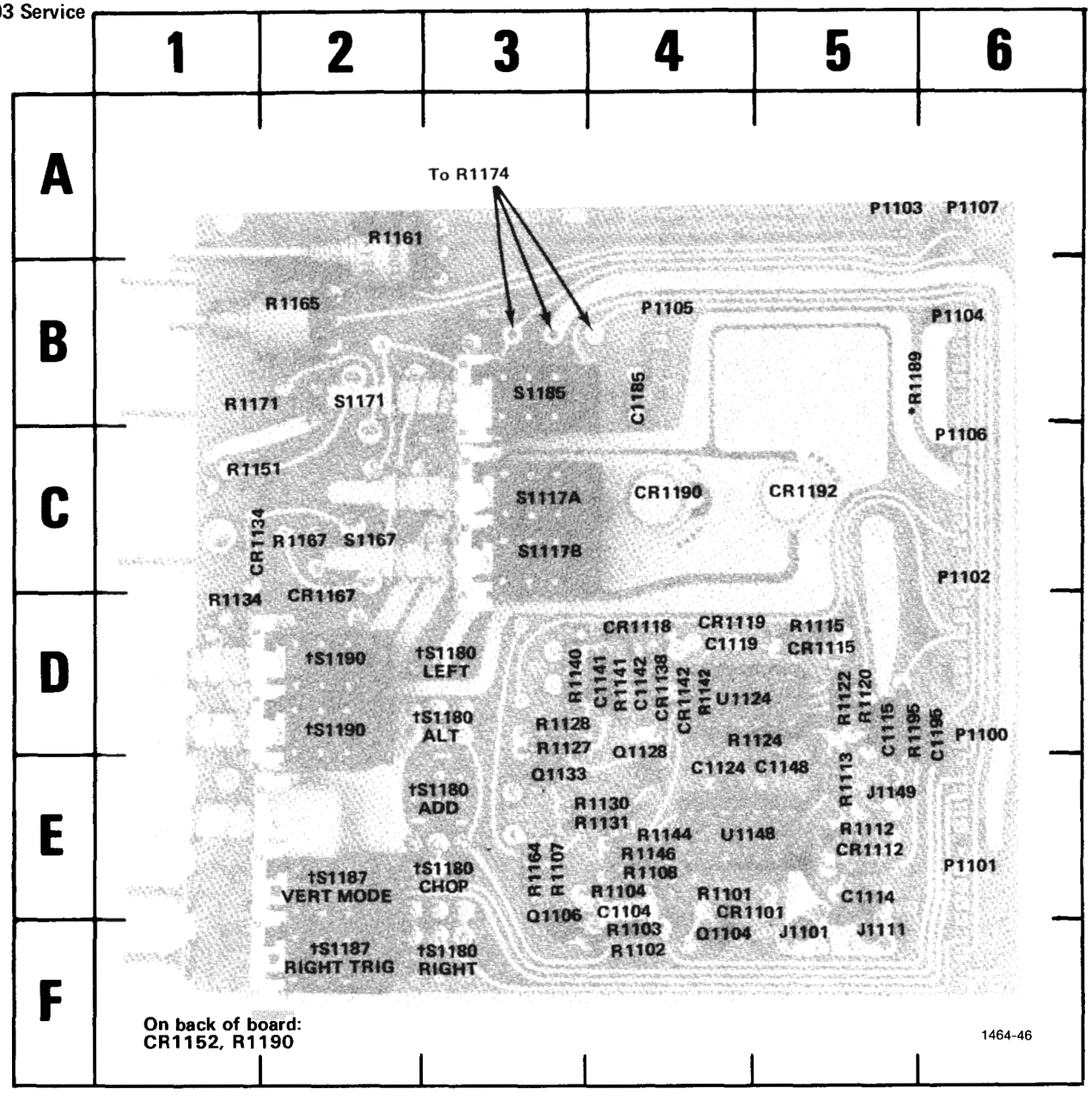
REV APR 1984

STANDARD FRONT PANEL





†Furnished as a unit.

*See Parts List for serial number ranges.

A2 Front Panel Circuit board (Option 10).

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1104	4E	CR1118	4D	P1101	6E	R1101	4E	R1128	3D	R1195	5D
C1114	5E	CR1119	4D	P1102	6C	R1102	4F	R1130	4E		
C1115	5D	CR1134	1C	P1103	5A	R1103	4F	R1131	4E	S1117A	3C
C1119	4D	CR1138	4D	P1104	6B	R1104	4E	R1134	1D	S1117B	3C
C1124	4E	CR1142	4D	P1105	4B	R1107	3E	R1140	3D	S1167	2C
C1141	4D	CR1167	2D	P1106	6C	R1108	4E	R1141	4D	S1171	2B
C1142	4D	CR1190	4C	P1107	6A	R1111	5E	R1142	4D	S1180	3D-F
C1148	5E	CR1192	5C			R1112	5E	R1144	4E	S1185	3B
C1185	4B			Q1104	4F	R1113	5E	R1146	4E	S1187	2E-F
C1195	6D	J1101	5F	Q1106	3E	R1115	5D	R1151	2C	S1190	2D
		J1111	5F	Q1128	4D	R1120	5D	R1164	3E		
CR1101	4E	J1149	5E	Q1133	3E	R1122	5D	R1167	2C	U1124	4D
CR1112	5E					R1124	5D	R1171	1B	U1148	4E
CR1115	5D	P1100	6D			R1127	3D	R1189	6B		

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.

R7903

OPTION 10 FRONT PANEL ◇2

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REV JUN 1986

EXP

FRONT PANEL BOARD A2

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

GRAT ILLUM
S1117A
EXT
AUTO
S1119
MANUAL
+5V (DCPL)
R1120 47k
C1119 0.1
CR1119
CR1118
AUTO
EXT
R1124 22k
C1124 33µF
R1122 4.7k
U1124 74121N
1 V
500 µs
-15V
Q1128
Q1133
+0.9
+14.5
R1127 2k
R1128 2k
R1130 15k
R1131 1k
CR1134
R1134 5k
PRESET
GRAT ILLUM
R1167 10k
(S1167)
CW
PULSED (CW)
CR1167
P1106
7
TO P1417-7 POWER SUPPLY ◇10

SWP GATE FROM J60 ◇3
J1101
CR1101
R1101 60.4k
+0.5
R1102 60.4k
R1103 1k
+15
Q1106
Q1104
R1104 10k
C1104 150
R1107 3.3k
R1108 4.3k
-15V

REMOTE / READOUT SS FROM J1062 ◇8
J1111
R1111 10k
R1112 4.7
R1113 10M
C1115 .005
CR1115
CR1112
C1114 0.01
R1115 68k

U1124 & U1148
74121N
2 V
5 V
500 µs

EXT
AUTO
CR1138
CR1142
R1144 47k
C1148 0.22
R1142 1M
R1146 4.7k
C1142 .002
R1141 10M
C1141 .01
R1140 10
U1148 74121N
J1149
REMOTE READOUT SS TO J2192 ◇12
FCW
(S1171C)

EXT
AUTO
S1117B
MANUAL
S1139
READOUT

POWER (ON)
DS1164
R1164 12

READOUT (INTENSITY)
R1171 5k
OFF FCCW
FCW PULSED
(S1171B)
FCW
FCCW
(S1171D)
CR1152
PRESET
R1151 5k
(S1171A)
FCW
-15V

P1100
P1
TO P14-5 ◇3
PIN FC
PIN FD
PIN FF
PIN FH
TO CR20 ◇3
TO LOGIC ◇4

INTENSITY
R1174 5k

S1187
TRIG SOURCE
LEFT
VERT MODE
RIGHT

S1180
VERT MODE
LEFT
ALT
ADD
CHOP
RIGHT

P1101
P2
TO P14-4 ◇3
PIN FM
PIN FK
PIN FL
PIN FN
TO P14-3
TO P8-6 ◇3

P1102
P3
-50V
-15V
+15V
+5V
GND
+5 VL
+5 VL

R1195 4.7
C1195 0.1
CR1190 CR1192
+5V LIGHTS
LOW
HIGH

S1190
CONTROL ILLUM
HIGH
ON
OFF

PARTIAL MAIN INTERFACE A4

S1185A ◇1 ◇6
BEAM FINDER

C1185 .001
P1105
TO P860 ◇7

PARTIAL REG BOARD A16

CRT BEZEL
P1104
CAMERA POWER
CAMERA TRIGGER

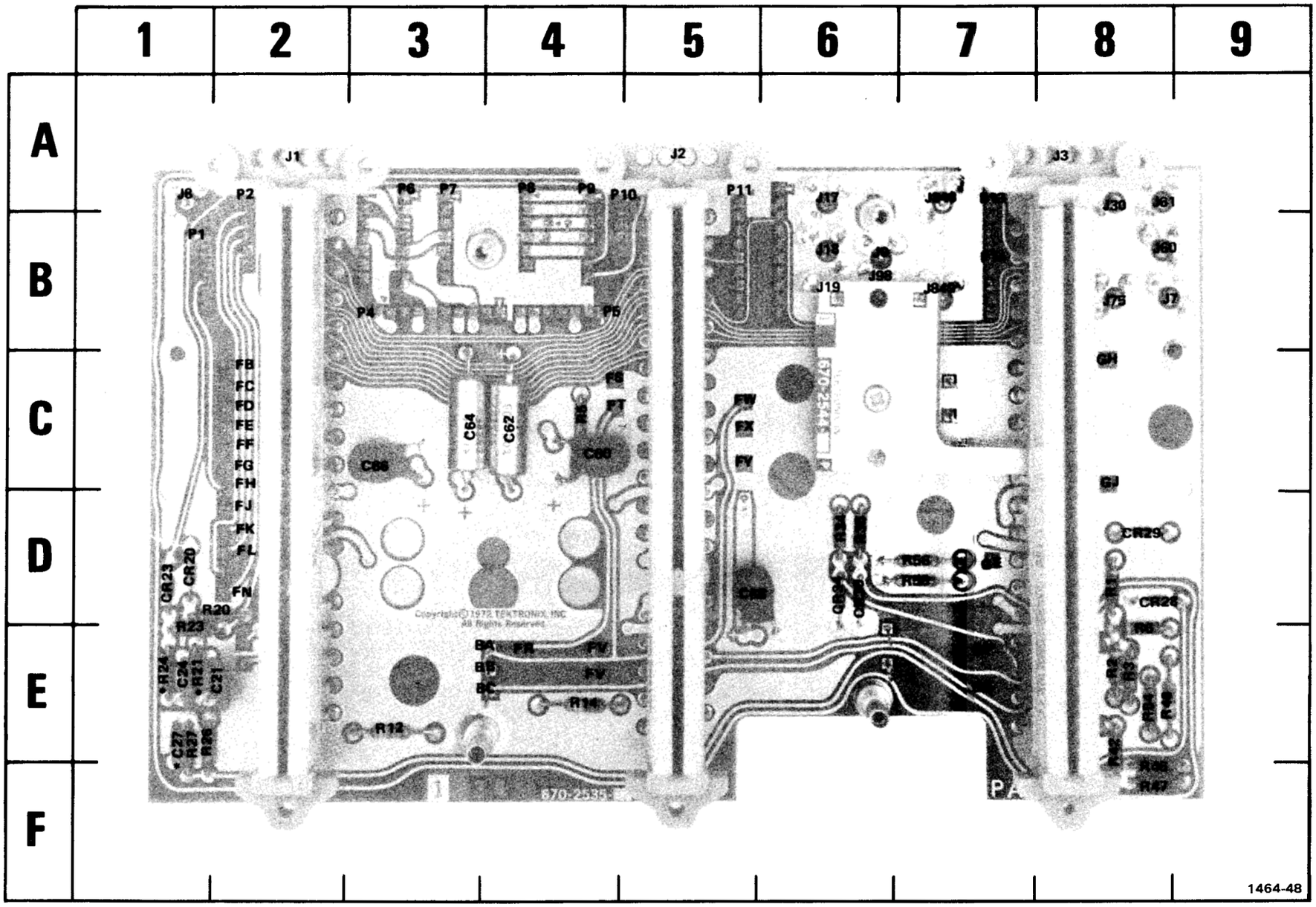
GRATICULE LIGHTS BOARD A3
GRATICULE LIGHTS
DS1187
DS1188
DS1189

R1189 300
R1190 120

LIGHTS COM
+5V LIGHTS
LIGHTS COM

P1106
P1417

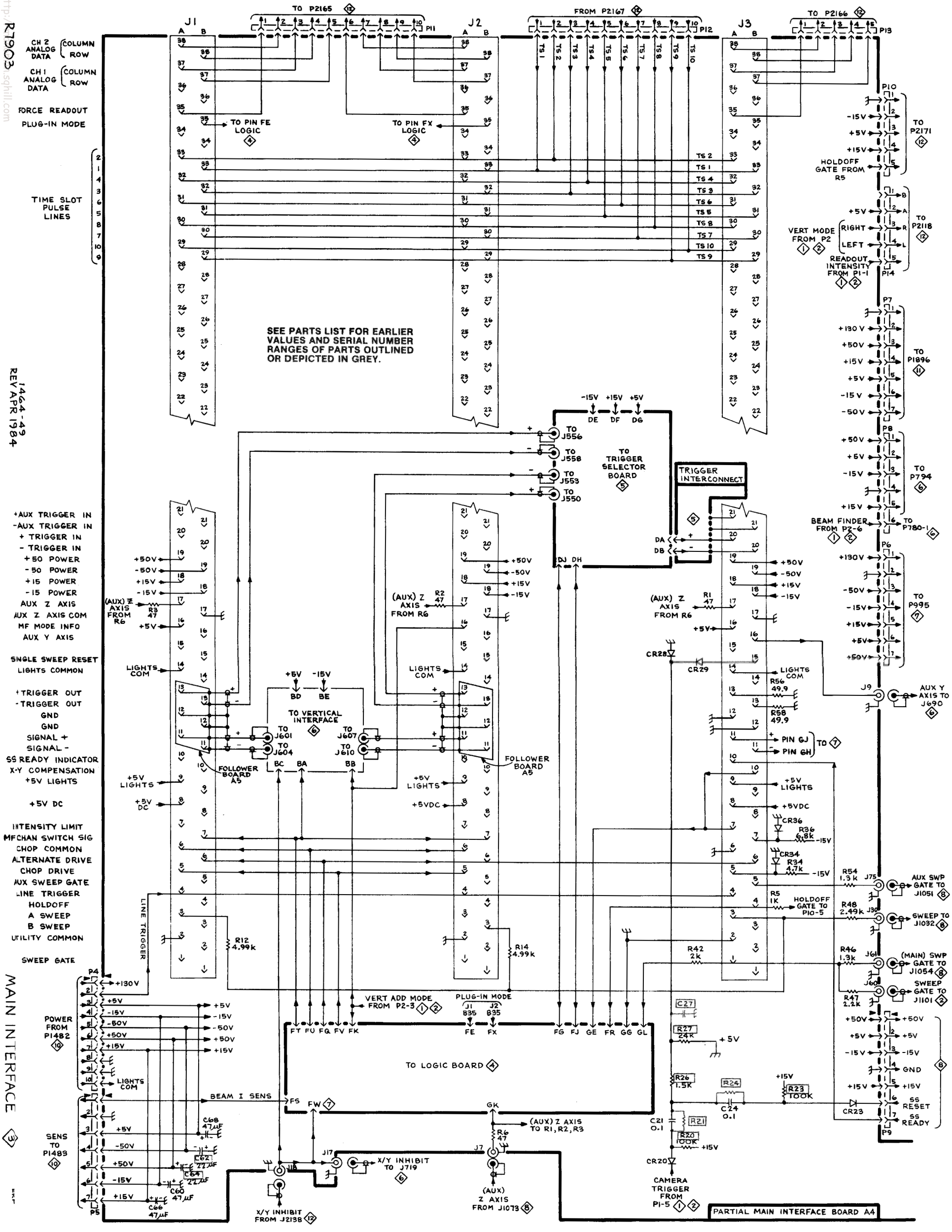
LIGHTS COMMON
+5V LIGHTS
GRAT LIGHTS
LIGHTS COMMON

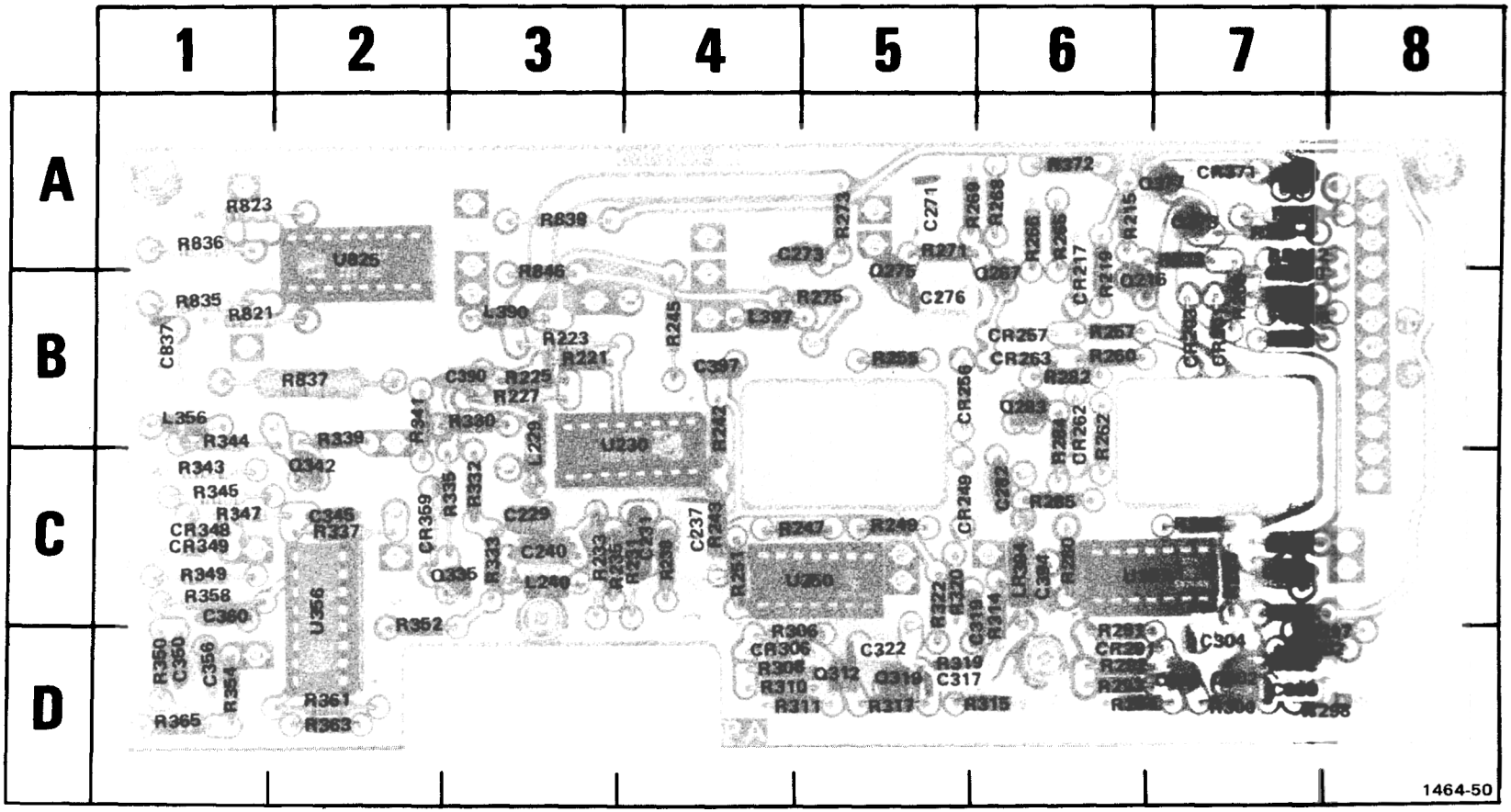


*See Parts List for serial number ranges.

A4 Main Interface circuit board.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C21	2E	CR20	1D	J8	1A	J849	7B	P11	5A	R21	1E
C24	1E	CR23	1D	J9	6B	P1	1B	P13	7A	R23	1E
C27	1E	CR28	8D	J17	6A	P2	2A	P14	7B	R24	1E
C60	4C	CR29	8D	J18	6B	P4	3B	R1	8D	R26	1E
C62	4C	CR34	6D	J19	6B	P5	4B	R2	8E	R27	1E
C64	3C	CR36	6D	J30	8A	P6	3A	R3	8E	R34	6D
C66	3C	J1	2A	J60	8B	P7	3A	R5	4C	R36	6D
C68	5D	J2	5A	J61	8A	P8	4A	R6	8D	R42	8E
		J3	8A	J75	8B	P9	4A	R12	3E	R46	8F
		J7	8B	J98	6B	P10	4A	R14	4E	R47	8F
				J848	7A			R20	2D	R48	8E
										R54	8E
										R56	7D
										R58	7D





A6 Logic circuit board.

REV JUN 1986

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C229	3C	CR212	7A	Q302	7D	R247	5C	R302	8D	R358	1C
C231	4C	CR217	6A	Q312	5D	R249	5C	R308	4D	R361	2D
C237	4C	CR249	5C	Q319	5D	R251	4C	R304	7C	R363	2D
C240	3C	CR256	5B	Q335	3C	R255	5B	R306	4D	R365	1D
C271	5A	CR257	6B	Q342	2C	R257	6B	R310	4D	R371	7A
C273	4A	CR262	6B	Q370	7A	R260	6B	R311	4D	R372	6A
C276	5B	CR263	6B	Q373	7A	R262	6B	R315	6D	R375	7A
C282	6C	CR291	6D	Q377	6A	R265	6A	R314	6C	R821	1B
C300	7D	CR306	4D			R266	6A	R317	5D	R823	1A
C302	7D	CR348	1C	R205	7B	R268	6A	R319	6D	R835	1B
C304	7D	CR349	1C	R207	7B	R269	5A	R320	5C	R836	1A
C317	6D	CR359	2C	R209	7B	R271	5A	R322	5C	R837	2B
C319	6C	CR371	7A	R213	7A	R273	5A	R330	3B	R839	3A
C322	5D			R215	6A	R275	5B	R332	3C	R846	3A
C345	2C	L229	3B	R218	7B	R280	6C	R333	3C		
C350	1D	L240	3C	R219	6B	R282	6B	R335	2C	U230	3B
C356	1D	L356	1B	R221	3B	R284	6B	R337	2C	U250	5C
C360	1C	L390	3B	R223	3B	R285	6C	R339	2B	U287	6C
C390	3B	L392	7C	R225	3B	R286	7C	R341	2B	U356	2C
C392	7C	L397	4B	R227	3B	R289	7C	R343	1C	U825	2A
C394	6C			R231	4C	R291	6D	R344	1B		
C397	4B	LR394	6C	R233	3C	R292	6D	R345	1C		
C837	1B			R235	3C	R293	6D	R347	1C		
		Q216	6B	R238	4C	R294	6D	R349	1C		
CR201	7B	Q267	6B	R242	4B	R297	8D	R350	1C		
CR203	7B	Q275	5A	R243	4C	R298	8D	R352	2C		
CR210	7B	Q283	6B	R245	4B	R300	7D	R354	1D		
		Q295	7D								

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.

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

FROM VERT MODE SWITCH S1180 ① ②

RIGHT — FN
ALT — FM
CHOP — FL
ADD — FK

FROM TRIGGER SOURCE SWITCH S1187 ① ②

VERT MODE — FF
RIGHT — FH

TO TRIGGER SELECTOR ⑤

VERT ADD MODE L/R — FJ, FG

(VERT) PLUG-IN MODE ③

LEFT J1-B35 — FE
J2-B35 RIGHT — FX

CR201 CR203 CR210 CR212 CR217 CR249 CR256 CR257 CR262 CR263 CR306 CR348 CR349 CR359 CR371

R207 1k R205 1k R213 3k R215 49k R216 3.6k R209 2k R219 16k R255 1k R257 1k R260 1k R262 390 R221 22k R225 22k R223 1.00k R227 1.00k R245 15.0k R249 510 R243 51 R242 5.1k R231 332 R235 9.1k R233 3.01k R238 5.1k R240 100 R335 25.5k R330 10k R332 4.7k R333 27k R337 2.1k R339 82 R341 51 R345 1.5k R344 357 R343 150 R347 2.21k R349 2k R350 150 R354 6.2k R352 6.2k R361 3.01k R363 15k R365 15k R372 1k R371 22.1k R375 15.0k

Q216 Q335 Q342 Q267 Q275 Q283 Q295 Q302 Q312 Q319 Q370 Q373 Q377

C229 1µF C231 200 C237 39 C240 .01 C356 0.1 C358 1.33k C360 .001 C345 .001 C350 .001 C273 .001 C282 .001 C300 2.7 C302 .001 C304 8 C317 2.7 C319 .001 C322 8 C390 .01 C392 0.1 C394 0.1 C397 1.0

L229 3.9µH L356 3.9µH L240 3.9µH L390 3.9µH L392 3.9µH L397 3.9µH LR394 2.5µH

U230 VERT CHOP BLANKING / CLOCK GEN

U250B ½ 7474N U250A ½ 7474N U287A ½ 7474A U287B ½ 7474N

U356 Z AXIS LOGIC

R268 12k R269 820 R271 680 R273 220 R276 8 R275 4.7k R265 2.7k R266 1k R280 10k R282 100 R284 22k R286 10k R289 10k R291 390 R292 1.2k R293 2.2k R294 1k R297 12k R298 820 R300 680 R302 220 R304 4.7k R306 390 R308 1.2k R310 2.2k R311 1k R314 12k R315 820 R317 680 R319 220 R320 10 R322 4.7k R285 51 R251 10k R247 10k

VERT MODE SIGNAL

ALT MODE 1 V 1 ms

CHOP MODE 1 V 500 ms

MF CHANNEL SWITCH SIG (DISPLAY RIGHT) TO PIN BA ⑥ TO B7-J1,J2 ③

ALTERNATE DRIVE TO B6-J1,J2 ③

CHOP COMMON TO A6-J1,J2 ③

CHOP DRIVE TO A5-J1,J2 ③

PARTIAL MAIN INTERFACE A4

(DCPL) +5V 7474N

1 µs SWEEP 2 V 5 µs

TO PIN 14 7474N'S (DCPL) +5V

Z AXIS INHIBIT FROM J2139 ⑫

INTENSITY LIMIT ③ FROM J3-A7,B10

BEAM I SENS ③ FROM P5-1

(AUX) Z AXIS ③ FROM R6

UTILITY COMMON ③ FROM J3-A2

SWEEP GATE ③ FROM J3-A1

HOLDOFF GATE FROM B4-J3 ③ J98

Z AXIS SIGNAL TO J1801 ⑪

AUTO FOCUS SIGNAL TO J1748 ⑪

J8

* SEE ①② FOR INTERCONNECTOR DETAILS.

R1174 INTENSITY

X/Y INHIBIT FROM J18 ③

R1171 READOUT (INTENSITY)

PARTIAL MAIN INTERFACE A4

PARTIAL LOGIC BOARD A6

1464-51
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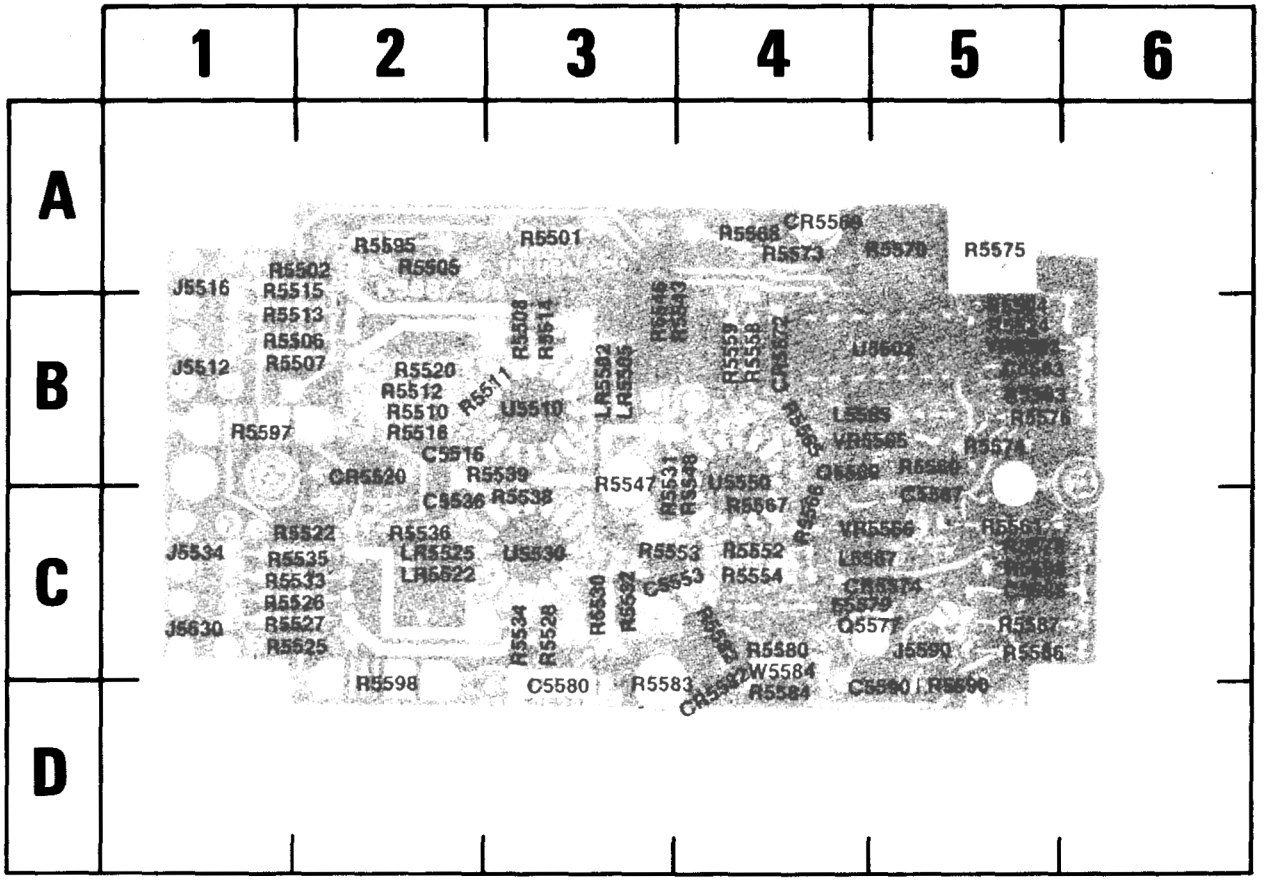
R7903

LOGIC ④



Located on back of board.
C5511
C5531
C5540
C5569
R5540

A7 Trigger Selector circuit board, SN B181040-above.

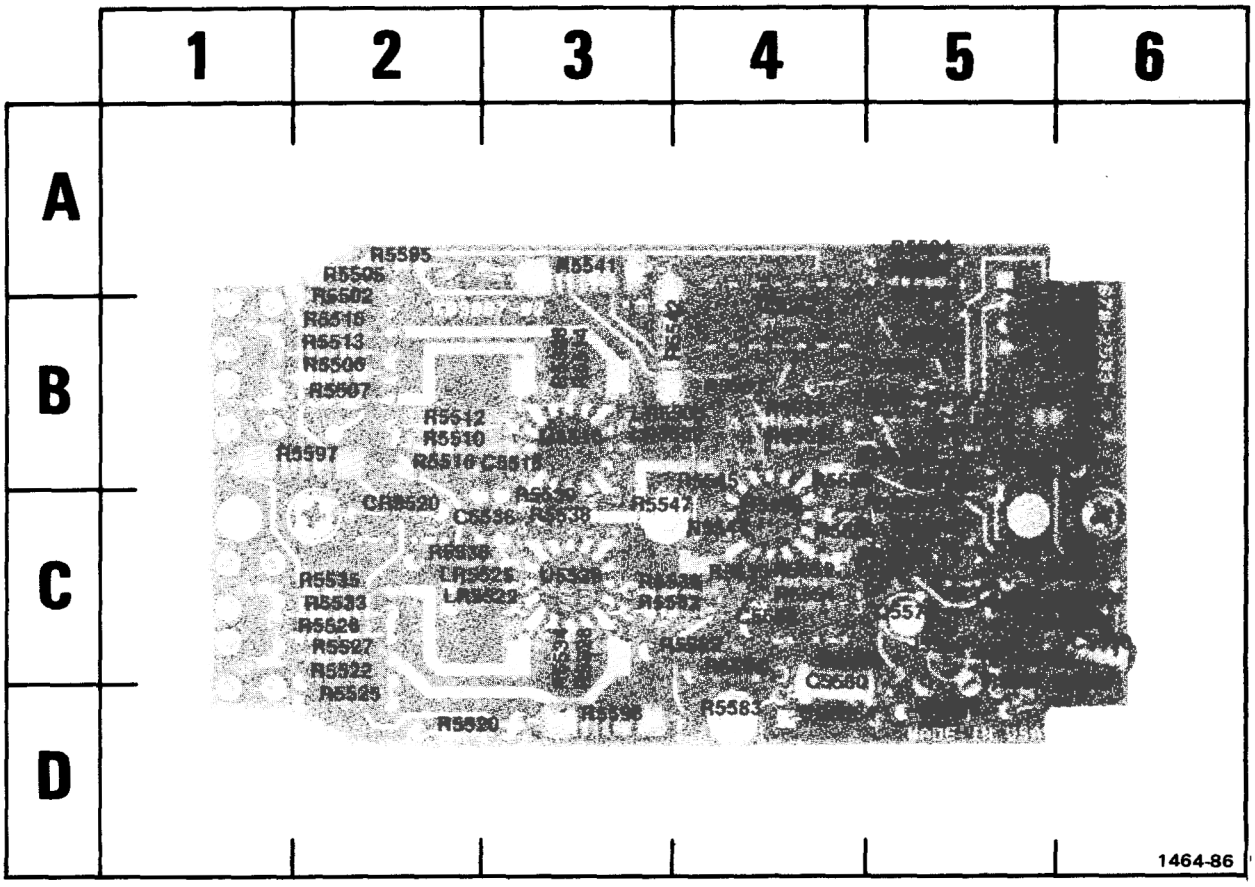
CKT NO	GRID LOC
C5516	2B
C5536	2C
C5553	3C
C5563	5B
C5567	5C
C5580	3D
C5588	5C
C5590	5D
CR5520	2B
CR5569	4A
CR5572	4B
CR5582	4D
E5579	4C
J5512	1B
J5516	1A
J5530	1C
J5534	1C
J5590	5C

CKT NO	GRID LOC
L5565	4B
L5567	5C
LR5502	3B
LR5505	3B
LR5522	2C
LR5525	2C
Q5569	4B
Q5577	5C
R5501	3A
R5502	2A
R5504	5B
R5505	2A
R5506	2B
R5507	2B
R5508	3B
R5510	2B
R5512	2B
R5513	2B

CKT NO	GRID LOC
R5514	3B
R5515	2A
R5516	2B
R5520	2B
R5522	2C
R5524	5B
R5525	2C
R5526	2C
R5527	2C
R5528	3C
R5530	3C
R5531	3B
R5532	3C
R5533	2C
R5534	3C
R5535	2C
R5536	2C
R5538	3C
R5539	3B
R5546	3B
R5547	3B

CKT NO	GRID LOC
R5548	4B
R5552	4C
R5553	3C
R5554	4C
R5558	4B
R5559	4B
R5561	5C
R5563	5B
R5565	4B
R5566	4C
R5567	4C
R5568	4A
R5569	5B
R5570	5A
R5573	4A
R5574	5B
R5575	5A
R5576	5B
R5578	5C
R5580	4C
R5582	4C

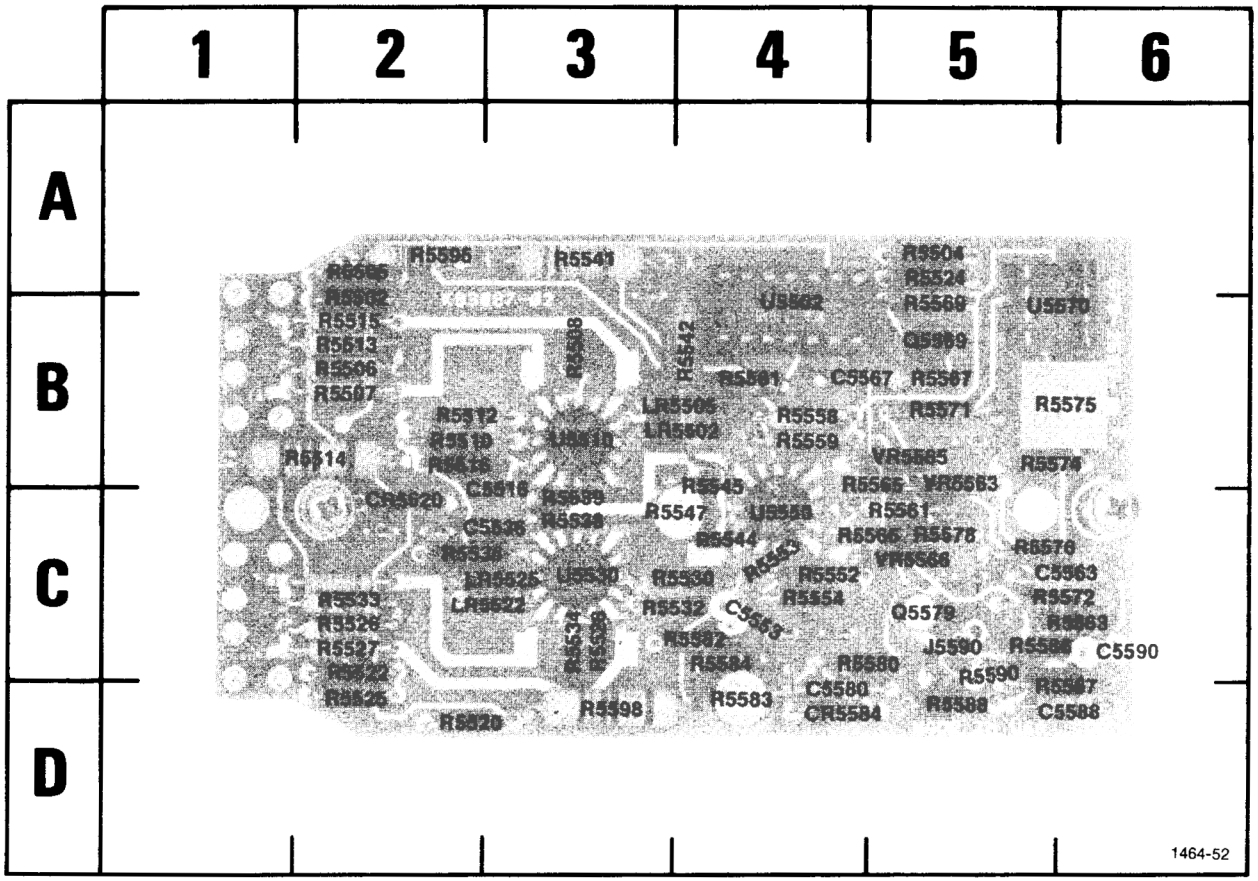
CKT NO	GRID LOC
R5583	3D
R5584	4D
R5586	5C
R5587	5C
R5588	5C
R5590	5D
R5595	2A
R5597	1B
R5598	2D
U5502	5B
U5510	3B
U5530	3C
U5550	4B
VR5563	5B
VR5565	5B
VR5566	5C
W5584	4C



Located on back of board:
R5568

A7 Trigger Selector circuit board, SN B140585-B181039.

CKT NO	GRID LOC
C5516	3B
C5536	2C
C5553	6C
C5563	4C
C5567	5B
C5580	4C
C5588	6C
C5590	6C
CR5520	2C
CR5572	5B
CR5574	6C
CR5584	4D
J5590	5C
L5565	5B
L5567	5C
LR5502	3B
LR5505	3B
LR5522	2C
LR5525	2C
Q5569	5B
Q5579	5C
R5501	4B
R5502	2B
R5504	5A
R5505	2A
R5506	2B
R5507	2B
R5508	3B
R5510	2B
R5512	2B
R5513	2B
R5514	3B
R5515	2B
R5516	2B
R5520	2D
R5522	2C
R5524	5A
R5525	2D
R5526	2C
R5527	2C
R5528	3C
R5530	3C
R5532	3C
R5533	2C
R5534	3C
R5535	2C
R5536	2C
R5538	3C
R5539	3C
R5541	3A
R5542	3B
R5544	4C
R5545	4B
R5547	3C
R5552	4C
R5553	4C
R5554	4C
R5558	4B
R5559	4B
R5561	5C
R5563	6C
R5565	4B
R5566	4C
R5567	5B
R5569	5A
R5570	5B
R5574	5B
R5575	5B
R5576	5C
R5578	5C
R5580	4C
R5582	4C
R5583	4D
R5584	4C
R5586	5C
R5587	5C
R5588	5D
R5590	5C
R5595	2A
R5597	2B
R5598	3D
U5502	4B
U5510	3B
U5530	3C
U5550	4C
VR5563	5B
VR5565	5B
VR5566	5C



A7 Trigger Selector circuit board, SN B130525—B140584.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C5516	3C	R5501	4B	R5532	4C	R5567	5B	U5510	3B
C5536	3C	R5502	2B	R5533	2C	R5569	5B	U5530	3C
C5553	4C	R5504	5A	R5534	3C	R5571	5B	U5550	4C
C5563	6C	R5505	1A	R5535	2C	R5572	6C	U5570	5B
C5567	4B	R5506	2B	R5536	3C	R5574	6B		
C5580	4D	R5507	2B	R5538	3C	R5575	6B	VR5563	5C
C5588	6D	R5508	3B	R5539	3C	R5576	5C	VR5565	5C
C5590	6C	R5510	2B	R5541	3A	R5578	5C	VR5566	5C
		R5512	2B	R5542	4B	R5580	4C		
CR5520	2C	R5513	2B	R5544	4C	R5582	4C		
CR5584	4D	R5514	3B	R5545	4C	R5583	4D		
		R5515	2B	R5547	4C	R5584	4C		
J5590	5C	R5516	2B	R5552	4C	R5586	5C		
		R5520	2D	R5553	4C	R5587	6D		
LR5502	3B	R5522	2C	R5554	4C	R5588	5D		
LR5505	3B	R5524	5A	R5558	4B	R5590	5C		
LR5522	3C	R5525	2D	R5559	4B	R5595	1A		
LR5525	3C	R5526	2C	R5561	5C	R5597	2B		
		R5527	2C	R5563	6C	R5598	3D		
Q5569	5B	R5528	3C	R5565	5C				
Q5579	5C	R5530	4C	R5566	4C	U5502	4B		

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

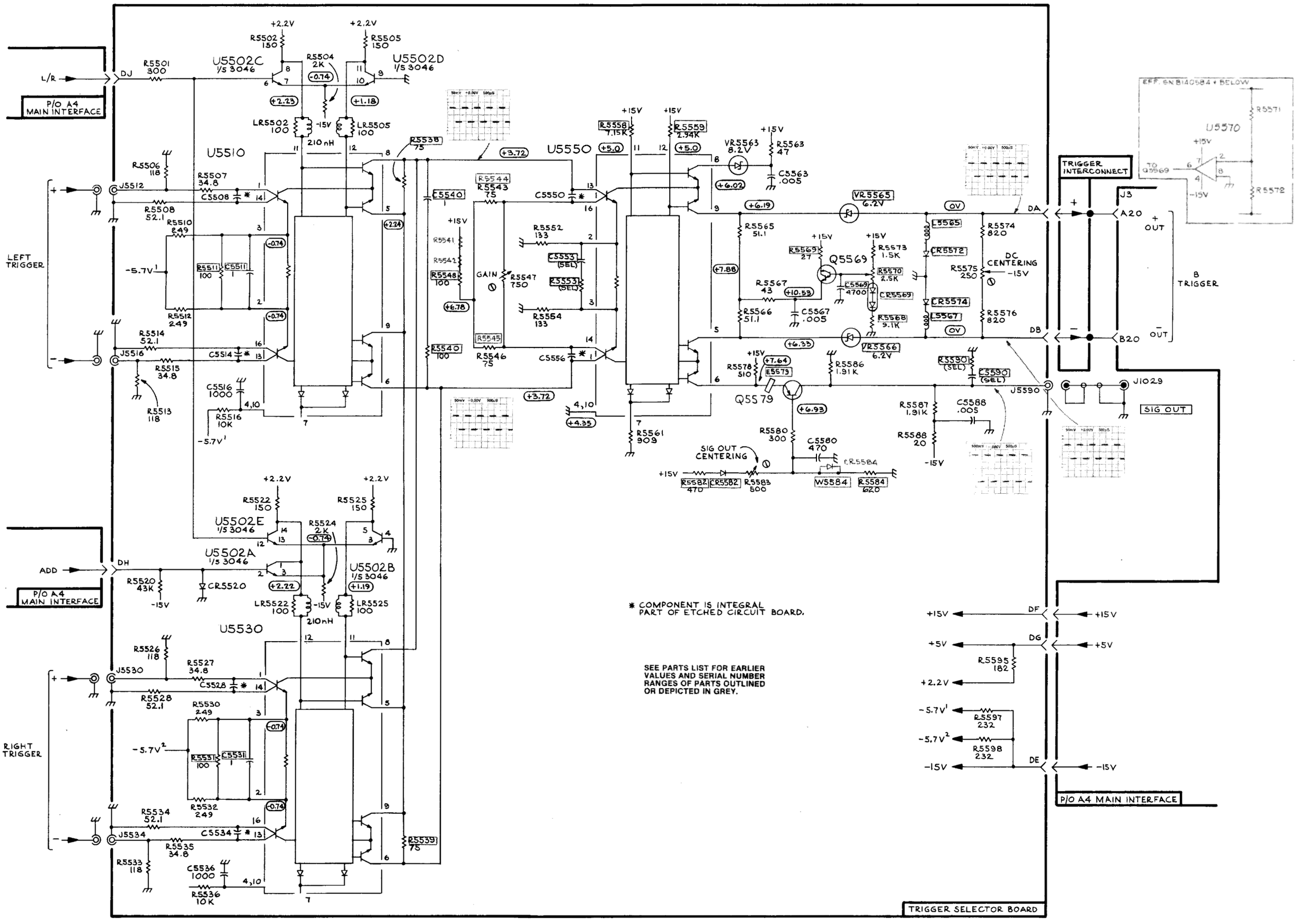
Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

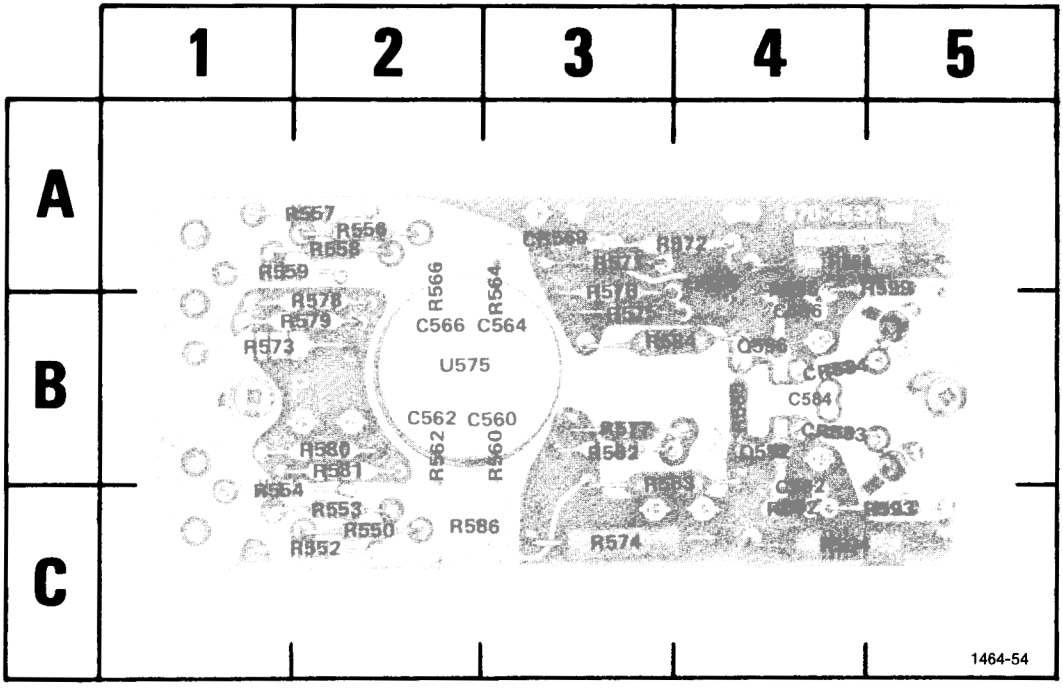
TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.



* COMPONENT IS INTEGRAL PART OF ETCHED CIRCUIT BOARD.

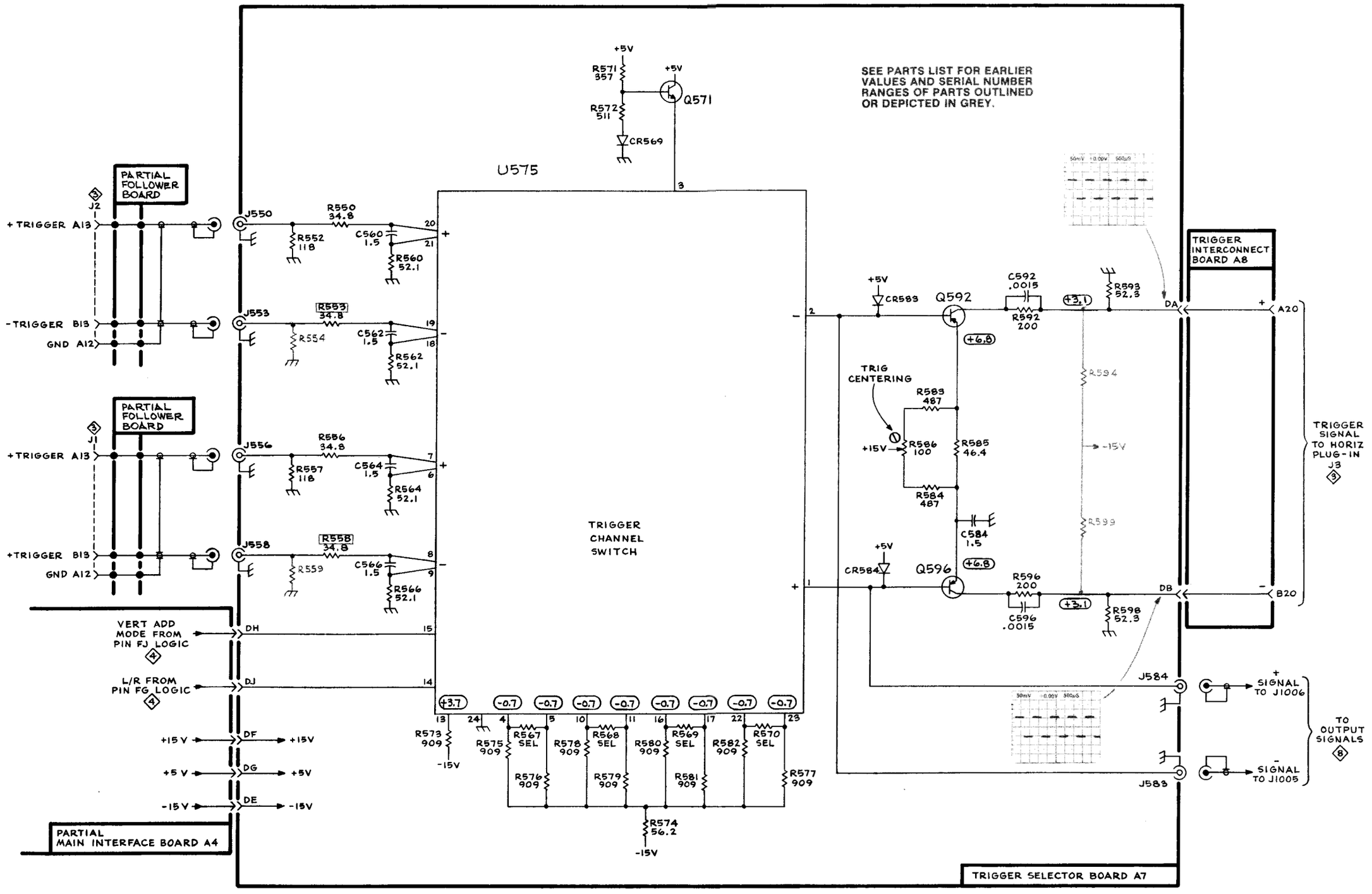
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.



A7 Trigger Selector circuit board, SN B130524 - below.

REV JUN 1986

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C560	3B	R556	2A	R583	3C
C562	2B	R557	2A	R584	4B
C564	3B	R558	2A	R585	4B
C566	2B	R559	1A	R586	2C
C584	4B	R560	3B	R592	4C
C592	4C	R562	2B	R593	5C
C596	4B	R564	3A	R594	4C
		R566	2A	R596	4A
CR569	3A	R571	3A	R599	5A
CR583	4B	R572	8A		
CR584	4B	R573	1B	U575	2B
		R574	3C		
Q571	4A	R575	3B		
Q592	4B	R576	3A		
Q596	4B	R577	3B		
		R578	2B		
R550	2C	R579	2B		
R552	2C	R580	2B		
R553	2C	R581	2B		
R554	1C	R582	3B		

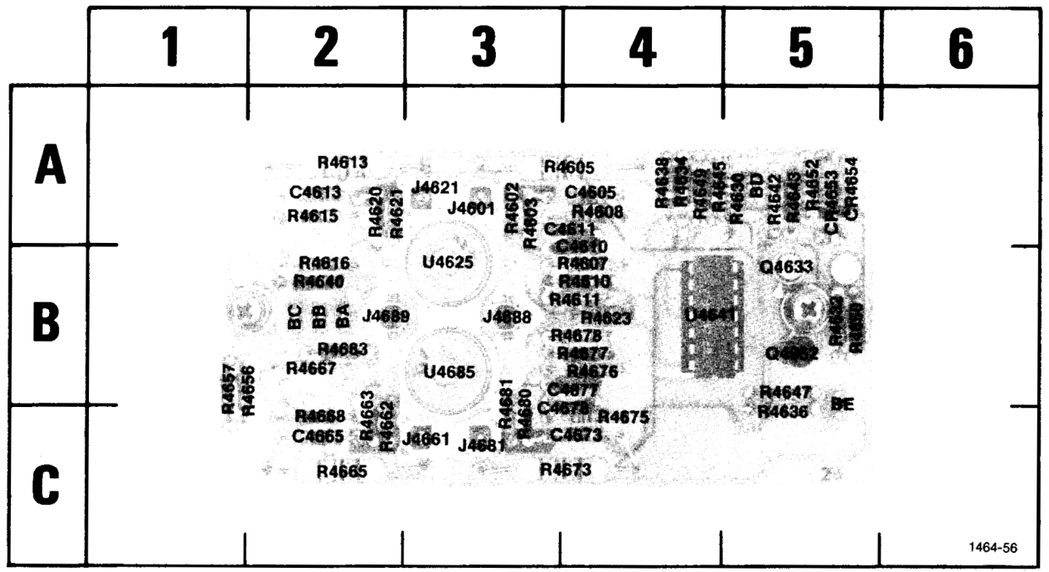


R7903

1464-55
REV APR 1984

TRIGGER SELECTOR 5

SN B130524 AND BELOW

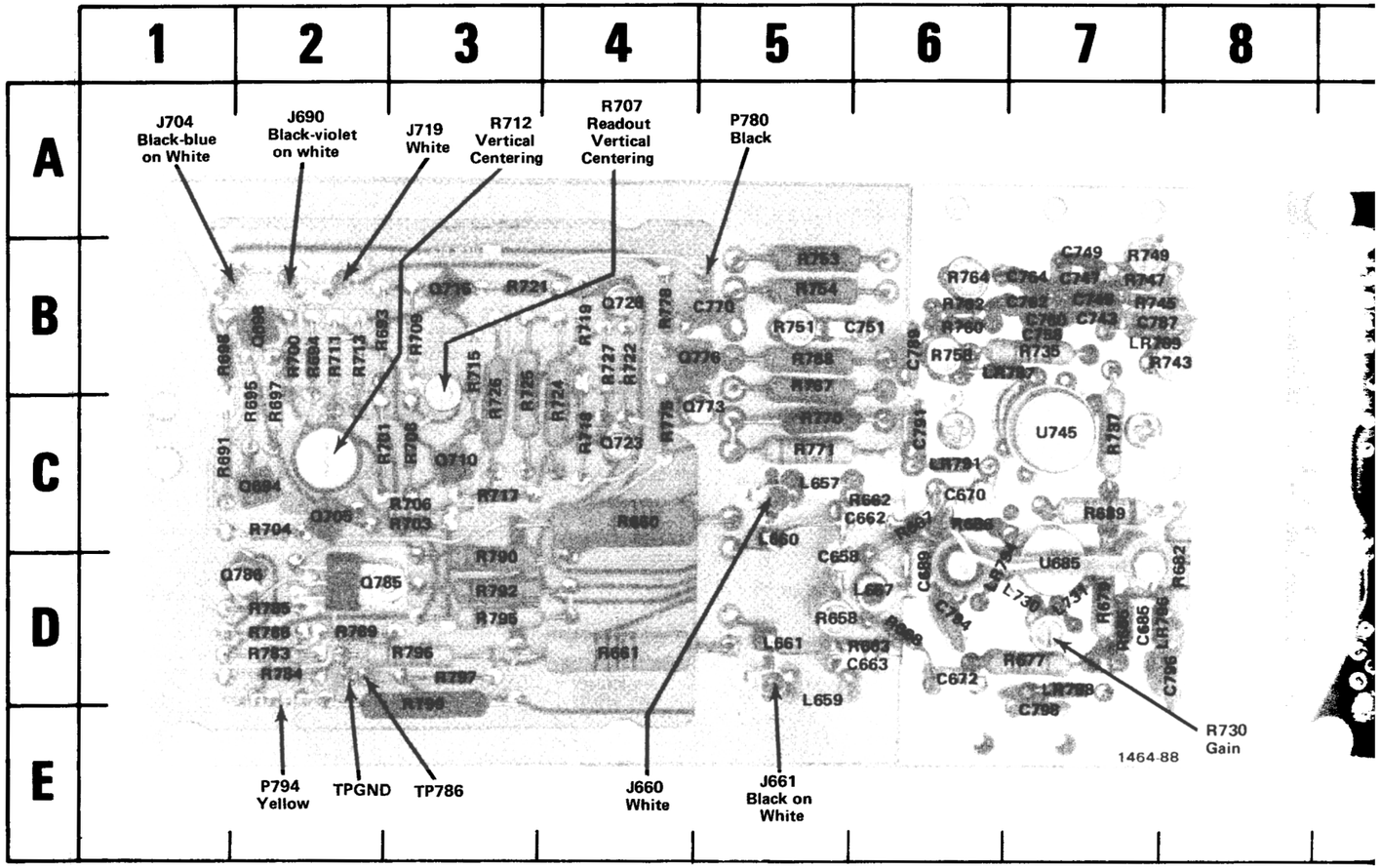


REV. E MAR 1978 **A9 Vertical Interface circuit board, SN B120000—above.**

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C4605	4A	R4607	4B	R4662	2C
C4610	4A	R4608	4A	R4663	2C
C4611	4A	R4610	4B	R4665	2C
C4613	2A	R4611	4B	R4667	2B
C4665	2C	R4613	2A	R4668	2C
C4673	4C	R4615	2A	R4673	4C
C4677	4B	R4616	2B	R4675	4C
C4678	4C	R4620	2A	R4676	4B
		R4621	2A	R4677	4B
CR4653	5A	R4623	4B	R4678	4B
CR4654	5A	R4630	5A	R4680	3B
		R4632	5B	R4681	3B
J4601	3A	R4634	4A	R4683	2B
J4621	3A	R4636	5C		
J4661	3C	R4638	4A	U4625	3B
J4681	3C	R4640	2B	U4641	4B
J4688	3B	R4642	5A	U4685	3B
J4689	2B	R4643	5A		
		R4645	4A		
Q4633	5B	R4547	5B		
Q4652	5B	R4649	4A		
		R4650	5B		
R4602	3A	R4652	5A		
R4603	3A	R4656	1B		
R4605	4A	R4657	1B		

Located on back of board.

L4621	R4625
L4601	R4685
L4661	R4687
L4681	R4689
R4627	R4669



A10 Vertical Amplifier circuit board (front view) — SN B180000 — above.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO
C657	13C	C762	7B	LR791	6C	R663	6D	R709	3B	R751
C658	5D	C764	7B	LR794	6D	R667	6C	R711	2B	R753
C659	13B	C770	5B	LR796	7E	R668	6D	R712	3A	R754
C662	6C	C787	7B	LR798	7D	R676	14B	R713	2B	R756
C663	6D	C789	6B			R677	7D	R715	3B	R758
C670	6C	C791	6C	P780	5A	R679	7D	R717	3C	R760
C672	6D	C794	6D	P794	2E	R680	15C	R718	4C	R762
C675	14B	C796	7E			R682	7E	R719	4B	R764
C676	14B	C798	7D	Q694	2C	R684	14B	R721	3B	R767
C680	15C			Q698	2B	R685	7D	R722	4B	R768
C681	14C	J660	4E	Q705	2C	R686	6C	R724	4C	R770
C685	7D	J661	5E	Q710	3C	R688	14C	R725	3B	R771
C689	6D	J690	2A	Q716	3B	R689	7C	R726	3B	R775
C733	14C	J704	1A	Q723	4C	R691	1C	R727	4B	R778
C734	14C	J719	3A	Q728	4B	R693	2B	R730	7E	R783
C738	15C			Q773	5C	R694	2B	R732	14B	R784
C739	14C	L657	5C	Q776	5B	R695	2C	R733	14B	R785
C743	14C	L659	5D	Q785	2D	R697	2C	R734	14D	R786
C738	15C	L660	5C	Q786	2D	R698	1B	R735	7B	R789
C743	7B	L661	5D			R700	2B	R737	7C	R790
C745	7B	L667	6D	R657	13C	R701	2C	R738	15C	R792
C747	7B	L730	7D	R658	5D	R703	3C	R741	14D	R795
C749	7B	L731	7D	R659	13B	R704	2C	R743	7B	R796
C751	6B			R660	4C	R706	3C	R745	7B	R797
C758	7B	LR787	7B	R661	4D	R707	4A	R747	7B	R799
C760	7B	LR789	7B	R662	6C	R708	3C	R749	7B	

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.

P/O A5 FOLLOWER BOARD

U4625

FROM A VERT SIG

VERTICAL CHANNEL SWITCH

J4601

R4602 100 · R4610 ≠620 · *L4601 · R4607 2.00 · R4603 105 ≠SEL · R4611 ≠560 · C4609 470 · C4610 ≠.0015 · C4611 ≠.015 · R4605 243 · R4608 200 · CASE · R4613 243 · R4615 169 · R4617 30.9 · C4613 470 · R4619 100 · C4615 3.9 · R4622 86 · R4620 105 ≠SEL · R4618 30.9 · R4621 100 · R4616 169 · *L4621 · J4621

R4625 100 · R4627 100 · R4623 1K · SUB

+5V · -15V · BD · BE · R4630 100 · (+2.5V N) (+1.5V RO) · +V · R4634 120 · Q4633 · R4632 300 · U4641D ⅛ 3046 · U4641E ⅓ 3046 · R4636 1.3K · R4638 120 · R4640 510 · R4642 1.5K · R4643 180 · R4645 120 · R4647 1.3K · U4641A ⅓ 3046 · U4641B ⅓ 3046 · R4652 160 · CR4653 · CR4654 · U4641C ⅓ 3046 · R4649 120 · Q4652 · R4650 1K · R4656 3.6K · R4657 1K · U4685

MF CHAIN SWITCH SIG (DISPLAY RIGHT) FROM PIN FT 4

X/Y INHIBIT FROM J18 3

VERT ADD MODE FROM P2-3 1 2

P/O A2 MAIN INTERFACE

FROM B VERT SIG

U4661 · *L4661 · R4662 100 · R4667 200 · R4663 105 ≠SEL · R4669 100 · C4665 470 · R4665 243 · R4668 200 · CASE · R4673 243 · R4675 200 · C4674 ≠.0015 · C4678 ≠.015 · C4673 470 · R4677 ≠620 · R4678 ≠560 · R4680 105 ≠SEL · R4676 200 · R4681 100 · *L4681 · J4681

VERTICAL CHANNEL SWITCH

R4687 100 · R4683 1K · SUB

A9 VERTICAL INTERFACE

J2 3

P/O A5 FOLLOWER BOARD

* NOMINAL VALUE-SELECTED

* WIRE LOOP

U4625, U4685

J4688 · J4689 · R4689 SEL

JG47 · JG51 · JG49 · JG53 · DL650

DELAY LINE TERMINATION

J4660 · J4661

C657 2.5 · R657 27 · R658 200 · ≠C658 1-3 · C659 2.5 · R659 27

L660 0.12μH · R660 150 · R661 150 · L661 0.12μH · R667 560 · LG667 2-6μH · R668 560 · R663 24.9

C662 39 · C663 39 · C670 270 · C672 270 · R662 24.9 · R670 4.7 · C676 1.8 · R676 100 · C680 1.8 · R680 100 · R672 4.7

C675 1.5 · ≠L676 · R677 51.1 · R679 51.1 · ≠L680 · C681 1.5

+5.40 · +5.9 · +15V · +6.9V

* INDUCTANCE DUE TO LEAD LENGTH

≠ INDUCTANCE IS PART OF CIRCUIT BOARD

HF AMP

U685

+9V · -15V · +5.2 · +5.1 · +5.1 · +5.2

R684 SEL · R685 82 · R686 82 · R688 SEL · R682 178 · R689 178 · C685 270 · C689 270 · +6V

R733 47 · +11.95 · -11.95 · R731 50 · L730 ½T · L731 ½T · R730 100 · R732 47 · VERTICAL GAIN

≠L733 · ≠L734 · ≠L738 · ≠L739 · C733 1.5 · R734 100 · C734 1.8 · C736 1.5 · R735 51.1 · R736 100 · R737 51.1 · C738 1.8 · R738 100 · C739 1.5

U745

(DCPL#1) +15V · +15V (DCPL#2) · OUTPUT AMP · +34.5 · +34.5

+11.2 · +11.2 · +11.2 · +11.2

R741 SEL · R743 500 · C743 SEL · R745 SEL · C745 1500 · R747 SEL · R749 1K · C747 .022 · C749 0.47 · R753 100 · R754 100

R756 SEL · R758 500 · C758 SEL · R760 SEL · C760 5600 · R762 SEL · R764 2K · C762 0.1 · C764 2μF · R751 2K · C751 0.5-3.0 · R767 100 · R768 100 · +12V

U685, U745

CRT TERMINATION

LR780 80μH · R782A · 180 · CRT · 180 · R782B · LR784 80μH · C783 .005

* THICK FILM RESISTOR

Y READOUT FROM J2299 12

J719 · +5V · R701 200 · R700 910 · Q698 · R698 51 · R697 39.2 · R695 39.2 · R694 910 · R693 200 · +5V

Q710 · R719 953 · R717 300 · Q723 · R718 200 · R708 150 · RO VERT CENT · Q705 · R703 30K · R707 100 · VERT CENT · R711 1.21K · R715 187 · R712 1.5K · R713 1.21K · R706 2.87K · R709 150 · Q716 · R722 162 · R721 300 · Q728 · R704 620 · R724 332 · R727 36.5 · R726 84.5 · R725 332 · -15V

AUX Y AXIS FROM J9 3

J690 · Q694 · R691 49.9

X/Y INHIBIT FROM J2138 THRU J18,17 3 2

J704 · R778 470 · +15V · R775 1.8K · Q773 · Q776 · +0.4 · R771 169

C770 .005 · R770 44 · P780 · S11858 1 2 BEAM FINDER

+48.8V · +15V · (DCPL#1) +15V · (DCPL#2) +15V · +12.V · +9V · +5V · -15V · +6V · +6.9V

R783 23.2K · R785 4.7K · Q785 · Q786 · R789 TP 3.6K 786 · R786 3.6K TP GND · R284 10K

LR787 0.4μH · LR789 0.5μH · 56 · 100 · LR791 0.5μH · LR794 0.5μH · LR796 0.5μH · LR798 0.5μH

R790 45.3 · R792 45.3 · R795 61.9 · R796 301 · R797 44.2 · R799 150

C787 .005 · C789 .005 · C791 .005 · C794 .005 · C796 .005 · C798 .005

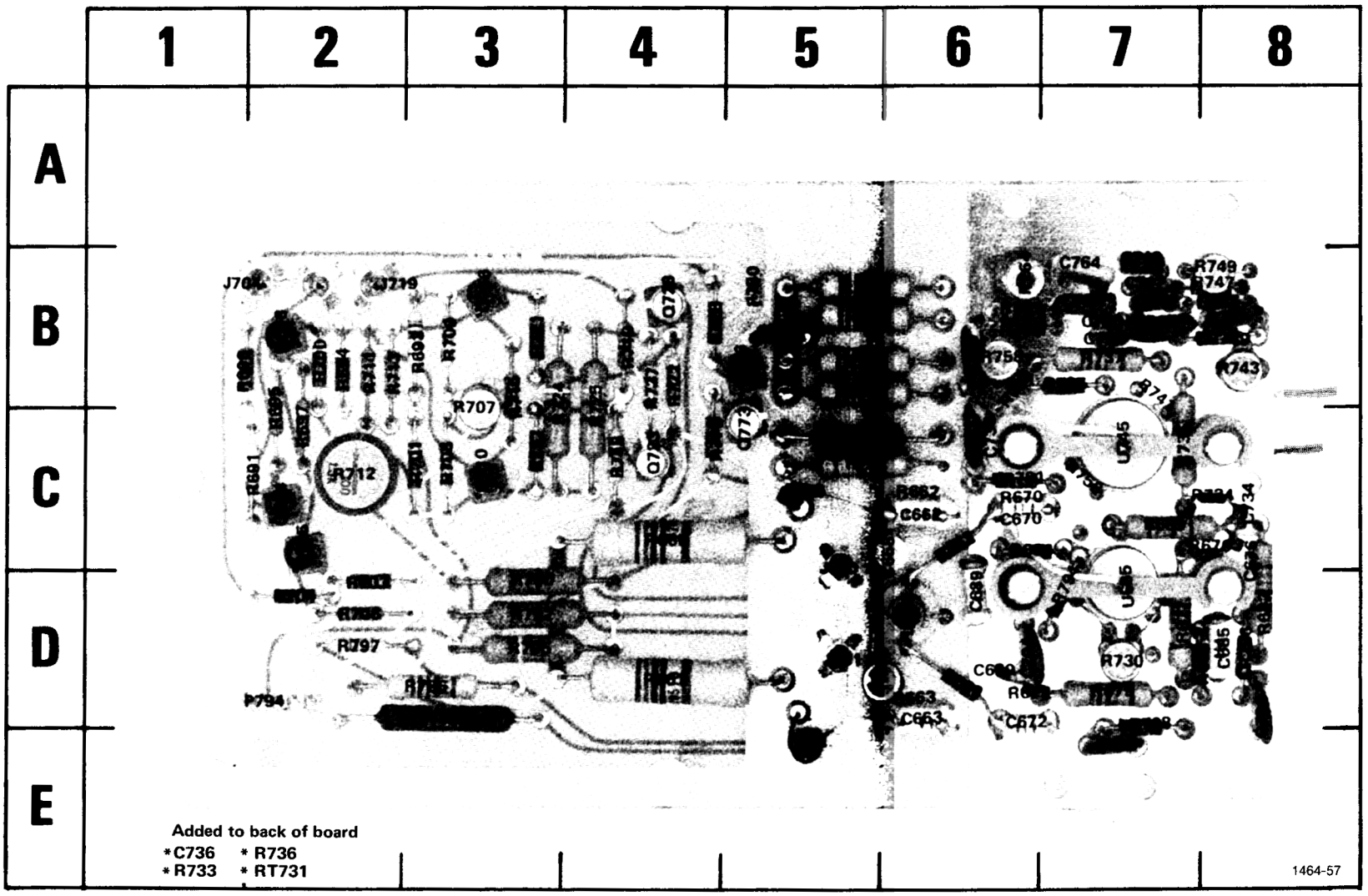
A10 VERTICAL AMPLIFIER

P794 · FROM P8 3 · +50V +15V · -5V -15V GND

(2390)1464-87 REV APR 1985

VERTICAL AMPLIFIER 6 RL SN B180000 & ABOVE

R7903



*See Parts List for serial number ranges.

A10 Vertical Amplifier circuit board (SN B120000 - B179999).

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C658	6C	C764	7B	LR789	8B	R658	6D	R695	2C	R721	3B	R762	6B
C662	6C	C770	5B	LR791	6C	R660	4C	R697	2C	R722	4B	R764	6B
C663	6D	C787	8B	LR794	7D	R661	4D	R698	1B	R724	3B	R767	5B
C670	6C	C789	6B	LR796	8D	R662	6C	R700	2B	R725	4B	R768	5B
C672	6D	C791	6C	LR798	7D	R663	6D	R701	3C	R727	4B	R770	5C
C676	8C	C794	6D			R667	6C	R703	2D	R730	7D	R771	5C
C680	6D	C796	8D	P780	5B	R668	6D	R704	2D	R734	8C	R775	4C
C685	8D	C798	7E	P794		R670	6C	R706	2D	R735	7C	R778	4B
C689	6D					R672	6D	R707	3B	R737	7B	R787	7B
C734	8C	J660	5C	Q694	2C	R676	8C	R708	3C	R738	6B	R790	3D
C738	6C	J661	5D	Q698	2B	R677	7D	R709	3B	R741	7B	R792	3D
C743	7B	J704	1B	Q705	2C	R679	7D	R711	2B	R745	8B	R795	3D
C745	7B	J719	2B	Q710	3C	R682	8D	R712	2C	R747	8B	R796	3D
C747	7B			Q716	3B	R685	8D	R713	2B	R749	8B	R797	2D
C749	7B	L660	5C	Q723	4C	R686	6C	R715	3B	R753	5B	R799	3D
C758	7B	L661	5E	Q728	4B	R689	7C	R717	3C	R754	5B		
C760	7B	L667	6D	Q773	5C	R691	2C	R718	4C	R756	7C	U685	7D
C762	7B			Q776	5B	R693	3B	R719	4B	R758	6B	U745	7C
						R694	2B			R760	6B		

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

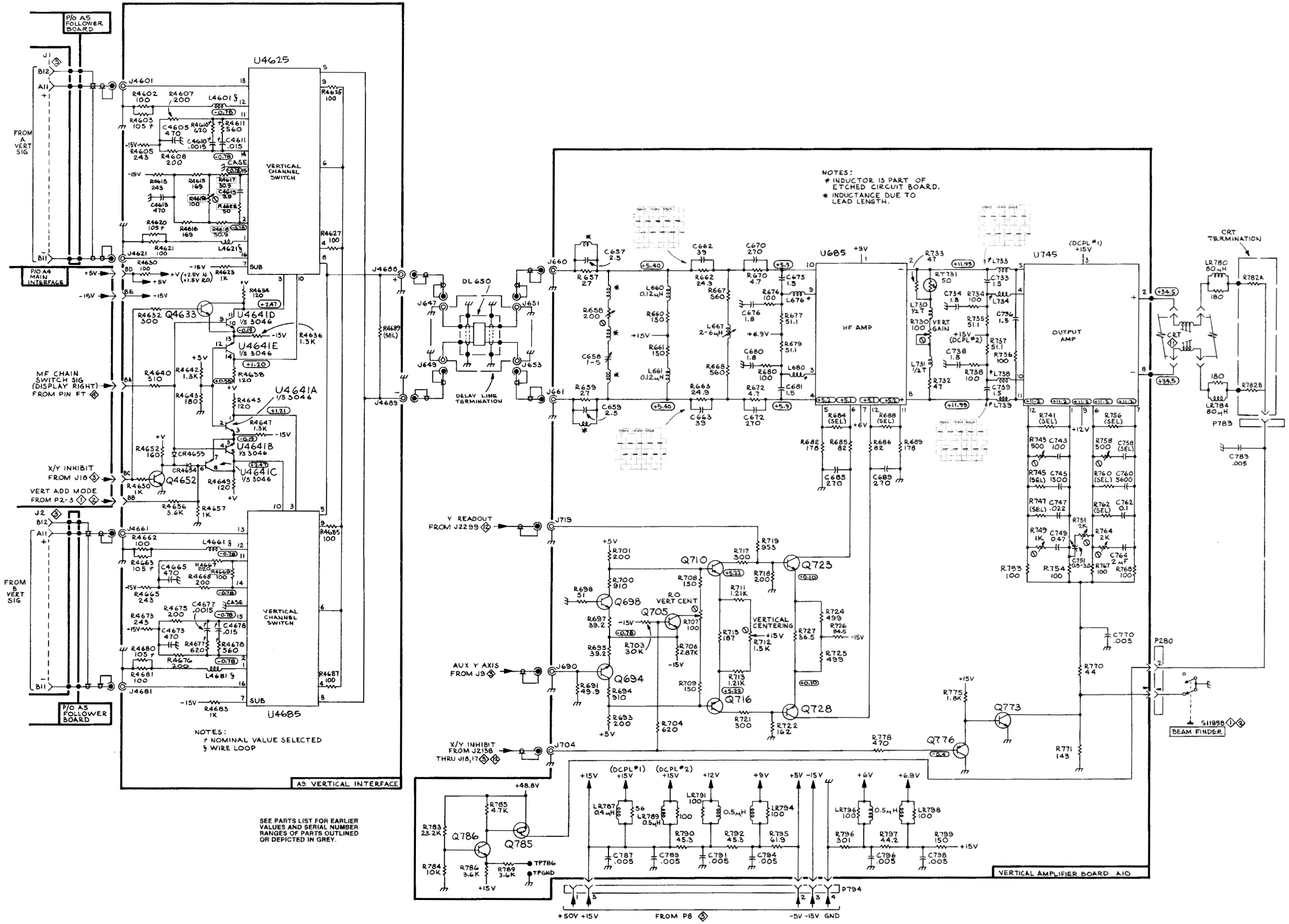
Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

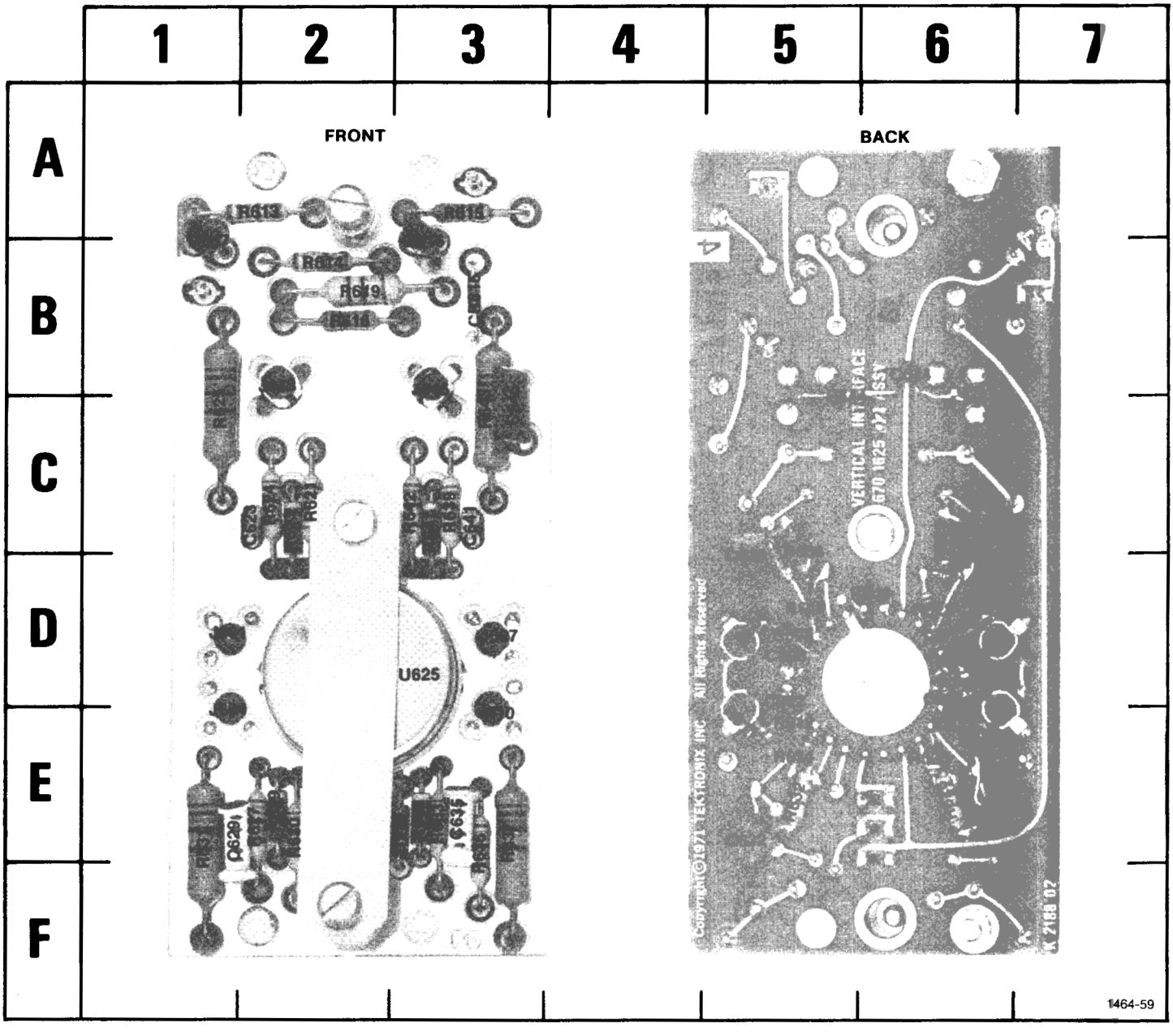
Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.



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

VERTICAL AMPLIFIER ⑥

SN B120000 – SN B179999



A9 Vertical Interface circuit board, SN B119999 and below.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C603	6D	CR615	3B	R605	6E	R622	6D	R636	3E
C606	6D			R606	6E	R623	2C	R637	3E
C609	5D	J601	1D	R608	5D	R624	2C	R638	5C
C612	5D	J604	1D	R609	5D	R625	1C	R639	3C
C620	6C	J607	3D	R611	5E	R626	6E	R640	5D
C623	2C	J610	3D	R612	5E	R627	2E	R641	3C
C626	6E	J643	2B	R613	2A	R628	6E	R642	3C
C629	1E	J645	3B	R614	2B	R629	2E	R643	3C
C632	5E			R615	3A	R630	2E	R644	5C
C635	3E	Q616	3B	R616	2B	R631	1E	R646	6D
C638	5D	Q617	1B	R618	3E	R632	5E		
C641	3C			R619	2B	R633	3E	U625	3D
C644	6B	R602	6D	R620	6C	R634	5E		
C645	3C	R603	6D	R621	2C	R635	3E		

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

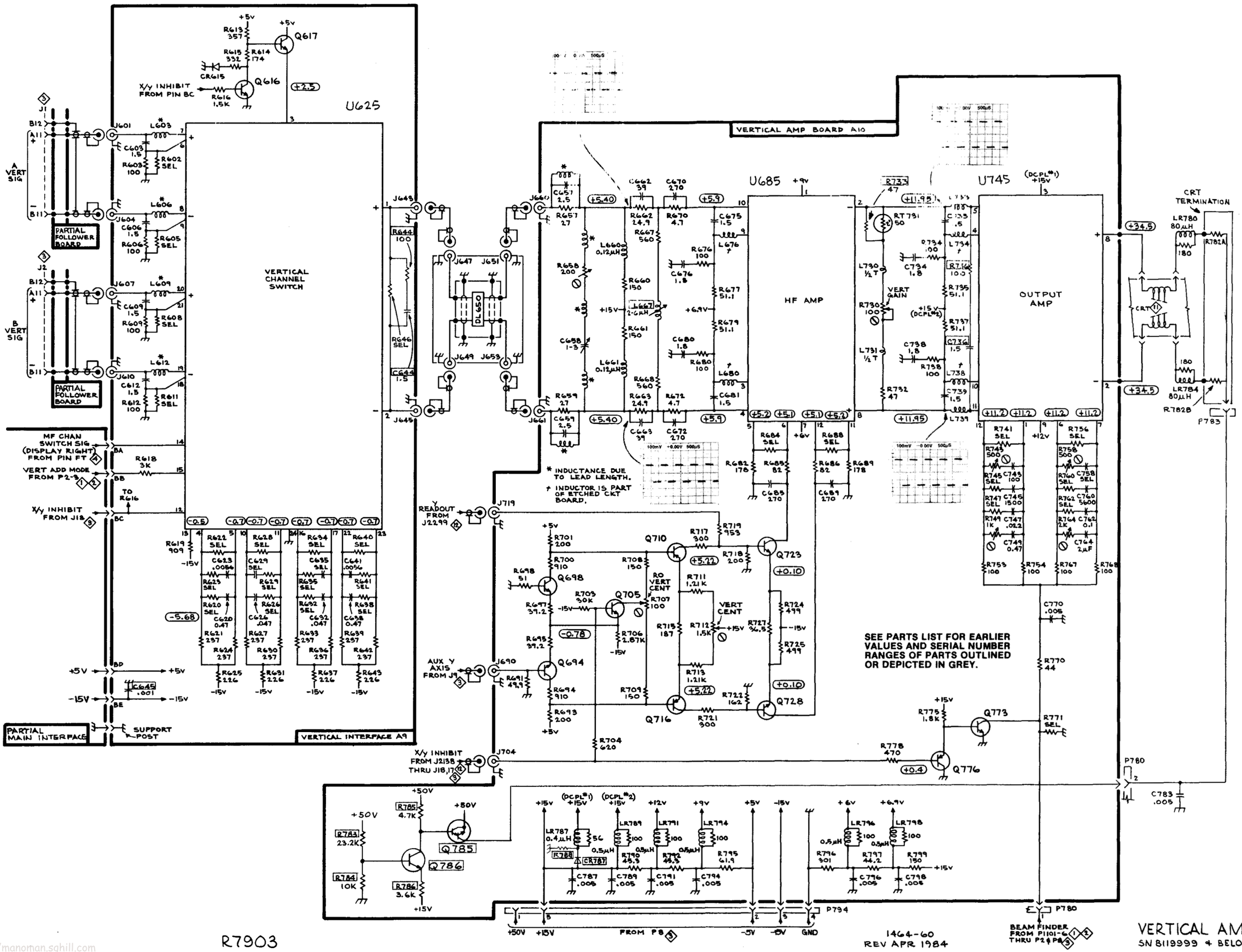
Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

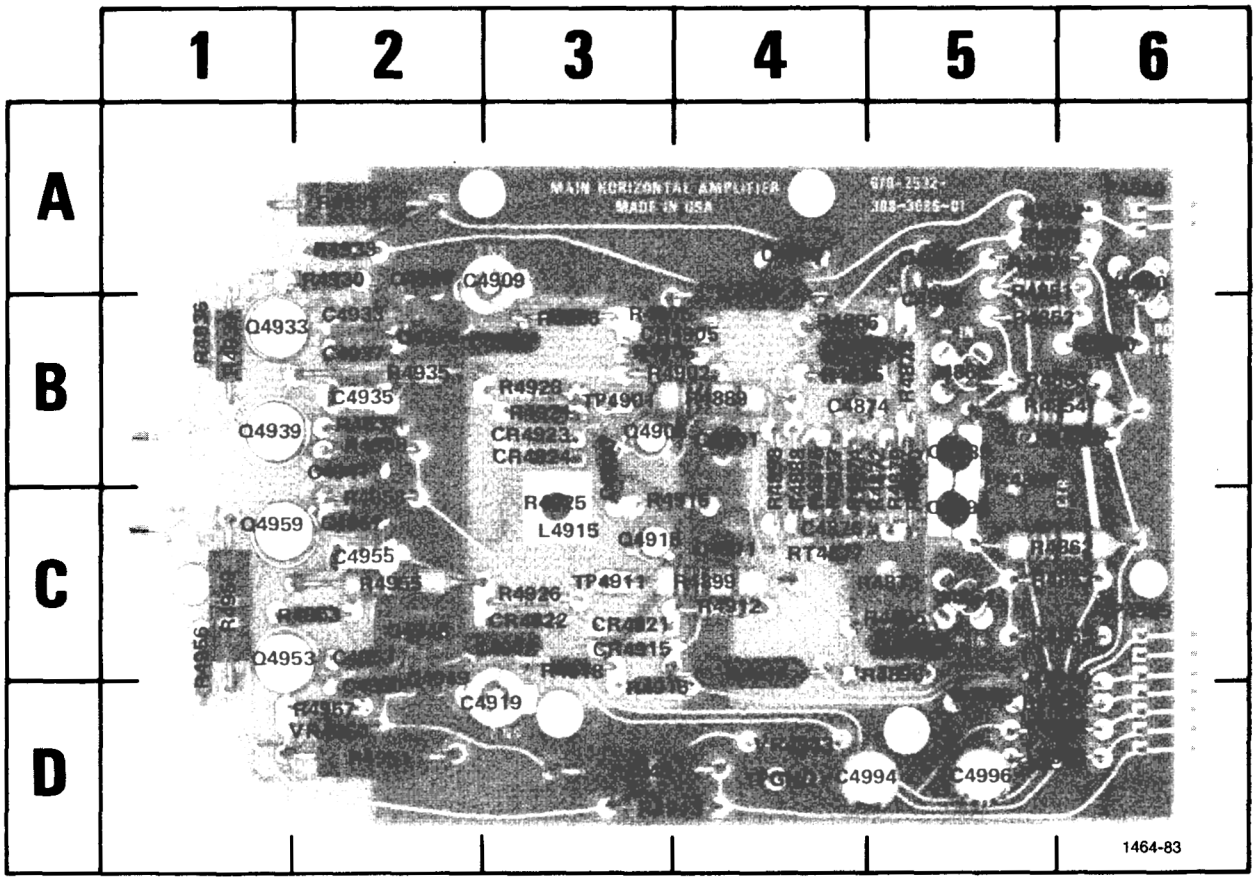
Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.



R7903

1464-60
REV APR 1984

VERTICAL AMPLIFIER 6
SN B119999 & BELOW



A11 Horizontal Amplifier circuit board (SN B150000 - above).

CKT NO	GRID LOC
C4874	4B
C4876	4C
C4882	5B
C4886	4B
C4896	5C
C4908	3B
C4909	3A
C4918	3C
C4919	3D
C4920	3B
C4933	2B
C4937	2B
C4941	2B
C4950	2D
C4953	2C
C4955	2C
C4957	2C
C4990	4A
C4992	5D
C4994	5D
C4996	5D
C4997	6C
CR4905	3B
CR4915	3C
CR4921	3C
CR4922	3C
CR4923	3C
CR4924	3B
J4850	6A
J4853	5B
J4854	5C
L4915	3C
L4994	5D
P4860	6A
P4995	6D
Q4883	5A
Q4885	5B
Q4895	5C
Q4901	4B
Q4905	3B
Q4911	4C
Q4915	3C
Q4928	2B
Q4929	2A
Q4933	1B
Q4939	1B
Q4948	2C
Q4949	2C
Q4953	1C
Q4959	1C
R4850	6A
R4851	5A
R4852	5B
R4853	6B
R4854	6B
R4862	5C
R4863	5C
R4865	5C
R4867	6B
R4868	5B
R4870	5B
R4872	5B
R4873	5C
R4874	4B
R4876	4B
R4877	4B
R4878	5B
R4879	5B
R4881	5A
R4882	5A
R4883	5A
R4885	4B
R4886	4B
R4888	4B
R4889	4B
R4896	5C
R4898	4B
R4899	4C
R4902	3B
R4904	4A
R4905	3B
R4906	3B
R4908	3B
R4912	4C
R4914	4C
R4915	3D
R4916	4C
R4918	3C
R4921	3B
R4923	3B
R4925	3C
R4926	3C
R4930	2A
R4931	2A
R4933	2A
R4935	2B
R4936	1B
R4937	2B
R4938	2B
R4939	1B
R4943	3D
R4949	3D
R4951	2D
R4853	2C
R4955	2C
R4956	1C
R4957	2D
R4958	2C
R4959	1C
R4990	5D
R4992	5D
RT4877	4C
TP4901	3B
TP4911	3C
TPGND	4D
VR4943	4D
VR4950	2D

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS	RECOMMENDED TYPE
Oscilloscope	Frequency response DC to 75 MHz Deflection factor 5 mV to 5 V/Div Input impedance 1 MΩ 20 pF Sweep rate 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.	Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance 10 MΩ Range 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

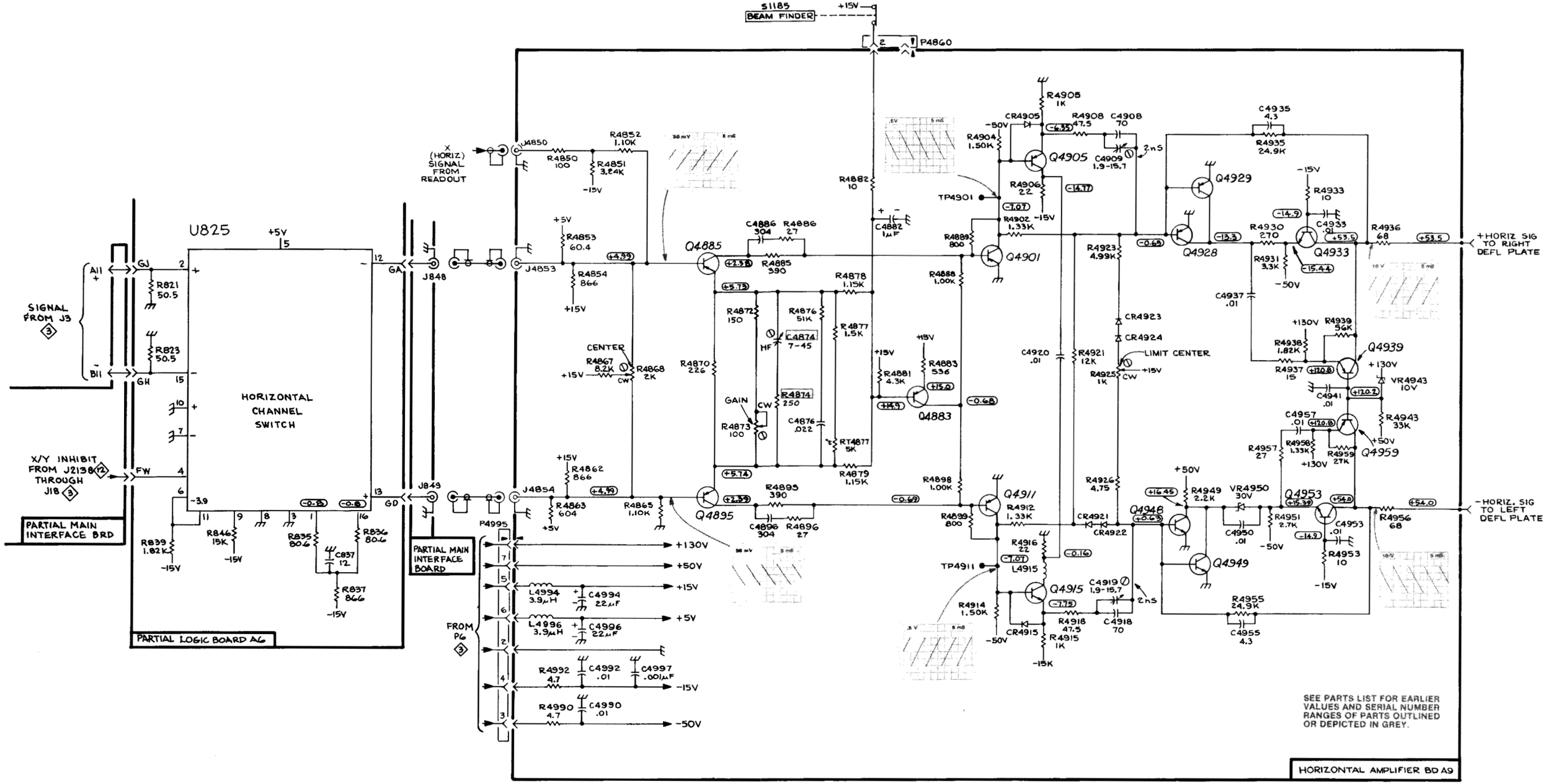
Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

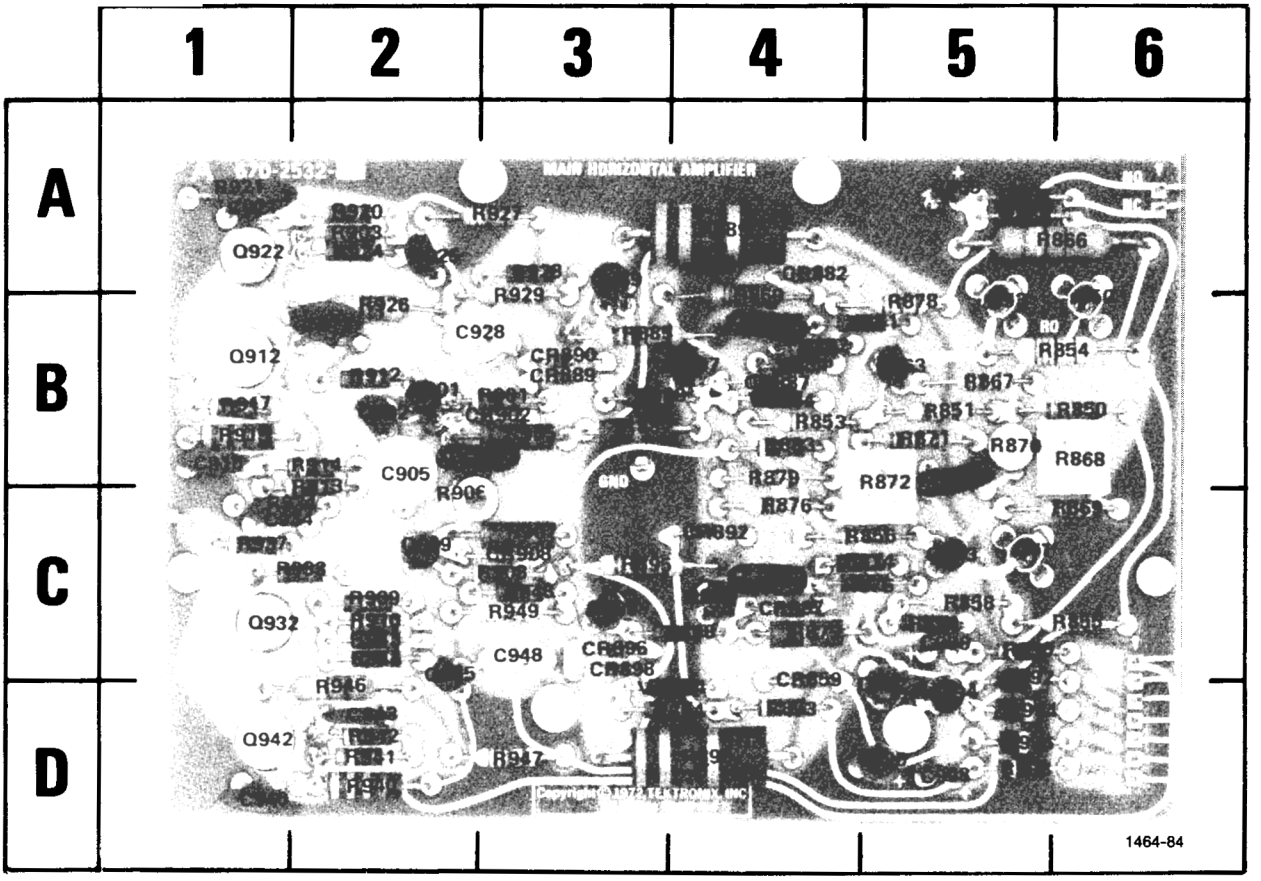
Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.



R7903

(1590) 1464-85
REV SEP 1985

SN B150000 - ABOVE
HORIZONTAL AMPLIFIER ⑦



A11 Horizontal Amplifier circuit board (SN B149999 - below).

REV JUN 1986

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C862	4B	CR859	4C	L994	5D	R850	6B	R870	5B	R899	4D	R928	3A
C865	5A	CR882	4A	L996	5D	R851	5B	R871	5B	R901	3B	R929	3B
C875	4C	CR887	4B			R853	4B	R872	5B	R903	2A	R933	2C
C870	5B	CR889	3B	Q863	5B	R854	6B	R874	5C	R905	3B	R934	1C
C905	2B	CR890	3B	Q873	5C	R855	6C	R875	5C	R907	3C	R937	1C
C906	3B	CR892	4C	Q887	4B	R856	5C	R876	4C	R908	3C	R940	2D
C912	2B	CR896	3C	Q889	3A	R858	5C	R878	5B	R909	2C	R941	2D
C915	1B	CR897	4C	Q897	4C	R859	5C	R879	4B	R910	2C	R942	2D
C921	1A	CR898	3C	Q899	3C	R860	4A	R883	4B	R912	2B	R943	2C
C928	3B	CR902	3B	Q901	2B	R861	5B	R884	4B	R913	2B	R944	2C
C934	1C	CR908	3C	Q902	2B	R862	4B	R885	3B	R914	2B	R946	2D
C940	1D			Q909	2C	R864	5A	R887	3B	R915	1B	R947	3D
C943	2D	J850	6B	Q912	1B	R865	5A	R888	3B	R917	1B	R948	3C
C990	5C	J853	5B	Q922	1A	R866	6A	R889	4A	R920	2A	R949	3C
C948	3C	J857	5C	Q925	2A	R867	5B	R893	4D	R921	1A	R990	5C
C992	5C			Q932	1C	R868	6B	R894	4D	R924	2A	R998	5D
C994	5D	L992	5C	Q942	1D	R869	6C	R895	3C	R926	2B		
C996	5D			Q945	2C			R898	4C	R927	3A	VR884	4B
C998	5D											VR894	4C

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

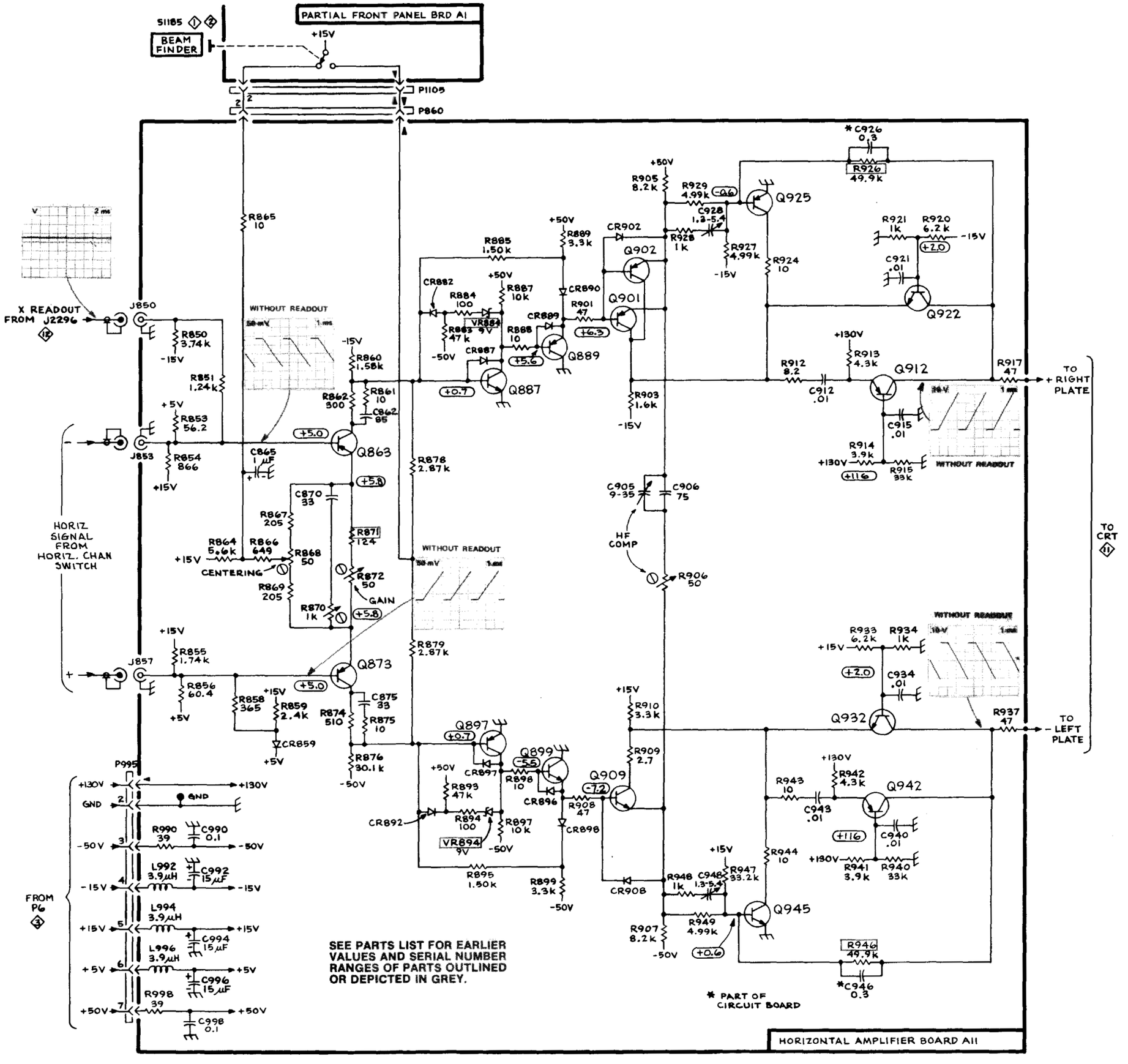
Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.



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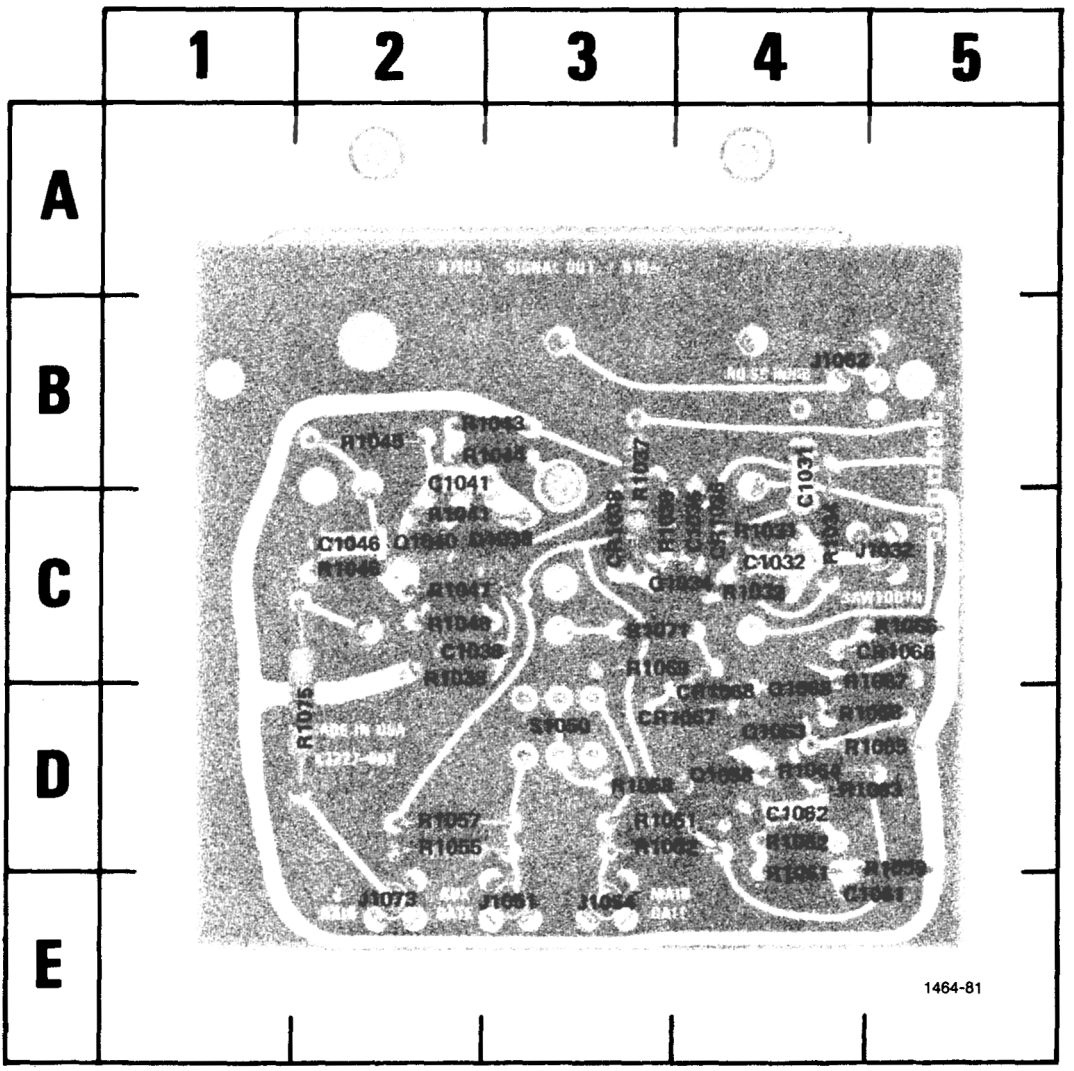
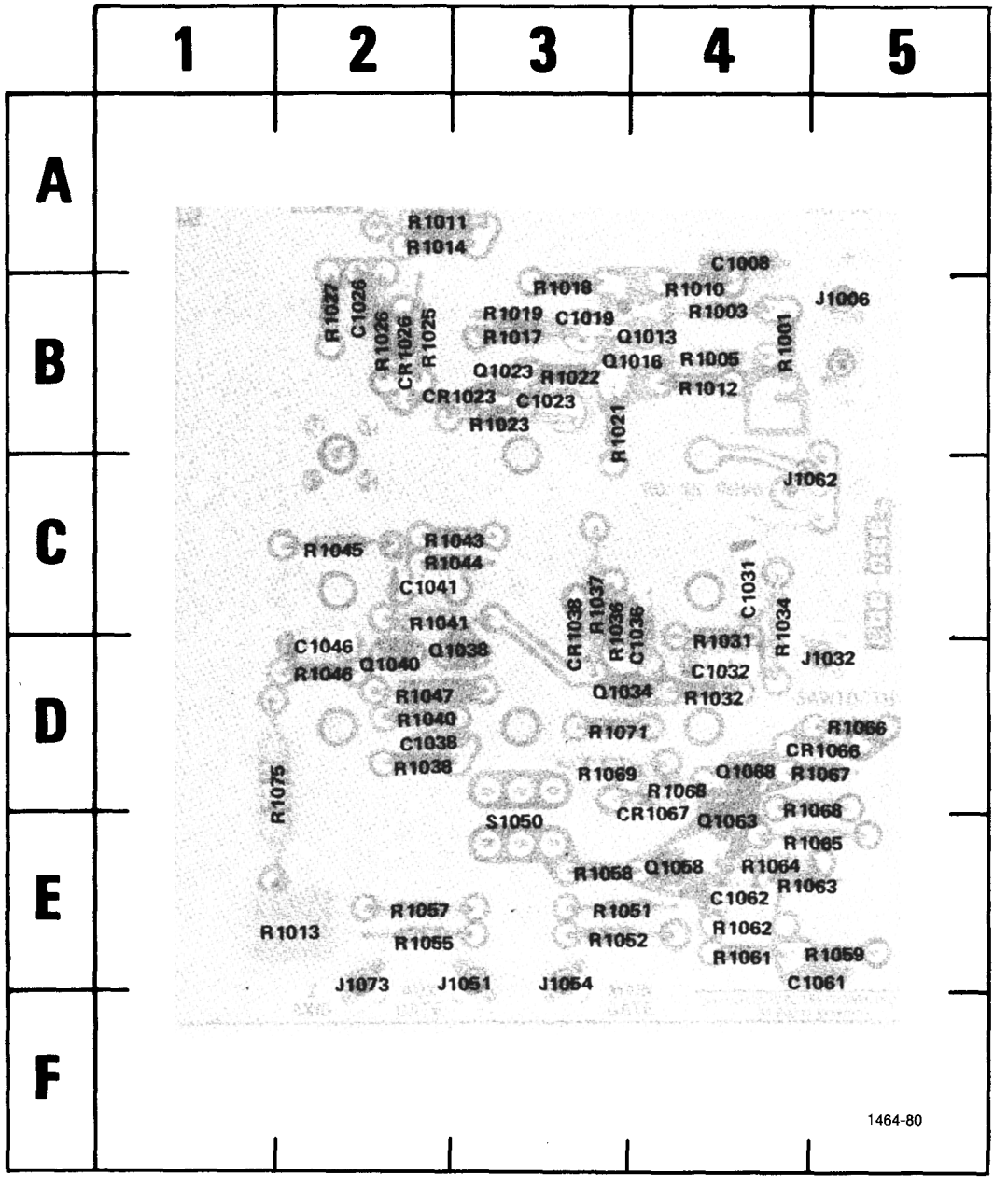
REV SEP 1985

SN B149999 + BELOW
HORIZONTAL AMPLIFIER



A12 Output Signals circuit board, SN B160810 - above.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1031	4B	CR1068	4D	Q1068	4C	R1046	2C	R1067	5D
C1032	4C					R1047	2C	R1068	5D
C1036	4C	J1032	5C	R1031	4C	R1051	3D	R1069	3C
C1038	2C	J1051	3D	R1032	4C	R1052	3D	R1071	3C
C1041	2B	J1054	3E	R1034	4C	R1055	2D	R1075	2D
C1046	2C	J1062	4B	R1036	3C	R1057	2D		
C1061	5E	J1073	2E	R1037	3C	R1058	3D	S1050	3D
C1062	4D			R1038	2C	R1059	5E		
		Q1034	4C	R1040	2C	R1061	4D		
CR1036	4C	Q1038	3C	R1041	2C	R1062	4D		
CR1038	3C	Q1040	2C	R1043	3B	R1063	5D		
CR1066	5C	Q1058	4D	R1044	3B	R1064	4D		
CR1067	4D	Q1063	4D	R1045	2B	R1065	5D		
						R1066	5C		



A12 Output Signals circuit board, SN B160809 - below.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1008	4A	CR1023	3B	Q1013	4B	R1012	4B	R1034	4C	R1059	5E
C1019	3B	CR1026	2B	Q1016	3B	R1013	2E	R1036	3C	R1061	4E
C1023	3B	CR1038	3C	Q1023	3B	R1014	2A	R1037	3C	R1062	4E
C1026	2B	CR1066	5D	Q1034	3D	R1017	3B	R1038	2D	R1063	4E
C1031	4C			Q1040	2D	R1018	3B	R1041	2C	R1064	4E
C1032	4D	J1006	5B	Q1058	4E	R1019	3B	R1043	2C	R1065	4E
C1036	4C	J1007	5B	Q1063	4E	R1021	3B	R1045	2C	R1066	5D
C1038	2D	J1032	5D	Q1068	4D	R1022	3B	R1046	2D	R1067	5D
C1041	2C	J1051	3E			R1023	3B	R1047	2D	R1069	3D
C1046	2D	J1054	3E	R1001	4B	R1025	2B	R1051	3E	R1071	3D
C1061	5E	J1062	4C	R1003	4B	R1026	2B	R1052	3E	R1075	2D
C1062	4E	J1073	2E	R1005	4B	R1027	2B	R1055	2E		
				R1010	4B	R1031	4D	R1057	2E	S1050	3E
				R1011	2A	R1032	4D	R1058	3E		

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.

+ SIGNAL FROM J584
- SIGNAL FROM J583
SEE ⑤ SN B130524 + BELOW
J1006
J1005
* PART OF BOARD
R1001
* C1001
R1003
R1005
R1010
R1014
+15V
C1008
VERT SIG
R1011
R1013
R1012
+8.0
Q1013
Q1016
R1018
+5V
C1019
R1017
+7.2
+15V
R1019
R1021
* C1021
R1022
+5V
R1023
C1023
Q1023
C1024
CR1023
-0.2
R1025
R1026
CR1026
C1026
R1027
+15V
J1029 (VERT)
SIG OUT
1 V
1 ms

SWEEP FROM J30 ⑤
J1032
R1031 100
C1031 2.7
C1032 51
R1032 47
R1034 6.19k
-15V
+0.6
C1036 .01
+15V
R1036 6.8k
CR1036
Q1034
+50V
R1037 7.15k
CR1038
+15V
R1038 2.7
C1038 .01
Q1038
R1040 15
R1041 5.62k
C1041 2.7
+15V
R1043 1.3k
R1044 4.3k
Q1040
R1047 1.5k
-15V
R1046 62
C1046 15
R1045 845
J1049
SAWTOOTH
5 V
1 ms

(MAIN) SWEEP GATE FROM J61 ⑤
J1054
R1051 287
R1052 14.0k
-15V
[GATE SELECTOR S1050]
R1058 100
C1061 .01
+15V
R1059 47
R1061 330
C1062 240
Q1058
R1063 100
+15V
R1065 267
Q1063
R1064 1k
-15V
R1068 33
+15V
R1066 750
CR1066
R1067 2.2k
+10.6
Q1068
CR1068
CR1069
R1069 909
R1071 22
J1069
GATE
10 V
1 ms

AUX SWP GATE FROM J75 ⑤
J1051
R1055 287
R1057 14.0k
-15V
MAIN
AUX

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

P1066
+50V
+5V
-15V
GND
+15V
FROM/TO P9 ③
J1091
SS RESET
J1093
SS READY
J1095
GRAT/READOUT SS
J1097
READOUT INHIBIT
J1099
Z AXIS INPUT
J1062
SEE NOTE
(REMOTE) READOUT SS TO J1111 ④
(REMOTE) READOUT SS TO J2192 ④
R1075 453
J1073
(AUX) Z AXIS TO J7 ③
SIGNALS BOARD A13
OPTION 10
SIGNALS BOARD A12

NOTE:
FOR PULSED PANEL OPTION 10, ADD STRAP TO GND. READOUT INHIBIT IS ELIMINATED AND READOUT SS BECOMES GRAT/READOUT SS.

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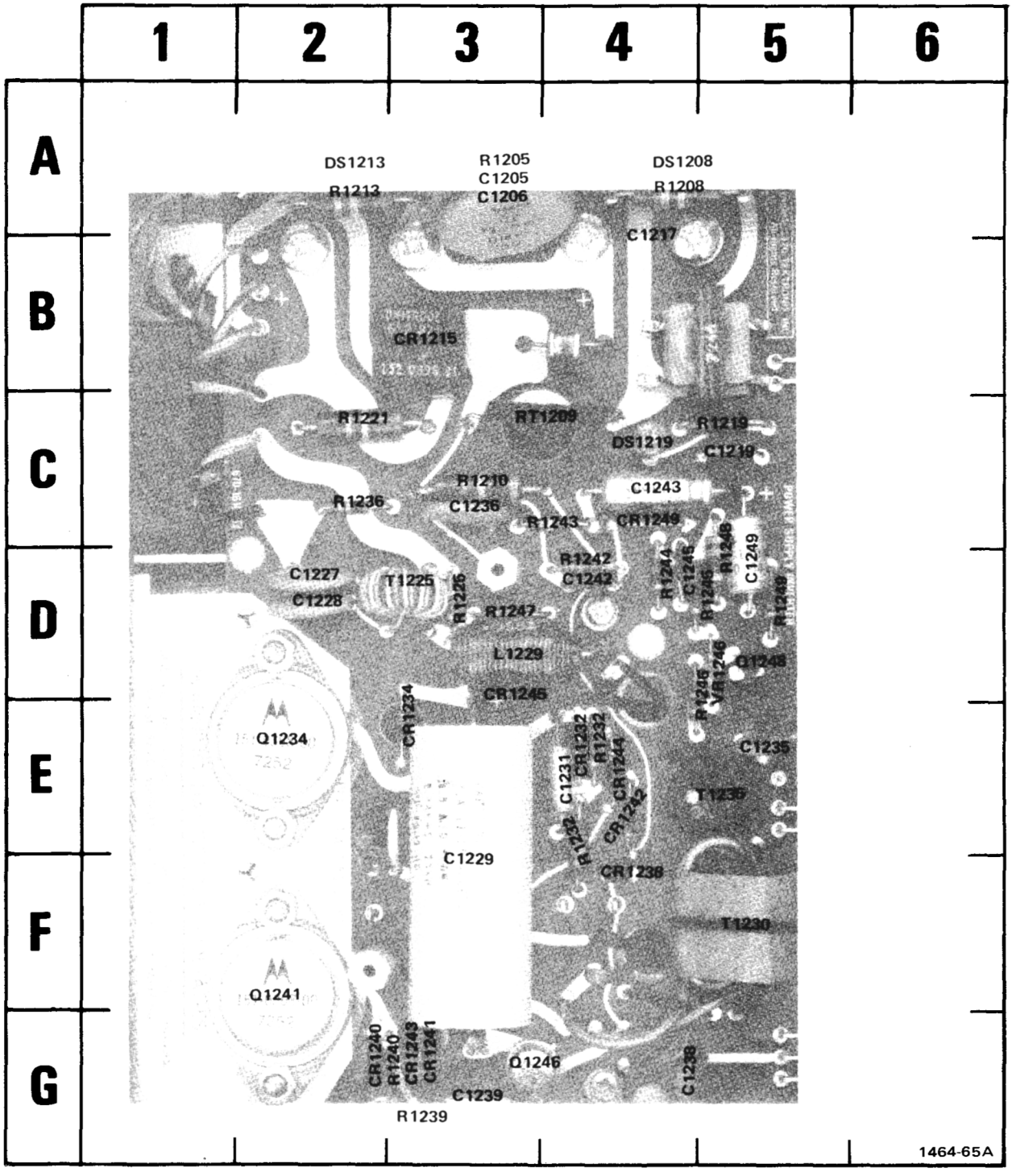
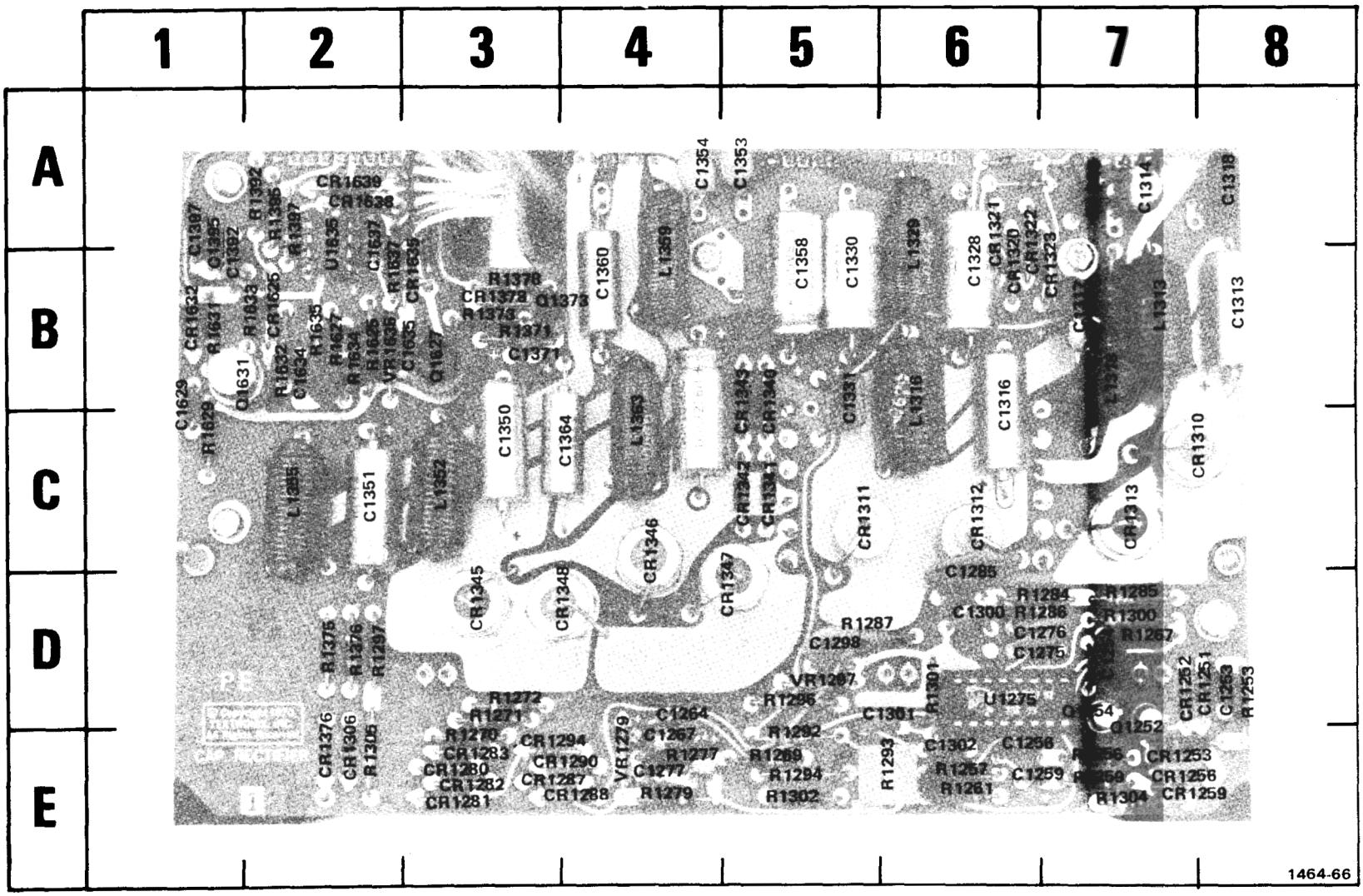
R7903

OUTPUT SIGNALS ⑧



A14 Line Inverter circuit board.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1205	3A	C1242	4D	CR1243*	3G	Q1246	3G	R1239	3G	T1208	5B
C1206	3A	C1243	4C	CR1244	4E	Q1248	5D	R1240	3G	T1225	3D
C1217	4A	C1245	4D	CR1245*	3D			R1242	4D	T1230	5F
C1219	5C	C1249	5D	CR1249	4C	R1205	3A	R1243	4C	T1235	5E
C1227	2D					R1208	4A	R1244	4D		
C1228	2D	CR1215	3B	DS1208	4A	R1210	3C	R1245	5D	VR1246	5D
C1229	3F	CR1232	4E	DS1213	2A	R1213	2A	R1246	5D		
C1231	4E	CR1234	3E	DS1219	4C	R1219	5C	R1247	3D		
C1235	5E	CR1238	4F			R1221	2C	R1248	5D		
C1236	3C	CR1240	2G	L1229	3D	R1225	3D	R1249	5D		
C1238	4G	CR1241	3G			R1232	4E				
C1239	3G	CR1242	4E	Q1234	2E	R1236	2C	RT1209	3C		
				Q1241	2F						



REV JUN 1986

A15 Cap. Rectifier circuit board.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1253	8D	C1330	5B	CR1253	7E	CR1340	5C	L1352	3C	R1272	3D	R1376	2D
C1254	7D	C1331	5C	CR1256	7E	CR1341	5C	L1355	2C	R1277	4E	R1378	3B
C1256	6E	C1350	3C	CR1259	7E	CR1342	5C	L1359	4B	R1279	4E	R1392	2A
C1259	6E	C1351	2C	CR1280	3E	CR1343	5C	L1363	4C	R1285	7D	R1395	2A
C1264	4D	C1353	5A	CR1281	3E	CR1345	3D			R1284	6D	R1397	2A
C1267	4E	C1354	4A	CR1282	3E	CR1346	4C	Q1252	7D	R1286	6D	R1625	2B
C1275	6D	C1358	5B	CR1283	3E	CR1347	5D	Q1254	7D	R1287	5D	R1627	2B
C1276	6D	C1360	4B	CR1287	3E	CR1348	3D	Q1373	3B	R1292	5E	R1629	1C
C1277	4E	C1362	4C	CR1288	4E	CR1376	2E	Q1627	3B	R1293	6E	R1631	1B
C1285	6C	C1364	4C	CR1290	3E	CR1378	3B	Q1631	2B	R1294	5E	R1632	2B
C1298	5D	C1371	3B	CR1294	3E	CR1625	2B			R1296	5D	R1633	2B
C1300	6D	C1392	1A	CR1306	2E	CR1632	1B	R1253	8D	R1297	2D	R1634	2B
C1302	6E	C1395	1A	CR1310	7C	CR1635	3B	R1256	7E	R1300	7D	R1635	2B
C1313	8B	C1397	1A	CR1311	5C	CR1638	2A	R1257	6E	R1301	6D	R1637	2B
C1314	7A	C1629	1C	CR1312	6C	CR1639	2A	R1259	7E	R1302	5E		
C1316	6C	C1634	2B	CR1313	7C			R1261	6E	R1304	7E	U1275	6D
C1317	7B	C1635	3B	CR1320	6B	L1313	7B	R1267		R1305	2E	U1635	2A
C1318	8A	C1637	2A	CR1321	6B	L1316	6C	R1269	5E	R1371	3B		
C1326	7A			CR1322	6B	L1318	7B	R1270	3E	R1373	3B	VR1279	4E
C1328	6B	CR1251	8D	CR1323	7B	L1329	6B	R1271	3D	R1375	2D	VR1297	5D
												VR1635	2B

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.

LINE INVERTER BOARD A14

INVERTER/RECTIFIERS ⑨

PARTIAL CAP. RECTIFIER BOARD A15

PARTIAL REGULATOR BD A16

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

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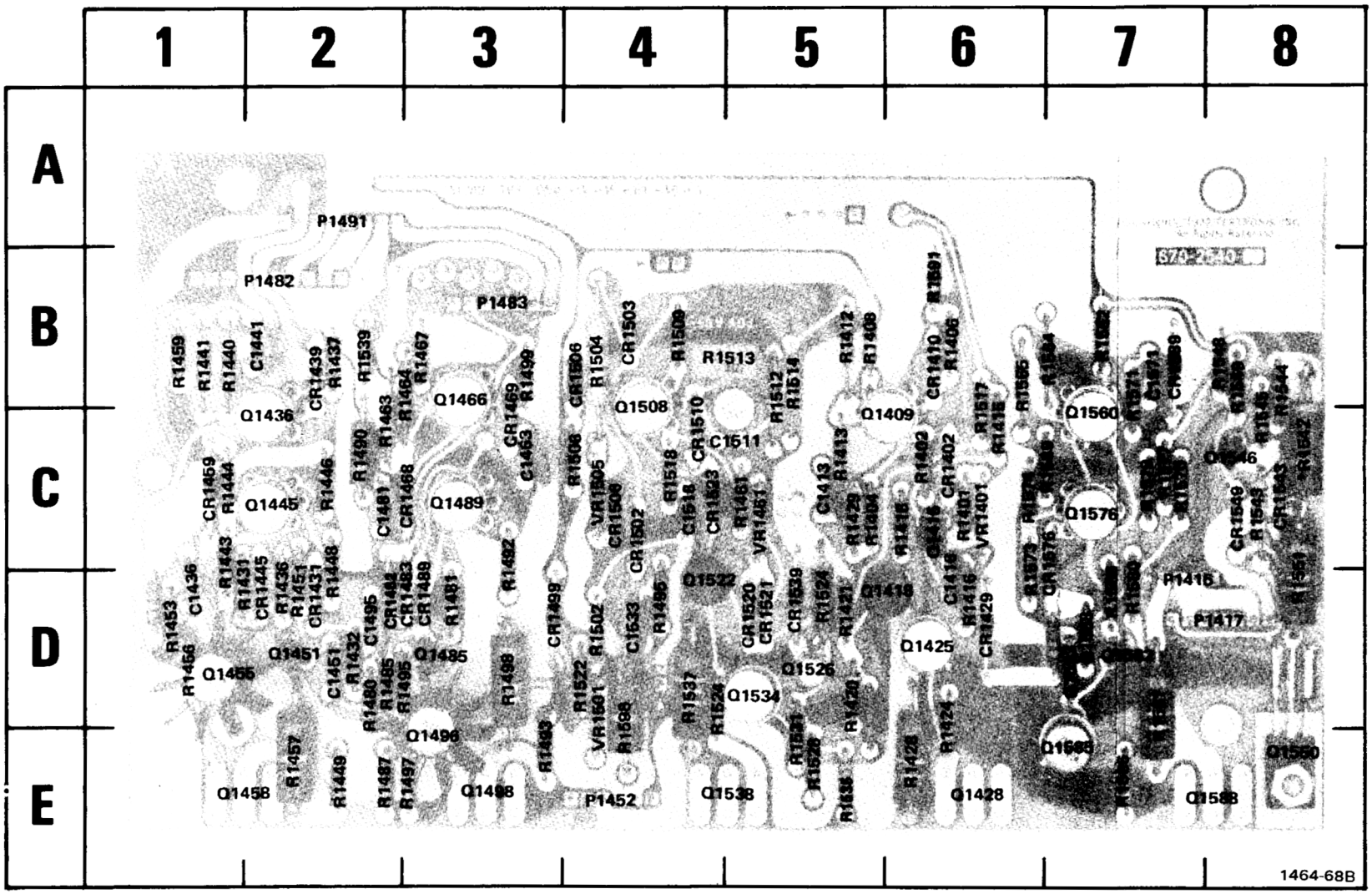
WIRING FOR SN B191374 & BELOW



*See Parts List for serial number ranges.

A16 L.V. Regulator circuit board

REV JUN 1986

CKT NO	GRID LOC
C1413	5C
C1416	6D
C1436	1D
C1441	2B
C1451	2D
C1463	3C
C1481	2C
C1495	2D
C1511	5C
C1518	4C
C1571	7B
CR1251	5D
CR1402	6C
CR1410	6B
CR1429	6D
CR1431	2D
CR1439	2B
CR1445	2D
CR1459	1C
CR1468	3C
CR1469	3C
CR1482	2D
CR1483	2D
CR1489	3D
CR1499	3D
CR1502	4C
CR1503	4B
CR1506	4B
CR1510	4C
CR1520	5D
CR1523	4C
CR1539	5D
CR1543	8C
CR1549	8C
CR1576	7C
CR1589	7B
P1415	7D
P1417	8D
P1452	4E
P1482	2B
P1483	3B
P1491	2A
Q1409	5C
Q1415	6C
Q1418	5D
Q1425	6D
Q1428	6E
Q1436	2C
Q1445	2C
Q1451	2D
Q1455	1D
Q1458	2E
Q1466	3B
Q1485	3D
Q1489	3C
Q1496	3E
Q1498	3E
Q1508	4B
Q1522	4D
Q1526	5D
Q1534	5D
Q1538	5E
Q1546	8C
Q1550	8E
Q1560	7B
Q1576	7C
Q1582	7D
Q1585	7E
Q1588	8E
R1401	6C
R1402	6C
R1404	5C
R1406	6B
R1408	5B
R1412	5B
R1413	5C
R1415	6C
R1416	6D
R1418	6C
R1420	5D
R1421	5D
R1424	6E
R1428	6E
R1429	5C
R1431	1D
R1432	2D
R1436	2D
R1437	2B
R1440	1B
R1441	1B
R1443	1C
R1444	1C
R1446	2C
R1448	2D
R1449	2E
R1453	1D
R1456	1D
R1457	2E
R1459	1B
R1461	5C
R1463	2C
R1464	2C
R1467	3B
R1480	2D
R1481	3D
R1485	2D
R1487	2E
R1490	2C
R1492	3D
R1493	3E
R1495	2D
R1497	3E
R1498	3D
R1499	3B
R1451	2D
R1502	4D
R1504	4B
R1506	4C
R1509	
R1512	5B
R1513	4B
R1514	5B
R1517	6B
R1518	4C
R1522	4D
R1524	5D
R1528	5E
R1531	5E
R1535	5E
R1537	4D
R1539	2B
R1542	8C
R1543	8C
R1544	8B
R1545	8B
R1548	8B
R1549	8B
R1551	8D
R1562	7B
R1564	7B
R1565	6B
R1566	7D
R1567	7D
R1568	7D
R1570	7C
R1571	7B
R1573	6D
R1574	6C
R1577	7C
R1579	7C
R1580	7D
R1583	7D
R1586	7E
R1587	7D
R1589	6C
R1591	6B
R1598	4E
VR1401	6C
VR1461	5C
VR1501	4D
VR1505	4C

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

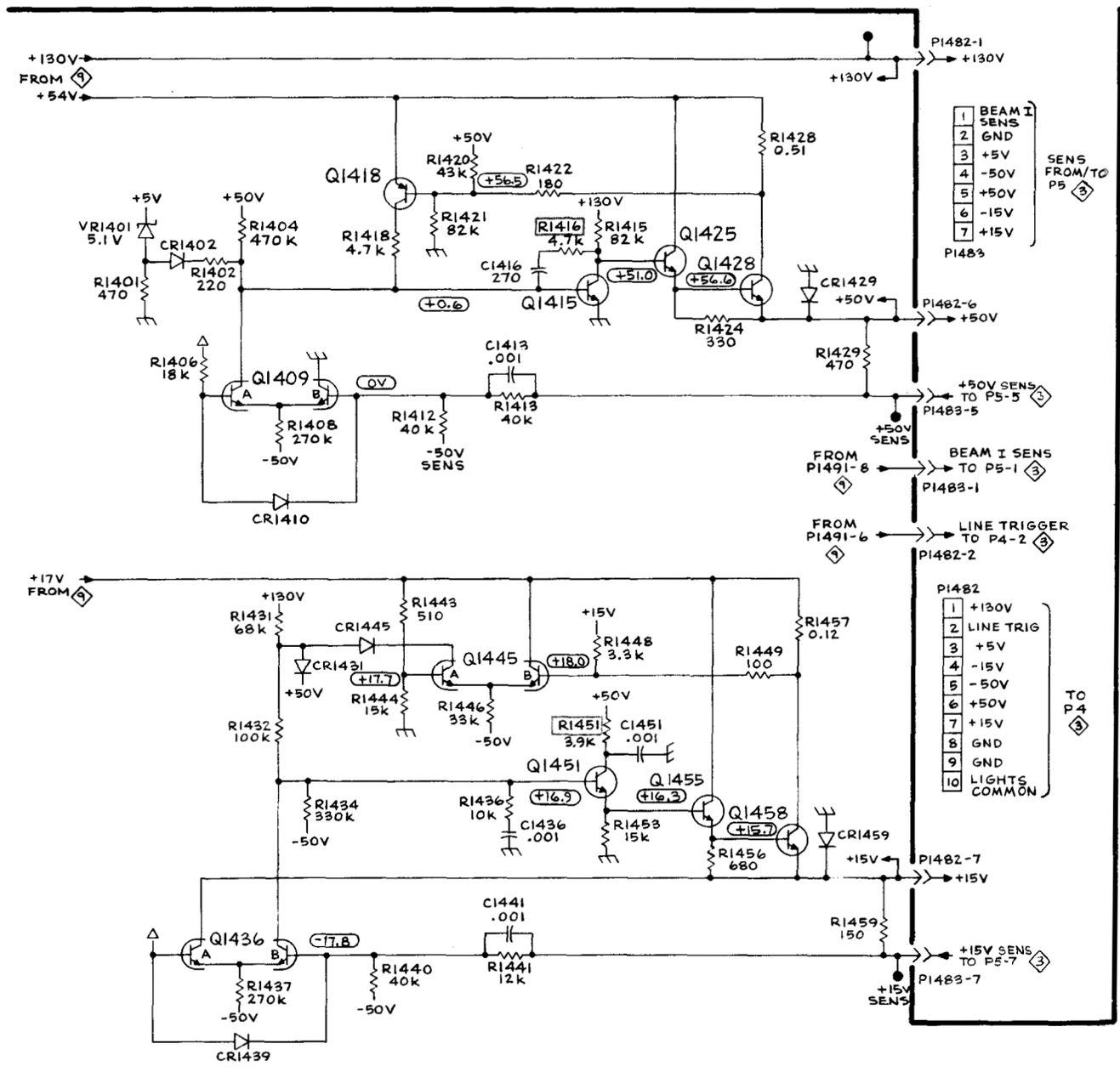
Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.



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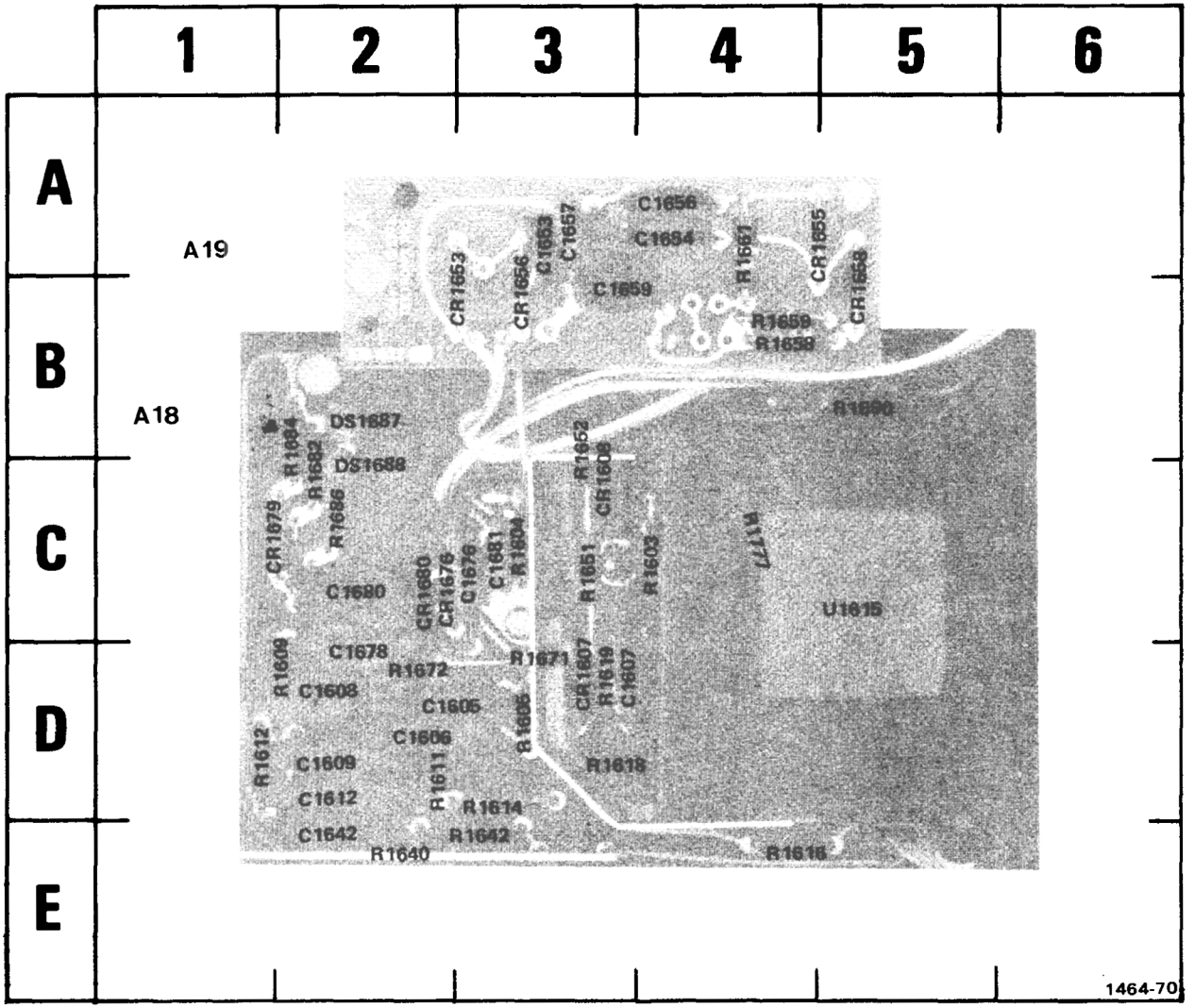
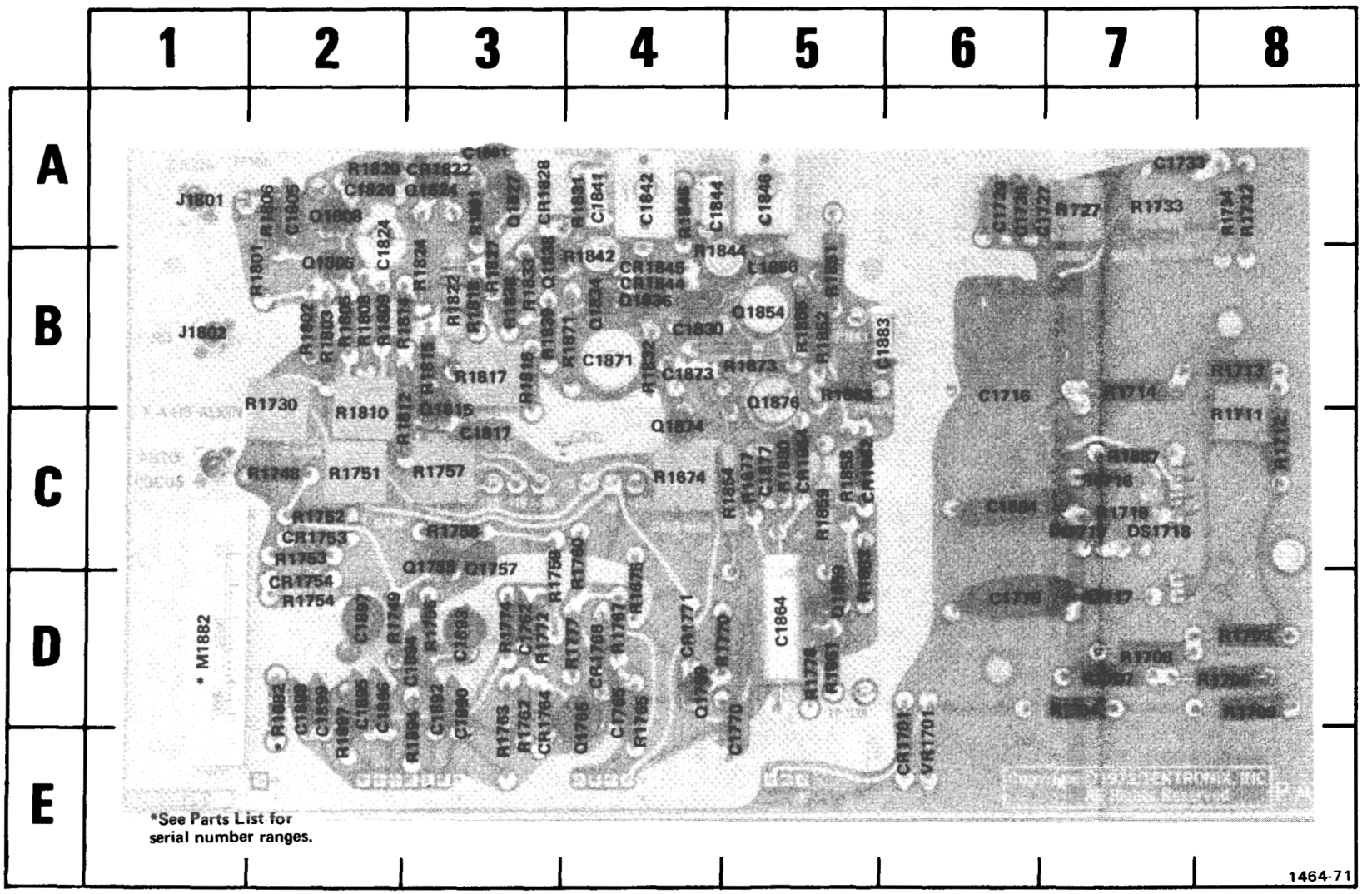
LOW-VOLTAGE REGULATORS 10



A18 High Voltage circuit board.

A19 Auto Focus circuit board.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1605	2D	C1680	2C	DS1688	2C	R1642	3E
C1606	2D	C1681	3C			R1651	3C
C1607	3D			R1603	4C	R1652	3C
C1608	2D	CR1607	3D	R1604	3C	R1658	4B
C1609	2D	CR1608	3C	R1605	3D	R1659	4B
C1612	2D	CR1653	2A	R1609	2D	R1661	4A
C1642	2E	CR1655	4A	R1611	2D	R1671	3D
C1653	3A	CR1656	3B	R1612	1D	R1672	2D
C1654	4A	CR1658	5B	R1614	3D	R1682	2C
C1656	4A	CR1676	2C	R1616	4E	R1684	2B
C1657	3A	CR1679	1C	R1618	3D	R1686	2C
C1659	3B	CR1680	2C	R1619	3D	R1690	5B
C1676	3C			R1640	2E		
C1678	2D	DS1687	2B			U1615	5C



*See Parts List for serial number ranges.

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A20 Z-Axis circuit board.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C1716	6B	C1873	4B	CR1771	4D	Q1757	3C	R1705	8D	R1752	2C	R1805	2B	R1839	3B
C1727	6A	C1877	5C	CR1822	3A	Q1765	4D	R1706	8D	R1753	2C	R1806	2A	R1842	4B
C1729	6A	C1883	5B	CR1828	3A	Q1769	4D	R1707	7D	R1754	2D	R1808	2B	R1844	4B
C1733	7A	C1890	3D	CR1844	4B	Q1805	2B	R1708	7D	R1756	3D	R1809	2B	R1846	4A
C1736	6A	C1891	3A	CR1845	4B	Q1808	2A	R1709	8D	R1757	3C	R1810	2C	R1851	5B
C1762	3D	C1892	3D	CR1862	5C	Q1815	3B	R1711	8C	R1758	3C	R1812	2C	R1852	5B
C1765	4D	C1893	3D	CR1864	5C	Q1824	3A	R1712	8C	R1759	3D	R1814	2B	R1854	5C
C1770	5D	C1894	3D			Q1827	3A	R1713	8B	R1760	4C	R1815	3B	R1856	5B
C1778	6D	C1895	2D	DS1718	7C	Q1834	4B	R1714	7B	R1762	3D	R1816	3B	R1858	5C
C1805	2A	C1896	2D	DS1719	7C	Q1836	4B	R1716	7C	R1763	3D	R1817	3B	R1859	5C
C1817	3C	C1897	2D			Q1838	3B	R1717	7D	R1765	4D	R1818	3B	R1861	5D
C1820	2A	C1898	2D	J1748	1C	Q1854	5B	R1719	7C	R1767	3S	R1820	2A	R1863	5D
C1824	2A	C1899	2D	J1801	1A	Q1859	5D	R1727	7A	R1770	4S	R1822	3B	R1871	4B
C1830	4B			J1802	1B	Q1874	4C	R1730	2B	R1772	3D	R1824	3B	R1873	5B
C1841	4A	CR1701	6E			Q1876	5B	R1732	8A	R1774	3D	R1827	3B	R1877	5C
C1842	4A	CR1753	2C	L1856	5B			R1733	7A	R1777	4D	R1831	4A	R1880	5C
C1844	6C	CR1754	2D			R1674	4C	R1734	8A	R1778	5D	R1832	4B	R1882	2D
C1846	5A	CR1764	3D	M1882	1D	R1675	4D	R1748	2C	R1801	2B	R1833	3B	R1883	5B
C1864	5D	CR1768	4D			R1704	7D	R1749	2D	R1802	2B	R1838	3B	R1887	7C
C1871	4B			Q1755	3C			R1751	2C	R1803	2B			R1891	3A
														R1894	3E
														R1897	2D
														VR1701	6E

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VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS		RECOMMENDED TYPE
Oscilloscope	Frequency response Deflection factor Input impedance Sweep rate	DC to 75 MHz 5 mV to 5 V/Div 1 MΩ 20 pF 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.		Tektronix P6053B, or equilvalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance Range	10 MΩ 0 – 500 V	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must have readout system).

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

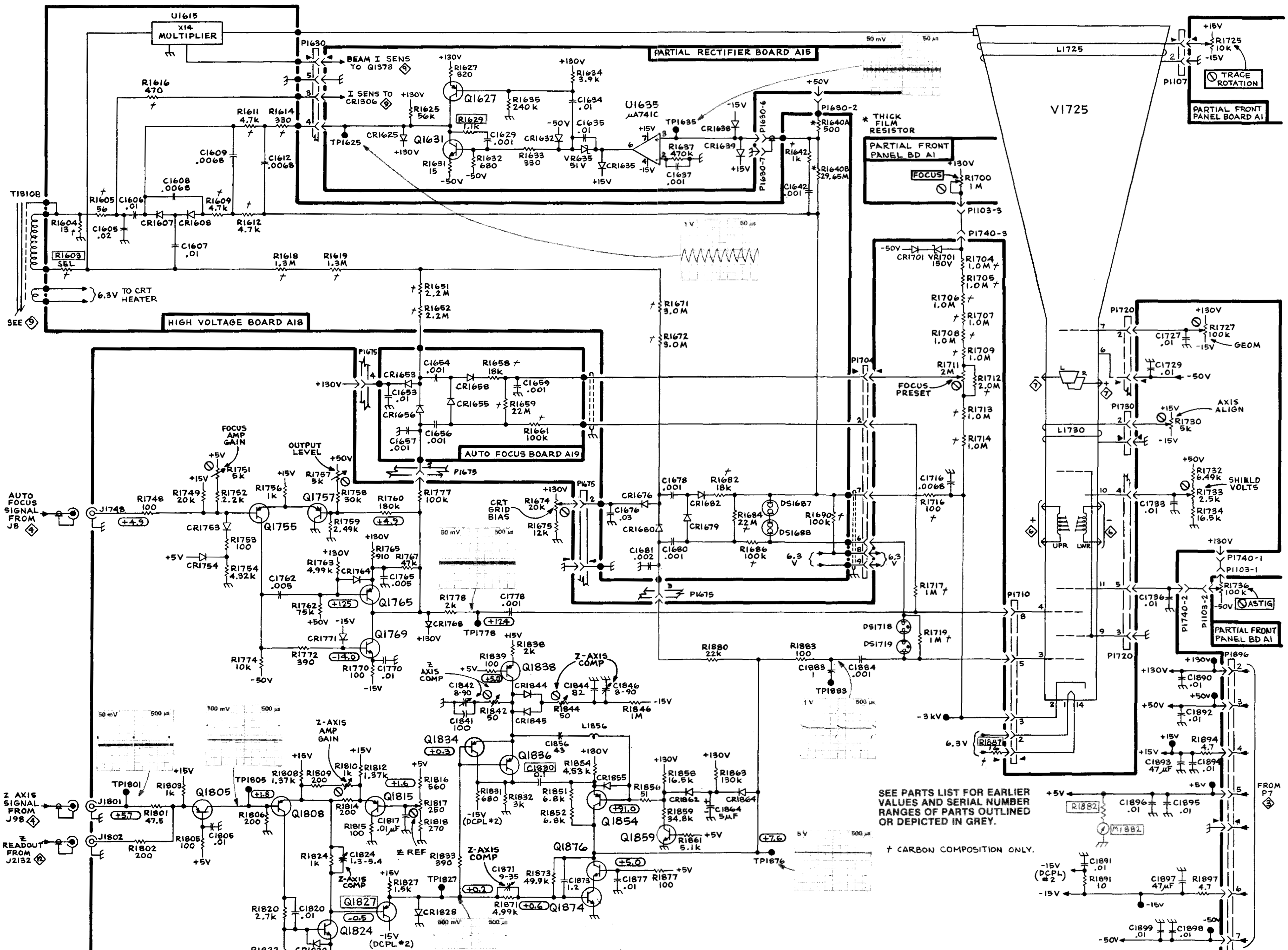
Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.


U1615
X14 MULTIPLIER
BEAM I SENS TO Q1373
I SENS TO CR1306
PARTIAL RECTIFIER BOARD A15
U1635 μA741C
THICK FILM RESISTOR
V1725
L1725
TRACE ROTATION
PARTIAL FRONT PANEL BOARD A1
PARTIAL FRONT PANEL BD A1
FOCUS
T1310B
6.3V TO CRT HEATER
HIGH VOLTAGE BOARD A18
AUTO FOCUS BOARD A19
FOCUS PRESET
GEOM
AXIS ALIGN
SHIELD VOLTS
ASTIG
L1730
UPR
LWR
FOCUS AMP GAIN
OUTPUT LEVEL
AUTO FOCUS SIGNAL FROM J8
CRT GRID BIAS
Z AXIS COMP
Z-AXIS COMP
Z-AXIS AMP GAIN
Z REF
Z AXIS SIGNAL FROM J98
Z READOUT FROM J2132
FROM P7
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
† CARBON COMPOSITION ONLY.
Z AXIS BOARD A20

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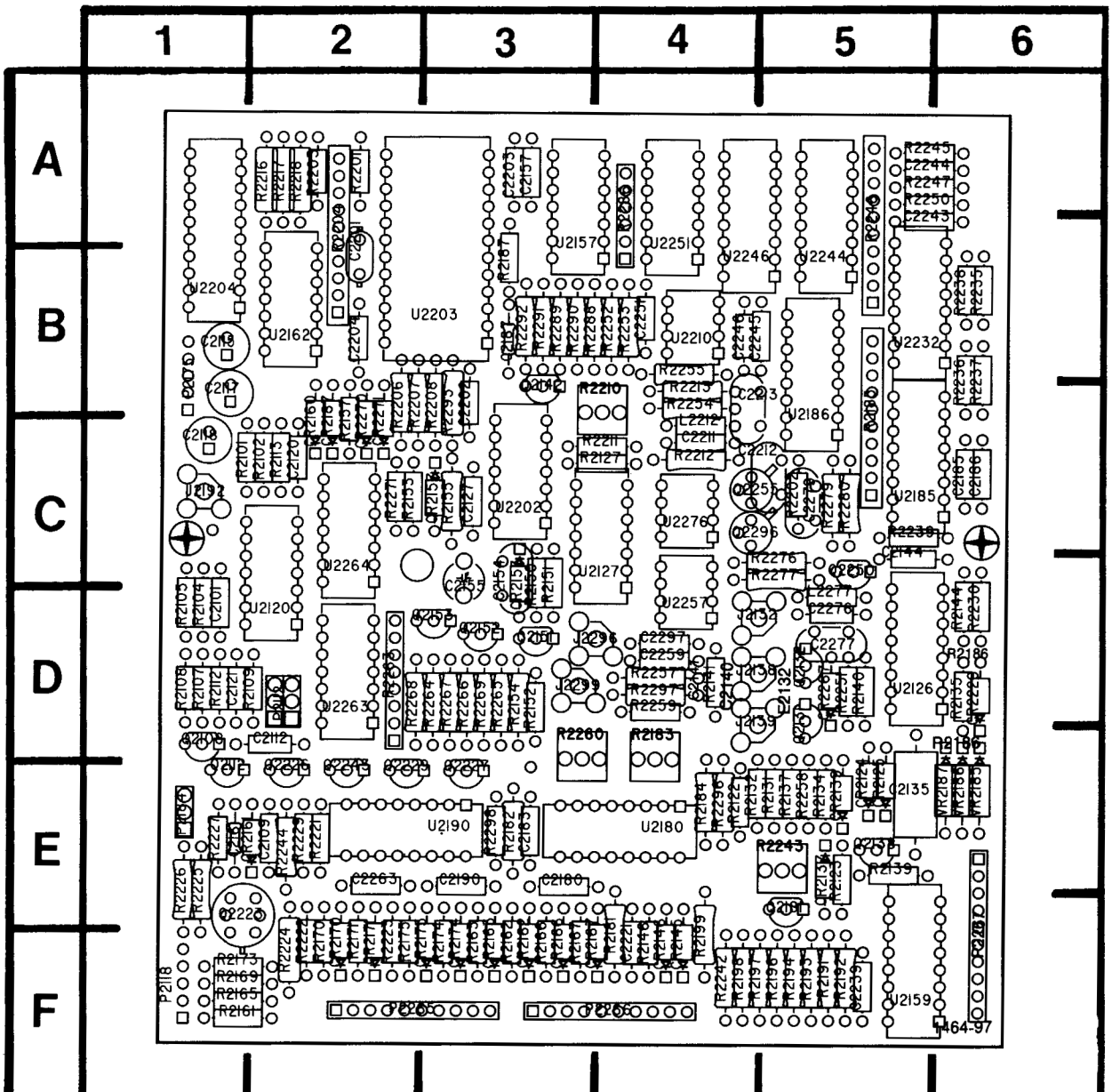
CRT CIRCUIT (11)



A21 Readout circuit board, SN B202462 & Up

CKT NO	GRID LOC
C2101	1D
C2109	2E
C2112	2D
C2115	1B
C2117	1B
C2118	1C
C2120	2C
C2121	1D
C2127	3C
C2135	5C
C2140	4D
C2141	4D
C2144	5C
C2154	3D
C2155	3D
C2157	3A
C2161	1E
C2180	3E
C2183	3E
C2185	6C
C2186	6C
C2187	3B
C2190	3E
C2201	2B
C2202	3C
C2203	3A
C2204	2B
C2211	4C
C2212	4C
C2213	4B
C2221	4F
C2239	4F
C2243	5A
C2244	5A
C2245	4B
C2246	4B
C2251	4B
C2259	4D
C2263	2E
C2276	5D
C2277	5D
C2279	5C
C2297	4D

CKT NO	GRID LOC
CR2124	5E
CR2125	5E
CR2137	5E
CR2139	5E
CR2145	4F
CR2146	4F
CR2153	3D
CR2157	3C
CR2160	2C
CR2161	1E
CR2162	3F
CR2163	3F
CR2166	3F
CR2167	4F
CR2170	2F
CR2171	2F
CR2174	3F
CR2175	3F
CR2187	2C
CR2229	6D
CR2267	5D
CR2270	2C
CR2271	2C
J2132	4D
J2138	4D
J2139	4D
J2192	1C
J2296	4D
J2299	3D
L2212	4C
L2277	5D
P2112	2D
P2118	1F
P2175	1B
P2184	1E
P2265	2F
P2266	4F
P2267	6F

CKT NO	GRID LOC
Q2108	1D
Q2112	1E
Q2131	4D
Q2132	4D
Q2138	4E
Q2142	3B
Q2151	3D
Q2152	3D
Q2153	3D
Q2181	5E
Q2223	1E
Q2226	2E
Q2227	3E
Q2229	2E
Q2243	2E
Q2250	5C
Q2255	4C
Q2296	4C
R2101	1C
R2102	2C
R2104	1D
R2105	1D
R2107	1D
R2108	1D
R2109	1D
R2112	1D
R2113	2C
R2122	4E
R2123	5E
R2127	4C
R2131	5E
R2132	4E
R2134	5E
R2135	6D
R2137	5E
R2139	5E
R2140	5D
R2141	4D
R2144	6D
R2146	4F
R2150	3D
R2151	3D

CKT NO	GRID LOC
R2152	3D
R2153	2C
R2154	3D
R2155	3C
R2157	2C
R2161	1F
R2162	3F
R2163	3F
R2165	1F
R2166	3F
R2167	3F
R2169	1F
R2170	2F
R2171	2F
R2173	1F
R2174	3F
R2175	2F
R2181	4F
R2182	3E
R2183	4D
R2184	4E
R2185	5C
R2187	3B
R2191	5F
R2192	5F
R2193	5F
R2194	5F
R2196	5F
R2197	4F
R2198	4F
R2199	4F
R2201	2A
R2202	5C
R2203	2A
R2204	2A
R2206	2C
R2207	2C
R2208	3C
R2210	4B
R2211	4C
R2212	4C
R2213	4B

CKT NO	GRID LOC
R2216	2A
R2217	2A
R2218	2A
R2221	2E
R2222	2F
R2223	2F
R2224	2F
R2225	1E
R2226	1E
R2227	1E
R2229	2E
R2230	6D
R2235	6B
R2236	6B
R2237	6B
R2238	6B
R2239	5C
R2242	4F
R2243	5E
R2244	2E
R2245	5A
R2246	5A
R2247	5A
R2250	5A
R2251	5D
R2252	4B
R2253	4B
R2254	4B
R2255	4B
R2257	4B
R2258	5E
R2259	4D
R2260	3D
R2263	2D
R2264	3D
R2265	3D
R2266	3D
R2267	3D
R2268	2D
R2269	3D
R2271	2C
R2276	2C
R2277	2C

CKT NO	GRID LOC
R2279	2C
R2280	2C
R2286	4A
R2288	3B
R2289	3B
R2290	3B
R2291	3B
R2292	3B
R2293	3B
R2296	4E
R2297	4D
R2298	3E
U2120	3D
U2126	5D
U2126	4C
U2157	3B
U2159	5F
U2162	2B
U2180	4E
U2185	5C
U2186	5C
U2190	3E
U2202	3C
U2203	3B
U2204	1B
U2210	4B
U2232	5B
U2244	5B
U2246	4B
U2251	4B
U2257	4D
U2263	2D
U2264	2C
U2276	4C
VR2185	6E
VR2186	6E
VR2187	6E

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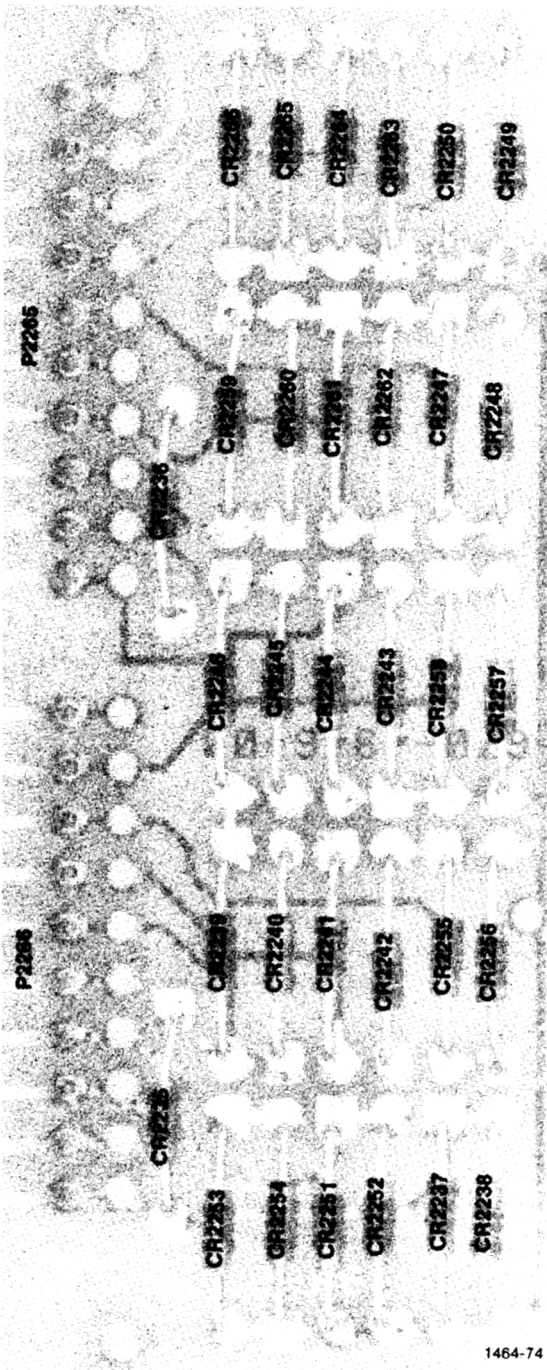

A22 Readout Protection #1 circuit board, SN B11000 & Up.

READOUT SINGLE SHOT FROM J1062 (8) OR J1149 (2)

HOLD OFF GATE

READOUT MODE

GATE TRIG

FREE RUN

FROM P100 (3)

READOUT INTENSITY FROM P14-5 (3)

FROM P13 (3)

ROW ANALOG DATA

FROM P11 (3)

FORCE READOUT

COLUMN ANALOG DATA

A22 PROTECTION BOARD

U2126 TIMER

U2180 ROW DATA SWITCH

U2190 COLUMN DATA SWITCH

U2159 TIMESLOT COUNTER

TIMESLOT PULSE LINES FROM U2159

U2232 ZEROS LOGIC & MEMORY

U2185 ROW DECODER

U2244 COLUMN

Z AXIS INHIBIT TO J13 (4)

Z READOUT TO J1802 (11)

X-Y INHIBIT TO J18 (1)

STROBE TO U2232-15

HORIZ CHARACTER DATA TO U2276-2

VERT SEPARATION

Y READOUT TO J104 (6)

X READOUT TO J850 (7)

HORIZ CHARACTER DATA

TO P12 (3)

TYPE	+15V	-15V
TL072	8	4
	+5V	GND
2732	24	12
7402	14	7
74LS08	14	7
7417	14	7
74LS33	14	7
74LS147	16	8
74LS273	20	10
74LS393	14	7
74LS74	14	7

A21 READOUT SYSTEM BOARD

READOUT SYSTEM (12)

SN B202462-UP

R7903

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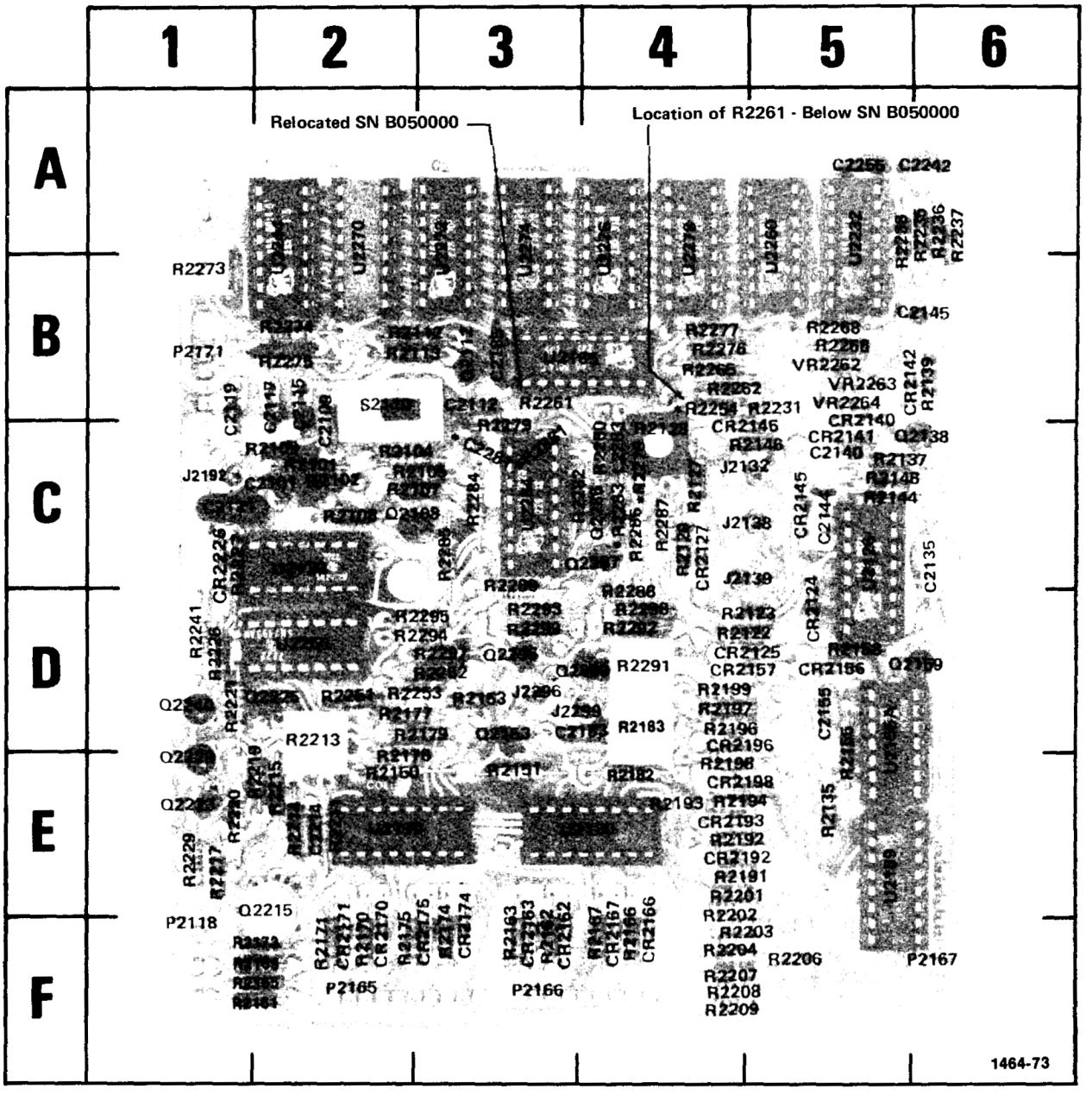
ADD JUN 1986



*See Parts List for serial number ranges.

A21 Readout circuit board, SN B202461 & Below.

CKT NO	GRID LOC
C2101	2C
C2109	2B
C2112	3B
C2115	2B
C2117	2B
C2119	1B
C2121	1C
C2135	6C
C2140	5C
C2145	6B
C2155	5D
C2183	3D
C2185	3B
C2214	2E
C2242	6A
C2255	5A
C2281	3C
CR2124	5D
CR2125	5D
CR2127	4C
CR2140	5B
CR2141	5C
CR2142	5B
CR2145	5C
CR2146	5C
CR2156	5D
CR2157	5D
CR2162	3F
CR2163	3F
CR2166	4F
CR2167	4F
CR2170	
CR2171	2F
CR2174	3F
CR2175	3F
CR2192	5D
CR2193	4E
CR2196	4D
CR2198	4E
CR2226	1C
J1075	1C
J2132	4C
J2138	5C
J2139	5C
J2192	1C
J2296	4D
J2299	3D
L2283	4C
P2118	1F
P2165	2F
P2166	3F
P2167	6F
P2171	1B
Q2108	2C
Q2112	3B
Q2138	6C
Q2153	3D
Q2159	6D
Q2215	2E
Q2223	1E
Q2225	2D
Q2229	1E
Q2240	1D
Q2286	4C
Q2287	4C
Q2296	3D
Q2299	3D
S2110	2B
R2101	2C
R2102	2C
R2104	2C
R2105	2C
R2107	2C
R2108	2C
R2109	2C
R2112	2B
R2113	2B
R2122	5D
R2123	5D
R2127	4C
R2128	4C
R2129	4C
R2135	5E
R2137	5C
R2139	6B
R2144	5C
R2146	5C
R2148	5C
R2150	2E
R2151	3E
R2153	3D
R2155	5E
R2158	5D
R2161	2F
R2162	3F
R2163	3F
R2165	2F
R2166	4F
R2167	4F
R2169	2F
R2170	2F
R2171	2F
R2173	2F
R2174	3F
R2175	2F
R2177	2D
R2178	2E
R2179	2D
R2182	4E
R2183	4D
R2191	5E
R2192	4E
R2193	4E
R2194	4E
R2196	4D
R2197	4D
R2198	4E
R2199	4D
R2201	5E
R2202	5E
R2203	5F
R2204	4F
R2206	5F
R2207	4F
R2208	4F
R2209	4F
R2211	2E
R2213	2D
R2214	2E
R2215	2E
R2217	1E
R2220	1E
R2221	1D
R2226	1D
R2227	1C
R2229	1E
R2231	5B
R2235	6A
R2236	6A
R2237	6A
R2238	
R2251	2D
R2252	3D
R2253	2D
R2254	4B
R2261	3B
R2262	4B
R2265	4B
R2266	5B
R2268	5B
R2273	1A
R2274	2B
R2275	2B
R2276	4B
R2277	4B
R2278	4C
R2279	3C
R2280	4C
R2281	3C
R2282	3C
R2283	4C
R2284	3C
R2285	3C
R2286	4C
R2287	4C
R2288	4D
R2289	3C
R2291	4D
R2292	4D
R2293	3D
R2294	3D
R2295	3D
R2297	3D
R2298	4D
R2299	3D
U2120	2C
U2126	5C
U2155A	5D
U2159	5E
U2180	4E
U2185	3B
U2190	2E
U2232	5A
U2244	2A
U2250	2D
U2260	5A
U2270	2A
U2272	3A
U2274	3A
U2276	4A
U2278	4A
U2284	3C
VR2262	5B
VR2263	5B
VR2264	5B

ADD JUN 1986

VOLTAGES AND WAVEFORMS

The voltages and waveforms shown on this diagram were obtained by using the recommended test equipment and test set-ups listed below.

RECOMMENDED TEST EQUIPMENT

ITEM	SPECIFICATIONS	RECOMMENDED TYPE
Oscilloscope	Frequency response DC to 75 MHz Deflection factor 5 mV to 5 V/Div Input impedance 1 MΩ 20 pF Sweep rate 500 ns	Tektronix 7704A equipped with 7A15A Amplifier and 7B50A or 7B80 Time Base.
Probe	Fast rise 10X attenuation probe compatible with the vertical amplifier of the test oscilloscope.	Tektronix P6053B, or equivalent.
Voltmeter (Non-Loading Digital Multimeter)	Input impedance 10 mΩ Range 0—500 V have readout system).	Tektronix DM 501A with power module, Digital Multimeter (test oscilloscope must

Voltage Measurements

Voltage measurements on this diagram were made under the following conditions:

Set front panel controls (knob type) to mid-range.

Set VERT MODE for LEFT.

Set TRIG SOURCE for VERT MODE.

No plug-in units are installed.

Voltmeter common is connected to chassis ground.

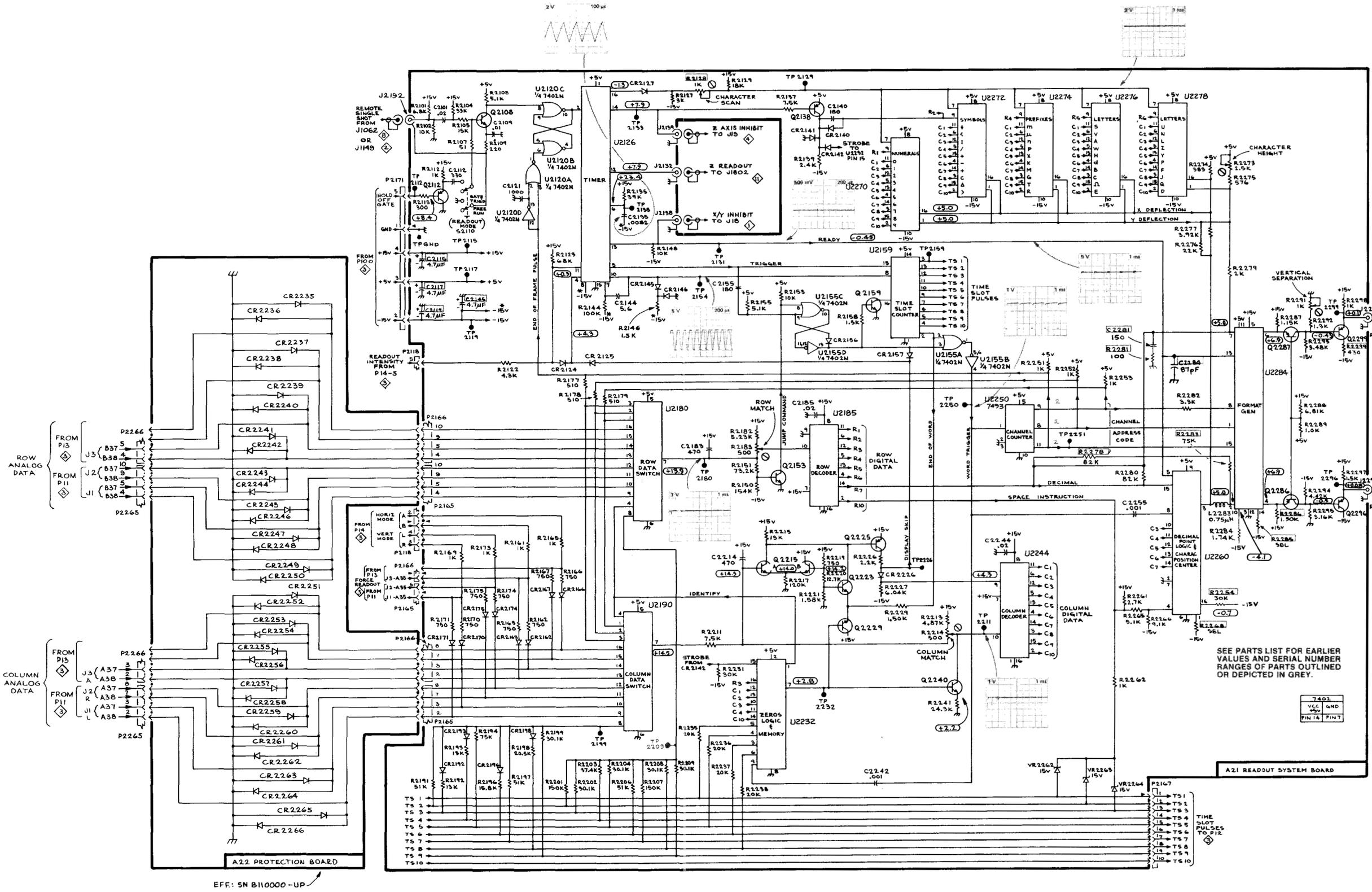
Waveforms

Waveforms shown on this diagram were obtained under the following conditions:

R7903 OSCILLOSCOPE UNDER TEST. Front panel controls are set the same as for voltage measurements. A 7A16A Vertical plug-in unit and a 7B80 Time Base unit are installed in the mainframe under test. A 4 Volts calibration signal is applied to the vertical amplifier. The vertical amplifier is set for 1 V/Division deflection centered on the CRT. The 7B80 is set for free running sweep, 1 ms/Division sweep rate. Readout information is being displayed.

TEST OSCILLOSCOPE. The test oscilloscope is internally triggered, with the vertical deflection indicated on the waveform photo. The test oscilloscope vertical input is AC coupled.

Waveforms shown are actual waveform photographs taken with a Tektronix Oscilloscope Camera System and Projected Graticule. Vertical deflection factor shown on waveform is the actual deflection factor from the probe tip. Voltages and waveforms on the diagrams (shown in grey) are not absolute and may vary between instruments because of component tolerances, internal calibration, or front-panel settings. Readouts are simulated in larger-than-normal type.



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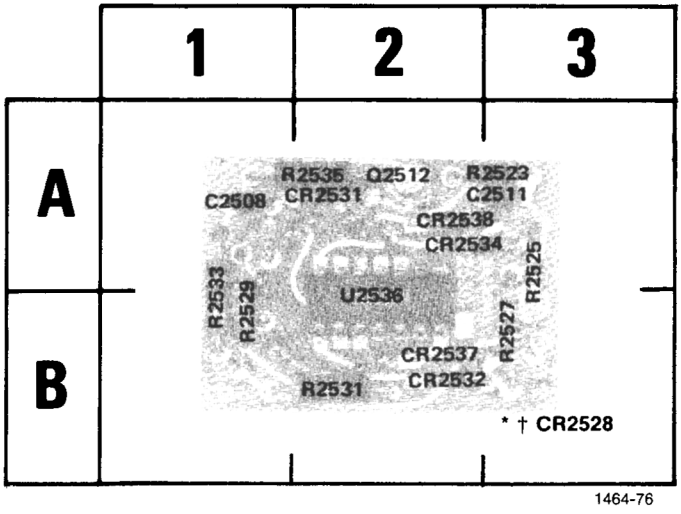
READOUT SYSTEM 12
SN B202461 + Below



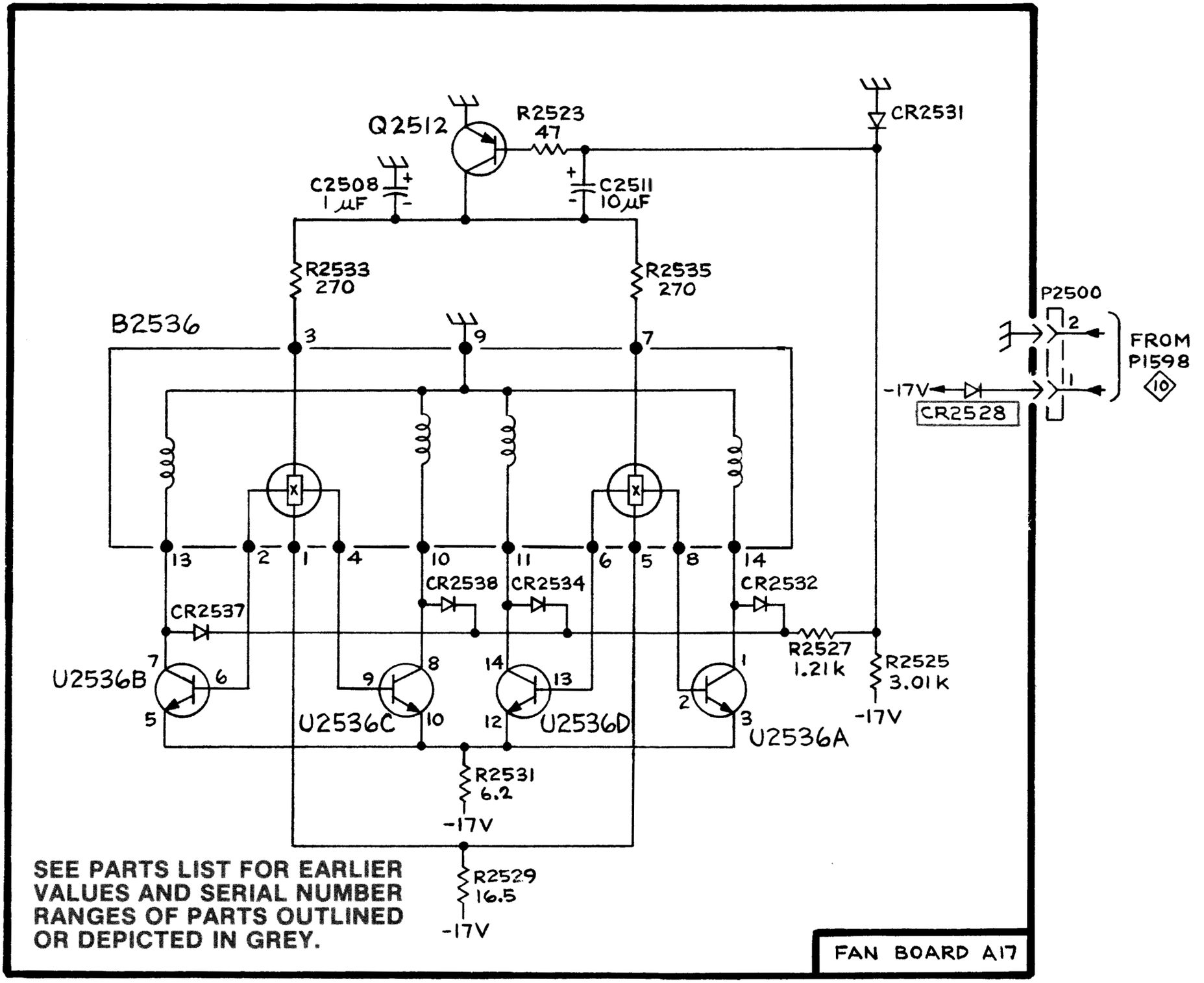
*See Parts List for serial number ranges.

REV JUN 1986

A17 Fan Motor circuit board. SN B209999 & Below

CKT NO	GRID LOC
C2508	1A
C2511	3A
CR2531	2A
CR2532	2B
CR2534	2A
CR2537	2B
CR2538	2A
Q2512	2A
R2523	3A
R2525	3A
R2527	3B
R2529	1B
R2531	2B
R2533	1B
R2535	2A
U2536	2B

† ADDED TO BACK OF BOARD

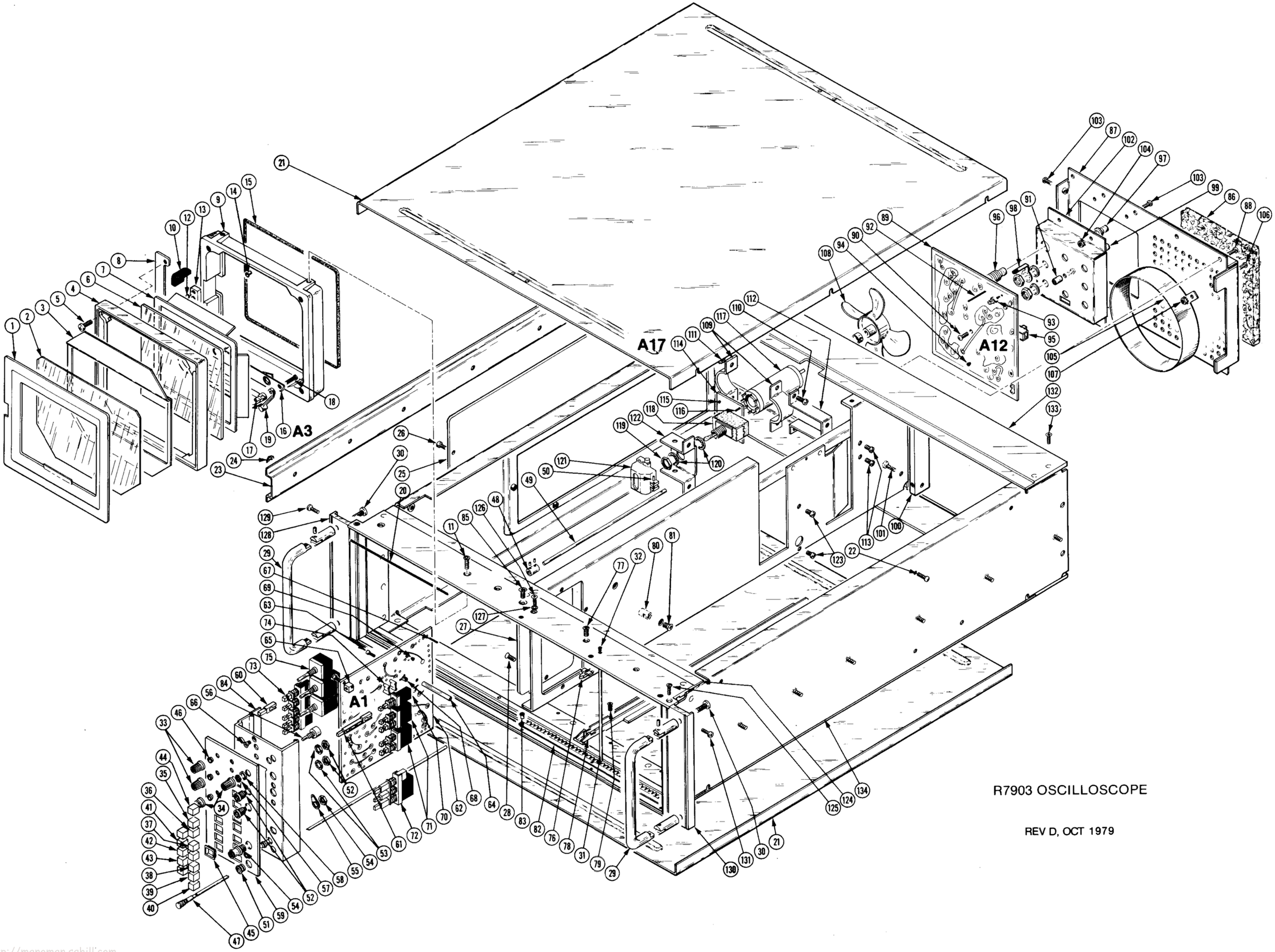


R7903

1464-77
REV. D, JUN 1986

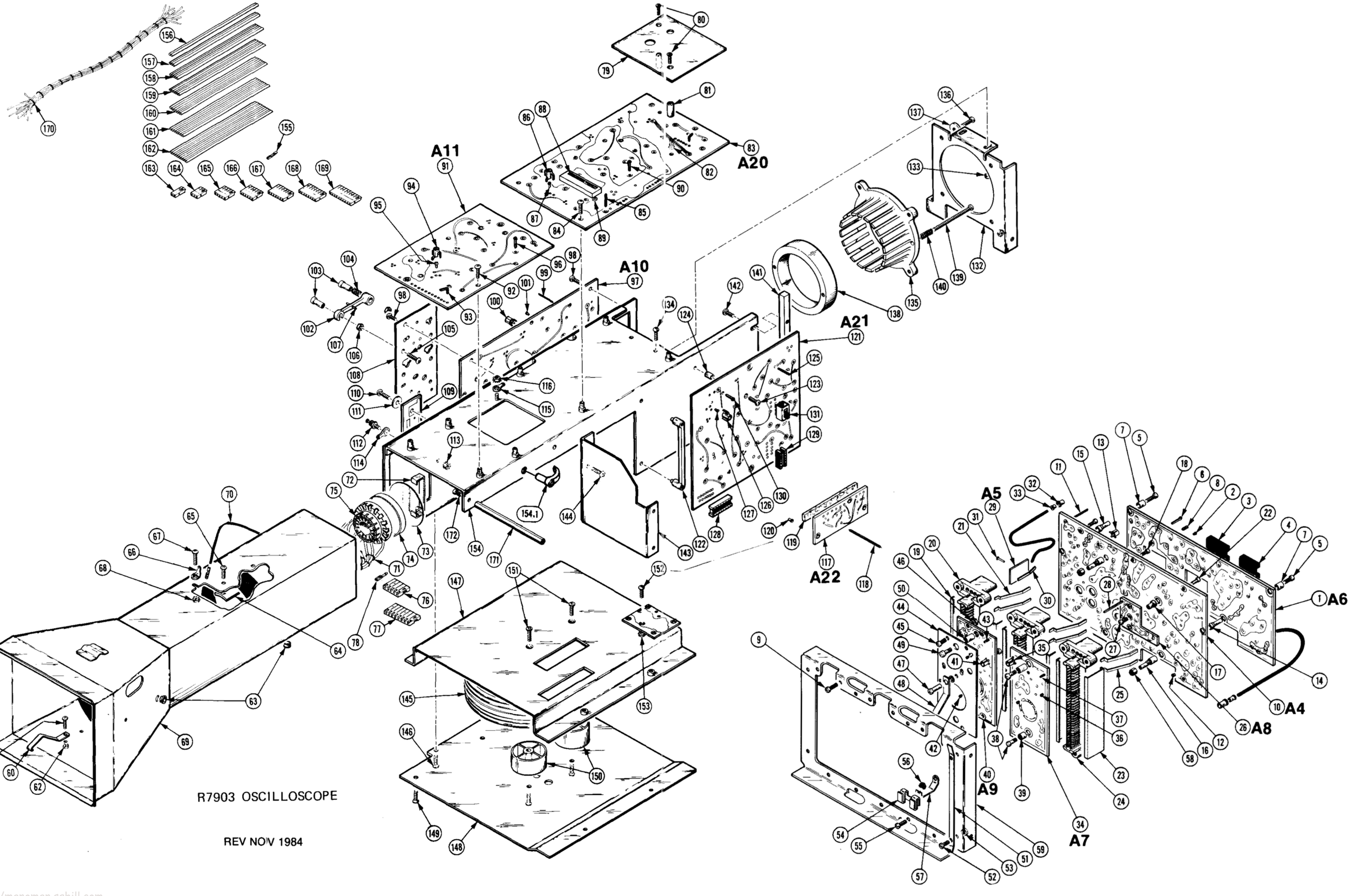
FAN CIRCUIT 13

SN B209999 + Below



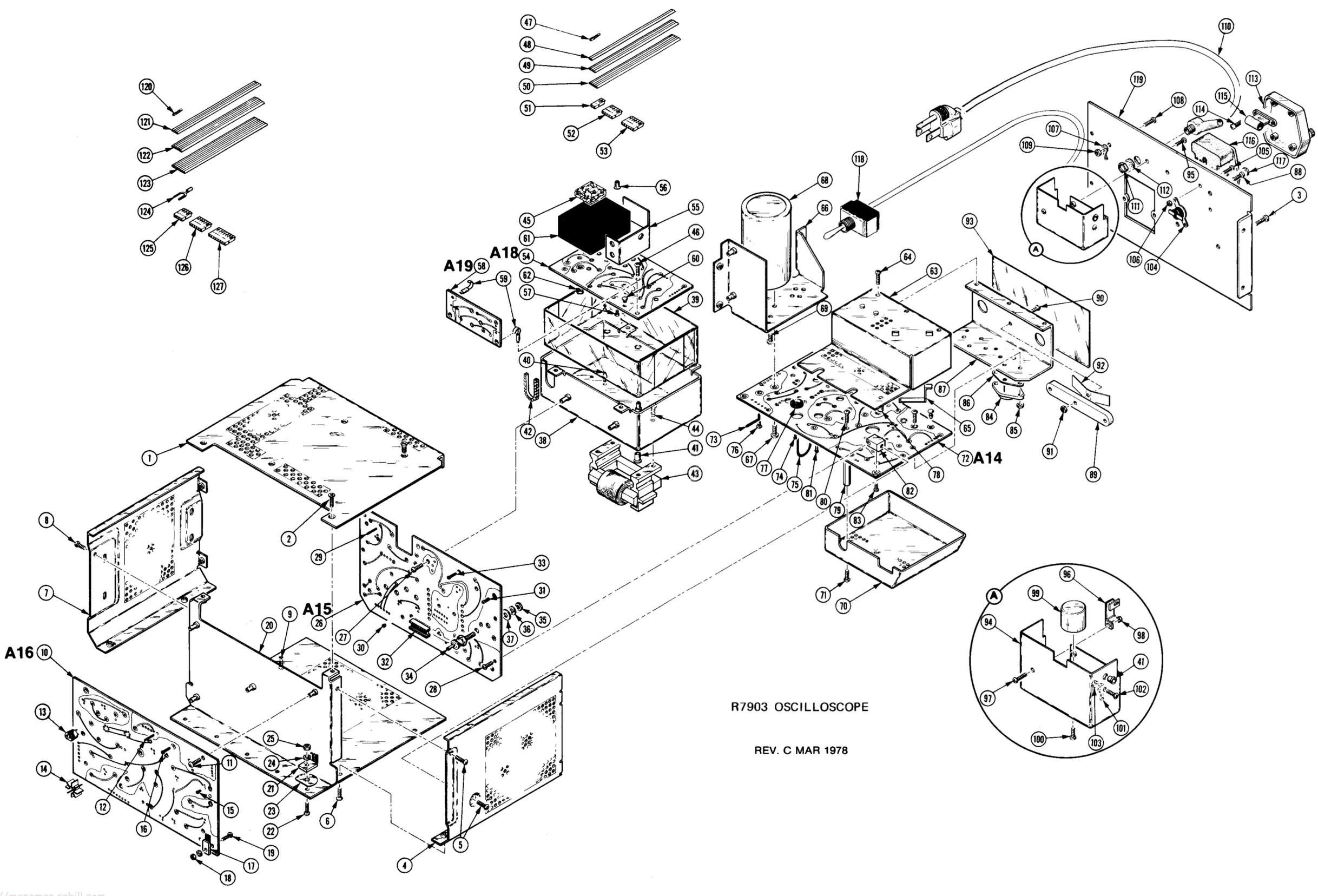
R7903 OSCILLOSCOPE

REV D, OCT 1979



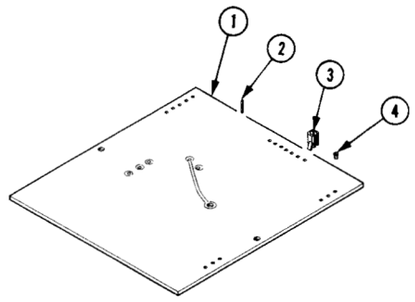
R7903 OSCILLOSCOPE

REV NOV 1984

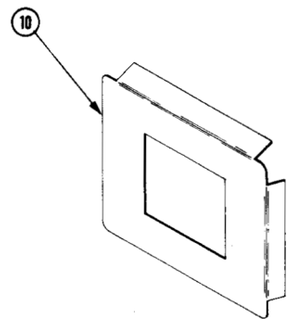


REPLACEABLE MECHANICAL PARTS FOR FACTORY INSTALLED OPTIONS

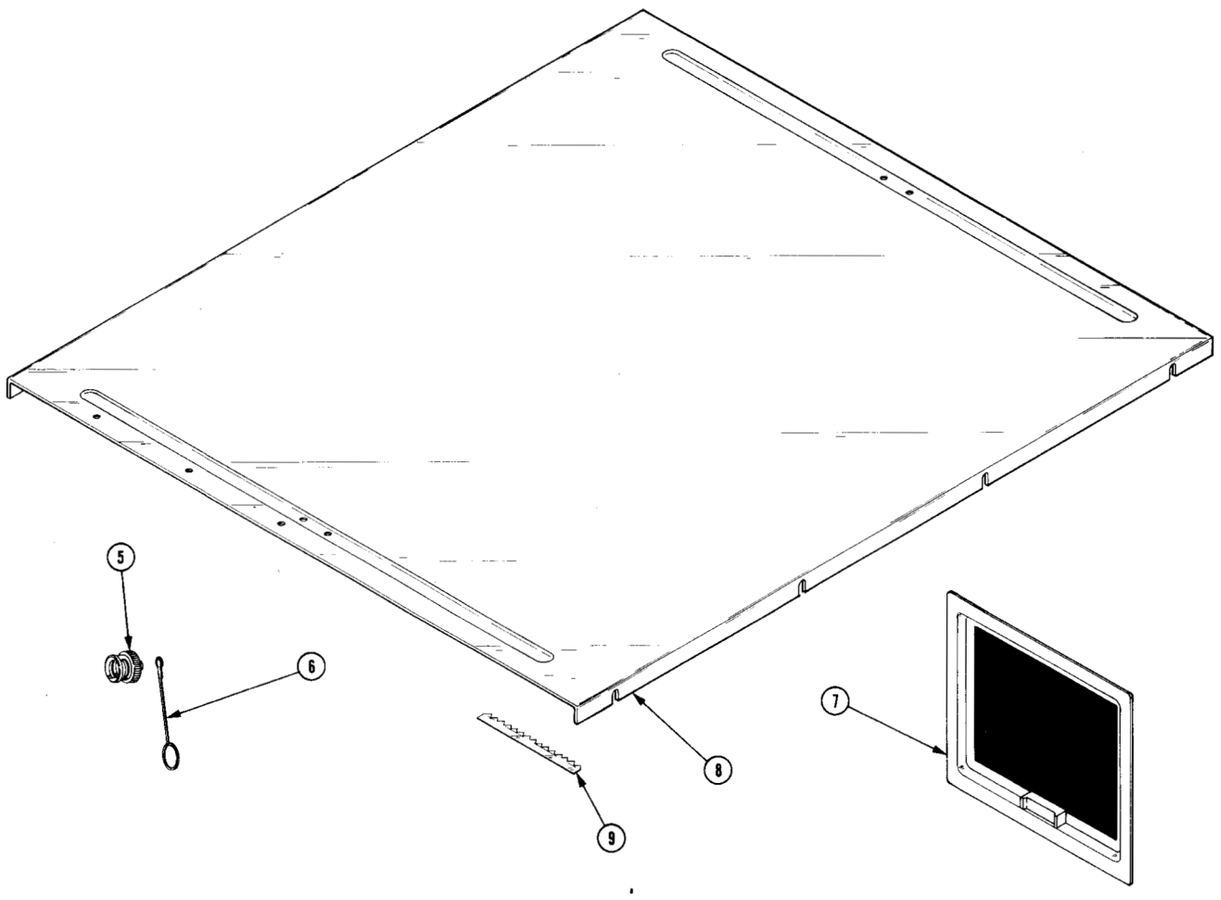
OPTION 1



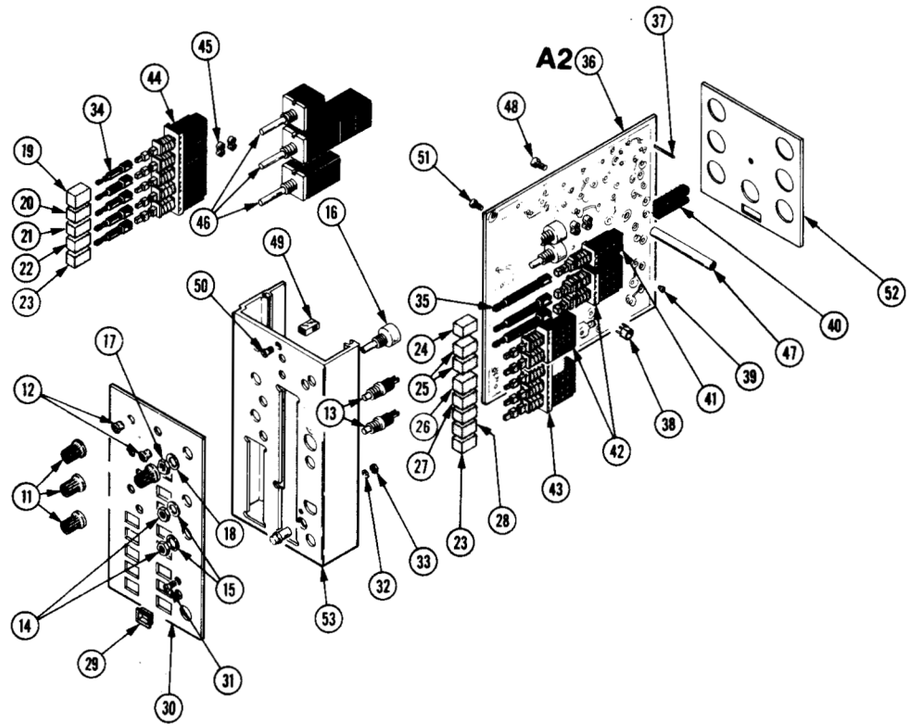
OPTION 4



OPTION 3



OPTION 10



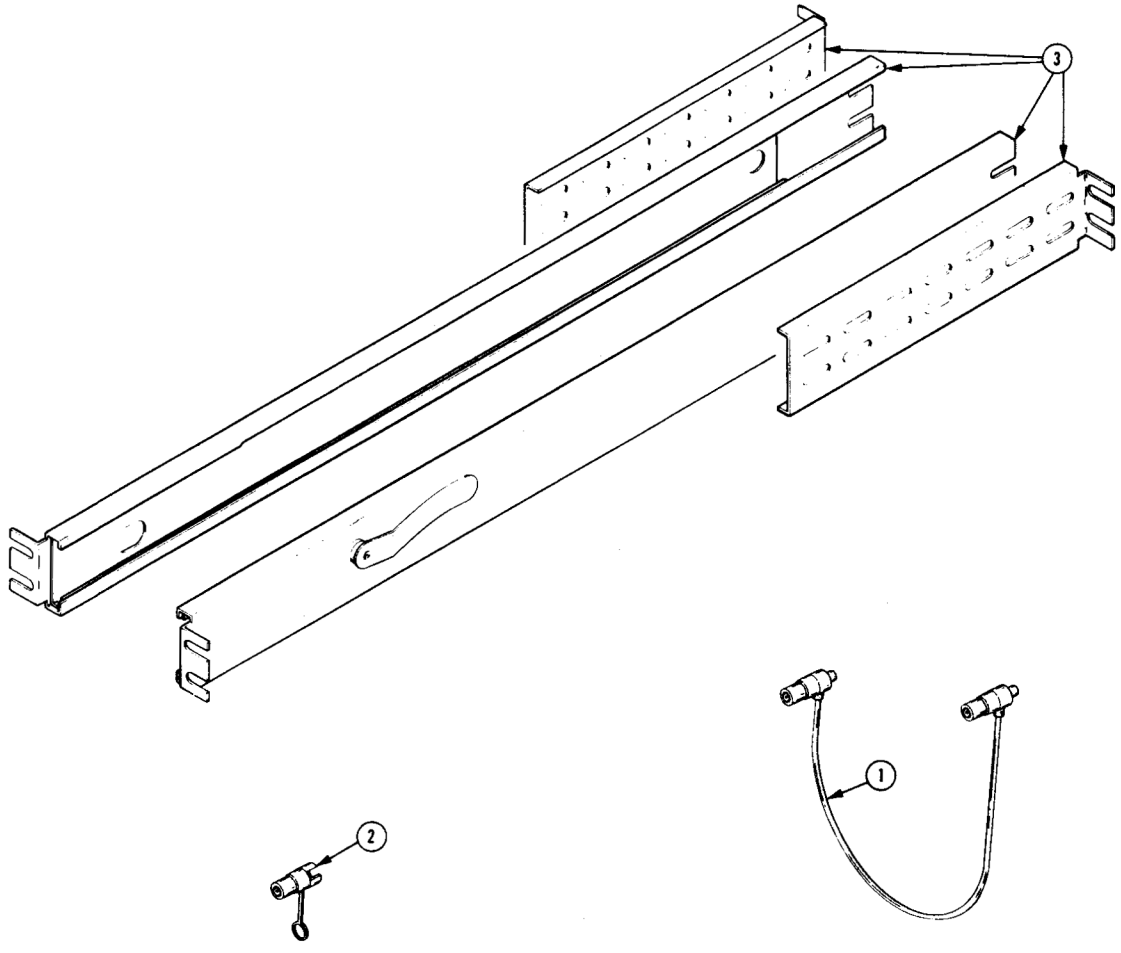


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
-1	012-0087-00			2		LEAD ELECTRICAL:18.0 L RED,BNC TO BNC	80009	012-0087-00
-2	012-0092-00			1		ADAPTER,CONN:FEMALE BNC TOEXP STUD	80009	012-0092-00
-3	351-0314-00	B010100	B181319	1		SLIDE,DWR,EXT:22.0 X 1.69,PAIR	80009	351-0314-00
	351-0314-01	B181320		1		SLIDE,DWR,EXT:W/CLOSED MOUNTING SLOTS	80009	351-0314-01
	016-0099-00			1		HDW KIT,ELEK EQ:RACKMOUNT HDW	80009	016-0099-00
	070-1462-00			1		MANUAL:OPERATOR'S	80009	070-1462-00
	070-1464-00			1		MANUAL:SERVICE	80009	070-1464-00