



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

1474

**NTSC COLOR
SYNC GENERATOR**

INSTRUCTION MANUAL

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


070-2097-00
Product Group 20

Serial Number _____

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WARNING




THE REMAINING PORTION OF THIS TABLE OF CONTENTS LISTS SERVICING AND SETUP INFORMATION. THIS INFORMATION IS TO BE USED BY QUALIFIED PERSONNEL ONLY. TO AVOID ELECTRICAL SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN DESCRIBED IN THE OPERATOR'S INFORMATION UNLESS QUALIFIED TO DO SO.

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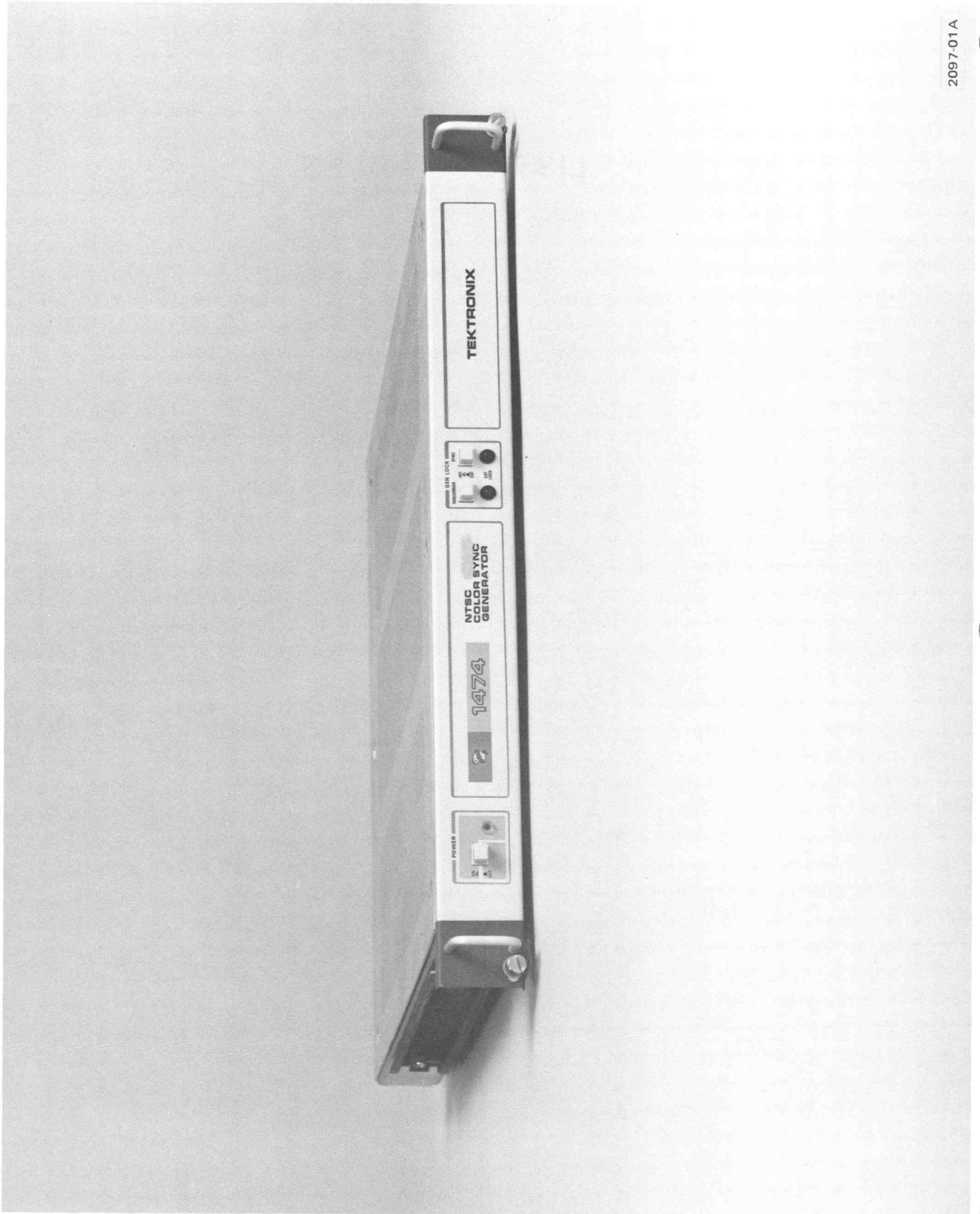
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The Tektronix 1474 NTSC Color Sync Generator.

PART I

OPERATOR'S INFORMATION

INTRODUCTION

This manual is divided into two parts for safety purposes. Part I should be used by operating and service personnel. Part II is to be used by qualified service personnel only since servicing exposes personnel to hazardous primary voltages.

UNPACKING AND INCOMING INSPECTION

Safety Summary

This portion of the manual contains safety information which the operator and service technician must follow to avoid hazardous primary voltages to ensure safe operation of this instrument.

WARNING information in this manual is intended to protect personnel from hazardous primary voltages.

CAUTION information is intended to protect the instrument from damage.

The following are general safety precautions that must be observed during all phases of operation.

WARNING

To reduce the electrical shock hazard, the instrument chassis must be properly grounded. Refer to the following for more information.

The 1474 Generator operates from a single-phase power source with one of the current-carrying conductors (neutral conductor) at ground (earth) potential. Operation from power sources where both current-carrying

conductors are live with respect to ground (such as phase-to-phase on a 3-wire system) is not recommended, since only the line conductor has over-current (fuse) protection within the instrument.

The 1474 Generator has a 3-wire cord with a 3-terminal polarized plug for connection to the power source and earth ground. The earth ground terminal of the plug is directly connected to the metal parts of the instrument. For electric-shock protection, insert the power plug in a mating outlet with an earth ground contact. Table 1-1 gives the conductor color codes of power cords used in Tektronix instruments.

If a 3- to 2-wire adapter is used to connect the 1474 to a 2-wire ac power system, be sure to connect the ground lead of the adapter to a conductor that connects to earth ground. Failure to complete the grounding system may allow the metal parts of this instrument to be elevated above ground potential and create a shock hazard.

TABLE 1-1

Power Cord Color Identification

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

Unpacking and Incoming Inspection—1474

WARNING

Electrical shock hazards are present inside this instrument. Only qualified service personnel should remove the instrument cover.

Damage Inspection

After carefully removing the 1474 Generator from the shipping carton, inspect the instrument for possible damage incurred during shipment. Report any shortage or damage to the carrier. Refer to the next topic, Accessories List, for use as a check-off list for the accessories.

Save the shipping carton in case you need it to repackage the instrument for shipment.

Accessories List

The following items, including this instruction manual, are shipped in the same carton as the instrument:

Qty.	Description	Tektronix Part No.
1	1474 Instruction Manual	070-2097-00
1	Track, slide, one pair with hardware	351-0331-03

NOTE

The chassis sections (Tektronix Part No. 351-0104-03) are factory-mounted on the left and right sides of the instrument.

Instrument Repackaging for Shipment

If the instrument is to be shipped to a Tektronix Service Center or to the factory for service or repair, attach a tag showing:

1. Owner with complete address and the name of an individual at your firm that can be contacted.
2. Instrument serial number.
3. Description of the service required.

Save and re-use the carton in which your instrument was shipped (see Fig. 1-1). If the original packaging is unfit for use or not available, repackage the instrument as follows:

1. Obtain a corrugated cardboard carton of no less than six inches more than the instrument dimensions. The carton test strength should be 275 pounds.

2. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.
3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and instrument, allowing three inches on all sides.
4. Seal carton with shipping tape or industrial stapler.

Checking Instrument Operation

Before connecting the instrument to a power source (also referred to as the "mains"), be sure to look at the rear panel to find the operating voltage for which the instrument has been set.

CAUTION

You can damage your instrument if you operate it from a 240 V ac line voltage when the instrument has been set for 120 V ac only operation.

Any changes must be made by qualified service personnel only. Instructions for changing the operating voltage, fuse, and operating modes are provided in Part II—Service & Setup Information portion of this manual.

Checking the 1474 Output Signals. To check out the instrument operation for incoming inspection, use the information in the "Sync Generator Output Waveforms," in Section 2 of this manual. The waveforms shown in Fig. 9-1 can be used as a reference to determine that your instrument is generating the proper signals or not.

Checking 1474 Gen Lock Operation. Connect composite video from a color VTR (Video Tape Recorder) to one of the 1474 GEN LOCK LOOP input connectors. Connect a 75-ohm termination to the other GEN LOCK loop-through connector.

With equipment turned on and the VTR operating, set the 1474 GEN LOCK SUBCARRIER and SYNC pushbuttons to EXT. The 1474 GEN LOCK indicator lamps should be illuminated, indicating a full-color, gen-locked condition.

NOTE

If the GEN LOCK SUBCARRIER lamp is not on, a qualified service person should adjust the VTR Subcarrier Reference Oscillator so that the frequency is centered within the lock-in range of the 1474. The lock-in range is 3.579545 MHz \pm 200 Hz.

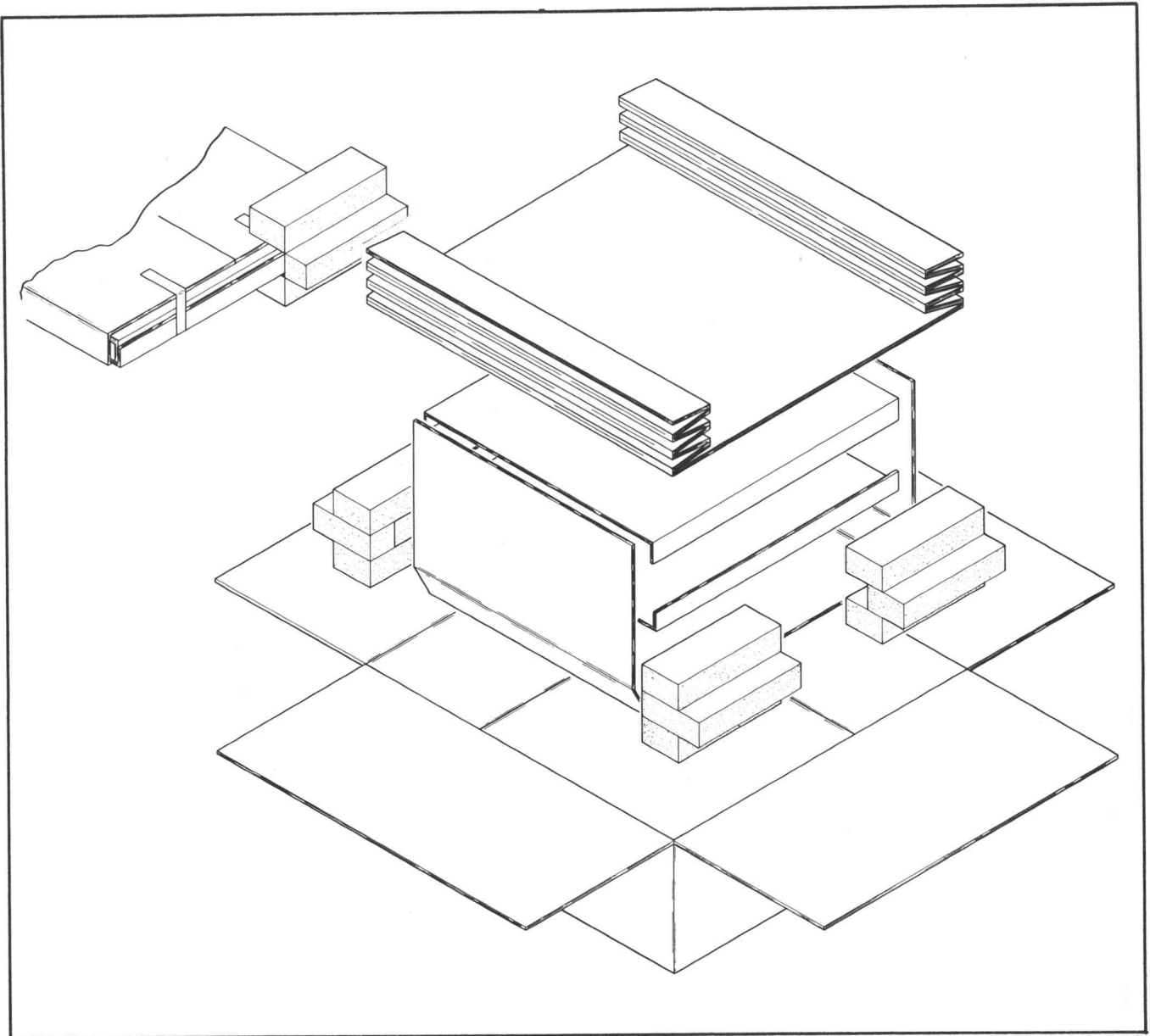
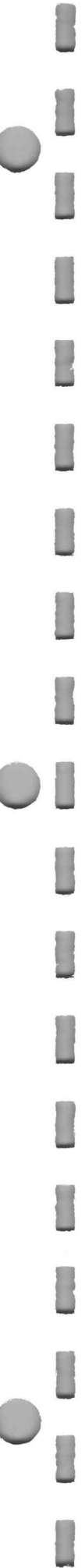


Fig. 1-1. Repackaging the instrument for shipment.



OPERATING INSTRUCTIONS AND APPLICATIONS

PRODUCT DESCRIPTION

The 1474 NTSC Color Sync & Test Signal Generator is a compact, solid-state unit. This instrument is designed as a full color, gen-locked sync generator. The main features of the 1474 are as follows:

- Full Color Sync Generator with Gen Lock
- Locks to Most Helical Scan Video Tape Recorders
- Compact (Only 3-1/2 Inches High)
- Sync and Timing Signals
 - Comp Sync (Two Outputs)
 - Comp Blanking (Two Outputs)
 - Vertical Drive
 - Horizontal Drive
 - Burst Gate
 - Subcarrier (Two Outputs)
 - Black Burst
- Phasing Control on Four Signals
 - SUB 1
 - SUB 2
 - Generator to Gen Lock (MASTER)
 - SUB 3 and BLACK BURST

Phasing control of SUB 1 and SUB 2 are adjustable by means of screwdriver adjustments through the top panel of the instrument. MASTER SUBCARRIER PHASE is adjustable by a front-panel screwdriver adjustment, and BLACK BURST phasing is set by an internal screwdriver adjustment. Range of the various adjustments is via a plug jumper selector (internally located), and gain of SUB 1 and SUB 2 signals is also set by internal adjustment.

All controls, except the Generator to Gen Lock (MASTER), are variable resistor adjustments with a range of approximately 120 degrees, and a jumper arrangement giving a 360 degree shift in 90 degree increments. The MASTER phase control is a goniometer with a continuous range of 360 degrees.

Also available, via a rear-panel bnc connector, is the capability of remotely controlling the MASTER phase. This is achieved by connecting a 10-kilohm potentiometer from the REMOTE MASTER connector to signal ground. This control will allow a phase-shift range of approximately 100 degrees.

SYNC GENERATOR OUTPUT WAVEFORMS

Figure 9-1 (located in foldout pages) illustrates the sync signals generated by the 1474. The oscilloscope

waveforms show amplitude and waveshape of each signal generated. These waveforms can be used as a reference when verifying instrument performance. All signals are terminated into 75 ohms.

FUNCTION OF FRONT PANEL PUSHBUTTONS AND INDICATOR LIGHTS

This portion of the manual describes the function of the front panel pushbuttons and indicator lamps.

POWER Pushbutton

Controls application of ac mains voltage to the instrument.

POWER ON Light

Illuminates when the ac mains voltage is applied to the instrument, the POWER pushbutton is pressed in, and the fuse is good.

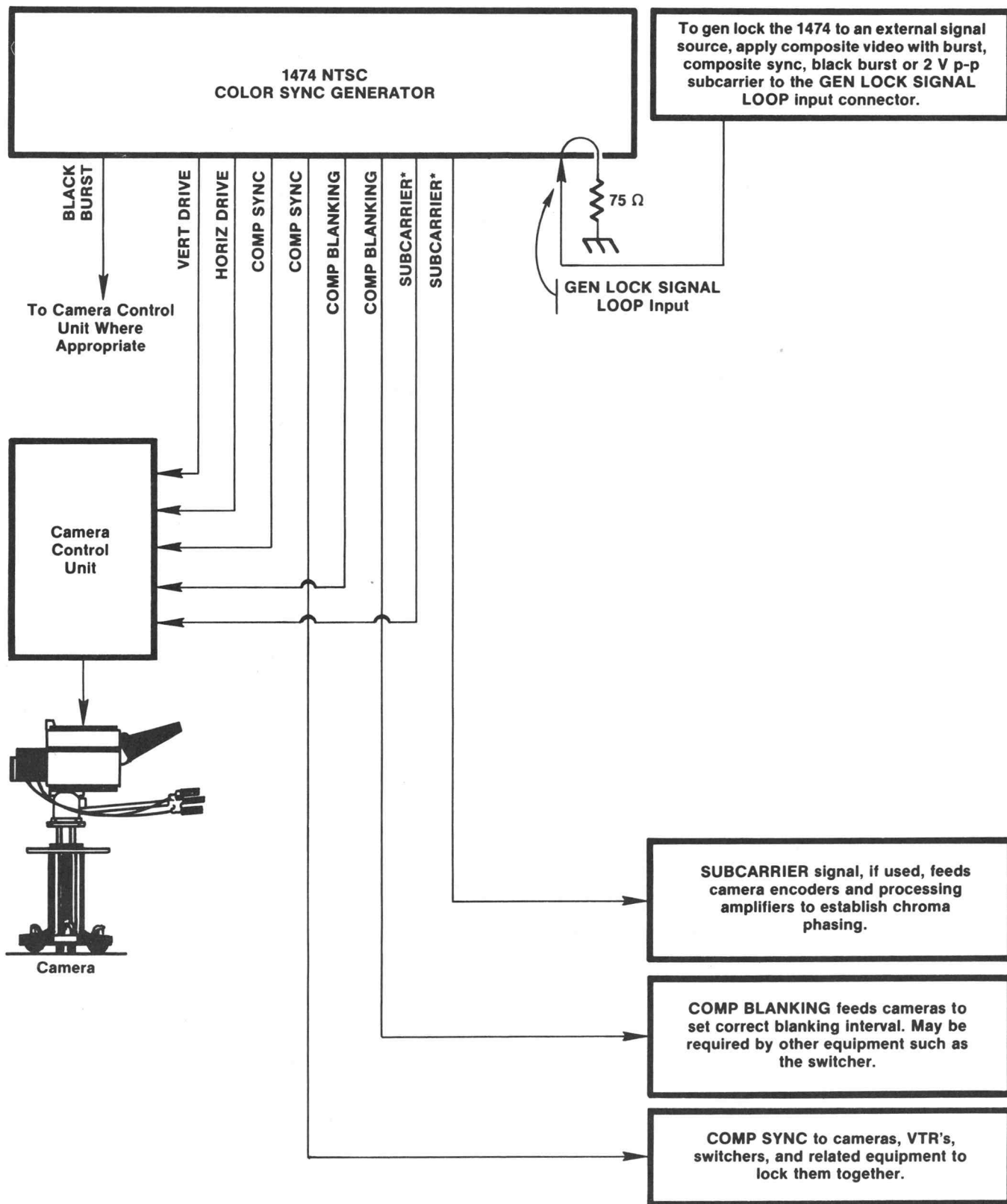
GEN LOCK Pushbuttons and Lights

In general, when the GEN LOCK SUBCARRIER and SYNC pushbuttons are set to INT, the 1474 operates as a master generator and the EXT LOCK indicator lights are off. This same condition applies when the pushbuttons are set to EXT and there is no signal, the signal is lost, or the signal amplitude is too low at the rear panel GEN LOCK SIGNAL LOOP connectors.

In EXT mode of operation, loss of sync from the composite video signal will automatically switch both sync and subcarrier to internal in the 1474 and both lights will turn off. Loss of just burst will switch only the subcarrier to internal and remove burst from the signal at the BLACK BURST connector. The SUBCARRIER light will turn off and the SYNC light will remain on.

If 1.5 volts p-p or more of CW (Continuous Wave) subcarrier only is applied to the 1474 operating in the EXT mode, the internal subcarrier will gen lock to the external subcarrier. Then the sync and timing signals in the 1474 will be frequency-locked to both internal and external subcarrier. In this mode the SUBCARRIER light is on and the SYNC light is off.

If a 1 V to 4 V composite sync signal with no burst is applied to the 1474, internal sync will gen lock to external sync and the SYNC light will be on. Internal subcarrier, however, will not be gen locked and the SUBCARRIER light will be off.



*If the subcarrier signal is applied to more than one Camera Control Unit simultaneously, keep the cable lengths to each camera equal for proper phasing.

(2096) 2097-04

Fig. 2-1. Block diagram showing some typical applications for the 1474 Generator. All 1474 output signals in use must be terminated into 75 ohms.

BLOCK DIAGRAM FOR TYPICAL APPLICATIONS

Fig. 2-1 is a block diagram showing some typical applications for the signals generated by the 1474. Also, this illustration shows that the 1474 can be gen locked to an external signal if this signal is applied to the GEN LOCK SIGNAL LOOP connectors.

All signals should be terminated into 75 ohms to maintain proper signal amplitudes. Although the block diagram shows the signals being used simultaneously, this may not occur in actual practice.

REFERENCE BOOK AND PAMPHLET LIST

Since it is beyond the scope of this instruction manual to cover all possible applications for the 1474 Generator, further information can be obtained by referring to the books and pamphlets listed here.

Capital Radio Engineering Institute, "Principles and Standards of Television," McGraw-Hill, New York, 1965.

Capital Radio Engineering Institute, "The Synchronizing Generator I," McGraw-Hill, New York, 1965.

C.P. Oliphant and V.M. Ray, "Color TV Training Manual," Howard W. Sams and Co., Indianapolis, 1965.

C.W. Rhodes, "Measuring Distortions in the Television Signal," Tektronix, Inc., 1972.

James E. Coulter and James T. Carlson, "The Fundamentals, Distortion Measurements, and Operational Techniques of Television Video," Western Telecommunications, Inc., 1975.

L.C. Showalter, "Closed-Circuit TV for Engineers and Technicians," Howard W. Sams and Co., Indianapolis, 1959.

L.E. Weaver, "Television Measurements Techniques," Peter Peregrinus Ltd., London, 1971.

"Television Operational Measurements Video and RF for NTSC Systems," by Stu Rasmussen and Clifford B. Schrock, Tektronix, Inc., 1976.

"520A NTSC Vectorscope" Instruction Manual, Tektronix, Inc., Reprint Sept 1975.

"Picture Monitor Color Temperature Adjustment Using the Tektronix J16," Television Products Application Notes No. 7, REV 673, Tektronix, Inc., 1973.

"The Measurement of Signal Level with the 1480-Series of Waveform Monitors," Television Products Application Notes No. 11, Tektronix, Inc., 1974.



SPECIFICATION

Performance Conditions

The electrical characteristics are **valid only** if the 1474 is calibrated at an ambient temperature between +20°C and +30°C, and operated between 0°C and +50°C.

During storage and operation, relative humidity should not exceed 95% at 40°C.

ELECTRICAL CHARACTERISTICS

SYNC GENERATOR OUTPUTS

Characteristics	Performance Requirements
General Characteristics of Drive Signals	
Nominal Output Level into 75 Ω	
Subcarrier	2 V p-p.
All Other Drive Signals	-4 V.
Rise and Fall Times	140 ns nominal.
Drive Pulses	Digitally determined.
COMPOSITE SYNC Timing	All values are nominal. Measured between 50% amplitude points.
Horizontal Sync	
Duration of Pulse	4.8 μ s.
Line Period	63.6 μ s.
Equalizing Pulse	
Duration of Pulse	2.4 μ s.
Period	31.8 μ s.
Duration of First Equalizing Pulse Sequence	3 lines (6 equalizing pulses).
Duration of Second Equalizing Pulse Sequence	3 lines (6 equalizing pulses).

SYNC GENERATOR OUTPUTS (cont'd)

Characteristics	Performance Requirements	
Field Sync		
Interval between each Serration	29 μ s (2 intervals per line).	
Duration of one Serration	4.8 μ s (2 serrations per line).	
Duration of Sync Pulse	3 lines.	
Equalizing and Serrated Sync Pulse Sequence	6 equalizing pulses, 6 serrations, 6 equalizing pulses.	
COMPOSITE BLANKING		
Line Blanking Duration	11 μ s at 50% amplitude.	
Field Blanking Duration	21 lines.	
Field Period	16.7 ms.	
VERTICAL DRIVE		
Duration	9 lines.	
Field Period	16.7 ms.	
HORIZONTAL DRIVE		
Duration of Line Blanking	6.4 μ s at 50% amplitude.	
BURST GATE		
Duration	2.5 μ s at 50% amplitude.	
Delay from Line Sync	5.1 μ s.	
SUBCARRIER		
Frequency	3.579545 MHz \pm 10 Hz.	
BLACK BURST		
Composite Sync Amplitude Into 75 Ω	IRE ¹	Millivolts
	-40 IRE	286 mV
Setup Amplitude	7.5 IRE	53.6 mV
Burst Amplitude	40 IRE	286 mV
Burst Frequency	3.579545 MHz \pm 10 Hz (Internal Only). Can be locked to an external standard.	
Sync and Setup Timing	Same as Composite Sync and Blanking given on page 3-1.	

¹ IRE equals 7.14 millivolts.

SYNC GENERATOR OUTPUTS (cont'd)

Characteristics	Performance Requirements
BURST TIMING	
Delay from Line Sync	5.3 μ s.
Breezeway	0.5 μ s.
Duration of Envelope	2.5 μ s.

GEN LOCK SIGNAL LOOP INPUT

Characteristics	Performance Requirements
Horizontal Sync Lock Range	Approximately \pm 300 Hz.
Subcarrier Lock Range	Approximately \pm 200 Hz.
Gen Lock Input Signal Requirements	
Composite Video	1 V when loop-through connectors are externally terminated into 75 Ω .
Composite Sync	1 V to 4 V when loop-through connectors are externally terminated into 75 Ω .
Subcarrier	2 V p-p nominal

PHASE CONTROLS

Characteristics	Performance Requirements
PHASE CONTROL RANGE	
Generator to Gen Lock (MASTER) SUB 1, SUB 2 SUB 3 and BLACK BURST	Continuously 360° (Goniometer).
Potentiometer Range	Approximately 120°.
Internal Jumper Range	360° in 90° increments.
REMOTE MASTER	
(with 10 k Ω potentiometer)	0 to \geq 100°.

POWER SOURCE

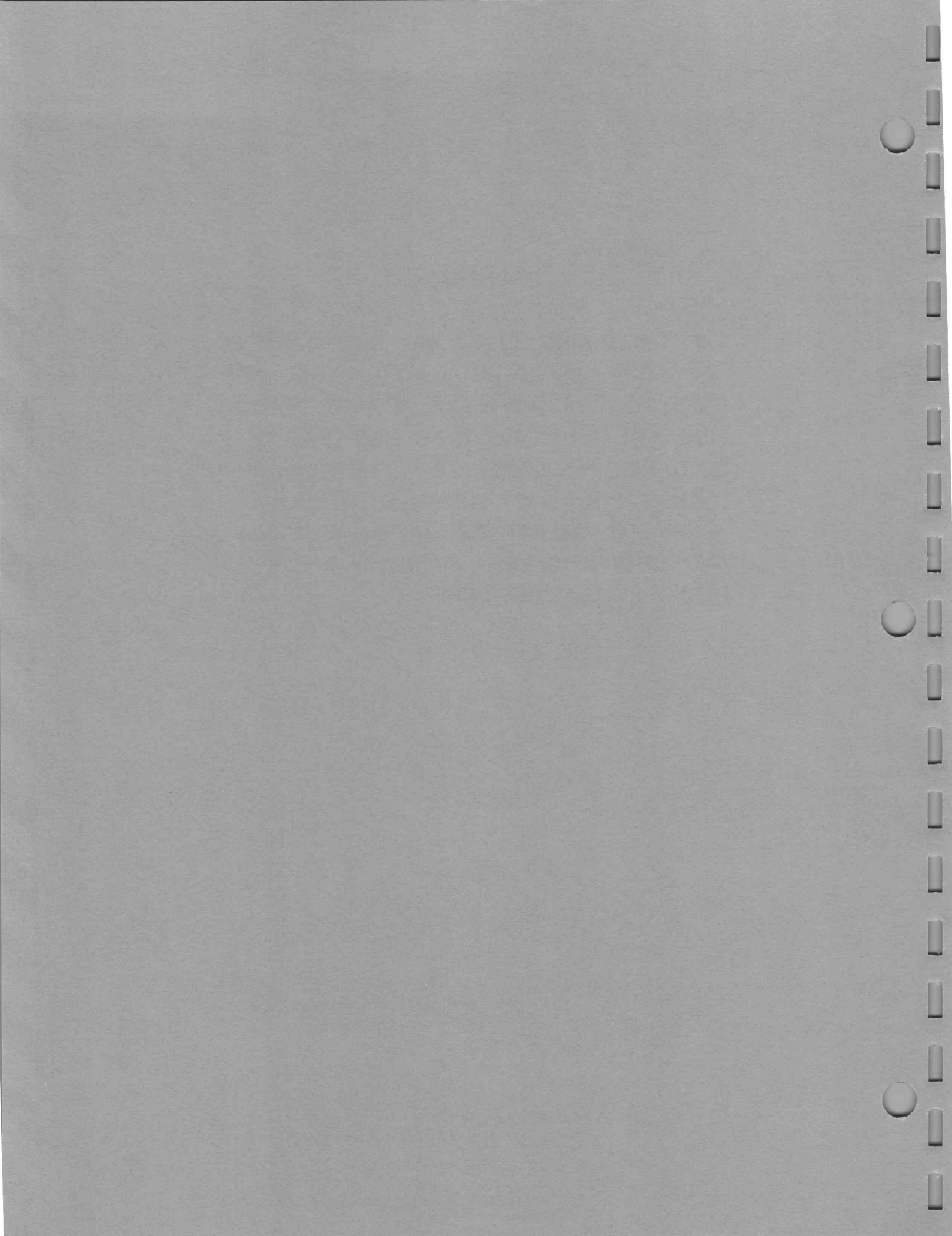
Characteristics	Performance Requirements
Line Voltage Input (ac, rms)	
120 V	100 V to 132 V.
240 V	210 V to 250 V.
Line Frequency	50—60 Hz.
Power Consumption	35 watts maximum.
Fuses	
120 V	1 A fast blow.
240 V	0.5 A fast blow.

MECHANICAL CHARACTERISTICS

Characteristics	Performance Requirements
Length (overall)	19.0 inches (48.26 cm)
Width	19.0 inches (48.26 cm)
Height	1.75 inches (4.45 cm)
Net Weight	9 pounds 3 ounces (4.2 kg)
Domestic Shipping Weight	17 pounds 14 ounces (8.1 kg)

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.



PART II

SERVICE & SETUP INFORMATION

WARNING

SERVICE INSTRUCTIONS ARE INTENDED FOR USE BY QUALIFIED PERSONNEL ONLY: TO AVOID ELECTRIC SHOCK DO NOT ATTEMPT ANY SERVICING OTHER THAN CONTAINED IN THE OPERATOR'S INFORMATION PORTION UNLESS YOU ARE QUALIFIED TO DO SO.

INTRODUCTION

This part of the manual is to be used by qualified personnel only. In addition to the Safety Information that follows, please read the Safety Summary located at the start of "Part I — Operator's Information."

INSTALLATION

Safety Information

The following are general safety precautions that must be observed during all phases of operation and maintenance.

WARNING

Do not service or make internal adjustments to this instrument unless another person, capable of giving first aid and resuscitation, is present.

Avoid live circuits. Electrical shock hazards are present in the front half portion of the Power Supply board; especially primary circuit fuse F89 (neon lamp DS78¹), and power transformer T80 primary winding terminals. To avoid electrical shock, disconnect the instrument from the power source before touching components or soldering.

Avoid coming in contact with components that are operating at a high temperature, such as the high wattage resistors spaced above the board, power transistors, and some of the metal case transistors. Some IC's on the Sync circuit board also run at a high temperature (approximately +60°C).

Handle silicone grease with care when replacing power transistors Q39, Q49, and Q59. Avoid getting silicone grease in the eyes. Wash hands thoroughly after use.

Power Connections and Fuse

Use the information given in Fig. 4-1 and Table 4-1 to determine the position of the internal selector switches and to be certain that the correct fuse is installed.

CAUTION

For continued fire hazard protection, replace with same rated 250 V fuse as listed in Table 4-1.

To obtain access to the switches and fuse, disconnect the power cord from the outlet. Remove the top cover from the instrument by loosening the large 1/4-turn screws in the cover, and then lifting off the cover. (Lift the plastic cover off the fuse¹.)

¹For instruments below SN B010109.

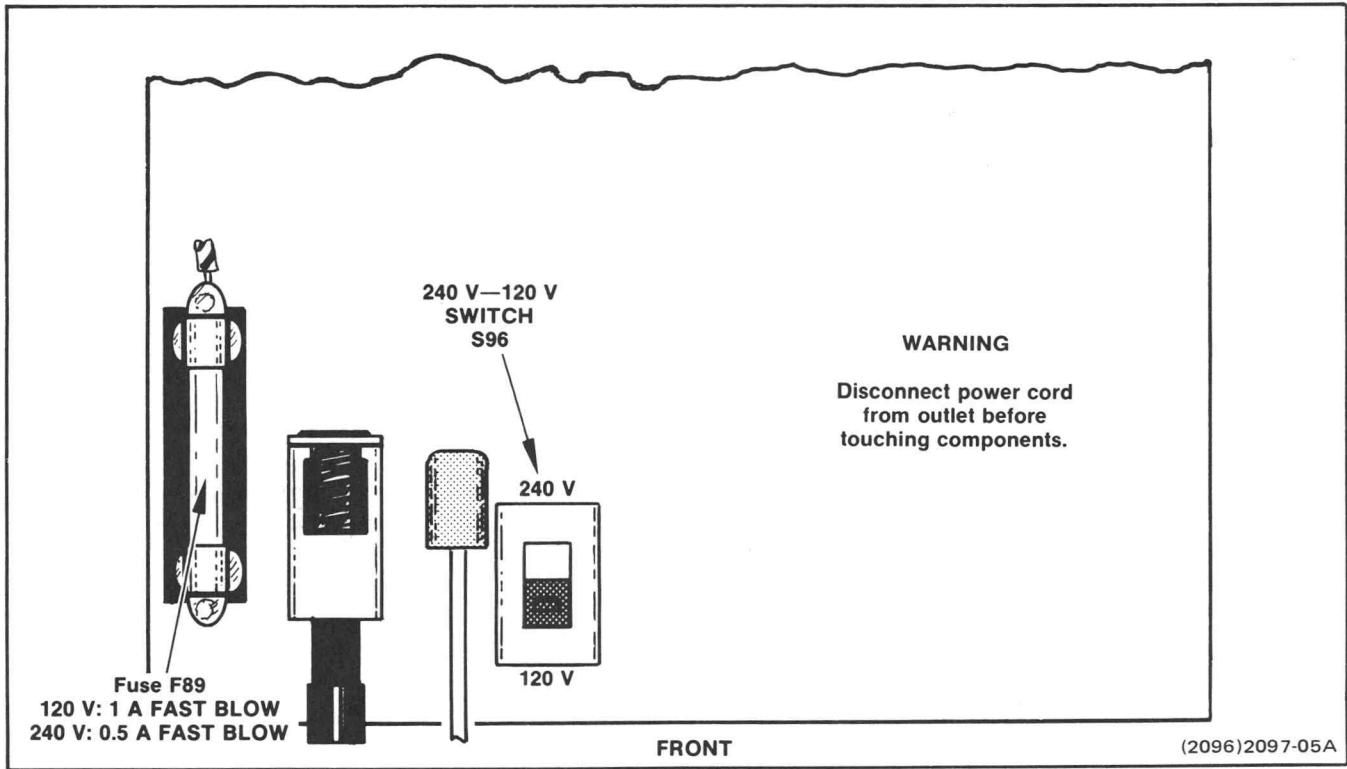


Fig. 4-1. Partial Power Supply board, top view. Top cover is removed.

TABLE 4-1
Line Voltage Ranges

Nominal Line Voltage	240 V-120 V Switch S96 Position	Line Voltage Range for Regulated Operation	Fuse F89
120 V ac	120 V	100 V to 132 V.	1 A Fast Blow
240 V ac	240 V	210 V to 250 V.	0.5 A Fast Blow

If the S96 switch setting is changed, place the metal cover on the rear panel so the proper "CONNECTED FOR" voltage is exposed.

Reinstall the fuse cover, if removed, and the instrument top cover with the WARNING information toward the front.

Operating Changes

There are some internal electrical changes that will alter the instrument operation for special applications. The following describes these changes:

1. Gen locking to helical scan VTR's (Video Tape Recorders) with block sync and/or head dropout.
2. Gen locking to sound-in-sync signals.

WARNING

When the top cover is removed from the instrument, avoid an electrical shock hazard by staying clear of the front half of the Power Supply board when adjusting instrument operation for gen lock. Disconnect the power cord from the outlet before soldering or unsoldering wire straps.

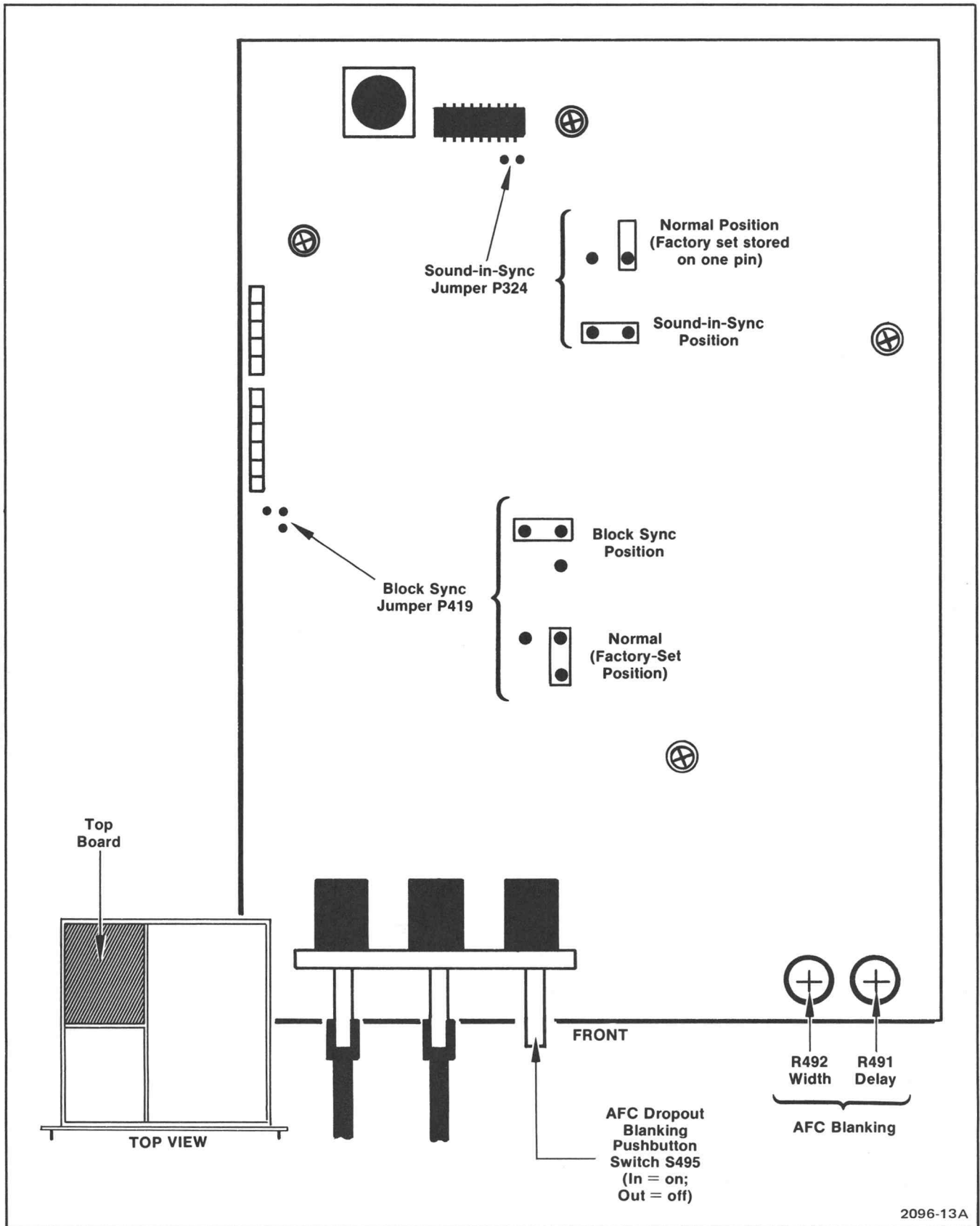


Fig. 4-2. A3 Gen Lock circuit board showing jumper and adjustment locations.

Installation—1474

1a. VTR's with Head Dropout. The instrument is shipped with internal AFC Dropout Blanking switch S495 set to the Off (out) position to satisfy most gen lock applications. However, in a situation where the 1474 is gen locked to a VTR that is generating noise during the head dropout interval, the picture monitor display may have horizontal sync jitter at the top or bottom of the picture. A more stable display may be obtained by setting the AFC Dropout Blanking switch (see Fig. 4-2) to the On (pressed in) position.

In the On position, the 1474 is factory-set to blank the AFC during the first 6 lines **after** vertical sync starting at line 11. If this interval and its timing location is not the same as or is greater than the VTR head dropout interval, you can readjust R491 and R492 as described below and in step 3 of the Adjustment Procedure in Section 6.

The AFC Blanking Delay adjustment, R491 (see Fig. 4-2), has a range that moves the dropout blanking interval from a position before vertical sync to a position at the start of the active lines, or any position between these two areas. The AFC Blanking Width adjustment, R492, has a range that changes the width of the dropout gate from approximately 4 horizontal lines minimum to approximately 14 horizontal lines maximum. Go to step 3 in the Adjustment Procedure in Section 6.

NOTE

*When in doubt as to the timing of the blanking interval, **do not use** the AFC Dropout Blanking feature. That is, leave the AFC Dropout Blanking switch, S495, in the Off (out) position.*

1b. VTR's with Block Sync and Head Dropout. To gen lock the 1474 to VTR's with block sync and head dropout, move the Block Sync Jumper, P419, from its Normal (factory-set) position to the Block Sync position as shown in Fig. 4-2. Also, use the information given previously in part 1a, VTR's with Head Dropout.

CAUTION

Jumper P419 should never be left off the pins; otherwise, the 1474 will generate unstable sync signals.

2. Gen Locking to Sound-in-Sync Signals. The 1474 Generator will gen lock to sound-in-sync composite video signals if the Sound-in-Sync Jumper P324 is moved to the Sound-in-Sync position as shown in Fig. 4-2.

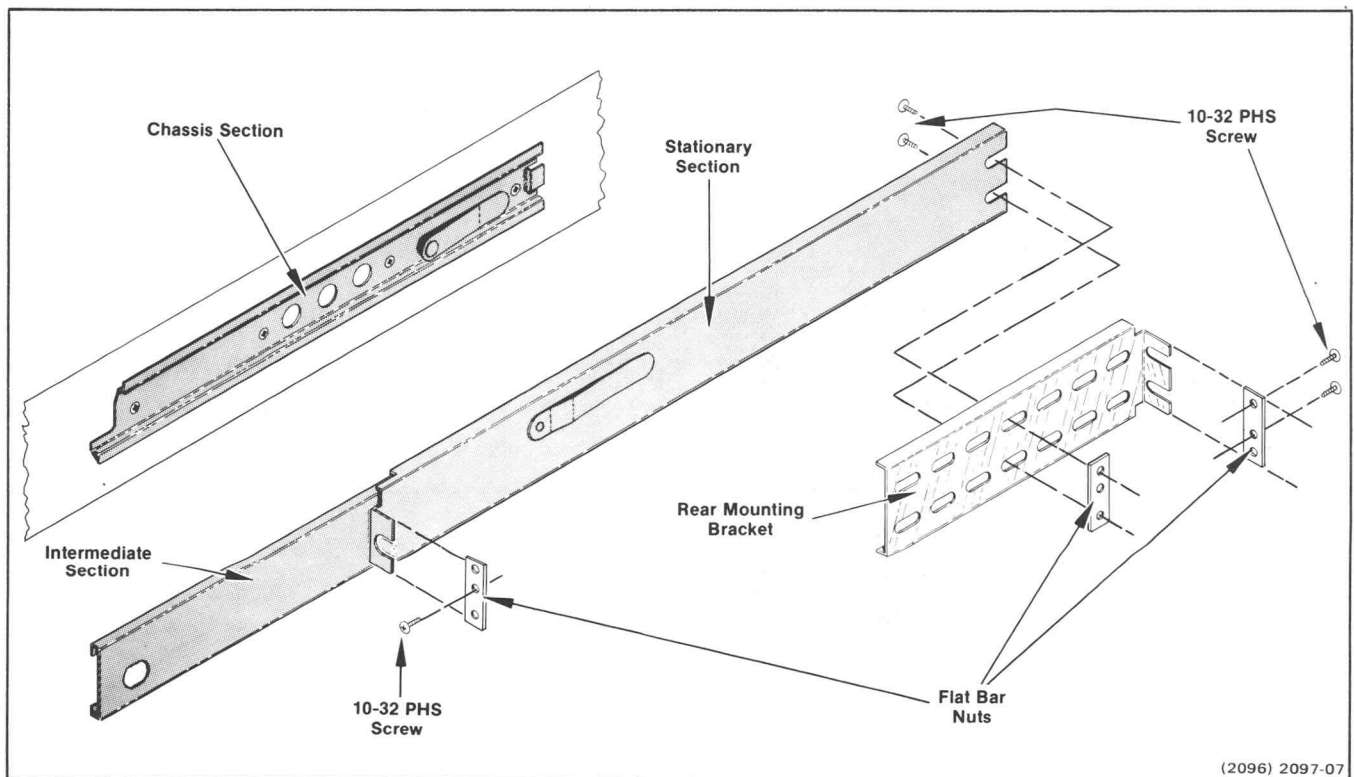


Fig. 4-3. Exploded view of rackmounting hardware showing the relative position of parts.

When **not** operating in the sound-in-sync mode, jumper P324 should be removed and stored on one of the pins as shown in the illustration.

3. Variable Blanking Mode. Figure 6-2 (in Section 6 ADJUSTMENTS) shows the location of factory-installed jumpers on Advance Horiz Blank (P180), Advance Vert Blank (P190), Horiz Drive Delay (P239), and Comp Blank Delay (P249), located on the A2 SYNC circuit board.

To enable the Variable Blanking Mode, move P180 and P190 to the Advance (Variable Blanking) position, which is marked by the letter A on the board. Move P239 and P249 to the Delayed position, which is marked by the letter D on the board. Leading Edge Delay (R241) and Trailing Edge Delay (R232) must then be adjusted for the desired relation to sync and for desired blanking width. See Section 6 ADJUSTMENTS for the proper procedure.

4. Variable Blanking Mode. Figure 6-2 (in Section 6 ADJUSTMENTS) shows the location of factory-installed

jumpers on Advance Horiz Blank (P180), Advance Vert Blank (P190), Horiz Drive Delay (P239), and Comp Blank Delay (P249), located on the A2 SYNC circuit board.

To enable the Variable Blanking Mode, move P180 and P190 to the Advance (Variable Blanking) position, which is marked by the letter A on the board. Move P239 and P249 to the Delayed position, which is marked by the letter D on the board. Leading Edge Delay (R241) and Trailing Edge Delay (R232) must then be adjusted for the desired relation to sync and for desired blanking width. See Section 6 ADJUSTMENTS for the proper procedure.

Rackmounting

Fig. 4-3 shows an exploded view of the rackmounting hardware for installing the instrument in a cabinet rack.

The stationary section with its intermediate section and the rear mounting extension bracket are fastened to the front and rear rails of the cabinet rack. Then, the instrument with attached slideout track chassis sections slides into the intermediate section to complete the installation.



MAINTENANCE

Service Centers

Tektronix, Inc. provides complete instrument repair and calibration at local Field Service Centers or the Factory Service Center. Contact your local Tektronix Field Office or representative for further information. If you need to ship the instrument, follow the repackaging instructions given in Part 1 — Instrument Repackaging for Shipment.

Cleaning

Accumulations of dirt and dust on components acts as an insulating blanket preventing efficient heat dissipation. Dust on circuit boards can cause electrical conduction paths to occur, especially under high humidity conditions. Clean your instrument before this happens! Use the cleaning information that follows.

CAUTION

Avoid the use of chemical cleaning agents that might damage the plastics and remove the lettering from the 1474 Generator. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents. Recommended cleaning agents are isopropyl alcohol or Kelite (1 part Kelite, 20 parts water).

Exterior. Dust the cabinet off with a soft cloth. The remaining dust can be removed with a soft cloth, dampened in a mild detergent and water solution. Do not use abrasive cleaners.

Interior. Dust is best removed from the interior with dry, low pressure air (approximately 9 lbs/in²). Dirt clinging to surfaces may be removed with a small paint brush and blown away using low pressure air.

After cleaning the instrument and checking its performance, install the top cover on the instrument. The top cover protects personnel from electrical shock hazard and also protects the interior of the instrument from dust and dirt.

Power Supply Fuses

The three secondary dc power supplies in the instrument are protected by fuses (see Fig. 5-1). Table 5-1 lists the fuse ratings and types for instrument SN B010120 and up.

TABLE 5-1

Power Supply Fuses

Power Supply	Fuse		
	Circuit No.	Fuse Rating	Fuse Type
-15V	F75	1A	Slow Blow
+5 V	F76	1A	Slow Blow
+15 V	F85	1A	Slow Blow

SN B010120 and below, F75 and F85 are 3A fast blow; F76 is 5A fast blow.

Special Handling of IC's

Some of the IC's on the Sync circuit board are static sensitive. They require special handling when removed to protect them from damage. These IC's are: U162, U164, U201, U231, and U261. The following are some precautionary measures that must be taken.

1. Dissipate any personally accumulated static charge by touching a grounded object before handling the component.
2. Pick up the IC by the body only. They should not be handled by the leads.
3. Do not subject the IC to unnecessary sliding movements over any surface at any time.
4. Use conductive or antistatic containers for storing and transporting IC's. Keep replacement IC's in their original containers.

Troubleshooting

The best method for isolating trouble in the 1474 after determining that the power supplies are operating normally is to use the signal tracing method.

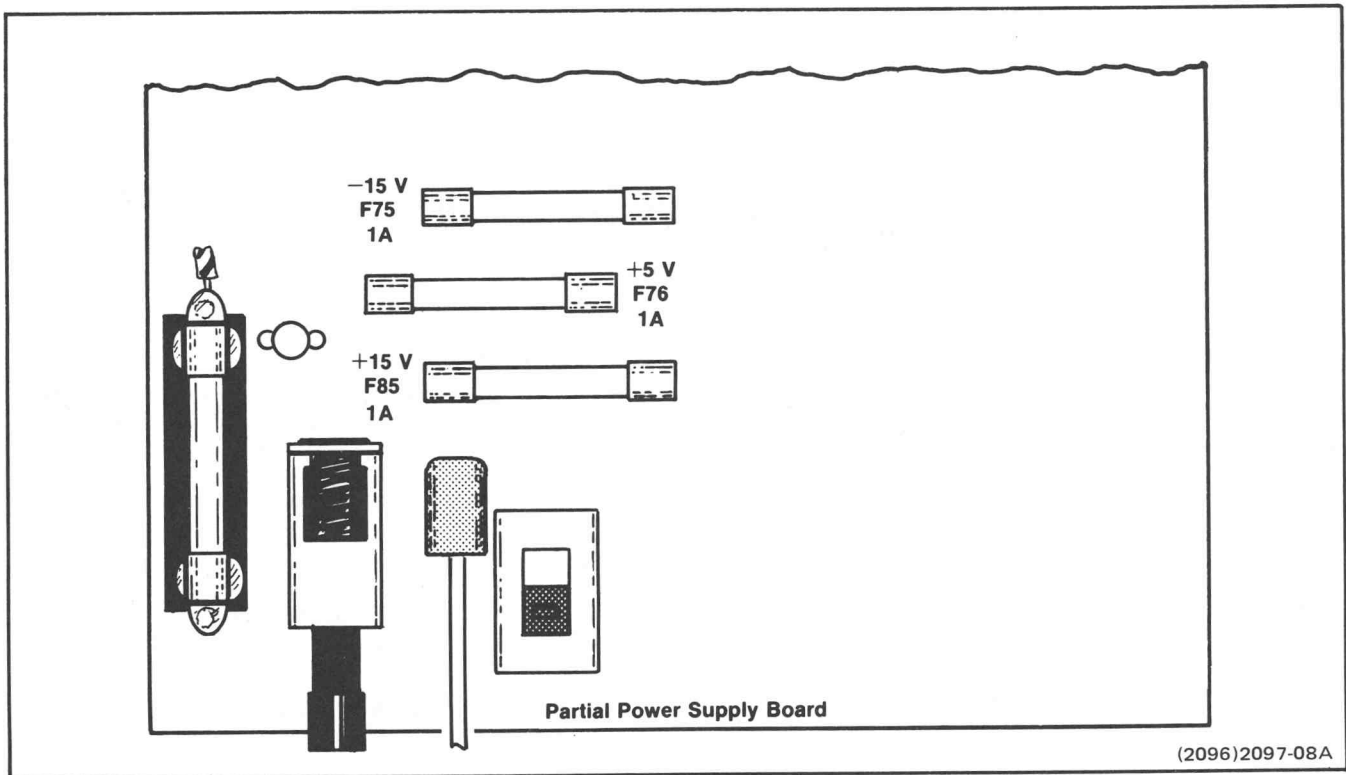


Fig. 5-1. Location of secondary dc power supply fuses.

The "Test Equipment" list in the Adjustments portion of this manual is a handy reference for deciding the test equipment, cables, and terminations that are needed.

Figure 9-1, located on the foldout page following the schematic diagrams, can be used as a guide to check that the 1474 is generating the proper waveforms.

The schematic diagrams are laid out so they physically resemble the circuit boards. Components on the circuit boards are numbered using the grid system. Starting in the upper left corner of each board with the front panel of the instrument facing to the right, the numbers increase from 1 to 9 going down and by 10's going to the right.

This circuit numbering system and the schematic layouts should make it easier for you to locate components on the board and their approximate location on the schematic. Idealized drawings of waveforms are provided on the schematics as an aid to signal tracing and understanding circuit operation.

To troubleshoot the Sync board (which is located under the Gen Lock board) operate the instrument without the Gen Lock board as follows:

1. Turn off the instrument.
2. Note the location and orientation of the Gen Lock board connectors. Disconnect these connectors from the Gen Lock board.

3. Remove the Gen Lock board by removing four screws. Leave the push button extension shafts attached to the switches.
4. Insert two #22 insulated solid-wire jumpers in connector P399 at the end that was disconnected from the Gen Lock board. One jumper connects from pin 2 to pin 4; the other jumper connects from pin 3 to pin 6 (see Fig. 6-2 in the Adjustment Procedure). Ground pin 5 of P399.
5. Turn on the instrument.

Factory Selected Components

Different batch runs of transistors and IC's used during production testing have characteristics that must be matched by selecting components. Such components are indicated on the schematic diagram by adding "(SEL)" below the circuit number. The information that follows describes these components.

C124, C126, C127, C128, and C129 on Sync diagram 2 are factory selected. The values of these components are selected to obtain a nominal 140 ns rise and falltime on the drive pulses. Leave the values of the selected capacitors as they are unless the associated IC is replaced and the drive pulse rise and falltimes are greater than 170 ns or less than 110 ns.

ADJUSTMENTS

Calibration Interval

Recalibrate the instrument only when its performance does not meet specifications. A partial calibration is desirable after replacing components or when there is a need for "touching up" some of the adjustments to restore instrument accuracy.

Tektronix Field Service

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

Test Equipment

Minimum Specifications are given.

1. Dual-Trace Oscilloscope. For setting power supply voltages and displaying waveforms.

Bandwidth: DC to at least 20 MHz.

Minimum Deflection Factor: 5 mV/div; 50 mV with 10X probe.

Main Sweep Rate: To at least 0.1 μ s/div. X10 magnifier extends maximum sweep rate to 10 ns/div.

Delayed Sweep Rate: To at least 0.1 μ s/div.

Tektronix T935 Oscilloscope, or equivalent.

2. Composite Video Source. This signal source with burst is required when performing adjustments on the Gen Lock circuit board. Amplitude: 1 V into 75 ohms. Also, horizontal drive and vertical drive signals are needed to externally trigger the oscilloscope time base. Tektronix 1470 NTSC Color Sync & Test Generator, Tektronix 1474 NTSC Color Sync Generator, or equivalent. Black burst is used as the composite video source in the procedure.

3. Frequency Counter. Required when setting the Subcarrier Freq Adj R248 adjustment on the Sync circuit board. Frequency Counter characteristics: Capable of direct counting 3.579545 MHz in 7 digits. Measurement accuracy should be within ± 1 count \pm time-base accuracy of 1 part in 10^5 over 0-50°C temperature range. Tektronix DC 501 or equivalent. The DC 501 is a plug-in unit that requires power from a mainframe such as the Tektronix TM 501.

4. Digital Voltmeter. For checking and adjusting power-supply voltages. TEKTRONIX DM 501 or equivalent. Requires power from a TEKTRONIX TM 500-Series Mainframe.

5. 75-Ohm Coaxial Cable. For interconnecting the signals to the test equipment. At least four 42-inch 75-ohm cables equipped with BNC connectors are needed. Tektronix Part No. 012-0074-00.

6. 75-Ohm End-Line Termination. Two each. BNC connectors. Tektronix Part No. 011-0102-00.

7. 75-Ohm Feed-Through Termination. Two each. BNC connectors. Tektronix Part No. 011-0103-02.

8. Variable Attenuator. Needed when adjusting Burst Detector R390. Has the end terminals of a 150-ohm potentiometer connected from input to ground, and the divider arm connected to the attenuator output. This test fixture can be easily constructed using the following parts:

Description	Tektronix Part No.
Accessory housing without electrical components; equipped with bnc female and male connectors.	011-0081-00
Resistor, 150 ohms $\pm 20\%$, variable, miniature.	311-0482-00

NOTE

If the variable attenuator is not available, you can use three 75 ohm terminations as described in step 3, parts r and u of the Adjustment Procedure.

9. Potentiometer. Needed when checking/adjusting the range of Remote Master Phase Range C922. Has one end terminal and the center arm connected together at the REMOTE MASTER input, and the other end terminal connected to ground. This test fixture can be easily constructed using the following parts:

Description	Tektronix Part No.
Accessory housing without electrical components equipped with bnc female and male connectors.	011-0081-00
Resistor, 10 k Ω $\pm 20\%$, variable composition, miniature.	311-0491-00

Adjustments—1474

Preliminary Procedure

Turn on the instrument and allow at least 5 minutes for warmup before proceeding. Be sure that the instrument is operating in an ambient temperature of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

Circuit Board Illustrations





Figs. 6-1 through 6-3 are circuit board illustrations that show locations of the adjustments and test points describ-

ed in the procedure. Also, the schematic diagram titles and reference numbers are given on the illustrations so that you can quickly refer to the proper schematic when locating these adjustments and test points.

Adjustment List

Table 6-1 is a list of the adjustments for use as an easy reference. This list serves as an index to the calibration procedure.

TABLE 6-1
Adjustment List

Step No.	Circuit No.	Adjustment	Circuit Board & Diagram
1a	R13	-15 V Adj	Power Supply board; see Fig. 6-1 Power Supply diagram 
	R43	+15 V Adj	
	R62	+5 V Adj	
2b	R230	Subcarrier Amplitude	Sync board; see Fig. 6-2 Sync diagram 
2e	R248	Subcarrier Freq Adj	
2g	L205	10 MHz Freq Adj	
2i	R139	Burst Position & Width Adj	
2n	R232	Trailing Edge Delay	
2o	R241	Leading Edge Delay	Sync diagram 2
3d	R315	Sync Separator Cal	Gen Lock board; see Fig. 6-3 Gen Lock diagram 
3i	R331	H Delay	
3k	R411	Vert Reset Position	
3n	R492	AFC Blanking Width	
3(o)	R491	AFC Blanking Delay	
3(u)	R390	Burst Detector	Phasing board; see Fig. 6-5 Phase Shifter diagram 
4d	P909, R905	SUB 3 & Black Burst Phase	
4g	Goniometer, P929	Master Phase	
4i	C922	Remote Phase Range	
4m	R994	SUB 1 Gain	
4(o)	P989, R987	SUB 1 Phase	
4q	R964	SUB 2 Gain	
4s	P969, R967	SUB 2 Phase	
5u	R530	Burst Detector	

ADJUSTMENT PROCEDURE

This procedure gives the optimum setting for each adjustment. Use 75-ohm terminations to terminate the 1474 output signals that are connected to test equipment except when externally triggering the oscilloscope time base.

IMPORTANT

Set the GEN LOCK SUBCARRIER and SYNC pushbuttons to INT (pressed in position) before starting the procedure.

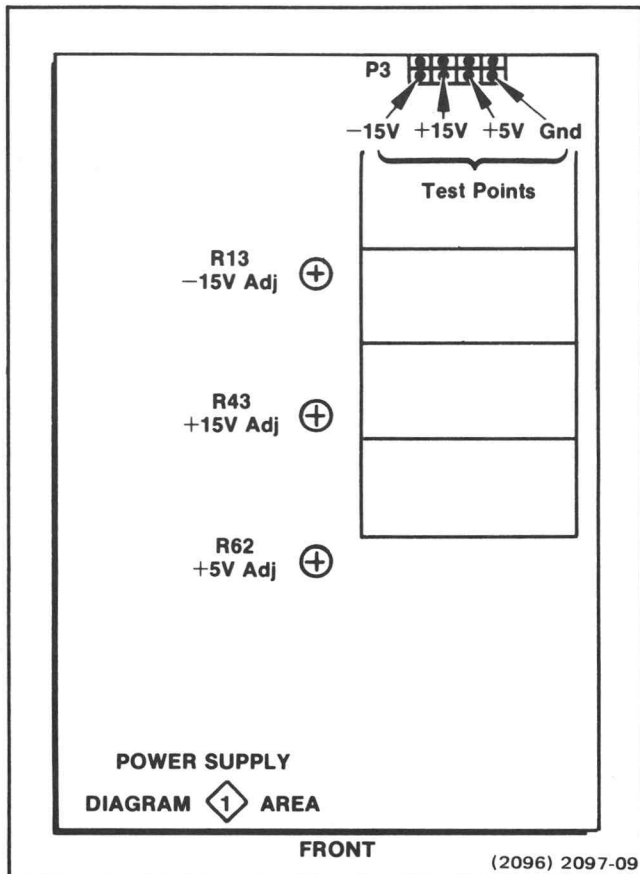


Fig. 6-1. A1 Power Supply circuit board showing adjustment and test point locations.

1. Adjust Power Supplies

NOTE

If any of the power supplies are adjusted, the entire instrument calibration must be checked.

a. Dc-couple an oscilloscope (or digital voltmeter) to each of the test points on the Power Supply board and, if necessary, set the corresponding adjustment to obtain the voltage given in the following list. Perform the adjustments in the same sequence as the list. The chassis can be used as a ground instead of multi-pin connector Gnd.

Voltage Test Point	Adjustment
-15 V	-15 V Adj R13
+15 V	+15 V Adj R43
+5 V	+5 V Adj R62

b. Disconnect the probe from the voltage test point.

2. Sync Generator Adjustment

a. Initial Setup: Externally trigger the oscilloscope time base using the 1474 HORIZ DRIVE signal. Apply the 1474 BLACK BURST signal through a 75-ohm termination to the oscilloscope vertical input connector.

b. ADJUST—Subcarrier Amplitude R230 for a burst amplitude of 286 mV p-p.

c. Disconnect the BLACK BURST signal. Apply one of the 1474 SUBCARRIER signals through a 75-ohm termination to the oscilloscope. Connect the other SUBCARRIER signal through a 75-ohm termination to a frequency counter.

d. CHECK—For 2 V p-p nominal subcarrier amplitude as displayed on the oscilloscope.

e. CHECK/ADJUST—Subcarrier Freq Adj R248 for a 3.579545 MHz indication on the frequency counter.

f. Disconnect the SUBCARRIER signals from the test equipment. Connect the 1474 BLACK BURST signal to the oscilloscope or waveform monitor, if available. Terminate the signal into 75 ohms.

g. CHECK/ADJUST—10 MHz Freq Adj L205 for center of lock-in range between burst and horizontal sync of the waveform displayed on the oscilloscope (or waveform monitor).

h. Disconnect the BLACK BURST signal from the test equipment. Connect the 1474 BURST GATE signal through a 75-ohm termination to the oscilloscope.

i. CHECK/ADJUST—Burst Position & Width Adj R139 for a 2.5 μ s burst gate duration between 50% amplitude points. This is equivalent to 9 cycles of burst at HAD (Half Amplitude Duration). One method for checking the accuracy of your adjustment is to apply the 1474 SUBCARRIER signal to the other channel of the oscilloscope operating in the alternate mode. Check that the burst gate equals 9 cycles of subcarrier signal.

j. CHECK/ADJUST—Burst Start Adj C132 so that the leading edge of the burst gate occurs 5.1 μ s after the leading edge of the horizontal sync pulse. Recheck burst gate duration as described in part i. (The adjustments may slightly interact. Readjust each as necessary.)

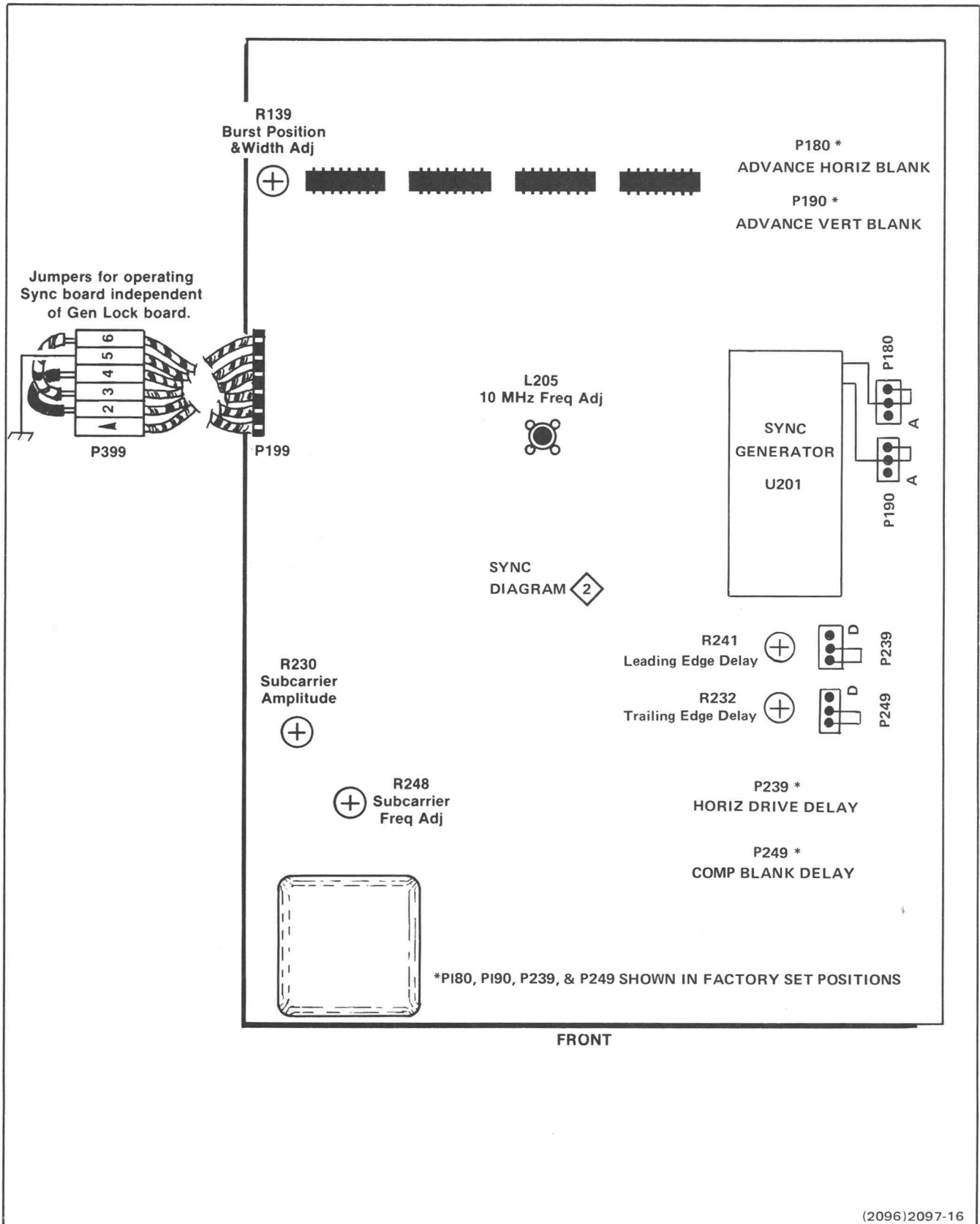
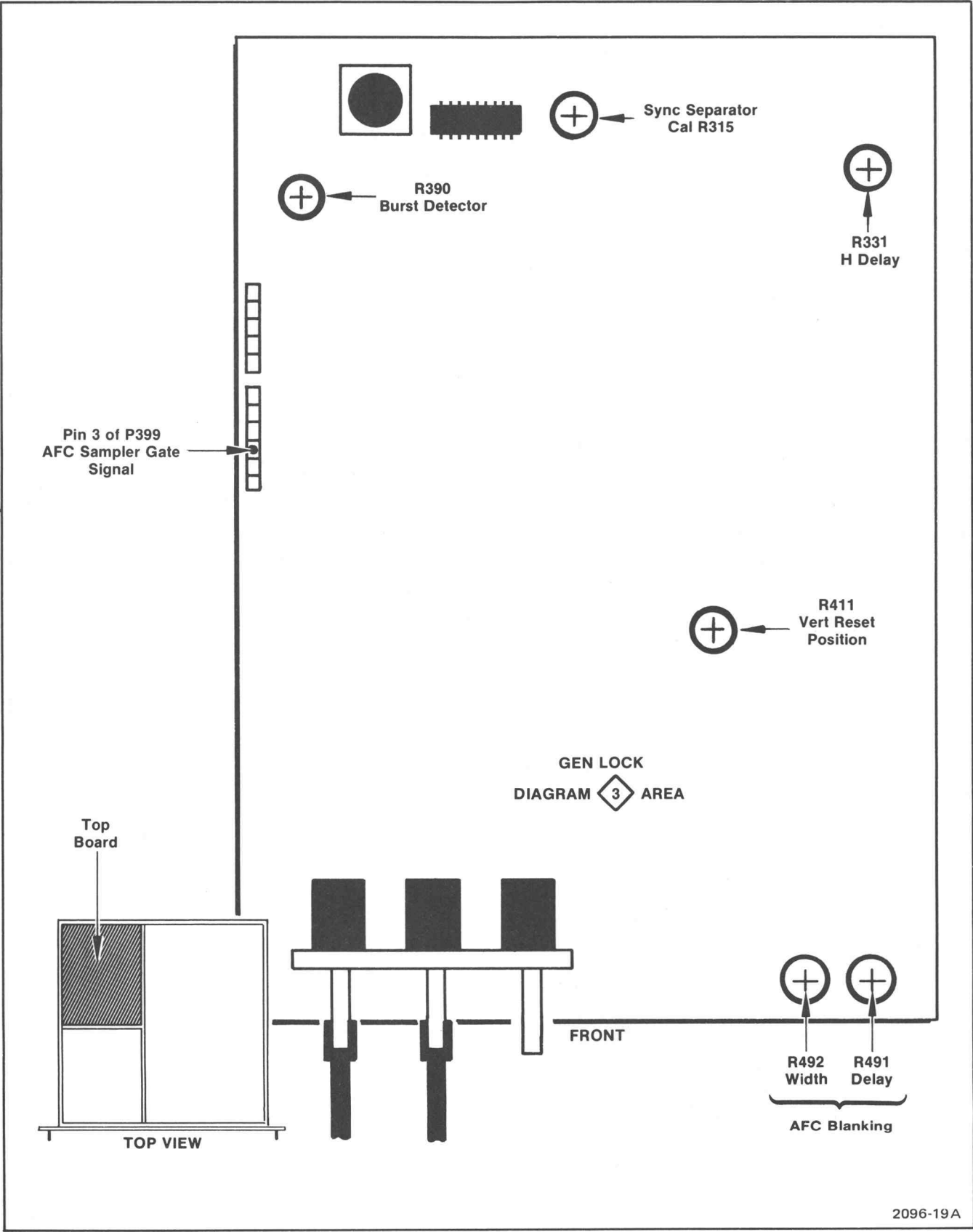


Fig. 6-2. A2 SYNC circuit board showing jumper and adjustment locations.



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Fig. 6-3. A3 Gen Lock circuit board showing adjustment and test point locations.

Adjustments—1474

k. Disconnect the BURST GATE and SUBCARRIER signals from the oscilloscope.

NOTE

To change to Variable Blanking Mode, perform the following steps.

l. Connect the BLACK BURST output of the 1470 or 1474 to the test oscilloscope vertical input, via a 75-ohm cable and 75-ohm termination. Externally trigger the test oscilloscope from the COMP SYNC output. Use delayed sweep to view the setup transitions, sync, and burst of the BLACK BURST output signal.

m. Move jumpers P180 and P190 to the Advance (delayed) position. This position is marked by the letter 'A' on the Sync board (that is, toward P239 and P249). Move jumpers P239 and P249 to the delayed position (toward U201). This position is marked by the letter 'D' on the Sync board. The instrument is now in the Variable Blanking mode.

n. ADJUST—R232 so that the trailing edge of setup (leading edge of blanking) has the desired time relationship to the leading edge of sync.

o. ADJUST—R241 to move the leading edge of setup (trailing edge of blanking) for the desired blanking width.

At the factory, R232 is adjusted so that the 4 IRE point of the trailing edge of setup is $1.4 \mu\text{s}$ from the -20 IRE point of the leading edge of sync. R241 is adjusted so that there is $10.7 \mu\text{s}$ from the trailing 4 IRE point to the leading 4 IRE point of setup. P180, P190, P239, and P249 are then moved to the normal blanking mode.

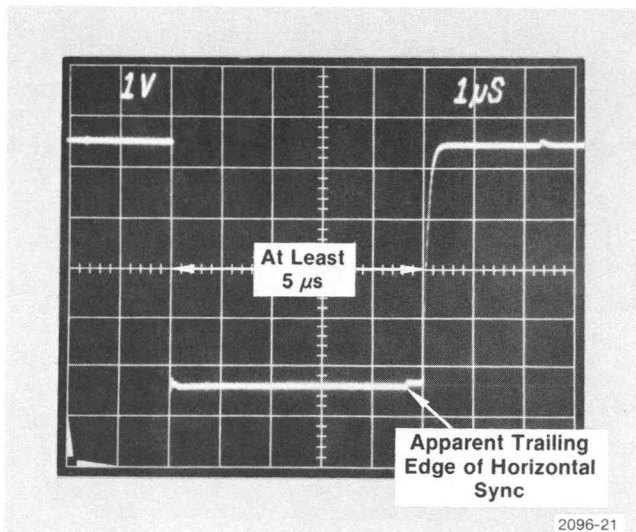


Fig. 6-4. Waveform at the connector pins of Jumper P324 when P324 is set to the Sound.in.Sync position.

p. Set the jumpers to the desired blanking mode.

3. Gen Lock Adjustments

a. Initial Setup: Apply composite sync or video with burst from a color sync test generator to the 1474 GEN LOCK SIGNAL LOOP input connector. Connect a 75-ohm termination to the other GEN LOCK SIGNAL LOOP input connector. Externally trigger the oscilloscope time base with a horizontal drive signal from either generator.

b. Set the Sound-in-Sync Jumper, P324, to the Sound-in-Sync position as shown in Fig. 4-2. Connect the oscilloscope probe to one of the pins jumpered by P324. Display the negative-going horizontal line rate pulse (see Fig. 6-4).

c. Set the 1474 under test GEN LOCK SYNC and GEN LOCK SUBCARRIER pushbuttons to EXT.

d. CHECK/ADJUST—Sync Separator Cal R315 so the duration of the negative-going pulse displayed on the oscilloscope extends just beyond the apparent trailing edge of horizontal sync as pointed out in Fig. 6-4. Since horizontal sync has a nominal duration of $4.8 \mu\text{s}$, R315 should be adjusted to obtain a pulse duration of at least $5 \mu\text{s}$ but no greater than $5.2 \mu\text{s}$ when measured between the 50% amplitude points.

e. Disconnect the oscilloscope probe from the test point and set jumper P324 in the 1474 under test to the Normal position; that is, stored on one of the two pins.

NOTE

Use a dual-trace oscilloscope with delayed sweep to perform the remaining gen lock adjustment procedure.

f. Externally trigger the oscilloscope time base from the color sync test generator (not the 1474 under test) horizontal drive signal.

g. Disconnect the termination from the 1474 under test GEN LOCK SIGNAL LOOP input connector. Connect the looped-through composite sync or video signal from this connector through a 75-ohm termination to Channel 1 on the oscilloscope. Apply the 1474 under test BLACK BURST signal through a 75-ohm termination to Channel 2 on the oscilloscope. Check that the oscilloscope vertical Input Coupling switches are set to DC.

h. Using dual-trace alternate mode of operation, set the oscilloscope controls to display the horizontal sync and burst portion of the waveforms magnified and superimposed.

i. CHECK/ADJUST—H Delay R331 so the horizontal sync pulses are superimposed; that is, one pulse is centered within the other pulse. (There may be a very slight difference in pulse durations.)

Another method is to set the oscilloscope vertical Mode switch to Add, invert one signal, and adjust H Delay R331 for minimum horizontal sync output. After making the adjustment, return the vertical Mode switch to Alternate and the Polarity switch to +Up (non-inverted) operation.

A third method is to use a color picture monitor, if available, operating in the A-B pulse-cross mode.

j. Externally trigger the oscilloscope from the color sync test generator vertical drive signal. Using chopped mode of operation, set the oscilloscope controls to display a stable, magnified view of the vertical blanking interval for both waveforms superimposed.

k. CHECK/ADJUST—Vert Reset Position R411 to superimpose the vertical blanking intervals.

Other methods to use are the Add and A-B modes described in part i of this step.

l. Disconnect the 1474 BLACK BURST signal from Channel 2 on the oscilloscope. Connect a probe from Channel 2 of the oscilloscope to pin 3 (AFC Sampler Gate signal) of multi-pin connector P399 on the Gen Lock circuit board (see Fig. 6-3). Display the vertical blanking interval of both waveforms using dual-trace chopped mode of operation and delayed sweep.

m. Press in the 1474 internal AFC Dropout Blanking switch, S495 (see Fig. 4-2), to the On position. Check that the GEN LOCK SYNC and GEN LOCK SUBCARRIER pushbuttons are set to EXT.

n. CHECK/ADJUST—AFC Blanking Width R492 for a gate duration of 6 lines. Use the horizontal lines of the color bar waveform as a gauge when determining gate duration.

o. CHECK/ADJUST—AFC Blanking Delay, R491, so the AFC sampler gate starts at line 11. This is the first horizontal line that follows the last equalizing pulse sequence.

p. The preceding procedure for the AFC Blanking adjustments (parts n and o of this step) is for helical scan VTR's with head dropout after the vertical interval. Connect your VTR to the 1474 GEN LOCK SIGNAL LOOP

input connector in place of the test signal generator. With the VTR running, note on the VTR waveform displayed on channel 1 of the oscilloscope the location where the head switch occurs with respect to the AFC sampler gate waveform displayed on channel 2. If necessary, readjust Width R492 and Delay R491 to straddle the VTR head switch area of the waveform.

q. Disconnect all the test equipment from the 1474 under test.

r. Apply a 4-V p-p unterminated subcarrier signal from a color sync test generator or from the 1474 under test through a variable attenuator to the 1474 GEN LOCK SIGNAL LOOP connector. (If a variable attenuator is **not** available, connect two 75-ohm feedthrough terminations in series with the signal and terminate the other GEN LOCK SIGNAL LOOP connector into 75 ohms. These terminations reduce the amplitude to approximately 1 V p-p.)

s. Connect an oscilloscope probe to the wire strap that connects the GEN LOCK SIGNAL LOOP connectors together. Set the oscilloscope for single-channel internally-triggered operation to monitor the incoming subcarrier signal. Set the variable attenuator for approximately 1.5 V p-p subcarrier signal amplitude as displayed on the oscilloscope.

t. Set the 1474 under test GEN LOCK SYNC pushbutton to INT. Check that the GEN LOCK SUBCARRIER pushbutton is set to EXT.

u. CHECK/ADJUST—Slowly rotate the variable attenuator so that the subcarrier signal amplitude decreases to 0.8 V p-p as displayed on the oscilloscope. At this level, check that the 1474 under test GEN LOCK SUBCARRIER light turns off. This indicates that the 1474 has automatically switched from external to internal subcarrier lock. If the light does not turn off at 0.8 V p-p, adjust Burst Detector R390 for this threshold level. (If you are using the 75-ohm terminations in place of the variable attenuator, adjust Burst Detector R390 so the GEN LOCK SUBCARRIER light just turns on. This setting will result in a threshold level of approximately 0.9 V p-p.)

4. Phasing Control Adjustments

a. Initial Setup: Externally trigger the test oscilloscope time base, using the 1470 HORIZ DRIVE signal. Simultaneously display the 1474 BLACK BURST and the SUB 3 signal, using 75-ohm terminations, on the test oscilloscope with the vertical set to the chopped mode. Set the test oscilloscope delaying sweep to 10 μ s/div, and free-run the delayed sweep at 100 ns/div.

b. CHECK—that the burst of the BLACK BURST signal and the SUB 3 signal are in phase.

c. Using the delay-time control on the test oscilloscope, display the leading edge of the BLACK BURST sync pulse.

Adjustments—1474

d. CHECK/ADJUST—settings of the Black Burst Phase controls, P909 and R905, so that the 50% point on the falling/leading edge of the sync pulse is at the 50% point of the rising/positive slope of the Subcarrier signal.

e. Connect a Black Burst signal from the composite video source to the GEN LOCK input of the 1474. Connect the Subcarrier Out signal from the composite video source to the Ext. Subcarrier input of the vectorscope. Using equal lengths of cable, connect the 1474 GEN LOCK loop-through connector to input A of the vectorscope, and connect the 1474 SUB 3 output to input B of the vectorscope. Terminate both vectorscope input loop-throughs with 75-ohm terminations.

f. Using the vectorscope Phase control, set the composite video source burst vector at the 180° mark.

g. CHECK—that the MASTER Phase controls, P929 and the goniometer, vary the phase of SUB 3 a full 360°.

h. Connect the 10-kilohm potentiometer across the REMOTE MASTER connector.

i. CHECK/ADJUST—the Remote Master Phase Range control, C922, for a range of 0 to 100° as the 10-kilohm potentiometer is varied through its range.

j. Disconnect the 10-kilohm potentiometer from the REMOTE MASTER connector.

k. ADJUST—the MASTER Phase control to place the input B vector at the 180° mark.

l. Connect SUB 1 through a cable and 75-ohm termination to the input of the test oscilloscope.

m. CHECK/ADJUST—SUB 1 Gain, R994, for a 2-volt (p-p) waveform on the test oscilloscope.

n. Disconnect the cable from the 1474 SUB 3 connector, and connect it to the 1474 SUB 1 connector.

o. CHECK/ADJUST—that settings of the SUB 1 Phase controls, P989 and R987, vary the phase of SUB 1 a full 360°. Leave the controls set so that the input B vector is at the 180° mark.

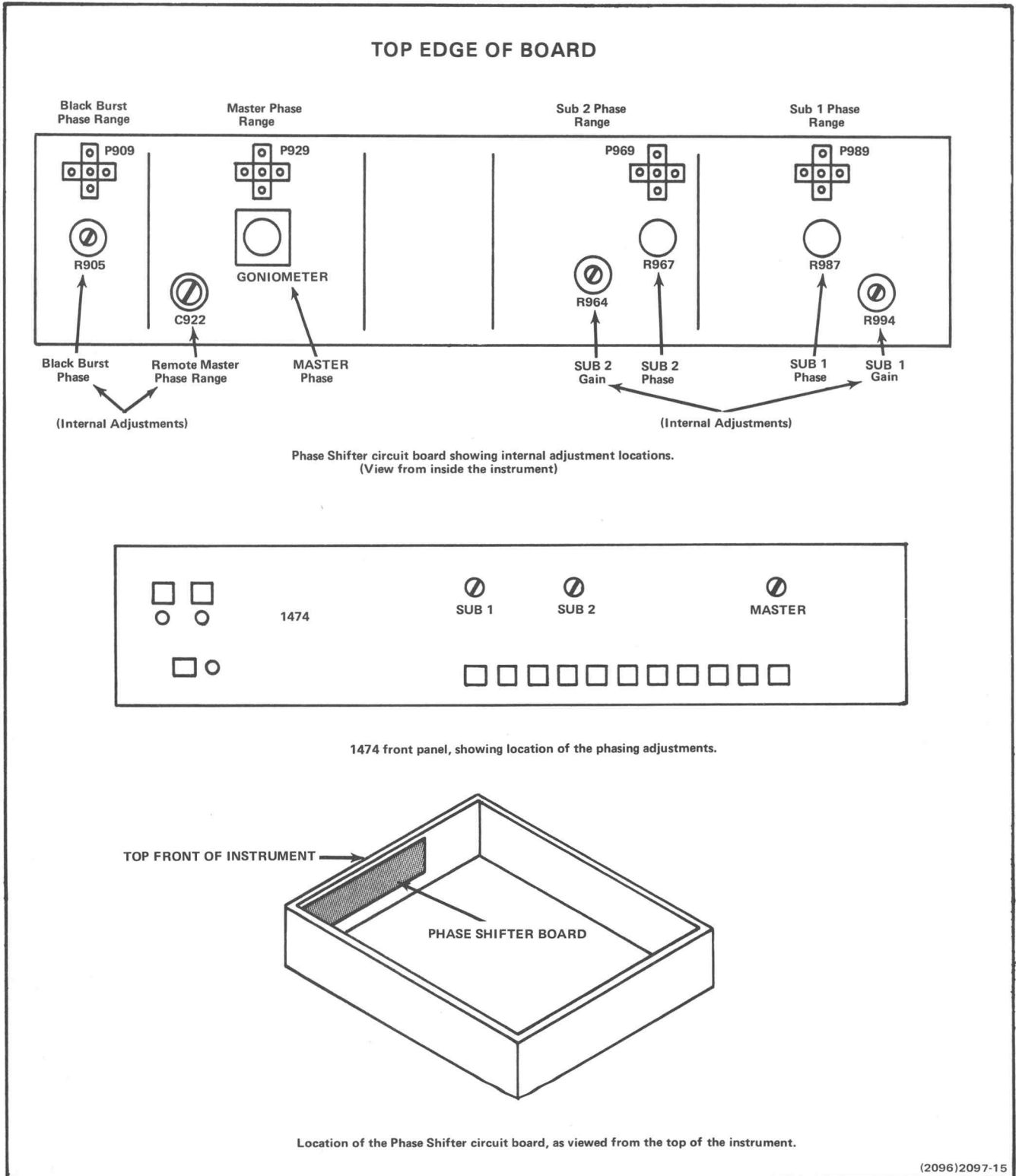
p. Connect SUB 2 through a cable and 75-ohm termination to the input of the test oscilloscope.

q. CHECK/ADJUST—SUB 2 Gain, R964, for a 2-volt waveform on the test oscilloscope.

r. Disconnect the cable from the 1474 SUB 1 connector and connect it to the 1474 SUB 2 connector.

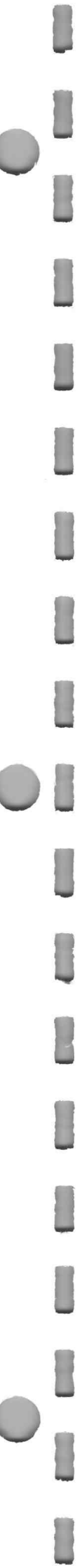
s. CHECK/ADJUST—that settings of the SUB 2 Phase controls, P969 and R967, vary the phase of SUB 2 a full 360°. Leave the controls set so that the input B vector is at the 180° mark.

t. This completes the 1474 adjustment procedure. Check that the internal AFC Dropout Blanking switch S495, Sound-in-Sync jumper P324, and Block Sync jumper P419 are positioned as required to correctly interface the 1474 Generator to the television system. Disconnect all test equipment and install the top cover on the instrument.



(2096)2097-15

Fig. 6-5. Phase Shifter board location and adjustment locations.



INSTRUMENT OPTIONS

Catalog options are listed here. Custom modifications are negotiated and documented separately.

Option 1—Sync Generator Without Gen Lock

This instrument uses the same front and rear panels as the standard 1474 Generator except for the following differences:

1. No gen lock. The Gen Lock circuit board has been removed.
2. The unused holes in the front and rear panels are plugged.



REPLACEABLE 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

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

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
53109	FELLER ASA ADOLF AG., C/O PANEL COMPONENTS CORP.	355 TESCONI CIRCLE	SANTA ROSA, CA 95401
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
03508	GENERAL ELECTRIC COMPANY, SEMI-CONDUCTOR PRODUCTS DEPARTMENT	ELECTRONICS PARK	SYRACUSE, NY 13201
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867, 19TH AVE. SOUTH	MYRTLE BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
05820	WAKEFIELD ENGINEERING, INC.	AUDUBON ROAD	WAKEFIELD, MA 01880
05828	GENERAL INSTRUMENT CORP ELECTRONIC SYSTEMS DIV.	600 W JOHN ST.	HICKSVILLE LI, NY 11802
06383	PANDUIT CORPORATION	17301 RIDGELAND	TINLEY PARK, IL 60477
06666	GENERAL DEVICES CO., INC.	525 S. WEBSTER AVE.	INDIANAPOLIS, IN 46219
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
09023	CORNELL-DUBILIER ELECTRONIC DIVISION	2652 DALRYMPLE ST.	SANFORD, NC 27330
09422	FEDERAL PACIFIC ELECTRIC CO.	2216 W. ARMITAGE AVE.	CHICAGO, IL 60647
11897	PLASTIGLIDE MFG. CORPORATION	P O BOX 867, 1757 STANFORD ST.	SANTA MONICA, CA 90406
13511	AMPHENOL CARDRE DIV., BUNKER RAMO CORP.		LOS GATOS, CA 95030
15801	FENWAL ELECTRONICS, DIV. OF KIDDE WALTER AND CO., INC.	63 FOUNTAIN ST.	FRAMINGHAM, MA 01701
18324	SIGNETICS CORP.	811 E. ARQUES	SUNNYVALE, CA 94086
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
26365	GRIES REPRODUCER CO., DIV. OF COATS AND CLARK, INC.	125 BEECHWOOD AVE.	NEW ROCHELLE, NY 10802
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
28520	HEYMAN MFG. CO.	147 N. MICHIGAN AVE.	KENILWORTH, NJ 07033
32159	WEST-CAP ARIZONA	2201 E. ELVIRA ROAD	TUCSON, AZ 85706
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
50437	RELIANCE STEEL PRODUCTS COMPANY	3700 WALNUT STREET	MCKEESPORT, PA 15132
51642	CENTRE ENGINEERING INC.	2820 E COLLEGE AVENUE	STATE COLLEGE, PA 16801
51984	NEC AMERICA INC. RADIO AND TRANSMISSION DIV.	2990 TELESTAR CT. SUITE 212 BOX 698	FALLS CHURCH, VA 22042
53944	ELT INC., GLOW LITE DIVISION	6435 N PROESEL AVENUE	PAULS VALLEY, OK 73075
55680	NICHICON/AMERICA/CORP.	87 MARSHALL ST.	CHICAGO, IL 60645
56289	SPRAGUE ELECTRIC CO.	16931 MILLIKEN AVE.	NORTH ADAMS, MA 01247
57668	R-OHM CORP.	2155 N FORBES BLVD	IRVINE, CA 92713
59660	TUSONIX INC.		TUCSON, AZ 85705
71400	BUSSMAN MFG., DIVISION OF MCGRAW- EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
71590	CENTRALAB ELECTRONICS, DIV. OF GLOBE-UNION, INC.	P O BOX 858	FORT DODGE, IA 50501
71785	TRW, CINCH CONNECTORS	1501 MORSE AVENUE	ELK GROVE VILLAGE, IL 60007
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
73899	JFD ELECTRONICS COMPONENTS CORP.	PINETREE ROAD	OXFORD, NC 27565
74921	ITEN FIBRE CO.,	4001 BENEFIT AVE., P O BOX 9	ASHTABULA, OH 44004
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
75378	CTS KNIGHTS, INC.	400 REIMANN AVE.	SANDWICH, IL 60548
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
77250	PHEOLL MANUFACTURING CO., DIVISION OF ALLIED PRODUCTS CORP.	5700 W. ROOSEVELT RD.	CHICAGO, IL 60650
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
80031	ELECTRA-MIDLAND CORP., MEPCO DIV.	22 COLUMBIA ROAD	MORRISTOWN, NJ 07960
80112	G. C. ELECTRONICS COMPANY, A DIVISION OF HYDROMETALS, INC.	3225 EXPOSITION PLACE	LOS ANGELES, CA 90018
80126	PACIFIC ELECTRICORD CO.	747 W. REDONDO BEACH, P O BOX 10	GARDENA, CA 90247
82389	SWITCHCRAFT, INC.	5555 N. ELSTON AVE.	CHICAGO, IL 60630
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
84411	TRW ELECTRONIC COMPONENTS, TRW CAPACITORS	112 W. FIRST ST.	OGALLALA, NE 69153
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E. WASHINGTON STREET P. O. BOX 372	INDIANAPOLIS, IN 46206
91418	RADIO MATERIALS COMPANY, DIV. OF P.R. MALLORY AND COMPANY, INC.	4242 W BRYN MAWR P. O. BOX 609	CHICAGO, IL 60646 COLUMBUS, NE 68601
91637	DALE ELECTRONICS, INC.	34-63 56TH ST.	WOODSIDE, NY 11377
95238	CONTINENTAL CONNECTOR CORP.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641
95987	WECKESSER CO., INC.	135 W. MAGNOLIA BLVD.	BURBANK, CA 91502
98978	INTERNATIONAL ELECTRONIC RESEARCH CORP.	U. S. HIGHWAY 1	NEW BRUNSWICK, NJ 08901
99742	PERMACEL DIV. OF JOHNSON AND JOHNSON		

Replaceable Electrical Parts—1474

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-4552-01	B010100	B019999	CKT BOARD ASSY:POWER SUPPLY	80009	670-4552-01
A1	670-4552-05	B020000	B039999	CKT BOARD ASSY:POWER SUPPLY	80009	670-4552-05
A1	670-4552-07	B040000	B050549	CKT BOARD ASSY:POWER SUPPLY	80009	670-4552-07
A1	670-4552-09	B050550		CKT BOARD ASSY:POWER SUPPLY	80009	670-4552-09
A2	670-4553-00	B010100	B019999	CKT BOARD ASSY:SYNC GENERATOR	80009	670-4553-00
A2	670-4553-01	B020000	B030363	CKT BOARD ASSY:SYNC GENERATOR	80009	670-4553-01
A2	670-4553-03	B030364	B030424	CKT BOARD ASSY:SYNC GENERATOR	80009	670-4553-03
A2	670-4553-04	B030425	B040534	CKT BOARD ASSY:SYNC GENERATOR	80009	670-4553-04
A2	670-4553-06	B040535		CKT BOARD ASSY:SYNC GENERATOR	80009	670-4553-06
A3	670-4554-00	B010100	B050549	CKT BOARD ASSY:GENERATOR LOCK (REMOVED FOR OPTION 01)	80009	670-4554-00
A3	670-4554-03	B050550		CKT BOARD ASSY:GENERATOR LOCK (REMOVED FOR OPTION 01)	80009	670-4554-03
A5	670-3953-02			CKT BOARD ASSY:OVEN CONTROL	80009	670-3953-02
A6	670-5400-01	XB020000	B020321	CKT BOARD ASSY:COLOR PHASE CONTROLLER	80009	670-5400-01
A6	670-5400-06	B020322	B050565	CKT BOARD ASSY:COLOR PHASE CONTROLLER	80009	670-5400-06
A6	670-5400-08	B050566		CKT BOARD ASSY:COLOR PHASE CONTROLLER	80009	670-5400-08
C1	290-0135-00	B010100	B050549	CAP., FXD, ELCTLT:15UF, 20%, 20V	56289	150D156X0020B2
C1	290-0135-01	B050550		CAP., FXD, ELCTLT:15UF, 20%, 20V	56289	150D156X0020B2
C5	290-0135-00	B010100	B050549	CAP., FXD, ELCTLT:15UF, 20%, 20V	56289	150D156X0020B2
C5	290-0135-01	B050550		CAP., FXD, ELCTLT:15UF, 20%, 20V	56289	150D156X0020B2
C6	290-0135-00	B010100	B050549	CAP., FXD, ELCTLT:15UF, 20%, 20V	56289	150D156X0020B2
C6	290-0135-01	B050550		CAP., FXD, ELCTLT:15UF, 20%, 20V	56289	150D156X0020B2
C7	283-0003-00			CAP., FXD, CER DI:0.01UF, +80-20%, 150V	91418	SP103Z151-4R9
C10	290-0633-00			CAP., FXD, ELCTLT:2400UF, +75-10%, 30V	56289	39D360
C18	283-0000-00	B010100	B019999X	CAP., FXD, CER DI:0.001UF, +100-0%, 500V	59660	0831610Y5P0102D
C19	283-0028-00	XB020000		CAP., FXD, CER DI:0.0022UF, 20%, 50V	56289	55C144
C20	290-0633-00			CAP., FXD, ELCTLT:2400UF, +75-10%, 30V	56289	39D360
C27	283-0004-00			CAP., FXD, CER DI:0.02UF, +80-20%, 150V	91418	SP203Z151-4R9
C30	290-0632-00			CAP., FXD, ELCTLT:6200UF, +75-10%, 15V	56289	39D357
C35	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	59660	0831610Y5P0102D
C38	283-0003-00			CAP., FXD, CER DI:0.01UF, +80-20%, 150V	91418	SP103Z151-4R9
C39	283-0059-00			CAP., FXD, CER DI:1UF, +80-20%, 50V	72982	8131N031Z5U0105Z
C48	283-0004-00			CAP., FXD, CER DI:0.02UF, +80-20%, 150V	91418	SP203Z151-4R9
C50	290-0632-00			CAP., FXD, ELCTLT:6200UF, +75-10%, 15V	56289	39D357
C56	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	59660	0831610Y5P0102D
C57	283-0004-00			CAP., FXD, CER DI:0.02UF, +80-20%, 150V	91418	SP203Z151-4R9
C58	283-0003-00			CAP., FXD, CER DI:0.01UF, +80-20%, 150V	91418	SP103Z151-4R9
C102	281-0773-00			CAP., FXD, CER DI:0.01UF, 10%, 100V	04222	SA201C103KAA
C103	283-0674-00			CAP., FXD, MICA D:85PF, 1%, 500V	00853	D155F850F0
C109	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C111	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C112	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C113	281-0592-00			CAP., FXD, CER DI:4.7PF, +/-0.5PF, 500V	59660	301-000-COH0479D
C114	281-0592-00			CAP., FXD, CER DI:4.7PF, +/-0.5PF, 500V	59660	301-000-COH0479D
C115	281-0592-00			CAP., FXD, CER DI:4.7PF, +/-0.5PF, 500V	59660	301-000-COH0479D
C116	281-0592-00			CAP., FXD, CER DI:4.7PF, +/-0.5PF, 500V	59660	301-000-COH0479D
C117	281-0592-00			CAP., FXD, CER DI:4.7PF, +/-0.5PF, 500V	59660	301-000-COH0479D
C118	281-0592-00			CAP., FXD, CER DI:4.7PF, +/-0.5PF, 500V	59660	301-000-COH0479D
C119	281-0773-00			CAP., FXD, CER DI:0.01UF, 10%, 100V	04222	SA201C103KAA
C123	290-0745-00			CAP., FXD, ELCTLT:22UF, +50-10%, 25V	56289	502D225
C124	283-0601-00			CAP., FXD, MICA D:22PF, 10%, 300V	00853	D153C220K0
C125	283-0598-00			CAP., FXD, MICA D:253PF, 5%, 300V	09023	CD15EC(253)J03
C126	283-0601-00			CAP., FXD, MICA D:22PF, 10%, 300V	00853	D153C220K0
C127	283-0601-00	B010100	B030363	CAP., FXD, MICA D:22PF, 10%, 300V	00853	D153C220K0
C127	283-0781-00	B030364		CAP., FXD, MICA D:27PF, 5%, 500V	09023	CD15ED270J03
C128	283-0601-00			CAP., FXD, MICA D:22PF, 10%, 300V	00853	D153C220K0
C129	283-0601-00			CAP., FXD, MICA D:22PF, 10%, 300V	00853	D153C220K0
C130	283-0663-00	B010100	B030424	CAP., FXD, MICA D:16.8PF, +/-0.5PF, 500V	00853	D155C16R8D0

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C130	283-0648-00	B030425		CAP., FXD, MICA D:10PF, 5%, 100V	00853	D151C100D0
C131	281-0773-00			CAP., FXD, CER DI:0.01UF, 10%, 100V	04222	SA201C103KAA
C132	281-0158-00	XB030425		CAP., VAR, CER DI:7-45PF, 50V	73899	DVJ-5006
C133	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C134	283-0663-00			CAP., FXD, MICA D:16.8PF, +/-0.5PF, 500V	00853	D155C16R8D0
C138	283-0598-00			CAP., FXD, MICA D:253PF, 5%, 300V	09023	CD15EC(253)J03
C145	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C147	283-0601-00	B010100	B010119	CAP., FXD, MICA D:22PF, 10%, 300V	00853	D153C220K0
C147	283-0615-00	B010120		CAP., FXD, MICA D:33PF, 5%, 500V	00853	D155E330J0
C155	283-0639-00	XB010120		CAP., FXD, MICA D:56PF, 1%, 100V	00853	D151E560F0
C157	283-0615-00			CAP., FXD, MICA D:33PF, 5%, 500V	00853	D155E330J0
C158	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	59660	0831610Y5P0102D
C159	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C165	283-0004-00			CAP., FXD, CER DI:0.02UF, +80-20%, 150V	91418	SP203Z151-4R9
C166	283-0691-00			CAP., FXD, MICA D:650PF, 1%, 300V	00853	D153F651F0
C167	283-0059-00			CAP., FXD, CER DI:1UF, +80-20%, 50V	72982	8131N031Z5U0105Z
C168	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C175	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C178	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	91418	MX104Z2504R0
C179	283-0639-00			CAP., FXD, MICA D:56PF, 1%, 100V	00853	D151E560F0
C183	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	91418	MX104Z2504R0
C184	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	91418	MX104Z2504R0
C185	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C192	290-0745-00	B010100	B040534	CAP., FXD, ELCTLT:22UF, +50-10%, 25V	56289	502D225
C192	290-0267-00	B040535		CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C193	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C194	283-0047-00			CAP., FXD, CER DI:270PF, 5%, 500V	72982	083152Z25D00271J
C195	283-0634-00			CAP., FXD, MICA D:65PF, 1%, 100V	00853	D151E650F0
C196	283-0633-00			CAP., FXD, MICA D:77PF, 1%, 100V	00853	D151E770F0
C197	283-0639-00			CAP., FXD, MICA D:56PF, 1%, 100V	00853	D151E560F0
C198	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C203	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V	59660	0831610Y5P0102D
C208	290-0745-00			CAP., FXD, ELCTLT:22UF, +50-10%, 25V	56289	502D225
C209	281-0773-00			CAP., FXD, CER DI:0.01UF, 10%, 100V	04222	SA201C103KAA
C212	283-0000-00	B010100	B030363X	CAP., FXD, CER DI:0.001UF, +100-0%, 500V	59660	0831610Y5P0102D
C216	283-0594-00			CAP., FXD, MICA D:0.001UF, 1%, 100V	00853	D151F102F0
C217	283-0641-00			CAP., FXD, MICA D:180PF, 1%, 100V	00853	D151E181F0
C218	283-0644-00			CAP., FXD, MICA D:150PF, 1%, 500V	00853	D155F151F0
C224	283-0047-00	B010100	B030363	CAP., FXD, CER DI:270PF, 5%, 500V	72982	083152Z25D00271J
C224	283-0631-00	B030364		CAP., FXD, MICA D:95PF, 1%, 100V	00853	D151E950F0
C226	283-0692-00			CAP., FXD, MICA D:670PF, 1%, 300V	00853	D15-3F671F0
C227	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C229	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V	91418	MX104Z2504R0
C233	283-0081-00	B010100	B030363X	CAP., FXD, CER DI:0.1UF, +80-20%, 25V	91418	MX104Z2504R0
C234	283-0081-00	B010100	B030363	CAP., FXD, CER DI:0.1UF, +80-20%, 25V	91418	MX104Z2504R0
C234	283-0631-00	B030364		CAP., FXD, MICA D:95PF, 1%, 100V	00853	D151E950F0
C235	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C237	283-0108-00	XB040535		CAP., FXD, CER DI:220PF, 10%, 200V	56289	272C13
C238	283-0690-00			CAP., FXD, MICA D:560PF, 1%, 300V	00853	D153F561F0
C243	290-0745-00	B010100	B030363X	CAP., FXD, ELCTLT:22UF, +50-10%, 25V	56289	502D225
C246	283-0089-00			CAP., FXD, CER DI:82PF, 5%, 100V	91418	CD820J1034R0
C249	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
G250	283-0599-00	B010100	B030363X	CAP., FXD, MICA D:98PF, 5%, 500V	00853	D105F980J0
C251	283-0599-00	B010100	B030363X	CAP., FXD, MICA D:98PF, 5%, 500V	00853	D105F980J0
C252	283-0599-00	B010100	B030363X	CAP., FXD, MICA D:98PF, 5%, 500V	00853	D105F980J0
C254	283-0639-00	B010100	B010119X	CAP., FXD, MICA D:56PF, 1%, 100V	00853	D151E560F0
C255	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C256	290-0267-00	B010100	B010119X	CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C260	283-0599-00	B010100	B030363X	CAP., FXD, MICA D:98PF, 5%, 500V	00853	D105F980J0

Replaceable Electrical Parts—1474

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C261	283-0599-00	B010100	B030363X	CAP., FXD, MICA D:98PF, 5%, 500V	00853	D105F980J0
C262	283-0599-00	B010100	B030363X	CAP., FXD, MICA D:98PF, 5%, 500V	00853	D105F980J0
C267	283-0636-00			CAP., FXD, MICA D:36PF, 1.4%, 100V	00853	D155E360G0
C281	290-0527-00			CAP., FXD, ELCTLT:15UF, 20%, 20V	90201	TDC156M020FL
C282	290-0527-00			CAP., FXD, ELCTLT:15UF, 20%, 20V	90201	TDC156M020FL
C291	290-0297-00			CAP., FXD, ELCTLT:39UF, 10%, 10V	56289	150D396X9010B2
C292	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C300	283-0594-00			CAP., FXD, MICA D:0.001UF, 1%, 100V (REMOVED FOR OPTION 01)	00853	D151F102F0
C305	283-0598-00			CAP., FXD, MICA D:253PF, 5%, 300V (REMOVED FOR OPTION 01)	09023	CD15EC(253)J03
C306	283-0616-00			CAP., FXD, MICA D:75PF, 5%, 500V (REMOVED FOR OPTION 01)	00853	D155E750J0
C307	283-0004-00			CAP., FXD, CER DI:0.02UF, +80-20%, 150V (REMOVED FOR OPTION 01)	91418	SP203Z151-4R9
C308	283-0203-00			CAP., FXD, CER DI:0.47UF, 20%, 50V (REMOVED FOR OPTION 01)	72982	8131M058Z5U0474M
C310	283-0594-00			CAP., FXD, MICA D:0.001UF, 1%, 100V (REMOVED FOR OPTION 01)	00853	D151F102F0
C315	283-0177-00			CAP., FXD, CER DI:1UF, +80-20%, 25V (REMOVED FOR OPTION 01)	56289	273C5
C317	290-0167-00			CAP., FXD, ELCTLT:10UF, 20%, 15V (REMOVED FOR OPTION 01)	56289	150D106X0015B2
C318	283-0256-00			CAP., FXD, CER DI:130PF, 5%, 100V (REMOVED FOR OPTION 01)	51642	200-100N1500131J
C320	283-0649-00			CAP., FXD, MICA D:105PF, 1%, 300V (REMOVED FOR OPTION 01)	00853	D153F1050F0
C322	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C323	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V (REMOVED FOR OPTION 01)	91418	MX104Z2504R0
C324	283-0177-00			CAP., FXD, CER DI:1UF, +80-20%, 25V (REMOVED FOR OPTION 01)	56289	273C5
C325	283-0003-00			CAP., FXD, CER DI:0.01UF, +80-20%, 150V (REMOVED FOR OPTION 01)	91418	SP103Z151-4R9
C326	283-0081-00			CAP., FXD, CER DI:0.1UF, +80-20%, 25V (REMOVED FOR OPTION 01)	91418	MX104Z2504R0
C330	283-0680-00			CAP., FXD, MICA D:330PF, 1%, 500V (REMOVED FOR OPTION 01)	00853	D155F331F0
C331	285-0627-00			CAP., FXD, PLSTC:0.0033UF, 5%, 100V (REMOVED FOR OPTION 01)	56289	192P33252
C332	285-0650-00			CAP., FXD, PLSTC:0.027UF, 5%, 100V (REMOVED FOR OPTION 01)	56289	192P27352
C333	285-1098-00			CAP., FXD, PLSTC:0.22UF, 10%, 80V (REMOVED FOR OPTION 01)	56289	192P2249R8
C334	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C335	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V (REMOVED FOR OPTION 01)	59660	0831610Y5P0102D
C336	283-0629-00			CAP., FXD, MICA D:62PF, 1%, 500V (REMOVED FOR OPTION 01)	00853	D105E620F0
C342	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C346	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V (REMOVED FOR OPTION 01)	59660	0831610Y5P0102D
C349	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C353	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V (REMOVED FOR OPTION 01)	59660	0831610Y5P0102D

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C355	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V (REMOVED FOR OPTION 01)	59660	0831610Y5P0102D
C357	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C361	285-0651-01			CAP., FXD, PLSTC:0.0017UF, 5%, 100V (REMOVED FOR OPTION 01)	84411	TEK44-172551
C362	285-0627-00			CAP., FXD, PLSTC:0.0033UF, 5%, 100V (REMOVED FOR OPTION 01)	56289	192P33252
C377	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C378	281-0773-00			CAP., FXD, CER DI:0.01UF, 10%, 100V (REMOVED FOR OPTION 01)	04222	SA201C103KAA
C379	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C382	283-0645-00			CAP., FXD, MICA D:790PF, 1%, 100V (REMOVED FOR OPTION 01)	00853	D151E791F0
C383	283-0645-00			CAP., FXD, MICA D:790PF, 1%, 100V (REMOVED FOR OPTION 01)	00853	D151E791F0
C384	283-0645-00			CAP., FXD, MICA D:790PF, 1%, 100V (REMOVED FOR OPTION 01)	00853	D151E791F0
C385	283-0660-00			CAP., FXD, MICA D:510PF, 2%, 500V (REMOVED FOR OPTION 01)	00853	D155F511G0
C386	283-0660-00			CAP., FXD, MICA D:510PF, 2%, 500V (REMOVED FOR OPTION 01)	00853	D155F511G0
C387	283-0004-00			CAP., FXD, CER DI:0.02UF, +80-20%, 150V (REMOVED FOR OPTION 01)	91418	SP203Z151-4R9
C388	283-0000-00			CAP., FXD, CER DI:0.001UF, +100-0%, 500V (REMOVED FOR OPTION 01)	59660	0831610Y5P0102D
C394	283-0648-00			CAP., FXD, MICA D:10PF, 5%, 100V (REMOVED FOR OPTION 01)	00853	D151C100D0
C395	283-0706-00			CAP., FXD, MICA D:91PF, +/-1PF, 500V (REMOVED FOR OPTION 01)	00853	D155F910F0
C396	283-0706-00			CAP., FXD, MICA D:91PF, +/-1PF, 500V (REMOVED FOR OPTION 01)	00853	D155F910F0
C398	283-0648-00			CAP., FXD, MICA D:10PF, 5%, 100V (REMOVED FOR OPTION 01)	00853	D151C100D0
C403	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C404	283-0104-00			CAP., FXD, CER DI:2000PF, 5%, 500V (REMOVED FOR OPTION 01)	72982	811-565B202J
C407	283-0104-00			CAP., FXD, CER DI:2000PF, 5%, 500V (REMOVED FOR OPTION 01)	72982	811-565B202J
C411	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C416	283-0080-00			CAP., FXD, CER DI:0.022UF, +80-20%, 25V (REMOVED FOR OPTION 01)	91418	MX223Z2504R0
C421	285-0916-00			CAP., FXD, PLSTC:0.01UF, 5%, 100V (REMOVED FOR OPTION 01)	84411	TEK35-10351
C422	283-0028-00			CAP., FXD, CER DI:0.0022UF, 20%, 50V (REMOVED FOR OPTION 01)	56289	55C144
C423	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C424	281-0510-00			CAP., FXD, CER DI:22PF, +/-4.4PF, 500V (REMOVED FOR OPTION 01)	59660	301-000C0G0220M
C425	290-0188-00			CAP., FXD, ELCTLT:0.1UF, 10%, 35V (REMOVED FOR OPTION 01)	56289	162D104X9035BC2
C428	281-0510-00			CAP., FXD, CER DI:22PF, +/-4.4PF, 500V (REMOVED FOR OPTION 01)	59660	301-000C0G0220M

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C429	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C437	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C447	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C452	285-1098-00			CAP., FXD, PLSTC:0.22UF, 10%, 80V (REMOVED FOR OPTION 01)	56289	192P2249R8
C459	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C462	285-0629-00			CAP., FXD, PLSTC:0.047UF, 20%, 100V (REMOVED FOR OPTION 01)	56289	192P47302
C466	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C493	290-0267-00			CAP., FXD, ELCTLT:1UF, 20%, 35V (REMOVED FOR OPTION 01)	56289	162D105X0035CD2
C494	290-0746-00			CAP., FXD, ELCTLT:47UF, +50-10%, 16V (REMOVED FOR OPTION 01)	55680	16U-47V-T
C495	290-0746-00			CAP., FXD, ELCTLT:47UF, +50-10%, 16V (REMOVED FOR OPTION 01)	55680	16U-47V-T
C902	290-0267-00	XB020000		CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C905	283-0638-00	XB020000		CAP., FXD, MICA D:130PF, 1%, 100V	00853	D151F131F0
C906	283-0677-00	XB020000		CAP., FXD, MICA D:82PF, 1%, 500V	00853	D155E820F0
C916	283-0641-00	XB020000		CAP., FXD, MICA D:180PF, 1%, 100V	00853	D151E181F0
C917	283-0644-00	XB020000		CAP., FXD, MICA D:150PF, 1%, 500V	00853	D155F151F0
C918	281-0775-00	XB020000		CAP., FXD, CER DI:0.1UF, 20%, 50V	04222	SA205E104MAA
C921	281-0775-00	XB020000		CAP., FXD, CER DI:0.1UF, 20%, 50V	04222	SA205E104MAA
C922	281-0205-00	XB020000		CAP., VAR, PLSTC:5.5-65PF, 100V	80031	2810C5R565QJ02F0
C923	283-0601-00	XB020000		CAP., FXD, MICA D:22PF, 10%, 300V	00853	D153C220K0
C934	281-0775-00	XB020000		CAP., FXD, CER DI:0.1UF, 20%, 50V	04222	SA205E104MAA
C957	281-0775-00	XB020000		CAP., FXD, CER DI:0.1UF, 20%, 50V	04222	SA205E104MAA
C958	290-0267-00	XB020000		CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C959	283-0644-00	XB020000		CAP., FXD, MICA D:150PF, 1%, 500V	00853	D155F151F0
C960	290-0267-00	XB020000		CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C966	283-0638-00	XB020000		CAP., FXD, MICA D:130PF, 1%, 100V	00853	D151F131F0
C967	283-0641-00	XB020000		CAP., FXD, MICA D:180PF, 1%, 100V	00853	D151E181F0
C968	290-0134-00	XB020000		CAP., FXD, ELCTLT:22UF, 20%, 15V	56289	150D226X0015B2
C969	283-0677-00	XB020000		CAP., FXD, MICA D:82PF, 1%, 500V	00853	D155E820F0
C974	290-0267-00	XB020000		CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C976	283-0641-00	XB020000		CAP., FXD, MICA D:180PF, 1%, 100V	00853	D151E181F0
C977	281-0775-00	XB020000		CAP., FXD, CER DI:0.1UF, 20%, 50V	04222	SA205E104MAA
C978	290-0267-00	XB020000		CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
C986	283-0644-00	XB020000		CAP., FXD, MICA D:150PF, 1%, 500V	00853	D155F151F0
C987	290-0134-00	XB020000		CAP., FXD, ELCTLT:22UF, 20%, 15V	56289	150D226X0015B2
C995	283-0677-00	XB020000		CAP., FXD, MICA D:82PF, 1%, 500V	00853	D155E820F0
C996	283-0638-00	XB020000		CAP., FXD, MICA D:130PF, 1%, 100V	00853	D151F131F0
C997	290-0267-00	XB020000		CAP., FXD, ELCTLT:1UF, 20%, 35V	56289	162D105X0035CD2
CR12	152-0141-02	XB020000		SEMICONV DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR50	152-0488-00			SEMICONV DEVICE:SILICON, 200V, 1500MA	04713	SDA317
CR51	152-0488-00			SEMICONV DEVICE:SILICON, 200V, 1500MA	04713	SDA317
CR52	152-0556-00			SEMICONV DEVICE:BRIDGE, 50V, 2.5A	05828	KBL005-8
CR156	152-0141-02			SEMICONV DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR157	152-0141-02			SEMICONV DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR165	152-0141-02			SEMICONV DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR166	152-0141-02			SEMICONV DEVICE:SILICON, 30V, 150MA	01295	1N4152R
CR168	152-0141-02			SEMICONV DEVICE:SILICON, 30V, 150MA	01295	1N4152R

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR186	152-0270-00			SEMICON D DEVICE: SILICON, 56PF AT 4V	04713	SMV1563
CR203	152-0141-02	XB030364		SEMICON D DEVICE: SILICON, 30V, 150MA	01295	1N4152R
CR256	152-0269-00	B010100	B019999	SEMICON D DEVICE: SILICON, VAR VCAP., 4V, 33PF	04713	SMV1263
CR256	152-0269-01	B020000		SEMICON D DEVICE: VVC, SI, 33PF, 5%, 35V	80009	152-0269-01
CR305	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR326	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR327	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR335	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR337	152-0153-00			SEMICON D DEVICE: SILICON, 15V, 50MA (REMOVED FOR OPTION 01)	07263	FD7003
CR339	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR415	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR416	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR423	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR424	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR429	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR448	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR449	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR471	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR481	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR485	152-0141-02			SEMICON D DEVICE: SILICON, 30V, 150MA (REMOVED FOR OPTION 01)	01295	1N4152R
CR924	152-0141-02	XB020000		SEMICON D DEVICE: SILICON, 30V, 150MA	01295	1N4152R
CR935	152-0269-01	XB020000		SEMICON D DEVICE: VVC, SI, 33PF, 5%, 35V	80009	152-0269-01
DS78	150-0035-00	B010100	B010108X	LAMP, GLOW: 90V, 0.3MA	53944	A1B-3
DS86	150-0035-00			LAMP, GLOW: 90V, 0.3MA	53944	A1B-3
DS494	150-1017-00			LT EMITTING DIO: GREEN, 550NM, 55MA MAX (REMOVED FOR OPTION 01)	50437	LSM-16L-100
DS495	150-1017-00			LT EMITTING DIO: GREEN, 550NM, 55MA MAX (REMOVED FOR OPTION 01)	50437	LSM-16L-100
F75	159-0032-00	B010100	B010185	FUSE, CARTRIDGE: 3AG, 0.5A, 250V, SLOW-BLOW	71400	MDL 1/2
F75	159-0019-00	B010186		FUSE, CARTRIDGE: 3AG, 1A, 250V, SLOW BLOW	71400	MDL1
F76	159-0032-00	B010100	B010185	FUSE, CARTRIDGE: 3AG, 0.5A, 250V, SLOW-BLOW	71400	MDL 1/2
F76	159-0019-00	B010186		FUSE, CARTRIDGE: 3AG, 1A, 250V, SLOW BLOW	71400	MDL1
F85	159-0032-00	B010100	B010185	FUSE, CARTRIDGE: 3AG, 0.5A, 250V, SLOW-BLOW	71400	MDL 1/2
F85	159-0019-00	B010186		FUSE, CARTRIDGE: 3AG, 1A, 250V, SLOW BLOW	71400	MDL1
F89	159-0022-00			FUSE, CARTRIDGE: 3AG, 1A, 250V, FAST-BLOW	71400	AGC 1
L103	108-0443-00			COIL, RF: 25UH	80009	108-0443-00
L205	114-0222-00			COIL, RF: 2-6UH, CORE 276-0568-00	80009	114-0222-00
L217	108-0443-00			COIL, RF: 25UH	80009	108-0443-00
L317	108-0317-00			COIL, RF: FIXED, 15UH (REMOVED FOR OPTION 01)	32159	71501M

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
L336	108-0443-00			COIL, RF: 25UH (REMOVED FOR OPTION 01)	80009	108-0443-00
L385	108-0231-00			COIL, RF: 4.5UH (REMOVED FOR OPTION 01)	80009	108-0231-00
L394	108-0214-00			COIL, RF: 400UH (REMOVED FOR OPTION 01)	80009	108-0214-00
L397	108-0214-00			COIL, RF: 400UH (REMOVED FOR OPTION 01)	80009	108-0214-00
L905	108-0317-00	XB020000		COIL, RF: FIXED, 15UH	32159	71501M
L918	108-0443-00	XB020000		COIL, RF: 25UH	80009	108-0443-00
L923	108-0317-00	XB020000		COIL, RF: FIXED, 15UH	32159	71501M
L957	108-0443-00	XB020000		COIL, RF: 25UH	80009	108-0443-00
L965	108-0317-00	XB020000		COIL, RF: FIXED, 15UH	32159	71501M
L975	108-0443-00	XB020000		COIL, RF: 25UH	80009	108-0443-00
L994	108-0317-00	XB020000		COIL, RF: FIXED, 15UH	32159	71501M
Q6	151-0188-00			TRANSISTOR: SILICON, PNP	04713	SPS6868K
Q18	151-0301-00			TRANSISTOR: SILICON, PNP	27014	2N2907A
Q28	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q29	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q35	151-0301-00			TRANSISTOR: SILICON, PNP	27014	2N2907A
Q36	151-0188-00			TRANSISTOR: SILICON, PNP	04713	SPS6868K
Q37	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q39	151-0352-00			TRANSISTOR: SILICON, NPN	03508	X44C282
Q48	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q49	151-0352-00			TRANSISTOR: SILICON, NPN	03508	X44C282
Q56	151-0301-00			TRANSISTOR: SILICON, PNP	27014	2N2907A
Q57	151-0188-00			TRANSISTOR: SILICON, PNP	04713	SPS6868K
Q58	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q59	151-0352-00			TRANSISTOR: SILICON, NPN	03508	X44C282
Q68	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q103	151-0188-00			TRANSISTOR: SILICON, PNP	04713	SPS6868K
Q146	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q156	151-0188-00			TRANSISTOR: SILICON, PNP	04713	SPS6868K
Q177	151-0103-00			TRANSISTOR: SILICON, NPN	80009	151-0103-00
Q201	151-0402-00			TRANSISTOR: SILICON, NPN, SEL FROM 3571TP	80009	151-0402-00
Q202	151-0220-00			TRANSISTOR: SILICON, PNP	07263	S036228
Q203	151-0220-00			TRANSISTOR: SILICON, PNP	07263	S036228
Q204	151-0402-00			TRANSISTOR: SILICON, NPN, SEL FROM 3571TP	80009	151-0402-00
Q206	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q208	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q211	151-0220-00	B010100	B030363X	TRANSISTOR: SILICON, PNP	07263	S036228
Q213	151-0402-00	B010100	B030363X	TRANSISTOR: SILICON, NPN, SEL FROM 3571TP	80009	151-0402-00
Q218	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q219	151-0190-00			TRANSISTOR: SILICON, NPN	07263	S032677
Q222	151-0402-00	B010100	B030363X	TRANSISTOR: SILICON, NPN, SEL FROM 3571TP	80009	151-0402-00
Q223	151-0220-00	B010100	B030363X	TRANSISTOR: SILICON, PNP	07263	S036228
Q236	151-0216-00			TRANSISTOR: SILICON, PNP	04713	SPS8803
Q248	151-0188-00			TRANSISTOR: SILICON, PNP	04713	SPS6868K
Q258	151-0367-00	B010100	B030448	TRANSISTOR: SILICON, NPN, SEL FROM 3571TP	01295	SKA6516
Q258	151-0367-01	B030449		TRANSISTOR: SILICON, NPN, SEL	01295	SKC0536
Q285	151-0223-00			TRANSISTOR: SILICON, NPN	04713	SPS8026
Q300	151-0221-00			TRANSISTOR: SILICON, PNP (REMOVED FOR OPTION 01)	04713	SPS246
Q313	151-0190-00			TRANSISTOR: SILICON, NPN (REMOVED FOR OPTION 01)	07263	S032677
Q314	151-0190-00			TRANSISTOR: SILICON, NPN (REMOVED FOR OPTION 01)	07263	S032677

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q320	151-0221-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	04713	SPS246
Q336	151-0188-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	04713	SPS6868K
Q338	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677
Q345	151-0192-00 -----			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521 (REMOVED FOR OPTION 01)	04713	SPS8801
Q346	151-0367-00	B010100	B030448	TRANSISTOR:SILICON,NPN,SEL FROM 3571TP (REMOVED FOR OPTION 01)	01295	SKA6516
Q346	151-0367-01 -----	B030449		TRANSISTOR:SILICON,NPN,SEL (REMOVED FOR OPTION 01)	01295	SKC0536
Q347	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677
Q359	151-0223-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	04713	SPS8026
Q363	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677
Q364	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677
Q369	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677
Q383	151-0269-00 -----	B010100	B030498	TRANSISTOR:SILICON,NPN,SEL FROM SE3005 (REMOVED FOR OPTION 01)	51984	41632BD
Q383	151-0269-01 -----	B030499		TRANSISTOR:SILICON,NPN,SCREENED (REMOVED FOR OPTION 01)	80009	151-0269-01
Q384	151-0269-00 -----	B010100	B030498	TRANSISTOR:SILICON,NPN,SEL FROM SE3005 (REMOVED FOR OPTION 01)	51984	41632BD
Q384	151-0269-01 -----	B030499		TRANSISTOR:SILICON,NPN,SCREENED (REMOVED FOR OPTION 01)	80009	151-0269-01
Q393	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677
Q404	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677
Q405	151-0192-00 -----			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521 (REMOVED FOR OPTION 01)	04713	SPS8801
Q406	151-0192-00 -----			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521 (REMOVED FOR OPTION 01)	04713	SPS8801
Q408	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677
Q412	151-1005-00 -----	B010100	B030448	TRANSISTOR:SILICON,JFE,N-CHANNEL (REMOVED FOR OPTION 01)	80009	151-1005-00
Q412	151-1005-02 -----	B030449		TRANSISTOR:SILICON,JFE,N-CHANNEL,CHK (REMOVED FOR OPTION 01)	80009	151-1005-02
Q417	151-1005-00 -----	B010100	B030448	TRANSISTOR:SILICON,JFE,N-CHANNEL (REMOVED FOR OPTION 01)	80009	151-1005-00
Q417	151-1005-02 -----	B030449		TRANSISTOR:SILICON,JFE,N-CHANNEL,CHK (REMOVED FOR OPTION 01)	80009	151-1005-02
Q433	151-1005-00 -----	B010100	B030448	TRANSISTOR:SILICON,JFE,N-CHANNEL (REMOVED FOR OPTION 01)	80009	151-1005-00
Q433	151-1005-02 -----	B030449		TRANSISTOR:SILICON,JFE,N-CHANNEL,CHK (REMOVED FOR OPTION 01)	80009	151-1005-02
Q438	151-1005-00 -----	B010100	B030448	TRANSISTOR:SILICON,JFE,N-CHANNEL (REMOVED FOR OPTION 01)	80009	151-1005-00
Q438	151-1005-02 -----	B030449		TRANSISTOR:SILICON,JFE,N-CHANNEL,CHK (REMOVED FOR OPTION 01)	80009	151-1005-02
Q446	151-0190-00 -----			TRANSISTOR:SILICON,NPN (REMOVED FOR OPTION 01)	07263	S032677

Replaceable Electrical Parts—1474

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q460	151-0190-00			TRANSISTOR: SILICON, NPN (REMOVED FOR OPTION 01)	07263	S032677
Q464	151-0190-00			TRANSISTOR: SILICON, NPN (REMOVED FOR OPTION 01)	07263	S032677
Q903	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q912	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q914	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q924	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q936	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q940	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q946	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q950	151-0103-00	XB020000		TRANSISTOR: SILICON, NPN	80009	151-0103-00
Q951	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q954	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q963	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q964	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q973	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q982	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q983	151-0103-00	XB020000		TRANSISTOR: SILICON, NPN	80009	151-0103-00
Q993	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q994	151-0190-00	XB020000		TRANSISTOR: SILICON, NPN	07263	S032677
Q1001	151-0216-00			TRANSISTOR: SILICON, PNP	04713	SPS8803
Q1002	151-0405-00	B010100	B030503	TRANSISTOR: SILICON, NPN, SEL FROM MJE800	04713	SJE943
Q1002	151-0405-02	B030504		TRANSISTOR: SILICON, NPN, SCREENED	80009	151-0405-02
R7	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R8	315-0301-00			RES., FXD, CMPSN: 300 OHM, 5%, 0.25W	01121	CB3015
R9	315-0331-00			RES., FXD, CMPSN: 330 OHM, 5%, 0.25W	01121	CB3315
R11	315-0153-00	XB020000		RES., FXD, CMPSN: 15K OHM, 5%, 0.25W	01121	CB1535
R12	315-0102-00	XB020000		RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R13	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R14	315-0101-00	B010100	B019999	RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R14	315-0102-00	B020000		RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R15	308-0245-00	B010100	B019999	RES., FXD, WW: 0.6 OHM, 5%, 2W	91637	CW2B30 0.60HM 5%
R15	308-0463-00	B020000		RES., FXD, WW: 0.3 OHM, 1%, 3W	91637	RS2B-KR3000F
R16	321-0172-00			RES., FXD, FILM: 604 OHM, 1%, 0.125W	91637	MFF1816G604R0F
R17	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
R18	321-0173-00			RES., FXD, FILM: 619 OHM, 1%, 0.125W	91637	MFF1816G619R0F
R25	321-0189-00			RES., FXD, FILM: 909 OHM, 1%, 0.125W	91637	MFF1816G909R0F
R26	315-0152-00			RES., FXD, CMPSN: 1.5K OHM, 5%, 0.25W	01121	CB1525
R27	315-0431-00			RES., FXD, CMPSN: 430 OHM, 5%, 0.25W	01121	CB4315
R28	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R34	315-0182-00			RES., FXD, CMPSN: 1.8K OHM, 5%, 0.25W	01121	CB1825
R35	321-0224-00			RES., FXD, FILM: 2.1K OHM, 1%, 0.125W	91637	MFF1816G21000F
R36	308-0755-00			RES., FXD, WW: 0.75 OHM, 5%, 2W	75042	BWH-R7500J
R37	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R38	315-0301-00			RES., FXD, CMPSN: 300 OHM, 5%, 0.25W	01121	CB3015
R39	315-0682-00			RES., FXD, CMPSN: 6.8K OHM, 5%, 0.25W	01121	CB6825
R43	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R44	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
R45	321-0189-00			RES., FXD, FILM: 909 OHM, 1%, 0.125W	91637	MFF1816G909R0F
R46	315-0431-00			RES., FXD, CMPSN: 430 OHM, 5%, 0.25W	01121	CB4315
R47	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R48	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R49	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R53	308-0245-00			RES., FXD, WW: 0.6 OHM, 5%, 2W	91637	CW2B30 0.60HM 5%

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R54	315-0752-00			RES., FXD, CMPSN: 7.5K OHM, 5%, 0.25W	01121	CB7525
R55	315-0752-00			RES., FXD, CMPSN: 7.5K OHM, 5%, 0.25W	01121	CB7525
R56	315-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.25W	01121	CB7515
R57	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R58	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R62	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R63	321-0197-00			RES., FXD, FILM: 1.1K OHM, 1%, 0.125W	91637	MFF1816G11000F
R64	315-0752-00			RES., FXD, CMPSN: 7.5K OHM, 5%, 0.25W	01121	CB7525
R65	321-0189-00			RES., FXD, FILM: 909 OHM, 1%, 0.125W	91637	MFF1816G909R0F
R66	315-0431-00			RES., FXD, CMPSN: 430 OHM, 5%, 0.25W	01121	CB4315
R67	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R68	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W	01121	CB4715
R69	315-0101-00	B010100	B019999	RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R69	315-0470-00	B020000		RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R88	315-0304-00	B010100	B010108X	RES., FXD, CMPSN: 300K OHM, 5%, 0.25W	01121	CB3045
R96	315-0304-00			RES., FXD, CMPSN: 300K OHM, 5%, 0.25W	01121	CB3045
R101	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R102	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R103	315-0511-00			RES., FXD, CMPSN: 510 OHM, 5%, 0.25W	01121	CB5115
R104	321-0265-00			RES., FXD, FILM: 5.62K OHM, 1%, 0.125W	91637	MFF1816G56200F
R105	321-0232-00			RES., FXD, FILM: 2.55K OHM, 1%, 0.125W	91637	MFF1816G25500F
R108	321-0164-00			RES., FXD, FILM: 499 OHM, 1%, 0.125W	91637	MFF1816G499R0F
R109	321-0204-00			RES., FXD, FILM: 1.3K OHM, 1%, 0.125W	91637	MFF1816G13000F
R112	321-0204-00			RES., FXD, FILM: 1.3K OHM, 1%, 0.125W	91637	MFF1816G13000F
R113	321-0277-00			RES., FXD, FILM: 7.5K OHM, 1%, 0.125W	91637	MFF1816G75000F
R114	321-0193-00			RES., FXD, FILM: 1K OHM, 1%, 0.125W	91637	MFF1816G10000F
R115	321-0093-00			RES., FXD, FILM: 90.9 OHM, 1%, 0.125W	91637	MFF1816G909R0F
R116	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R117	321-0195-00			RES., FXD, FILM: 1.05K OHM, 1%, 0.125W	91637	MFF1816G10500F
R119	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R120	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R121	321-0251-00			RES., FXD, FILM: 4.02K OHM, 1%, 0.125W	91637	MFF1816G40200F
R122	321-0251-00			RES., FXD, FILM: 4.02K OHM, 1%, 0.125W	91637	MFF1816G40200F
R123	321-0275-00			RES., FXD, FILM: 7.15K OHM, 1%, 0.125W	91637	MFF1816G71500F
R124	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R125	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R126	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R127	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R128	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R129	321-0293-00			RES., FXD, FILM: 11K OHM, 1%, 0.125W	91637	MFF1816G11001F
R131	321-0185-00			RES., FXD, FILM: 825 OHM, 1%, 0.125W	91637	MFF1816G825R0F
R132	321-0280-00			RES., FXD, FILM: 8.06K OHM, 1%, 0.125W	91637	MFF1816G80600F
R133	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R139	311-1560-00			RES., VAR, NONWIR: 5K OHM, 20%, 0.50W	73138	91-82-0
R141	315-0432-00			RES., FXD, CMPSN: 4.3K OHM, 5%, 0.25W	01121	CB4325
R142	321-0274-00			RES., FXD, FILM: 6.98K OHM, 1%, 0.125W	91637	MFF1816G69800F
R144	315-0203-00			RES., FXD, CMPSN: 20K OHM, 5%, 0.25W	01121	CB2035
R145	315-0914-00			RES., FXD, CMPSN: 910K OHM, 5%, 0.25W	01121	CB9145
R147	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
R148	321-0291-00			RES., FXD, FILM: 10.5K OHM, 1%, 0.125W	91637	MFF1816G10501F
R149	315-0431-00			RES., FXD, CMPSN: 430 OHM, 5%, 0.25W	01121	CB4315
R154	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R155	315-0105-00			RES., FXD, CMPSN: 1M OHM, 5%, 0.25W	01121	CB1055
R156	315-0562-00			RES., FXD, CMPSN: 5.6K OHM, 5%, 0.25W	01121	CB5625
R157	315-0303-00			RES., FXD, CMPSN: 30K OHM, 5%, 0.25W	01121	CB3035
R158	315-0473-00			RES., FXD, CMPSN: 47K OHM, 5%, 0.25W	01121	CB4735
R159	315-0473-00			RES., FXD, CMPSN: 47K OHM, 5%, 0.25W	01121	CB4735

Replaceable Electrical Parts—1474

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R167	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
R175	315-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.25W	01121	CB7515
R176	315-0104-00			RES., FXD, CMPSN: 100K OHM, 5%, 0.25W	01121	CB1045
R177	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W	01121	CB1015
R178	305-0271-00	B010100	B019999	RES., FXD, CMPSN: 270 OHM, 5%, 2W	01121	HB2715
R178	303-0471-00	B020000		RES., FXD, CMPSN: 470 OHM, 5%, 1W	01121	GB4715
R179	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R184	315-0100-00	B010100	B030363X	RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R186	315-0223-00			RES., FXD, CMPSN: 22K OHM, 5%, 0.25W	01121	CB2235
R189	321-0085-00			RES., FXD, FILM: 75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R194	315-0100-00	B010100	B030363X	RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R195	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W	01121	CB1035
R196	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
R197	321-0293-00			RES., FXD, FILM: 11K OHM, 1%, 0.125W	91637	MFF1816G11001F
R198	321-0251-00			RES., FXD, FILM: 4.02K OHM, 1%, 0.125W	91637	MFF1816G40200F
R200	315-0472-00	XB010120		RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W	01121	CB4725
R201	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R202	315-0181-00			RES., FXD, CMPSN: 180 OHM, 5%, 0.25W	01121	CB1815
R203	315-0181-00			RES., FXD, CMPSN: 180 OHM, 5%, 0.25W	01121	CB1815
R204	315-0150-00			RES., FXD, CMPSN: 15 OHM, 5%, 0.25W	01121	CB1505
R205	315-0150-00			RES., FXD, CMPSN: 15 OHM, 5%, 0.25W	01121	CB1505
R206	315-0182-00			RES., FXD, CMPSN: 1.8K OHM, 5%, 0.25W	01121	CB1825
R207	321-0277-00			RES., FXD, FILM: 7.5K OHM, 1%, 0.125W	91637	MFF1816G75000F
R208	321-0235-00			RES., FXD, FILM: 2.74K OHM, 1%, 0.125W	91637	MFF1816G27400F
R209	315-0752-00			RES., FXD, CMPSN: 7.5K OHM, 5%, 0.25W	01121	CB7525
R212	315-0150-00	B010100	B030363X	RES., FXD, CMPSN: 15 OHM, 5%, 0.25W	01121	CB1505
R213	315-0150-00	B010100	B030363X	RES., FXD, CMPSN: 15 OHM, 5%, 0.25W	01121	CB1505
R214	315-0181-00	B010100	B030363X	RES., FXD, CMPSN: 180 OHM, 5%, 0.25W	01121	CB1815
R215	315-0104-00			RES., FXD, CMPSN: 100K OHM, 5%, 0.25W	01121	CB1045
R216	315-0621-00			RES., FXD, CMPSN: 620 OHM, 5%, 0.25W	01121	CB6215
R217	315-0473-00			RES., FXD, CMPSN: 47K OHM, 5%, 0.25W	01121	CB4735
R218	321-0235-00			RES., FXD, FILM: 2.74K OHM, 1%, 0.125W	91637	MFF1816G27400F
R219	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R221	315-0393-00			RES., FXD, CMPSN: 39K OHM, 5%, 0.25W	01121	CB3935
R222	315-0393-00	B010100	B030363X	RES., FXD, CMPSN: 39K OHM, 5%, 0.25W	01121	CB3935
R223	315-0393-00	B010100	B030363	RES., FXD, CMPSN: 39K OHM, 5%, 0.25W	01121	CB3935
R223	315-0102-00	B030364		RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R224	315-0181-00	B010100	B030363	RES., FXD, CMPSN: 180 OHM, 5%, 0.25W	01121	CB1815
R224	321-0228-00	B030364		RES., FXD, FILM: 2.32K OHM, 1%, 0.125W	91637	MFF1816G23200F
R225	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R226	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R227	315-0151-00			RES., FXD, CMPSN: 150 OHM, 5%, 0.25W	01121	CB1515
R228	315-0470-00			RES., FXD, CMPSN: 47 OHM, 5%, 0.25W	01121	CB4705
R229	321-0293-00			RES., FXD, FILM: 11K OHM, 1%, 0.125W	91637	MFF1816G11001F
R230	311-1560-00			RES., VAR, NONWIR: 5K OHM, 20%, 0.50W	73138	91-82-0
R231	315-0393-00	B010100	B030363X	RES., FXD, CMPSN: 39K OHM, 5%, 0.25W	01121	CB3935
R232	315-0393-00	B010100	B030363	RES., FXD, CMPSN: 39K OHM, 5%, 0.25W	01121	CB3935
R232	311-1557-00	B030364		RES., VAR, NONWIR: 25K OHM, 20%, 0.50W	73138	91-79-0
R233	315-0393-00	B010100	B030363X	RES., FXD, CMPSN: 39K OHM, 5%, 0.25W	01121	CB3935
R234	315-0100-00	B010100	B030363	RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R234	321-0228-00	B030364		RES., FXD, FILM: 2.32K OHM, 1%, 0.125W	91637	MFF1816G23200F
R236	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R237	315-0104-00			RES., FXD, CMPSN: 100K OHM, 5%, 0.25W	01121	CB1045
R238	315-0203-00			RES., FXD, CMPSN: 20K OHM, 5%, 0.25W	01121	CB2035
R241	311-1557-00	XB030364		RES., VAR, NONWIR: 25K OHM, 20%, 0.50W	73138	91-79-0
R244	315-0102-00	XB030364		RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R245	315-0430-00			RES., FXD, CMPSN: 43 OHM, 5%, 0.25W	01121	CB4305

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R246	315-0112-00	B010100	B010119	RES., FXD, CMPSN: 1.1K OHM, 5%, 0.25W	01121	CB1125
R246	315-0112-00	B010120		RES., FXD, CMPSN: 1.1K OHM, 5%, 0.25W	01121	CB1125
R247	315-0272-00	B010100	B010119	RES., FXD, CMPSN: 2.7K OHM, 5%, 0.25W	01121	CB2725
R247	315-0181-00	B010120		RES., FXD, CMPSN: 180 OHM, 5%, 0.25W	01121	CB1815
R248	311-1559-00			RES., VAR, NONWIR: 10K OHM, 20%, 0.50W	73138	91-81-0
R254	315-0102-00	B010100	B019999X	RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R254	315-0100-00	XB030364		RES., FXD, CMPSN: 10 OHM, 5%, 0.25W	01121	CB1005
R256	315-0104-00			RES., FXD, CMPSN: 100K OHM, 5%, 0.25W	01121	CB1045
R257	315-0753-00			RES., FXD, CMPSN: 75K OHM, 5%, 0.25W	01121	CB7535
R258	315-0512-00			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W	01121	CB5125
R259	321-0303-00			RES., FXD, FILM: 14K OHM, 1%, 0.125W	91637	MFF1816G14001F
R261	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R268	315-0154-00			RES., FXD, CMPSN: 150K OHM, 5%, 0.25W	01121	CB1545
R283	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R284	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R285	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R286	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W	01121	CB1025
R294	315-0333-00			RES., FXD, CMPSN: 33K OHM, 5%, 0.25W	01121	CB3335
R300	321-0326-00			RES., FXD, FILM: 24.3K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G24301F
R301	315-0751-00			RES., FXD, CMPSN: 750 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB7515
R302	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1535
R303	315-0104-00			RES., FXD, CMPSN: 100K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1045
R305	315-0625-00			RES., FXD, CMPSN: 6.2M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB6255
R307	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R309	315-0243-00			RES., FXD, CMPSN: 24K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2435
R310	315-0625-00			RES., FXD, CMPSN: 6.2M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB6255
R311	321-0308-00			RES., FXD, FILM: 15.8K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G15801F
R312	321-0270-00			RES., FXD, FILM: 6.34K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G63400F
R313	315-0754-00			RES., FXD, CMPSN: 750K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB7545
R314	321-0311-00			RES., FXD, FILM: 16.9K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G16901F
R315	311-1271-00			RES., VAR, NONWIR: 50K OHM, 10%, 0.50W (REMOVED FOR OPTION 01)	32997	3329P-L58-503
R316	315-0391-00			RES., FXD, CMPSN: 390 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3915
R317	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1535
R318	315-0154-00			RES., FXD, CMPSN: 150K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1545
R319	315-0566-00			RES., FXD, CMPSN: 56M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5665
R320	315-0223-00			RES., FXD, CMPSN: 22K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2235
R321	315-0223-00			RES., FXD, CMPSN: 22K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2235
R322	321-0255-00			RES., FXD, FILM: 4.42K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G44200F

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R323	315-0563-00 -----			RES., FXD, CMPSN: 56K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5635
R324	315-0512-00 -----			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R325	315-0512-00 -----			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R326	315-0101-00 -----			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R327	315-0104-00 -----			RES., FXD, CMPSN: 100K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1045
R328	315-0302-00 -----			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3025
R329	315-0202-00 -----			RES., FXD, CMPSN: 2K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2025
R330	321-0229-00 -----			RES., FXD, FILM: 2.37K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G23700F
R331	311-1558-00 -----			RES., VAR, NONWIR: 20K OHM, 20%, 0.50W (REMOVED FOR OPTION 01)	73138	91-80-0
R332	315-0100-00 -----			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1005
R333	315-0512-00 -----			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R334	315-0512-00 -----			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R335	315-0473-00 -----			RES., FXD, CMPSN: 47K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4735
R336	315-0473-00 -----			RES., FXD, CMPSN: 47K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4735
R337	315-0102-00 -----			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R338	315-0124-00 -----			RES., FXD, CMPSN: 120K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1245
R339	315-0362-00 -----	B010100	B010107	RES., FXD, CMPSN: 3.6K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3625
R339	315-0272-00 -----	B010108		RES., FXD, CMPSN: 2.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2725
R340	321-0272-00 -----			RES., FXD, FILM: 6.65K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G66500F
R341	315-0183-00 -----			RES., FXD, CMPSN: 18K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1835
R342	315-0222-00 -----			RES., FXD, CMPSN: 2.2K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2225
R343	315-0100-00 -----			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1005
R344	315-0822-00 -----			RES., FXD, CMPSN: 8.2K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB8225
R345	315-0332-00 -----			RES., FXD, CMPSN: 3.3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3325
R347	315-0123-00 -----			RES., FXD, CMPSN: 12K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1235
R348	315-0472-00 -----			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4725
R349	315-0100-00 -----			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1005
R350	315-0202-00 -----			RES., FXD, CMPSN: 2K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2025

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R351	315-0275-00			RES., FXD, CMPSN: 2.7M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2755
R352	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1535
R353	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4715
R354	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R355	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R356	315-0303-00			RES., FXD, CMPSN: 30K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3035
R357	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1535
R358	315-0203-00			RES., FXD, CMPSN: 20K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2035
R359	315-0100-00			RES., FXD, CMPSN: 10 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1005
R360	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4725
R361	315-0332-00			RES., FXD, CMPSN: 3.3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3325
R362	315-0185-00			RES., FXD, CMPSN: 1.8M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1855
R363	315-0432-00			RES., FXD, CMPSN: 4.3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4325
R364	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R365	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R366	315-0752-00			RES., FXD, CMPSN: 7.5K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB7525
R367	315-0103-00			RES., FXD, CMPSN: 10K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1035
R368	315-0822-00			RES., FXD, CMPSN: 8.2K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB8225
R369	315-0242-00			RES., FXD, CMPSN: 2.4K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2425
R370	321-0304-00			RES., FXD, FILM: 14.3K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G14301F
R371	315-0512-00			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R372	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4725
R373	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R374	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R375	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R376	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R377	315-0682-00			RES., FXD, CMPSN: 6.8K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB6825
R378	315-0432-00			RES., FXD, CMPSN: 4.3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4325
R379	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R380	321-0315-00			RES., FXD, FILM: 18.7K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	CMF55-116G18701F
R381	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R382	315-0122-00			RES., FXD, CMPSN: 1.2K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1225
R385	315-0910-00			RES., FXD, CMPSN: 91 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB9105
R386	315-0621-00			RES., FXD, CMPSN: 620 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB6215
R387	315-0221-00			RES., FXD, CMPSN: 220 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2215
R388	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4715
R389	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1535
R390	311-1561-00	XB010108		RES., VAR, NONWIR: 2.5K OHM, 20%, 0.50W (REMOVED FOR OPTION 01)	73138	91-83-0
R392	315-0512-00			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R393	321-0321-00			RES., FXD, FILM: 21.5K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G21501F
R400	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1535
R401	315-0512-00			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R402	321-0350-00			RES., FXD, FILM: 43.2K OHM, 1%, 0.125W (REMOVED FOR OPTION 01)	91637	MFF1816G43201F
R404	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4715
R405	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R406	315-0302-00			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3025
R407	315-0302-00			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3025
R408	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R409	315-0471-00			RES., FXD, CMPSN: 470 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4715
R411	311-1557-00			RES., VAR, NONWIR: 25K OHM, 20%, 0.50W (REMOVED FOR OPTION 01)	73138	91-79-0
R412	315-0204-00			RES., FXD, CMPSN: 200K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2045
R413	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4725
R414	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R415	315-0752-00			RES., FXD, CMPSN: 7.5K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB7525
R416	315-0752-00			RES., FXD, CMPSN: 7.5K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB7525
R417	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4725
R418	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R419	315-0204-00			RES., FXD, CMPSN: 200K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2045
R422	315-0303-00			RES., FXD, CMPSN: 30K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3035
R423	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R425	315-0820-00			RES., FXD, CMPSN: 82 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB8205
R426	315-0242-00			RES., FXD, CMPSN: 2.4K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2425
R427	315-0333-00			RES., FXD, CMPSN: 33K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3335
R428	315-0101-00			RES., FXD, CMPSN: 100 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1015
R429	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R433	315-0105-00			RES., FXD, CMPSN: 1M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1055
R434	315-0106-00			RES., FXD, CMPSN: 10M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1065
R435	315-0512-00			RES., FXD, CMPSN: 5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R436	315-0183-00			RES., FXD, CMPSN: 18K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1835
R437	315-0395-00			RES., FXD, CMPSN: 3.9M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3955
R438	315-0105-00			RES., FXD, CMPSN: 1M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1055
R444	315-0392-00			RES., FXD, CMPSN: 3.9K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3925
R445	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1535
R446	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4725
R447	315-0103-00	B010100	B050549	RES., FXD, CMPSN: 10K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1035
R447	315-0915-00	B050550		RES., FXD, CMPSN: 9.1M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB9155
R448	315-0104-00			RES., FXD, CMPSN: 100K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1045
R453	315-0153-00			RES., FXD, CMPSN: 15K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1535
R454	315-0302-00			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3025
R455	315-0102-00			RES., FXD, CMPSN: 1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R459	315-0330-00			RES., FXD, CMPSN: 33 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3305
R461	315-0562-00			RES., FXD, CMPSN: 5.6K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5625
R462	315-0472-00			RES., FXD, CMPSN: 4.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4725
R464	315-0181-00			RES., FXD, CMPSN: 180 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1815
R465	315-0105-00			RES., FXD, CMPSN: 1M OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1055
R466	315-0302-00			RES., FXD, CMPSN: 3K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB3025

Replaceable Electrical Parts—1474

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R467	315-0181-00			RES., FXD, CMPSN:180 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1815
R468	315-0472-00			RES., FXD, CMPSN:4.7K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4725
R469	315-0473-00			RES., FXD, CMPSN:47K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB4735
R471	315-0181-00			RES., FXD, CMPSN:180 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1815
R481	315-0102-00			RES., FXD, CMPSN:1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R482	315-0512-00			RES., FXD, CMPSN:5.1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB5125
R483	315-0220-00			RES., FXD, CMPSN:22 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB2205
R484	307-0106-00			RES., FXD, CMPSN:4.7 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB47G5
R485	315-0102-00			RES., FXD, CMPSN:1K OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB1025
R491	311-1557-00			RES., VAR, NONWIR:25K OHM, 20%, 0.50W (REMOVED FOR OPTION 01)	73138	91-79-0
R492	311-1557-00			RES., VAR, NONWIR:25K OHM, 20%, 0.50W (REMOVED FOR OPTION 01)	73138	91-79-0
R493	307-0106-00			RES., FXD, CMPSN:4.7 OHM, 5%, 0.25W (REMOVED FOR OPTION 01)	01121	CB47G5
R901	315-0102-00	XB020000		RES., FXD, CMPSN:1K OHM, 5%, 0.25W	01121	CB1025
R904	315-0101-00	XB020000		RES., FXD, CMPSN:100 OHM, 5%, 0.25W	01121	CB1015
R905	311-1563-00	XB020000		RES., VAR, NONWIR:1K OHM, 20%, 0.50W	73138	91-85-0
R906	315-0302-00	XB020000		RES., FXD, CMPSN:3K OHM, 5%, 0.25W	01121	CB3025
R907	315-0201-00	XB020000		RES., FXD, CMPSN:200 OHM, 5%, 0.25W	01121	CB2015
R908	315-0201-00	XB020000		RES., FXD, CMPSN:200 OHM, 5%, 0.25W	01121	CB2015
R910	315-0102-00	XB020000		RES., FXD, CMPSN:1K OHM, 5%, 0.25W	01121	CB1025
R911	321-0277-00	XB020000		RES., FXD, FILM:7.5K OHM, 1%, 0.125W	91637	MFF1816G75000F
R913	321-0235-00	XB020000		RES., FXD, FILM:2.74K OHM, 1%, 0.125W	91637	MFF1816G27400F
R915	321-0318-00	XB020000		RES., FXD, FILM:20K OHM, 1%, 0.125W	91637	MFF1816G20001F
R916	315-0470-00	XB020000		RES., FXD, CMPSN:47 OHM, 5%, 0.25W	01121	CB4705
R918	315-0470-00	XB020000		RES., FXD, CMPSN:47 OHM, 5%, 0.25W	01121	CB4705
R924	315-0103-00	XB020000		RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R925	315-0302-00	XB020000	B020321	RES., FXD, CMPSN:3K OHM, 5%, 0.25W	01121	CB3025
R925	315-0392-00	B020322		RES., FXD, CMPSN:3.9K OHM, 5%, 0.25W	01121	CB3925
R928	315-0201-00	XB020000		RES., FXD, CMPSN:200 OHM, 5%, 0.25W	01121	CB2015
R930	321-0357-00	XB020000		RES., FXD, FILM:51.1K OHM, 1%, 0.125W	91637	MFF1816G51101F
R931	321-0385-00	XB020000		RES., FXD, FILM:100K OHM, 1%, 0.125W	91637	MFF1816G10002F
R935	315-0201-00	XB020000		RES., FXD, CMPSN:200 OHM, 5%, 0.25W	01121	CB2015
R936	315-0201-00	XB020000		RES., FXD, CMPSN:200 OHM, 5%, 0.25W	01121	CB2015
R950	315-0472-00	XB020000		RES., FXD, CMPSN:4.7K OHM, 5%, 0.25W	01121	CB4725
R953	315-0182-00	XB020000		RES., FXD, CMPSN:1.8K OHM, 5%, 0.25W	01121	CB1825
R954	321-0235-00	XB020000		RES., FXD, FILM:2.74K OHM, 1%, 0.125W	91637	MFF1816G27400F
R955	321-0277-00	XB020000		RES., FXD, FILM:7.5K OHM, 1%, 0.125W	91637	MFF1816G75000F
R956	321-0293-00	XB020000		RES., FXD, FILM:11K OHM, 1%, 0.125W	91637	MFF1816G11001F
R957	321-0251-00	XB020000		RES., FXD, FILM:4.02K OHM, 1%, 0.125W	91637	MFF1816G40200F
R958	315-0470-00	XB020000		RES., FXD, CMPSN:47 OHM, 5%, 0.25W	01121	CB4705
R961	321-0085-00	XB020000		RES., FXD, FILM:75 OHM, 1%, 0.125W	91637	MFF1816G75R00F
R962	303-0471-00	XB020000		RES., FXD, CMPSN:470 OHM, 5%, 1W	01121	GB4715
R963	321-0293-00	XB020000	B050565	RES., FXD, FILM:11K OHM, 1%, 0.125W	91637	MFF1816G11001F
R963	321-0299-00	B050566		RES., FXD, FILM:12.7K OHM, 1%, 0.125W	91637	MFF1816G12701F
R964	311-1560-00	XB020000		RES., VAR, NONWIR:5K OHM, 20%, 0.50W	73138	91-82-0
R965	321-0235-00	XB020000		RES., FXD, FILM:2.74K OHM, 1%, 0.125W	91637	MFF1816G27400F

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R966	315-0470-00	XB020000		RES.,FXD,CMPNSN:47 OHM,5%,0.25W	01121	CB4705
R967	311-1563-00	XB020000		RES.,VAR,NONWIR:1K OHM,20%,0.50W	73138	91-85-0
R969	315-0302-00	XB020000		RES.,FXD,CMPNSN:3K OHM,5%,0.25W	01121	CB3025
R970	315-0472-00	XB020000		RES.,FXD,CMPNSN:4.7K OHM,5%,0.25W	01121	CB4725
R971	315-0182-00	XB020000		RES.,FXD,CMPNSN:1.8K OHM,5%,0.25W	01121	CB1825
R974	321-0293-00	XB020000		RES.,FXD,FILM:11K OHM,1%,0.125W	91637	MFF1816G11001F
R975	321-0251-00	XB020000		RES.,FXD,FILM:4.02K OHM,1%,0.125W	91637	MFF1816G40200F
R977	315-0470-00	XB020000		RES.,FXD,CMPNSN:47 OHM,5%,0.25W	01121	CB4705
R981	321-0085-00	XB020000		RES.,FXD,FILM:75 OHM,1%,0.125W	91637	MFF1816G75R00F
R983	321-0235-00	XB020000		RES.,FXD,FILM:2.74K OHM,1%,0.125W	91637	MFF1816G27400F
R984	321-0235-00	XB020000		RES.,FXD,FILM:2.74K OHM,1%,0.125W	91637	MFF1816G27400F
R985	321-0277-00	XB020000		RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R986	315-0470-00	XB020000		RES.,FXD,CMPNSN:47 OHM,5%,0.25W	01121	CB4705
R987	311-1563-00	XB020000		RES.,VAR,NONWIR:1K OHM,20%,0.50W	73138	91-85-0
R992	303-0471-00	XB020000		RES.,FXD,CMPNSN:470 OHM,5%,1W	01121	GB4715
R993	321-0293-00	XB020000	B050565	RES.,FXD,FILM:11K OHM,1%,0.125W	91637	MFF1816G11001F
R993	321-0299-00	B050566		RES.,FXD,FILM:12.7K OHM,1%,0.125W	91637	MFF1816G12701F
R994	311-1560-00	XB020000		RES.,VAR,NONWIR:5K OHM,20%,0.50W	73138	91-82-0
R995	315-0302-00	XB020000		RES.,FXD,CMPNSN:3K OHM,5%,0.25W	01121	CB3025
R1001	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
R1002	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R1003	321-0354-00			RES.,FXD,FILM:47.5K OHM,1%,0.125W	91637	MFF1816G47501F
R1004	321-0271-00			RES.,FXD,FILM:6.49K OHM,1%,0.125W	91637	MFF1816G64900F
R1005	308-0788-00			RES.,FXD,WW:20 OHM,5%,1W	75042	BW-20F-20R00J
R1006	321-0279-00			RES.,FXD,FILM:7.87K OHM,1%,0.125W	91637	MFF1816G78700F
R1007	307-0472-00			RES.,THERMAL:100K OHM,5% DISC	15801	JP51J5
S94	260-1776-00			SWITCH,SLIDE:DPDT,3A,125VAC	82389	11A-1497A
S96	260-1776-00			SWITCH,SLIDE:DPDT,3A,125VAC	82389	11A-1497A
S98	260-1768-00			SWITCH,PUSH:DPDT,3A,125VAC	82389	14S-7102D
S495	260-1844-00			SWITCH,PUSH:3 BUTTON,2 POLE	71590	SERIES PB
S496	-----			(REMOVED FOR OPTION 01)		
S497	-----					
T80	120-0981-00			XFMR,PWR,STPDN:	80009	120-0981-00
TP1	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
TP306	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
	-----			(REMOVED FOR OPTION 01)		
TP325	214-0579-00			TERM,TEST POINT:BRS CD PL	80009	214-0579-00
	-----			(REMOVED FOR OPTION 01)		
U110	156-0130-00	B010100	B030503	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR	80009	156-0130-00
U110	156-0130-02	B030504		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN	04713	SC77162GH
U134	155-0145-00			MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD	80009	155-0145-00
U136	155-0145-00			MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD	80009	155-0145-00
U137	155-0145-00			MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD	80009	155-0145-00
U138	156-0733-00			MICROCIRCUIT,DI:DUAL MONOSTABLE MV	80009	156-0733-00
U142	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	01295	MICROA741CP
U144	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	01295	SN74121(N OR J)
U147	156-0527-00	B010100	B010129	MICROCIRCUIT,LI:NEG VOLTAGE REGULATOR,15V	04713	MC7915CT
U147	156-0930-00	B010130		MICROCIRCUIT,LI:NEGATIVE VOLTAGE REGULATOR	04713	SC75012P
U155	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	01295	MICROA741CP
U162	156-0503-00			MICROCIRCUIT,DI:HEX INVERTER BUFFER	02735	CD4009UBF
U164	156-0503-00			MICROCIRCUIT,DI:HEX INVERTER BUFFER	02735	CD4009UBF
U201	155-0147-00	B010100	B010244	MICROCIRCUIT,DI:CIRCUIT TV GEN MOS,40 LEAD	80009	155-0147-00
U201	155-0147-02	B010245	B030363	MICROCIRCUIT,DI:CIRCUIT TV GEN,MOS,40 LEAD	80009	155-0147-02
U201	155-0188-00	B030364		MICROCIRCUIT,DI:SYNC GENERATOR	80009	155-0188-00
U224	156-0388-00	XB030364		MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	80009	156-0388-00
U231	156-0786-00			MICROCIRCUIT,DI:QUAD,EXCLUSIVE OR GATE	80009	156-0786-00

Replaceable Electrical Parts—1474

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U234	156-0383-00	XB030364		MICROCIRCUIT,DI:QUAD 2-INPUT NOR GATE	80009	156-0383-00
U245	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U261	156-0504-00			MICROCIRCUIT,DI:HEX BUFFER	27014	MM5610AJ
U262	156-0733-00	XB030364		MICROCIRCUIT,DI:DUAL MONOSTABLE MV	80009	156-0733-00
U264	156-0388-00	B010100	B019999X	MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	80009	156-0388-00
U265	156-0784-00			MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER	01295	SN74LS163AN
U274	156-0784-00			MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER	01295	SN74LS163AN
U275	156-0784-00	B010100	B010155	MICROCIRCUIT,DI:SYNC 4 BIT BINARY COUNTER	01295	SN74LS163AN
U275	156-0248-00	B010156	B030503	MICROCIRCUIT,DI:FULLY SYNC BINARY COUNTER	80009	156-0248-00
U275	156-0248-02	B030504		MICROCIRCUIT,DI:SYN 4 BIT BINARY COUNTER	01295	SN74163
U318	155-0144-00			MICROCIRCUIT,LI:DUAL IN-LINE,16 LEAD (REMOVED FOR OPTION 01)	80009	155-0144-00
U329	156-0158-00	B010100	B010289	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER (REMOVED FOR OPTION 01)	18324	MC1458N
U329	156-0158-04	B010290		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER (REMOVED FOR OPTION 01)	01295	N99320JG
U331	156-0733-00			MICROCIRCUIT,DI:DUAL MONOSTABLE MV (REMOVED FOR OPTION 01)	80009	156-0733-00
U361	156-0733-00			MICROCIRCUIT,DI:DUAL MONOSTABLE MV (REMOVED FOR OPTION 01)	80009	156-0733-00
U365	156-0130-00	B010100	B030503	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR (REMOVED FOR OPTION 01)	80009	156-0130-00
U365	156-0130-02	B030504		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN (REMOVED FOR OPTION 01)	04713	SC77162GH
U366	156-0130-00	B010100	B030503	MICROCIRCUIT,LI:MODULATOR/DEMODULATOR (REMOVED FOR OPTION 01)	80009	156-0130-00
U366	156-0130-02	B030504		MICROCIRCUIT,LI:MODULATOR/DEMODULATOR,SCRN (REMOVED FOR OPTION 01)	04713	SC77162GH
U390	156-0382-00			MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE (REMOVED FOR OPTION 01)	01295	SN74LS00(N OR J)
U419	156-0382-00			MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE (REMOVED FOR OPTION 01)	01295	SN74LS00(N OR J)
U421	156-0733-00			MICROCIRCUIT,DI:DUAL MONOSTABLE MV (REMOVED FOR OPTION 01)	80009	156-0733-00
U434	156-0158-00	B010100	B010289	MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER (REMOVED FOR OPTION 01)	18324	MC1458N
U434	156-0158-04	B010290		MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER (REMOVED FOR OPTION 01)	01295	N99320JG
U449	156-0057-00			MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE (REMOVED FOR OPTION 01)	01295	SN7401N OR J
U461	156-0733-00			MICROCIRCUIT,DI:DUAL MONOSTABLE MV (REMOVED FOR OPTION 01)	80009	156-0733-00
U464	156-0388-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP (REMOVED FOR OPTION 01)	80009	156-0388-00
U938	156-0153-00	XB020000		MICROCIRCUIT,DI:HEX INVERTER,BUFFER	01295	SN7406N
U978	156-0058-00	XB020000		MICROCIRCUIT,DI:HEX INVERTER	80009	156-0058-00
U997	156-0388-00	XB020000		MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	80009	156-0388-00
U998	156-0388-00	XB020000		MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	80009	156-0388-00
VR28	152-0212-00			SEMICONV DEVICE:ZENER,0.5W,9V,5%	04713	SZ50646RL
VR184	152-0279-00	XB030364		SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	04713	SZG35010RL
VR233	152-0278-00	B010100	B030363X	SEMICONV DEVICE:ZENER,0.4W,3V,5%	04713	SZG35009K20
VR447	152-0227-00			SEMICONV DEVICE:ZENER,0.4W,6.2V,5% (REMOVED FOR OPTION 01)	04713	SZ13903
W254	131-0566-00	XB020000		BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	57668	JWW-0200E0
W256	131-0566-00	XB010120		BUS CONDUCTOR:DUMMY RES,2.375,22 AWG	57668	JWW-0200E0
Y1001	158-0116-00			XTAL UNIT,QTZ:14.318 MHZ,0.0035%,PRL	75378	H3W

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont					
1-1	390-0536-00	B010100	B019999	1		CABINET TOP,GEN:	80009	390-0536-00
	390-0536-01	B020000	B050544	1		CABINET TOP,GEN:	80009	390-0536-01
	390-0536-02	B050545		1		CABINET TOP,GEN:	80009	390-0536-02
						(ATTACHING PARTS)		
	214-0603-00			4		PIN,SECURING:0.450 DIA X 0.270 LONG	26365	OBD
	214-0604-00			4		WASH.,SPG TNSN:0.26 ID X 0.47 INCH OD	80009	214-0604-00
	386-1151-00			4		CLAMP,RIM CLENC:SPG STL CD PL	80009	386-1151-00
	386-0227-00			4		STOP,CLP,RIM CL:ACETAL	80009	386-0227-00
						- - - * - - -		
-2	351-0104-03			PR		SLIDE SECT,DWR:12.625 L,W/O HARDWARE	06666	C-720-3
-3	351-0331-01			PR		SLIDE,DWR,EXT:PAIR	80009	351-0331-01
						(ATTACHING PARTS)		
-4	212-0004-00			4		SCREW,MACHINE:8-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-5	213-0216-00			2		THUMBSCREW:10-32 X 0.85,0.375 OD HD SST	80009	213-0216-00
						(ATTACHING PARTS)		
-6	210-0894-00			2		WASHER,NONMETAL:0.19 ID X 0.438" OD,PLSTC	09422	OBD
-7	354-0025-00			2		RING,RETAINING:0.181 INCH FREE ID	79136	5555-18
						- - - * - - -		
-8	366-1257-00			3		PUSH BUTTON:GRAY PLASTIC	80009	366-1257-00
	-----			-		(1474)		
	366-1257-00			1		PUSH BUTTON:GRAY PLASTIC	80009	366-1257-00
	-----			-		(1474 OPTION 01)		
-9	426-0681-00			3		FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00
	-----			-		(1474)		
	426-0681-00			1		FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00
	-----			-		(1474 OPTION 01)		
-10	378-0803-01			1		LENS,LIGHT:CLEAR,ATTENUATOR	80009	378-0803-01
-11	358-0378-01			1		BUSHING,SLEEVE:0.250 OD X 0.131 ID,PRESS MT	80009	358-0378-01
-12	367-0160-00			2		HANDLE,BOW:1.25 L,AL ANODIZED	80009	367-0160-00
						(ATTACHING PARTS)		
-13	211-0008-00			4		SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL	83385	OBD
						- - - * - - -		
-14	407-1073-00			2		BRACKET,ANGLE:RACKMOUNT,ALUMINUM	80009	407-1073-00
						(ATTACHING PARTS)		
-15	212-0001-00			4		SCREW,MACHINE:8-32 X 0.250 INCH,PNH STL	77250	OBD
						- - - * - - -		
-16	384-1099-00			2		EXTENSION SHAFT:PUSH BUTTON,1.54 INCH LONG	80009	384-1099-00
	-----			-		(1474)		
-17	-----			1		CKT BOARD ASSY:GEN LOCK(SEE A3 REPL),1474 ONLY		
						(ATTACHING PARTS)		
-18	211-0008-00			4		SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL	83385	OBD
						- - - * - - -		
				-		CKT BOARD ASSY INCLUDES:		
-19	131-0589-00			27		. TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-20	131-0993-00			2		. BUS,CONDUCTOR:2 WIRE BLACK	00779	850100-01
-21	136-0260-02	B010100	B010309	1		. SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
	136-0260-02	B010310		5		. SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
-22	337-1417-00			1		. SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	80009	337-1417-00
-23	337-2379-00			1		. SHLD,ELECTRICAL:CIRCUIT CARD	80009	337-2379-00
-24	361-0542-00	B010100	B010199	4		. SPACER,SWITCH:PLASTIC	71590	J-64281
	361-0411-00	B010200		4		. SPACER,PUSH SW:0.13 W X 0.375 INCH L,PLSTC	71590	J64285-00
-25	260-1844-00			1		. SWITCH,PUSH:3 BUTTON,2 POLE	71590	SERIES PB
-26	-----			1		CKT BOARD ASSY:POWER SUPPLY(SEE A1 REPL)		
						(ATTACHING PARTS)		
-27	211-0008-00			4		SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL	83385	OBD
						- - - * - - -		
				-		CKT BOARD ASSY INCLUDES:		
-28	131-0589-00			8		. TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
-29	200-2024-00	B010100	B010109X	1		. COVER,FUSE:PLASTIC	80009	200-2024-00
-30	344-0286-00			6		. CLIP,ELECTRICAL:FOR 3AG FUSE,BRS	75915	102074
-31	346-0128-00			2		. STRAP,TIE DOWN:0.1W X 8.0" LONG,NYLON	06383	PLT2M
-32	352-0331-00			1		. LAMPHOLDER:	80009	352-0331-00
-33	352-0031-00	B010100	B010329	1		. FUSEHOLDER:3AG FUSE	75915	357001

Replaceable Mechanical Parts—1474

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-	344-0286-00	B010330		2	.	CLIP,ELECTRICAL:FOR 3AG FUSE,BRS (ATTACHING PARTS)	75915	102074
-34	211-0507-00			1	.	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-35	210-0407-00			1	.	NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS - - - * - - -	73743	3038-0228-402
-36	260-1768-00			1	.	SWITCH,PUSH:DPDT,3A,125VAC	82389	14S-7102D
-37	260-1776-00			2	.	SWITCH,SLIDE:DPDT,3A,125VAC	82389	11A-1497A
	119-0804-00			1		OVEN ASSEMBLY: (ATTACHING PARTS)	80009	119-0804-00
-38	211-0008-00			4		SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL - - - * - - -	83385	OBD
-39	200-1840-00			1		OVEN ASSEMBLY INCLUDES: . COVER,OVEN: (ATTACHING PARTS)	80009	200-1840-00
-40	210-0586-00	B010100	B010389	2	.	NUT,PL,ASSEM WA:4-40 X 0.25,STL	83385	OBD
	210-0406-00	B010340		1	.	NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS - - - * - - -	73743	12161-50
-41	342-0283-00			1	.	INSUL,OVEN,THRM:	80009	342-0283-00
-42	342-0284-00			1	.	INSUL,OVEN,THRM:	80009	342-0284-00
-43				1	.	CKT BOARD ASSY:SYNC GEN(SEE A2 REPL)		
	131-0993-00	XB030364		4	.	BUS,CONDUCTOR:2 WIRE BLACK	00779	850100-01
-44	131-0589-00	B010100	B030363	46	.	TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	131-0589-00	B030364		58	.	TERMINAL,PIN:0.46 L X 0.025 SO	22526	48283-029
-45	136-0260-02	B010100	B010309	2	.	SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
	136-0260-02	B010310	B030503	4	.	SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
	136-0260-02	B030504		3	.	SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
-46	131-0641-00	B010100	B010244	1	.	SOCKET,PLUG-IN:40 CONTACT	00779	1-485169-2
	136-0623-00	B010245		1	.	SOCKET,PLUG-IN:40 DIP,LOW PROFILE	73803	CS9002-40
-47	214-0269-00	B010100	B010299	1	.	HEAT SINK,XSTR:0.312 DIA X 0.75 L	98978	TXD-032-75
	214-1291-00	B010300		1	.	HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H	05820	207SB
	214-0579-00	XB030364		2	.	TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-48	346-0130-00			1	.	STRAP,RETAINING:FOR 40 CONTACT SBSTR SKT	00779	350894-1
-49				1	.	CKT BOARD ASSY:OVEN(SEE A5 REPL)		
-50	342-0285-00			1	.	INSULATOR,OVEN:ELECTRICAL,SILICONE RUBBER	80009	342-0285-00
-51	344-0281-00			1	.	CLIP,SPRING:OVEN,CU BE	80009	344-0281-00
-52	333-2199-00	B010100	B010339	1		PANEL,FRONT:	80009	333-2199-00
	333-2199-01	B010340	B019999	1		PANEL,FRONT:	80009	333-2199-01
	333-2199-02	B020000		1		PANEL,FRONT: (ATTACHING PARTS)	80009	333-2199-02
-53	210-0457-00			3		NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL - - - * - - -	83385	OBD
-54	384-1136-00			1		EXTENSION SHAFT:0.95 INCH LONG	80009	384-1136-00
-55				1		XFMR:(SEE T80 REPL) (ATTACHING PARTS)		
-56	211-0513-00			4		SCREW,MACHINE:6-32 X 0.625 INCH,PNH STL	83385	OBD
-57	210-0202-00			1		TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
-58	210-0935-00			4		WASHER,NONMETAL:FIBER,0.14 IDX 0.375"OD	74921	OBD
-59	166-0227-00			4		INS SLV,ELEC:0.187 ID X 1.50 INCH LONG	80009	166-0227-00
-60	129-0391-00			4		POST,ELEC-MECH:0.375 HEX X 0.375"LONG - - - * - - -	80009	129-0391-00
-61	358-0161-00			1		BSHG,STRAIN RLF:FOR 0.50 INCH HOLE,PLASTIC	28520	1147 SR-5P-4
-62	161-0033-09			1		CABLE ASSY,PWR,:3 WIRE,92 INCH LONG	80009	161-0033-09
-63	343-0298-00			2		CLAMP,LOOP:PLASTIC,W/ADHESIVE BACK	95987	HPC25
-64	344-0236-00			3		CLIP,SPR TNSN:	80009	344-0236-00
-65	407-1833-00			1		BRACKET,HEAT SK: (ATTACHING PARTS)	80009	407-1833-00
-66	211-0101-00			3		SCREW,MACHINE:4-40 X 0.25,100 DEG,FLH STL - - - * - - -	83385	OBD
-67	253-0202-00			FT	.	INSUL TAPE,ELEC:POLYIMIDE	99742	221
-68	210-0201-00			1		TERMINAL,LUG:0.12 ID,LOCKING,BRZ TIN PL (ATTACHING PARTS)	86928	OBD
-69	210-0406-00			1		NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS - - - * - - -	73743	12161-50
-70	179-2489-00	B010100	B019999X	1		WIRING HARNESS,:REAR PANEL	80009	179-2489-00
	179-2490-00			1		WIRING HARNESS,:AC POWER	80009	179-2490-00
-71	179-2491-00			1		WIRING HARNESS,:TRANSFORMER	80009	179-2491-00
	343-0549-00			10		STRAP,TIEDOWN:0.091 W X 3.62 INCH LONG	06383	PLT1M
-72	175-0826-00			FT	.	WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont					
1-73	131-0621-00			3		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-74	352-0199-00			1		. CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0199-00
-75	131-0955-00			12		CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
	-----			-		(1474)		
	131-0995-00			10		CONN,RCPT,ELEC:	95238	K 600-125-56WB
	-----			-		(1474 OPTION 01)		
-76	134-0026-00			1		BUTTON,PLUG:FOR 0.375" HOLE	80112	1711-M
	-----			-		(1474)		
	134-0026-00			3		BUTTON,PLUG:FOR 0.375" HOLE	80112	1711-M
	-----			-		(1474 OPTION 01)		
	198-3279-00			1		WIRE SET,ELEC:	80009	198-3279-00
	-----			-		(1474 OPTION 01)		
-77	175-0827-00			FT		. CABLE,SP,ELEC:4,26 AWG,STRD,PVC JKT,RBN	08261	SS04267(1061)OC
	131-0621-00			3		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-78	352-0200-00			2		. HLDR,TERM CONN:4 WIRE BLACK	80009	352-0200-00
	352-0200-02			2		. CONN BODY,PL EL:4 WIRE RED	80009	352-0200-02
-79	200-2008-00			1		COVER,HOLE:PLASTIC	80009	200-2008-00
	-----			-		(1474 OPTION 01)		
						(ATTACHING PARTS)		
-80	220-0743-00			1		NUT,STAMPED:0.187 THD X 0.217 H,CD PL STL	80009	220-0743-00
	-----			-		(1474 OPTION 01)		
						- - - * - - -		
-81	179-2488-00	B010100	B019999	1		WIRING HARNESS,:CHASSIS	80009	179-2488-00
	-----			-		(1474)		
	179-2488-01	B020000		1		WIRING HARNESS:	80009	179-2488-01
	-----			-		(1474)		
	343-0549-00			36		. STRAP,TIEDOWN:0.091 W X 3.62 INCH LONG	06383	PLT1M
	198-3281-00			1		WIRE SET,ELEC:	80009	198-3281-00
	-----			-		(1474)		
	131-0621-00			6		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-82	131-1119-00			4		. CONTACT,ELEC:FOR NO. 22-26 AWG WIRE	22526	75374-001
-83	352-0169-00			2		. HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00
-84	352-0197-00			2		. CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0197-00
	352-0198-00			2		. HLDR,TERM CONN:2 WIRE BLACK	80009	352-0198-00
-85	441-1342-00	B010100	B019999	1		CHASSIS,GEN:MAIN	80009	441-1342-00
	441-1342-01	B020000	B050543	1		CHASSIS,GEN:MAIN	80009	441-1342-01
	441-1342-02	B050544		1		CHASSIS,GEN:MAIN	80009	441-1342-02
	385-0070-00	XB020000		2		SPACER,POST:0.5 L W/6-32 THD THRU,AL	80009	385-0070-00
	407-1833-00	XB020000		1		BRACKET,HEAT SK:	80009	407-1833-00
	211-0503-00	XB020000		2		SCREW,MACHINE:6-32 X 0.188 INCH,PNH STL	83385	OBD
	131-0955-00	XB020000		2		CONN,RCPT,ELEC:BNC,FEMALE	13511	31-279
	361-0905-00	XB020000		1		. SPACER,SLEEVE:0.695 L X 0.316 ID,AL	80009	361-0905-00
	179-2621-00	XB020000		1		WIRING HARNESS:	80009	179-2621-00
	-----			-		(1474 OPTION 01)		
	198-3939-00	XB020000		1		WIRE SET,ELEC:	80009	198-3939-00
	-----			-		(1474 OPTION 01)		
	198-3345-01	XB020000		1		WIRE SET,ELEC:	80009	198-3345-01
	-----			-		(1474)		
	348-0055-00	XB020000		1		GROMMET,PLASTIC:0.25 INCH DIA	80009	348-0055-00
	210-0048-00	XB020000		1		WASHER,LOCK:0.313 X 0.425 INCH OD,STL	78189	1218-04
-86	-----			2		LED:(SEE DS494,DS495 REPL)		
	-----			1		CKT BOARD ASSY:COLOR PHASE CONT(SEE A6 REPL)		
	119-0647-00	XB020000		1		. GONIOMETER,ELEC:3-58MHZ	80009	119-0647-00
						(ATTACHING PARTS)		
	210-1261-00	XB020000		3		. WASHER,FLAT:0.325 ID X 0.05 THK,NYLON	11897	167-NN-Q627
	210-0580-00	XB020000		1		. NUT,PLAIN,HEX.:0.312-32 X 0.474 INCH,BRS	73743	OBD
						- - - * - - -		
	131-0589-00	XB020000		45		. TERMINAL,PIN:0.46 L X 0.025 SQ	22526	48283-029
	136-0220-00	XB020000		15		. SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT	71785	133-23-11-034
	136-0183-00	XB020000		2		. SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
	136-0269-02	XB020000		4		. SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CLE	73803	CS9002-14
	131-1334-00	XB020000		4		. BUS CONDUCTOR:	80009	131-1334-00
	337-0896-00	XB020000		4		. PLATE,ELEC SHLD:CKT BOARD MOUNT,BRS	80009	337-0896-00
	198-4569-00	XB030494		1		WIRE SET,ELEC:	80009	198-4569-00
	-----			-		(OPTION 01 ONLY)		
	352-0197-00	XB030494		1		. CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0197-00
	-----			-		(OPTION 01 ONLY)		
	352-0202-00	XB030494		1		. HLDR,TERM CONN:6 WIRE BLACK	80009	352-0202-00
	-----			-		(OPTION 01 ONLY)		

Replaceable Mechanical Parts—1474

Fig. & Index No.	Tektronix Part No.	Serial/Model No.		Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont									
1-87	161-0033-39	XB030489		1						CABLE ASSY,PWR:3,0.75MM SQ,220V,98.0 L - (A1 EUROPEAN ONLY)	80126	OBD
-88	161-0033-40	XB030489		1						CABLE ASSY,PWR:3,0.75MM SQ,240V,98.0 L - (A2 UNITED KINGDOM ONLY)	80126	OBD
-89	161-0033-41	XB030489		1						CABLE ASSY,PWR:3,0.75MM SQ,240V,98.0 L - (A3 AUSTRALIAN ONLY)	S3109	OBD
-90	161-0033-42	XB030489		1						CABLE ASSY,PWR:3,18 AWG,240V,98.0 L - (A4 NORTH AMERICAN ONLY)	80126	OBD

DIAGRAMS AND CIRCUIT DESCRIPTION

This section of the manual contains block and schematic diagrams with waveforms and circuit descriptions.

Symbols

Symbols used on the diagrams are based on ANSI Y32 2-1970 and IEEE No. 315 March 1971. Logic symbology is based on ANSI Y32 14-1973 (IEEE Std. 91-1973). Logic symbols depict the logic function performed and may differ from the manufacturer's data.

Component Values

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

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

Resistors = Ohms (Ω).

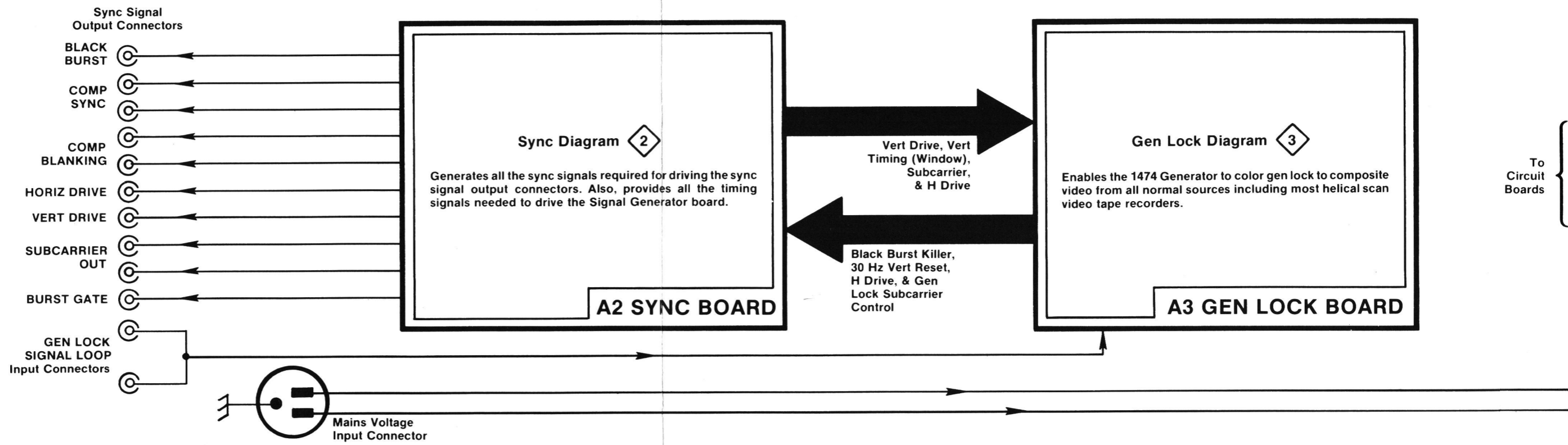
Semiconductor Types

Refer to the Electrical Parts List.

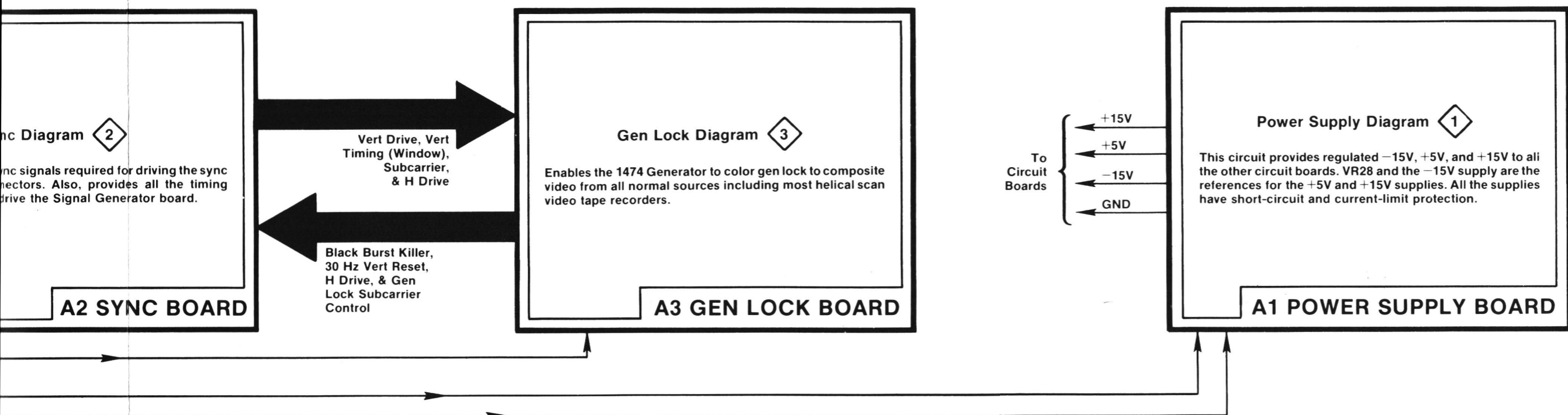
Reference Designators

The following letters are used as reference designators to identify components or assemblies on Tektronix, Inc. schematic diagrams.

A	Assembly, separable or repairable (circuit board, etc.)	LR	Inductor/resistor combination
AT	Attenuator, fixed or variable	M	Meter
B	Motor	P	Connector, movable portion
BT	Battery	Q	Transistor, silicon-controlled rectifier, or programmable unijunction transistor
C	Capacitor, fixed or variable	R	Resistor, fixed or variable
CR	Diode, signal or rectifier	RT	Thermistors
DH	Decoupling Hybrid	S	Switch
DL	Delay Line	T	Transformer
DS	Indicating device (lamp)	TC	Thermocouple
E	Spark Gap	TP	Test Point
F	Fuse	U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
FL	Filter	V	Electron tube
H	Heat dissipating device (heat sink, heat radiator, etc.)	VR	Voltage regulator (zener diode, etc.)
HR	Heater	Y	Crystal
J	Connector, stationary portion		
K	Relay		
L	Inductor, fixed or variable		



1474



BLOCK DIAGRAM

2097-13

The functional block diagram for the 1474 NTSC Color Sync Generator is arranged similarly to the physical layout of the circuit boards in the instrument.

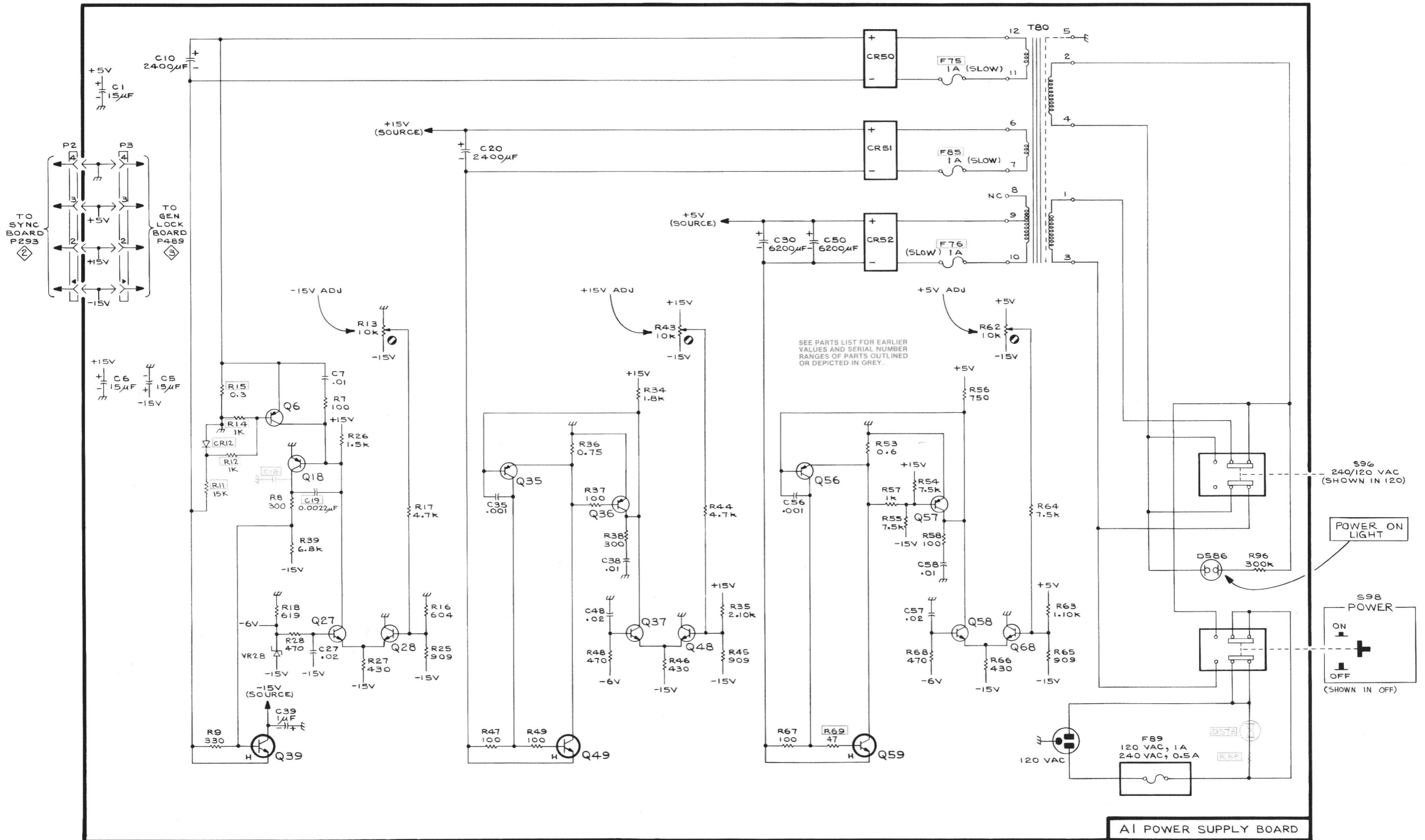
The schematic diagram titles with their assigned diagram numbers are placed in the blocks so you can correlate the boards and diagrams. A brief circuit description is also provided in each block. The main signal lines between blocks are shown and the signals are identified.

Since diagrams 2 and 3 contain complex circuitry, a detailed circuit description is provided for each of these diagrams and placed near their respective diagram pullout page. For example, you'll find the circuit description for Sync diagram 2 on the back side of Power Supply diagram 1.

Note:

1. For your convenience, the location of the active components on this diagram are located approximately as on the circuit board layout when the front of instrument faces to your right.

2. A dark circle around the symbol for Q39, Q49, and Q59 denotes a power transistor.



1474

2097-02
REV B JAN 1980

POWER SUPPLY

POWER SUPPLY

SYNC CIRCUIT DESCRIPTION

Purpose of Sync Circuit

This circuitry generates all the sync signals required for driving the sync signal output connectors.

Circuit Description

The 1474 Generator produces output signals that are timed by either internal or external sources, as determined by the settings of the GEN LOCK SUBCARRIER and SYNC pushbutton switches.

Internal Reference. Assume the GEN LOCK pushbuttons are set to INT. In this mode of operation, the 1474 utilizes its own crystal-controlled Subcarrier X4 (14.318180 MHz) Oscillator as a timing standard and subcarrier source.

The subcarrier signal obtained from the collector circuit of Q219 is applied to the base of Q206 in the Subcarrier Amplifier circuit. The output of this stage (the emitter of Q177) drives the SUBCARRIER OUT rear-panel connectors, the Black Burst Subcarrier Modulator circuit, and the Gen Lock Demodulator circuit on diagram 3.

The Subcarrier & H Rate Counters are also used to provide H-rate squarewaves at pin 14 of U265. These squarewaves drive the 10 MHz Oscillator AFC Sampler on this diagram (via pin 4 of P199) and the Sync Control Logic circuitry on Gen Lock diagram 3.

The timing source for deriving the remaining elements of the composite sync signal is the 10.069929 MHz Oscillator Q236. The signal from this oscillator is applied to the Two-Phase Clock U245 circuit that divides the frequency by two, providing 5 MHz complementary pulses at pins 5 and 6 of U245.

The 5 MHz pulses from U245 are applied to the Two-phase Clock Drivers, which drive the Sync Generator U201. All outputs from the Sync Generator U201 are buffered by U162 and U164 before the signals are used to drive other circuits.

One output from the Sync Generator U201 is H drive at pin 33. This signal is applied via U164 to pin 6 of P199 and then through a jumper to pin 3 of P199 when operating the Sync board independent of Gen Lock. The H drive signal goes from pin 3 of P199 through C147 to the base of Q146 in the 10 MHz Oscillator AFC Sampler circuit and is compared to an H-rate squarewave coming from pin 14 of U265 in the Subcarriers & H Rate Counters circuit. This subcarrier countdown H rate squarewave, which comes from pin 14 of U265, actually goes through pin 2 of P199 to pin 4 of P199 if a jumper is used to omit the Gen Lock board. The signal from pin 4 of P199 is fed through CR168, R177, and C167 to the emitter of Q156 in the 10 MHz Oscillator AFC Sampler circuit.

A dc control voltage is applied from pin 6 of U155 in the 10 MHz Oscillator AFC Sampler circuit to varicap CR186. This varicap controls the frequency of the 10 MHz Oscillator so the oscillator will be frequency- and phase-locked to the Subcarrier X4 Oscillator.

The one shots in the Burst Position & Width Gating circuit U138 are controlled by the setting of the Burst Position & Width adjustment R139. This control is adjusted to obtain a 2.5 μ s burst gate width which is equivalent to 9 cycles of burst.

The signals from the Output Drivers (U134, U136, and U137) are set at -8 V amplitude (unterminated) by the Output Drivers -8 V Reference U142. The Output Drivers use the Voltage Regulator U147 as a -10 V power supply source.

U110 combines chroma at pin 2 with the gate at pin 7 to obtain a gated burst output at pin 6. Burst from pin 6 of U110 is combined with comp blanking from pin 9 of U134 to obtain setup and with comp sync from pin 16 of U136. All of these signals are combined to produce black burst that is applied to the BLACK BURST connector J8.

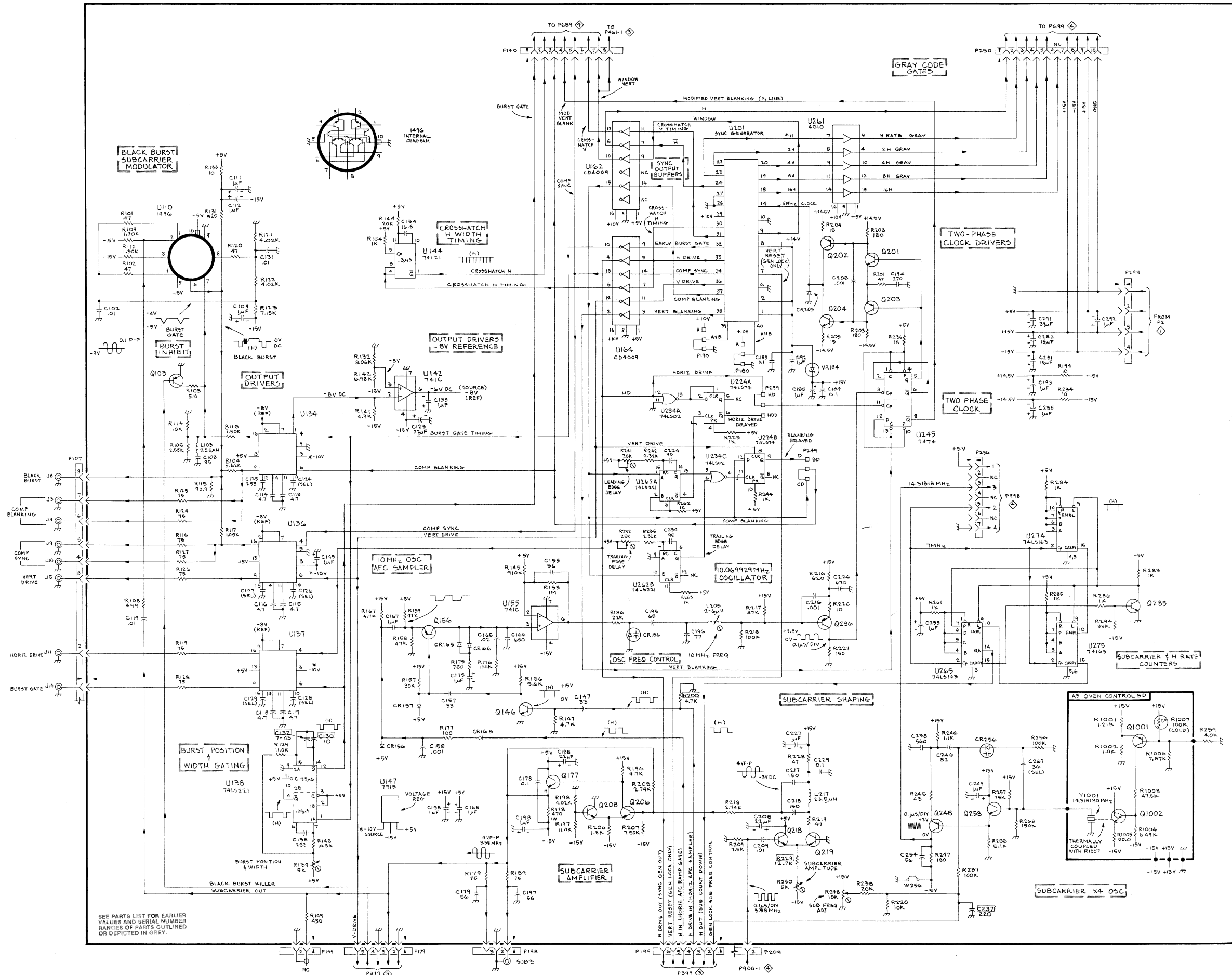
External Reference or Gen Lock. Horizontal Lock: When an external signal is applied to the GEN LOCK connector and the GEN LOCK pushbuttons are set to EXT, the H out signal applied from pin 14 of U265 in the Subcarrier & H Rate Counters to pin 2 of P199 is disconnected by the Sync Control Logic U390 circuit on the Gen Lock diagram. Thus, this H out signal will not be coming in via pin 4 of P199 to the base of Q146 in the 10 MHz Oscillator AFC Sampler circuit. Instead, an H rate externally referenced signal is applied from the Gen Lock diagram to pin 4 of P199 to lock up the 10 MHz Oscillator Q236. Hence, all internal sync will be locked to the external composite sync source. (Refer to the Gen Lock circuit description for details.)

Subcarrier Lock: With the Gen Lock circuit operating in the EXT mode, pin 1 of P199 is driven from a low impedance voltage source that controls the Subcarrier X4 Oscillator. That is, this voltage source overrides the Subcarrier Frequency Adj R248. The voltage source is a function of the incoming subcarrier frequency plus phase relation to the Subcarrier X4 Oscillator and adjusts the oscillator until frequency and phase lock are achieved. (See Gen Lock circuit description for details.)

U201 SYNC GENERATOR PIN IDENTIFICATION

PIN	INPUT/OUTPUT	IDENTIFICATION
1	V _{DD} (+14 V)	7 V to 14 V Supply Voltage
2	Input I _{VB}	Inhibit Vertical Blanking
6	Input PAL (Gnd)	PAL/PAL-M System Select
7	Input R	Reset Vertical Counter
8	Input NTSC (+14 V)	NTSC System Select
9	Output WND	Window
10	V _{SS} (Gnd)	Ground
14	Input CLK	5 MHz Clock
18	Output 16H	High Frequency Divider
19	Output 8H	High Frequency Divider
20	Output 4H	High Frequency Divider
22	Output 2H	High Frequency Divider
23	Output H*	High Frequency Divider
24	Output H	High Frequency Divider
27	Input RH (Gnd)	Reset H Divide
28	Input RHC (Gnd)	Reset Horizontal Counter
29	Input AHD (+10 V)	Advance Horizontal Drive
30	Output 20H	Convergence H Timing
31	Output 15V	Convergence Vert Timing
32	Output CBG	Color Burst Gate
33	Output HD	Horizontal Drive
34	Output CS	Composite Sync
36	Output VD	Vertical Drive
37	Output CB	Composite Blanking
38	Output VB	Vertical Blanking
39	Input AVB	Advance Vertical Blanking
40	Input AHB	Advance Horizontal Blanking

} +10 V—Advance
 } Gnd—Normal



Note:

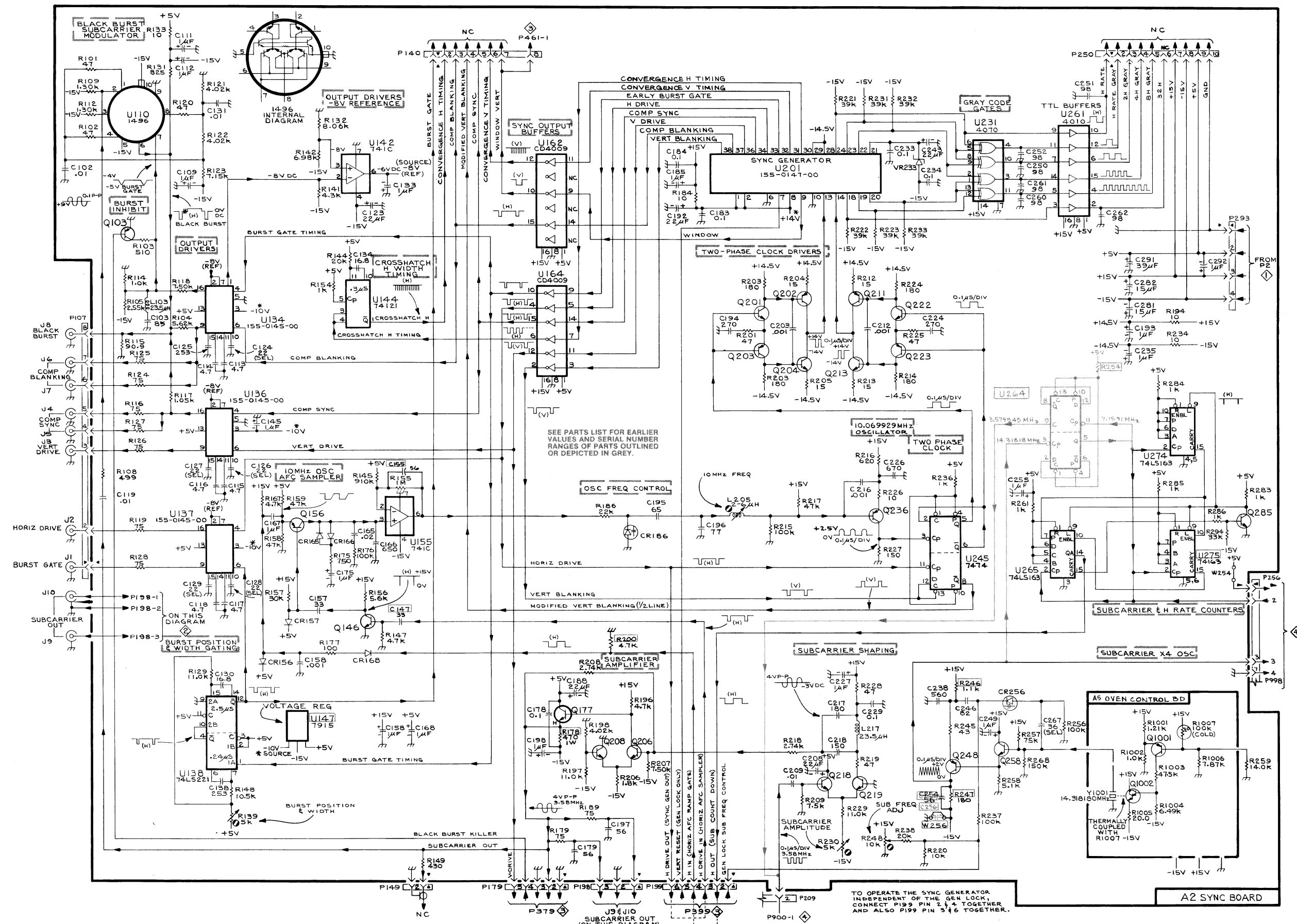
1. For your convenience, the location of the active components on this diagram are located approximately as on the circuit board layout when the front of instrument faces to your right.

2. (V) **Vertical Rate.**
Test Scope Sweep at 2 ms/DIV.
Test Scope Externally Triggered on 1474 Vert Drive.

- (H) **Horizontal Rate.**
Test Scope Sweep at 10 μ s/DIV.
Test Scope Externally Triggered on 1474 Horiz Drive.

- (DC) **Voltage Control Line.**
Normally Non-Repetitive.

3. A dark circle around the symbol for Q177 denotes a metal case transistor.



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(SN B029999 & BELOW)
A2 SYNC BOARD
CH 7-1-76

GEN LOCK CIRCUIT DESCRIPTION 3

Purpose of Gen Lock Circuit

This circuit enables the 1474 Generator to color gen lock to composite video from all normal sources, including most helical scan video tape machines.

The following is a summary of the operating modes.

1. Internal Sync Mode (GEN LOCK SYNC and SUB-CARRIER switches set to INT): Gen Lock circuitry is switched to internal mode. Both the GEN LOCK SYNC and SUBCARRIER lights are off and the instrument operates as a master sync generator.

2. External Sync Mode (GEN LOCK SYNC and SUB-CARRIER switches set to EXT): Gen locks on composite sync with burst, composite video with burst, 4 V composite sync, or 2 V p-p subcarrier applied to the GEN LOCK SIGNAL LOOP input connector.

(a) With 2 V p-p subcarrier only applied, SUB-CARRIER light turns on to indicate a subcarrier lock condition.

(b) When an external composite sync or video with burst is applied, both the SYNC and SUBCARRIER lights turn on to indicate a full gen locked condition.

(c) If composite sync without burst is applied to the instrument, the SYNC light turns on to indicate sync is locked. SUBCARRIER light is off to indicate the instrument is operating on internal subcarrier frequency. Burst is automatically deleted from the BLACK BURST output signal.

(d) If composite sync is absent but burst and/or chroma is present, both the SYNC and SUBCARRIER lights turn off as the instrument automatically switches to internal mode.

Circuit Description

Sync Separator U318 and Sync Control Logic U390.

External Gen Lock: The signal for gen locking the 1470 Generator is applied to the rear panel GEN LOCK SIGNAL LOOP connectors J6 or J7. This signal should be a standard signal; that is, terminated if it is not looped through to a termination. The signal is fed to pin 16 of the Sync Separator U318. The purpose of U318 is to strip composite sync off of the video and AGC the sync signal.

Stripped composite sync is applied from pin 5 of U318 to pin 5 of U390. The purpose of U390 is to determine which composite sync (internal or external) is to be used.

Assume that GEN LOCK SYNC pushbutton S496 is set to EXT. CR485 reverse biases and a +2 V high is applied to pins 9 and 10 of U419, causing a low to occur at pin 8. This low is applied to pins 1, 2, and 13 of U390 and therefore the output at pin 3 is high. This condition allows the stripped composite sync applied to pin 5 of U390 to go through U390 to pin 6 and on to pin 9.

Since the GEN LOCK SYNC pushbutton S496 is set to EXT, which causes a low to be applied to pin 13 of U390, pin 11 is high, and this level is applied to pin 10. As a result, stripped composite sync derived from the external source passes through U390B and U390C to U390C pin 8. From pin 8 of U390C, this signal is applied to the base circuit of Q314 and also ac coupled to pin 1 of U331.

Sync Control Logic U390. Internal Sync: If the GEN LOCK SYNC pushbutton is set to INT, the opposite conditions as compared to EXT occur. Pins 1, 2, and 13 go high. The signal applied to pin 5 is turned off so there is no output at pin 8. Since pin 13 is high, the internal H rate signal applied to pin 12 goes to pin 11 which is connected to pin 10. Pin 9 of U390 is high due to pin 4 going low so the signal on pin 10 appears at pin 8. Hence, there is an internal H rate signal present at pin 8 of U390.

The purpose of the internal H rate signal at pin 8 of U390 is to generate a burst gate.

Vertical Pickoff Ampl and Vert Integrator. In the EXT GEN LOCK mode, Q314 and Q313 amplify the stripped composite sync signal and apply it to the Vertical Integrator (Q363 and Q364). This circuit is a peak detector that determines where the vertical interval is by the ratio of the H sync rate to serration rate. For block sync, it is the ratio of sync to block sync. The output at the collector of Q364 is a negative-going vertical rate signal applied to pin 2 of U464.

U464, U421, and Q464. With a vertical rate signal applied to pin 2 of U464A and a horizontal drive signal applied to pin 3, U464A uses the horizontal drive signal to line latch and field select the 60 Hz vertical signal. At the output (pin 6 of U464A) there is a 30 Hz rate, positive-going pulse.

The 30 Hz rate signal is applied to pin 2 of U421A, a dual one shot. The first half of U421 is a delay circuit for developing a reset pulse; the second half of U421 controls the width.

U421B output (pin 12) is a 3.5 V negative-going 30 Hz rate signal that is applied to the base of Q464. The purpose of Q464 is to convert the 3.5 V signal to +15 V for resetting pin 7 of U201, which is the Sync Generator on diagram 2. To get to pin 7, the 15 V reset signal is fed through pin 5 of P399 and pin 5 of P199 to U201.

0.5 H Pulse Deletion & Horiz Delay U331. In EXT GEN LOCK mode of operation, the stripped sync from pin 8 of U390 is ac coupled through C320 to pin 1 of U331A. The purpose of U331A (a one shot) is to provide horizontal delay with respect to external sync. This delay is adjustable by means of Horiz Delay adjustment R331; adjustment range is approximately $\pm 2 \mu\text{s}$.

U331B is also a one shot. This half of U331 ensures that the output at pin 5 is H rate and not 2 H; that is, 0.5 H duration pulses are deleted. Pin 12 output is an H sync signal that is referenced to the external signal source.

H Squarewave Generator U361B. External Gen Lock: The gen lock H delay pulse at the output (pin 13) of U331 is applied to pin 9 of U361B, the H Squarewave Generator. The purpose of U361B is to make the signal square. Hence, the output at pin 12 of U361B is a squarewave referenced to the external signal.

U361A. Internal Sync: This circuit modifies the burst gate applied to Q345. Modification comes from pin 13 of U361 through CR335 and R342 to ensure that burst is short; just burst width and no more.

Q300 and Q320. These two transistors are connected as a one shot that generates a gate across burst. This gate is referenced to the external signal source applied to the GEN LOCK SIGNAL LOOP connector. This signal is used to gate only the burst into the demodulators (U365 and U366).

Q383 and Q384. The H sync signal from pin 12 of U331B is ac coupled through C382 to the base of Q383. Transistors Q383 and Q384 are connected as a one shot that generates another burst gate, which will be used to turn on Burst Samplers Q412 and Q417.

U461 and U464. AFC Blanking for Tape Dropout. In EXT GEN LOCK mode of operation, the window vertical timing signal from pin 10 of U162 (on the Sync diagram) is applied through pin 8 of P140 and single pin connector P461 to pin 2 of U461A. U461 consists of two one shots. The trailing edge of the window vertical timing signal is used to trigger pin 2 of U461A. This half of U461 has an AFC Blanking Delay adjustment (R491) to control the position of the AFC blanking signal that is present at the output (pin 13). R491 adjustment range is sufficient to position the AFC blanking signal from several lines before to several lines after vertical sync.

The delayed AFC blanking signal is applied from pin 13 of U461 to pin 9, the other half of U461. The trailing edge of the signal triggers pin 9. This half of U461 sets the width of the AFC blanking signal by means of AFC Blanking Width control R492. The output signal at pin 5 of U461B is applied to pin 12 of U464B for line latching the 60 Hz trigger. The output (pin 8) is a negative-going AFC blanking signal.

Subcarrier Amplifier Q346 and Q347. In EXT GEN LOCK mode, the subcarrier signal or composite video with burst, or composite sync with burst, for gen locking the 1474 Generator, is applied to the GEN LOCK SIGNAL LOOP connectors J6 or J7. The signal is applied through C315, R317, and subcarrier filter (C318, L317) to the emitter circuit of Q346. Q346 and Q347 with associated circuitry are the Subcarrier Amplifier. The subcarrier signal, including burst or any other signal that has subcarrier on it, will appear at the collector of Q347. This signal is ac coupled to the emitter of Q345 when Q345 is turned off.

Q345, Q336, and U329. External Gen Lock: Q345 is a clamp and is normally on except during burst time. During burst time, Q345 is turned off by the burst gate applied to its base. Hence, burst appears at the emitter of Q345 during burst time only and is coupled through R354 and C355 to pin 4 of Demodulators U365 and U366.

The burst signal at the emitter of Q345 is applied through R337 and C335 to the base of Q336. Transistor Q336 is an amplifier that has a 3.58 MHz resonant circuit in its collector. When 3.58 MHz is applied to the base of Q336, the signal is amplified and is present at the collector. This amplified burst signal is rectified through CR326 and C326. Then, the rectified burst signal is applied to pin 5 of U329B, and operational amplifier comparator.

Approximately 0.1 V is applied to pin 6 of U329B when CR327 is reverse biased. Assuming this condition, whenever pin 5 of U329B goes above 0.1 V due to the presence of rectified burst, pin 7 goes positive to about +13 V and reverse biases CR448. This condition allows external control of the Subcarrier X4 Oscillator located on the Sync diagram.

Q438. External Gen Lock: Continuing from the previous description of U329B and CR448, Q438 turns on when external burst is present. Thus, this FET is an automatic internal-external switch for subcarrier. The output of Q438 is applied to the SUBCARRIER pushbutton switch S497.

If subcarrier or burst is absent when sync is present at the GEN LOCK SIGNAL LOOP connector, then the voltage on pin 5 of U329B will be lower than pin 6. Pin 7 of U329B will go to -13 V or -14 V and will turn on CR448. As a result, Q438 turns off and therefore the circuit will automatically switch to internal control.

If sync is missing but burst and other subcarrier type of signals are present, pin 1 of U329A goes negative and automatically switches the internal-external sync circuitry to internal. In addition, Q338 base goes negative and the collector goes positive. This positive signal connects CR327 to R307 and pin 6 of U329B. The voltage divider between R339 and R307 places a voltage on pin 6 that will be more positive than the voltage on pin 5. That is, the subcarrier component of the signal being rectified by CR326 and C326 does not cause pin 5 to exceed the positive voltage on pin 6. Therefore, pin 7 will be low (approx. -13 V) and the circuit remains in the internal subcarrier mode.

There is one condition when the preceding situation is reversed. That is when 1.5 V or more of external subcarrier is applied to the GEN LOCK SIGNAL LOOP connector. In this case, the high amplitude subcarrier signal, when rectified by CR326 and C326, causes pin 5 of U329B to go more positive than pin 6 even though pin 6 is at its most positive level. This condition causes pin 7 to go high (approx. +13 V) and the instrument gen locks to the external subcarrier signal. 1.5 V or more of subcarrier is also high enough amplitude to prevent subcarrier, from an unterminated color bar without sync for example, from gen locking the instrument. The objective is to recognize 1.5 V or more subcarrier and gen lock on it for external reference subcarrier lock.

Demodulators U365 and U366. External Gen Lock: Assume proper sync with burst is applied to the GEN LOCK SIGNAL LOOP input connector. A burst of subcarrier will be present at the emitter of Q345 at burst time. This signal is coupled through R354 and C355 to pin 4 of Demodulators U365 and U366. U365 is R-Y; U366 is B-Y. Subcarrier is applied to pin 8 of both units. For U366 the subcarrier comes from the Sync diagram; for U365 the same subcarrier is shifted 90°. These subcarrier signals are compared with incoming burst, and the output during burst time is a voltage that varies as a function of the difference frequency and phase.

The two voltages at pin 9 of each of the demodulators are filtered through L394 and L397, and are applied to the emitters of Q404 and Q408. The signal at the emitters of these transistors is ac coupled to Sync Clamps Q405 and Q406. These clamps operate during sync time to ensure that any residual subcarrier is clamped out before the Burst Samplers Q412 and Q417 are turned on for burst. Shortly after sync time, the Burst samplers turn on via the burst gating transistors Q383 and Q384.

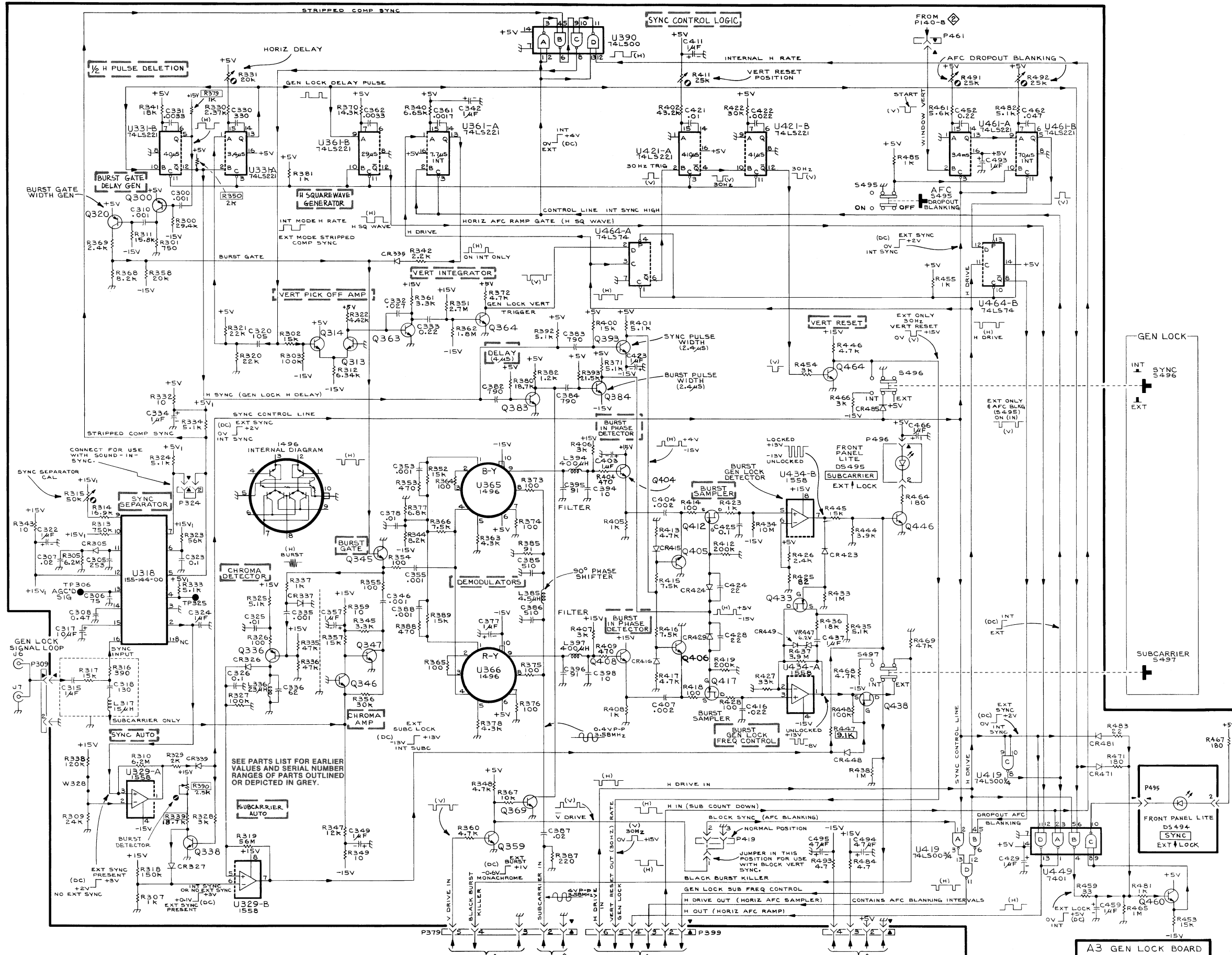
The R-Y and B-Y signals from Q412 and Q417 are applied to Burst Gen Lock Detector U434A & B. These signals cause a varying output voltage to occur as a function of the relationship of the two frequencies. Pin 1 of U434B is applied to the automatic internal-external switching FET Q438. Assuming Q438 is turned on and the SUBCARRIER switch S497 is set to the EXT position, the varying voltage is applied via pin 1 of P399 to pin 1 of P199 on the Sync diagram. This voltage controls the Subcarrier X4 Oscillator on the Sync diagram.

When the control voltage sets the frequency of the Subcarrier X4 Oscillator such that the subcarrier applied to Demodulators (U365 and U366) has the proper relationship to the externally-referenced burst applied to the demodulators, then the output (pin 1 of P399) will stay in a locked condition. The R-Y voltage at pin 7 of U434B is positive in the locked condition and this is indicated via Q446 turning on which turns on the GEN LOCK SUBCARRIER indicator light DS495.

Assume there is a loss of external burst or sync. This condition causes CR448 to turn on, Q438 turns off, and a low is applied through R447 to the base of Q446. This low overrides any signal on pin 7 of U434B and therefore turns off GEN LOCK SUBCARRIER light DS495 and leaves it off. The low applied through R447 is also applied through the EXT contacts of S497 to pin 4 of P379. The purpose of this dc level is to delete burst on the black burst signal available at the BLACK BURST connector.

Note:

1. For your convenience, the location of the active components on this diagram are located approximately as on the circuit board layout when the front of instrument faces to your right.
2. Option 1 instruments do not have a Gen Lock circuit board.
3. (V) **Vertical Rate.**
Test Scope Sweep at 2 ms/DIV.
Test Scope Externally Triggered on 1470 Vert Drive.
- (H) **Horizontal Rate.**
Test Scope Sweep at 10 μ s/DIV.
Test Scope Externally Triggered on 1470 Horiz Drive.
- (DC) **Voltage Control Line.**
Normally Non-Repetitive.



U419. This integrated circuit determines the characteristics of the H drive out signal going to the 10 MHz Oscillator AFC Sampler circuit.

In the external gen lock mode, the output of pin 11 of U419 is an H drive output that is referenced to the external signal. This H drive signal is applied to Q146 in the Horizontal AFC Sampler circuit on the Sync diagram. The signal may contain two blank areas that are associated with the activation of the block sync blanking and/or tape dropout blanking.

In the internal sync mode, the output at pin 11 of U419 is the same H drive signal as the one coming from pin 6 of P399.

U449, Q460, and DS494. U449 determines the source of the H out (Horiz AFC Ramp). In external gen lock mode, pins 1 and 13 of U449 will output to pin 4 of P399 an H rate squarewave derived from an external source.

U449B determines the time relationship of internal and external H to decide whether sync external lock should be indicated by SYNC light DS494. Assume the instrument is gen locked to the external signal, pin 4 of U449B goes high, the emitter of Q460 goes positive, and this dc level is inverted by U449C. DS494 turns on to indicate the instrument is gen locked.

In the internal sync mode, pins 1 and 13 of U449 will output to pin 4 of P399 the H input from the subcarrier countdown signal on pin 2 of P399. The SYNC light DS494 turns off as follows:

Pin 4 of U449B goes low, the emitter of Q460 goes negative, pin 10 of U449C goes high, and DS494 turns off.

Gen Lock Switching Logic

The following describes the logic for the signals going in and out of P399, pins 2, 3, 4, and 6.

Internal Sync Mode. The objective is to electronically connect pin 2 to pin 4 of P399, and to connect pin 6 to pin 3. The description that follows starts with pins 2 and 4.

The signal at pin 4 of P399 is the H out (Horiz AFC Ramp). This squarewave is used to generate a sampling ramp for the AFC Comparator Q146 on the Sync diagram. The output of Q146 is applied to U156, compared to another signal, and then applied to U155. The output of U155 is applied to the 10 MHz Oscillator Q236, which is the primary oscillator driving the Sync Generator U201 to obtain H lock.

The objective is to compare the two signals applied to Q156. The difference signal at the output of Q156 is applied to U155, whose output is used to change the 10 MHz Oscillator frequency until its counted-down H, which is called the horizontal drive, is the same frequency and phase as the counted-down subcarrier. Then, the signals lock together. The following describes how this is achieved.

Pin 2 of P399 signal is an H rate squarewave that is counted down from the Subcarrier X4 Oscillator by dividing by 2 to get 7.159090 MHz and then divided by 455 to obtain 15,734.263 Hz. This is the H rate signal used as the internal sync reference.

The signal at pin 2 of P399 is connected to pin 2 of U449A. If pin 3 of U449A is high, then pin 1 of U449A has an output that follows the H rate signal on pin 2. This H rate signal is applied to pin 4 of P399 to satisfy the requirement of electronically connecting pin 2 of P399 to pin 4 and supplying a sampling signal to Q156 in the 10 MHz Sampler circuit.

Now it is necessary to electronically connect pin 6 of P399 to pin 3. The signal on pin 3 is the other signal required to drive the 10 MHz AFC Sampler circuit. The signal on pin 6 of P399 is an H drive signal that comes from pin 33 of Sync Generator U201 and originates from the 10 MHz Oscillator whose output is counted down.

Pin 6 of P399 H-drive signal goes to pin 4 of U419B. If pin 5 is high, then the H drive signal appears at pin 6 of U419B and at pin 12 of U419D. If pin 13 of U419D is high, the H drive signal will be at pin 11, where it is applied to pin 3 of P399 to satisfy the other requirement of electronically connecting pin 6 of P399 to pin 3 and supplying a signal to Q146 in the 10 MHz AFC Sampler circuit.

The following describes the remaining logic that occurs at U419. Assume the GEN LOCK SYNC switch S496 is set to INT and the Block Sync jumper P419 is set to the Normal (non-block sync) position. This jumper connection causes pin 1 of U419A to be low (grounded). Regardless of the level on pin 2 of U419A, pin 3 of U419A and pin 13 of U419D will be high.

At the same time (assuming S495 is set to OFF), the level at pin 5 of U419B is high, allowing the H drive signal on pin 4 to appear at pin 6 of U419B and pin 12 of U419D. Since pin 13 is high, the H drive signal will appear at pin 11 of U419D and at pin 3 of P399 to satisfy the internal sync requirement.

Since the GEN LOCK SYNC switch S496 is also set to INT, a low is applied through CR485 to pin 2 of U419A. However, since pin 1 of U419A is grounded, pin 3 will remain high regardless of the level on pin 2. Thus, the high on pin 3 of U419A causes pin 13 to be high as described earlier.

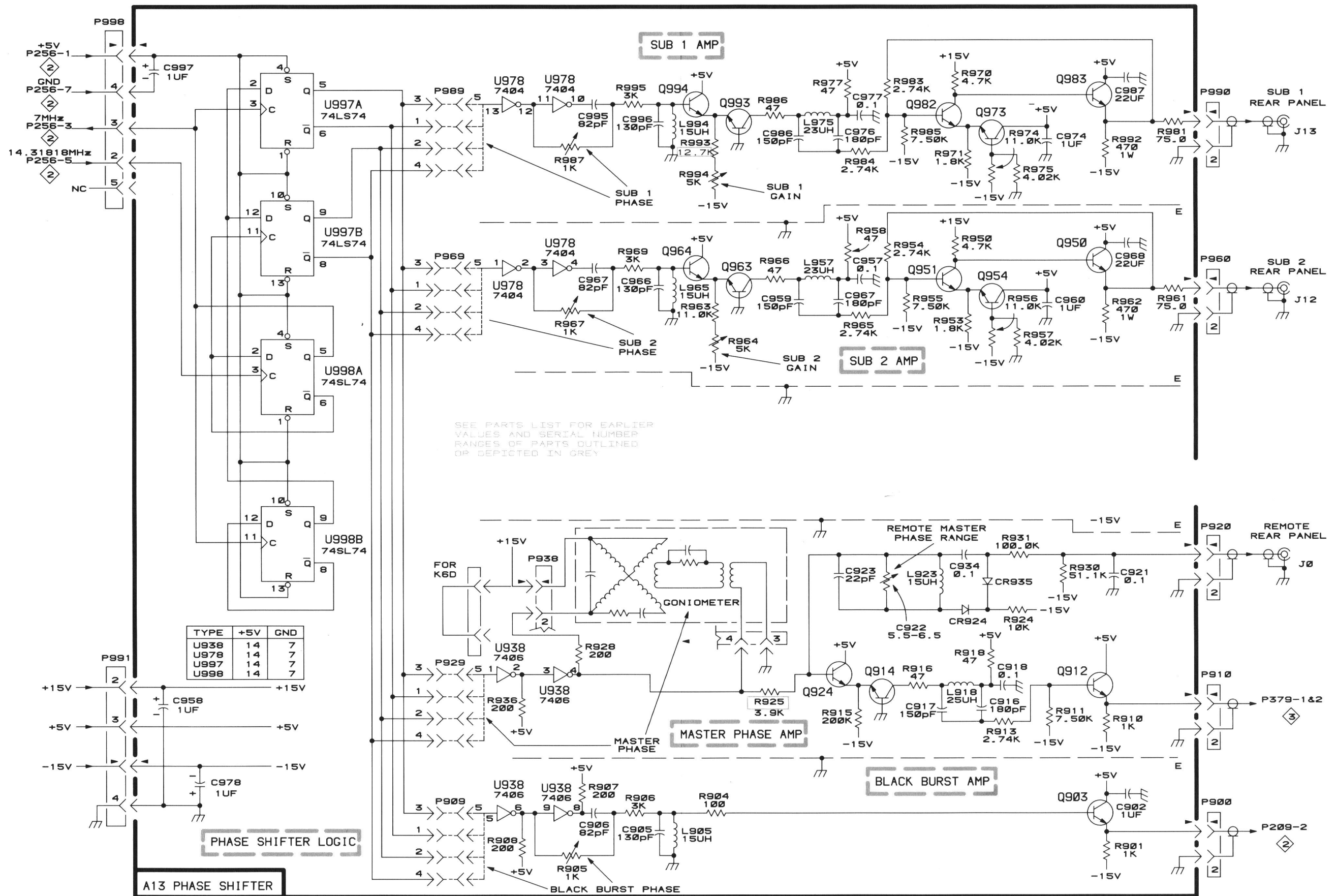
Block Sync. External Sync Mode. When the Block Sync jumper P419 is placed to the block sync position and the GEN LOCK SYNC switch S496 is set to EXT, an inverted V drive signal is applied to pin 1 of U419A during the vertical blanking interval and a high is placed on pin 2 of U419A, causing pin 3 of U419A to go low. This low is applied to pin 13 of U419D and will prevent the H drive signal on pin 12 of U419D from reaching pin 13. As a result, the H drive signal is turned off during the block sync interval. Thus, the 10 MHz AFC Sampler will also be turned off during this time.

If the GEN LOCK SYNC switch S496 is set to INT while jumper P419 is set to Block Sync, the inverted vertical

drive signal will not appear at pin 3 of U419A because pin 2 is low. However, the H drive signal is allowed to pass through U419D to pin 3 of P399. The objective is to inhibit block sync AFC blanking when operating the instrument in the internal sync mode.

AFC Dropout Blanking. External Sync Mode. Assume the AFC Dropout Blanking switch S495 is set to ON. The H drive signal will be blanked at pin 6 of U419B during the interval set by the AFC Dropout Blanking Delay R491 and Width R492 adjustments. Hence, the H drive out applied to pin 3 of P399 is blanked to shut off the 10 MHz AFC Sampler during this adjustable blanking interval.

Pins 3 and 11 of U461 are pulled low when GEN LOCK SYNC switch S496 is set to INT, thereby shutting off the AFC Dropout Blanking circuit.



TYPE	+5V	GND
U938	14	7
U978	14	7
U997	14	7
U998	14	7

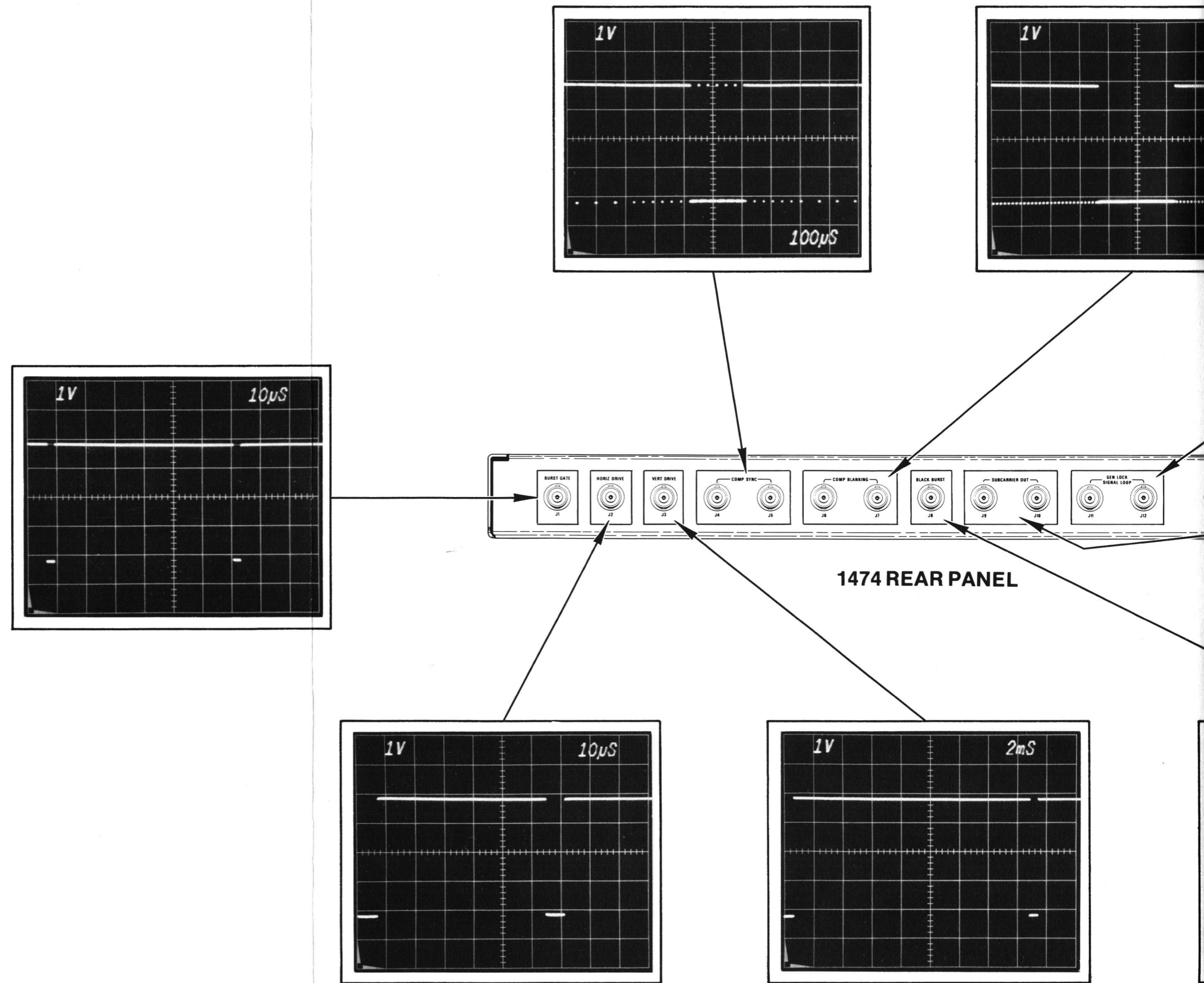


Fig. 9-1. Typical waveforms obtained at the rear-panel output connectors on the 1474. The connectors terminated into 75 ohms.

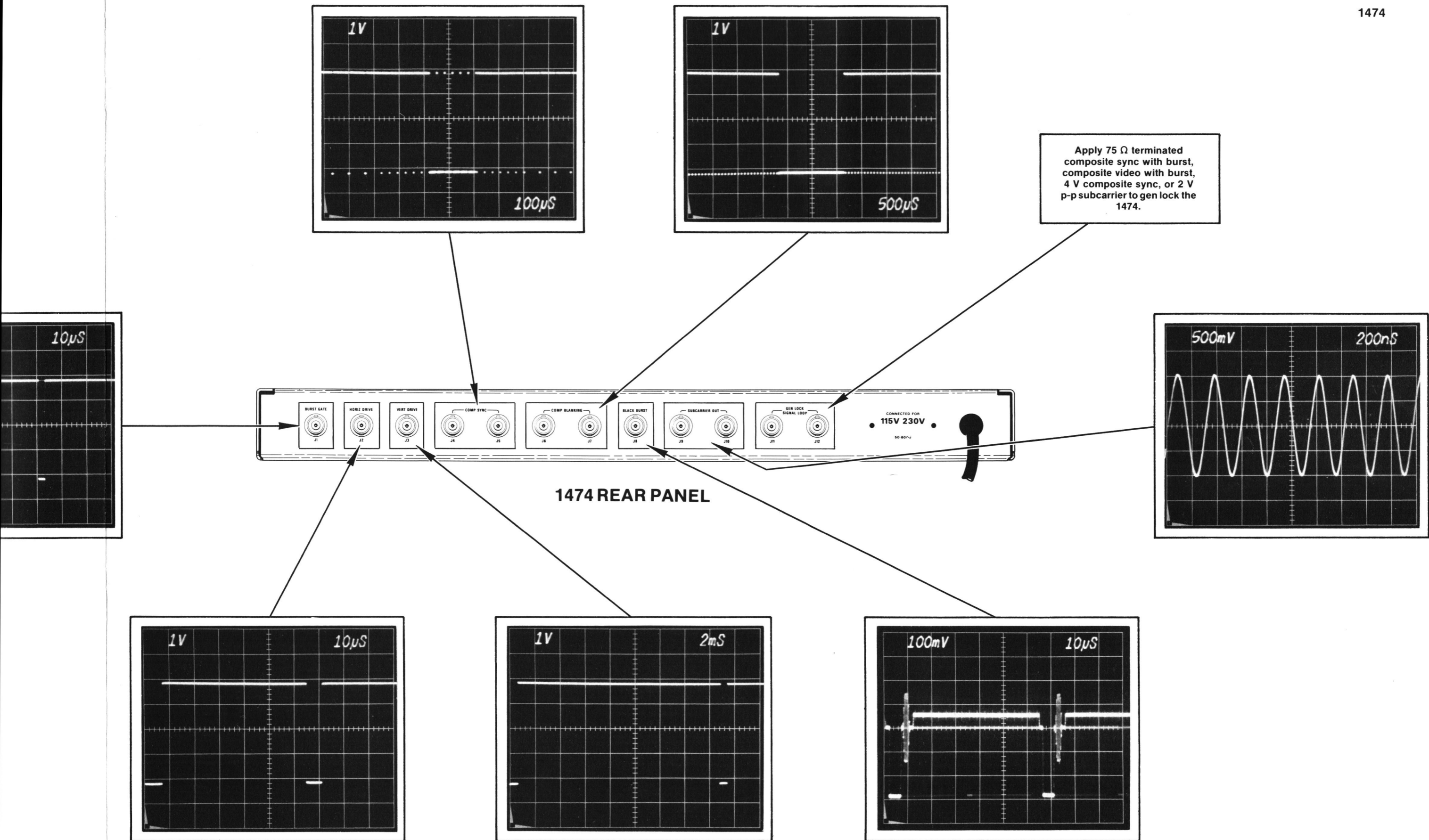
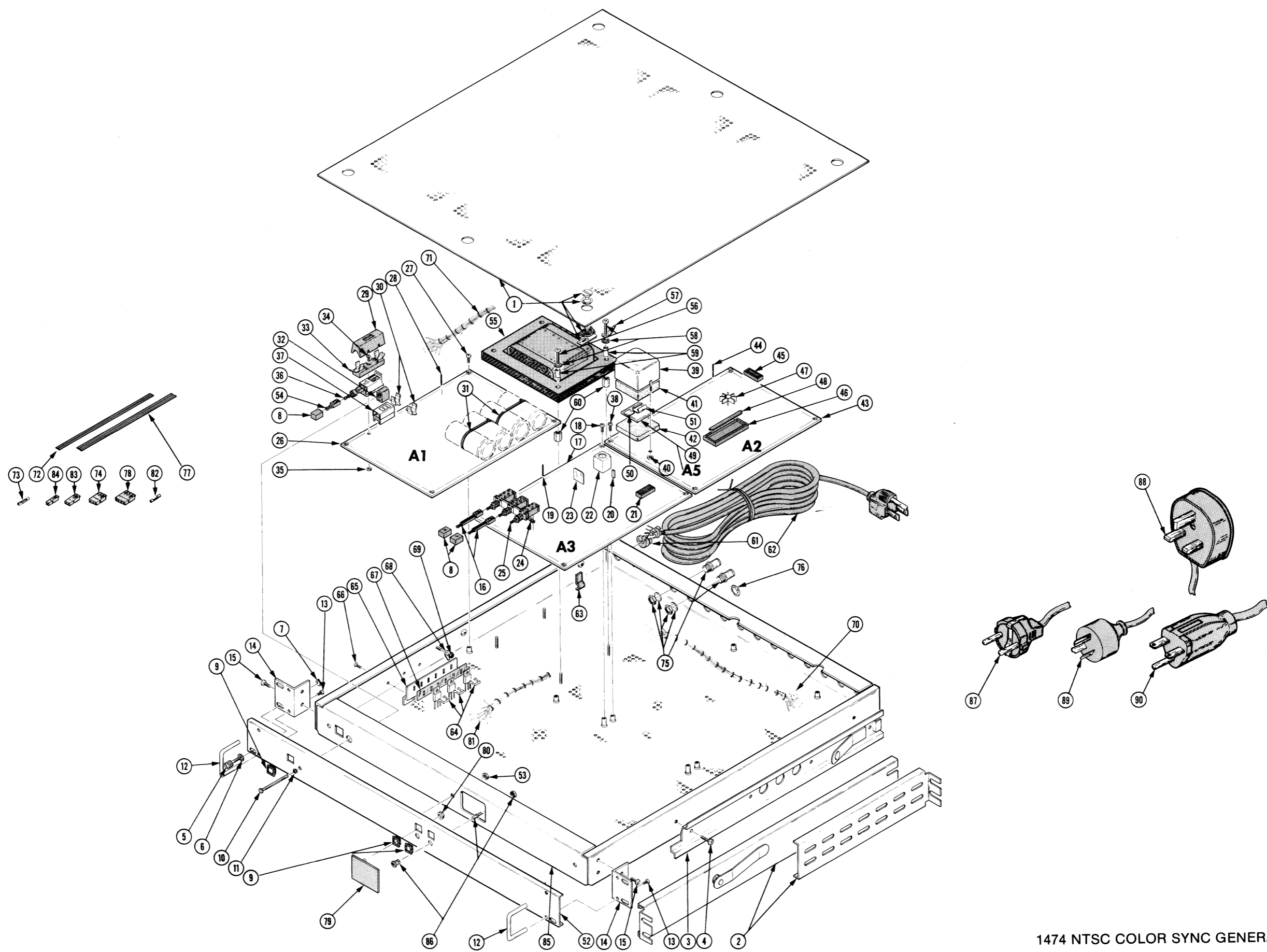


Fig. 9-1. Typical waveforms obtained at the rear-panel output connectors on the 1474. The connectors were externally terminated into 75 ohms.

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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.

Date: 2-11-81 Change Reference: C100/281

Product: GENERAL Manual Part No.: GENERAL

DESCRIPTION

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. Refer to the rackmounting instructions in this manual for complete information.