Instruction Manual

Tektronix

1725 (SN B040000 and Above) PAL/NTSC Vectorscope

070-7635-04

Warning
The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

CE

For further information, contact: Tektronix, Inc., Corporate Offices, P.O. Box 1000, Wilsonville, OR 97070–1000, U.S.A. Phone: (503) 627–7111; TLX: 192825; TWX: (910) 467–8708; Cable: TEKWSGT.

Tektronix' Television Division participates in the Broadcast Professionals Forum (BPFORUM) on the CompuServe® Information Service. Press releases on new products, product-specific newsletters, application information and technical papers are among the types of information uploaded.

Additionally, product specialists from Tektronix will be "on line" to answer questions regarding product applications, operation and maintenance.

Instructions for accessing the information on CompuServe can be found in the current Tektronix Television Products Catalog.

CompuServe access is currently available in the U.S.A., Canada, Europe, Japan, Australia, New Zealand, Argentina, Venezuela, Korea, and Taiwan.

WARRANTY

Tektronix warrants that this product, that it manufactures and sells, will be free from defects in materials and workmanship for a period of three (3) years from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Use Proper Fuse. Use only the fuse type and rating specified for this product.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Symbols and Terms

Terms in this Manual. These terms may appear in this manual:

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

CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

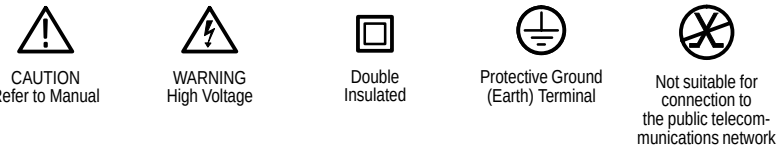
Terms on the Product. These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product. The following symbols may appear on the product:



Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

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

Disconnect Power. To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

Use Caution When Servicing the CRT. To avoid electric shock or injury, use extreme caution when handling the CRT. Only qualified personnel familiar with CRT servicing procedures and precautions should remove or install the CRT.

CRTs retain hazardous voltages for long periods of time after power is turned off. Before attempting any servicing, discharge the CRT by shorting the anode to chassis ground. When discharging the CRT, connect the discharge path to ground and then the anode. Rough handling may cause the CRT to implode. Do not nick or scratch the glass or subject it to undue pressure when removing or installing it. When handling the CRT, wear safety goggles and heavy gloves for protection.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

X-Radiation. To avoid x-radiation exposure, do not modify or otherwise alter the high-voltage circuitry or the CRT enclosure. X-ray emissions generated within this product have been sufficiently shielded.

Preface

The information in this manual is intended for instrument operators and service technicians. Operators are assumed to be familiar with basic television terms and measurements. Qualified service technicians are also assumed to be familiar with television terms and measurements, and have moderate experience with analog and logic circuits.

The manual is divided into two parts: Operator's Information and Service Information. The Operator's Information is useful to both operators and service technicians. The Service Information is intended only for qualified service technicians.

Section 1, Introduction

Section 1, Introduction, includes a general description of the instrument followed by the Specifications. The Specifications include references to the corresponding Performance check steps.

Section 2, Operating Instructions

Section 2, Operating Instructions, familiarizes the user with the front- and rear-panel controls, connectors, and indicators; includes an operator's check-out procedure; and includes other operator familiarization information.

Section 3, Installation

Section 3, Installation, includes electrical and mechanical installation information. The electrical installation information includes adjustments and operational changes available with the instrument. The mechanical installation information includes rackmounting, custom installation, and portable use.

Section 4, Theory of Operation

Section 4, Theory of Operation, provides an over-all block diagram description and detailed circuit descriptions. Read the block diagram description for an overview of the instrument. The detailed circuit descriptions should be used with the block diagram and schematic diagrams in the foldout pages for specific information about individual circuits.

Section 5, Checks and Adjustments

Section 5, Checks and Adjustments, includes the Performance Check Procedure and the Adjustment Procedure. The Performance Check Procedure is used to verify that the instrument's performance is within its specifications, and the Adjustment Procedure is used to adjust the instrument to meet its specifications. The procedures are preceded by a list of recommended test equipment. Each procedure has a short form listing of the individual steps.

Section 6, Maintenance

Section 6, Maintenance, includes preventive, troubleshooting, and corrective information.

Section 7, Options

Section 7, Options, documents instrument options. The information in this section summarizes the options. Additional details are included in appropriate places throughout the manual.

Section 8, Replaceable Electrical Parts

Section 8, Replaceable Electrical Parts, includes order information and part numbers for all replaceable electrical parts.

Section 9, Diagrams

Section 9, Diagrams, contains servicing illustrations. These include adjustment locations, circuit board part locations, a block diagram, and schematic diagrams. Parts locating tables are included that cross-reference the circuit board illustrations to the schematic diagrams.

Section 10, Replaceable Mechanical Parts

Section 10, Replaceable Mechanical Parts, includes ordering information and part numbers for all replaceable mechanical parts. This parts list is referenced to an exploded view mechanical drawing. Also included are lists of accessories and optional accessories.

Introduction

Section 1
Introduction

The TEKTRONIX 1725 is an 8½" wide by 5¼" high Vectorscope, weighing 8½ pounds. The crt occupies approximately two-thirds of the front-panel area, with the control panel taking up the remainder of the space.

Operation is controlled by a microprocessor that polls the front-panel switches. Front-panel switches are of the momentary touch type with lighted functional indicators. In addition, some of the switches are used to select special functions. Special functions are accessed by holding the switches in until the microprocessor recognizes the request.

The signal is displayed on a bright crt capable of displaying one line per frame. It is of the mesh type for better geometry, and uses an internal graticule to reduce parallax. The internal vector graticule has targets for both NTSC and PAL color signals that are scaled for both 75% and 100% amplitude color bars. Variable graticule scale illumination provides even lighting over the usable graticule area to improve measurement accuracy and the quality of waveform photographs.

Composite video signals, for the Channel A and B Inputs, and the External Reference Signal Input are brought in through high impedance bridging loopthroughs in order to protect the integrity of the signal paths. The input switching allows for the display of either Channel A or Channel B or both inputs. Synchronization can be either internal or external.

The 1725 offers a choice of individual displays of vectors or X–Y or both. The X–Y display, with accompanying graticule scale, allows this vectorscope to be used for stereo audio monitoring. Stereo audio balanced line input for X–Y display is through the rear-panel REMOTE connector. In addition to the usual color bar amplitude and phase relationships, the vector display can also be used to make differential gain and phase measurements. A +V display is used to check PAL system color encoders. Full 360˚ phase shift and a test circle are also included in this vectorscope.

The 1725, through the Auxiliary function, reacts to Store and Recall commands from a companion 1730–Series Waveform Monitor, when the two are interconnected. This allows the storing of up to four front–panel setups that can be recalled when a waveform monitor recall button is pressed, or a valid 1730–Series Remote ground closure occurs. The Auxiliary function can also take advantage of the blanking strobe from the waveform monitor, to unblank the Vectorscope crt for up to 1-line in 625-line select display.

Accessories

The 1725 is shipped with a set of accessories that are needed for its installation or day-to-day operation. These are the "Standard Accessories." They are packaged in a small, cardboard carton within the packing box.

In addition to the standard accessories, there are other accessory items that can be purchased from Tektronix, Inc., that will either enhance operation or help to customize the installation. The following list of accessories is divided into these two categories. Part numbers for the standard accessories can be found at the end of the Replaceable Mechanical Parts List.

Standard Accessories
(included with instrument)

1 Manual, Instruction (070–7635–XX)

1 Cable Assembly, Power (161–0216–00 for US/Japan only, all others 161–0066–XX)

1 Fuse, Cartridge: 3AG 2A, 250V, Fast-Blow (159–0021–00)

3 Light Bulbs, replacement for graticule scale (150–0168–00)

1 Auxiliary Control Cable for use with 1730–Series Waveform Monitor (012–1422–00)

1 Smoke Gray crt Filter (378–0258–00) – Installed

Optional Accessories
(ordered separately)

Camera, C9 (Option 20)

Viewing Hood (016–0475–00)

Front Panel Cover (200–3897–01)

Field-Installable Upgrades

1700F00, Plain Cabinet (painted silver grey)

1700F02, Portable Cabinet (silver grey)

1700F05, Side-by-Side Rack Adapter

1700F06, Blank Half-Rack-Width Panel

Power Cord Options

The 1725 is available with the following optional power cords.

Option A1 Power, Universal Europe, 220 V/16 A (Power Cord and 2 Fuses).

Option A2 Power, United Kingdom, 240 V/15 A (Power Cord and 2 Fuses).

Option A3 Power, Australia, 240 V/10 A (Power Cord and 2 Fuses).

Option A4 Power, North America, 250 V/10 A (Power Cord and 2 Fuses).

Option A5 Power, Swiss, 240 V/6 A (Power Cord and 2 Fuses).

If the 1725 is ordered without specifying a Power Cord Option, it is shipped with a standard 3-prong, 120 volt power plug.

Safety Information

The 1725 is intended to operate from an ac power source that will not apply more than 250 V rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor is essential for safe operation.

The 1725 was tested for compliance in a cabinet. To ensure continued compliance, the instrument will need to be enclosed in a cabinet that is equivalent to the Factory Upgrade Kits that are listed as Optional Accessories for the 1725. A drawing of the 1700F00 (plain cabinet) is contained in the Installation Instructions (Section 3).

The 1725 is designed and tested in accordance with the following industry safety standards:

UL1244–1980 — Standard for Electrical and Electronic Measuring and Testing Equipment.

FM. 3820 — Approval Standard for Electrical Utilization Equipment, Class Number 3820.

ANSI C39.5 — Safety Requirements for Electrical and Electronic Measuring and Controlling Instrumentation, 1974.

CSA — Electrical Bulletin No. 556B.

IEC 348, Second Edition — Safety Standard for Electronic Measuring Apparatus.

Specifications

The Performance Requirements listed here apply over an ambient operating temperature range of 0 to 50° C and are valid only when the instrument is calibrated at 25° ±5° C, following a minimum warm-up period of 20 minutes.

—Procedure and the list of test equipment required to verify Performance Requirements are located in Section 5.

Table 1–1: Signal and External Reference Inputs

CHARACTERISTIC	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	CHECK STEP
Return Loss (75W) Video Inputs (CH–A, CH–B) EXT REF	±40 dB from 50 kHz to 6 MHz.	Loopthrough terminated in 75Ω. Input in use or not, instrument power on or off, all deflection factor settings.	15
Crosstalk between Channels		≥70 dB of isolation between channels. Measured at F_{SC} between Channel A, Channel B, and EXT REF.	
Loopthrough Isolation		≥70 dB of isolation between loopthroughs. Measured at F_{SC} between Channel A, Channel B, and EXT REF.	
Input Requirements	Stable display with Composite video, or black burst with 286 mV (NTSC), 300 mV (PAL) burst ±6 dB.		3
Dc Input Impedance (Unterminated)	≥15 kW.		
EXT REF Input		Composite video. (Can be CW Subcarrier if two internal jumpers are moved.)	
Absolute Maximum Input Voltage		±12 Vdc plus peak ac.	
Maximum Operating Input Voltage		Peak ac + dc should be within +8.0 V and –5.6 V for proper operation.	

Table 1–2: Vector Mode

CHARACTERISTIC	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	CHECK STEP
Chrominance Processing Characteristics Nominal Subcarrier Frequency (F_{SC}) NTSC		3.579545 MHz.	
PAL		4.43361875 MHz.	
Chrominance Bandwidth Upper –3 dB Point	F_{SC} +500 kHz, ±100 kHz.		4
Lower –3 dB Point	F_{SC} −500 kHz, ±100 kHz.		4

Table 1–2: Vector Mode (Cont.)

CHARACTERISTIC	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	CHECK STEP
+V		+V type display as selected by front-panel button. When pushed, V axis is inverted at a ½ line rate to produce a single vector display of the PAL signal.	5
Display			
Vector Phase Accuracy	±1.25°	Measured with color bar signal.	5
Vector Gain Accuracy		Typically ±2.5%.	5
Quadrature Phasing		Typically ±0.5°.	
Subcarrier Regenerator		Subcarrier Regenerator freeruns in absence of appropriate signal. Reference can be burst of either displayed signal or external reference signal.	
Pull-In Range			
NTSC	±50 Hz of F_{SC}.		6
PAL	±10 Hz of F_{SC}.		6
Pull-In Time		Within 1 second, with subcarrier frequency within 50 Hz (10 Hz for PAL) of F_{SC}.	6
Auto Phase Lock			
Lock–in Time	<1.5 Seconds		11
Accuracy	±2°	Measured with burst at compass rose.	11
Phase Shift with Subcarrier Frequency Change			
NTSC	±2° from F_{SC} to (F_{SC} +50 Hz), or F_{SC} to (F_{SC} –50 Hz).		6
PAL	±2° from F_{SC} to (F_{SC} +10 Hz), or F_{SC} to (F_{SC} –10 Hz).		6
Phase Shift with Burst Amplitude Change	±2° from nominal burst amplitude to ±6 dB.	Internal or external burst reference.	6
Phase Shift with Input Channel Change	±0.5°.	With EXT REF selected.	7
Phase Shift with VAR GAIN Control	±1° as gain is varied from 3 dB to –6 dB.		7
PHASE Control Range		360° continuous rotation.	
Burst Jitter	0.5° rms or less.	With 140 IRE (1 V) composite video input. INT or EXT referenced.	7
Display Characteristics			
Differential Phase	±1°.	Measured with 140 IRE (1 V) linearity signal (5 step, 10 step, or Ramp) with 40 IRE (300 mV) of subcarrier.	8
Differential Gain	±1%.		8

Table 1–2: Vector Mode (Cont.)

CHARACTERISTIC	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	CHECK STEP
Position Control Range			
HORIZONTAL	At least 1/4" (6 mm) from center.		9
VERTICAL	At least 1/4" (6 mm) from center.		9
Clamp Stability	1/64" (0.4 mm) or less.	Center Spot Movement with Rotation of PHASE Control.	9
Variable GAIN Range	+14 dB to –6 dB of 75% color bar preset gain.	+5 to –1/2 amplitude.	10

Table 1–3: X Y Mode

CHARACTERISTIC	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	CHECK STEP
Input		DC Coupled differential inputs through rear-panel REMOTE connector.	
Input Amplitude	2 to 9 V p–p.	Adjustable full scale deflection 0 dBm to +12 dBm for 600W system. Factory set to 0 dBm.	
Maximum Input Voltage	+ or –15 V peak signal plus dc.		
Frequency Response	Dc to greater than 200 kHz.	3 dB point.	14
High Gain Mode	Dc to greater than 100 kHz.	3 dB point. Not a differential input, minus inputs must be grounded.	14
X and Y Input Phase Matching	Less than a trace width of separation at 20 kHz.	Singleended. Phase matching may be improved, above 20 kHz, by adjustment.	13

Table 1–4: CRT Display

CHARACTERISTIC	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	CHECK STEP
CRT Viewing Area		80 X 100 mm.	
Accelerating Potential		13.75 kV.	
Trace Rotation Range	Greater than ±1° from horizontal.	Total adjustment range is typically 8°.	12
Graticule		Internal Vector, variable SCALE illumination.	

Table 1–5: Power Source

CHARACTERISTIC	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	CHECK STEP
Mains Voltage Ranges	90–250 V.		2
Mains Frequency Range	48 Hz to 66 Hz.		
Power Consumption		25 Watts (85 BTU/HR) maximum.	

Table 1–6: Environmental Characteristics

CHARACTERISTIC	SUPPLEMENTAL INFORMATION
Temperature Non-Operating Operating	 –55° C to +75° C. 0° C to +50° C.
Altitude Non-Operating Operating	 To 50,000 feet. To 15,000 feet.
Vibration – Operating	15 minutes each axis at 0.015 inch, frequency varied from 10–55–10 Hz in 1-minute cycles with instrument secured to vibration platform. Ten minutes each axis at any resonant point or at 55 Hz if no resonant point is found.
Shock – Non-Operating	30 g's, 1/2 sine, 11 ms duration, 3 shocks per surface (18 total).
Transportation	Qualified under NTSC Test Procedure 1A, Category II (30-inch drop).
Humidity	Will operate at 95% relative humidity for up to five days. Do not operate with visible moisture on the circuit boards.

Table 1–7: Certifications and compliances

Category	Standards or description
EC Declaration of Conformity – EMC	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Union: EN 50081-1 Emissions: EN 55022 Class B Radiated and Conducted Emissions EN 50082-1 Immunity: IEC 801-2 Electrostatic Discharge Immunity IEC 801-3 RF Electromagnetic Field Immunity IEC 801-4 Electrical Fast Transient/Burst Immunity
Australia/New Zealand Declaration of Conformity – EMC	Complies with EMC provision of Radiocommunications Act per the following standard(s): AS/NZS 2064.1/2 Industrial, Scientific, and Medical Equipment: 1992

Table 1–7: Certifications and compliances (cont.)

Category	Standards or description	
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits.	
Safety Standards		
U.S. Nationally Recognized Testing Laboratory Listing	UL1244	Standard for electrical and electronic measuring and test equipment.
Canadian Certification	CAN/CSA C22.2 No. 231	CSA safety requirements for electrical and electronic measuring and test equipment.
European Union Compliance	Low Voltage Directive 73/23/EEC, amended by 93/69/EEC	
	EN 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Additional Compliance	IEC61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Installation (Overvoltage) Category	Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:	
	CAT III	Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location.
	CAT II	Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected.
	CAT I	Secondary (signal level) or battery operated circuits of electronic equipment.
Pollution Degree	A measure of the contaminates that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.	
	Pollution Degree 2	Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
Safety Certification Compliance		
Temperature, operating	+5 to +40° C	
Altitude (maximum operating)	2000 meters	
Equipment Type	Test and measuring	
Safety Class	Class 1 (as defined in IEC 1010-1, Annex H) – grounded product	
Overvoltage Category	Overvoltage Category II (as defined in IEC 1010-1, Annex J)	
Pollution Degree	Pollution Degree 2 (as defined in IEC 1010-1). Note: Rated for indoor use only.	

Table 1–8: Physical Characteristics

CHARACTERISTIC	SUPPLEMENTAL INFORMATION
Dimensions	
Height	5 1/4 inches (133.4 mm).
Width	8 1/2 inches (215.9 mm).
Length	18 1/8 inches (460.4 mm).
Weight	8.5 lbs (3.8 kg).

Operating Instructions

Section 2
Operating Instructions

These instructions provide information about the front-panel controls, rear-panel connectors, the Operator's Familiarization/Checkout Procedures, and discussions about vector and audio measurements using the 1725.

Front-Panel Controls and Indicators

The front-panel controls and indicators consist of momentary contact push-button switches, variable controls, and back-lit switch selections. See Figure 2–1 for the control and indicator locations.

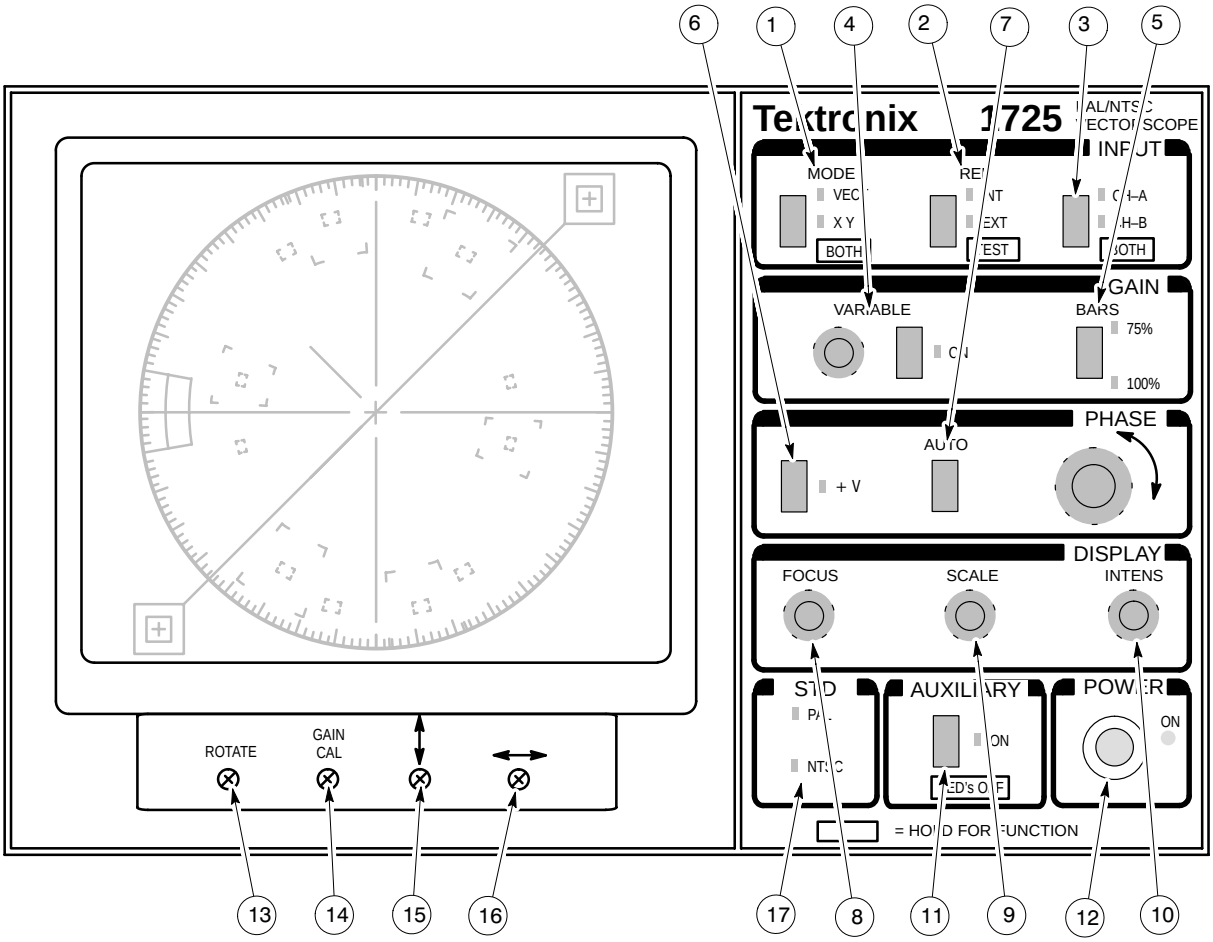


Figure 2–1: 1725 front panel controls and indicators

There are three push-button switches, located in the INPUT block, that have extra functions. The extra function is accessed by holding the switch down for approximately one second. The operating selection reverts to the top of the listed functions, when the push button is repushed to exit this function, with the exception of TEST, which reverts to its original state.

INPUT

1. MODE

A momentary push-button switch that toggles between the vector and XY displays. These two functions have back lighted nomenclature with rectangular indicators.

Holding this button in switches the MODE to a combination display of vector and XY. In this mode both the VECT and XY nomenclature and rectangular indicators light to indicate that the 1725 has been switched into this mode.

2. REF

A momentary push-button switch that toggles between INT and EXT sync references. These two functions have back lighted nomenclature with rectangular indicators.

Holding this button in switches the REF to an unlocked display of subcarrier and enables the V–axis switcher, if a signal containing a subcarrier reference signal is applied to the selected input. TEST nomenclature, framed by a blue box, lights up when the 1725 is in this mode.

3. A B

Momentary contact push-button switch that toggles the input between A and B. Back lighted nomenclature, with rectangular indicators, light to show which is selected for display.

Holding this button in switches the INPUT to a display of both A and B Inputs. This display requires an external sync reference. Both the CH–A and CH–B indicators light when the 1725 has been switched to this dual input mode. If the internal phase shifter jumper has been changed to dual, one indicator will be flashing to indicate which input the front-panel PHASE control is working with. See Section 3 (Installation) for details.

Both input signals must be of the same standard to obtain a meaningful BOTH display.

In dual phase shift mode, touching the AB switch changes the PHASE shifter to the opposite input. The front-panel LED blinks to indicate which input the PHASE control is active on.

In the "Tracks Channel" position of the internal jumper (factory shipped), touching the AB switch exits the AB mode of operation. When "Dual Phase" position has been selected the CHA–CHB switch must be held in to exit AB mode.

GAIN

4. VARIABLE

A momentary contact push-button switch that toggles between variable gain ON and off. The VARIABLE control adjusts amplifier input gain so that any input signal between 0.5 V and 2.0 V can be displayed. Control has no detent, action is continuous. Back lighted nomenclature, with rectangular indicators, lights up red to indicate that display gain is uncalibrated.

5. BARS

A momentary contact push-button switch that toggles between correct gain for displaying 75% and 100% amplitude color bar signals, using a single set of vector targets. Burst targets for both 75% and 100% amplitude color bars are on the graticule. Back lighted nomenclature, with rectangular indicators, lights to indicate which amplitude color bars the 1725 is set up to measure.

PHASE

6. +V (PAL only)

A momentary contact push-button switch that selects +V. It selects an overlayed +V with –V display on the +V Axis for alternate line comparisons. Back lighted nomenclature, with rectangular indicators, lights to indicate that either standard PAL or overlayed + and –V is being displayed.

7. AUTO

A momentary contact push-button switch that returns the burst(s) for the selected standard to the graticule target(s).

PHASE Control

A continuously-variable control with 360˚ range to set the phase of the decoder reference.

Display

8. FOCUS

A 270° rotation potentiometer that is adjusted for display definition.

9. SCALE

A 270° rotation potentiometer that controls the level of graticule illumination.

10. INTENS

A 270° rotation potentiometer that controls display brightness.

Miscellaneous

11. AUXILIARY

Toggles between AUXILIARY and independent operation. In the AUXILIARY mode, a Line Strobe (to blank the 1725 crt, for line selection) and data to actuate the front-panel setup is accepted from a companion 1730–Series. Back lighted nomenclature, with rectangular indicators, lights to indicate that the instrument is under AUXILIARY control.

Pushing and holding the AUXILIARY switch causes the front-panel LED indicators to extinguish. Pushing any front-panel button turns all front-panel indicators back on.

12. POWER

Turns on and off external power to the 1725. Contains a mechanical indicator that indicates the status of the POWER switch, even when the mains power is disconnected or shut down from another location.

13. ROTATE

A 270° rotation screwdriver adjustment that aligns the display with the graticule.

14. GAIN CAL

A 270° rotation screwdriver adjustment that sets the amplifier gains in the Vector Mode.

15. VERT POS

A 270˚ screwdriver-adjustable, variable control that provides limited vertical positioning of the display.

16. HORIZ POS

A 270˚ screwdriver-adjustable, variable control that provides limited horizontal positioning of the display.

17. STANDARD

Back lighted indicators that are used to show which color standard is being displayed. Standard is automatically selected by the 1725 subcarrier frequency sensing.

Rear-Panel Connectors

Signal input, power input, Auxiliary Control In, XY Input, and Demod Out are all located on the 1725 rear panel. Because of the similarity of the 1730–Series to the 1725 rear panel, the word **VECTORSCOPE** appears at the top of the panel. See Figure 2–2 for locations of rear-panel connectors.

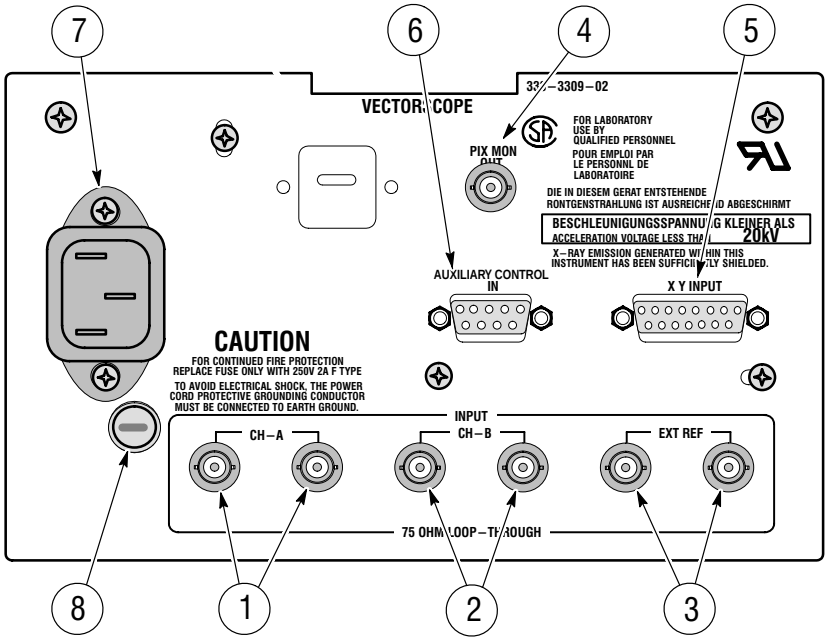


Figure 2–2: 1725 rear panel

BNC Connectors

1. CH–A

A bridging loop-through input for composite video signal, compensated for 75Ω. The input signal for display is selected by the front-panel INPUT switch.

2. CH–B

A bridging loop-through input for composite video signal, compensated for 75Ω. The input signal for display is selected by the front-panel INPUT switch.

3. EXT REF

A bridging loop-through input (compensated for 75Ω) for synchronizing signals. As factory shipped, the input signal may be black burst or composite video. Changing a pair of internal plug jumpers makes it possible to use CW Subcarrier as an external reference; however, horizontal (line) sync must be present on the CH–A INPUT for synchronization. See Section 3 (Installation) for details. External reference is selected by the front-panel REF switch.

4. DEMOD OUT

A 75Ω output of the demodulated R–Y signal that can be fed into a companion 1730–Series to provide a horizontal sweep of demodulated video.

Subminiature D–Type Connectors

5. XY INPUT

A 15-pin connector that is used for the differential input of a stereo audio signal that is to be displayed in the XY mode. One set of inputs can be configured for high gain single-ended input. Internal jumpers must be repositioned for this type of input. See Section 3 (Installation) for more information.

6. AUXILIARY

A 9-pin connector used to interface with the 1730–Series. Auxiliary control consists of a signal line (Line Strobe) and a serial interface. The serial interface allows the 1725 to operate in conjunction with the 1730–Series Store/Recall function.

Power Input

7. AC POWER

A standard ac plug receptacle for the 120 or 220 Vac power mains. Plug is compatible with any of the power cord options available for the 1725 Vectorscope.

Miscellaneous

8. AC FUSE

A holder for an F-type cartridge fuse which is the instrument ac mains supply fuse.

Using The 1725 In Auxiliary Mode

When the serial interface AUXILIARY cable (between the 1725 and a 1730–Series) is connected, the 1725 can be operated in the AUXILIARY mode. AUXILIARY allows the Input and Reference switching to follow the similar switches on the waveform monitor. For example, when the 1730–Series INPUT switch is changed from A to B, the 1725 INPUT switch will also change to B. Even though the vectorscope switching (INPUT and REF) follows the waveform monitor, the vectorscope INPUT and REF switches remain active so that they can be changed without changing the waveform monitor switching. The following functions can be controlled by the 1730–Series in AUXILIARY mode:

INPUT switching

REFerence switching

LINE SELECT

STORE and RECALL

INPUT Switching

INPUT switching allows the 1730–Series to select any of the three (CH–A, CH–B, or BOTH) inputs when AUXILIARY is ON. Note that the 1725 INPUT switch can be used independently, even though the instrument is in the AUXILIARY mode.

REF Switching

REF switching allows the 1730–Series to select either INT or EXT reference. It will not switch to TEST when the 1730–Series is switched to CAL. Reference will automatically be switched to EXT if the INPUT is switched to BOTH (from either waveform monitor or vectorscope). If the 1725 REF switch is in TEST, the 1730– Series switching will not take it out of that mode.

LINE SELECT The 1725 normal operation is full field. When it is used in AUXILIARY operating mode, the 1730–Series LINE SELECT switching controls the display on the vectorscope. It should be noted that the 1725 has no line selection capability when it is not connected to a 1730–Series Waveform Monitor.

STORE

NOTE. *Use caution to retain desired 1730–Series stored configurations. Read the STORE and RECALL SETUP instructions in Section 2 of the 1730–Series Instruction manual before proceeding.*

The current state of the front panel can be stored, in AUXILIARY mode, by executing the 1730–Series STORE command. When the 1730–Series STORE button is pushed, the 1725 front-panel indicators will blink to acknowledge that the command was received. The current front-panel configuration will now be stored in the 1725 NOVRAM as soon as one of the 1730–Series RECALL buttons is pushed.

Note that the indicators also blink when the 1725 is not in AUXILIARY; however, the front-panel configuration is not stored and the 1725 front panel will not change when that stored function (on the 1730–Series) is recalled.

RECALL When the 1725 is in the AUXILIARY mode and contains stored front-panel configurations, it reacts to 1730–Series RECALLs. When one of these RECALL buttons is pushed, the stored front-panel configurations of both instruments will be recalled. All front-panel controls remain active during AUXILIARY mode, and can be used to make changes in current front-panel configurations.

During AUXILIARY operation, the 1725 front-panel indicators continue to accurately display its current front-panel configuration.

Operator's Checkout Procedure

The following procedure is provided as an aid in obtaining a display on the 1725 Vectorscope, and may be used as a check of basic instrument operation. Only instrument functions are checked in this procedure. The Performance Check procedure, used to determine if the instrument is operating within performance requirements, is located in Section 5 of this manual. All checks can be made with a cabinet on and it is necessary to have all internal jumpers in the factory–set position.

This procedure requires two sources of composite video and composite sync signals. The TEKTRONIX 1410–Series Television Test Signal Generator mainframe with Sync, Color Bar, and Linearity modules was used as the NTSC

signal source in preparing this procedure. The TEKTRONIX 1411–Series Television Test Signal Generator mainframe with Sync, Color Bar, and Linearity modules was used as the PAL signal source in preparing this procedure.

1. Initial Setup

1725 Vectorscope

MODE	VECT
REF	INT
INPUT	CH A
VARIABLE	off
BARS	75%
+V	out
PHASE	Will be set later
FOCUS	Will be set later
SCALE	Counterclockwise
INTENS	Counterclockwise
POWER	OFF

Connect the NTSC color bar signal to the CH–A INPUT and terminate the remaining side of the loop-through input with a 75Ω termination. Connect the PAL modulated staircase signal to the CH–B INPUT. Connect the PAL black burst to the EXT REF and terminate in 75Ω. See Figure 2–3.

Set up the signal sources for the following composite video signals:

Full Field Color Bars

75% Ampl. 7.5% Setup — NTSC
75% Ampl. 0% Setup — PAL

PAL Modulated Staircase
(Flat Field, 10 Step)

Black Burst Signal
(Sync and Burst only)

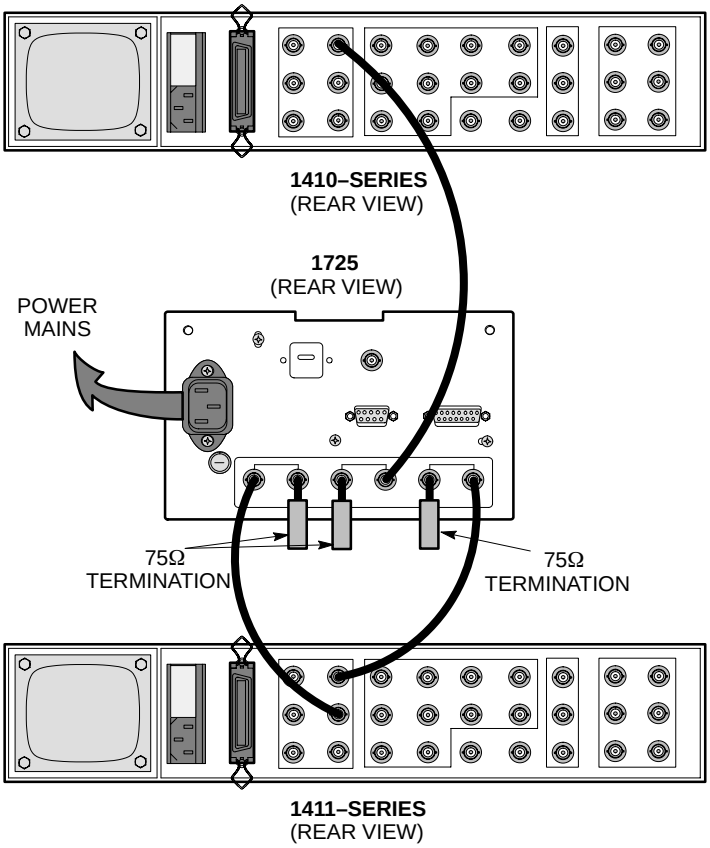


Figure 2–3: Initial equipment connections for operators checkout procedure

If the XY operation of the 1725 is to be checked, an audio signal is required. See the following:

Audio Signal: About 2 V between 1 and 100 kHz.

2. Apply Power

Connect the instrument to a suitable ac power source and push the POWER switch. Check that the indicator in the center of the switch is indicating that POWER is ON.

NOTE. *Do not set any of the front-panel screwdriver controls until after the instrument warms up (at least 20 minutes).*

Rotate the SCALE control clockwise and check that the graticule illuminates.

3. Obtain Display

Adjust the INTENS and FOCUS controls for the desired brightness and a well-defined vector display. Use the PHASE control to place the vector tips and burst on their targets. See Figure 2−4.

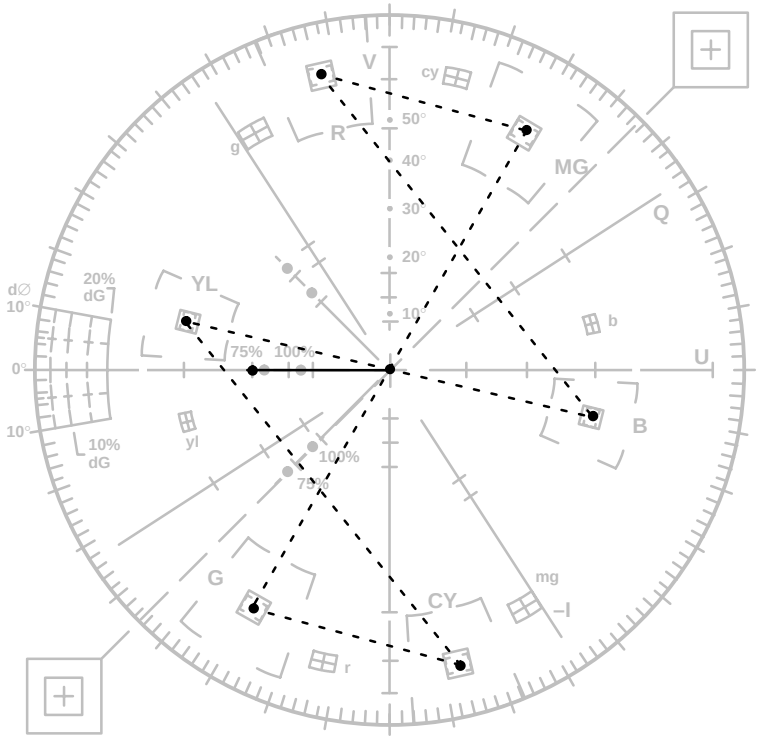


Figure 2–4: Typical 1725 vector display

Adjust the SCALE illumination control for the desired brightness. Note that the internal waveform graticule is illuminated along with the marker in NTSC graticule target and the NTSC LED indicator.

4. Select Input

Select the Channel B input for a display of the modulated staircase signal. See Figure 2–5. Check that the PAL indicator and graticule marker are both correct.

Rotate the PHASE control until the bursts are about 180° from their targets. Push the AUTO (PHASE) push button and check that the burst vector tips return to their targets.

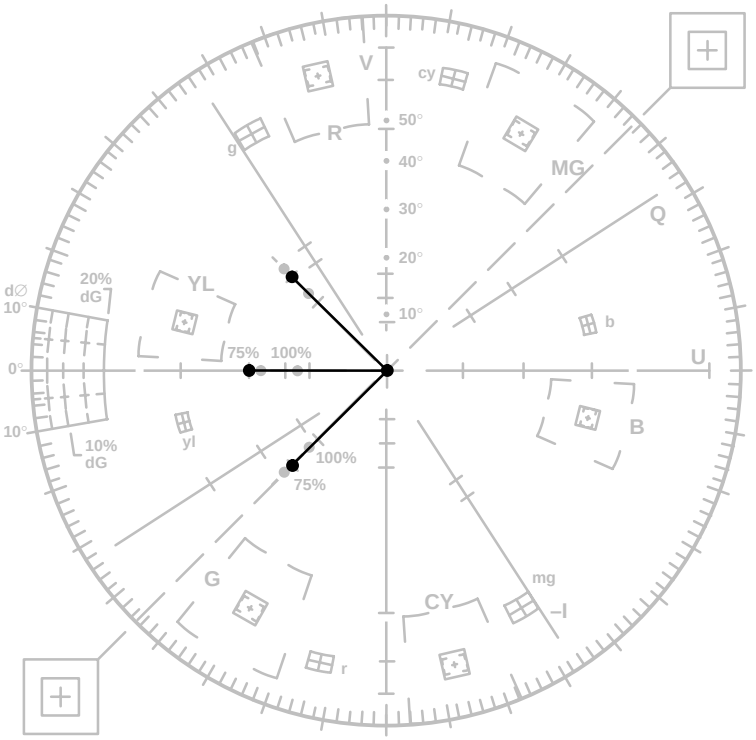


Figure 2–5: Modulated staircase waveform shown on a 1725

Briefly push the INPUT button and check that the CH–A indicator and the NTSC LED are lighted and that only a vector display is present.

5. Select Reference

Push the INPUT to switch to CH-B and the REF button and check that the front-panel EXT indicator lights. Check for a stable PAL modulated staircase display (CH–B INPUT).

Push the INPUT switch for a CH-A NTSC signal.

Push and hold the REF button until the front-panel TEST indicator lights. Check for a test circle display. See Figure 2–6.

Leave the 1725 REF in TEST.

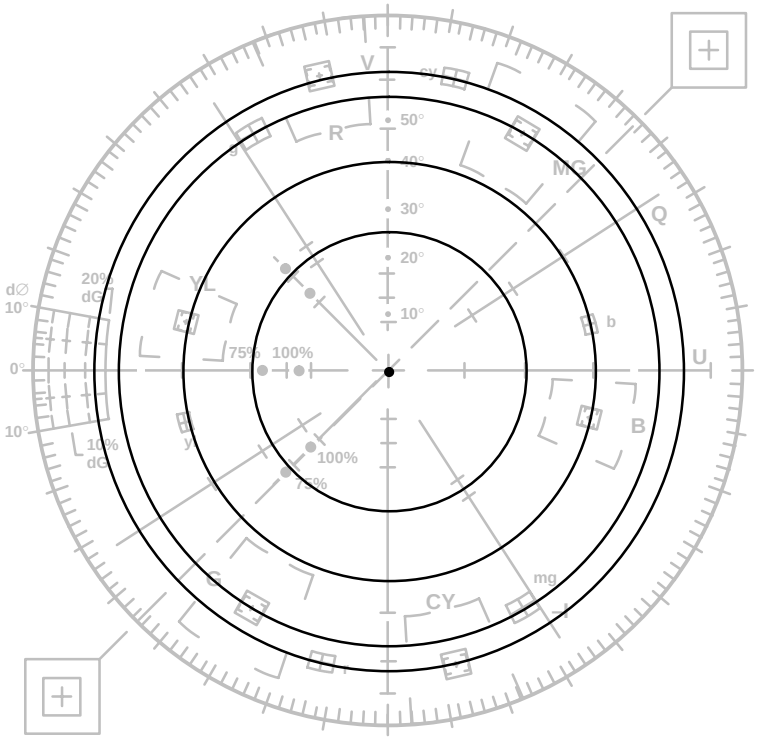


Figure 2–6: 1725 test circle display

6. Position Center Dot

Use a small screwdriver to adjust the VERTICAL and HORIZONTAL POSITIONing controls. Check that there is sufficient range to move the dot through the geographic center of the display (the graticule center target). It should be noted that the amount of adjustment range varies from instrument to instrument.

Adjust the positioning controls to place the center dot at the exact center of the graticule.

7. Set Gain

With the test circle displayed, use a screwdriver to adjust the GAIN CAL fully clockwise and check that the outer circle is outside of the outer (Red and Cyan) graticule targets.

Set the GAIN CAL fully counterclockwise and check that the outer circle is inside of the outer (Red or Cyan) graticule targets.

Set the GAIN CAL so that the outer circle passes through the outer (Red and Cyan) graticule targets.

8. Variable

With the test circle displayed, push the VARIABLE push button and check that the VARIABLE ON indicator lights.

Rotate the VARIABLE control clockwise and check that the display increases in size.

Rotate the VARIABLE control counterclockwise and check that the outer circle is inside the outer (Red and Cyan) targets.

Push the VARIABLE push button and check that the test circle is on the outer targets and that the front-panel VARIABLE ON indicator is turned off.

9. Check the Rotation of the Display

Variations in the earth's magnetic field may make adjustment of the ROTATE control necessary at installation time or whenever the instrument is moved.

Connect the audio signal, through the XY INPUT connector on the rear panel, to the +X input (pin 3). Set the 1725 MODE to XY. Set up the audio signal amplitude for a horizontal trace that is long enough to reach across the graticule compass rose.

Check that the sweep is a straight line parallel to the horizontal axis. If not, adjust the ROTATE adjustment until the sweep is parallel to the horizontal axis.

10. Check XY Mode

Connect the audio signal to both pins 3 and 7 of the rear-panel XY INPUT. Set the 1725 MODE to XY. Adjust the audio signal amplitude to place the diagonal trace on the 45° graticule line. Adjust audio signal amplitude so that the ends of the trace fall on the target (+) marks.

11. Check Dual Mode

Select INPUT A. With the color bar composite video signal connected to the CH–A INPUT and the audio signal connected to the XY INPUT (pins 3 and 7) push and hold the MODE push button until both VECT and XY are lighted. Check for a display of both vectors and the XY lissajous pattern.

Measurement Graticule

The 1725 graticule is unique in that it contains burst and vector targets for both PAL and NTSC color standards. The internal vector graticule has targets for

both NTSC and PAL (with or without setup) color signals that are scaled for both 75% and 100% amplitude color bars. See Figure 2–7. Variable graticule scale illumination provides even lighting over the usable graticule area to improve measurement accuracy and the quality of waveform photographs.

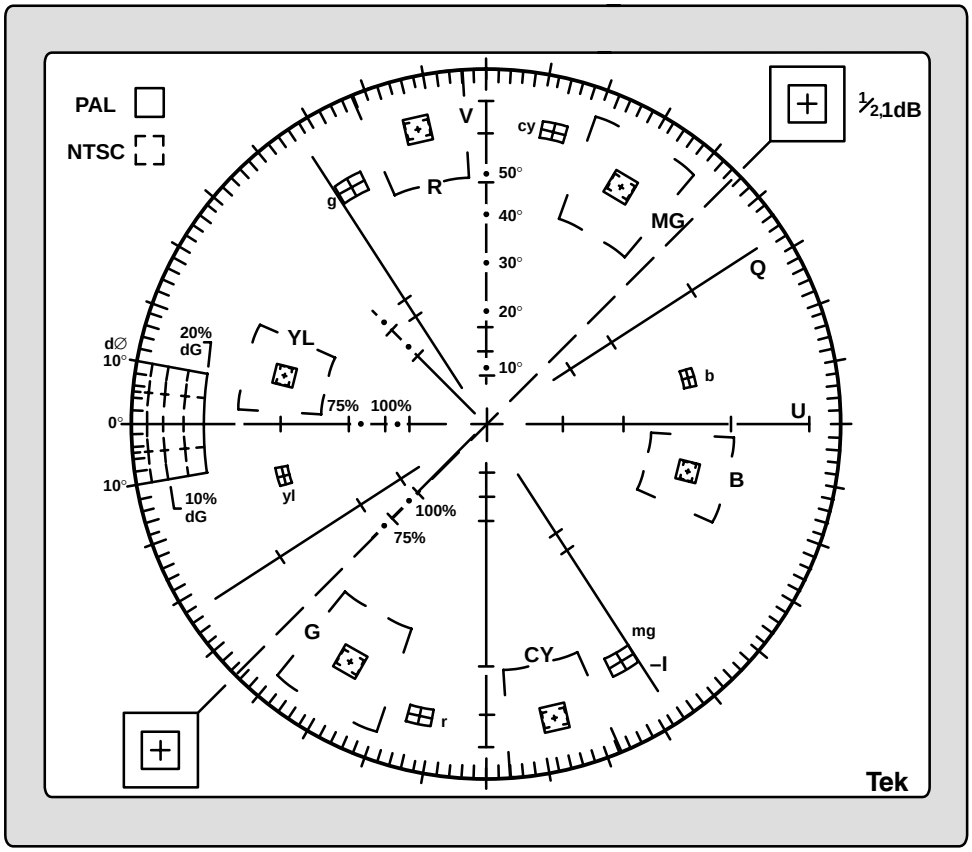


Figure 2–7: 1725 PAL/NTSC Vectorscope graticule

The NTSC and +V axis PAL vectors share targets. The tolerance for inner NTSC targets is tighter than the PAL tolerances, resulting in two targets in the smaller boxes. The smallest targets are for NTSC vectors.

Measurement Applications

The 1725 is a vectorscope capable of making both chrominance and XY measurements. The information that follows is intended to guide both new and experienced users through simple and complex measurement techniques. The information is divided by major topics, which are then subdivided into specific measurements.

Color Measurements

In color television, the visual sensation of color is described in terms of three qualities: luminance, hue, and saturation.

Luminance. Luminance is brightness as perceived by the eye. As the eye is most sensitive to green and least to blue light of equal energy, green is a bright color and blue is a dark color as conveyed by the luminance signal to monochrome TV receivers.

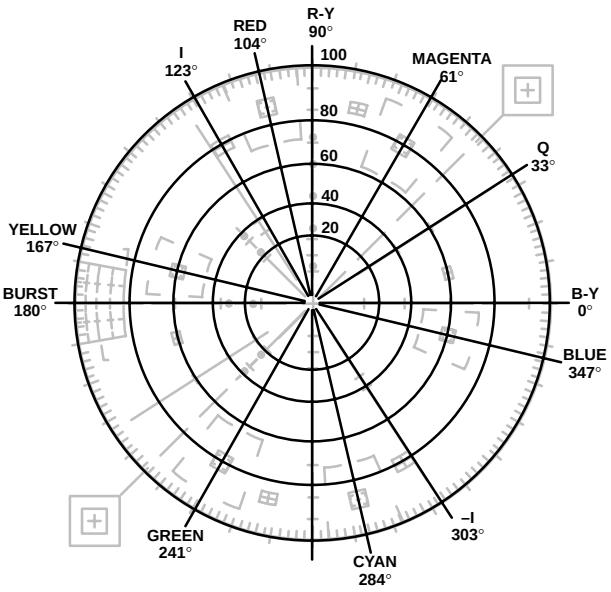


Figure 2–8: NTSC standard color phase Vector diagram

Chrominance. Chrominance is measured in terms of hue and amplitude. Hue is the attribute of color perception that determines whether the color is red, blue, green, etc. White, black, and gray are not considered hues. Hue is presented on the vectorscope crt as a phase angle and not in terms of wavelength. For example, red, having a wavelength of 610 millimicrons, is indicated as 104˚ on the standard color phase vector diagram when the burst is at 180˚ for NTSC or 135˚ for PAL. The standard color phase vector diagram is shown in Figure 2–8 for NTSC and Figure 2–9 for PAL.

Saturation is the degree to which a color (or hue) is diluted by white light in order to distinguish between vivid and weak shades of the same hue. For example, vivid red is highly saturated and pastel red has little saturation. Because saturation is a product of both luminance and chrominance amplitudes, and a vectorscope can only measure chrominance amplitude, the radial distance from the center to the end of the color vector is chrominance amplitude. If burst vector amplitude corresponds to the 75% amplitude marking (see Figure 2–10),

the colors represented by the vectors when they are within the targets are of 75% amplitude.

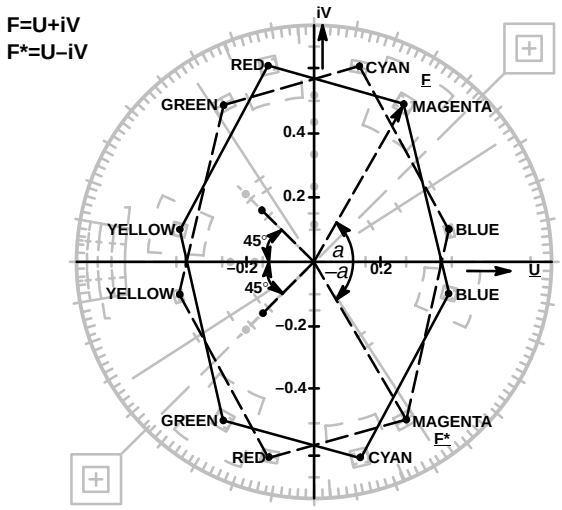


Figure 2–9: PAL standard color phase Vector target

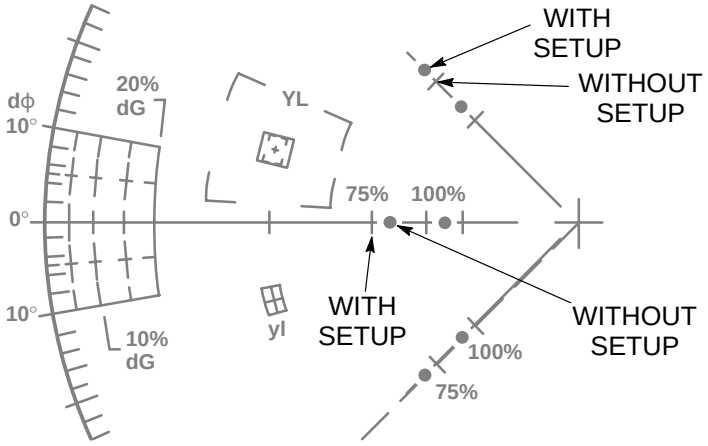


Figure 2–10: NTSC and PAL 75% and 100% burst targets on 1725 graticule

If burst vector amplitude corresponds to the 100% marking and the chrominance vectors are within the target, the color amplitude is 100%.

Encoding. The hue and color amplitude information in the color television system is carried on a single subcarrier frequency: 3.579545 MHz for NTSC and 4.43361875 MHz for PAL. These signals, in modulated subcarrier form, are called chrominance. The hue information is carried by the subcarrier phase; the

color amplitude information is carried by means of amplitude modulation with the subcarrier suppressed. A subcarrier which supplies phase information is required for demodulation. No picture chrominance signals are present during the horizontal blanking interval and a sample of the subcarrier, used by decoders for a reference (called burst), is provided within this interval.

Decoding. To recover the hue information, phase demodulators are employed in the vectorscope. The phase reference is the color subcarrier, which is regenerated by an oscillator in the instrument. The oscillator is locked in both phase and frequency to the incoming color burst signal on the horizontal (line) sync back porch. The vectorscope displays the relative phase and amplitude of the chrominance signal on polar coordinates. To identify these coordinates, the vector graticule (see Figure 2–8 for NTSC and Figure 2–9 for PAL) has points that correspond to the proper phase and amplitude of the three primary colors and their complements, which are related to the 180° burst vector for NTSC and the 135° burst vector for PAL. The coordinates for the primary colors (red, blue, and green) and their complements (cyan, yellow, and magenta), when the burst vector is at 225° for PAL, are identified with lowercase abbreviations.

Any errors in the color encoding, video tape recording, or transmission processes which change these phase or amplitude relationships causes color errors on the television receiver picture. The polar-coordinate-type of display, such as that obtained on the 1725, has proven to be the best method for portraying these errors.

Functional Use of the Vector Graticule

Measurement of Color Bars

The polar display permits measurements of hue in terms of the relative phase of the chrominance signal with respect to the color burst. Relative amplitude of chrominance to burst is expressed in terms of the displacement from center (radial dimension of amplitude) towards the color point which corresponds to 75% (or 100%) amplitude for the color being measured.

On the 1725 graticule, each NTSC chrominance vector terminates in a system of graticule targets in the form of two boxes (a small box inside a large box). See Figure 2–11. The dimensions of the large boxes represent ±10° centered on the exact chrominance phase, and ±20% of chrominance amplitude centered around 100% of standard amplitude. The dimensions of the smaller boxes represent ±2.5° and ±2.5 IRE.

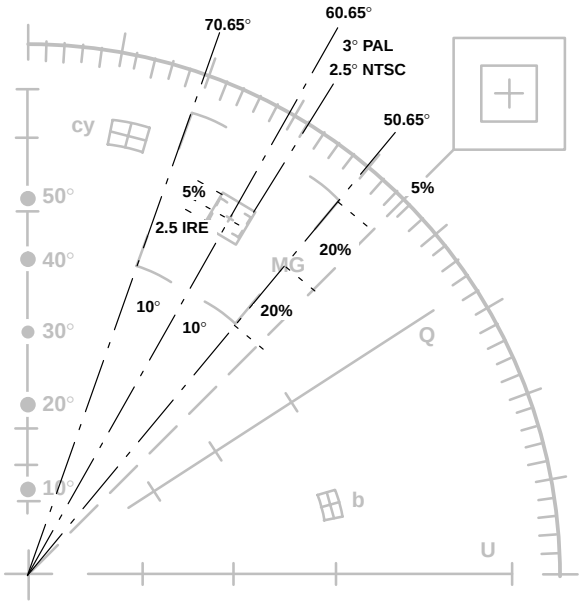


Figure 2–11: Fine detail of the 1725 graticule magenta target

On the 1725 graticule, each PAL chrominance vector related to the +V burst terminates in targets that are in the shape of two boxes (a small box inside a large box). See Figure 2–11. The large box represents ±10° centered on the exact chrominance phase and ±20% of chrominance amplitude centered around 100% standard amplitude. The dimensions of the inner target represent ±3° and ±5% of chrominance amplitude; the vectors associated with the –V burst terminate in the smaller targets.

The 1725 has small marks at intervals along the I and Q axes that denote the amplitudes of the chrominance components (see Figure 2–12). The small marks at intervals along the U and V axes denote the amplitudes of the U and V chrominance components (see Figure 2–13).

The horizontal and vertical axes of the vector graticule contain markings for checking bandwidth. A subcarrier frequency sine wave whose amplitude places it on the outer compass rose is used as a reference. When the frequency is changed the diameter of the circle should reduce. At a point equal to 70% of full amplitude (3 dB), there are gaps in the horizontal and vertical axes. This calibration aid makes it possible to check the –3 dB points of the demodulator output amplifiers.

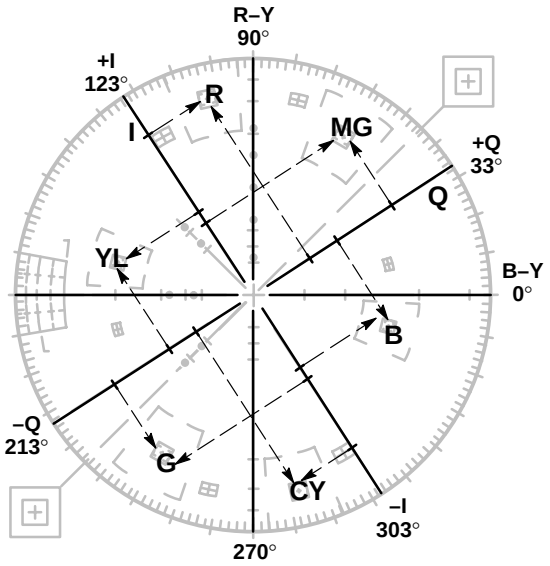


Figure 2–12: Relationship of I and Q modulation amplitudes to vector targets

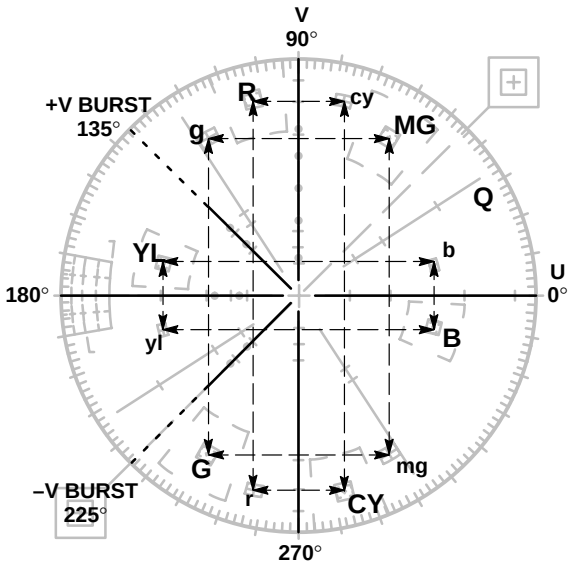


Figure 2–13: Relationship of U and V modulation amplitudes to vector targets

Differential Gain and Phase Measurements

The two major system distortions that affect the color signal are differential gain and differential phase. They are chrominance nonlinearities caused by luminance amplitude variations. Both can be measured on the vectorscope. Differential gain is a change in color subcarrier amplitude due to a change in the luminance signal while the hue of the original signal is held constant. In the reproduced picture, saturation will be distorted in the areas between the light and dark

portions of the scene. Differential phase is a phase change of the chrominance signal, caused by a change in the luminance signal, while the original chrominance signal amplitude is held constant. In the reproduced picture, the hue will vary with the scene brightness. Differential gain and differential phase may occur separately or together.

Differential gain (dG) and differential phase (dϕ) measurements can be made using the graticule markings located at the outer edge of the B–Y and U axis. See Figure 2–14 for differential gain and phase measurement illustration.

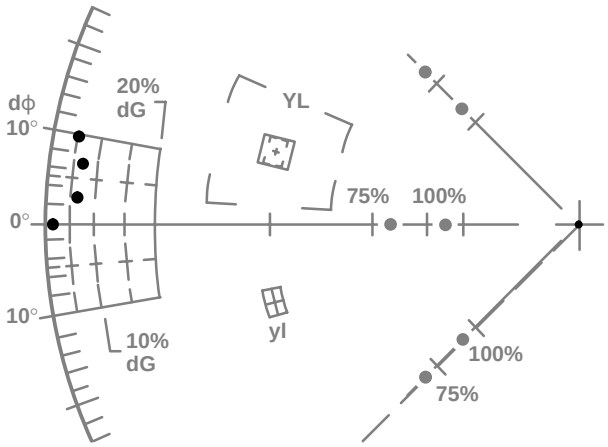


Figure 2–14: Differential phase and gain scales showing simulated 10˚differential phase (dΦ)

High Resolution Differential Phase Measurement — The DEMOD OUT from the 1725 can be used to drive one of the inputs to a 1730–Series Waveform Monitor for improved measurement resolution. This measurement requires a modulated ramp or staircase signal with the 1725 gain normalized so the chrominance amplitude is on the compass rose.

The 1730–Series must have the DC REST OFF and the VERTICAL GAIN at X5. Once these conditions are set up, using 1 LINE SWEEP makes each major vertical division of the 1730–Series graticule equal to 2˚, when referenced to the sweep origin.

Matching Color Signals

When the 1725 is in the dual phase shifter mode (see Installation, Section 3, for more information), it is possible to match vector phase and amplitude to a degree of accuracy far greater than previously attainable. By inputting a known signal into CH B and the signal to be matched to it into CH A, the signal on CH A can easily be adjusted for an exact match. The digital phase shifter can be assigned to either channel, as desired, by simply touching the INPUT switch for the desired input signal.

When this type of color signal matching is employed, all variations due to crt geometry, graticule resolution, quad phase errors, and differential gain and phase are effectively eliminated.

Applying the output of a programmable signal generator, such as the Tektronix TSG 1001, as the reference allows creation of a defacto custom graticule. When the signal input through CH A matches or approximates the displayed reference from CH B there is no need to display against a graticule scale.

Looking at Incidental Carrier Phase Modulation

The High-Gain X and Y inputs of the 1725 can be used to look at ICPM (Incidental Carrier Phase Modulation). ICPM is a change in carrier phase with a signal level change. It will show up as apparent differences between measurements made in synchronous and envelope detection modes. On home receivers with envelope detectors, the picture will be unaffected if the visual transmitter has been adjusted using envelope detection when there is appreciable ICPM. However, ICPM can show up in the home receivers audio as intercarrier buzz.

ICPM can be looked at by applying the Video and Quadrature Outputs from a demodulator to the 1725 X and Y Inputs. The Quadrature Output drives the High-Gain X Input and the Video Output drives the High-Gain Y Input. The resulting display will be vertical when ICPM is minimum, and tilted when ICPM is present.

CAUTION. *This is not a definitive measurement, but does provide a way of determining if ICPM is present in the signal.*

XY Measurements

Any oscilloscope, including vectorscopes that have identical X and Y amplifiers, can be used to make accurate stereo audio phase measurements. When identical signals of equal amplitude are input, the resultant display will be a lissajous pattern, whose opening is relative to the phase error between the signals. If there is no phase error between signals, the display will be a diagonal line, at a 45˚ angle. When the signals are not equal in phase, the pattern will have its axis on the diagonal but be displayed as an ellipse. As long as the amplitude of the signals remains the same, the amount of opening in the ellipse (up to 90˚) is a relative measure of the phase difference. At 90˚ the display is a circle; errors greater than 90˚ cause the axis to rotate by 90˚.

Making Stereo Audio Phase Measurements

The graticule for the 1725 has scales for measurement of stereo audio phase. The dashed diagonal line is the measurement axis for errors less than 90˚, it is terminated in amplitude targets that correspond to the length of X and Y axes.

The boxes, surrounding the cross hairs, are equal to amplitude errors of 1/2 and 1 dB, respectively. See Figure 2–15.

The upper half of the Y axis has markings, in 10˚ increments, for measurement of the elliptical waveform that occurs when there is a phase error. Both the X and Y axes have –3 dB markings making it easy to check the bandpass of the amplifiers. The 3 dB points are minor breaks in the line about 30% of the distance from the graticule circle to the graticule center.

In order to make this type of measurement it is essential that the input signal amplitudes be equalized. This is easily accomplished by applying only one signal at a time and adjusting its gain to correspond to the appropriate axis (horizontal to the X axis and vertical to the Y axis).

Once both signal gains are normalized they can be displayed in the XY Mode and the relative stereo phase measured. See Figure 2–15.

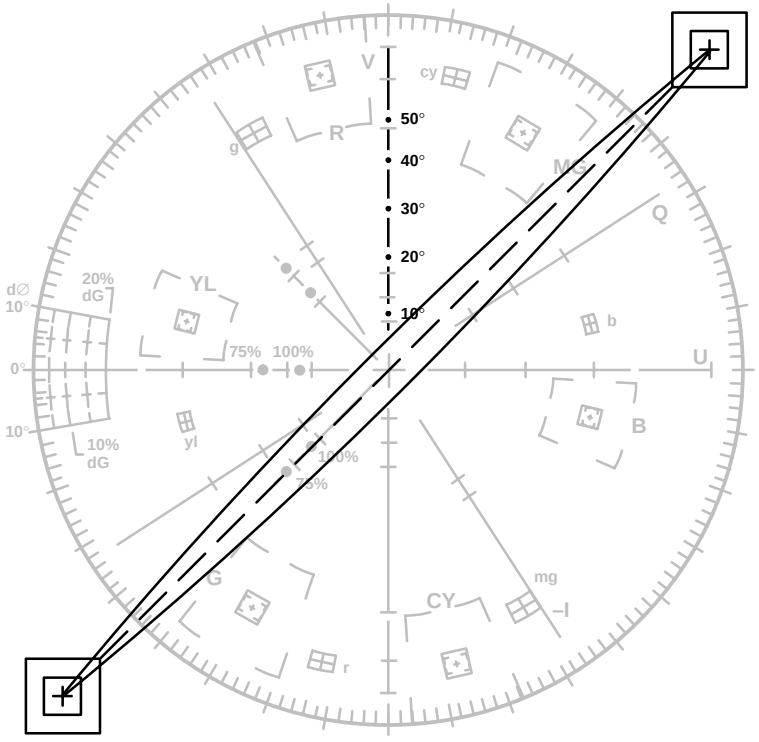


Figure 2–15: Measuring stereo audio phase difference in X and Y axes

Warning

The following servicing instructions are for use only by qualified personnel. To avoid personal injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer to General Safety Summary and Service Safety Summary prior to performing any service.

Installation

Section 3
Installation

Packaging

The shipping carton and pads provide protection for the instrument during transit; they should be retained in case subsequent shipment becomes necessary. Repackaging instructions can be found in Section 6 (Maintenance) of this manual.

Electrical Installation

Power Source

This instrument is intended to operate from a single-phase power source with one current-carrying conductor at or near earth-ground (the neutral conductor). Only the Line conductor is fused for over-current protection. Systems that have both current-carrying conductors live with respect to ground (such as phase-to-phase in multiphase systems) are not recommended as power sources.

Mains Frequency and Voltage Ranges

The 1725 Vectorscope operates over a frequency range of 48 to 66 Hz, at any mains voltage between 90 Vac and 250 Vac. These newer versions of the 1730–Series instruments *do not* require any internal changes to select their operating voltage range.

Operating Options

Not all installations are identical. In order to make operation of the 1725 Vectorscope as flexible as possible there are internal jumpers that can be changed to provide operating flexibility. For example, it is possible to select CW Subcarrier for EXT REF instead of Composite Video or Black Burst. The factory preset position is indicated by a box printed on the etched circuit board. Table 3–1 details these internal jumper selections. Be sure that all operators are aware of changes, to prevent unnecessary trouble reports, if any of these jumpers are placed in the optional position. See Figure 3–1 for locations of the internal Main board jumpers.

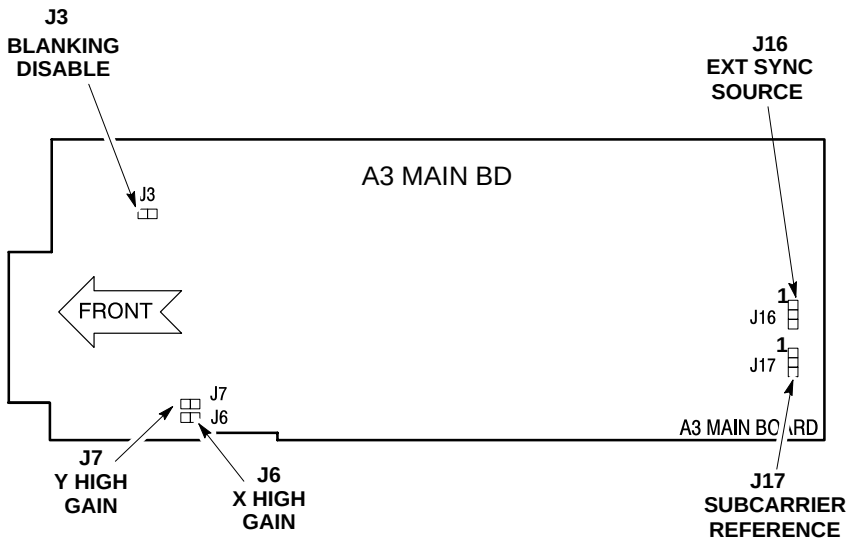


Figure 3–1: Jumper locations on the Main board

Table 3–1: Internal Jumper Selection

Jumper #	Name	Position	Purpose
A3J16	External Sync Source (EXT REF Input)	1–2	EXT REF (factory preset)
	Converted to CW Subcarrier Input	2–3	CH–A INPUT
A3J17	Subcarrier Reference	1–2	EXT REF (factory preset)
		2–3	CW Subcarrier applied to EXT REF INPUT
A3J3	Blanking Disable	Out	Normal Blanking (factory pre-set)
		In	CRT Blanking disabled
A3J7	Y Input High Gain	Out	Balanced 600Ω input (factory preset)
		In	Single-ended high gain mode
A3J6	X Input High Gain	Out	Balanced 600Ω input (factory preset)
		In	Single-ended high gain mode

Table 3–1: Internal Jumper Selection (Cont.)

Jumper #	Name	Position	Purpose
A3A1 J100	Light Enable	1–2	Lights Enabled (factory preset)
		2–3	Lights Disabled
A4J100	Phase Control	1–2	Tracks Channel Selection (factory preset)
		2–3	Dual Phase Shifter

XY INPUT Connector

The rear-panel XY INPUT connector is a 15-pin, sub-miniature, D-type connector that provides input to the Horizontal and Vertical (X and Y) Amplifiers. They are balanced (differential), dc-coupled, high impedance (>20 kΩ), un-terminated inputs provided for audio applications. If ac coupling is desired, external capacitors are required. These inputs are factory calibrated for 0 dBm in 600Ω but can be adjusted for any 600Ω system between 0 and 12 dBm. See Figure3–2.

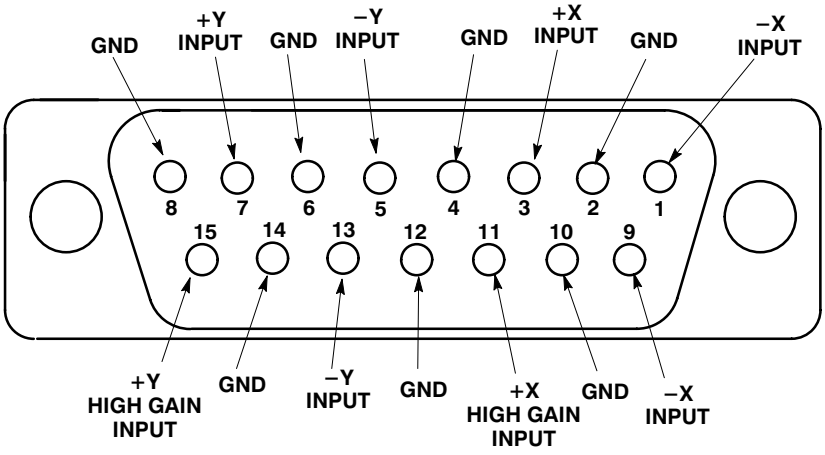


Figure 3–2: REMOTE connector pin functions

0 dBm is equal to 1 mW or 2.19 V peak-to-peak in 600Ω.

12 dBm is equal to 15.8 mW or 8.72 V peak-to-peak in 600Ω.

Inputs can be driven single-ended by driving either of the + X and Y inputs with the minus polarity inputs grounded.

In addition, a single-ended, high-gain mode can be used for other, primarily non-audio, applications. It can be accessed by installing plug jumpers on A3J6 and A3J7 (on the Main board) and inputting the signal on the +X and +Y inputs with the –X and –Y inputs grounded.

AUXILIARY Connector

The rear-panel AUXILIARY connector is a 9-pin, D-type connector. It is used to control the display from a companion 1730–Series Waveform Monitor. Line and Field selection information is provided to the vectorscope over the bus that is contained in this interface. Figure 3–3 and Table 3–2 show the AUXILIARY connector pin assignments.

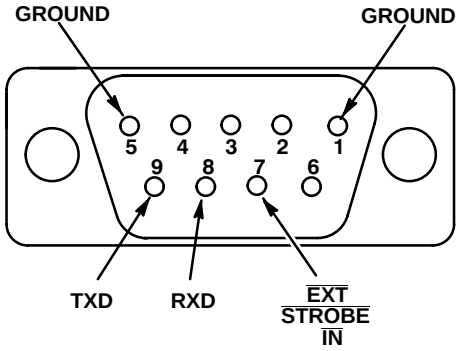


Figure 3–3: AUXILIARY connector pin functions

Table 3–2: AUXILIARY Connector Pin Assignments

Pin #	Use
1, 3, 4, & 5	Ground
7	External Strobe In for Line Select blanking.
8	RXD (Receive Data) 1730–Series communication to the 1725.
9	TXD (Transmit Data) 1725 return communication to 1730–Series.

Mechanical Installation

Cabinetizing

All qualification testing for the 1725 was performed in a 1700F00 cabinet. To guarantee compliance with specifications, the instrument should be operated in a cabinet. The plain cabinet, 1700F00, is shown in Figure 3–4.

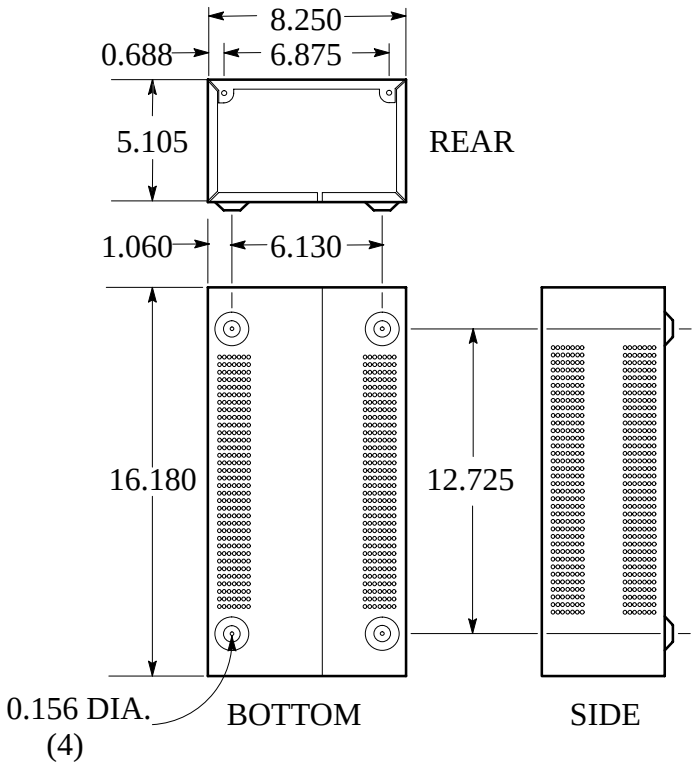


Figure 3–4: Dimensions of the 1700F00 plain cabinet.

The portable cabinet, 1700F02, is shown in Figure 3–5. The 1700F02 has a handle, four feet, a flip-up stand, and a front cover. This F02 cabinet is compatible with the TEKTRONIX BP1 battery pack, which can be used as a dc power source. The hole sizes and spacing are different from those of the 1700F00.

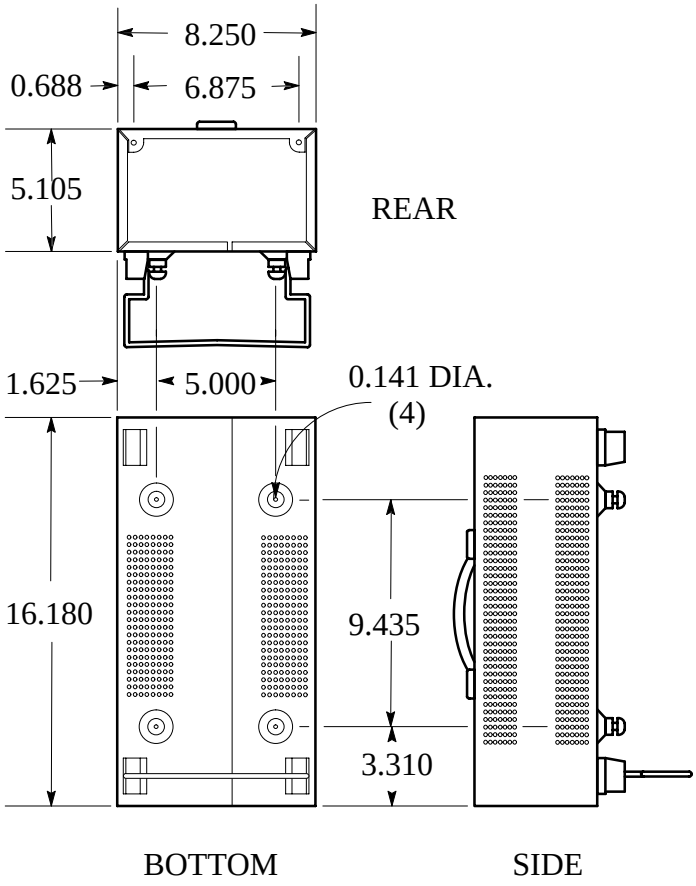


Figure 3–5: 1700F02 portable cabinet

All of the 1700–Series metal cabinets, which are available from Tektronix as Optional Accessories, provide the proper electrical environment for the instrument. They supply adequate shielding, minimize handling damage, and reduce dust accumulation within the instrument.

Securing the Instrument in its Cabinet

WARNING. *Do not attempt to carry a cabinetized instrument without installing the mounting screws. Without the mounting screws there is nothing to hold the instrument in the cabinet if it is tipped forward.*

The instrument is secured to the cabinet by two 6–32 Pozidrive® screws, located in the upper corners of the rear panel. See Figure 3–6.

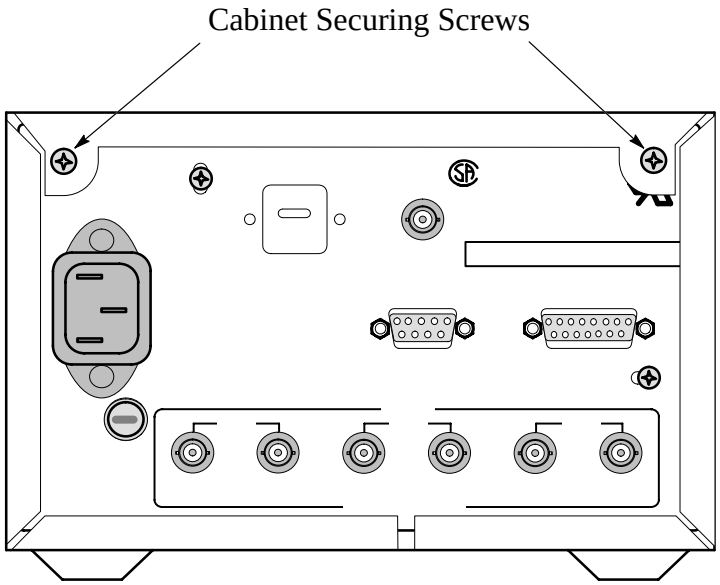


Figure 3–6: Rear view of the instrument, shown in the cabinet, with the securing screws identified

Rack Mounting

The optional 1700F05 side-by-side rack adapter, shown in Figure 3–7, consists of two attached cabinets. It can be used to mount the 1725 and another half-rack width instrument in a standard 19-inch rack.

The rack adapter is adjustable, so the 1725 can be more closely aligned with other equipment in the rack. See Figure 3–7.

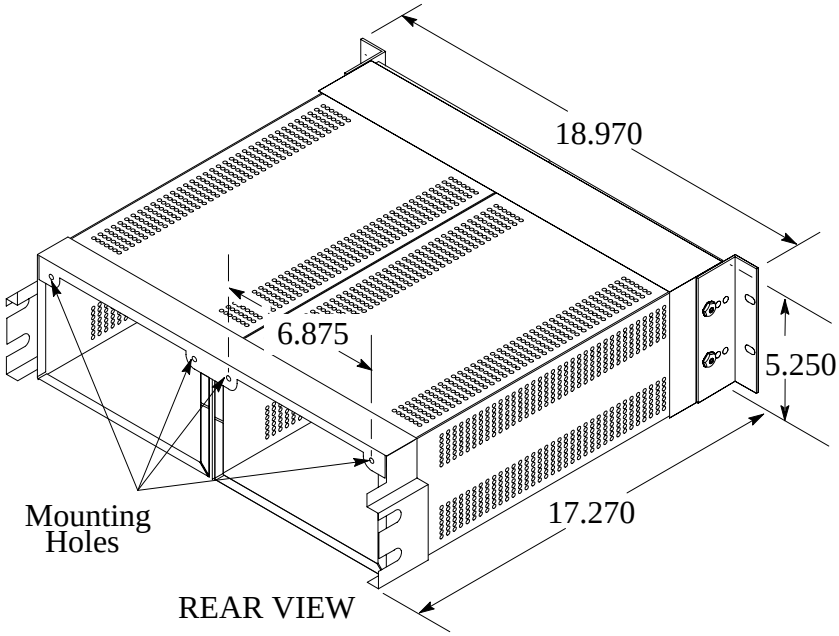


Figure 3–7: The 1700F05 side-by-side rack adapter

If only one section of the rack adapter is used, a 1700F06 Blank Panel can be inserted in the unused section. See Figure 3–8. The rack adapter and panel are available through your local Tektronix field office or representative.

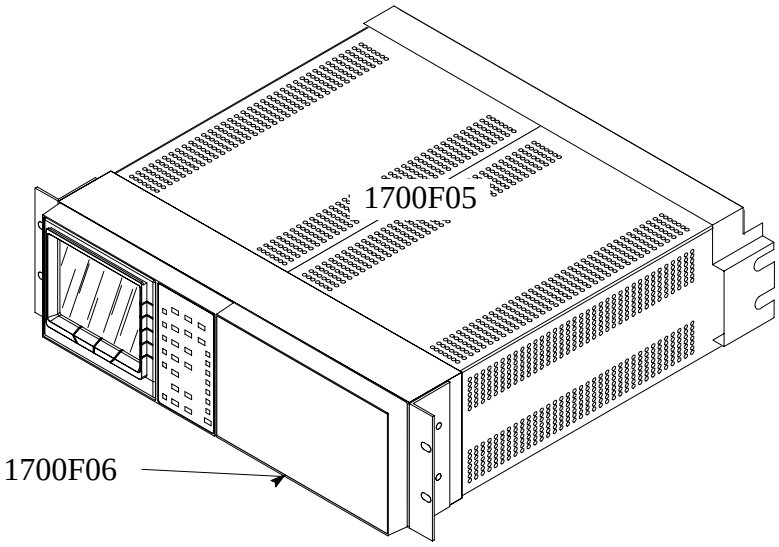


Figure 3–8: A 1700–Series instrument mounted in a 1700F05 cabinet with a blank front panel (1700F06) covering the unused side of the cabinet

In addition to being able to fill the unused side of the side-by-side rack mount cabinet (1700F05) with a blank front panel, an accessory drawer (1700F07) can be installed in the blank side of the cabinet. See Figure 3–9.

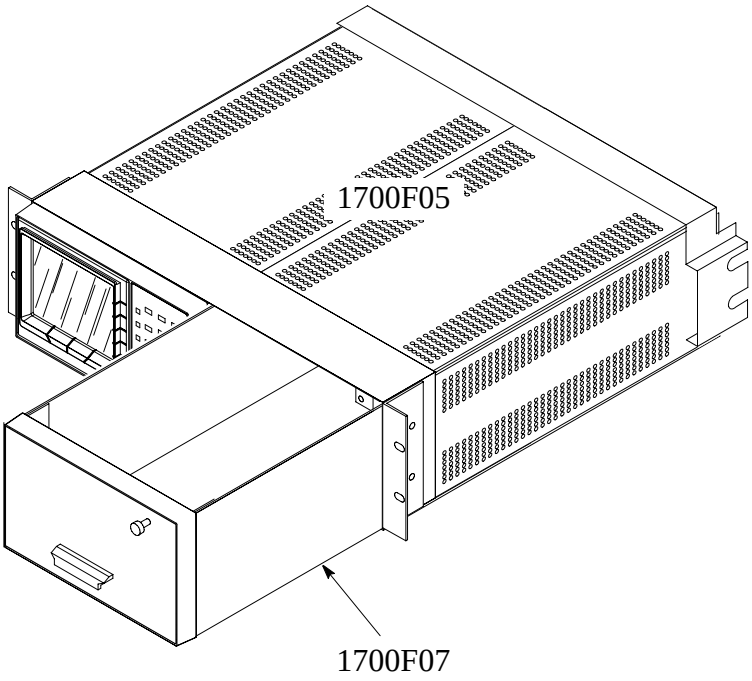


Figure 3–9: A 1700F05 side-by-side rack mounting cabinet with an instrument and a 1700F07 utility drawer

Custom Installation

For applications such as consoles, shown in Figure 3–10, the instrument can be mounted with front molding flush or protruding from the console. In both cases, allow approximately 3 inches of rear clearance for BNC and power cord connections.

To mount the 1725 safely, attach it to a shelf strong enough to hold its weight. Install the mounting screws through the four 0.156-inch diameter holes in the bottom of the 1700F00 cabinet. See Figure 3–10.

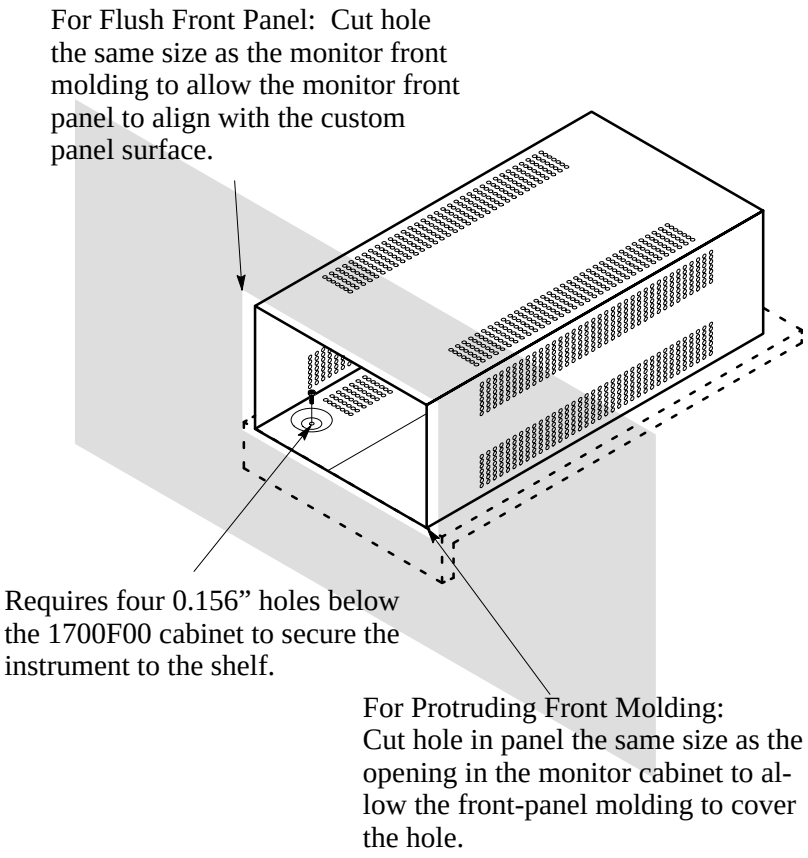


Figure 3–10: Considerations for custom installation of an instrument

Theory of Operation

Section 4
Theory of Operation

The material in this section is subdivided into general description, which is supported by the main block diagram and simplified block diagrams, and detailed circuit descriptions that use the schematic diagrams as illustrations. A thorough understanding of the instrument starts with a knowledge of how the major circuit blocks fit together, followed by individual circuit operation.

Overview

The simplified block diagram shown in Figure 4–1 and the following paragraphs are intended to introduce the 1725 Vectorscope in the broadest of terms. A full scale discussion of operation follows this overview.

The 1725 is a special purpose oscilloscope, designed to display the variations of phase in the NTSC or PAL color television signal. Color signals, input through the rear-panel bridging loopthrough connectors, are displayed on the crt in a Cartesian plot. An added feature makes it possible to compare two-channel audio signals. Audio signals are brought in through the rear-panel XY INPUT connector for an XY display of phases used for stereo encoding of the audio signal.

Front-panel mode switching is accomplished by push-button switches whose status is being constantly polled by a microprocessor. The microprocessor controls gains and switching functions to make specific measurements.

The composite video signal from either the Channel A or B input is first separated into its chrominance and luminance components. The luminance component is used to generate the clamp signals used in the display of the chrominance information and for synchronizing vectorscope operation. The gain of the chrominance signal is adjusted prior to input to the Demodulators, for quadrature demodulation. The demodulated output is filtered and clamped (at H-Sync rate) by clamped amplifiers. The Output Amplifiers match signal impedance and drive the crt deflection plates.

In addition to being demodulated and displayed, the chrominance signal can be used to provide the internal subcarrier sample (in the INT REF position) to the Subcarrier Regenerator. External Reference, when selected, is through the rear-panel bridging loopthrough EXT REF Input. The regenerated subcarrier can be phase shifted, by up to 360˚, using the front-panel PHASE control. For PAL applications, a 180˚ flip-flop is employed to reverse the phase of every other line so that the +V and –V signals can be overlaid for phase matching applications.

The regenerated subcarrier, used for demodulation, is applied directly to the B–Y (U) Demodulator and delayed by 90° (quadrature phased) for the R–Y (V) Demodulator.

The B–Y (U) Demodulator drives the Horizontal Output Amplifier; the R–Y (V) Demodulator drives the Vertical Output Amplifier.

The rear-panel X Y INPUT connector provides an input for audio signals, which can be displayed as XY signals for stereo comparisons. Identical amplifiers provide high input impedance and drive the Vertical and Horizontal Output Amplifiers.

If there is no signal, the Center Dot Blanking circuit blanks the crt to prevent it from being damaged by the non-deflected center dot.

BLOCK DIAGRAM

This description uses the 1725 Block Diagram, which is located at the beginning of the Diagram section (Section 9). The diagram can be folded out and viewed while reading this description.

Video Input

Video signals are applied through identical input amplifiers to normalize gain and provide impedance matching. An external reference can be used for both luminance- and chrominance-related functions. If composite video or black burst is used for the External Reference, no additional processing is required. When CW Subcarrier is used, the luminance reference is taken from the video input and the chrominance reference is attenuated from the subcarrier input, through the External Reference.

Luminance Processing

The sync signals used by the vectorscope are contained in the luminance information from the video inputs. The composite video signal through the Luminance Amplifier drives a sync separator, whose output is used to drive a Bowes Oscillator that regenerates H Sync. The H Sync also generates Sample Pulses and the Clamp signals, that activate the Burst Switches, and provide the line rate control signal for the V Axis Switcher.

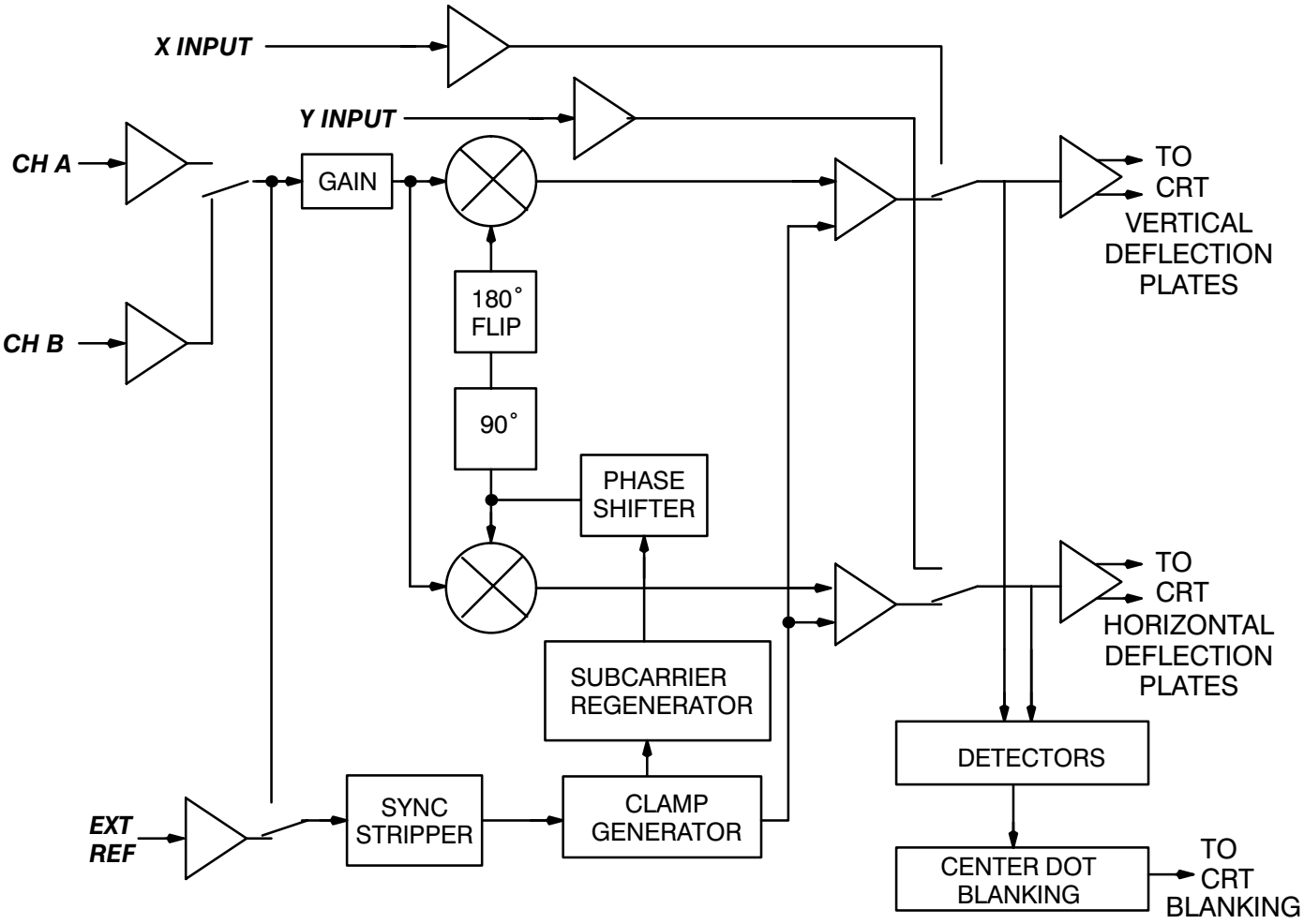


Figure 4–1: Simple block diagram of a vectorscope

Microcontroller The microprocessor polls the front panel to determine changes in status. Current status is stored in Nonvolatile Random Access Memory (NOVRAM), which makes it possible to return to the same front–panel condition should power be interrupted. If the 1725 is being used as an auxiliary instrument to a 1730–Series Waveform Monitor, any stored vectorscope front-panel setup data is also in the NOVRAM. Based on the front-panel conditions, the microcontroller generates controlling signals that are used throughout the 1725. The front-panel indicators are driven by the microcontroller so that they will mirror the current measurement criteria.

Gain Cell The gain cell uses front-panel VAR GAIN and GAIN CAL settings and switching signals from the microcontroller to adjust the chrominance gain prior

to demodulation. Gain cell chrominance is clamped to ground at sync tip time for a stable reference level.

Chrominance Processing

Chrominance from the incoming video signal, either internal or from the External Reference, is conditioned by the Chrominance Amplifier and applied to the Phase Detector at burst time (Burst Gate signal). The chrominance input to the Lock Detector is delayed by 90˚. The chrominance signal is compared to the regenerated subcarrier from the VCXO with the output low-pass filtered and buffered. The Phase Detector is clamped and supplied to the Error Amplifier, which provides an output voltage to correct the VCXO should it be off frequency.

The output of the Lock Detector compares the burst chrominance to 90˚ phase-shifted subcarrier, with the output low-pass filtered and buffered. The resulting signal is a pulse, when burst is present, that clamps the Phase Detector output. It is also checked for phase lock and, if unlocked, an output is supplied to the Error Amplifier to increase its bandwidth for a faster locking. When the TEST (Cal Mode) is enabled, the Error Amplifier is forced into an unlocked state to provide the test circles.

The regenerated and quadrature phase delayed subcarrier from the VCXO can be phase shifted up to 360˚ by a digital phase shifter (front-panel PHASE control) whose output is buffered prior to input to the demodulators.

Sampled output from the R–Y and B–Y and H sync are checked for coincidence, producing an “In Window” signal, which is fed back to the microcontroller to establish when burst is correctly placed.

The V Axis Switcher controls the PAL F_{SC} signal to the carrier input of the R–Y Demodulator to ensure the correct phase on alternate lines. When +V display, in PAL, is selected the switcher clamps one R–Y Demodulator input to ground to disable alternate line switching of subcarrier.

Demodulators

The 1725 employs quadrature demodulation, which consists of delaying the regenerated subcarrier by 90˚ to the R–Y (V) Demodulator. For PAL signals, an additional 180˚ phase shift is achieved by switching the regenerated subcarrier to the –input of the demodulator. The incoming chrominance is compared to the regenerated subcarrier and the output is low-pass filtered and amplified. Center Dot clamping is used to keep the effects of chrominance from distorting the display center dot.

Output Amplifiers

The Vertical and Horizontal Deflection Amplifiers do double duty. They are used to output both the vector display and the XY display. The input of the amplifiers is checked for the presence of a signal over a certain amplitude, and the resulting output is one input to the CRT Blanking circuit. X and Y signals are input through

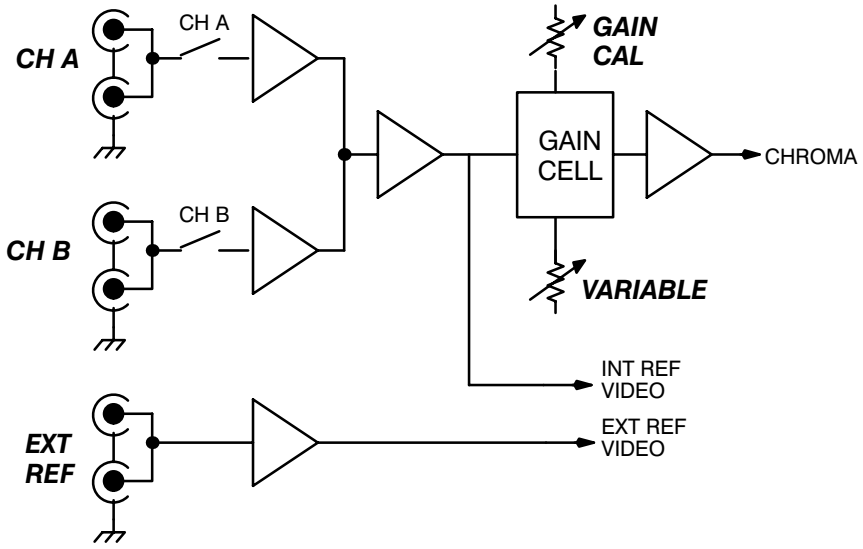
balanced amplifiers which can be converted to single-ended high gain inputs. Input switching is controlled by the microcontroller and front-panel switching.

CRT Blanking CRT blanking takes inputs from the front-panel INTENSITY control, the microcontroller, and the Center Dot Comparators to generate the blanking signal. In addition, in the Auxiliary mode of operation, a line select strobe from a companion 1730–Series can drive the blanking amplifier to unblank only the line or lines that are selected with the waveform monitor's line selector.

CIRCUIT DESCRIPTIONS

The following descriptions are divided by diagram number and then further subdivided by logical circuit blocks. The descriptions follow the order of the diagrams in Section 9. Individual diagrams can be folded out and consulted while studying these descriptions.

Diagram 1 Input Amplifier



Video signal input to the 1725 Vectorscope is through high-impedance bridging loopthrough inputs. Gain is normalized by the Input Amplifiers prior to being input to the gain cell. The amount of amplification provided by the gain cell is controlled by the Gain Cal, Variable, and the choice of 75% or 100% amplitude color bars.

The External Reference input is also a high-impedance bridging loopthrough, which is dc coupled to a unity gain operational amplifier.

Video Input Amplifiers

The Channel A and Channel B input buffers are ac coupled (C205 and C210), grounded base amplifiers with Q91 and Q97 as the active elements. Q90 is a saturating switch that shunts current away from the Channel B input when Channel A is being displayed. Q98 serves the same purpose when Channel B is being displayed. R468 and C209 are adjustments that match the phases and gains of Channel A and Channel B. They modify the input resistance of Channel B and the input capacitance of Channel A. Signal current flows through either CR44 or CR45 (depending on channel selection) into the summing junction of a differential amplifier (Q88 and Q89) that drives the Output Amplifier (Q87). Output signal drives the gain cell and Sync Separator (Diagram 2).

The External Reference Input Amplifier is nearly identical to the channel inputs and provides a signal to the reference switch. R484 is the input resistor and R457 is the feedback resistor, the combination of which sets the gain to one.

Gain Cell

The gain cell, whose output is chrominance, consists of U39, U41, Q82, and Q86. A bandpass filtered (C177 - R396) signal is fed into pin 6 of U39. U39 consists of a current source (U39C), differential amplifier pair (U39A and B), and a pair of transistors connected as diodes (U39D). U41 consists of four transistors connected in a cross-coupled gain cell arrangement with a transistor used as a heater to keep U41 at the same temperature as U39. The diode-connected pair in U39 is a current-to-voltage converter that drives the gain cell transistors in U41. U38 is an operational amplifier that drives the gain port of the gain cell.

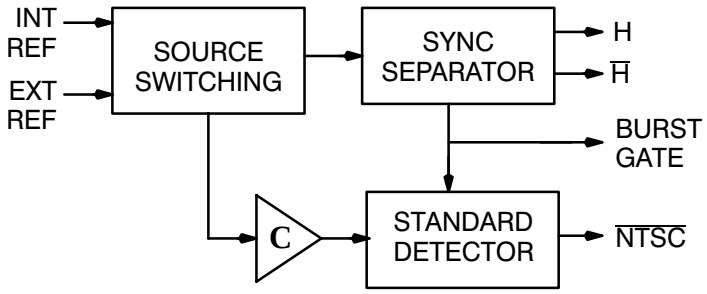
U38 is a buffer amplifier for the various signal levels controlling the gain of U41. Dual Inline Package (DIP) switches (U35), controlled by the microcontroller, switch in various voltages to set gains including the front-panel VARIABLE GAIN.

Q70, Q71, and Q80 form a clamp circuit to turn off the gain cell during sync time. This is accomplished by turning off the gain cell current source U39C.

The gain cell drives a low impedance phase-linear bandpass filter. Frequency range of the filter is approximately 1 MHz to 5 MHz which accommodates both NTSC and PAL subcarrier and sideband frequencies.

The filter output drives an operational amplifier, Q82 and Q85 (Chroma Amplifier). Gain is approximately 16 to boost the chroma signal amplitude back up from the low signal level output by the filter.

Diagram 2
Sync



Incoming signal is amplified and fed to the Luminance and Chrominance Amplifiers. Output of the Luminance Amplifier drives the Sync Separator, to generate the H Sync used throughout the vectorscope, and the Burst Gate for the Subcarrier Regenerator and Standard Detector. The Standard Detector outputs a low level for NTSC input signals and high level for PAL input signals.

Reference Switch

U43 is a Quad CMOS switch that selects the appropriate input signal for the Sync Separator, Standard Detector, and the Subcarrier Regenerator. In normal operation, both the sync and subcarrier sources follow the front-panel Reference switch and are driven by A or B when Internal is selected, or by the EXT REF input when External is selected. When P16 is in the 2 and 3 position, the Sync Separator is always driven by the A or B input, even when External Reference is selected. This mode is used if CW Subcarrier is the Reference for a composite video input signal. It will ensure that the clamp pulses are synchronous with the incoming video.

Chrominance Amplifier

The reference signal is ac-coupled through a tuned circuit, C202 and L17, to drive the Chroma Amplifier, Q93 and Q94. Luminance is removed and in normal operation the chrominance is amplified by about three times. With P17 in the 2 and 3 position (External CW Subcarrier input), the gain is changed to slightly less than one.

Luminance Amplifier

The reference signal is dc-coupled to the inverting Luminance Amplifier, Q92, which has unity gain and removes much of the chrominance. The collector of Q92 drives the Sync Separator.

Sync Separator

The Sync Separator strips off and processes the sync from the luminance signal to control the timing circuitry. The Sync Stripper receives its input through C186 and R443 into the base of Q83, a summing junction. Q83 and Q78 form an operational amplifier that inverts the sync signal and clips it near the sync tip.

Amplifier gain, which is high at sync tip time, is set by the combination of R443 (R_i) and R421 (R_f). During non-sync time (active video) CR40 and CR41 are both on, shunting Q78 to reduce amplifier gain and limit saturation so that the response to the next sync transition will be rapid.

During sync time a clamp circuit consisting of Q84 and Q85 maintains the output of the operational amplifier at about +5 V. The output is fed back to maintain the proper level. Q84 and CR42 are a current source that is on during sync tip. At the end of sync time, when Q78 goes low, CR42 is pulled down and Q85 shuts off.

Q74 outputs negative-going sync that has any remaining noise greatly reduced. The output of Q74 is fed back, through CR42, to the clamp circuit, Q85.

Bowes Oscillator

The Bowes Oscillator, Q75 and Q79, is triggered by the leading edge of sync. It accepts triggers only at H intervals, during the vertical interval, to avoid triggering on the wrong equalizing pulses. In the absence of sync the oscillator freeruns so that sample pulses are always available for clamping. The output at the collector of Q79 is negative-going and lasts for approximately 4.5 ms to provide horizontal sync to the rest of the instrument.

U37D inverts the output of the Bowes Oscillator to provide H pulses to the remainder of the instrument. U37A inverts the H pulses to provide /H to the blanking circuitry.

Burst Gate Generator

U40A is a one-shot that provides a positive-going pulse at its output (pin 13) that controls the sampling of burst (Burst Gate) by the Subcarrier Regenerator and Standard Detector. It is triggered by the trailing edge of sync and its Q output (pin 13) is a 4 ms long, positive-going, back porch pulse.

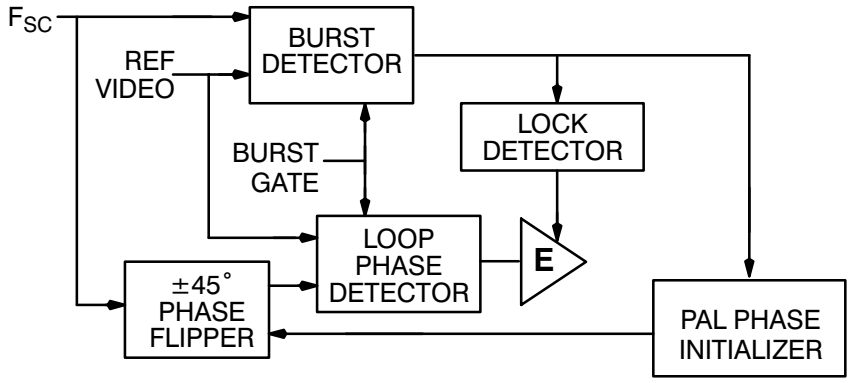
Standard Detector

The Standard Detector is a sampled frequency detector. Reference Video from the Chroma Amp is ac coupled to one signal input of U9 and a tank circuit. The tank circuit resonance frequency is approximately 4 MHz. When the input signal frequency is below resonance, the Carrier input will be delayed from the signal input. When the frequency is above resonance the carrier input phase will lead the signal input. The U9 bias input is controlled by burst gate, it turns on U9 during burst.

The output of U9, at pin 12, will be either a minus term when input signal frequency is below 4 MHz (NTSC) or a positive term when its above 4 MHz (PAL). C42 is a hold capacitor for U12 which is a buffer/decision maker.

The –input of U12 is a voltage level set by a voltage divider R80-R95. The output goes low and stays there for NTSC and high and stays there for PAL. The output is limited to ±5 V by CR11 and CR12.

Diagram 3
Subcarrier Regenerator



The heart of the Subcarrier Regenerator is a phase locked loop. See Figure 4–2. The Subcarrier Oscillator (VCXO) is a voltage-controlled oscillator that freeruns near the reference subcarrier frequency. The Loop Phase Detector is a mixer that detects phase differences between the reference input and the Subcarrier Oscillator during burst time. The difference output is an error signal proportional to the phase difference detected.

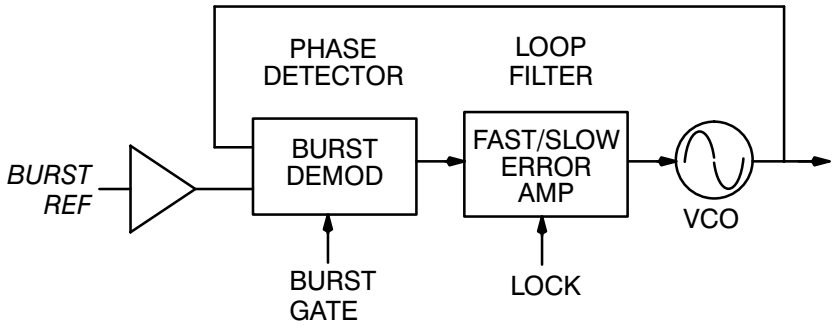


Figure 4–2: Block diagram of the Phase Locked Loop

The error signal drives the Phase Lock Control, which is a lowpass filter to remove high frequency ac components in the error signal. The filter has two bandwidths, a wide one to search for the unlocked signals, and a narrow one to maintain stable phase lock once the signal has been captured.

The Error Amp loop filter completes the loop by controlling the Subcarrier Oscillator. If the input reference changes, the oscillator will follow.

±45˚ Phase Flipper

When PAL subcarrier is input to the Loop Phase Detector a 90º phase shift is required on alternate lines. This is accomplished by either delaying or advancing the demodulator carrier inputs by 45º.

U33B, which is clocked at an H rate, provides the flipper control signals that alternately turn Q34 and Q35 on and off to provide a 90º subcarrier input phase shift between lines. C108 and R213 provide the 45º phase delay when Q34 is turned on and Q35 is turned off. C106 and R228 provide the 45º advance when Q35 is turned on and Q34 turned off.

When an NTSC signal is input, the preset for U33B is pulled high to turn on Q35 and keeps Q34 turned off. When Q35 is on, the input subcarrier signal is correctly phased for NTSC signals.

Loop Phase Detector and Amplifier

U23 is the Subcarrier Regenerator (Phase Lock) Loop Phase Detector. It is a balanced demodulator, whose carrier input is driven by the VCXO CW sine wave. Its signal input is driven by burst chrominance (Ref Video) from the Chroma Amplifier (Diagram 2). The output of this phase detector is an ac multiplication of the input signals, which occurs only during the time that both of the input signals are present and the demodulator is turned on by the Burst Gate signal. Q32 is the gate switch for the Loop Phase Detector, U23. The average dc output level is proportional to the difference in phase between the inputs. When the loop is locked the output of U23 (pin 12) is zero.

The output corresponding in time to the burst packet is lowpass filtered to remove any chrominance and harmonics to drive U18. The filter L7, C98, and C86 has a 377 MHz bandwidth. U18 is a non-inverting, high-gain operational amplifier used to drive the Error Amplifier.

Error Amplifier

U17 is a non-inverting amplifier whose RC feedback network acts as a lowpass filter to determine the Subcarrier Regenerator loop response. Any input voltage to U17 is amplified and biases the VCXO varicap (Diagram 4).

Loop frequency determines the speed that the loop locks up. When the phase lock loop is not locked up a wider bandwidth is needed. If the loop is unlocked C70, R120, and C57 are the filter elements. When lock up is achieved U13D closes and shunts another filter, consisting of C71, R121, and C58, across the filter to slow down filter response and make it less sensitive to noise.

The Loop Balance control, R161, adjusts the Phase Locked Loop dc offset so that there is no phase shift when there are burst amplitude changes.

Lock Detector and Amplifier

The Lock Detector is similar to the Loop Phase Detector, except that the + Carrier input signal is phase shifted by 90˚. This results in the output of the Lock Detector being maximum when the output of the Loop Phase Detector is zero. Since Loop Phase Detector output is zero (phases are matched) during

burst, the Lock Detector provides a large-amplitude pulse occurring only during burst time. When NTSC is selected Q41 is turned on to provide an additional 45º fixed phase shift.

U11 is an integrating amplifier that outputs a low level when the loop is locked. When the subcarrier regenerator is unlocked the output of U11 will be alternately positive and negative, making a net output term of zero. When the output of U11 is low (locked) the output of U14A goes high and Q17 turns on to close switch U13D, which slows down the loop response. The output of U17 is also read by the controller to determine when the loop is locked.

Burst Detector

U25 and U26 form an envelope detector with a current output. When the Subcarrier Regenerator is locked burst current flows through Q24 to U18. Prior to lockup the burst gate is steered through Q21 to U18. When lockup occurs burst sampling occurs on burst. When the Subcarrier Regenerator is not locked sampling occurs in a window corresponding to the Burst Gate signal.

Q22 is an inverter amplifier outputting a burst sample pulse to the Auto Zero circuit on Diagram 4.

Q16 is an integrator that generates a burst present pulse. When the base goes high, Q16 pulls down on the RC network, R117 and C68, which has a long time constant. Q15 is a buffer amplifier for the /BST_HERE (Burst Here) output to the CPU. This signal controls, through the CPU, the front-panel STANDARD indicator if burst is missing.

PAL Phase Initializer

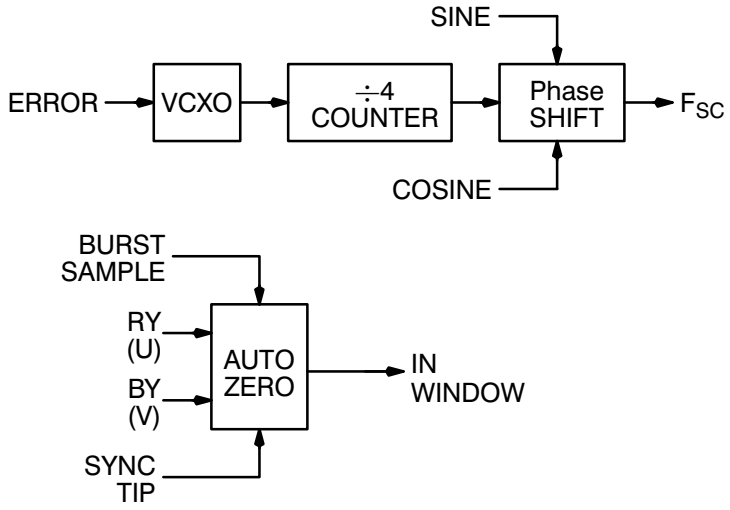
The phase alternate line characteristic of the PAL signal make it possible for the Subcarrier Regenerator to lockup 180º out of phase. If lockup is attempted in this condition the output of the Lock Detector will be positive for one burst and negative for the other, instead of high for both bursts.

When the Subcarrier Regenerator is locked to F_{SC} the Lock Detector outputs only a high at burst time. If the Lock Detector outputs a low at burst time, U14B outputs a low. A low output from U14B turns on Q13 to charge an RC network (C72 and R125) with a time constant of approximately 50 ms. The output of the RC network turns on Q14 which keeps the output of U14B.

The output of U14B pulls the Preset of U33B down to pull up on its Q output. When the Q output goes high Q35 in the 45˚ Phase Flipper turns on. The next –45˚ PAL burst that occurs will cause the output of U23 to go low and U25 to go high, which is the locked up state.

When lockup occurs Q10 turns on and locks out PAL Phase Initializer and the Subcarrier Regenerator is locked to the correct phase. In addition, when U14 is locked out the U33B Preset line goes high, which allows it to be clocked by the H rate clock signal.

Diagram 4
VCXO, Phase Shift, and Auto Zero



The VCXO is a phase locked, voltage-controlled, switched crystal oscillator that operates at 4 x subcarrier. Crystals are switched to the correct value for the selected input. VCXO output is divided down by a ÷4 counter and input to mixers where it is mixed with dc levels corresponding to the selected amount of phase shift. Phase shifted F_{SC} is limited, filtered and output to the Demodulators.

Auto Zero provides a pulse to the controller when the burst phase is in the proper quadrants.

VCXO The VCXO is a crystal controlled ECL oscillator consisting of U8A and B. Center frequency is established by Y2 for PAL and Y1 for NTSC. The center frequency for the crystal oscillator is fine tuned by Netting Capacitor adjustments C28 and C31. The Error voltage from the Subcarrier Regenerator (Diagram 3) Error Amplifier is applied across a varactor, CR3, which changes capacity with a voltage change. This provides the frequency correction for the VCXO.

When the CAL mode is selected Q9 is turned on hard and saturates to place a high on the control line to free run the oscillator and, if there is a subcarrier present on the input, provide a display of circles.

The 4 x subcarrier output of the oscillator is input to a Johnson Counter, U7A and U7B, which divides its input frequency by 4 to yield a PAL or NTSC in phase and quadrature output.

The in phase output is shaped into a sine wave by a Pi filter consisting of L5, C19, L4, and C24, to provide the F_{SC} signal back to the Subcarrier Regenerator to complete the phase lock loop.

Phase Shift

The Phase Shifter itself is an optical encoder that is read by the Controller, which provides DAC Sine and Cosine signals that drive the Control inputs of demodulators, U2 and U210.

The $\div 4$ counter provides in-phase and quadrature outputs to the Phase Shift mixers. Pins 8 and 10 of both mixers have ECL levels of the subcarrier. Pin 1 of both U2 and U210 have levels between + and –2.5 V, generated by the Controller, corresponding to the current setting of the front-panel PHASE control.

The output of the mixers, pin 12, is the result of multiplying and adding the in phase and quadrature components of subcarrier with the sine and cosine levels. L2, C36, and C11 is a filter to remove unwanted resultants. Q3 is a limiter driving a filter consisting of L3, C17, C20, and C21 that outputs a clean phase shifted PAL or NTSC subcarrier to drive the Demodulators (Diagram 4).

Auto Zero

The RY (V) and BY (U) are applied to the inputs of a pair of comparators, U16 and U15. A Burst Sample, derived directly from the Subcarrier Regenerator Burst Detector (Diagram 3), gates on the comparators. When RY (V) is 0 and BY (U) is a minus level the burst is in the correct phase.

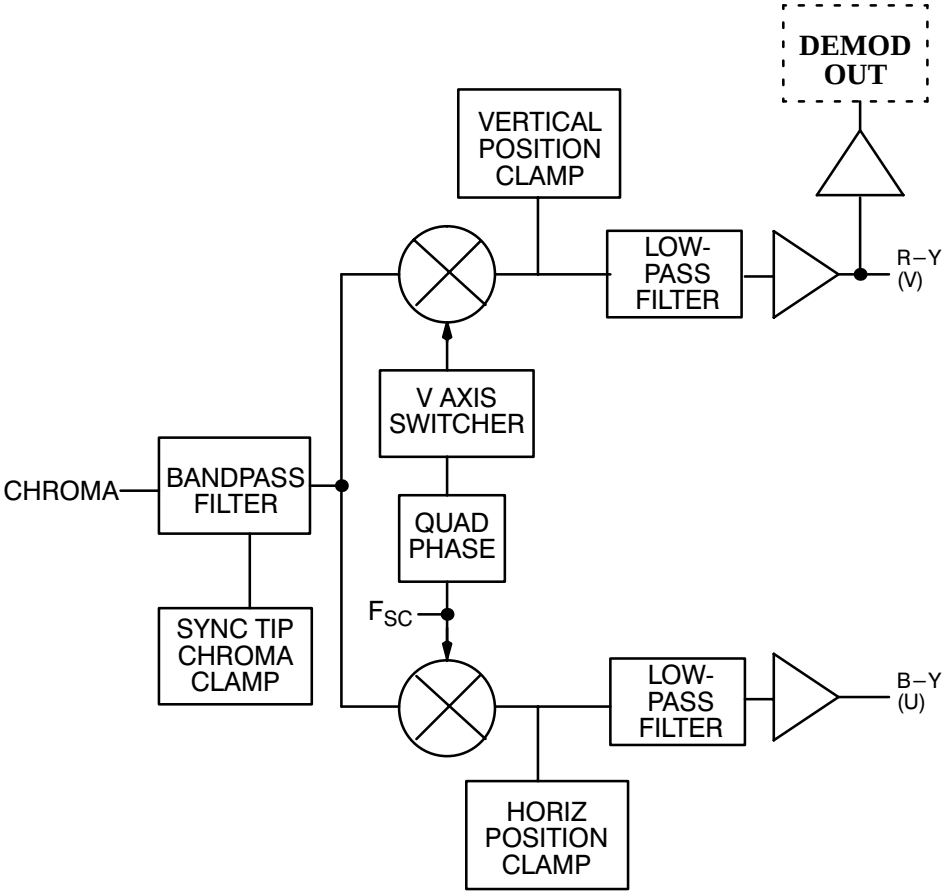
Sync tip clamping is used to provide a common reference level. At sync tip a pulse turns on Q11 and Q12 grounding the ac coupled RY (V) and BY (U) inputs to the comparators.

U10B and U10C form a window detector that is centered around burst phase. R57 is the Zero Adjustment. In addition to U10B and U10C, U10D goes high when its –input goes low. When the burst occurs in the correct phase there will be a positive pulse output to the Controller to signify burst is correctly phased.

Post Regulators

The + and –15 V supplies generated on the Power Supply circuit board are further regulated to meet the onboard needs of the 1725 Main (A3) circuit board. U130 and U31 are the post regulators for the –11.8 V and +11.8 V supplies. R272 is the –11.8 V Adjust and R306 is the +11.8 V Adjust.

Diagram 5 Demodulator



Incoming chrominance is bandpass filtered, clamped at sync tip time, and compared to the phase shifted regenerated subcarrier signal for demodulation. Subcarrier signal is quadrature shifted (90˚) before input to the R–Y (V) demodulator. In addition, for PAL applications, and any time the front-panel selected Test Circle is enabled, a V Axis switcher shifts the subcarrier input by 180˚ for alternate lines.

Output signal from the Demodulators is lowpass filtered and amplified prior to driving the Horizontal and Vertical Output Amplifiers. The output of the R–Y (V) Demodulator is also available through the rear-panel Demodulator Output.

V Axis Switcher

The V Axis Switcher reroutes the V Axis Demodulator carrier input on alternate lines. V Axis switching is enabled when the TEST function is selected from the front panel.

V Axis switching displays the PAL signal with the –V lines overlaid on the +V lines. The resulting display appears as though only the +V signal is displayed,

similar to an NTSC display. This display evaluates relative differences between the +V and –V lines, just as the signal is decoded in a PAL receiver. The Microcontroller pulls the Preset input of U36A (a D-type flip-flop) high, which allows the horizontal sync, clock pulses to toggle its outputs at a line rate. The D input is controlled by another flip-flop, U36B (on Diagram 3), which has identified the +V lines (for PAL) in the Subcarrier Regenerator.

The flip-flop outputs drive Q39 and Q40. A high output turns on the corresponding transistor to shunt the signal at its collector to ground. This alternately grounds and drives the + and – carrier inputs on the V Demodulator with subcarrier to demodulate the –V lines 180° away from the +V lines.

Chrominance Demodulators

The Chrominance Demodulators, U29 and U26, are double-balanced demodulators, whose outputs are voltages proportional to the phase difference between the signal input (pins 1 and 4) and the carrier input (pins 8 and 10). The signal inputs are driven by chrominance from the Gain Cell (Diagram 1). The carrier inputs are driven by a continuous sine wave, at subcarrier frequency, from the Subcarrier Regenerator (Diagram 3). T1 is a balanced transformer driving an LRC delay network, with L10 adjustment for PAL quad phase and C107 adjusted for NTSC quad phase. The V Axis Switching circuit, when operating, determines which carrier input of the R–Y (V) Demodulator is driven by subcarrier. When NTSC is selected U36A Preset input is forced low to turn on Q39 and ground the + Carrier input.

The demodulator gains are set by the R–Y Gain (R277) and the B–Y Gain (R263). The bias is controlled by the Center Dot Position Clamp circuits. R336 provides a small percentage of the Y signal into the X signal to be used as part of the orthogonality adjustment.

Demodulator Output Filters and Amplifiers

A four-pole active lowpass filter (Q54 and Q52 for the R–Y (V) and Q53 and Q58 for the B–Y (U)) removes the high frequency components of the demodulation process. These filters determine the bandwidth of the vector mode signal path to control the rise time and delay of the demodulated signal.

Q64, Q65, and Q66 (for the R–Y/V) and Q61, Q63, and Q67 (for the B–Y/U) are inverting operational amplifiers with a gain of about 15. The amplifier outputs, to drive the Deflection Amplifiers, are from high impedance emitter followers Q64 (R–Y/V) and Q61 (B–Y/U).

Vector Center Dot Position Clamp

The R–Y (V) Demodulator output is also fed back through R299 to a clamp circuit consisting of U28 and Q51. U28 is an operational transconductance amplifier used in a sample-and-hold circuit. The demodulated R–Y chrominance drives the negative input (pin 2), while a voltage, controlled by the Vector Vertical Position control (R258), is the reference level to the positive input (pin 3).

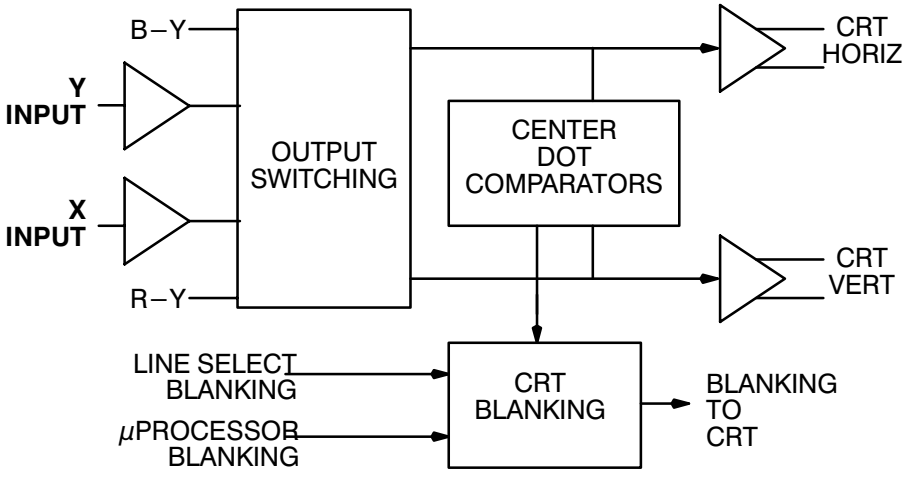
The B–Y (U) Demodulator output is also fed back through R330 to a clamp circuit consisting of U27 and Q46. U27 is an operational transconductance amplifier used in a sample-and-hold circuit. The demodulated B–Y chrominance drives the negative input (pin 2), while a voltage, controlled by the Vector Horizontal Position control (R244), is reference level to the positive input (pin 3).

During the middle of horizontal sync time, a pulse is applied to the bias pin of the amplifier (pin 5) to turn the device on and transfer the voltage levels on the –inputs to the storage capacitors C142 (for R–Y/V) and C134 (for B–Y/U). The stored levels are applied through source followers Q51 (R–Y/V) and Q46 (B–Y/U) to the bias inputs (pin 5) of Demodulators U29 (R–Y/V) and U26 (B–Y/U). This changes the output bias current of the demodulator to change the demodulated signal dc level, which is the dc level for the Deflection Amplifier (Diagram 4).

Vertical and Horizontal Standard Dot Generators

Every other line, during sync time, Q55 and Q60 are turned on to deflect the center dot to the Standard Targets on the graticule. In addition, when NTSC is selected Q57 is turned on, which reduces the amount of current flowing into the vertical amplifier and moves the dot to the NTSC target.

Diagram 6 Deflection Amplifier



External X and Y signals are input through the rear-panel sub-miniature D-type XY INPUT connector. Output switching selects either the R–Y (V) and B–Y (U) or XY for amplification and display by the Horizontal and Vertical Deflection Amplifiers. Driving signals for the Deflection Amplifiers are also input, as

active driving signals for the Center Dot Comparators, to provide blanking when the crt beam is not deflected away from center screen.

CRT blanking signals from Line Select and the Microcontroller are combined with the vectorscope H rate sync to provide the blanking signal to the grid circuit.

XY Input Amps

U24 is a Quad Operational Amplifier. U24A and B are Balanced Differential Input Amplifiers, intended for audio use. In a 600W system, R207 and R209 can be adjusted to normalize signals from 0 dBm to +12 dBm (2 V_{P-P} to 9 V_{P-P}). The input impedance is greater than 20 kW to ground.

P6 and P7 can be installed on J6 and J7 to increase the gain through the + Inputs of the X and Y amplifiers. These inputs are provided for special non-audio applications where a higher gain may be needed.

U24D and C drive the X and Y Deflection Amplifiers through a Microcontroller enabled switch, U42. A small amount of Y signal is fed through R223 to the X Amplifier for the orthogonality adjustment.

Deflection Amplifiers

The Vertical Deflection Amplifier consists of Q73 and Q77 (a differential pair). Positioning current is input through Q77 with the signal current input through Q73.

Q72 and Q76 are grounded base amplifiers that speed up the amplifiers by minimizing the miller capacitance on Q73 and Q77. CR34, CR35, CR38, and CR39 prevent Q72 and Q76 from saturating when the amplifier is overdriven by large signals. Q68 and Q69 are the current source for the differential pair. The Horizontal Deflection Amplifier is virtually identical in operation to the Vertical Deflection Amplifier.

The Orthogonality control, R387, feeds Y signals into the –input of the Horizontal Deflection Amplifier. Both the vector and XY circuits feed +2% Y signals into the X signal, for use in orthogonality compensation. Adjusting the orthogonality control cancels out some or all of the Y signal in the X Amplifier. The effect of this control is to change the deflection angle between the X and Y axis to compensate for crt geometry.

Center Dot Comparators

U22 is a quad comparator with open collector outputs that are tied together. When both the X and Y signals are close to 0 V (no signal with only a center dot), the output of all the comparators is high. At horizontal sync time U32C opens and C25 discharges in the positive direction toward ground. When the X or Y signal is away from 0 V, after sync time, U32C is closed and the output of at least one of the comparators will be be low (–6 V) and C25 recharges.

CRT Blanking

During active line time, if there is signal present, the NOSIG input to U6 is low and the Microcontroller generated /UP BLANK controls unblanking.

U6 outputs three signals: BLANK, to the Z–Axis Control (Diagram 8), DOT to the Standard Dot Generator (Diagram 5), and /CLAMP to the Demodulator Clamp Circuit (Diagram 5). The PAL outputs the signals required for standard dot generation, blanking and unblanking of the crt, and sync tip clamping of the demodulator. See Figure 4–3.

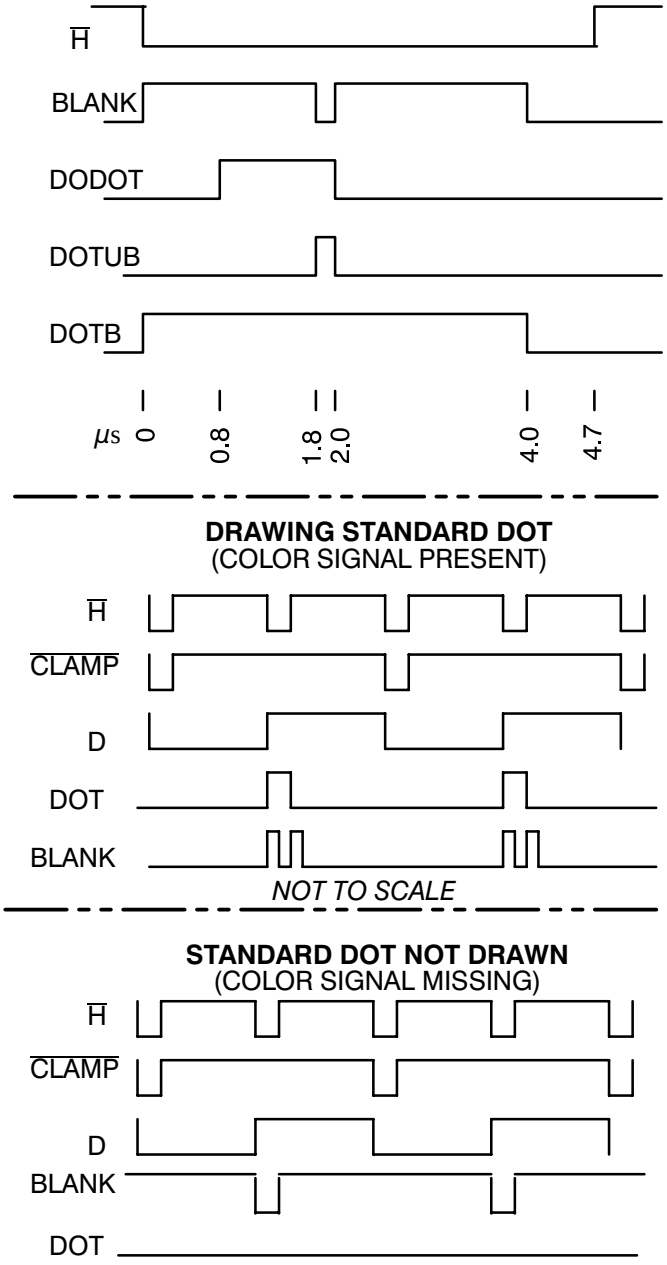


Figure 4–3: Dot timing signals for U6

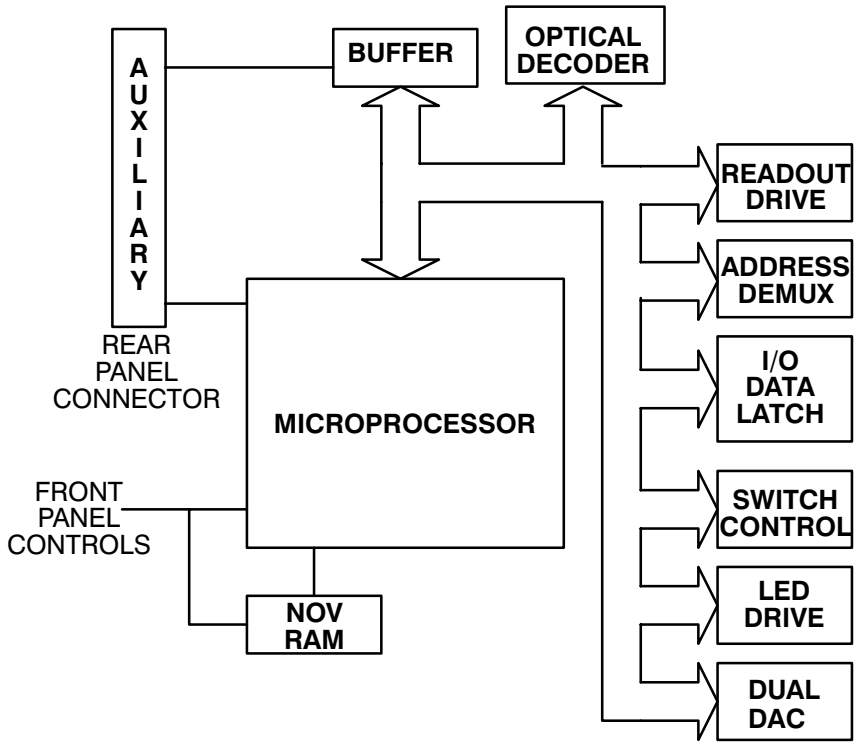
The DOT output enables the Standard Dot Generators, every other line, at H sync time as dictated by the D (H/2) signal. On these lines the Dot Generators deflect the the center dot and the BLANK signal goes low to unblank the crt. On lines where DOT is low the BLANK still goes low, but in this case the dot remains in the center of the crt.

When there is no burst present, the DOT line remains low and the center dot is displayed on every other line.

When the BLANK output of U6 is high the crt is blanked. The line select blanking signal originates in the 1730–Series when it is a companion to the 1725. When Line Sel Blank is high, the crt is blanked and the line select bright-up circuitry is enabled. The line select blanking signal is low during the selected line to unblank the crt for that line. Q31 enables the bright-up circuitry. CR14 and C73 keep the bright-up circuitry enabled during the time that the Line Sel Blank is low to unblank the crt during the selected line.

When P3 is installed the transitions to the center dot are displayed.

Diagram 7 Microcontroller



Operation of the 1725 is controlled by the Microprocessor. It controls switching operation by either polling the front-panel switches, or in response to stored/re-

called front-panel configurations (Auxiliary Input from a companion 1730–Series).

Output of the Optical Encoder (PHASE) is decoded and an 8-bit word, corresponding to the control position, is output to the Data bus. A dual Digital-to-Analog Converter decodes the 8-bit word and outputs two dc levels corresponding to the desired in phase and quadrature phase of subcarrier.

In addition, the Microprocessor drives the front-panel indicator light emitting diodes through a light driver.

A Non-Volatile Random Access Memory (NOVRAM) retains the current operating state in the event of power interruption, including operator power down.

Microprocessor

The 1725 is controlled by a Microprocessor and Erasable Programmable Read Only Memory (EPROM). U107 is an 8-bit Microcontroller that operates with U109 (32k X 8 EPROM) or contains its own masked ROM. Pins 32 through 39 of U107 (AD0-AD7) is a multiplexed address and data bus. U110 de–multiplexes the lower address bus for program code retrieval. U107 controls switching in response to front-panel keyboard action. Front-panel switches are ground closures that are matrixed and polled by Port 1 of U107 (Columns 0-2 and Rows 0-2).

In addition, a serial bus structure is input to U107 through pin 10 (RXD) and output through pin 11 (TXD). This is the Auxiliary bus for operation with a companion 1730–Series.

The front-panel LEDs are driven through U103 and U104. The front-panel LEDs light when the light driver outputs are low. In addition, U104 pins 2, and 5 are control lines (75%, 100%, and Variable) for instrument switching functions. Other switching control lines are output through U102.

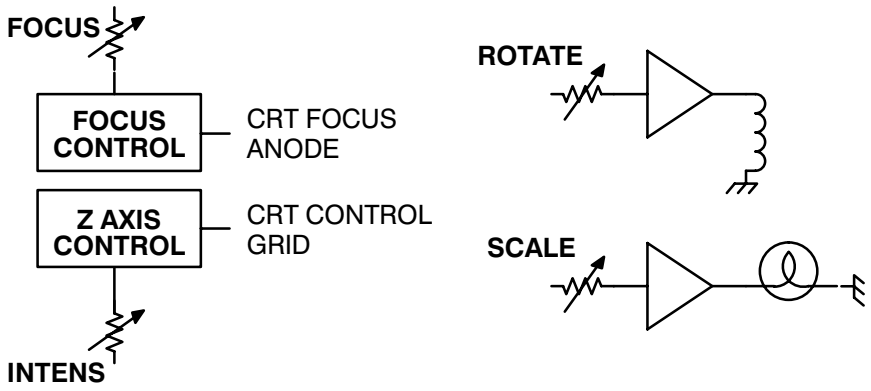
U106 is the NOVRAM used to retain the current front-panel status and the front-panel status for the Stored Recalls (Auxiliary). Data is written in and read out through pins 3 and 4; pin 1 of U107 (Col 0) controls data in and out. Pin 2 of U107 (Col 1) provides the serial clock. Pin 14 (NOVCE) is the chip enable. These three lines (Clock, Read/Write, and Chip Enable) are active when:

1. Power is turned on.
2. Any front-panel switch is pressed.
3. In Auxiliary, when a Store or Recall is requested from the companion 1730– Series.

U101 is the Power Down Detection circuit. It detects the loss of instrument power in time for the NOVRAM (U106) to execute a save operation. When the +5 V supply drops a few hundred millivolts, pin 7 is pulled low, which causes

U106 to Store its current status. The front-panel and Auxiliary (Store/Recall) data is saved in a matter of milliseconds when the power starts to drop below safe operating levels for the NOVRAM. U108 is a three-terminal regulator operating from the +15 V supply that comes onto the circuit board from the Power Supply circuit board. As soon as the +15 V raises enough to provide a +5 V output from U108, U106 recalls the data saved so that it will be available to the Microprocessor when all supplies are up to their operating tolerances.

Diagram 8 Control Circuit



Blanking signals are input to an intensity switching matrix along with a dc voltage level set by the front-panel INTENSITY control. Focus level, for the crt focus anode, is set by regulating the current through a transistor current source. The amount of focus current through the transistor depends on the setting of the front-panel FOCUS control. The effects of small variations in the magnetic field surrounding the instrument are compensated for by an adjustable magnetic field placed around the crt bulb. Scale Illumination for the crt face plate is set by controlling the output amplitude of a triangle generator that drives the scale illumination bulbs.

Switches to select operating modes, controls used with the control circuits, and Light Emitting Diodes (LED) to relay status to the operator are contained on the Front Panel circuit board.

Z–Axis Control

U20 is a transistor array with two of the transistors connected as a differential current switch. The static output current (pin 8) is set by the front-panel INTENSITY control using Q23 (in the FOCUS control circuit) as a current source. The blanking signal is input to the switch through pin 9. When pin 9 goes high the current output (pin 8) is shut off and the Z–Axis Amplifier (Diagram 10) blanks the crt.

In Line Select mode (which requires an external blanking pulse, input through the Auxiliary connector, from a 1730–Series) the intensity setting has to change to brighten up the line(s). This is accomplished by increasing the current through the current source (Q23). U19A is an open collector dual comparator that goes low when the Line Select Blanking occurs, which allows current in R175 to add to the current in Q23, the current source.

Focus Control

The Focus control operation must also control two different display criteria. In the normal mode of operation the Focus voltage will be selected by the control setting only, Q27 is off. When a line select unblanking pulse occurs, U19B turns on and additional current flows through Q27. R200, the LS Focus adjustment, is adjusted for optimum focus in Line Select at the normal display focus setting.

Trace Rotation

Trace rotation is necessary to compensate for changes in the magnetic field surrounding the 1725. Q42 and Q44 are emitter followers that provide the Trace Rotation current to a coil located inside the crt shield, around the tube. Current amplitude and polarity are controlled by the front-panel ROTATE screwdriver adjustment.

Graticule Illumination

U21A is a triangle generator whose output is compared to the front-panel SCALE control output level by U21B (a comparator). The output of U21B is a 6.5 kHz square wave, the duty cycle of which is controlled by the front-panel SCALE ILLUM control. U21B drives saturating switch Q30, which applies the square wave to the graticule lights. L9 and C100 serve as a lowpass filter to keep noise off the +15 V supply.

Switches

The eight push-button switches are matrixed for reading by the Microcontroller (Diagram 7). When a push-button is closed a connection is made between one Column and one Row address for the microprocessor. When one of the “Hold for Function” switches, such a MODE or INPUT is held in, the Microcontroller reacts differently and outputs appropriate instructions to the 1725 control circuits.

Controls

Four of the front-panel controls operate between two voltage levels. INTENS voltage levels are set by the Z–Axis Control and Focus Control.

The PHASE control, R100, is an optical encoder converting the position of the control into a digital word to be decoded by the Microcontroller (Diagram 7) and converted into voltage levels (sine and cosine) for the Phase Shifter on Diagram 4.

Indicators

The indicators are Light Emitting Diodes (LED) operating between +5V and a latched TTL low in the Microcontroller. There are three banks of LEDs. Each

bank has a 100W resistor in series with it (R203, R232, and R235). The microprocessor outputs a TTL low to complete the circuit and light the appropriate LED.

Diagram 9
Low Voltage Power Supply

The Low Voltage Power Supply converts the mains line voltage (90-250 VAC) to supply the power requirements of the instrument. The voltages supplied by the Low Voltage Power Supply are +40 V, ± 15 V, and +5 V.

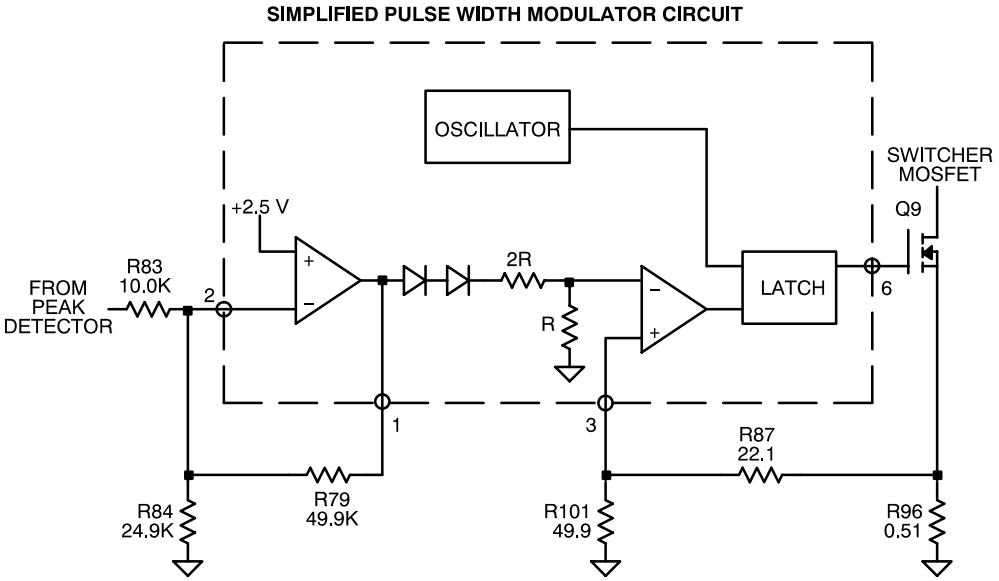
The Low Voltage Power Supply is called a Flyback Switcher. When switcher mosfet Q9 is turned on, its drain voltage drops to approximately 0 V. The current through the 350 μH primary winding of T3 begins ramping up. The voltages present at all secondaries is such that the rectifier diodes are reverse biased. Energy is being stored in the magnetic field of T3. When Q9 turns off, the drain voltage "flies back" in a positive direction. Current now flows in all of the secondary windings and supplies power.

Line Rectifier and Filter

The input line voltage is filtered by the rear-panel connector to reduce the electrical noise conducted into or out of the instrument. R89 limits the initial charging current through the rectifier diodes and C54.

CR21, CR22, CR23, and CR24 form a bridge rectifier. C54 filters the 110 to 350 VDC rectifier output. L4 filters the switching noise produced by the switcher. R102 reduces the circulating current in the parallel circuit consisting of L4 and C44. DS4, R93, and R94 form a line voltage indicator. R91 and R92 charge C42. C42 provides power to U5 until the primary housekeeping winding provides power through CR17.

Pulse Width Modulator



U5 is a current-mode pulse width modulator (PWM). A current-mode PWM uses two feedback loops. The inner current-feedback loop directly controls the switcher mosfet peak current. The outer voltage-feedback loop programs the inner loop peak current trip point.

U5 pin 2 is the inverting input of an internal op-amp. The non-inverting input is set to 2.5 V by an internal voltage reference. Current from the peak detector flows through R83 and R79. R84 provides a 100 μA offset. The voltage at U5 pin 1 will vary in order to maintain U5 pin 2 at 2.5 V.

The voltage at U5 pin 1 is modified by an internal circuit and sets the trip point of the internal comparator. U5 pin 3 is the external input to the comparator. R88 and C52, connected to U5 pin 4, set the internal oscillator to 80 kHz.

The circuit works as follows: The oscillator resets the latch and U5 pin 6 goes high, turning the switcher mosfet on. The current through the switcher mosfet increases, causing the voltage across R96 to increase. This voltage is divided by R87 and R101, and is applied to the comparator (pin 3). When the voltage at U5 pin 3 reaches the comparator trip point, the latch toggles and the switcher mosfet is turned off. This process is repeated at an 80 kHz rate.

C58 increases the PWM noise immunity by rolling off the internal op-amp frequency response. R82 holds the switcher mosfet off as the circuit is powering up. R81 slows the turn-on of the switcher mosfet while CR27 speeds up the turn off.

Output Filters

The three output windings supply four output voltages. Each output is rectified by a single diode and filtered by an LC pi filter.

Error Amplifier

The Error Amplifier regulates the +5 V output by feeding an error signal to the Pulse Width Modulator. VR1 is a 2.5 V shunt regulator containing an op-amp and a voltage reference. The +5 V is divided by R69 and R70 to provide 2.5 V to VR1, with fine adjustment provided by R99. C40 and R71 determine the gain and frequency response of VR1. VR4 controls overshoot of the +5 V at power up. R98 and CR26 provide a minimum operating current for VR1. R68 decouples C39 from VR1. Overvoltage protection for the +5V supply is provided by a crowbar circuit formed by Q11, VR3, R13, and R14.

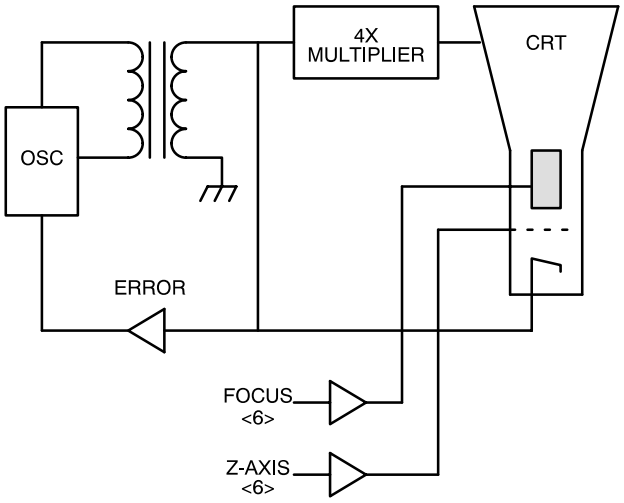
Feedback Transformer Driver and Peak Detector

The 80 kHz sawtooth waveform at U3 pin 3 trips comparator U3. U3 pin 1 then feeds a trigger pulse to one-shot U4. U4 pin 13 outputs a 300 ns pulse to the 130 mA current source consisting of Q7 and Q8. When Q8 turns on, T2 pin 2 is pulled down until CR15 (Error Amplifier) is forward biased. The negative going pulse at T2 pin 2 is peak detected by CR16 and C46. The dc voltage present at the anode of CR16 feeds the pulse-width modulator and the Output Under-Voltage Shutdown circuit. CR29 resets T2 between pulses.

Output Under-Voltage Shutdown

If the +5 V is below 4.9 V, the Error Amplifier will cause the Peak Detector output to go below 2.9 V. The output of comparator U3B will pull low and shutdown Pulse Width Modulator U5. C47 and R96 delay the operation of U3B long enough for the power supply to power up. If the +5 V does not reach 4.9 V within 50 ms of power up, U3B will shutdown the switcher. The power supply will then cycle on and off every couple of seconds.

Diagram 10
High Voltage Power Supply



The High Voltage Power Supply generates the heater, cathode, control grid, focus anode, and post accelerating potentials required to display the outputs of the Vertical and Horizontal Output Amplifiers.

HV Osc and Error Amp

The High Voltage Power Supply is generated by a sine wave oscillator and step-up transformer. Q6 and T1 are the principal elements of an Armstrong oscillator running at about 22 kHz. Error Amplifier U2 regulates the +100 V output and keeps the High Voltage Power Supply constant under varying load conditions by controlling the base current to Q6. The +100 V output is regulated directly, while the High Voltage Power Supply is indirectly regulated through a current feedback circuit.

R48, C16, R60, and R64 form the High Voltage Power Supply current feedback circuit. As the current from the High Voltage Power Supply is increased, the voltage to the + side of the Error Amplifier (U2) increases, which increases the base drive to Q6, the HV Osc. This current feedback compromises the regulation of the +100 V supply to keep the high voltage constant with varying intensities.

C66 and Q10 are a start delay circuit that holds the Error Amplifier output low, through CR30, until C66 is charged. Delaying the start of the high voltage oscillator allows the Low Voltage Power Supply to start, unencumbered by the load from the high voltage oscillator.

Power Supply Outputs

CR4 is the high voltage rectifier. Filter capacitors C3, C4, and C8 work with CR4 to provide –2530 V to the crt cathode. U1 is a four-times multiplier providing +11 kV to the CRT anode.

Focus Amplifier

Q1 and Q2 form an operational amplifier that sets the voltage at the bottom of the focus divider. The front-panel FOCUS pot determines the voltage at the bottom of the focus divider. The Center Focus control, R11, is set for optimum beam focus, as viewed on the CRT, with the front-panel FOCUS control set to mid range. Once the Center Focus adjustment has been set, adjusting the front-panel FOCUS control changes the voltage at the bottom end of the divider and, consequently, the voltage on the CRT focus anode.

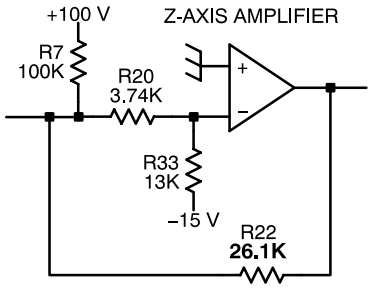
Grid Drive Circuit

The cathode of the CRT is at a –2530 V potential with the grid coupled to the Z Axis Amplifier by the grid drive circuit. The grid is approximately 75 V negative with respect to the cathode. The 200 V_{P-P} sine wave present at the cathode of CR8 is input to the Grid Drive circuit where it is clipped for use as CRT control grid bias.

The sine wave from the cathode of CR8 is coupled through R47 to a clipping circuit consisting of CR5 and CR6. Clipping level for the positive excursion of the sine wave is set by the CRT Bias adjustment, R58. The negative clipping

level is set by the front-panel INTENSITY control through the Z Axis Amplifier. The clipped sine wave is coupled through C11 to a rectifier made up of CR1 and CR3. The rectified, clipped sine wave is the crt control grid bias voltage. C9 couples the blanking signal from the Z Axis Amplifier to the crt control grid. DS1, and DS2 limit the crt grid to cathode voltage at instrument turn on or off. DS3 limits the crt heater to cathode voltage.

Z Axis Amplifier

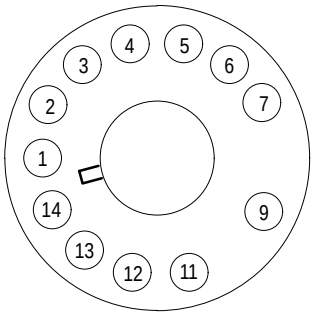


This is an inverting amplifier with negative feedback. R22 is the feedback resistor while R7, R20, and R33 act to maintain the summing junction at +5 V. Without any Z Axis input current, the amplifier output is approximately +10 V. Negative Z Axis input current will cause the output to go positive.

Q5 is a current amplifier feeding the output stage. Q3 and Q4 form a push-pull output stage. Q3 acts as a 2.7 mA constant current pull-up, while Q4 is the pull-down transistor. C6 speeds up the amplifier by coupling ac signals to the base of Q3. CR2 and R41 protect the amplifier during crt arcing.

CRT

The pinout for the CRT is shown in Figure 4–4.



Pin	Description
1	Filament (f)
2	Cathode (k)
3	GRID (g1)
4	FOCUS (g3)
5	ASTIG (g4)
6	GEOM (g5)
7	VERT PLATE (y2)
9	VERT PLATE (y1)
11	HORIZ PLATE (x2)
12	1st ANODE (g2)
13	HORIZ PLATE (x1)
14	Filament (f)

Figure 4–4: Pinout of the CRT Socket

Checks and Adjustments

Section 5
Checks and Adjustments

This section of the manual consists of the procedures to check performance and return the instrument to operation within the stated performance requirements. Each of the two full procedures is preceded by a short-form procedure that can be used by those who are familiar with the Performance Check or Adjustment procedures. Note that the step numbers in the short-form procedures correspond exactly to those in the full procedure.

RECOMMENDED EQUIPMENT LIST

The following equipment is recommended for use in the Performance Check and Adjustment Procedures for this instrument. Other equipment may be substituted; however, care must be used to ensure that the accuracy of the substituted equipment does not compromise the results of a particular procedure step.

Electrical Instruments

1. **Test Oscilloscope**

   Vertical Amplifier: 30 MHz Bandwidth, differential input with 1 mV Sensitivity.

   Time Base: 10 ns/div to 5 ms/div sweep speeds, triggering to 5 MHz.

   For example: a TEKTRONIX 7603 Oscilloscope with a 7A13 Differential Comparator (needed for use with the TEKTRONIX Return Loss Bridge), and a 7B53A Dual Time Base. Also 10X probes, P6106 (Tektronix Part No. 010-6106-03).

2. **Television Signal Generators** (two standards required)

   Color test signals for the PAL and NTSC television standards: color bar signal, linearity staircase with variable APL, and black burst signal.

   For example:

   NTSC – TEKTRONIX 1410 with Option AA and Option AB (modified SPG2 and TSG7) and TSG3.

   and

   PAL – TEKTRONIX 1411 with Option AA and Option AB (modified SPG12 and TSG11) and TSG13.

The 1410, and 1411 Option AA are mainframes with modified SPG2 (NTSC) and SPG12 (PAL) Sync Generators with the added features of: variable subcarrier frequency (±20 Hz, ±50 Hz for the 1410; ±5 Hz, and ±10 Hz for the 1411), variable burst amplitude, variable sync amplitude, and SCH unlock.

NOTE. *The 1410 Series generators with standard SPG and TSG modules can be used, but this will not allow all checks and adjustments to be made.*

The Signal Generator mainframes can be ordered with one or both options (AA and AB).

The TSG3, and 13 are Modulated Staircase Generators with variable APL.

3. **Television Waveform Monitor with Auxiliary Line Select Output.**

   For example: A TEKTRONIX 1730–Series Waveform Monitor. (A Function Generator may be substituted if a waveform monitor is not available. See item 6, in this list.)

4. **Leveled Sine Wave Generator, 250 kHz to 10 MHz and 50 kHz reference frequency**

   For example: A TEKTRONIX SG503 Leveled Sine Wave Generator installed in a TEKTRONIX TM500–Series Power Module. Flatness ±1%, 250 kHz to 50 MHz. The flatness can be calibrated (a chart made of variations) with the TEKTRONIX Peak-to-Peak Detector (015-0408-00).

5. **Audio Signal Generator, 10 Hz to 250 kHz**

   For example: A TEKTRONIX SG505 Option 02 Oscillator installed in a TEKTRONIX TM500–Series Power Module.

6. **Function Generator, –10 V pulse at 1 kHz** *(Needed only if Waveform Monitor is not available.)*

   For example: A TEKTRONIX FG501A Function Generator installed in a TEKTRONIX TM500–Series Power Supply Module.

7. **Voltmeter, 0 to >100 Vdc; accuracy, ±0.1%**

   For example: A TEKTRONIX DM501A in a TM500–Series Power Module.

8. **Power Module** (required for Items 3, 4, 5, and 6)

   For powering and housing TEKTRONIX DM501A, DC503A, SG505 Option 02.

   For example: A TEKTRONIX TM506 Power Module.

9. **Variable Autotransformer**

   For example: General Radio Metered Auto Transformer W10MT3W. If 220 Volt operation must be checked, a conversion transformer or appropriate 220 V autotransformer is needed.

Auxiliary Equipment

10. **Return Loss Bridge**

    Range, at least 46 dB return loss sensitivity, 50 kHz to 6 MHz.

    For example: Tektronix Part No. 015-0149-00.

11. **75Ω Terminators** (three required; two must be feed-through types)

    For example: End-line, 75Ω terminator (Tektronix Part No. 011-0102-00), and a feed through, 75Ω terminator (Tektronix Part No. 011-0103-02).

12. **75Ω Coaxial Cable** (3 required)

    For example: 42 inch RG59U (Tektronix Part No. 012-0159-00).

13. **10X, 75Ω Attenuator**

    For example: Tektronix Part No. 011-0061-00.

14. **Alligator Clip to BNC Adapter**

    For example: Tektronix Part No. 013-0076-00.

15. **Dual Input Coupler**

    Matched BNC cable-T for making phase comparisons between two inputs. Matched length of the two arms within ±0.1 inch.

    For example: Tektronix Part No. 003-0837-00.

16. **Precision 50Ω Coaxial Cable**

    Tektronix Part No. 012-0482-00 (used with the TEKTRONIX SG503).

17. **50Ω to 75Ω Minimum Loss Attenuator**

    Tektronix Part No. 011-0057-00.

18. **XY Input Test Connector**

    Fifteen–pin, subminiature D–type connector (for example: Tektronix Part No. 131-0459-00), modified to input the audio signal for XY checks and adjustments. See Figure 5–1.

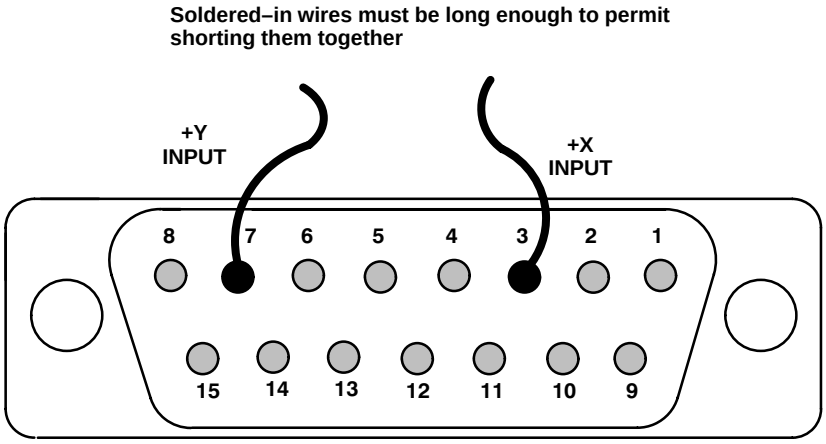


Figure 5–1: XY Input test connector

PERFORMANCE CHECK

The short form procedure that follows is intended for those familiar with how to accurately check out this instrument performance. The full Performance Check Procedure follows the Short Form Performance Check procedure; step numbers are identical in both procedures.

Short Form Performance Check

1. PRELIMINARY SETUP

2. CHECK POWER SUPPLY OPERATION

REQUIREMENT — Check ac input range, 90–132 V or 180–250 V as determined by the Line Voltage Selector switch.

c. **CHECK –** for stable operation over the voltage range.

3. CHECK SYNCHRONIZATION

REQUIREMENT— Stable display with composite video or black burst with 40 IRE (300 mV PAL) sync ±6 dB.

d. **CHECK –** for stable display in both EXT and INT reference modes.

f. **CHECK –** for a stable display in both EXT and INT reference modes.

4. CHECK DEMODULATOR NTSC AND PAL CHANNEL BAND-WIDTH

REQUIREMENT — Upper –3 dB point: F_{SC} +(400 kHz to 600 kHz). Lower –3 dB point: F_{SC} –(400 kHz to 600 kHz).

f. **CHECK –** that the frequency readout on the Sine wave Generator is between 2.98 to 3.18 MHz.

i. **CHECK –** that the frequency readout on the Sine wave Generator is between 3.98 to 4.18 MHz.

n. **CHECK –** that the frequency readout on the Sine wave Generator is between 3.83 to 4.03 MHz.

q. **CHECK –** that the frequency readout on the Sine wave Generator is between 4.83 to 5.03 MHz.

5. CHECK COLOR BAR DECODING ACCURACY

REQUIREMENT — Vector Phase accuracy within ±1.25°. Vector Gain accuracy typically within ±1.25 IRE (NTSC) or ±2.5% (PAL).

g. **CHECK –** that all of the vectors fall within ±1.25° and ±1.25 IRE of the target centers. These specifications represent one-half the dimension from the center cross of a vector target to the edge of the small inner box.

j. **CHECK –** that all of the vectors fall within ±1.25° and ±1.25 IRE of the target centers. These specifications represent one-half the dimension from the center cross of a vector target to the edge of the small inner box.

n. **CHECK –** that all of the vectors fall within ±1.25° and ±2.5% of the target centers. These specifications represent one-half the dimension from the center cross of a vector target to the edge of the small inner box.

q. **CHECK –** that all of the vectors fall within ±1.25° and ±2.5% of the target centers. These specifications represent one-half the dimension from the center cross of a vector target to the edge of the small inner box.

6. CHECK SUBCARRIER REGENERATOR PERFORMANCE

REQUIREMENT — Pull in range: F_{SC} ±50 Hz (±10 Hz for PAL). Pull in time less than 1 second. Phase shift at these frequency offsets less than 0.5°. Phase shift with ±6 dB burst amplitude change less than 2°.

c. **CHECK –** that the 1725 locks to the generator within 1 second at these frequencies.

d. **CHECK –** that the 1725 display does not change by more than ±0.5° at these frequencies.

g. **CHECK –** that the 1725 burst vector phase does not change by more than ±2° within the + and –6 dB range.

j. **CHECK –** that the 1725 locks to the generator within 1 second at these frequencies.

k. **CHECK –** that the 1725 display does not change by more than ±0.5° at these frequencies.

n. **CHECK –** that the 1725 burst vector phase does not change by more than ±2° within the + and –6 dB range.

7. CHECK PHASE ACCURACY

REQUIREMENT — Phase shift with signal input channel change less than 0.5°. Phase shift with +3 to –6 dB VAR GAIN change: less than 1°. Burst jitter: less than 0.5°.

d. **CHECK –** that the CH–A to CH–B phase match is within ±0.5°.

h. **CHECK –** that there is less than 0.5° burst jitter with either INT or EXT REF.

j. **CHECK –** that there is less than 1° phase change over this range.

8. CHECK AMPLIFIER LINEARITY

REQUIREMENT — Differential Phase: less than 1° for a 10 to 90% APL Linearity Staircase. Differential Gain: less than 1% for a 10 to 90% APL Linearity Staircase.

d. **CHECK –** that dots are overlayed to ±1°.

g. **CHECK –** that dot is overlayed to ±1°, at both 10 and 90% average picture levels.

9. CHECK CHROMINANCE VECTOR CLAMP PERFORMANCE

REQUIREMENT — Clamp stability: 1/64" (0.4 mm) or less center dot movement as the PHASE control is rotated throughout its range. Position Control range: at least 1/4" (6 mm) from the center at either limit.

b. **CHECK –** that the center dot of the vector display moves less than 1/64" (0.4 mm) as the PHASE control is rotated.

c. **CHECK –** while varying both screwdriver position controls throughout their range, that the range of each control is greater than + and – 1/4" (6 mm) from the centered position.

10. CHECK VARIABLE GAIN

REQUIREMENT — Input subcarrier signals between –6 dB and +14 dB (29.5 IRE and 147 IRE NTSC; 0.210 V and 1.05 V for PAL) can be adjusted to the burst amplitude.

d. **CHECK –** that the burst vector can be adjusted to the 75% amplitude target.

g. **CHECK –** that the burst vector can be adjusted to the compass rose.

11. CHECK AUTO PHASE ACCURACY

REQUIREMENT — Bursts return to targets ±2°, in 1.5 seconds when AUTO is pushed.

d. **CHECK –** that the tip of the burst vector returns to 0° ±2°, in 1.5 seconds.

h. **CHECK –** that the tip of the burst vector returns to 0° ±2°, in 1.5 seconds.

l. **CHECK –** that the tip of the burst vector returns to 0° ±2°, in 1.5 seconds.

12. CHECK TRACE ROTATION RANGE

REQUIREMENT — Range greater than ±1° from horizontal.

e. **CHECK –** that either end of the trace can be moved more than 1° (one-half minor division on the compass rose) either direction from horizontal.

13. CHECK XY INPUT PHASE MATCHING

REQUIREMENT — less than a trace width of separation at 100 kHz.

d. **CHECK –** for a trace width or less separation in the diagonal display.

14. CHECK XY FREQUENCY RESPONSE

REQUIREMENT — the –3 dB point at 200 kHz or greater in standard mode; 100 kHz or more in High Gain mode.

d. **CHECK –** that the display reaches the –3 dB gaps in the horizontal axis or beyond.

h. **CHECK –** that the display reaches the –3 dB gaps in the horizontal axis or beyond.

l. **CHECK –** that the display reaches the –3 dB gaps in the horizontal axis or beyond.

p. **CHECK –** that the display reaches the –3 dB gaps in the vertical axis or beyond.

15. CHECK RETURN LOSS

REQUIREMENT — Return loss for each input: at least 40 dB from 50 kHz to 6 MHz (instrument on or off, input in use or not, for any deflection factor setting).

c. **CHECK –** that the return loss of the CH–A, CH–B, and EXT REF INPUTs is better than 40 dB, from 50 kHz to 6 MHz. Make this check (within this frequency range) with the instrument power on and off. Using the Nomograph supplied with the Return Loss Bridge, 40 dB converts to 5 mV on the test oscilloscope vertical scale.

Long Form Performance Check

The following preparations should be made before starting the Performance Check.

Set the 1725 as follows:

Table 5–1: Preliminary Control Settings

POWER	ON
INTENSITY	Adjust as indicated in numbered steps.
FOCUS	
SCALE	
MODE	VECT
REF	INT
INPUT	CH–B
VARIABLE	Off
BARS	75%
AUXILIARY	Off

NOTE. *CH B input is used for NTSC signal inputs and CH A input is used for PAL signal inputs throughout this procedure.*

1. PRELIMINARY SETUP

a. Connect the variable autotransformer to the AC power connector. Turn on the autotransformer and set the output for the local nominal mains voltage (110 V or 220 V).

b. Connect the NTSC Composite Color Bar signal with 100% Peak White Bar and 75% amplitude bars to the CH–B INPUT and terminate the opposite side of the loop through with a 75Ω terminator. See Figure 5–2.

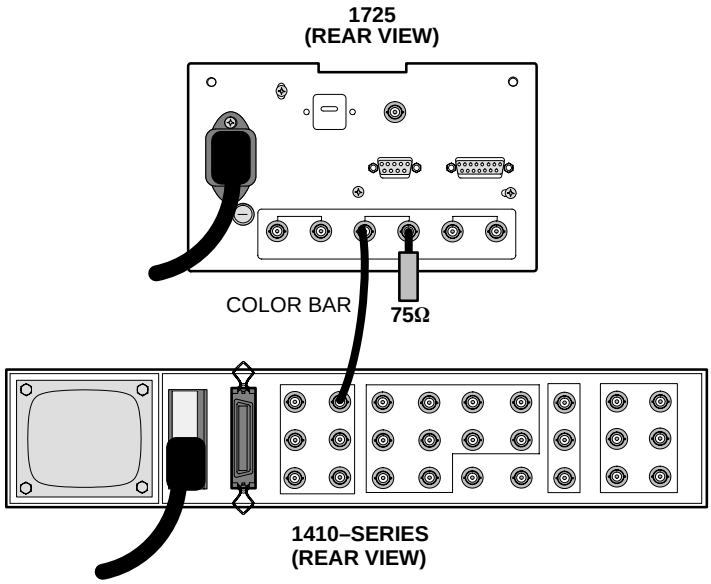


Figure 5–2: Initial equipment connections for performance checks

2. CHECK POWER SUPPLY OPERATION

REQUIREMENT — Check ac input range, 90 – 250 V.

a. Turn on the 1725 and adjust the controls for a useable display.

b. Vary the autotransformer from low line to high line voltage (90 – 132 V for 110 V operation, or 180 – 250 V for 220 V operation).

c. CHECK – for stable x operation over the appropriate voltage range.

d. Return the autotransformer output to the local nominal mains voltage.

3. CHECK SYNCHRONIZATION

REQUIREMENT — Stable display with composite video or black burst with 40 IRE (300 mV PAL) sync ±6 dB.

a. Disconnect the color bar signal and loop through connect the black burst output from the 1410 SPG2 Mod AA as shown in Figure 5–3.

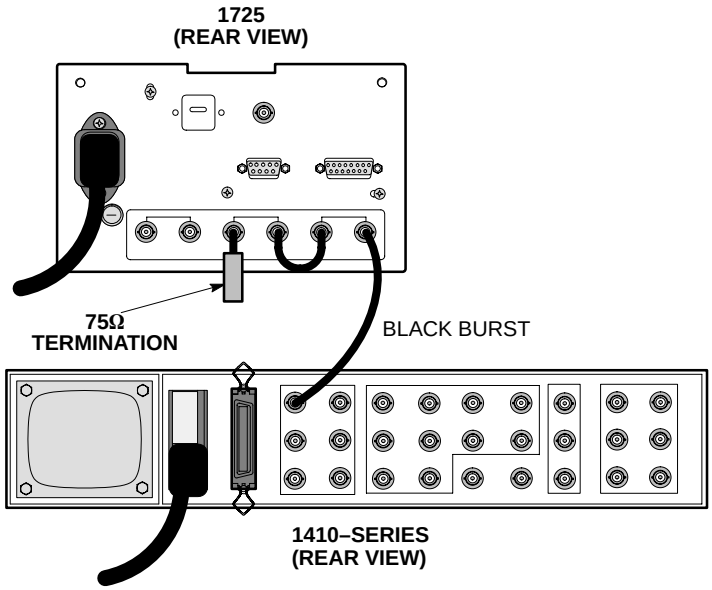


Figure 5–3: Equipment connections to check synchronization

b. Push the 1725 VAR ON and adjust the VAR control to place the vector tip on the compass rose.

c. Remove the 75Ω terminator from CH–B.

d. **CHECK –** for stable display in both EXT and INT reference modes.

e. Triple terminate CH–B, using three 75Ω terminators.

f. **CHECK –** for a stable display in both EXT and INT reference modes.

g. Disconnect the black burst signal and remove two of the terminators from CH–B.

4. CHECK DEMODULATOR NTSC AND PAL CHANNEL BANDWIDTH

REQUIREMENT — Upper –3 dB point: F_{SC} +(400 kHz to 600 kHz). Lower –3 dB point: F_{SC} –(400 kHz to 600 kHz).

a. Set the 1725 MODE to VECTOR and REF to EXT.

b. Connect the Leveled Sine wave Generator through the Precision 50Ω cable and 50Ω to 75Ω Minimum-Loss Attenuator to the CH–B INPUT. See Figure 5–4.

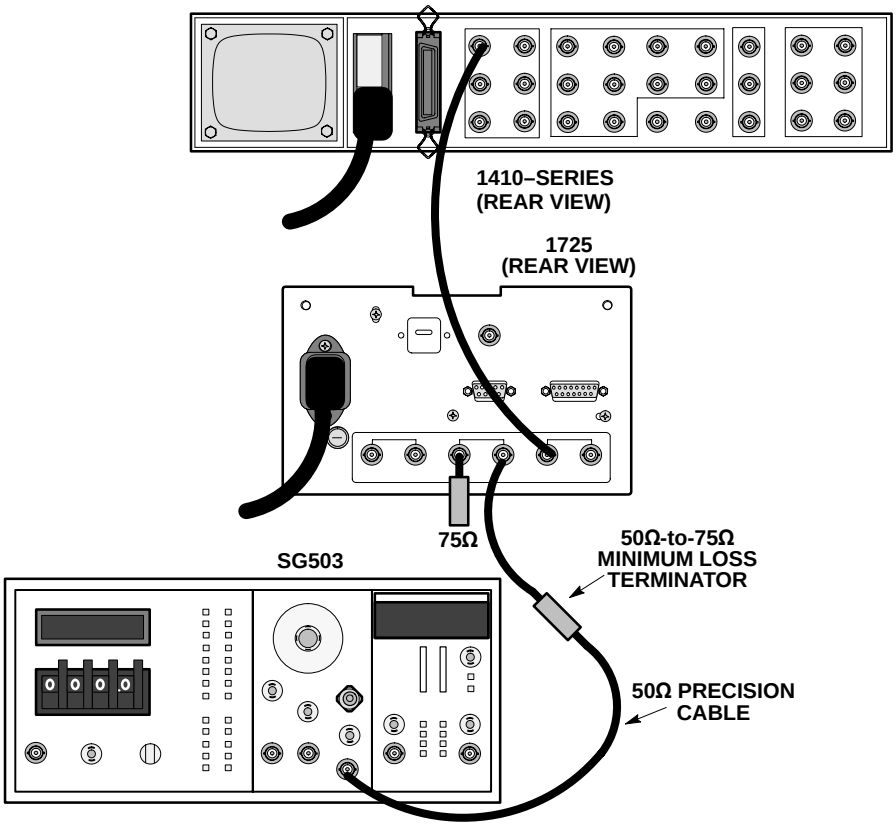


Figure 5–4: Initial connections for checking bandwidth

c. Connect the NTSC black burst signal to the EXT REF.

d. Set the Sine wave Generator frequency to 3.58 MHz and adjust the Sine wave Generator amplitude so that the circle overlays the vector graticule circle.

e. Decrease the Sine wave Generator frequency until the perimeter of the circle touches the –3 dB (70%) point gaps on the vertical graticule axis. See Figure 5–5.

f. **CHECK –** that the frequency readout on the Sine wave Generator is between 2.98 to 3.18 MHz.

g. Repeat parts e. and f. of this step for the horizontal graticule axis.

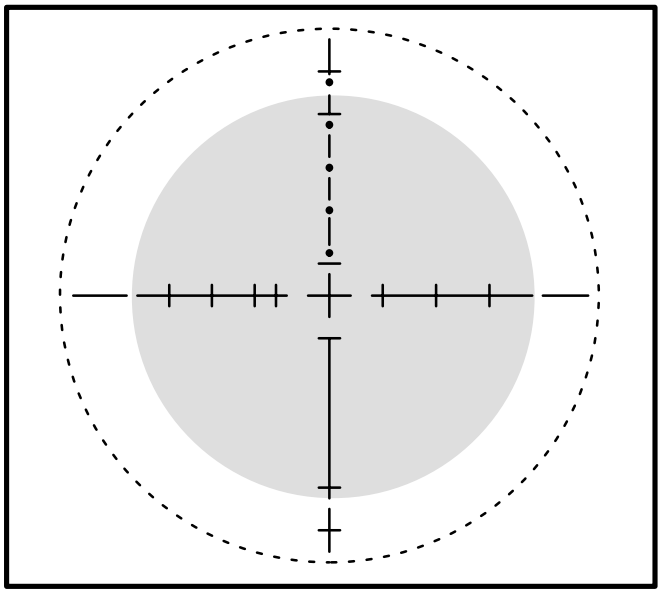


Figure 5–5: Perimeter of the sine wave circle just touches –3 dB point gaps

h. Increase the Sine wave Generator frequency until the perimeter of the circle touches the –3 dB (70%) point gaps on the vertical graticule axis.

i. **CHECK –** that the frequency readout on the Sine wave Generator is between 3.98 to 4.18 MHz .

j. Repeat steps h. and i. for the horizontal graticule axis.

k. Connect the PAL black burst signal to the 1725 EXT REF.

l. Adjust the Sine wave Generator frequency to 4.43 MHz and adjust the Sine wave Generator amplitude so that the circle overlays the vector graticule circle.

m. Decrease the Sine wave Generator frequency until the perimeter of the circle touches the –3 dB (70%) point gaps on the vertical graticule axis. See Figure 5–5.

n. **CHECK –** that the frequency readout on the Sine wave Generator is between 3.83 to 4.03 MHz.

o. Repeat steps m. and n. for the horizontal graticule axis.

p. Increase the Sine wave Generator frequency until the perimeter of the circle touches the –3 dB (70%) point gaps on the vertical graticule axis.

q. **CHECK –** that the frequency readout on the Sine wave Generator is between 4.83 to 5.03 MHz.

r. Repeat steps p. and q. for the horizontal graticule axis.

s. Disconnect the Sine wave Generator input.

5. CHECK COLOR BAR DECODING ACCURACY

REQUIREMENT — Vector Phase accuracy within ±1.25˚. Vector Gain accuracy typically within ±1.25 IRE (NTSC) or ±2.5% (PAL).

a. Set the 1725 REF to INT.

b. Connect the PAL Color Bar signal to the CH–A INPUT and terminate the remaining side of the loop through connector with a 75Ω terminator. See Figure 5–6.

c. Connect the NTSC color bar signal to the CH–B INPUT and terminate the remaining side of the loop through connector with a 75Ω terminator. See Figure 5–6.

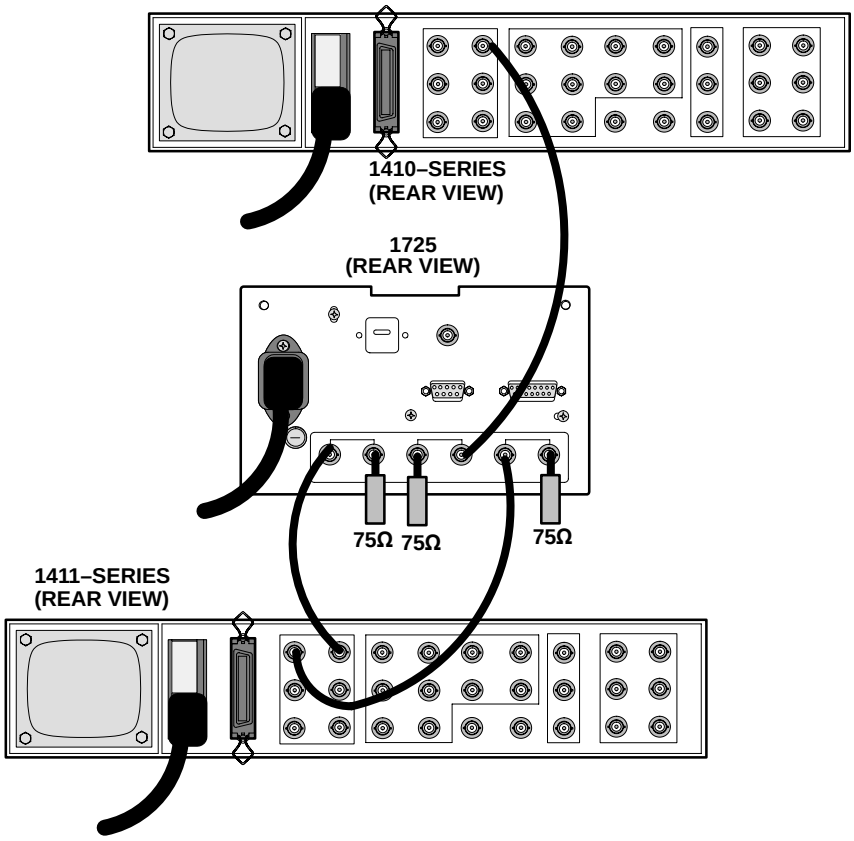


Figure 5–6: Equipment connections to check decoding accuracy

d. Set the 1725 INPUT to CH–B.

e. Set the NTSC television signal generator for 75% amplitude color bars.

f. Adjust the PHASE control to place the vector dots in their graticule targets.

g. **CHECK –** that all of the vectors fall within ±1.25° and ±1.25 IRE of the target centers. These specifications represent one-half the dimension from the center cross of a vector target to the edge of the small inner box.

h. Set the 1725 BARS to 100%.

i. Set the NTSC television signal generator for 100% color bars.

j. **CHECK –** that all of the vectors fall within ±1.25° and ±1.25 IRE of the target centers. These specifications represent one-half the dimension from the center cross of a vector target to the edge of the small inner box.

k. Select CH–A.

l. Set the PAL television signal generator for 100% amplitude color bars and set the 1725 BARS to 100%.

m. Adjust the PHASE control to place the vector dots in their graticule targets.

n. **CHECK –** that all of the vectors fall within ±1.25° and ±2.5% of the target centers. These specifications represent one-half the dimension from the center cross of a vector target to the edge of the small inner box.

o. Set the PAL television signal generator for 75% amplitude color bars and set the 1725 BARS to 75%.

p. Adjust the PHASE control to place the vector dots in their graticule targets.

q. **CHECK –** that all of the vectors fall within ±1.25° and ±2.5% of the target centers. These specifications represent one-half the dimension from the center cross of a vector target to the edge of the small inner box.

r. Turn on 1725 +V.

s. **CHECK –** that the Burst vectors can be overlayed to within 2% using the PHASE control.

6. CHECK SUBCARRIER REGENERATOR PERFORMANCE

REQUIREMENT — Pull in range: F_{SC} ±50 Hz (±10 Hz for PAL). Pull in time less than 1 second. Phase shift at these frequency offsets is within ±2°. Phase shift with ±6 dB burst amplitude change less than 2°.

a. Turn off 1725 +V.

b. Change the generator's subcarrier frequency by ±10.

c. CHECK – that the 1725 locks to the generator within 1 second at these frequencies.

d. CHECK – that the Vectorscope display does not change by more than ±2° at these frequencies.

e. Change the CH–A input to the Black Burst signal from the PAL Television Signal Generator.

f. Vary the generator Burst Amplitude + and –6 dB from the calibrated amplitude (1/2 to 2X amplitude). *Requires SPG12 Mod AA.*

g. CHECK – that the 1725 burst vector phase does not change by more than ±2° within the + and –6 dB range.

h. Select the CH–B INPUT.

i. Change the generator's subcarrier frequency by ±50 Hz

j. CHECK – that the 1725 locks to the generator within 1 second at these frequencies.

k. CHECK – that the Vectorscope display does not change by more than ±2° at these frequencies.

l. Change the CH–B input to the Black Burst signal from the NTSC Television Signal Generator.

m. Vary the generator Burst Amplitude + and –6 dB from the calibrated amplitude (1/2 to 2X amplitude). *Requires SPG2 Mod AA.*

n. CHECK – that the 1725 burst vector phase does not change by more than ±2° within the + and –6 dB range.

7. CHECK PHASE ACCURACY

REQUIREMENT — Phase shift with signal input channel change less than 0.5°. Phase shift with +3 to –6 dB VAR GAIN change: less than 1°. Burst jitter: less than 0.5°.

a. Connect the PAL Color Bar signal through a 75Ω feed through terminator and a dual input coupler to the CH–A and CH–B input connectors. Connect the black burst signal to the EXT REF loop through and terminate in 75Ω. See Figure 5–7.

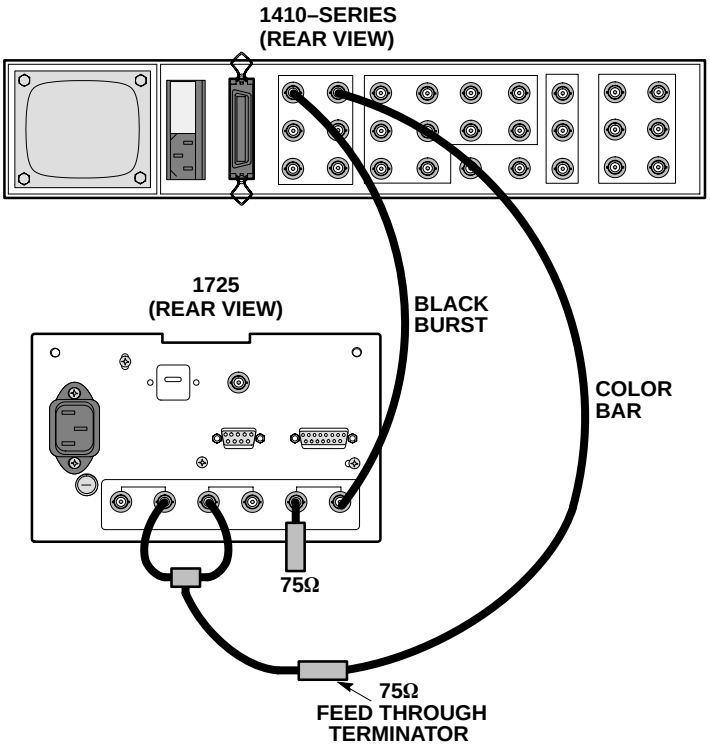


Figure 5–7: Signal connection for checking CH–A/CH–B phase matching.

b. Select EXT REF.

c. Alternately select INPUT A and B.

d. **CHECK –** that the CH–A to CH–B phase match is within ±0.5°.

e. Remove the black burst signal and termination from the EXT REF INPUT.

f. Move the connection from CH–A to the EXT REF. See Figure 5–8.

g. Alternately display INPUT B with INT and EXT REF.

h. **CHECK –** that there is less than 0.5° burst jitter with either INT or EXT REF.

i. Disconnect the color bar signal from the dual input coupler.

j. Apply the NTSC Linearity Staircase signal.

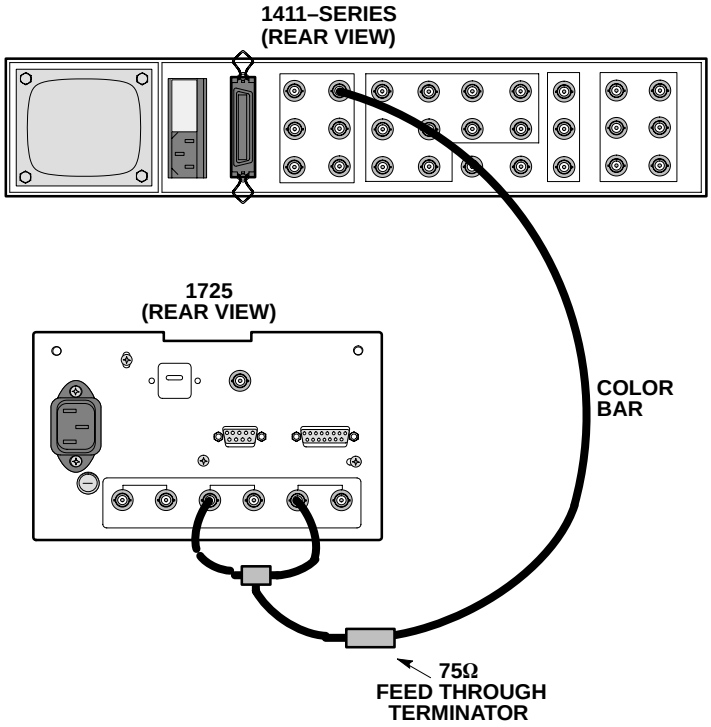


Figure 5–8: Equipment connections for checking burst jitter

k. Set the NTSC Staircase generator for 5-step and 40 IRE subcarrier.

l. Set the Staircase vector dot to the left horizontal graticule line with the PHASE control.

m. Turn ON VARIABLE GAIN and rotate the VARIABLE control until the staircase vector is one-third longer (+3 dB) and to the point that the vector has been decreased to one-half of the original vector length (–6 dB).

n. CHECK – that there is less than 1˚ phase change over this range.

8. CHECK AMPLIFIER LINEARITY

REQUIREMENT — Differential Phase: less than 1˚ for a 10 to 90% APL Linearity Staircase. Differential Gain: less than 1% for a 10 to 90% APL Linearity Staircase.

a. Turn off VARIABLE GAIN.

b. Use the PHASE control to position the vector dot (representing the subcarrier on the staircase) to the burst cross on the horizontal graticule axis.

c. Turn on the VARIABLE GAIN and use the VARIABLE control to place dots at the graticule compass rose.

d. **CHECK –** that dots are overlayed to ±1°.

e. If more than one dot is visible, use the VARIABLE GAIN control to place the dot for the largest amplitude step to the graticule compass rose.

f. Set the Television Signal Generator APL level for 10 and 90% average picture levels. Readjust the VARIABLE control, if necessary to place the dot back to the compass rose.

g. **CHECK –** that dot is overlaid to ±1°, at both 10 and 90% average picture levels.

h. Disconnect the NTSC Linearity Staircase signal and remove the dual coupler.

9. CHECK CHROMINANCE VECTOR CLAMP PERFORMANCE

REQUIREMENT — Clamp stability: 1/64" (0.4 mm) or less center dot movement as the PHASE control is rotated throughout its range. Position Control range: at least 1/4" (6 mm) from the center at either limit.

a. Connect the NTSC color bar signal to the CH–B INPUT and terminate remaining side of loop through with a 75Ω terminator.

b. **CHECK –** that the center dot of the vector display moves less than 1/64" (0.4 mm) as the PHASE control is rotated.

c. **CHECK –** while varying both screwdriver position controls throughout their range, that the range of each control is greater than + and – 1/4" (6 mm) from the centered position.

d. Return the vector display center dot to the centered position.

e. Disconnect the Color Bar signal and terminator.

10. CHECK VARIABLE GAIN

REQUIREMENT — Input subcarrier signals between –6 dB and +14 dB (29.5 IRE and 147 IRE NTSC; 0.210 V and 1.05 V for PAL) can be adjusted to the burst amplitude.

a. Connect the Black Burst output of the NTSC Television Signal Generator to the 1725 CH–B INPUT connector. Do not terminate this loop through connector.

b. Press the 1725 VARIABLE push button.

c. Adjust the 1725 VARIABLE GAIN.

d. **CHECK –** that the burst vector can be adjusted to the 75% amplitude target.

e. Terminate the open side of the CH B INPUT loopthrough with (3) 75Ω terminators.

f. Adjust the 1725 VARIABLE GAIN.

g. **CHECK –** that the burst vector can be adjusted to the compass rose.

h. Disconnect the Black Burst signal and terminators.

11. CHECK AUTO PHASE ACCURACY

REQUIREMENT — Bursts return to targets ±2˚, in 1.5 seconds when AUTO is pushed.

a. Connect the NTSC generator 75% Color Bar signal to the CH A INPUT. Terminate remaining side of the loopthrough connector with a 75Ω termination.

b. Use the 1725 VARIABLE GAIN and PHASE control to place the tip burst vector on intersection of the graticule 0˚ axis and the compass rose.

c. Push the 1725 AUTO Phase.

d. **CHECK –** that the tip of the burst vector returns to 0˚ ±2˚, in 1.5 seconds.

e. Turn off the VARIABLE GAIN.

f. Set the burst vector to its target.

g. Push the AUTO PHASE.

h. **CHECK –** that the tip of the burst vector returns to 0˚ ±2˚, in 1.5 seconds.

i. Disconnect the NTSC Color Bar signal.

j. Connect the PAL generator 75% Color Bar signal to the CH A INPUT. Terminate remaining side of the loopthrough connector with a 75Ω termination.

k. Push the AUTO PHASE.

l. **CHECK –** that the tip of the burst vector returns to 0° ±2°, in 1.5 seconds.

m. Remove the PAL generator signal and 75Ω termination from the CH–A INPUT.

12. CHECK TRACE ROTATION RANGE

REQUIREMENT — Range greater than ±1° from horizontal.

a. Connect the output of the Audio Signal Generator to pin 3 of the 1725 rear- panel XY INPUT connector. See Figure 5–9.

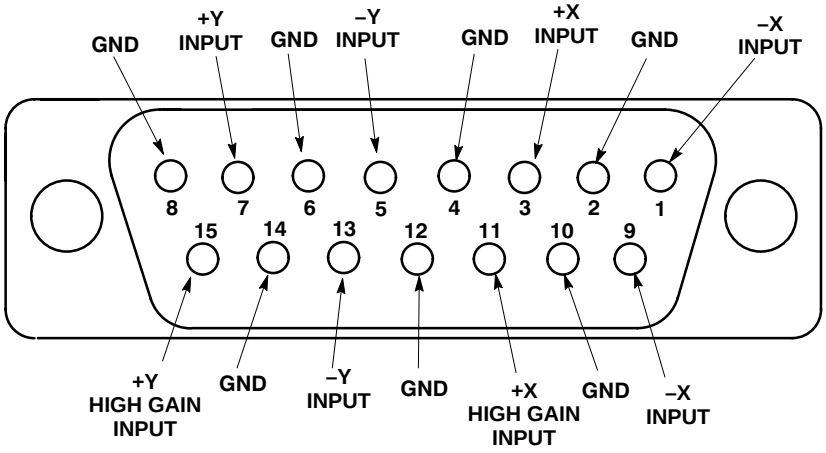


Figure 5–9: X Y INPUT connector pin functions.

b. Adjust the Audio Signal Generator amplitude for a displayed amplitude, on the horizontal axis, that is greater than the width of the graticule compass rose.

c. If necessary, use a small screwdriver and adjust the 1725 vertical positioning to place the trace on the horizontal axis.

d. Use a small screwdriver to adjust the 1725 ROTATE from end to end.

e. **CHECK –** that either end of the trace can be moved more than 1° (one-half minor division on the compass rose) either direction from horizontal.

f. Set ROTATE so that the trace is on the horizontal axis.

13. CHECK XY INPUT PHASE MATCHING

REQUIREMENT — less than a trace width of separation at 100 kHz.

a. Connect the Audio Signal Generator output to both pins 3 and 7. See Figure 5–9.

b. Set the Audio Signal Generator frequency to 10 kHz and adjust its amplitude so that the trace extends between the targets (+) on the diagonal line.

c. Set the Audio Signal Generator frequency to 100 kHz.

d. CHECK – that there is a trace width or less separation in the diagonal display. See Figure 5–10.

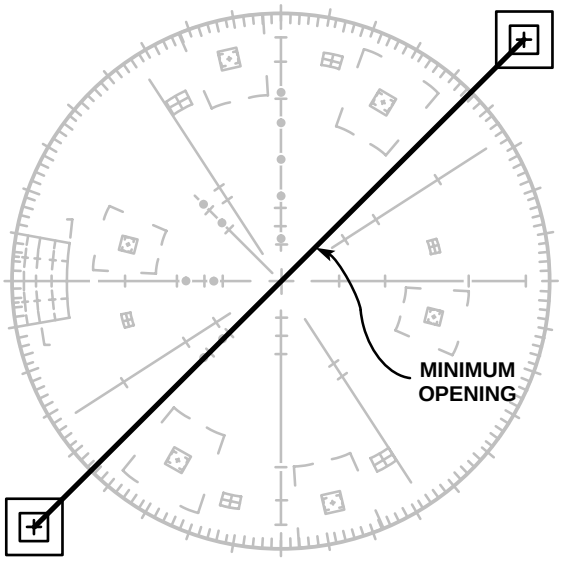


Figure 5–10: Audio frequency XY display.

14. CHECK XY FREQUENCY RESPONSE

REQUIREMENT — the –3 dB point at 200 kHz or greater in standard mode; 100 kHz or more in High Gain mode.

a. Connect the Leveled Sine wave Generator to pin 3 of the 1725 rear-panel XY INPUT connector. See Figure 5–9.

b. Set the Leveled Sine wave Generator frequency to 50 kHz and set its amplitude for a display the width of the compass rose.

c. Set the Leveled Sine wave Generator frequency to 200 kHz.

d. CHECK – that the display reaches the –3 dB gaps in the horizontal axis or beyond.

e. Connect the Leveled Sine wave Generator output to pin 7 of the 1725 rear- panel XY INPUT connector.

f. Set the Leveled Sine wave Generator to 50 kHz and set its amplitude for a display the height of the compass rose.

g. Set the Leveled Sine wave Generator frequency to 200 kHz.

h. CHECK – that the display reaches the –3 dB gaps in the vertical axis or beyond.

Perform steps i. through p. only if internal jumpers J920 and J921 (Main board) are set to High Gain mode.

i. Connect the audio signal to pin 11 and ground pin 9 of the 1725 rear-panel XY INPUT connector. See Figure 5–9.

j. Set the Audio Signal Generator frequency to approximately 10 kHz and adjust its amplitude for a display equal to the width of the graticule compass rose.

k. Set the Audio Signal Generator to 100 kHz.

l. CHECK – that the display reaches the –3 dB gaps in the horizontal axis or beyond.

m. Connect the audio signal to pin 15 and ground pin 13 of the 1725 rear-panel XY INPUT connector.

n. Set the Audio Signal Generator frequency to approximately 10 kHz and adjust its amplitude for a display equal to the height of the graticule compass rose.

o. Set the Audio Signal Generator to 100 kHz.

p. CHECK – that the display reaches the –3 dB gaps in the vertical axis or beyond.

15. CHECK RETURN LOSS

REQUIREMENT — Return loss for each input: at least 40 dB from 50 kHz to 6 MHz (instrument on or off, input in use or not, for any deflection factor setting).

a. Connect the output from the Sine wave Generator, through a minimum loss attenuator, to the input of the Return Loss Bridge. Set the Sine wave Generator to 50 kHz. Connect the output of the Bridge to the oscilloscope and set the amplitude of the display to 500 mV_{P-P} with the

terminator removed from the Unknown arm of the Bridge. See Figure 5–11.

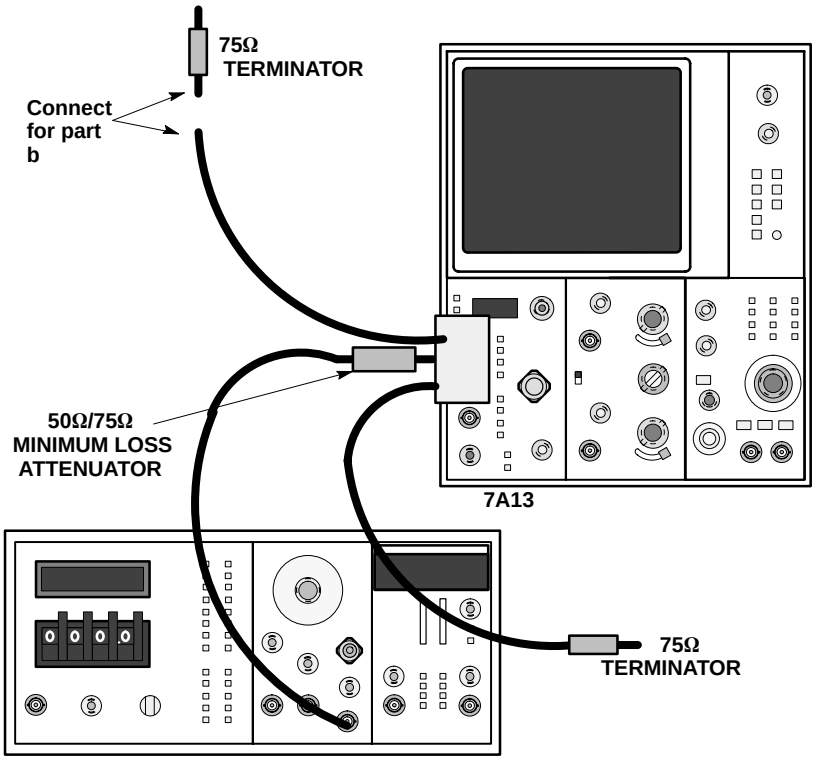


Figure 5–11: Initial equipment setup for return loss.

b. Change the generator frequency to 6 MHz. Reconnect the terminator to the Unknown arm, set the 7A13 for 1 mV per division, and balance the Bridge. See Figure 5–11. Connect the Unknown arm to the INPUT (CH–A, CH–B, or EXT REF) of the 1725 instrument and connect the terminator to the opposite side of the loopthrough. See Figure 5–12.

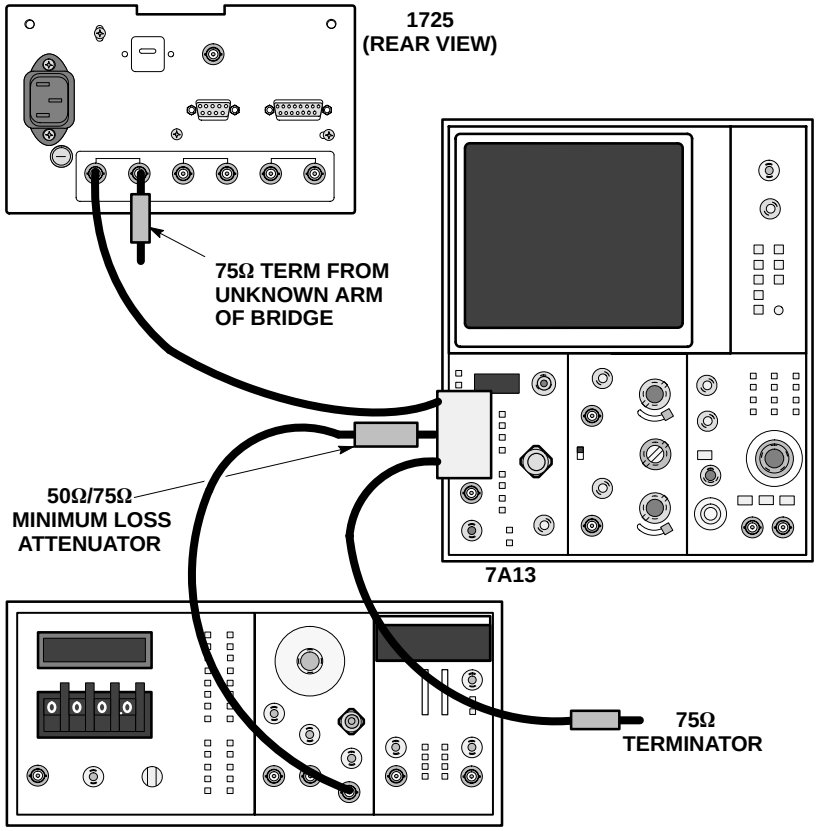


Figure 5–12: Measuring return loss of 1725 CH–A input.

c. CHECK – that the return loss of the CH–A, CH-B, and EXT REF INPUTs is better than 40 dB, from 50 kHz to 6 MHz. Make this check (within this frequency range) with the instrument power on and off. Using the Nomograph supplied with the Return Loss Bridge, 40 dB converts to 5 mV on the test oscilloscope vertical scale.

End of Performance Check Procedure

ADJUSTMENT PROCEDURE

There are two Adjustment procedures. One is a short form or abbreviated procedure, intended to be used by those who are familiar with the instrument. Step numbers in the Short Form Adjustment procedure correspond directly with those of the full length procedure.

Short Form Adjustment Procedure

1. ADJUST +5 V

b. Adjust +5 V (R99)

2. ADJUST CRT BIAS

b. Adjust R58

3. ADJUST GEOMETRY, FOCUS, AND ASTIGMATISM

a. Adjust R45

c. Adjust R11 and R49

4. ADJUST TRACE ROTATION

5. ADJUST ON-BOARD REGULATED POWER SUPPLIES

b. Adjust R272

d. Adjust R306

6. ADJUST LOCK-IN PHASE

c. Adjust C31

g. Adjust C28

7. ADJUST CENTER DOT OVERLAY AND VECTOR POSITION

d. Adjust R258

e. Adjust R244

8. ADJUST PHASE AND GAIN MATCH

d. Adjust C209

9. ADJUST ORTHOGONALITY

c. Adjust R387

10. ADJUST X AND Y GAINS

b. Adjust R207

d. Adjust R209

11. ADJUST XY PHASING

c. Adjust C176

12. ADJUST LOOP DC BALANCE

e. Adjust R161

13. ADJUST QUAD PHASE AND +V BAL

f. Adjust L10

i. Adjust C107

14. ADJUST PAL TRANSITION

b. Adjust C175

15. ADJUST R–Y AND B–Y GAINS

c. Adjust R277

d. Adjust R263

16. ADJUST NTSC 100% GAIN

c. Adjust R371

17. ADJUST PAL GAIN

c. Adjust R365

18. ADJUST CRT STANDARD INDICATOR

b. Adjust R325 (Vertical) and R339

19. ADJUST AUTO LOCK IN RANGE

e. Adjust R57

20. ADJUST LINE SELECT FOCUS

With a 1730–Series Waveform Monitor:
e. Adjust R200

Without a 1730–Series Waveform Monitor:
e. Adjust R200

Long Form Adjustment Procedure

Figure 5–13 shows the locations of the adjustments and test points used in this procedure.

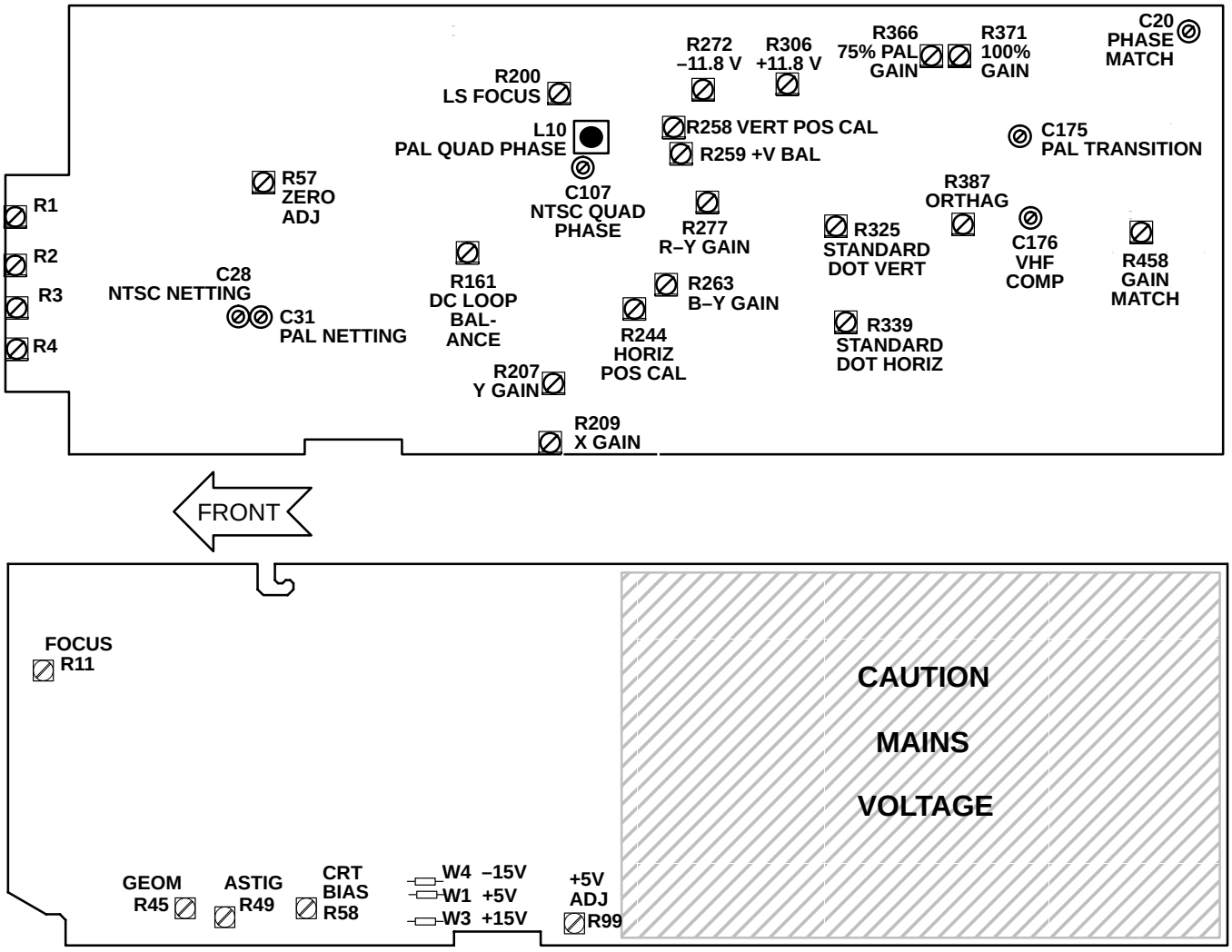


Figure 5–13: Adjustment and test point locations for the 1725 Vectorscope

SIGNAL CONNECTIONS. Connect the PAL black burst signal to the 1725 EXT REF INPUT and terminate with a 75Ω termination. Connect the PAL color bar signal to the 1725 CH–A INPUT and terminate with a 75Ω termination. Connect the NTSC color bar signal to the CH–B INPUT and terminate with a 75Ω termination. See Figure 5–14.

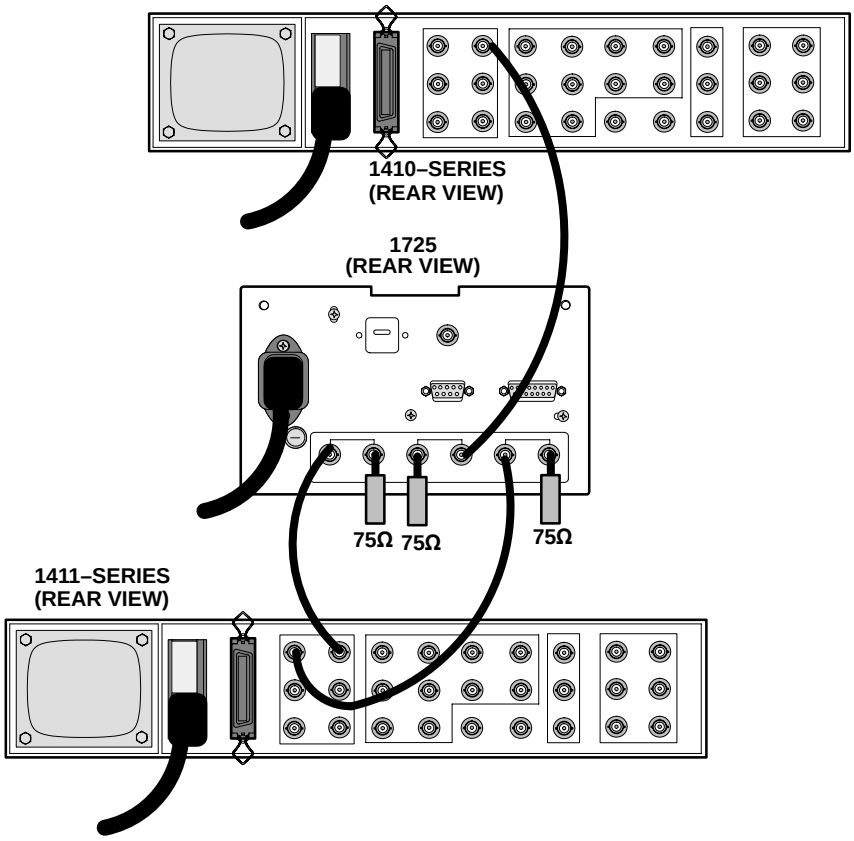


Figure 5–14: Initial equipment connections for the adjustment procedure

Connect the Audio Signal Generator to the 1725 XY INPUT. See Figure 5–1 for a diagram of how to hook up the 15-pin D-type connector to calibrate the 1725 Vectorscope. Set the Audio Signal Generator frequency to 50 kHz.

FRONT-PANEL PRESETS. Preset the 1725 front panel as shown in Table 5–2:

Table 5–2: Preliminary Control Settings

INPUT	
MODE	VECT
REF	INT
INPUT	CH–A
GAIN	
VARIABLE	Off
BARS	75%
PHASE	
+V	off

Table 5–2: Preliminary Control Settings (Cont.)

DISPLAY	
FOCUS	As desired
SCALE	
INTENS	
AUXILIARY	Off
POWER	ON

Allow 20 minutes of warm-up time, at normal room temperature (approximately 25° C), before making any adjustments to the instrument.

Refer to Figure 5–13 for adjustment locations.

1. **ADJUST +5 V**

   a. Connect the DMM negative lead to TP1 (GND) and the positive lead to W1 (+5V).

   b. **ADJUST R99** (+5V ADJ) for +5.0 V ±0.5V.

2. **ADJUST CRT BIAS**

   a. Turn the intensity control fully counterclockwise.

   b. **ADJUST R58** (CRT BIAS) so that the display is just extinguished.

3. **ADJUST GEOMETRY, FOCUS, AND ASTIGMATISM**

   a. **ADJUST R45** (GEOM) for 35V ±1V at pin 1 of J3.

   b. Set the FOCUS control on the front panel so that it is approximately at the center of its rotation.

   c. **ADJUST R11** (CTR FOCUS) and **R49** (ASTIG) for a clearly-defined vector display.

4. **ADJUST TRACE ROTATION**

   a. Switch the 1725 MODE to XY.

   b. Connect the Audio Signal Generator output to the X INPUT. See Figure 5–15.

   c. Adjust the Audio Generator amplitude for a line equal to the compass rose.

d. Adjust the front-panel ROTATE screwdriver adjustment for a level trace across the crt's X axis.

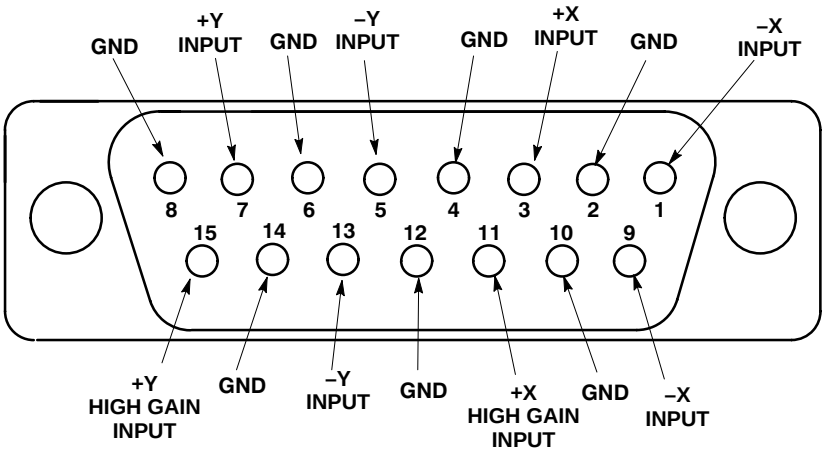


Figure 5–15: X Y INPUT connector pin functions.

e. Disconnect the Audio Generator signal from the 1725.

5. ADJUST ON-BOARD REGULATED POWER SUPPLIES

a. Connect the voltmeter ground lead to one of the rear-panel ground lugs and the active lead to the –11.8 V test point (Emitter of U164). See Figure 5–13.

b. **ADJUST R272** (–11.8 V ADJ) for –11.78 to –11.82 volts.

c. Connect the voltmeter active lead to the +11.8 V test point (Emitter of U172). See Figure 5–13.

d. **ADJUST R306** (+11.8 V ADJ) for +11.78 to +11.82 volts.

6. ADJUST LOCK-IN PHASE

a. Set the 1725 INPUT to CH–A, MODE to VECTOR, and REF to INT.

b. Connect the voltmeter ground lead to one of the rear-panel ground lugs, and the active lead to TP1 (test point).

c. **ADJUST C31** (PAL Netting) for a locked display and a voltmeter reading of –6 V.

d. Change the Television Signal Generator's subcarrier frequency by ±10 Hz.

e. Check for locked display.

f. Select CH–B.

g. **ADJUST C28** (NTSC Netting) for a locked display and a voltmeter reading of –6 V.

h. Change the generator's subcarrier frequency by +50 Hz for NTSC and check for a locked display.

i. Return the generator to subcarrier frequency.

7. ADJUST CENTER DOT OVERLAY AND VECTOR POSITION

a. Disconnect the Television Signal Generator output from the CH–B INPUT.

b. Adjust the 1725 front-panel horizontal and vertical position controls to center the dot at the graticule center mark.

c. Change the 1725 MODE to BOTH.

d. **ADJUST R258** (Vertical Position Cal) for the best dot overlay.

e. **ADJUST R244** (Horiz Position Cal) for the best dot overlay.

f. Change the 1725 MODE to VECT.

g. Adjust the 1725 front-panel horizontal and vertical position controls to center the dot at the graticule center mark.

8. ADJUST PHASE AND GAIN MATCH

a. Connect the PAL Television Signal Generator color bar output through a 75Ω feedthrough termination and dual-input connector to both the CH–A and CH–B inputs. Connect the PAL Black Burst signal to the EXT REF and terminate the remaining side of the loopthrough in 75Ω. See Figure 5–16.

b. Set INPUT to BOTH (hold INPUT switch until both the A and B indicators light).

c. Set the front-panel GAIN CAL to midrange.

d. **ADJUST C209** (Phase Match) and R594 (Gain Match) for the best gain and phase match of the two vector displays.

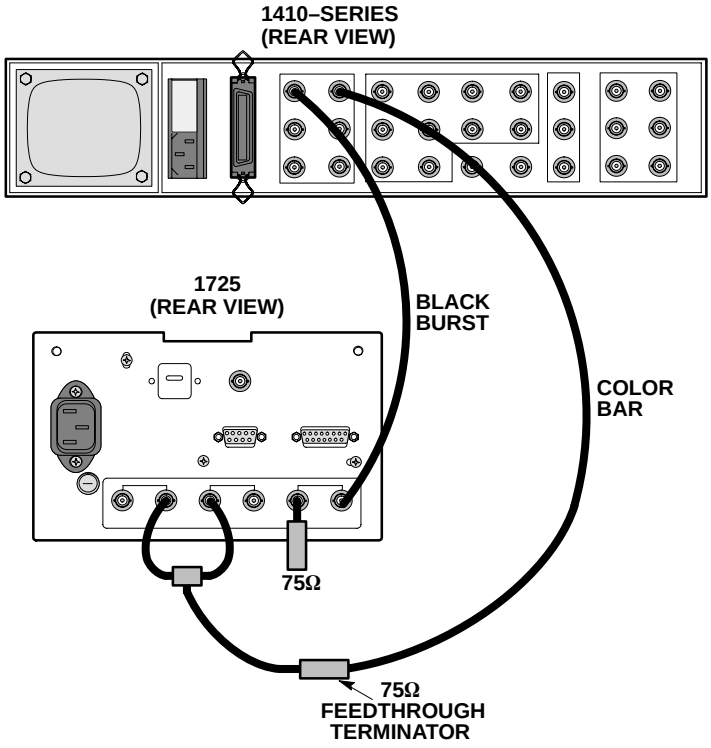


Figure 5–16: Equipment connections for CH–A/CH–B phase match adjustment

9. ADJUST ORTHOGONALITY

a. Switch MODE to XY.

b. Connect the Audio Signal Generator output to the Y INPUT.

c. **ADJUST R387** (Orthog) for a straight line, parallel to the Y axis.

10. ADJUST X AND Y GAINS

a. Set the Audio Generator to the desired output voltage between 2 V and 9 V (the 1725 is shipped at 2.4 V).

b. **ADJUST R207** (Y Gain) for a Y axis display equal to the vertical distance between the centers of the dB boxes.

c. Disconnect the Audio Signal Generator from the Y INPUT and connect it to the X INPUT.

d. **ADJUST R209** (X Gain) for a display amplitude equal to the horizontal distance between the centers of the dB boxes.

11. ADJUST XY PHASING

a. Connect the Audio Signal Generator output to both X and Y INPUTs of the 1725.

b. Set the Audio Signal Generator frequency to 100 kHz.

c. **ADJUST C176** (VHF Comp) for minimum opening in the diagonal trace. See Figure 5–17.

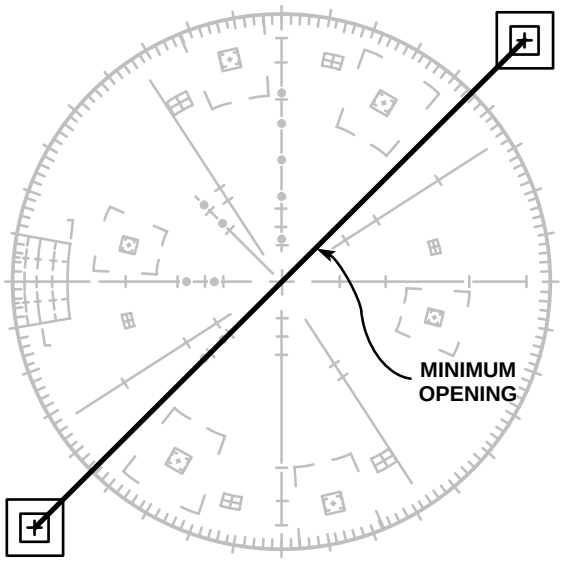


Figure 5–17: Audio frequency XY display.

12. ADJUST LOOP DC BALANCE

a. Connect the PAL Television Signal Generator Black Burst signal to CH–A INPUT. Terminate in 75Ω.

b. Switch INPUT to CH–A, REF to INT, and MODE to VECT.

c. Connect the test oscilloscope X10 probe to pin 3 of U18. Set the test oscilloscope vertical to 100 mV/div, ac coupled; horizontal to 20 μs/div and Internal Triggering.

d. Ground the test oscilloscope input and position the trace to graticule center.

e. **ADJUST R161** (DC Loop Balance) to return the test oscilloscope trace to graticule center.

f. Position one of the PAL burst vectors on the horizontal axis.

g. Turn ON the 1725 VAR.

h. Rotate the VAR until the burst vector is 1/2 normal and then 1 1/2 times normal; check that the burst vector remains within 2º of the horizontal axis.

i. If vector moves more than 2º repeat steps d. and e.

j. Turn off the 1725 VAR.

13. ADJUST QUAD PHASE AND +V BAL

a. Reconnect the PAL (CH–A) and NTSC (CH–B) color bar signals to the INPUTs. Terminate both inputs in 75Ω. See Figure 5–14.

b. Select CH A INPUT.

c. Hold the REF switch in until the TEST indicator lights.

d. Set the front-panel GAIN CAL to midrange.

e. Position the center dot directly under the graticule center mark (+).

f. **ADJUST L10** (PAL Quad Phase) and R259 (+V Bal) for the best overlay of the test circles.

g. Select INT REF and CH B.

h. Hold the REF switch in until the TEST indicator lights.

i. **ADJUST C107** (NTSC Quad Phase) for the best overlay of the test circles.

14. ADJUST PAL TRANSITION

a. Select CH–A, INT REF, and 75% BARS.

b. **ADJUST C175** (PAL Transition) for the best transition line between the green and magenta targets.

15. ADJUST R–Y AND B–Y GAINS

a. Select CH–B (NTSC) and 75% BARS.

b. Check to see that the center dot is directly under the graticule center mark (+).

c. **ADJUST R277** (R–Y Gain) to place the red and cyan (R and CY) vector tips directly on their targets.

d. **ADJUST R263** (B–Y Gain) to place the blue and yellow (B and Y) vector tips directly on their targets.

16. ADJUST NTSC 100% GAIN

a. Select 100% Amplitude Color Bars from the PAL Television Test Signal Generator.

b. Push the 1725 100% BARS button.

c. **ADJUST R371** (100% Gain) the red and cyan (R and CY) vector tips directly on their targets.

17. ADJUST PAL GAIN

a. Select CH–A INPUT (PAL) and 75% BARS.

b. Select 75% Amplitude Color Bars from the PAL Television Test Signal Generator.

c. **ADJUST R365** (PAL 75% Gain) to place the vector tips on their target.

d. Select 100% Amplitude Color Bars.

e. Push the 1725 100% BARS button.

f. Check that the PAL vector tips within their inner targets.

18. ADJUST CRT STANDARD INDICATOR

a. Select CH–B.

b. **ADJUST R325** (Vertical) and **R339** (Horizontal) Indicator positions to place the indicator dot in the middle of the NTSC indicator box.

c. Select CH–A (PAL input signal) and check that the indicator dot is in the PAL indicator box.

19. ADJUST AUTO LOCK IN RANGE

a. Select CH–B (NTSC input signal).

b. Use the front-panel Horizontal and Vertical positioning controls to place the center dot directly at graticule center.

c. Use the VARIABLE GAIN and PHASE control to position the burst vector tip directly on the horizontal axis at 1/2 burst amplitude. See Figure 5–18.

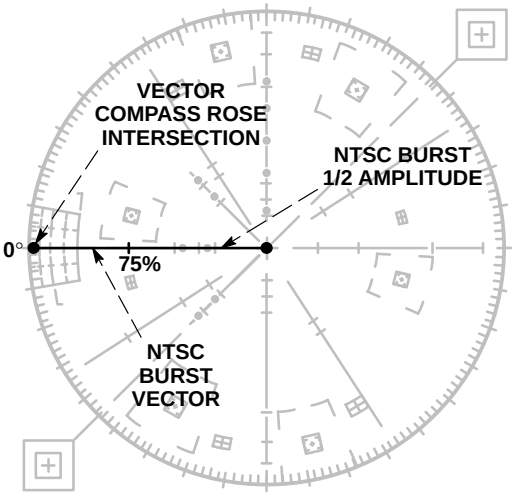


Figure 5–18: Adjustment point for auto phase lock

d. Press 1725 AUTO PHASE button and allow the display to lockup. ($\leq$1.5 seconds.)

e. **ADJUST R57** (Zero Adjust) to position the burst vector tip back to the 0° compass rose intersection.

f. Repeat steps d. and e. until the vector tip remains on target when the AUTO PHASE button is pushed.

g. Set the VARIABLE GAIN to place the burst vector tip on the compass rose. See Figure 5–18.

h. Press 1725 AUTO PHASE button and check that the burst tip is within ±2° of the horizontal axis.

i. Turn off 1725 VARIABLE GAIN and display the NTSC 75% color bar signal.

j. Push the AUTO PHASE and check that burst returns to target ±2°.

k. Select CH–A to display the PAL color bar signal.

l. Push AUTO PHASE and check that the bursts return to the graticule burst targets ±2°.

m. Turn on the VARIABLE GAIN and use the VARIABLE GAIN and PHASE controls to position the burst vector tips directly on the compass at the point where the extended burst vectors (±45°) intersect the compass rose.

n. Push AUTO PHASE and check that the bursts return to the graticule compass rose at the extended burst targets ±2°.

o. Push the AUTO PHASE and check that burst returns to target ±2°.

p. Turn off 1725 VARIABLE GAIN and display the PAL 75% color bar signal.

q. Push the AUTO PHASE and check that burst returns to target ±2°.

r. Repeat steps b. and c. until the vector tip remains on target when the AUTO PHASE button is pushed.

20. ADJUST LINE SELECT FOCUS

With a 1730–Series Waveform Monitor:

a. Connect an Auxiliary cable between the 1725 and a 1730–Series of the same color standard that is to be displayed.

b. loop through connect the color bar signal to both the waveform monitor and the 1725.

c. Set the 1730–Series Waveform Monitor for line select and display one line from the active part of the field (after the vertical interval).

d. Push the 1725 AUXILIARY button.

e. **ADJUST R200** (LS Focus) for the best 1725 display.

Without a 1730–Series Waveform Monitor:

f. Connect the output of the Function Generator to pin 7 of the 1725 rear-panel AUXILIARY connector.

g. Set the Function Generator for a narrow, negative-going, 10 V, 1 kHz pulse.

h. Set the 1725 for VECT and adjust INTENS and FOCUS for the best display.

i. Push the 1725 AUXILIARY button.

j. **ADJUST R200** (LS Focus) for the best 1725 display.

Maintenance

Section 6
Maintenance

This section contains instructions for preventive maintenance, general troubleshooting, Serial Port and LED Driver diagnostics, and corrective maintenance. If the instrument does not function properly, troubleshooting and corrective measures should be taken immediately to circumvent additional problems.

Preventive Maintenance

Preventive maintenance consists of cleaning, visual inspection, performance checking, and, if needed, readjustment. The preventive maintenance schedule established for the instrument should be based on the environment in which it is operated and the amount of use. Under average conditions, scheduled preventive maintenance should be performed every 2000 hours of operation.

Cleaning

NOTE. *Cleaning Rosin:*

A 2% RMA flux content solder is recommended for making repairs in this instrument. Cleaning of rosin residue is not recommended. Most cleaning solvents tend to reactivate the rosin and spread it under components where it may cause corrosion under humid conditions. The rosin residue, if left alone, does not exhibit these corrosive properties.

The instrument should be cleaned often enough to prevent dust or dirt from accumulating. Dirt acts as a thermal insulating blanket that prevents effective heat dissipation, and can provide high-resistance electrical leakage paths between conductors or components in a humid environment.

Exterior. Clean the dust from the outside of the instrument by wiping with a soft cloth or small brush. A brush is especially useful to remove dust from around the selector buttons, knobs, and connectors. Hardened dirt may be removed with a cloth dampened in water that contains a mild detergent. Abrasive cleaners should not be used.

Crt. Clean the crt protective shield, light filter, and crt face with a soft, lint-free cloth dampened in denatured alcohol.

Interior. Clean the interior of the instrument by loosening the accumulated dust with a dry, soft brush. Once the dirt is loosened remove it with low-pressure air

(high-velocity air can damage some parts). Hardened dirt or grease may be removed with a cotton-tipped applicator dampened with a solution of mild detergent and water. Abrasive cleaners should not be used. If the circuit board assemblies must be removed for cleaning, follow the instructions for removal/replacement under the heading of Corrective Maintenance.

After cleaning, allow the interior to thoroughly dry before applying power to the instrument.

CAUTION. *Cleaning fluids:*

Do not allow water to get inside any enclosed assembly or component. Do not clean any plastic materials with organic cleaning solvents, such as benzene, toluene, xylene, acetone, or similar compounds, because they may damage the plastic.

Visual Inspection

After cleaning, carefully check the instrument for defective connections, damaged parts, and improperly seated transistors or integrated circuits. The remedy for most visible defects is obvious; however, if heat-damaged parts are discovered, determine the cause of overheating before replacing the damaged part, to prevent additional damage.

Periodic checks of the transistors and integrated circuits are not recommended. The best measure of performance is the actual operation of the component in the circuit.

Static-Sensitive Components

This instrument contains electrical components that are susceptible to damage from static discharge. Static voltages 1 kV to 30 kV are common in unprotected environments. Table 6–1 shows the relative static discharge susceptibility of various semiconductor classes.

Table 6–1: Static Susceptibility

Relative Susceptibility Levels		Voltage
1	CMOS	100V – 500V
2	ECL	200V – 500V
3	SCHOTTKY SIGNAL DIODES	250 V
4	SCHOTTKY TTL	500 V
5	HF BIPOLAR TRANSISTORS	400 to 600 V
6	JFETS	600 to 800 V

Table 6–1: (Cont.)Static Susceptibility

Relative Susceptibility Levels		Voltage
7	LINEAR μCIRCUITS	400 to 1000 V est.
8	LOW POWER SCHOTT-KY TTL	900 V
9	TTL	1200 V

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive components or assemblies.
3. Discharge the static voltage from your body, by wearing a wrist grounding strap, while handling these components. Servicing static-sensitive assemblies or components should be done only at a static-free work station by qualified personnel.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up the components by the body, never by the leads.
7. Do not slide the components over any surface.
8. Avoid handling components in areas that have a floor or work surface covering capable of generating a static charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only special antistatic, suction, or wick-type desoldering tools.

Performance Checks and Readjustments

Instrument performance should be checked after each 2000 hours of operation, or every 12 months if used intermittently. This will help to ensure maximum performance and assist in locating defects that may not be apparent during regular operation. The Performance Check Procedure and the Adjustment Procedure are in Section 5.

Troubleshooting

The material contained here is general and is not intended to cover specific cases. Note that the manual itself is considered a troubleshooting aid, and as such a brief discussion of its content is in order.

The procedural information that appears as General Troubleshooting Techniques should be familiar to most technicians; however, a quick review may save some time and reduce "wheel spinning."

Foldout Pages

The foldout pages at the back of the manual contain significant information useful for troubleshooting the instrument. Block and schematic diagrams, circuit board illustrations, and parts locating charts are found there.

Diagrams. Schematic diagrams are the most often used troubleshooting aids. The circuit number and electrical value of each component is shown on the diagram. The first tabbed page has definitions of the symbology used on the schematic diagrams. Refer to the Replaceable Electrical Parts list for a complete description of each component. Circuits that are mounted on circuit boards or assemblies are enclosed in a border, with the name and assembly number shown on the border.

***NOTE**. Change Information:*

Check the Change Information section at the rear of the manual for corrections and modifications to the instrument and the manual.

Circuit Board Illustrations. Electrical components, connectors, and test points are identified on circuit board illustrations, which are located on the back of a preceding schematic diagram.

Parts Locating Charts. Every component mounted on an etched circuit board is assigned a circuit number for identification. The circuit board illustrations and the schematics all have locator grids, shown around the outer edge. The parts locating charts show the grid location for each component, on both the board illustration and the schematics.

Adjustment Locations. The circuit board illustrations have the adjustments and test points called out as a calibration and troubleshooting aid.

Assembly and Circuit Numbering. The circuit board assemblies are assigned assembly numbers. Figure 6–1 shows the circuit board assembly locations for this instrument.

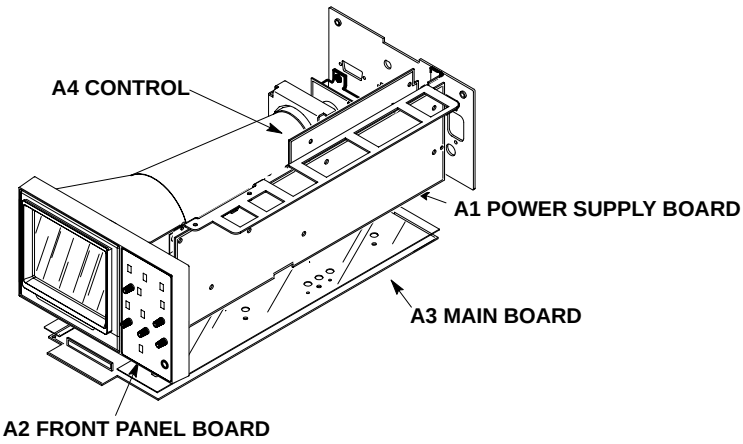


Figure 6–1: Circuit board assembly locations

Parts Lists

There are two separate parts lists in this manual. The Replaceable Electrical Parts list is in Section 8, which precedes the schematic diagrams and circuit board illustrations. The Replaceable Mechanical Parts list (Section 10), accompanied by exploded view drawings, follows the schematic diagrams and circuit board illustrations.

Replaceable Electrical Parts. This list is arranged by assembly as designated in ANSI Standard Y32.16–1975. The list begins with the part numbers for the major assemblies (etched circuit boards). Each circuit board is identified by an A# (assembly number).

The circuit numbers of the individual components in the parts list is made up by combining the assembly number with the individual circuit number. EXAMPLE: R117 on Assembly (circuit board) A3 is listed in the Replaceable Electrical Parts list as A3R117.

***NOTE**. Check Parts Lists:*

Always consult the parts list and "Change Information" for part numbers and descriptions before ordering replacement parts. Some parts may have been replaced in an individual instrument.

Replaceable Mechanical Parts. This list is arranged so that it corresponds to the exploded view drawings for major instrument components. The list and exploded view drawings comprise Section 10 of this manual. An Accessories Illustration and accompanying parts list is also included in this section.

Major Assembly Interconnection

Signals and power supply voltages are passed through the instrument with a system of interconnecting cables. The connector holders on these cables have

numbers that identify terminal connectors; numerals are used from 2 up. A triangular key symbol is used to identify pin 1 on the circuit board and the connector to assist in aligning the connector with the correct square pins. Figure 6–2 shows the numbering scheme (and the triangular marking) on the connector and the marking on the etched circuit board.

A pin replacement kit including necessary tools, instructions, and replacement pins is available from Tektronix, Inc. Contact a Tektronix field office or representative for assistance in ordering this kit.

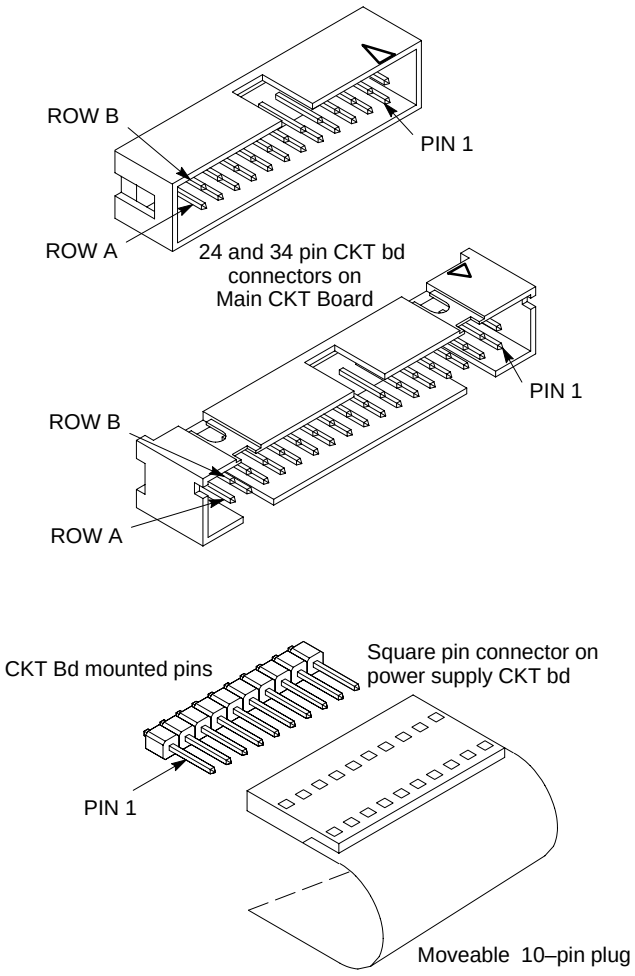


Figure 6–2: Multiple pin connectors used in the 1725 Vectorscope

General Troubleshooting Techniques

The following procedure is designed to assist in isolating problems, which in turn expedites repairs and minimizes down time.

1. Ensure that the malfunction exists in the instrument. This is done by making sure that the instrument is operating as intended by Tektronix (see Operating

Instructions in Section 2), and by being sure that a malfunction has not occurred up stream from the vectorscope.

2. Determine and evaluate all trouble symptoms. This is accomplished by isolating the problem to a general area such as an assembly. The block diagram is a valuable aid in signal tracing and circuit isolation.

CAUTION. *Probes and Meter Leads:*

Use extreme care when probing with meter leads or probes, because of the high component density and limited access within the instrument. The inadvertent movement of leads or a probe could cause a short circuit or transient voltages capable of destroying components.

3. Determine the nature of the problem. Attempt to make the determination of whether the instrument is out of calibration or if there has been a component failure. Once the type of failure has been determined, proceed on to identify the functional area most likely at fault.

4. Visually inspect the suspect assembly for obvious defects. Most commonly these will be broken or loose components, improperly seated components, overheated or burned components, chafed insulation, etc. Repair or replace all obvious defects. In the case of overheated components, determine the cause of overheating and correct the cause before re-applying power.

5. Use successive electrical checks to locate the source of the problem. The primary tool for problem isolation is the oscilloscope. Use the Performance Check Procedure (located in Section 5) to determine if a circuit is operating within specifications. At times it may be necessary to change a calibration adjustment to determine if a circuit is operational, but since this can destroy instrument calibration, care should be exercised. Before changing an adjustment, note its position so that it can be returned to its original setting.

6. Determine the extent of the repair. If the necessary repair is complex, it may be advisable to contact your local Tektronix field office or representative before continuing. If the repair is minor, such as replacing a component, see the parts list for replacement information. Removal and replacement procedures for the assemblies can be found under Corrective Maintenance.

CAUTION. *Removing Components:*

Always remove the assembly from the instrument prior to attempting to replace a soldered-in component. See Corrective Maintenance for the correct procedure.

Specific Troubleshooting Procedures

Two areas of the the 1725 Vectorscope require specific troubleshooting methods. The power supply can not be worked on safely without using an Isolation Transformer and following a specific troubleshooting procedure.

The Serial Port (Auxiliary Input) and the LED Driver circuits have specific diagnostic routines. These should be followed to isolate problems quickly.

Power Supply

The power supply is of the high-efficiency type and requires a specific trouble-shooting procedure and an isolation transformer to avoid personal danger or instrument damage.

The 1725 power supply presents special troubleshooting problems, if a fault occurs. Besides having a sizeable area where dangerous potentials can be contacted, the type of circuitry employed can not be troubleshot by conventional means.

WARNING. *Read Instructions:*

Do not attempt to troubleshoot the 1725 power supply without reading these instructions.

Troubleshooting Procedure

NOTE. *Read Theory of Operation:*

A review of the power supply Theory of Operation is recommended before attempting repairs.

The equipment needed to troubleshoot the power supply:

- Digital Multimeter (DMM), with a diode check function
- Oscilloscope
- 0 to 20 VDC Variable Power Supply
- Clip Lead – to short across a component
- High Voltage Probe, ≥ 1 GΩ input resistance

Introduction

The Troubleshooting Procedure for the Power Supply (Assembly A1) is split into two sections, the Low Volts and High Volts Supplies. Start the procedure by determining which section of the power supply the problem is in. Apply ac power and turn on the power supply. From Table 6–2, determine which symptom the power supply exhibits and refer to the corresponding procedure.

Table 6–2: Power Supply Fault Symptoms

Symptom	Procedure
Line fuse open	Rectifier/Switcher Check (Low Volts)
Power Supply cycles OFF/ON	Output Check (Low Volts), or High Voltage Oscillator Check (High Volts)
Does not power up	Control Circuit Check (Low Volts)
+5 V not regulating	Error Amplifier Check (Low Volts)
Improper CRT display	High Volts Supply

Low Volts Supply

***NOTE**. Low Volts Supply Load:*

A 20Ω, 2 watt resistor should be used as a load for the Low Volts Supply. Disconnect J4 and connect the 20Ω resistor between W1 (+5 V) and TP1 (secondary ground).

1. Preliminary Checks

a. A properly functioning and loaded Low Volts supply will output the voltages listed in Table 6–3. Use the DMM to measure the voltages between TP1 and the voltage test points. If the supply is not regulating properly, continue with the procedure.

Table 6–3: Low Volts Supply Voltages

Test Point	Voltage Range
W1 – (+5 V)	+4.88 to +5.12 V
W4 – (+15 V)	+14.0 to +16.0 V
W3 – (–15 V)	–14.0 to –16.0 V
W2 – (+40 V)	+39.0 to +41.0 V

NOTE. *Low Volts Supply Power Connection:*

The Low Volts power supply troubleshooting is performed without applying ac power.

b. Disconnect ac power from the instrument. Disconnect the instrument from the Power Supply by removing the jumper from J4.

c. Use the digital multimeter to measure the voltage between TP2 and the tab (drain) of Q9. Check that the voltage is near 0 V.

WARNING. *Dangerous Voltages:*

Do not proceed until the drain of Q9 is near 0 V. Dangerous voltage potentials are present in the circuit until the capacitors discharge.

2. Rectifier/Switcher Check

a. Use the digital multimeter to measure the voltage between TP2 and the tab (drain) of Q9. Be sure the voltage is near 0 V before proceeding.

b. Unsolder and lift one end of R102.

c. With the negative lead of the digital multimeter connected to TP2 and the positive lead connected to the tab of Q9, measure the circuit resistance. A resistance of less than 20 kΩ indicates a shorted mosfet (Q9). If the mosfet is shorted, replace it and perform the Control Circuit Check.

d. Using the digital multimeter diode test function, test CR21, CR22, CR23, and CR24 for shorts. Diode replacements must be fast reverse recovery (300 ns) types to reduce conducted noise.

e. Reconnect the lifted end of R102.

3. Output Check

a. Connect the negative output from the 20 VDC Power Supply to TP1. Connect the positive output to W4 (+15 V). The circuit should draw less than 20 mA. Excessive current draw can be caused by CR11 or U2 (High Volts power supply).

b. Connect the negative output from the 20 VDC Power Supply to TP1. Connect the positive output to W2 (+40 V). The circuit should draw less than 20 mA. Excessive current draw can be caused by CR14 or Q6 (High Volts power supply).

c. Connect the positive output from the 20 VDC Power Supply to TP1. Connect the negative output to W3 (–15 V). The circuit should draw less than 20 mA. Excessive current draw can be caused by CR12.

d. Connect the negative output from the 5 VDC Power Supply to TP1. Connect the positive output to W1 (+5 V). The circuit should draw less than 20 mA. Excessive current draw can be caused by CR13 or Q1 and Q2 (High Volts power supply).

4. Control Circuit Check

a. Connect the negative output from the 20 VDC Power Supply to TP2. Connect the positive output to the cathode of CR17. Short C47 with a clip lead. Connect the oscilloscope probe ground to TP2.

b. Table 6–4 lists the signal present in a properly functioning control circuit.

Table 6–4: Control Circuit Test Points

Circuit Location	Signal
U5, pin 1	Approximately 5 VDC
U5, pin 2	Approximately 2 VDC
U5, pin 3	0 V
U5, pin 4	80 kHz triangle wave, 2 V p-p
U5, pin 6	80 kHz square wave, 18 V p-p
U3, pin 1	80 kHz square wave, 5 V p-p
U3, pin 2	2.1 VDC
U3, pin 6	2.9 VDC
U3, pin 7	Approximately 5 VDC
U4, pin 13	80 kHz repetition rate, 300 ns width, approximately 3 V p-p
Q8, collector	80 kHz repetition rate, 400 ns width, switching from 5 V to approximately 2 V

c. Remove the clip lead from across C47.

5. Error Amplifier Check

a. Connect the negative output from the variable DC power supply to TP1. Connect the positive output to W1 (+5 V).

b. Connect the negative output of another variable DC power supply to TP1. Connect the positive output to W4 (+15 V). Set the variable power supply to 20 VDC.

c. Connect the digital multimeter between TP1 and the cathode of CR15.

d. Set the variable DC power supply connected to W1 (+5 V) to 4.8 V. The cathode of CR15 should be approximately 20 V.

e. Set the variable DC power supply connected to W1 (+5 V) to 5.2 V. The cathode of CR15 should be approximately 2 V.

f. If this check did not reveal the cause for the +5 V supply not regulating, refer to the Output Check and the Control Circuit Check.

High Volts Supply

1. Preliminary Checks

a. Table 6–5 lists the High Volts Supply fault symptoms and procedures.

Table 6–5: High Volts Supply Fault Symptoms

Symptom	Procedure
Unable to focus CRT using the front-panel control	Focus Amplifier Check
Unable to adjust CRT intensity using the front-panel control	Z-Axis Amplifier Check Grid Drive Check
No CRT display	High Voltage Oscillator Check CRT Voltage Check

b. Load the Low Volts Supply with the instrument, or with the 20Ω resistor as detailed at the beginning of the Troubleshooting Procedure.

2. Focus Amplifier Check

a. Unsolder and lift one end of R24.

b. Power up the power supply.

c. Using the digital multimeter, measure the voltage between TP1 and the collector of Q1. It should be approximately –140 V.

d. Reconnect the lifted end of R24.

3. Z-Axis Amplifier Check

a. Unsolder and lift one end of R8.

b. Power up the power supply.

c. Using the digital multimeter, measure the voltage between TP1 and the collector of Q4. It should be approximately +10 V.

d. Short together the base and emitter of Q5. The collector of Q4 should be approximately +100 V.

e. Reconnect the lifted end of R8.

4. Grid Drive Check

a. Turn off the power supply. Use the diode check on the digital multimeter to test CR1, CR2, CR3, CR5, and CR6 for shorts.

b. Power up the power supply.

c. Using the digital multimeter, measure the voltage between TP1 and the cathode of CR5. It should vary between approximately +75 and +200 V as R58 (CRT Bias) is adjusted.

d. Connect the oscilloscope probe to the anode of CR5 and the probe ground to TP1. The signal should be a clipped sine wave of +75 to +200 V p-p.

5. High Voltage Oscillator Check

a. Connect the oscilloscope probe to T1 pin 3 (Q6 collector) and the probe ground to TP1. Power up the supply. The signal should be a +60 V_{p-p}, 22 kHz sine wave.

b. Check the voltages listed in Table 6–6 using the digital multimeter:

Table 6–6: High Voltage Oscillator Test Points

Circuit Location	Voltage
T1, pin 4	Approximately +40 V
T1, pin 13	Less than +2 V
U2, pin 2	Approximately +4.8 V
U2, pin 6	+4 to +11 V
CR9, cathode	Approximately +100 V

6. CRT Voltage Check

***NOTE**. High Voltage Probe:*

This check requires a high voltage probe having an input resistance of 1 GΩ or more.

a. Connect the high voltage probe ground to TP1.

b. Load the Low Volts supply with the instrument, or with a 20Ω, 2 watt resistor loading the 5 V supply.

c. Power up the power supply.

d. Use the high voltage probe to measure the voltage at the anode of CR4. It should be approximately –2530 V.

e. Measure the voltage at the anode end of CR3. It should be 50–150 V more negative than the reading from the anode of CR4.

Serial Port and LED Driver Diagnostics

A non-destructive diagnostic program is built into the 1725. All that is required to perform these diagnostics is a male, 9-pin, sub-miniature D-type connector with pins 8 and 9 connected together. The procedure contained here will isolate non-operating front-panel indicators, and open or shorted receive or transmit lines in the serial interface.

1. Turn off instrument POWER.

2. Install the male, sub-miniature D-type connector on the rear-panel AUXILIARY connector.

3. Hold in the AUXILIARY and POWER switches until all front-panel indicators light. This step checks:

a. LEDs and LED Drivers

b. Interface continuity (RXD in and TXD out)

When all indicators are lit there is continuity from the Microprocessor, out through the TXD Buffer, and back through the RXD Buffer. If all front-panel indicators do not light, check indicator or Driver. If indicators blink, check RXD Buffer (U818A) or TXD Buffer (U818B).

4. Remove the male connector from the rear-panel AUXILIARY connector and check for blinking indicators. This step checks for shorted RXD and TXD lines.

If lights remain on, the RXD and TXD lines are shorted together.

5. Turn off POWER. This ends the Diagnostic Procedure. When the 1725 is powered up again it will be operating in the normal vectorscope configuration.

Corrective Maintenance

***NOTE**. Solder:*

A 2% RMA flux content solder is recommended for making repairs in this instrument. Cleaning of rosin residue is not recommended. Most cleaning solvents tend to reactivate the rosin and spread it under components where it may cause corrosion under humid conditions. The rosin residue, if left alone, does not exhibit these corrosive properties.

***NOTE**. Warranty Repairs:*

No repair should be attempted during the warranty period.

Obtaining Replacement Parts

Replacement parts are available through the local Tektronix, Inc., field office or representative. However, many common electronic parts are available through local sources. Using a local source, where possible, will eliminate shipping delays.

Changes to Tektronix instruments are sometimes made to accommodate improved components, as they become available, and to improve circuit performance. Therefore, it is important to include the following information when ordering parts:

1. Part Number
2. Instrument Type or Number
3. Serial Number
4. Modification or Option Number (if applicable)

If a part has been replaced with a new or improved part, the new part will be shipped if it is a direct replacement. If not directly replaceable the local Tektronix field office or representative will contact the customer concerning any changes. After any repair, circuit readjustment may be required.

Mechanical Disassembly/Assembly

The instructions contained here are for disassembly. Re-assembly is performed by reversing the order of the steps used to disassemble the instrument.

WARNING. *Unplug Power Cord:*

Before attempting any disassembly of the instrument be sure to disconnect the power cord.

CAUTION. *Rear Panel Screws:*

Do not re-insert screws in the rear panel when the instrument is removed from the cabinet.

NOTE. *Screw Types:*

All screws, unless otherwise noted, are TORX® screws and can be removed with a T15 screwdriver tip (Tektronix part number 003–0966–00). The exception is #2 Pozidrive® screws which can be removed with a #1 Pozidrive® tip (003–0443–00).

Bezel Removal

1. Remove the two bezel screws. See Figure 6–3.
2. Grasping the bottom of the bezel, pull straight out and upward. There are two hinges at the top of the bezel that hold it in place. Once the bezel is at an approximate 45° angle with the front panel they will disengage.
3. To replace, reverse the procedure.

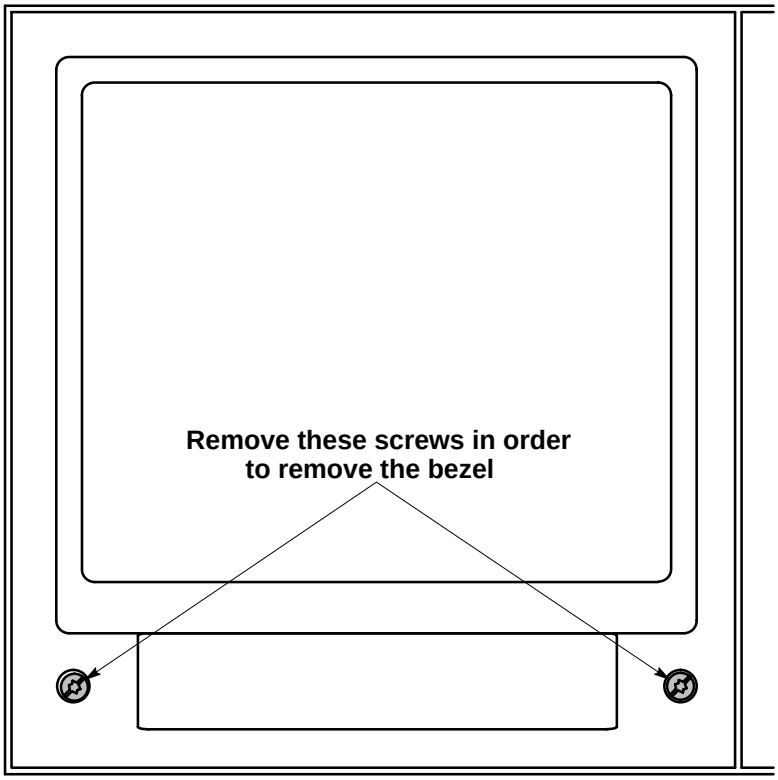


Figure 6–3: Screws that need to be removed to remove the bezel.

Graticule Light Removal and Replacement

For graticule light removal and replacement, tweezers with curved, serrated tips are recommended. For example: Miltex PL312, 6–100 (equivalent to PL312), or PL317 (longer than PL312).

CAUTION. *Bulb Removal:*

Needle-nosed pliers are not recommended.

Replacement bulbs are supplied with this instrument as Standard Accessories. Additional bulbs can be purchased from Tektronix (see Replaceable Electrical Parts list) or from local electronics distribution sources.

1. Remove the bezel according to the preceding instructions.
2. To remove a bulb, position the tweezer tips on the thin, flat portion of the bulb (close to the plastic socket). Carefully pull the bulb straight out.

3. To install a bulb, hold it with the tweezers as described in step 2, position it in front of the socket and push the bulb with your finger until it snaps into place.

4. Replace the bezel.

CRT Removal

1. Remove the bezel.

WARNING. *The CRT may retain a dangerous charge. Ground the conductor of the anode to discharge the CRT. Do not allow the conductor to touch your body or any circuitry.*

2. Slide a screwdriver with an insulated handle under the anode cap on the side of the CRT, and ground the anode to the chassis, to discharge the CRT. DO NOT touch the metal shaft of the screwdriver while doing this. Disconnect the anode cap by prying it gently away from the CRT.

3. Disconnect J225 (trace rotation) on the Main board and push the connector through the hole in the board.

WARNING. *The crt is a high vacuum device and must be handled with care. Safety glasses, gloves, and protective clothing should always be worn when handling crts.*

4. The CRT can now be pulled straight out (some pressure may be needed). The CRT shield, along with the grommet around its front and the rubber manchet around its back, should come out with the CRT.

Replacement of the CRT

1. If the CRT is to be replaced, remove the metal shield from the neck of the old CRT and place it around the neck of the new CRT, with the WARNING sticker towards the top of the instrument. This should place the opening in the grommet on the front edge of the shield towards the bottom of the instrument. Ensure that the rubber manchet is on the back edge of the shield.

2. Slip the CRT part way back into position and feed the trace rotation wires (and plug) back through the hole in the Main board.

WARNING. *The CRT may retain a dangerous charge. Ground the the anode connector to discharge the CRT. Do not allow the conductor to touch your body or any circuitry.*

3. Use a screwdriver to ground the CRT anode connector to the chassis.

4. Slide the CRT into the instrument, guiding the rubber manchet on the end of the shield into the rear CRT support.

5. Align the socket on the A10 CRT Socket board with the pins and key on the CRT. Gently push the CRT and the socket board together until the CRT pins are fully seated in the socket.

6. Replace the trace rotation connector (J225, Main board), and snap the anode lead onto the anode connector on the side of the CRT.

7. Wipe the faceplate of the CRT to remove fingerprints, then replace the bezel. If the fit is too tight to allow the bezel to go into position, or if the CRT has a loose fit after the bezel is completely tightened down, then the rear CRT support must be repositioned.

   To reposition the rear CRT support, loosen the two nuts that hold the support in place. With the CRT and bezel in place, push the support towards the front of the instrument until it is snug against the rubber manchet on the rear of the CRT shield. Tighten the two support nuts.

Removing the Rear Panel

1. Remove the five rear screws. See Figure 6–4.

2. Unsolder the six bnc and one ground connection. (If 1700F10 Field Upgrade is installed, unsolder leads from the battery connector.)

3. Pull the rear panel free from the chassis; be careful not to pull the unsoldered wires.

4. To replace, reverse the procedure.

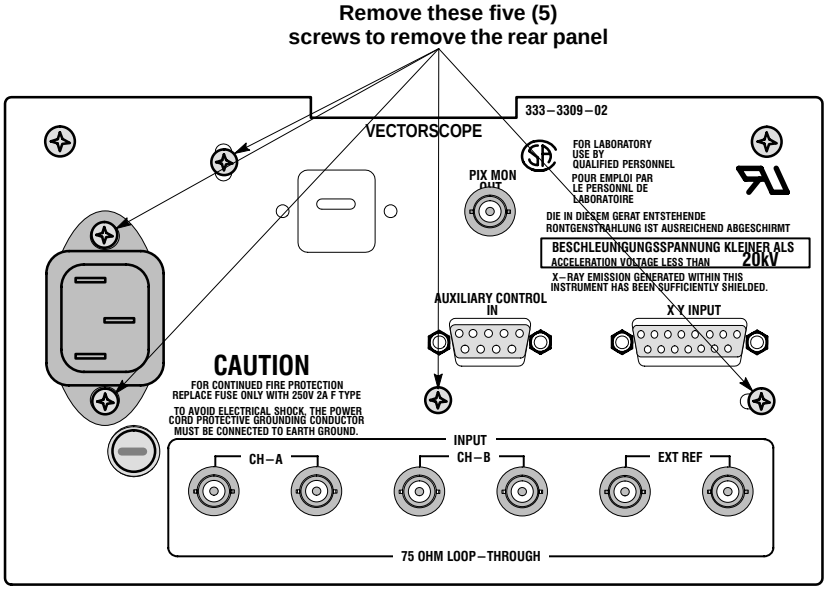


Figure 6–4: Screws that need to be removed to remove the rear panel

Removing the Front Panel Circuit Board

1. Remove the blue multiwire connector from J154.
2. Remove the two screws holding the board in place. See Figure 6–5 for locations.
3. Remove the board by slipping it through the front-panel opening.
4. To access the Front Panel board components:
   a. Remove the knobs from the front.
   b. Remove the four screws from the rear.
   c. The board should now separate from the front panel making the components accessible.
5. To re-assemble, reverse the procedure.

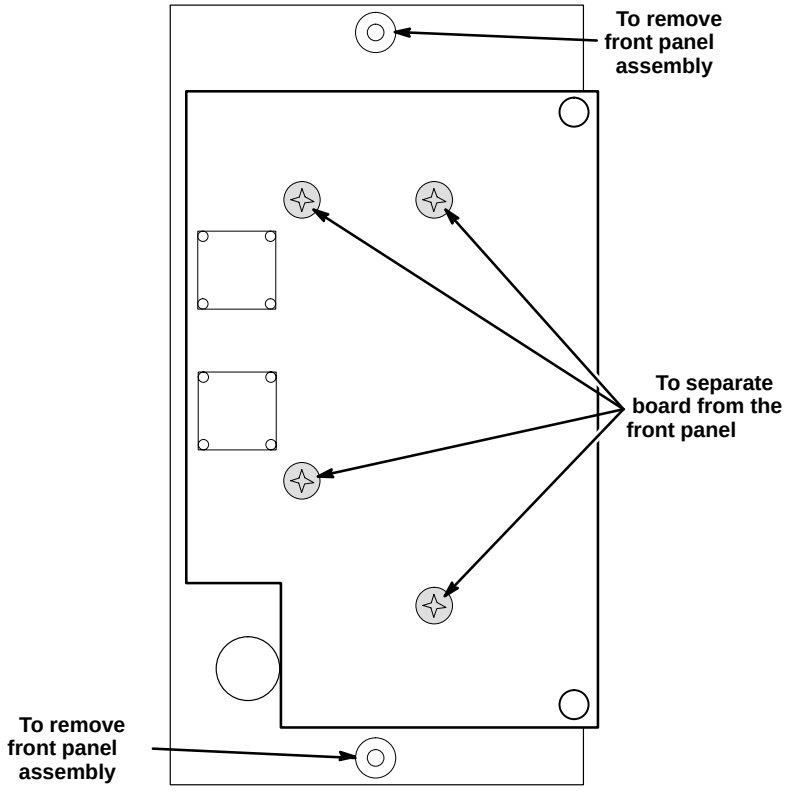


Figure 6–5: Screws that hold the Front Panel circuit board (A2) in place.

Removing the Main Board

1. Remove the plugs from the following connectors: J216 to the Front Panel board, J546 on the Power Supply board, the plug on the Phase Shifter (Assembly A4), and J225 on the Main board (the trace rotation leads to the crt).
2. Unsolder the leads to the six bnc connectors and three ground from the rear panel, the two horizontal crt leads (red and green), the R–Y out, and the two vertical crt leads (blue and brown).
3. Slip the crt and trace rotation lead through the appropriate holes in the Main board.
4. Remove the eight screws that are holding the board in place. See Figure 6–6 for their locations.

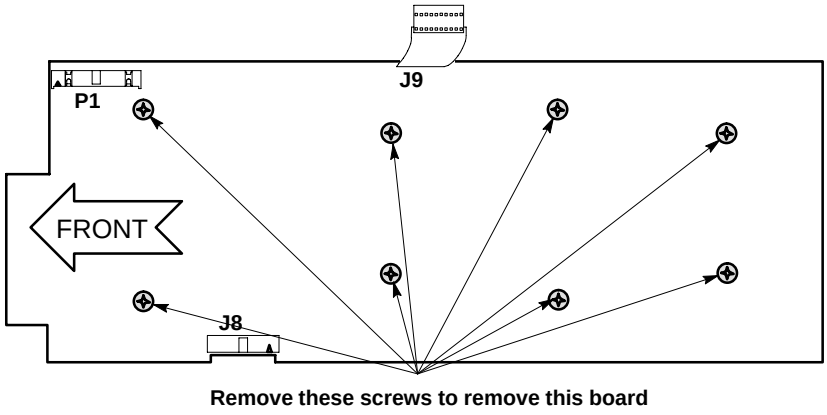


Figure 6–6: Screws holding the main circuit board (A3) in place.

5. Remove the board by sliding it toward the rear panel until the toe of the board clears the front, then lift out.
6. To replace the Main board, lay the board flat and slide it back into place.
7. To complete the replacement of the board, reverse the rest of the steps.

Removing the Power Supply Board

1. Remove the plug from J546 on the Power Supply board; it is the connection to the Main board.
2. Remove the anode connection from the crt and discharge it to ground.

WARNING. *CRT Retained Charge Hazard:*

The crt may retain a dangerous charge. Ground the conductor of the anode to discharge the crt. Do not allow the conductor to touch your body or any circuitry.

3. Unsolder the following connections: J122 pins 1 through 4, J133 pins 1 through 4, and J215 the focus lead. (If a 1700F10 Field Upgrade Kit is installed, unsolder leads to the rear-panel DC Connector.)
4. Disconnect the ac line filter from the rear panel by unscrewing its two mounting screws.
5. Use a #1 Pozidrive® tip to disconnect the power on/off switch from the front casting.
6. Remove the seven screws that are holding the Power Supply board down. See Figure 6–7.
7. Remove the board by sliding it forward and lifting it up.
8. To replace the board, reverse this procedure.

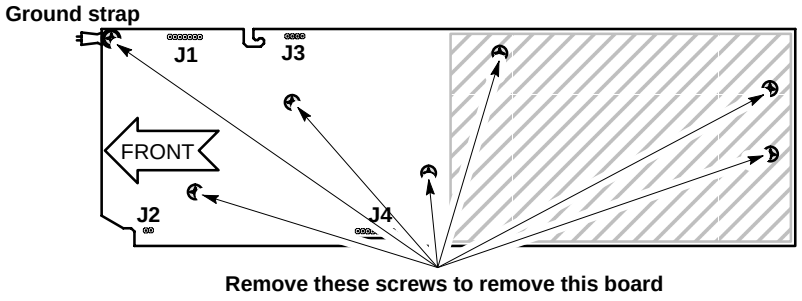


Figure 6–7: Screws holding the Power Supply circuit board (A1) in place

Removing the Control Board

1. Disconnect the two ribbon cables from P101 and P102.
2. Remove the two screws securing the circuit board to the chassis. See Fig. 6–8.
3. To replace the Control board, reverse steps 1 and 2.

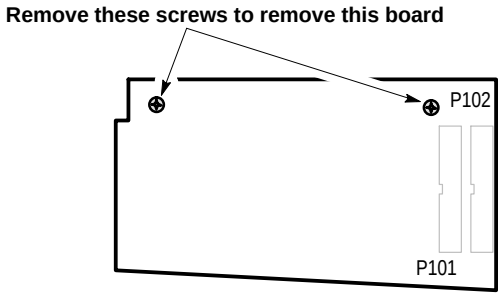


Figure 6–8: Screws holding the Control board (A4) in place

Repackaging

Identification Tag

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

1. Owner (with complete address) and the name of the person at your firm that can be contacted.
2. Instrument serial number and a description of the service required.

Repackaging for Shipment

Repackage the instrument in the original manner for maximum protection. If the original packaging materials are not in good condition or are unavailable, use the following procedure to repackage the instrument. See Figure 6–9.

1. Obtain a corrugated cardboard carton whose inside dimensions are at least six inches greater than the dimensions of the instrument to allow room for cushioning. The shipping carton should have a test strength of at least 275 pounds.
2. Surround the instrument with polyethylene sheeting to protect the finish.
3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the instrument. Allow three inches on all sides for cushioning.
4. Seal the carton with shipping tape or an industrial stapler.

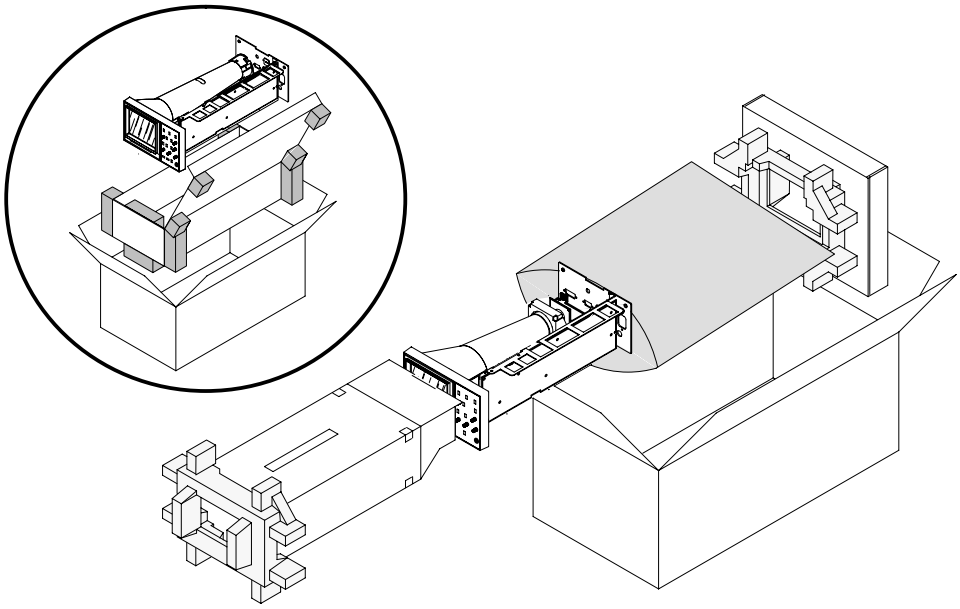


Figure 6–9: Repackaging

Options

Section 7
Options

There are no customer-orderable options available for this instrument, with the exception of the power cord options shown on the pull-out in Section 10. However, there are customer-installable Field Upgrade Kits that can be ordered.

Cabinets

All of the Safety and EMI tests used to qualify the 1725 were performed in a cabinet. There are two optional cabinets and a dual rack adapter available for the installation of these instruments. Only a brief description is provided here, for more information contact a Tektronix field office or distributor.

Plain Cabinet (1700F00) This is a plain, silver-grey cabinet that is designed for permanent mounting. The pattern of ventilating holes in top, bottom, and sides provides adequate air circulation for any heat generated within the instrument. When being permanently mounted, care must be taken to allow the free circulation of air to and from these ventilating holes. A drawing of this cabinet, that can be used in mounting the cabinet, is located in Section 3 (Installation) of this manual.

Carrying Case (1700F02) This is a silver-grey, metal cabinet, with feet and carrying handle designed for portable applications. A TEKTRONIX BP1 can easily be mounted to this cabinet to provide a 12 Vdc power source for portable operation.

Side-by-Side Rack Adapter (1700F05) This is a 19-inch, rack mounting adapter that accepts two 1700–Series instruments in a side–by–side configuration. Instrument cabinets are 1700F00 that are connected together for this installation. If only one 1700–Series instrument is to be installed in the Side-by-Side Rack Adapter, a blank panel (1700F06) can be installed for appearance and air flow protection.

Ordering

Any of these items can be ordered with the 1725 instrument. In addition, these items are available, along with accessory items listed in this manual, from your nearest Tektronix field office or distributor. Be sure to include both the name and number of any Field Upgrade Kits ordered.

Replaceable Electrical Parts

Replaceable Electrical Parts

This section contains a list of the components that are replaceable for the 1725. Use this list to identify and order replacement parts. There is a separate Replaceable Electrical Parts list for each instrument.

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. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument 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.

Using the Replaceable Electrical Parts List

The tabular information in the Replaceable Electrical Parts list is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replaceable parts.

Cross Index–Mfr. Code Number to Manufacturer

The Mfg. Code Number to Manufacturer Cross Index for the electrical parts list is located immediately after this page. The cross index provides codes, names, and addresses of manufacturers of components listed in the electrical parts list.

Abbreviations

Abbreviations conform to American National Standards Institute (ANSI) standard Y1.1.

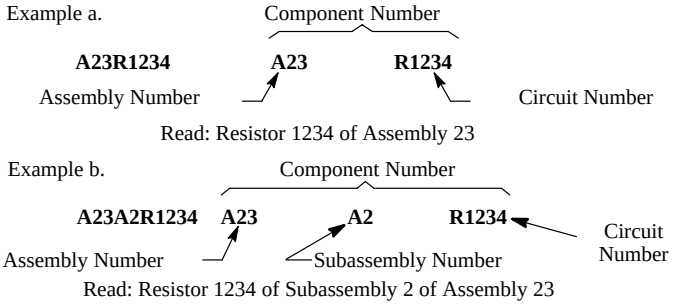
List of Assemblies

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

Column Descriptions

Component No. (Column 1)

The component circuit number appears on the diagrams and circuit board illustrations, located in the diagrams section. Assembly numbers are also marked on each diagram and circuit board illustration, in the Diagram section and on the mechanical exploded views, in the mechanical parts list. The component number is obtained by adding the assembly number prefix to the circuit number.



The electrical parts list is arranged by assemblies in numerical sequence (A1, with its subassemblies and parts, precedes A2, with its subassemblies and parts).

Mechanical subparts to the circuit boards are listed in the electrical parts list. These mechanical subparts are listed with their associated electrical part (for example, fuse holder follows fuse).

Chassis-mounted parts and cable assemblies have no assembly number prefix and are located at the end of the electrical parts list.

Tektronix Part No. (Column 2)

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

Serial/Assembly No. (Column 3 and 4)

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

Name and Description (Column 5)

An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.

The mechanical subparts are shown as *ATTACHED PARTS* / *END ATTACHED PARTS* or *MOUNTING PARTS* / *END MOUNTING PARTS* in column five (5).

Mfr. Code (Column 6)

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

Mfr. Part No. (Column 7)

Indicates actual manufacturer's part number.

Cross Index – Mfr. Code Number To Manufacturer

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
TK0196	ALMAC–STROUM ELECTRONICS (DIST)	9500 SW NIMBUS AVE BUILDING E	BEAVERTON, OR 97005
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0515	EVOX–RIFA INC	100 TRI–STATE INTERNATIONAL SUITE 290	LINCOLNSHIRE IL 60015
TK0891	MICONICS	1 FAIRCHILD AVE	PLAINVIEW NY 11803
TK0978	KINSEKI LTD	8–1 IZUMI–HONCHO 1–CHOME KOMAE CIT	TOKYO JAPAN
TK1155	QUALITY PLSTC INJECTION MOLDING	3910 INDUSTRIAL AVE	COEUR D'ALENE ID 83814
TK1462	YAMAICHI ELECTRONICS CO LTD 2ND FLOOR NEW KYOEI BLDG 17–11	3–CHROME SHIBAURA MINATO–KU	TOKYO JAPAN
TK1617	CRAFT FACTORY PLSTCS	17145 SW ALEXANDER	ALOHA OR 97007
TK1727	PHILIPS NEDERLAND BV AFD ELONCO	POSTBUS 90050	5600 PB EINDHOVEN THE NETHERLANDS
TK1743	UNITRODE (UK) LTD	6 CRESSWELL PARK BLACKHEATH	LONDON SE 3 9RD ENGLAND
TK1913	WIMA THE INTER–TECHNICAL GROUP IND	2269 SAW MILL RIVER ROAD PO BOX 127	ELMSFORD NY 10523
TK2058	TDK CORPORATION OF AMERICA	1600 FEEHANVILLE DRIVE	MOUNT PROSPECT, IL 60056
TK2073	TOKYO AMERICA INC	565 W GULF ROAD	ARLINGTON HEIGHTS IL 60005
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
0GV52	SCHAFFNER EMC INC	9–B FADEM ROAD	SPRINGFIELD, NJ 07081
0H1N5	TOSHIBA MARCON ELECTRONICS AMERICA CORPORATION	998 FIRST EDGE DRIVE	VERNON HILLS IL 60061
0JR03	ZMAN MAGNETICS INC	7633 S 180th	KENT WA 98032
0JR04	TOSHIBA AMERICA INC ELECTRONICS COMPONENTS DIV	9775 TOLEDO WAY	IRVINE CA 92718
0J260	COMTEK MANUFACTURING OF OREGON (METALS)	PO BOX 4200	BEAVERTON OR 97076–4200
0J9R2	HARISON ELECTRIC CO LTD	ASAHIMACHI 5–CHOME IMABARI	EHIME JAPAN
0LUA3	PHILIPS COMPONENTS	100 PROVIDENCE PIKE	SLATERSVILLE, RI 02876
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655303	DALLAS TX 75262–5303
02113	COILCRAFT INC	1102 SILVER LAKE RD	CARY IL 60013–1658
04222	AVX/KYOCERA DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008–4229
09023	CORNELL–DUBILIER ELECTRONICS DIV FEDERAL PACIFIC ELECTRIC CO	2652 DALRYMPLE ST	SANFORD NC 27330
09969	DALE ELECTRONICS INC	EAST HIGHWAY 50 P O BOX 180	YANKTON SD 57078
11236	CTS CORPORATION RESISTOR NETWORKS DIVISION	406 PARR ROAD	BERNE IN 46711–9506

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
11502	IRC, INC	PO BOX 1860	BOONE NC 28607–1860
12697	CLAROSTAT MFG CO INC	12055 ROJAS DRIVE SUITE K	EL PASO, TX 79936
12969	MICROSEMI CORPORATION WATERTOWN DIVISION	530 PLEASANT STREET	WATERTOWN MA 02172
13103	THERMALLOY CO INC	2021 W VALLEY VIEW LN PO BOX 810839	DALLAS TX 75381
14552	MICROSEMI CORP	2830 S FAIRVIEW ST	SANTA ANA CA 92704–5948
15454	KETEMA RODAN DIVISION	2900 BLUE STAR STREET	ANAHEIM CA 92806–2591
17856	SILICONIX INC	2201 LAURELWOOD RD	SANTA CLARA CA 95054–1516
18796	MURATA ELECTRONICS NORTH AMERICA INC. STATE COLLEGE OPERATIONS	1900 W COLLEGE AVE	STATE COLLEGE PA 16801–2723
19701	PHILIPS COMPONENTS DISCRETE PRODUCTS DIV RESISTIVE PRODUCTS FACILITY AIRPORT ROAD	PO BOX 760	MINERAL WELLS TX 76067–0760
20093	ELECTRICAL INDUSTRIES SUB OF NORTH AMERICAN PHILLIPS CORP	691 CENTRAL AVE	MURRAY HILL NJ 07974–1507
21845	SOLITRON DEVICES INC	3301 ELECTRONICS WAY	WEST PALM BEACH, FL 33407
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
23499	JUDD WIRE INC.	870 LOS VALLECITOS BLVD.	SAN MARCOS, CA 92069
24226	GOWANDA ELECTRONICS CORP	NO 1 INDUSTRIAL PL	GOWANDA NY 14070–1409
24355	ANALOG DEVICES INC	1 TECHNOLOGY DRIVE	NORWOOD MA 02062
24546	DALE ELECTRONICS A VISHAY INTERTECHNOLOGY INC CO	550 HIGH ST	BRADFORD PA 16701–3737
26364	COMPONENTS CORP	6 KINSEY PLACE	DENVILLE NJ 07834–2611
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051–0606
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507–2114
33096	COLORADO CRYSTAL CORP	2303 W 8TH ST	LOVELAND CO 80537–5268
34361	OMRON ELECTRONICS INC.	2105 HAMILTON AVE SUITE 160	SAN JOSE, CA 95125
34371	HARRIS SEMICONDUCTOR SEMICONDUCTOR SECTOR	MS 58–71 PO BOX 883	MELBOURNE, FL 32902–0883
34649	INTEL CORP	3065 BOWERS AVE PO BOX 58130	SANTA CLARA CA 95051
48726	UNITRODE INTEGRATED CIRCUITS CORP (UICC)	7 CONTINENTAL BLVD PO BOX 399	MERRIMACK NH 03054–0399
50139	ALLEN–BRADLEY CO ELECTRONIC COMPONENTS	1414 ALLEN BRADLEY DR	EL PASO TX 79936
50434	HEWLETT–PACKARD CO OPTOELECTRONICS DIV	370 W TRIMBLE RD	SAN JOSE CA 95131–1008
50444	HEWLETT–PACKARD CO H P LABORATORIES	1501 PAGE MILL RD	PALO ALTO CA 94304–1126
51406	MURATA ELECTRONICS NORTH AMERICA INC HEADQUARTERS AND GEORGIA OPERATIONS	2200 LAKE PARK DR	SMYRNA GA 30080
52769	SPRAGUE–GOODMAN ELECTRONICS INC	1700 SHAMES DRIVE	WESTBURY, NY 11590
53387	3M COMPANY ELECTRONIC PRODUCTS DIV	3M AUSTIN CENTER	AUSTIN TX 78769–2963
55335	JKL COMPONENTS CORP	13343 PAXTON STREET	PACOIMA CA 91331

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195–4526
56501	THOMAS & BETTS CORP	1555 LYNNFIELD RD	MEMPHIS, TN
56845	DALE ELECTRONICS INC	2300 RIVERSIDE BLVD PO BOX 74	NORFOLK NE 68701–2242
57668	ROHM CORPORATION	15375 BARRANCA PARKWAY SUITE B207	IRVINE CA 92718
58050	TEKA PRODUCTS INC	45 SALEM ST	PROVIDENCE RI 02907
60395	XICOR INC	851 BUCKEYE CT	MILPITAS CA 95035–7408
61429	FOX ELECTRONICS DIV OF FOX ELECTRONICS INC	5842 CORPORATION CIRCLE	FOR MEYERS FL 33905
61935	SCHURTER INC	1016 CLEGG COURT	PETALUMA CA 94952–1152
65654	CHRISTIANA INDUSTRIES CORP	6500 N CLARK ST	CHICAGO IL 62606–4002
7X318	KASO PLSTCS INC	11015 A NE 39th	VANCOUVER WA 98662
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076–9749
75042	IRC ELECTRONIC COMPONENTS PHILADELPHIA DIV TRW FIXED RESISTORS	401 N BROAD ST	PHILADELPHIA PA 19108–1001
75498	MULTICOMP INC	3005 SW 154TH TERRACE #3	BEAVERTON OR 97006
76493	BELL INDUSTRIES INC JW MILLER DIV	306 E ALONDRA BLVD PO BOX 2859	GARDENA, CA 90247–1059
8X345	NORTHWEST SPRING MFG CO	5858 WILLOW LANE	LAKE OSWEGO, OR 97035
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
83701	ELECTRONIC DEVICES INC	21 GREY OAKS AVE	YONKERS NY 10710–3205
9M860	ELECTRONIC SUB ASSEMBLY MFG CORP (ESAM)	930 SE M STREET PO BOX 376	GRANTS PASS OR 97526–3248
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601–3632

Replaceable Electrical Parts

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A1	671–2890–11		B041517	CIRCUIT BD ASSY:POWER SUPPLY	80009	671289011
A1	671–2890–12	B041518		CIRCUIT BD ASSY:POWER SUPPLY	80009	671289012
A2	671–1999–01			CIRCUIT BD ASSY:FRONT PANEL	80009	671199901
A3	672–1342–08		B041385	CIRCUIT BD ASSY:MAIN	80009	672134208
A3	672–1342–09	B041386		CIRCUIT BD ASSY:MAIN	80009	672134208
A3A1	671–1796–01			CIRCUIT BD ASSY:GRATICULE LIGHT	80009	671179600
A4	671–2000–02			CIRCUIT BD ASSY:CONTROL	80009	671200002
A10	671–3637–00			CIRCUIT BD ASSY:CRT SOCKET BD	80009	671363700
A11	671–3761–00			CKT BD ASSY:SERIAL FILTER	80009	671376100
A1	671–2890–11		B041517	CIRCUIT BD ASSY:POWER SUPPLY	80009	671289011
A1	671–2890–12	B041518		CIRCUIT BD ASSY:POWER SUPPLY	80009	671289012
A1C1	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C2	283–0021–00			CAP,FXD,CER DI:0.001UF,20%,5000V	TK2058	TCK45YS3H102M–A
A1C3	283–0261–00			CAP,FXD,CER DI:0.01UF,20%,4000V	18796	DHR28Z5U103M4KV
A1C4	283–0261–00			CAP,FXD,CER DI:0.01UF,20%,4000V	18796	DHR28Z5U103M4KV
A1C5	285–1341–01			CAP,FXD,PLSTC:MTLZD FILM;0.1UF,20%,100V,POLYESTER	TK1913	MKS 2 0.1UF 20%
A1C6	281–0771–00			CAP,FXD,CER DI:2200PF,20%,200V	04222	SA102C222MAA
A1C7	285–1470–00			CAP,FXD,PLSTC:MTLZD FILM;330PF,1600VDC/500VAC	TK1913	FKP1 330/1600/5
A1C8	283–0261–00			CAP,FXD,CER DI:0.01UF,20%,4000V	18796	DHR28Z5U103M4KV
A1C9	283–0261–00			CAP,FXD,CER DI:0.01UF,20%,4000V	18796	DHR28Z5U103M4KV
A1C10	281–0563–00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X 0.290	04222	SA305E474MAA
A1C11	283–0021–00			CAP,FXD,CER DI:0.001UF,20%,5000V	TK2058	TCK45YS3H102M–A
A1C12	281–0707–00			CAP,FXD,CER DI:15000PF,10%,200V	04222	MA302C153KAA
A1C13	281–0707–00			CAP,FXD,CER DI:15000PF,10%,200V	04222	MA302C153KAA
A1C14	281–0707–00			CAP,FXD,CER DI:15000PF,10%,200V	04222	MA302C153KAA
A1C15	285–1341–01			CAP,FXD,PLSTC:MTLZD FILM;0.1UF,20%,100V,POLYESTER	TK1913	MKS 2 0.1UF 20%
A1C16	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A1C17	285–1341–01			CAP,FXD,PLSTC:MTLZD FILM;0.1UF,20%,100V,POLYESTER	TK1913	MKS 2 0.1UF 20%
A1C18	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C19	290–1310–00			CAP,FXD,ALUM:10UF,20%,160V,ESR=24.9 OHM(120HZ,20C)	0H1N5	CEJSM2C100M
A1C20	281–0707–00			CAP,FXD,CER DI:15000PF,10%,200V	04222	MA302C153KAA
A1C21	281–0707–00			CAP,FXD,CER DI:15000PF,10%,200V	04222	MA302C153KAA
A1C22	281–0563–00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X 0.290	04222	SA305E474MAA
A1C23	285–1328–00			CAP,FXD,PLSTC:MTLZD FILM;0.01UF,5%,2000V	TK1913	FKP1 .01/2000/5
A1C24	290–1310–00			CAP,FXD,ALUM:10UF,20%,160V,ESR=24.9 OHM(120HZ,20C)	0H1N5	CEJSM2C100M
A1C25	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C27	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C28	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C29	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C30	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C31	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C32	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C33	290–1310–00			CAP,FXD,ALUM:10UF,20%,160V,ESR=24.9 OHM(120HZ,20C)	0H1N5	CEJSM2C100M
A1C34	290–1310–00			CAP,FXD,ALUM:10UF,20%,160V,ESR=24.9 OHM(120HZ,20C)	0H1N5	CEJSM2C100M

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A1C35	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C36	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C37	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C38	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C39	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C40	281–0772–00			CAP,FXD,CERAMIC:MLC;4700PF,10%,100V	04222	SA101C472KAA
A1C41	281–0563–00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X 0.290	04222	SA305E474MAA
A1C42	290–1267–00			CAP,FXD,ALUM:560UF,20%,50V,ESR=0.40 OHM (100KHZ,20C)	0H1N5	CEEFM1H561M7
A1C43	281–0563–00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X 0.290	04222	SA305E474MAA
A1C44	285–1331–00			CAP,FXD,MTLZD:0.47UF,5%,400V	TK1913	MKS4 .47/400/5
A1C45	281–0563–00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X 0.290	04222	SA305E474MAA
A1C46	283–0005–03			CAP,FXD,CER DI:0.01 UF,+80–20%,250V	04222	SR30VE103ZAATR2
A1C47	283–0059–00			CAP,FXD,CERAMIC:MLC;1.0UF,20%,50V,0.150 X 0.290	04222	SA305E474MAA
A1C48	281–0809–00			CAP,FXD,CERAMIC:MLC;200 PF,5%,100V,0.100 X 0.170	04222	SA101A201JAA
A1C49	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C50	281–0563–00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X 0.290	04222	SA305E474MAA
A1C51	281–0773–00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A1C52	281–0773–00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A1C53	285–1437–00			CAP,FXD,PLSTC:100PF,5%,1600VDC/500VAC	TK1913	FKP1/100/1600/5
A1C54	290–1275–00			CAP,FXD,ALUM:330UF,20%,400V,35X35MM,105C	55680	LGQ2G331MHSC
A1C56	285–1246–00			CAP,FXD,PPR DI:0.022UF,20%,250VAC	TK0515	PME 289 MB 5220
A1C57	285–1222–00			CAP,FXD,PLSTC:0.068UF,20%,250V	TK0515	PME 271 M 568
A1C58	281–0809–00			CAP,FXD,CERAMIC:MLC;200 PF,5%,100V,0.100 X 0.170	04222	SA101A201JAA
A1C59	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C60	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A1C65	285–1301–01			CAP,FXD,MTLZD:0.47UF,10%,50VTAPE & AMMO PACK	TK1913	MKS 2 .47/50 OR
A1C66	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A1CR1	152–0061–00			DIODE,SIG:200V,0.1A,700NS,4.0PF	12969	PV122
A1CR2	152–0061–00			DIODE,SIG:200V,0.1A,700NS,4.0PF	12969	PV122
A1CR3	152–0061–00			DIODE,SIG:200V,0.1A,700NS,4.0PF	12969	PV122
A1CR4	152–0409–00			DIODE,RECT:FAST RCVRY;12KV,10MA,250NS	83701	CRVT150
A1CR5	152–0061–00			DIODE,SIG:200V,0.1A,700NS,4.0PF	12969	PV122
A1CR6	152–0061–00			DIODE,SIG:200V,0.1A,700NS,4.0PF	12969	PV122
A1CR7	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR8	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR9	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR10	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR11	152–0808–00			DIODE,RECT:ULTRA FAST;150V,3A,1.1VF,30NS	0LUA3	BYV28–150
A1CR12	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR13	152–1191–00			DIODE,RECT:SCHTKY;100V,10A,150A IFSM,800MAF AT 10A	04713	MBR10100
A1CR14	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR15	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR16	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A1CR17	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR19	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A1CR20	152–0897–00			DIODE,RECT:FAST RCVRY;1000V,1.5A,300NS	0LUA3	BYV96E
A1CR21	152–1165–00			DIODE,RECT:ULTRA FAST;600V,4A,50NS	04713	MUR460RL
A1CR22	152–1165–00			DIODE,RECT:ULTRA FAST;600V,4A,50NS	04713	MUR460RL
A1CR23	152–1165–00			DIODE,RECT:ULTRA FAST;600V,4A,50NS	04713	MUR460RL
A1CR24	152–1165–00			DIODE,RECT:ULTRA FAST;600V,4A,50NS	04713	MUR460RL
A1CR25	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A1CR26	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A1CR27	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936

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A1CR29	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1CR30	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A1CR31	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A1DS1	150–0050–00			LAMP,GLOW:135V MAX,1.9MA,C2A–T,WIRE LEAD	0J9R2	NE–2Q–11R–T
A1DS2	150–0050–00			LAMP,GLOW:135V MAX,1.9MA,C2A–T,WIRE LEAD	0J9R2	NE–2Q–11R–T
A1DS3	150–0050–00			LAMP,GLOW:135V MAX,1.9MA,C2A–T,WIRE LEAD	0J9R2	NE–2Q–11R–T
A1DS4	150–0050–00			LAMP,GLOW:135V MAX,1.9MA,C2A–T,WIRE LEAD	0J9R2	NE–2Q–11R–T
A1F1	159–0021–00			FUSE,CARTRIDGE:3AG,2A,250V,FAST BLOW *MOUNTING PARTS*	71400	AGC–2
	200–2264–00			CAP,FUSEHOLDER:3AG FUSES	61935	FEK 031 1666
	204–0906–00			BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES *END MOUNTING PARTS*	61935	TYPE FAU 031.35
A1J1	131–5338–00			CONN,HDR:PCB/WIREWRAP;MALE,STR,1 X 7,0.15CTR, 0.230 MLG X 0.285 TAIL,30 GLD,SIDE BY SIDE STACKABLE	22526	65561–107
A1J2	131–4794–00			CONN,HDR:PCB;MALE,STR,1 X 2,0.1 CTR,0.235MLG X 0.112 TAIL,30 GOLD,0.035 DIA PCB	53387	2402–6112 UB
A1J3	131–5337–00			CONN,HDR:PCB/WIREWRAP;MALE,STR,1 X 4,0.150	22526	65561–104
A1J4	131–3392–00			CONN,HDR:PCB;MALE,STR,1 X 10,0.1 CTR,0.230	00779	1–102844–1
A1J6	119–1946–00			FILTER,RFI:1A,250V,400HZ W/PC TERMINAL	0GV52	FX326–1/02–K–D–
A1L1	108–1412–00			IDCTR,FXD:POWER;4.7UH,20%,I<3.7A,RDC<0.017 OHM,Q>10,SRF>30MHZ,BOBBIN	TK2058	TSL0807–4R7M3R0
A1L2	108–1412–00			IDCTR,FXD:POWER;4.7UH,20%,I<3.7A,RDC<0.017 OHM,Q>10,SRF>30MHZ,BOBBIN	TK2058	TSL0807–4R7M3R0
A1L3	108–1412–00			IDCTR,FXD:POWER;4.7UH,20%,I<3.7A,RDC<0.017 OHM,Q>10,SRF>30MHZ,BOBBIN	TK2058	TSL0807–4R7M3R0
A1L4	108–0205–00			IDCTR,FXD:POWER;1MH,5%,IDC<400 MA,RDC<2.12 OHM,Q>47@0.25MHZ	76493	8209
A1Q1	151–0749–00			XSTR,SIG:BIPOLAR,PNP;400V,500MA,50MHZ,AMPLIFIER	04713	MPSA94
A1Q2	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A1Q3	151–0350–03			XSTR,SIG:BIPOLAR,PNP;150V,600MA,100MHZ,AMPLIFIER	04713	2N5401RLRP
A1Q4	151–0347–02			XSTR,SIG:BIPOLAR,NPN;160V,600MA,100MHZ,AMPLIFIER	04713	2N5551RLRP
A1Q5	151–0350–03			XSTR,SIG:BIPOLAR,PNP;150V,600MA,100MHZ,AMPLIFIER	04713	2N5401RLRP
A1Q6	151–0476–00			XSTR,PWR:BIPOLAR,NPN;100V,3.0A,3.0MHZ,AMPLIFIER *ATTACHED PARTS*	04713	TIP31C
	214–3848–00			HTSK,SEMIC:XSTR,TO–220;ALUM,CLIP–ON,BLCK ANDZ *END ATTACHED PARTS*	13103	6043PB
A1Q7	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A1Q8	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A1Q9	151–1286–00			XSTR,PWR:MOS,N–CH;800V,4.0A,3.0 OHM *ATTACHED PARTS*	0LUA3	BUK456–800A
	210–0406–00			NUT,PLAIN,HEX:4–40 X 0.188,BRS CD PL	73743	12161–50
	211–0008–00			SCREW,MACHINE:4–40 X 0.25,PNH,STL	TK0435	ORDER BY DESC
	214–3841–00			HEAT SINK,SEMIC:XSTR,TO–220;VERT MT,(2)SOLDERABLE TABS,ALUM,BLACK ANDZ *END ATTACHED PARTS*	13103	6021PB
A1Q10	151–0350–03			XSTR,SIG:BIPOLAR,PNP;150V,600MA,100MHZ,AMPLIFIER	04713	2N5401RLRP
A1Q11	151–0528–00			THYRISTOR,PWR:BIPOLAR,SCR;50V,16A RMS,PHASE	0LUA3	BT152–400R
A1R1	303–0155–00			RES,FXD,CMPSN:1.5M OHM,5%,1W	50139	GB1555
A1R2	301–0225–02			RES,FXD,CMPSN:2.2M OHM,5%,0.5W	50139	EB2255
A1R3	303–0155–00			RES,FXD,CMPSN:1.5M OHM,5%,1W	50139	GB1555
A1R4	303–0155–00			RES,FXD,CMPSN:1.5M OHM,5%,1W	50139	GB1555
A1R5	303–0155–00			RES,FXD,CMPSN:1.5M OHM,5%,1W	50139	GB1555
A1R7	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A1R8	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A1R11	311–1256–00			RES,VAR,TRMR:CERMET;2.5M OHM,10%,0.5W,0.375	32997	3386F–1–255
A1R12	315–0471–03			RES,FXD,CMPSN:470 OHM,5%,0.25W	50139	CB4715
A1R13	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A1R14	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R20	322–3248–00			RES,FXD,FILM:3.74K OHM,1%,0.2W,TC=T0	91637	CCF50G37400F

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A1R22	322–3329–00			RES,FXD,FILM:26.1K OHM.1%,0.2W,TC=T0M	91637	CCF501G26101F
A1R24	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A1R25	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A1R26	322–3452–00			RES,FXD,FILM:499K OHM,1%,0.2W,TC=TOMI,SMALL	91637	CCF50–2–G4993FT
A1R27	322–3300–02			RES,FXD,FILM:13K OHM,0.5%,0.2W,TC=T2	91637	CCF501D13001D
A1R28	322–3344–00			RES,FXD,FILM:37.4K OHM,1%,0.2W,TC=T0MI	91637	CCF501G37401F
A1R29	315–0470–03			RES,FXD,CMPSN:47 OHM,5%,0.25W	50139	CB4705
A1R30	315–0103–03			RES,FXD,CMPSN:10K OHM,5%,0.25W	50139	CB1035
A1R31	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A1R32	322–3452–00			RES,FXD,FILM:499K OHM,1%,0.2W,TC=TOMI,SMALL	91637	CCF50–2–G4993FT
A1R33	322–3300–02			RES,FXD,FILM:13K OHM,0.5%,0.2W,TC=T2	91637	CCF501D13001D
A1R34	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A1R35	322–3162–00			RES,FXD:METAL FILM;475 OHM,1%,0.2W,TC=100 PPM	91637	CCF50G475R0F
A1R36	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A1R37	322–3034–00			RES,FXD:METAL FILM;22.1 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G22R10F
A1R38	315–0226–01			RES,FXD,CMPSN:22 M OHM,5%,0.25W	50139	CB2265
A1R39	315–0471–03			RES,FXD,CMPSN:470 OHM,5%,0.25W	50139	CB4715
A1R40	315–0103–03			RES,FXD,CMPSN:10K OHM,5%,0.25W	50139	CB1035
A1R41	322–3121–00			RES,FXD:METAL FILM;178 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G178R0F
A1R42	322–3402–00			RES,FXD:METAL FILM;150K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G15002F
A1R43	315–0471–03			RES,FXD,CMPSN:470 OHM,5%,0.25W	50139	CB4715
A1R44	315–0471–03			RES,FXD,CMPSN:470 OHM,5%,0.25W	50139	CB4715
A1R45	311–2239–00			RES,VAR,TRMR:CERMET;100K OHM,20%,0.5W,0.197	TK2073	GF06UT2 104 M L
A1R46	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R47	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A1R48	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0MI	91637	CCF501G30100F
A1R49	311–2236–00			RES,VAR,TRMR:CERMET,20K OHM,20%,0.5W,SIDE ADJUST	TK2073	GF06UT2 203 M L20
A1R50	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R51	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A1R52	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R53	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R54	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A1R55	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A1R56	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R57	322–3034–00			RES,FXD:METAL FILM;22.1 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G22R10F
A1R58	311–2239–00			RES,VAR,TRMR:CERMET;100K OHM,20%,0.5W,0.197	TK2073	GF06UT2 104 M L
A1R59	322–3485–07			RES,FXD,FILM:5K OHM,0.1%,0.2W,TC=T9	91637	CCF501C50000B
A1R60	322–3268–00			RES,FXD,FILM:6.04K OHM,1%,0.2W,TC=T0MI	91637	CCF501G60400F
A1R61	322–3034–00			RES,FXD:METAL FILM;22.1 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G22R10F
A1R62	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A1R63	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A1R64	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A1R65	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A1R66	322–3452–00			RES,FXD,FILM:499K OHM,1%,0.2W,TC=TOMI,SMALL	91637	CCF50–2–G4993FT
A1R67	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R68	322–3121–00			RES,FXD:METAL FILM;178 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G178R0F
A1R69	322–3289–07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R	91637	CCF501C10001B
A1R70	322–3289–07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R	91637	CCF501C10001B
A1R71	322–3418–00			RES,FXD:METAL FILM;221K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G22102F
A1R72	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R73	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A1R74	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A1R75	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A1R76	322–3248–00			RES,FXD,FILM:3.74K OHM,1%,0.2W,TC=T0	91637	CCF50G37400F
A1R77	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A1R78	322–3248–00			RES,FXD,FILM:3.74K OHM,1%,0.2W,TC=T0	91637	CCF50G37400F
A1R79	322–3356–00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0MI	91637	CCF501G49901F
A1R80	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F

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A1R81	322–3121–00			RES,FXD:METAL FILM;178 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G178R0F
A1R82	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A1R83	322–3289–07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R	91637	CCF501C10001B
A1R84	322–3315–00			RES,FXD,FILM:18.7K OHM,1%,0.2W,TC=T0MI	91637	CCF501G18701F
A1R85	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A1R86	308–0793–00			RES,FXD:0.51 OHM,5%,1WTC=150PPM/DEG C,MI	75042	BW20 .51OHM 5PE
A1R87	322–3034–00			RES,FXD:METAL FILM;22.1 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G22R10F
A1R88	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A1R89	307–0746–00			RES,THERMAL:5 OHM,10%,7A/DEG C	15454	SG200–S STRAI
A1R90	305–0242–00			RES,FXD,CMPSN:2.4K OHM,5%,2W	11502	GF–3 OR GS–3 24
A1R91	306–0104–00			RES,FXD,CMPSN:100K OHM,10%,2W	24546	FP42 OR FP2 100
A1R92	306–0104–00			RES,FXD,CMPSN:100K OHM,10%,2W	24546	FP42 OR FP2 100
A1R93	322–3402–00			RES,FXD:METAL FILM;150K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G15002F
A1R94	322–3402–00			RES,FXD:METAL FILM;150K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G15002F
A1R95	322–3256–00			RES,FXD,FILM:4.53K OHM,1%,0.2W,TC=T0MI	91637	CCF50–2–G4531FT
A1R96	322–3356–00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0MI	91637	CCF501G49901F
A1R97	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A1R98	322–3289–07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R	91637	CCF501C10001B
A1R99	311–2239–00			RES,VAR,TRMR:CERMET;100K OHM,20%,0.5W,0.197	TK2073	GF06UT2 104 M L
A1R101	322–3068–00			RES,FXD:METAL FILM;49.9 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G49R90F
A1R102	308–0290–00			RES,FXD,WW:8 OHM,5%,5W	91637	CW52–8R000J T/R
A1R103	322–3452–00			RES,FXD,FILM:499K OHM,1%,0.2W,TC=TOMI,SMALL	91637	CCF50–2–G4993FT
A1T1	120–1695–00			TRANSFORMER,PWR:HIGH VOLTAGE,FEEDBACK 3V, RESONANT 231V, 100V 1MA,2750V 3.3MA, 6.3V 86MA	75498	120–1695–00
A1T2	120–1945–00			XFMR,RF:PRI 8UH,2:7,ON–OFF,VERTICAL MT,PC MT	0JR03	120–1945–00
A1T3	120–1944–00			TRANSFORMER,RF:PRI 88V,PRI 15V,SEC 40V AT 0.385A,5V AT 2A,15V AT 0.80,IDED,PC MOUNT,1.45 X 1.7 X 1.17H	75498	129–2074–EC
A1TP1	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A1TP2	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A1U1	152–0900–00			MODULE,HV:7.5KVAC IN,15KVDC OUT,POTTED MODULE	51406	MSL2556
A1U2	156–0067–00			IC,LINEAR:BIPOLAR,OP–AMP	01295	UA741CP
A1U3	156–1225–00			IC,LINEAR:BIPOLAR,COMPTR;DUAL,OPEN COLL,300NS	01295	LM393P
A1U4	156–2761–01			IC,DIGITAL:HCMOS,MULTIVIBRATOR	0JR04	TC74HC221AP
A1U5	156–2524–00			IC,LINEAR:BIPOLAR,SW–REGULATOR CONTROLLER;PWM, CURRENT MODE,SINGLE TOTEM POLE OUTPUT	48726	UC3842N
A1VR1	156–1631–01			IC,LINEAR:BIPOLAR,VR;ADJUST,SHUNT,100MA,2.2%	01295	TL431CLPM
A1VR2	152–0195–00			DIODE,ZENER:5.1V,5%,0.4W	04713	MZ5523D
A1VR3	152–0195–00			DIODE,ZENER:5.1V,5%,0.4W	04713	MZ5523D
A1VR4	152–0149–00			DIODE,ZENER:10V,5%,0.4W	04713	1N961BRL
A1VR5	152–0287–00			DIODE,ZENER:110V,5%,0.4W	04713	1N986BRL
A1VR6	152–0287–00			DIODE,ZENER:110V,5%,0.4W	04713	1N986BRL
A1W1	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA0207
A1W2	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA0207
A1W3	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA0207
A1W4	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA0207
A2	671–1999–01			CIRCUIT BD ASSY:FRONT PANEL	80009	671199901
A2DS116	150–1286–00			DIODE,OPTO:LED;ASSEMBLY,GRN,150–1109–00 IN	TK1155	150–1286–00
A2DS118	————————			(PART OF A2DS116)		
A2DS132	150–1290–00			DIODE,OPTO:LED;ASSEMBLY,GRN,150–1109–00 IN	TK1155	150–1290–00
A2DS133	————————			(PART OF A2DS132)		
A2DS134	————————			(PART OF A2DS132)		
A2DS146	150–1286–00			DIODE,OPTO:LED;ASSEMBLY,GRN,150–1109–00 IN	TK1155	150–1286–00
A2DS147	————————			(PART OF A2DS146)		
A2DS227	150–1283–00			LED ASSEMBLY:DIRECTIONAL;1 IN 1	TK1155	150–1283–00
A2DS247	150–1289–00			LED ASSEMBLY:DIRECTIONAL;2 IN 3 GREEN	TK1155	150–1289–00

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A2DS249	————————			(PART OF A2DS247)		
A2DS323	150–1282–00			DIODE,OPTO:LED;ASSEMBLY,GRN,150–1109–00 IN	TK1155	150–1282–00
A2DS521	150–1289–00			LED ASSEMBLY:DIRECTIONAL;2 IN 3 GREEN	TK1155	150–1289–00
A2DS522	————————			(PART OF A2DS521)		
A2DS523	150–1282–00			DIODE,OPTO:LED;ASSEMBLY,GRN,150–1109–00 IN	TK1155	150–1282–00
A2J101	174–2409–00			CA ASSY,SP,ELEC:34,28 AWG,12.0 L,RIBBON	80009	174240900
A2R100	311–2402–00			ENCODER,OPTICAL:120 CYCLES PER REVOLUTION,0825 SQ,0.375–32 BUSHING,0.25O SHAFT	50434	HRPG–ASCA14R
				ATTACHED PARTS		
	366–0718–00			KNOB:0.588 OD X 0.253 ID X 0.607 H,GREY W/WHITE INDEX SLOT	7X318	366–0718–00
				END ATTACHED PARTS		
A2R203	307–0488–00			RES NTWK,FXD,FI:5 100 OHM,20%,0.75W	11236	750–61R100 OHM
A2R212	311–2540–00			RES,VAR,PNL:CP,20K OHM,20%,0.5W,LIN,W/ GNDNG LUG	12697	311–2540–00
				ATTACHED PARTS		
	214–4725–00			SPRING:COMPRESSION SPRING,0.026,302 STNLSS STEEL	8X345	214–4725–00
	366–1701–01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366170101
				END ATTACHED PARTS		
A2R232	307–0488–00			RES NTWK,FXD,FI:5 100 OHM,20%,0.75W	11236	750–61R100 OHM
A2R235	307–0488–00			RES NTWK,FXD,FI:5 100 OHM,20%,0.75W	11236	750–61R100 OHM
A2R412	311–2540–00			RES,VAR,PNL:CP,20K OHM,20%,0.5W,LIN,W/ GRNDNG LUG	12697	311–2540–00
				ATTACHED PARTS		
	214–4725–00			SPRING:COMPRESSION SPRING,0.026,302 STNLSS STEEL	8X345	214–4725–00
	366–1701–01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366170101
				END ATTACHED PARTS		
A2R429	311–2540–00			RES,VAR,PNL:CP,20K OHM,20%,0.5W,LIN,W/ GRNDNG LUG	12697	311–2540–00
				ATTACHED PARTS		
	214–4725–00			SPRING:COMPRESSION SPRING,0.026,302 STNLSS STEEL	8X345	214–4725–00
	366–1701–01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366170101
				END ATTACHED PARTS		
A2R443	311–2540–00			RES,VAR,PNL:CP,20K OHM,20%,0.5W,LIN,W/ GRNDNG LUG	12697	311–2540–00
				ATTACHED PARTS		
	214–4725–00			SPRING:COMPRESSION SPRING,0.026,302 STNLSS STEEL	8X345	214–4725–00
	366–1701–01			KNOB:GY,0.127 ID X 0.392 OD X 0.4 H	80009	366170101
				END ATTACHED PARTS		
A2S108	260–2300–00			SWITCH,SIG:SPST;PUSH,MOM,NO,W/GND TERM,MNL INSERTION,100 GRAMS,SILVER,SEALED	34361	B3F1152
				ATTACHED PARTS		
	366–0616–00			PUSH BUTTON:0.585 X 0.3 X 0.150	7X318	ORDER BY DESC
				END ATTACHED PARTS		
A2S125	260–2300–00			SWITCH,SIG:SPST;PUSH,MOM,NO,W/GND TERM,MNL INSERTION,100 GRAMS,SILVER,SEALED	34361	B3F1152
				ATTACHED PARTS		
	366–0616–00			PUSH BUTTON:0.585 X 0.3 X 0.150	7X318	ORDER BY DESC
				END ATTACHED PARTS		
A2S142	260–2300–00			SWITCH,SIG:SPST;PUSH,MOM,NO,W/GND TERM,MNL INSERTION,100 GRAMS,SILVER,SEALED	34361	B3F1152
				ATTACHED PARTS		
	366–0616–00			PUSH BUTTON:0.585 X 0.3 X 0.150	7X318	ORDER BY DESC
				END ATTACHED PARTS		
A2S222	260–2300–00			SWITCH,SIG:SPST;PUSH,MOM,NO,W/GND TERM,MNL INSERTION,100 GRAMS,SILVER,SEALED	34361	B3F1152
				ATTACHED PARTS		
	366–0616–00			PUSH BUTTON:0.585 X 0.3 X 0.150	7X318	ORDER BY DESC
				END ATTACHED PARTS		
A2S243	260–2300–00			SWITCH,SIG:SPST;PUSH,MOM,NO,W/GND TERM,MNL INSERTION,100 GRAMS,SILVER,SEALED	34361	B3F1152
				ATTACHED PARTS		

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	366–0616–00			PUSH BUTTON:0.585 X 0.3 X 0.150 *END ATTACHED PARTS*	7X318	ORDER BY DESC
A2S308	260–2300–00			SWITCH,SIG:SPST;PUSH,MOM,NO,W/GND TERM,MNL INSERTION,100 GRAMS,SILVER,SEALED *ATTACHED PARTS*	34361	B3F1152
	366–0616–00			PUSH BUTTON:0.585 X 0.3 X 0.150 *END ATTACHED PARTS*	7X318	ORDER BY DESC
A2S317	260–2300–00			SWITCH,SIG:SPST;PUSH,MOM,NO,W/GND TERM,MNL INSERTION,100 GRAMS,SILVER,SEALED *ATTACHED PARTS*	34361	B3F1152
	366–0616–00			PUSH BUTTON:0.585 X 0.3 X 0.150 *END ATTACHED PARTS*	7X318	ORDER BY DESC
A2S518	260–2300–00			SWITCH,SIG:SPST;PUSH,MOM,NO,W/GND TERM,MNL INSERTION,100 GRAMS,SILVER,SEALED *ATTACHED PARTS*	34361	B3F1152
	366–0616–00			PUSH BUTTON:0.585 X 0.3 X 0.150 *END ATTACHED PARTS*	7X318	ORDER BY DESC
A3	672–1342–08		B041385	CURCUIT BD ASSY:MAIN	80009	672134208
A3	672–1342–09	B041386		CIRCUIT BD ASSY:MAIN *ATTACHED PARTS*	80009	672134208
	337–0607–00			PLATE,ELEC SHLD:CIRCUIT BOARD (QUANTITY 3) *END ATTACHED PARTS*	0J260	337–0607–00
A3C1	290–0748–00			CAP,FXD,ELCTLT:10UF,+50–20%,25WVDC	0H1N5	CEUST1E100
A3C2	290–0748–00			CAP,FXD,ELCTLT:10UF,+50–20%,25WVDC	0H1N5	CEUST1E100
A3C3	281–0768–00			CAP,FXD,CER DI:470PF,20%,100V	04222	SA101A471KAA
A3C4	281–0768–00			CAP,FXD,CER DI:470PF,20%,100V	04222	SA101A471KAA
A3C5	281–0764–00			CAP,FXD,CER DI:82PF,5%,100V	TK2058	MA12COG2A820J
A3C6	283–0680–00			CAP,FXD,MICA DI:330PF,1%,500V	TK0891	RDM15FD331F03
A3C7	283–0630–01			CAP,FXD,MICA DI:110PF,1%,500V	09023	CDA15FD111F03
A3C8	281–0819–00			CAP,FXD,CERAMIC:MLC;33 PF,5%,50V,0.100 X 0.170	04222	SA102A330JAA
A3C9	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C10	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A3C11	281–0960–00			CAP,FXD,CERAMIC:MLC;10PF,+/–.25PF,200V,NPO,.170X.100	04222	SA102A100CAA
A3C12	283–0680–00			CAP,FXD,MICA DI:330PF,1%,500V	TK0891	RDM15FD331F03
A3C13	283–0630–01			CAP,FXD,MICA DI:110PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD111F03
A3C14	281–0812–00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V	04222	SA101C102KAA
A3C15	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C16	283–0630–01			CAP,FXD,MICA DI:110PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD111F03
A3C17	281–0863–00			CAP,FXD,CERAMIC:MLC;240PF,5%,100V,0.100 X 0.170	04222	SA101A241JAA
A3C18	283–0728–01			CAP,FXD,MICA DI:120PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD121F03
A3C19	283–0766–01			CAP,FXD,MICA DI:47PF,1%,500V,TAPE & AMMO PACK	09023	CDA15ED470D03
A3C20	281–0761–00			CAP,FXD,CERAMIC:MLC;27PF,5%,100V,0.100 X 0.170	04222	SA102A270JAA
A3C21	281–0776–00			CAP,FXD,CERAMIC:MLC;120PF,5%,100V ,0.100 X 0.170	04222	SA102A121JAA
A3C22	283–0640–01			CAP,FXD,MICA DI:160PF,1%,100VTAPE & AMMO PACK	TK0891	ADVISE
A3C23	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C24	281–0759–00			CAP,FXD,CERAMIC:MLC;22PF,10%,100V,0.100 X 0.170	04222	SA102A220KAA
A3C25	290–0748–00			CAP,FXD,ELCTLT:10UF,+50–20%,25WVDC	0H1N5	CEUST1E100
A3C26	283–0633–01			CAP,FXD,MICA DI:77PF,1%,500V,RADIAL	09023	CDA15ED770F03
A3C27	283–0597–00			CAP,FXD,MICA DI:470PF,10%,300V	TK0891	RDM15FD471K03
A3C28	281–0184–00			CAP,VAR,PLSTC:2–18PF,500VDC	TK1727	2222–809–05003
A3C29	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C30	283–0597–00			CAP,FXD,MICA DI:470PF,10%,300V	TK0891	RDM15FD471K03
A3C31	281–0184–00			CAP,VAR,PLSTC:2–18PF,500VDC	TK1727	2222–809–05003
A3C32	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C33	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C34	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA

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A3C35	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C36	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C37	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C38	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C39	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C40	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C41	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C42	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C43	283–0766–01			CAP,FXD,MICA DI:47PF,1%,500V,TAPE & AMMO PACK	09023	CDA15ED470D03
A3C44	283–0766–01			CAP,FXD,MICA DI:47PF,1%,500V,TAPE & AMMO PACK	09023	CDA15ED470D03
A3C45	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C46	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C47	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C48	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C49	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C50	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C51	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A3C52	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C53	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C54	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C55	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C56	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C57	283–0641–00			CAP,FXD,MICA DI:180PF,1%,100V	TK0891	RDM15FD181F03
A3C58	283–0190–00			CAP,FXD,CER DI:0.47UF,5%,50V	04222	SR305C474JAA
A3C59	283–0725–01			CAP,FXD,MICA DI:214PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD(214)F03
A3C60	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C61	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C62	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C63	283–0643–00			CAP,FXD,MICA DI:22PF,0.5%,500V	TK0891	RDM10ED220D03
A3C64	283–0643–00			CAP,FXD,MICA DI:22PF,0.5%,500V	TK0891	RDM10ED220D03
A3C67	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C68	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C69	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C70	283–0663–01			CAP,FXD,MICA DI:16.8PF,500VTAPED & REELED	TK0891	RDM15CD16R8D03
A3C71	281–0813–00			CAP,FXD,CERAMIC:MLC;0.047UF,20%,50V	04222	SA105E473MAA
A3C72	281–0773–00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A3C73	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C74	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C75	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A3C76	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A3C77	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C78	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C79	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C80	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C81	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C82	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C83	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C84	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C85	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C86	281–0864–00			CAP,FXD,CERAMIC:MLC;430PF,5%,100V,0.100 X 0.170	04222	SA101A431JAA
A3C87	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C88	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C89	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C90	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C91	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C92	281–0812–00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V	04222	SA101C102KAA
A3C93	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C94	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3C95	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C96	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C97	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C98	281–0826–00			CAP,FXD,CERAMIC:MLC;2200PF,10%,100V	TK1743	CGB222KEX
A3C99	281–0864–00			CAP,FXD,CERAMIC:MLC;430PF,5%,100V,0.100 X 0.170	04222	SA101A431JAA
A3C100	290–0770–01			CAP,FXD,ALUM:100UF,20%,63V,ESR=1.33 OHM (120HZ,20C)	55680	UVX1J101MPA1TD
A3C101	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C102	281–0826–00			CAP,FXD,CERAMIC:MLC;2200PF,10%,100V	TK1743	CGB222KEX
A3C103	281–0812–00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V	04222	SA101C102KAA
A3C104	283–0663–01			CAP,FXD,MICA DI:16.8PF,500V	TK0891	RDM15CD16R8D03
A3C105	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C106	283–0629–01			CAP,FXD,MICA DI:62PF,1%,500V,TAPE & AMMO PACK	09023	CDA10ED620F03
A3C107	281–0182–00			CAP,VAR,PLSTC:1.8–10PF,300V	19701	2222 809 05216
A3C108	283–0629–01			CAP,FXD,MICA DI:62PF,1%,500V,TAPE & AMMO PACK	09023	CDA10ED620F03
A3C109	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C110	281–0812–00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V	04222	SA101C102KAA
A3C111	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C112	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C113	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C114	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C115	283–0649–01			CAP,FXD,MICA DI:105PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD(105)F03
A3C116	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C117	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A3C118	281–0773–00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A3C119	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C120	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C121	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C122	281–0773–00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A3C123	283–0629–01			CAP,FXD,MICA DI:62PF,1%,500V,TAPE & AMMO PACK	09023	CDA10ED620F03
A3C124	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C125	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C126	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A3C127	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C128	281–0773–00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A3C129	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C130	281–0759–00			CAP,FXD,CERAMIC:MLC;22PF,10%,100V,0.100 X 0.170	04222	SA102A220KAA
A3C131	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A3C132	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C133	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C134	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C135	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C136	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C137	283–0644–01			CAP,FXD,MICA DI:150PF,1%,500VTAPE & AMMO PACK	TK0891	ADVISE
A3C138	283–0728–01			CAP,FXD,MICA DI:120PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD121F03
A3C139	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A3C140	290–0943–00			CAP,FXD,ALUM:47UF,+50–20%,25V,6 X 11MM	0H1N5	CEUSM1E470–Q
A3C141	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A3C142	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C143	283–0644–01			CAP,FXD,MICA DI:150PF,1%,500V	TK0891	ADVISE
A3C144	283–0649–01			CAP,FXD,MICA DI:105PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD(105)F03
A3C145	290–0943–00			CAP,FXD,ALUM:47UF,+50–20%,25V,6 X 11MM	0H1N5	CEUSM1E470–Q
A3C146	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C147	283–0728–01			CAP,FXD,MICA DI:120PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD121F03
A3C148	283–0725–01			CAP,FXD,MICA DI:214PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD(214)F03
A3C149	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C150	290–0943–00			CAP,FXD,ALUM:47UF,+50–20%,25V,6 X 11MM	0H1N5	CEUSM1E470–Q
A3C151	283–0725–01			CAP,FXD,MICA DI:214PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD(214)F03
A3C152	283–0649–01			CAP,FXD,MICA DI:105PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD(105)F03

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A3C153	281–0810–00			CAP,FXD,CERAMIC:MLC;5.6PF,+/–0.5PF,100V,0.100 X 0.170	04222	SA102A5R6DAA
A3C154	281–0819–00			CAP,FXD,CERAMIC:MLC;33 PF,5%,50V,0.100 X 0.170	04222	SA102A330JAA
A3C155	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C156	290–0943–00			CAP,FXD,ALUM:47UF,+50–20%,25V,6 X 11MM	0H1N5	CEUSM1E470–Q
A3C157	281–0898–00			CAP,FXD,CER DI:7.5PF,+/–0.5PF,500VTUBULAR,MI	04222	MA107A7R5DAA
A3C158	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C159	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C160	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C161	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C162	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C163	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C164	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C165	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C166	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C167	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C168	281–0761–00			CAP,FXD,CERAMIC:MLC;27PF,5%,100V,0.100 X 0.170	04222	SA102A270JAA
A3C169	281–0861–00			CAP,FXD,CER DI:270PF,5%,50V	04222	SA101A271JAA
A3C170	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C171	281–0812–00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V	04222	SA101C102KAA
A3C172	281–0759–00			CAP,FXD,CERAMIC:MLC;22PF,10%,100V,0.100 X 0.170	04222	SA102A220KAA
A3C173	281–0861–00			CAP,FXD,CER DI:270PF,5%,50V	04222	SA101A271JAA
A3C174	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A3C175	281–0184–00			CAP,VAR,PLSTC:2–18PF,500VDC	TK1727	2222–809–05003
A3C176	281–0184–00			CAP,VAR,PLSTC:2–18PF,500VDC	TK1727	2222–809–05003
A3C177	281–0826–00			CAP,FXD,CERAMIC:MLC;2200PF,10%,100V	TK1743	CGB222KEX
A3C178	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C179	281–0895–00			CAP,FXD,CER DI:6.8PF,100VDC	04222	SA102A6R8DAA
A3C180	283–0672–01			CAP,FXD,MICA DI:200PF,1%,500VTAPE & AMMO PACK	09023	CDA15FD201F03
A3C181	281–0758–00			CAP,FXD,CERAMIC:MLC;15PF,20%,100V,NPO,0.100	04222	SA102A150MAA
A3C182	283–0631–01			CAP,FXD,MICA DI:95PF,1%,500VTAPED & REELED	TK0891	RDM15FD950F03
A3C183	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C184	283–0051–02			CAP,FXD,CER DI:0.0033UF,5%,100V	TK2058	FK22COG2A332J–T
A3C185	283–0698–01			CAP,FXD,MICA DI:390PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD391F03
A3C186	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C187	283–0785–01			CAP,FXD,MICA DI:250PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD251F03
A3C188	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C189	283–0177–05			CAP,FXD,CER DI:1UF,+80–20%,25V	04222	SR303E105ZAAAP1
A3C190	283–0058–02			CAP,FXD,CER DI:0.027UF,10%,100V	04222	SR591C273KAAAP1
A3C191	290–0746–00			CAP,FXD,ALUM:47UF,+50%–20%,16V,0.562 X0.351	55680	UVX1J470MPA
A3C192	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C193	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C194	290–0746–00			CAP,FXD,ALUM:47UF,+50%–20%,16V,0.562 X0.351	55680	UVX1J470MPA
A3C195	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C196	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C197	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C198	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C199	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C200	281–0756–00			CAP,FXD,CER:MLC;2.2PF,+/–0.5PF,200V,NPO,0.100 X 0.170	04222	SA102A2R2DAA
A3C201	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C202	283–0630–01			CAP,FXD,MICA DI:110PF,1%,500V,TAPE & AMMO PACK	09023	CDA15FD111F03
A3C203	281–0765–00			CAP,FXD,CER DI:100PF,5%,100V	04222	SA102A101JAA
A3C204	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A3C205	290–0848–00			CAP,FXD,ALUM:47UF,20%,16V,ESR=7.05 OHM(120HZ,25C)	0H1N5	CEBPM1E470M
A3C206	281–0756–00			CAP,FXD,CER:MLC;2.2PF,+/–0.5PF,200V,NPO,0.100 X 0.170	04222	SA102A2R2DAA
A3C207	281–0756–00			CAP,FXD,CER:MLC;2.2PF,+/–0.5PF,200V,NPO,0.100 X 0.170	04222	SA102A2R2DAA
A3C208	281–0756–00			CAP,FXD,CER:MLC;2.2PF,+/–0.5PF,200V,NPO,0.100 X 0.170	04222	SA102A2R2DAA
A3C209	281–0302–00			CAP,VAR,PLSTC:1.2–4PF,100V	52769	GSX367
A3C210	290–0848–00			CAP,FXD,ALUM:47UF,20%,16V,ESR=7.05 OHM(120HZ,25C)	0H1N5	CEBPM1E470M

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A3C211	290–0848–00			CAP,FXD,ALUM:47UF,20%,16V,ESR=7.05 OHM(120HZ,25C)	0H1N5	CEBPM1E470M
A3C212	281–0960–00			CAP,FXD,CERAMIC:MLC;10PF,+/–.25PF,200V,NPO,.170X.100	04222	SA102A100CAA
A3C213	283–0175–00	672–1342–09		CAP,FXD,CER DI:10PF,5%,200V SQUARE	04222	ADVISE
A3CR1	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR2	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR3	152–0269–01			DIODE,SIG:VVC;C4=33PF,5%,C4/C20=2	04713	SMV1263–1
A3CR4	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR5	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR6	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR7	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR11	152–0322–00			DIODE,SIG:SCHTKY;15V,410MVF AT 1MA,1.2PF	50434	5082–2672–T25
A3CR12	152–0322–00			DIODE,SIG:SCHTKY;15V,410MVF AT 1MA,1.2PF	50434	5082–2672–T25
A3CR13	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR14	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR15	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR16	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR17	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR18	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR19	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR20	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR21	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR22	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR23	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR24	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A3CR25	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR26	152–0066–00			DIODE,RECT:400V,1A,IFSM=30A,1.2VF,2US	0LUA3	1N5060
A3CR27	152–0066–00			DIODE,RECT:400V,1A,IFSM=30A,1.2VF,2US	0LUA3	1N5060
A3CR28	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR29	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR30	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR31	152–0066–00			DIODE,RECT:400V,1A,IFSM=30A,1.2VF,2US	0LUA3	1N5060
A3CR32	152–0066–00			DIODE,RECT:400V,1A,IFSM=30A,1.2VF,2US	0LUA3	1N5060
A3CR33	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR34	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR35	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR36	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR37	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR38	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR39	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR40	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR41	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR42	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR43	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR44	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR45	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3J3	131–4794–00			CONN,HDR:PCB;MALE,STR,1 X 2,0.1 CTR,0.235MLG X 0.112 TAIL,30GOLD,0.035 DIA PCB,SAFETY CONTROLLED	53387	2402–6112 UB
A3J4	131–4752–00			CONN,HDR::PCB;MALE,45 DEG,1 X 2,0.1CTR,0.240 MLG X 0.110 TAIL,30 GOLD	58050	082–0243–AS10
A3J6	131–4794–00			CONN,HDR:PCB;MALE,STR,1 X 2,0.1 CTR,0.235MLG X 0.112 TAIL,30GOLD,0.035 DIA PCB,SAFETY CONTROLLED	53387	2402–6112 UB
A3J7	131–4794–00			CONN,HDR:PCB;MALE,STR,1 X 2,0.1 CTR,0.235MLG X 0.112 TAIL,30GOLD,0.035 DIA PCB,SAFETY CONTROLLED	53387	2402–6112 UB
A3J8	131–3528–00			CONN,HDR::PCB;MALE,RTANG,2 X 12,0.1CTR,0.350 H X 0.112 TAIL,SHRD/4 SIDES,0.350 LONG,W/O LATCHES	56501	609–2407
A3J9	175–9797–00			CA ASSY,SP:FLAT FLEX;FLX,10,27 AWG,2.5 L,1 X 10,BOX X STR,SLDR TAB,CONN NON PLZ	TK2469	175–9797–00
A3J16	131–4530–00			CONN,HDR:PCB;MALE,STR,1 X 3,0.1 CTR,0.230MLG X 0.120 TAIL,30GOLD,BD RETENTION	00779	104344–1

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A3J17	131–4530–00			CONN,HDR:PCB;MALE,STR,1 X 3,0.1 CTR,0.230MLG X 0.120 TAIL,30GOLD,BD RETENTION	00779	104344–1
A3JS1	131–4794–00			CONN,HDR:PCB;MALE,STR,1 X 2,0.1 CTR,0.235MLG X 0.112 TAIL,30GOLD,0.035 DIA PCB,SAFETY CONTROLLED	53387	2402–6112 UB
A3JS2	131–4794–00			CONN,HDR:PCB;MALE,STR,1 X 2,0.1 CTR,0.235MLG X 0.112 TAIL,30GOLD,0.035 DIA PCB,SAFETY CONTROLLED	53387	2402–6112 UB
A3L1	108–0395–00			IDCTR,FXD:SIGNAL;64UH,TOROID FORM 276–0557–00	0JR03	108–0395–00
A3L2	108–0317–00			IDCTR,FXD:CUSTOM,PWR;15UH,10%,IDC<460MA,RDC<1.2 OHM,Q>55@2.5MHZ,SRF>30 MHZ,POWDERED IRON	0JR03	108–0317–00
A3L3	108–1503–00			IDCTR,FXD:SIGNAL;6.8UH,10%,IDC<185 MA,RDC<2 OHM,Q>40 (7.9MHZ),SRF=60MHZ	24226	10M681K
A3L4	108–1268–00			IDCTR,FXD:SIGNAL;56UH,10%,IDC<100 MA,RDC<5.7 OHM,Q>45@2.5MHZ,SRF>18 MHZ	24226	10M562K
A3L5	108–1268–00			IDCTR,FXD:SIGNAL;56UH,10%,IDC<100 MA,RDC<5.7 OHM,Q>45@2.5MHZ,SRF>18 MHZ	24226	10M562K
A3L6	108–0317–00			IDCTR,FXD:CUSTOM,PWR;15UH,10%,IDC<460MA,RDC<1.2 OHM,Q>55@2.5MHZ,SRF>30 MHZ,POWDERED IRON	0JR03	108–0317–00
A3L7	108–1343–00			IDCTR,FXD:POWER;100UH,10%,I<0.165A,RDC<3.5 OHM,Q>60,SRF>5.5MHZ	TK2058	SP0305–101K
A3L8	108–1343–00			IDCTR,FXD:POWER;100UH,10%,I<0.165A,RDC<3.5 OHM,Q>60,SRF>5.5MHZ	TK2058	SP0305–101K
A3L9	108–1262–00			IDCTR,FXD:POWER;100UH,10%,I<0.75A,RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807–101KR75
A3L10	114–0478–00			IDCTR,VAR:SHIELDED;11.2–16.8UH,Q>32@14UH,E CORE	02113	SLOT TEN–4–08
A3L11	108–1351–00			IDCTR,FXD:SIGNAL;82UH,10%,IDC<175 MA,RDC<3.2 OHM,Q>60 (2.5MHZ),SRF>6 MHZ	TK2058	SPT0305–820K–2
A3L12	108–1351–00			IDCTR,FXD:SIGNAL;82UH,10%,IDC<175 MA,RDC<3.2 OHM,Q>60 (2.5MHZ),SRF>6 MHZ	TK2058	SPT0305–820K–2
A3L13	108–1504–00			IDCTR,FXD:SIGNAL;33UH,10%,IDC<130 MA,RDC<3.4 OHM,Q>45 (2.52MHZ),SRF>24 MHZ	TK2058	TP0206–330K
A3L14	108–1504–00			IDCTR,FXD:SIGNAL;33UH,10%,IDC<130 MA,RDC<3.4 OHM,Q>45 (2.52MHZ),SRF>24 MHZ	TK2058	TP0206–330K
A3L15	108–1505–00			IDCTR,FXD:SIGNAL;68UH,10%,IDC<92 MA,RDC<6.7 OHM,Q>50 (2.5MHZ),SRF>15MHZ	TK2058	TPT0206–680K
A3L16	108–1505–00			IDCTR,FXD:SIGNAL;68UH,10%,IDC<92 MA,RDC<6.7 OHM,Q>50 (2.5MHZ),SRF>15MHZ	TK2058	TPT0206–680K
A3L17	108–0317–00			IDCTR,FXD:CUSTOM,PWR;15UH,10%,IDC<460MA,RDC<1.2 OHM,Q>55@2.5MHZ,SRF>30 MHZ,POWDERED IRON	0JR03	108–0317–00
A3P1	131–3571–00			CONN,HDR::PCB;MALE,RTANG,2 X 17,0.1CTR,0.350 H X 0.120 TAIL,SHRD/4 SIDES,CTR PLZ,30 GOLD	TK1462	FAP–34–08–2–OAS
A3P16	131–0993–00			CONN,BOX:SHUNT;FEMALE,STR,1 X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,JUMPER	22526	65474–006
A3P17	131–0993–00			CONN,BOX:SHUNT;FEMALE,STR,1 X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,JUMPER	22526	65474–006
A3PS1	131–0993–00			CONN,BOX:SHUNT;FEMALE,STR,1 X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,JUMPER	22526	65474–006
A3PS2	131–0993–00			CONN,BOX:SHUNT;FEMALE,STR,1 X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,JUMPER	22526	65474–006
A3Q1	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q3	151–0198–00			XSTR,SIG:BIPOLAR,NPN;15V,50MA,600MHZ	04713	SPS8811
A3Q4	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q5	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q6	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q7	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q8	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q9	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q10	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q11	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q12	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q13	151–0216–00			XSTR,SIG:BIPOLAR,PNP;25V,100MA,170MHZ,AMPLIFIER	04713	MPS6523

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3Q14	151–1005–00			XSTR,SIG:JFET,N–CH;5V,6MA,2MS,500 OHM	21845	F2233
A3Q15	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q16	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q17	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q21	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q22	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q23	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q24	151–0221–00			XSTR,SIG:BIPOLAR,PNP;12V,80MA,SWITCHING	27014	PN4258
A3Q25	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q26	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q27	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q28	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q29	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q30	151–0710–00			XSTR,SIG:BIPOLAR,NPN;40V,1.0A,50MHZ,AMPLIFIER	04713	MPSW01A
A3Q31	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q32	151–0221–00			XSTR,SIG:BIPOLAR,PNP;12V,80MA,SWITCHING	27014	PN4258
A3Q33	151–0221–00			XSTR,SIG:BIPOLAR,PNP;12V,80MA,SWITCHING	27014	PN4258
A3Q34	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q35	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q36	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q37	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q38	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q39	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q40	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q41	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q42	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q43	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q44	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q45	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q46	151–1025–00			XSTR,SIG:JFET,N–CH;6V,15MA,4.5MS,AMPLIFIER	17856	J304
A3Q47	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q48	151–0347–00			XSTR,SIG:BIPOLAR,NPN;160V,600MA,100MHZ,AMPLIFIER	0JR04	2N5551
A3Q49	151–0347–00			XSTR,SIG:BIPOLAR,NPN;160V,600MA,100MHZ,AMPLIFIER	0JR04	2N5551
A3Q50	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q51	151–1025–00			XSTR,SIG:JFET,N–CH;6V,15MA,4.5MS,AMPLIFIER	17856	J304
A3Q52	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q53	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q54	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q55	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q56	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q57	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q58	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q59	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q60	151–0223–00			XSTR,SIG:BIPOLAR,NPN;15V,500MA,SWITCHING	04713	MPS2369A
A3Q61	151–0195–00			XSTR,SIG:BIPOLAR,NPN;20V,100MA,150MHZ,AMPLIFIER	04713	MPS6521
A3Q62	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q63	151–0195–02			XSTR,SIG:BIPOLAR,NPN;20V,100MA,150MHZ,AMPLIFIER	04713	MPS6521RLRP
A3Q65	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q66	151–0195–02			XSTR,SIG:BIPOLAR,NPN;20V,100MA,150MHZ,AMPLIFIER	04713	MPS6521RLRP
A3Q67	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q68	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q69	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q70	151–0325–00			XSTR,SIG:BIPOLAR,PNP;15V,50MA,SWITCHING	27014	2N5771
A3Q71	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q72	151–0347–00			XSTR,SIG:BIPOLAR,NPN;160V,600MA,100MHZ,AMPLIFIER	0JR04	2N5551
A3Q73	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q74	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q75	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904

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A3Q76	151–0347–00			XSTR,SIG:BIPOLAR,NPN;160V,600MA,100MHZ,AMPLIFIER	0JR04	2N5551
A3Q77	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q78	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q79	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q80	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q81	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q82	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q83	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q84	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q85	151–0195–02			XSTR,SIG:BIPOLAR,NPN;20V,100MA,150MHZ,AMPLIFIER	04713	MPS6521RLRP
A3Q86	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q87	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q88	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q89	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q90	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q91	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q92	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q93	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q94	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q95	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q96	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q97	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q98	151–0188–00			XSTR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0JR04	2N3906
A3Q99	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3Q100	151–0190–00			XSTR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0JR04	2N3904
A3R1	311–2269–00			RES,VAR,NONWW:TRMR,20K OHM,20%,0.5WLINEAR,MI	TK2073	GF06VT2 203 M L
A3R2	311–2269–00			RES,VAR,NONWW:TRMR,20K OHM,20%,0.5WLINEAR,MI	TK2073	GF06VT2 203 M L
A3R3	311–2269–00			RES,VAR,NONWW:TRMR,20K OHM,20%,0.5WLINEAR,MI	TK2073	GF06VT2 203 M L
A3R4	311–2269–00			RES,VAR,NONWW:TRMR,20K OHM,20%,0.5WLINEAR,MI	TK2073	GF06VT2 203 M L
A3R5	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R6	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R7	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R8	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R9	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R10	322–3235–00			RES,FXD:METAL FILM;2.74K OHM,1%,0.2W,TC=100	91637	CCF501G27400F
A3R11	322–3280–00			RES,FXD,FILM:8.06K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G80600F
A3R12	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R13	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R14	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R15	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R16	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R17	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R18	301–0131–00			RES,FXD,FILM:130 OHM,5%,0.5W	TK1727	SFR30 2322–182–
A3R19	322–3235–00			RES,FXD:METAL FILM;2.74K OHM,1%,0.2W,TC=100	91637	CCF501G27400F
A3R20	322–3172–00			RES,FXD,FILM:604 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G604ROF
A3R21	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R22	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R23	322–3315–00			RES,FXD,FILM:18.7K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G18701F
A3R24	322–3356–00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G49901F
A3R25	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R26	322–3356–00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G49901F
A3R27	322–3201–00			RES,FXD:METAL FILM;1.21K OHM,1%,0.2W,TC=100	91637	CCF501G12100F
A3R28	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R29	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R30	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R31	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R32	322–3172–00			RES,FXD,FILM:604 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G604ROF
A3R33	322–3210–00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R34	322–3354–00			RES,FXD:METAL FILM;47.5K OHM,1%,0.2W,TC=100	91637	CCF501G47501F
A3R35	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R36	322–3172–00			RES,FXD,FILM:604 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G604ROF
A3R37	322–3169–00			RES,FXD:METAL FILM;562 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2F562R0F
A3R38	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R39	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R40	322–3356–00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G49901F
A3R41	322–3169–00			RES,FXD:METAL FILM;562 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2F562R0F
A3R42	322–3169–00			RES,FXD:METAL FILM;562 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2F562R0F
A3R43	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R44	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R45	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R46	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R47	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R48	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R49	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R50	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R51	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R52	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R53	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R54	322–3281–00			RES,FXD:METAL FILM;8.25K OHM,1%,0.2W,TC=100	91637	CCF501G82500F
A3R55	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R56	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R57	311–2236–00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 203 M L
A3R58	322–3339–00			RES,FXD:METAL FILM;33.2K OHM,1%,0.2W,TC=100	91637	CCF50–2–G3322FT
A3R59	322–3266–00			RES,FXD,FILM:5.76K OHM,1%,0.2W,TC=T0MI	91637	CCF501G57600F
A3R60	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R61	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R62	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R63	322–3169–00			RES,FXD:METAL FILM;562 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2F562R0F
A3R64	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R65	322–3169–00			RES,FXD:METAL FILM;562 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2F562R0F
A3R66	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	91637	CCF501G500R0F
A3R67	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	91637	CCF501G500R0F
A3R68	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	91637	CCF501G500R0F
A3R69	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	91637	CCF501G500R0F
A3R70	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A3R71	322–3169–00			RES,FXD:METAL FILM;562 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2F562R0F
A3R72	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1500F
A3R73	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A3R74	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R75	322–3169–00			RES,FXD:METAL FILM;562 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2F562R0F
A3R76	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R77	322–3285–00			RES,FXD,FILM:9.09K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G90900F
A3R78	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R79	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R80	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R81	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R82	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R83	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1500F
A3R84	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R85	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R86	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R87	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R88	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R89	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R93	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W,TC=100	91637	CCF501G22100F
A3R94	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R95	322–3218–00			RES,FXD:METAL FILM;1.82K OHM,1%,0.2W,TC=100	91637	CCF501G18200F
A3R96	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R97	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R98	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R99	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R101	322–3154–00			RES,FXD:METAL FILM;392 OHM,1%,0.2W,TC=100 PPM	57668	RB20FX392E
A3R102	322–3339–00			RES,FXD:METAL FILM;33.2K OHM,1%,0.2W,TC=100	91637	CCF50–2–G3322FT
A3R103	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R104	322–3327–00			RES,FXD,FILM:24.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G24901F
A3R105	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R106	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R107	322–3356–00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G49901F
A3R108	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A3R109	322–3356–00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G49901F
A3R110	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A3R111	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R112	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R113	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R114	322–3421–00			RES,FXD,FILM:237K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50–2F23702F
A3R115	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R116	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R117	322–3481–00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A3R118	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R119	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R120	315–0475–00			RES,FXD,FILM:4.7M OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R121	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R122	322–3449–00			RES,FXD,FILM:464K OHM,1%,0.2W,TC=T0MI,SMALL	57668	CRB20 FXE 464K
A3R123	322–3151–00			RES,FXD,FILM:365 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G365ROF
A3R124	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R125	315–0106–00			RES,FXD,FILM:10M OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R126	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R127	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R128	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R129	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R130	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R131	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R132	322–3354–00			RES,FXD:METAL FILM;47.5K OHM,1%,0.2W,TC=100	91637	CCF501G47501F
A3R133	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R134	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R135	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R136	322–3369–00			RES,FXD:METAL FILM;68.1K OHM,1%,0.2W,TC=100	57668	CRB20 FXE 68R1
A3R137	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R138	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R139	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R140	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R141	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R142	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R143	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R144	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R145	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R146	322–3172–00			RES,FXD,FILM:604 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G604ROF
A3R147	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R148	322–3281–00			RES,FXD:METAL FILM;8.25K OHM,1%,0.2W,TC=100	91637	CCF501G82500F
A3R149	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R150	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R151	322–3449–00			RES,FXD,FILM:464K OHM,1%,0.2W,TC=T0MI,SMALL	57668	CRB20 FXE 464K
A3R152	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R153	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R154	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R155	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R156	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R157	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R158	322–3354–00			RES,FXD:METAL FILM;47.5K OHM,1%,0.2W,TC=100	91637	CCF501G47501F
A3R159	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R160	322–3254–00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT
A3R161	311–2236–00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 203 M L
A3R162	322–3141–00			RES,FXD,FILM:287 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G287ROF
A3R163	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R164	322–3339–00			RES,FXD:METAL FILM;33.2K OHM,1%,0.2W,TC=100	91637	CCF50–2–G3322FT
A3R165	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R166	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R167	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R168	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R169	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R170	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R171	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R172	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R173	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R174	322–3389–00			RES,FXD,FILM:110K OHM,1%,0.2W,TC=T0MI,SMALL	56845	CCF–50–2–1103F
A3R175	322–3377–00			RES,FXD:METAL FILM;82.5K OHM,1%,0.2W,TC=100	91637	CCF50–2F82501F
A3R176	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R177	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R178	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R179	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R180	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R181	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R182	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R183	322–3331–00			RES,FXD:METAL FILM;27.4K OHM,1%,0.2W,TC=100	57668	CRB20 FXE 27K4
A3R184	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R185	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	91637	CCF501G500R0F
A3R186	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R187	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R188	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	91637	CCF501G500R0F
A3R189	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R190	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R191	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R192	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R193	322–3396–00			RES,FXD,FILM:130K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50–2–G1303F
A3R194	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R195	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R196	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R197	322–3214–00			RES,FXD,FILM:1.65K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50G16500F
A3R198	322–3214–00			RES,FXD,FILM:1.65K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50G16500F
A3R199	322–3369–00			RES,FXD:METAL FILM;68.1K OHM,1%,0.2W,TC=100	57668	CRB20 FXE 68R1
A3R200	311–2238–00			RES,VAR,TRMR:CERMET;50K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 503 M L
A3R201	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R202	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R203	322–3130–00			RES,FXD:METAL FILM;221 OHM,1%,0.2W,TC=100 PPM	57668	RB20FX221E
A3R204	322–3130–00			RES,FXD:METAL FILM;221 OHM,1%,0.2W,TC=100 PPM	57668	RB20FX221E
A3R205	322–3141–00			RES,FXD,FILM:287 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G287ROF
A3R206	322–3314–00			RES,FXD:METAL FILM;18.2K OHM,1%,0.2W,TC=100	91637	CCF501G18201F
A3R207	311–2236–00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 203 M L
A3R208	322–3314–00			RES,FXD:METAL FILM;18.2K OHM,1%,0.2W,TC=100	91637	CCF501G18201F
A3R209	311–2236–00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 203 M L
A3R210	322–3481–00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A3R211	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R212	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R213	322–3169–00			RES,FXD:METAL FILM;562 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2F562R0F
A3R214	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R215	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R216	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R217	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R218	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R219	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R220	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R221	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R222	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G30100F
A3R223	322–3402–00			RES,FXD:METAL FILM;150K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G15002F
A3R224	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G30100F
A3R225	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R226	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R227	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R228	322–3166–00			RES,FXD,FILM:523 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G523R0F
A3R229	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R230	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R231	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R232	301–0101–00			RES,FXD,FILM:100 OHM,5%,0.5W	TK1727	SFR30 2322–182–
A3R233	322–3158–00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A3R234	322–3158–00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A3R235	322–3481–00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A3R236	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R237	322–3171–00			RES,FXD,FILM:590 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G590R0F
A3R238	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R239	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R240	322–3481–00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A3R241	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R242	322–3281–00			RES,FXD:METAL FILM;8.25K OHM,1%,0.2W,TC=100	91637	CCF501G82500F
A3R243	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R244	311–2236–00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 203 M L
A3R245	322–3162–00			RES,FXD:METAL FILM;475 OHM,1%,0.2W,TC=100 PPM	91637	CCF50G475R0F
A3R246	322–3481–00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A3R247	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R248	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R249	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R250	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R251	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R252	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	91637	CCF501G500R0F
A3R253	322–3487–00			RES,FXD,FILM:500 OHM,1%,0.2W,TC=TO	91637	CCF501G500R0F
A3R254	322–3177–02			RES,FXD,FILM:681 OHM,0.5%,0.2W,TC=T2	91637	CMF501D681ROD
A3R255	322–3172–00			RES,FXD,FILM:604 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G604ROF
A3R256	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R257	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R258	311–2236–00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 203 M L
A3R259	311–2238–00			RES,VAR,TRMR:CERMET;50K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 503 M L
A3R260	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R261	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R263	311–2231–00			RES,VAR,TRMR:CERMET;1K OHM,20%,0.5W,0.197 SQ	TK2073	GF06UT2 102 M L
A3R264	322–3177–02			RES,FXD,FILM:681 OHM,0.5%,0.2W,TC=T2	91637	CMF501D681ROD
A3R265	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R266	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R267	322–3158–00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A3R268	322–3281–00			RES,FXD:METAL FILM;8.25K OHM,1%,0.2W,TC=100	91637	CCF501G82500F
A3R269	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R270	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F

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A3R271	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R272	311–2230–00			RES,VAR,TRMR:CERMET;500 OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 501 M L
A3R273	322–3281–00			RES,FXD:METAL FILM;8.25K OHM,1%,0.2W,TC=100	91637	CCF501G82500F
A3R274	322–3162–00			RES,FXD:METAL FILM;475 OHM,1%,0.2W,TC=100 PPM	91637	CCF50G475R0F
A3R275	322–3357–00			RES,FXD,FILM:51.1K OHM,1%,0.2W,TC=T0TAPED &	91637	CCF501G51101F
A3R276	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R277	311–2231–00			RES,VAR,TRMR:CERMET;1K OHM,20%,0.5W,0.197 SQ	TK2073	GF06UT2 102 M L
A3R278	322–3151–00			RES,FXD,FILM:365 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G365ROF
A3R279	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R280	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R281	322–3151–00			RES,FXD,FILM:365 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G365ROF
A3R282	301–0330–00			RES,FXD,FILM:33 OHM,5%,0.5W	TK1727	SFR30 2322–182–
A3R283	322–3177–02			RES,FXD,FILM:681 OHM,0.5%,0.2W,TC=T2	91637	CMF501D681ROD
A3R284	322–3162–00			RES,FXD:METAL FILM;475 OHM,1%,0.2W,TC=100 PPM	91637	CCF50G475R0F
A3R285	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R286	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R287	322–3266–00			RES,FXD,FILM:5.76K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G57600F
A3R288	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R289	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W,TC=100	91637	CCF50–1–G33200F
A3R290	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R291	322–3201–00			RES,FXD:METAL FILM;1.21K OHM,1%,0.2W,TC=100	91637	CCF501G12100F
A3R292	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R293	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R294	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R295	322–3354–00			RES,FXD:METAL FILM;47.5K OHM,1%,0.2W,TC=100	91637	CCF501G47501F
A3R296	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R297	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R298	322–3172–00			RES,FXD,FILM:604 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G604ROF
A3R299	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R300	322–3201–00			RES,FXD:METAL FILM;1.21K OHM,1%,0.2W,TC=100	91637	CCF501G12100F
A3R301	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R302	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R303	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W,TC=100	91637	CCF501G22100F
A3R304	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R305	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R306	311–2230–00			RES,VAR,TRMR:CERMET;500 OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 501 M L
A3R307	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W,TC=100	91637	CCF50–1–G33200F
A3R308	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R309	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R310	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R311	322–3266–00			RES,FXD,FILM:5.76K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G57600F
A3R312	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R313	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R314	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W,TC=100	91637	CCF501G22100F
A3R315	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R316	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R317	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R318	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R319	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W,TC=100	91637	CCF50–1–G33200F
A3R320	308–0549–00			RES,FXD,WW:6.3K OHM,1%,3W	91637	RS2B–B63000F
A3R321	308–0549–00			RES,FXD,WW:6.3K OHM,1%,3W	91637	RS2B–B63000F
A3R322	301–0330–00			RES,FXD,FILM:33 OHM,5%,0.5W	TK1727	SFR30 2322–182–
A3R323	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R324	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R325	311–2234–00			RES,VAR,TRMR:CERMET;5K OHM,20%,0.5W,0.197 SQ	TK2073	GF06UT2 502 M L
A3R326	322–3210–00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A3R327	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R328	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W,TC=100	91637	CCF501G22100F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R329	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R330	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R331	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R332	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R333	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R334	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R335	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G30100F
A3R336	322–3326–00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC–T0MI,SMALL BODY	91637	CCF50–2F24301F
A3R337	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R338	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R339	311–2234–00			RES,VAR,TRMR:CERMET;5K OHM,20%,0.5W,0.197 SQ	TK2073	GF06UT2 502 M L
A3R340	322–3277–00			RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0	91637	CCF501G75000F
A3R341	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R342	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R343	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R344	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R345	322–3305–00			RES,FXD,FILM:14.7K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G1472FT
A3R346	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R347	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R348	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G30100F
A3R349	322–3254–00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT
A3R350	322–3281–00			RES,FXD:METAL FILM;8.25K OHM,1%,0.2W,TC=100	91637	CCF501G82500F
A3R351	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R352	322–3277–00			RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0	91637	CCF501G75000F
A3R353	322–3210–00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A3R354	322–3277–00			RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0	91637	CCF501G75000F
A3R355	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R356	322–3197–00			RES,FXD,FILM:1.1K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11000F
A3R357	322–3277–00			RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0	91637	CCF501G75000F
A3R358	322–3154–00			RES,FXD:METAL FILM;392 OHM,1%,0.2W,TC=100 PPM	57668	RB20FX392E
A3R359	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R360	322–3154–00			RES,FXD:METAL FILM;392 OHM,1%,0.2W,TC=100 PPM	57668	RB20FX392E
A3R361	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R362	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R363	322–3085–00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G75R00F
A3R364	322–3299–00			RES,FXD,FILM:12.7K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G12701F
A3R365	322–3473–00			RES,FXD,FILM:825K OHM,1%,0.2W,TC=100PPM,MI	91637	CCF50–2F82502FT
A3R366	311–2234–00			RES,VAR,TRMR:CERMET;5K OHM,20%,0.5W,0.197 SQ	TK2073	GF06UT2 502 M L
A3R367	322–3396–00			RES,FXD,FILM:130K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50–2–G1303F
A3R368	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R369	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W,TC=100	91637	CCF501G22100F
A3R370	322–3218–00			RES,FXD:METAL FILM;1.82K OHM,1%,0.2W,TC=100	91637	CCF501G18200F
A3R371	311–2236–00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 203 M L
A3R372	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R373	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R374	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R375	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R376	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R377	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R378	322–3295–00			RES,FXD:METAL FILM;11.5K OHM,1%,0.2W,TC=100	91637	CCF50G11501F
A3R379	322–3201–00			RES,FXD:METAL FILM;1.21K OHM,1%,0.2W,TC=100	91637	CCF501G12100F
A3R380	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1500F
A3R381	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R382	322–3297–00			RES,FXD:METAL FILM;12.1K OHM,1%,0.2W,TC=100	91637	CCF501G12101F
A3R383	322–3293–00			RES,FXD:METAL FILM;11K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G11001F
A3R384	322–3152–00			RES,FXD,FILM:374 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G374ROF
A3R385	322–3269–02			RES,FXD,FILM:6.19K OHM,0.2W,5%	91637	CCF501D61900D
A3R386	322–3269–02			RES,FXD,FILM:6.19K OHM,0.2W,5%	91637	CCF501D61900D

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R387	311–2236–00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197SQ	TK2073	GF06UT2 203 M L
A3R388	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A3R389	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R390	322–3154–00			RES,FXD:METAL FILM;392 OHM,1%,0.2W,TC=100 PPM	57668	RB20FX392E
A3R391	322–3335–00			RES,FXD,FILM:30.1K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G30101F
A3R392	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R393	322–3261–00			RES,FXD,FILM:5.11K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50G5111FT
A3R394	322–3311–00			RES,FXD,FILM:16.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	56845	CCF–50–2–1692F
A3R395	322–3254–00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT
A3R396	322–3147–00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A3R397	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R398	322–3152–00			RES,FXD,FILM:374 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G374ROF
A3R399	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R400	322–3326–00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC–T0MI,SMALL BODY	91637	CCF50–2F24301F
A3R401	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R402	322–3354–00			RES,FXD:METAL FILM;47.5K OHM,1%,0.2W,TC=100	91637	CCF501G47501F
A3R403	322–3250–00			RES,FXD:METAL FILM;3.92K OHM,1%,0.2W,TC=100	91637	CCF50–2F39200F
A3R404	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R405	322–3243–00			RES,FXD:METAL FILM;3.32K OHM,1%,0.2W,TC=100	91637	CCF50–1–G33200F
A3R406	322–3232–00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G25500F
A3R407	322–3189–00			RES,FXD,FILM:909 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G909FOR
A3R408	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R409	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R410	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R411	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R412	322–3181–00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G750ROF
A3R413	322–3181–00			RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G750ROF
A3R414	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R415	322–3281–00			RES,FXD:METAL FILM;8.25K OHM,1%,0.2W,TC=100	91637	CCF501G82500F
A3R416	322–3250–00			RES,FXD:METAL FILM;3.92K OHM,1%,0.2W,TC=100	91637	CCF50–2F39200F
A3R417	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R418	322–3265–00			RES,FXD:METAL FILM;5.62K OHM,1%,0.2W,TC=100	91637	CCF501G56200F
A3R419	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R420	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R421	322–3473–00			RES,FXD,FILM:825K OHM,1%,0.2W,TC=100PPM,MI	91637	CCF50–2F82502FT
A3R422	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R423	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R424	322–3262–00			RES,FXD,FILM:5.23K OHM,1%,0.2W,TC=T0	91637	CCF50G52300F
A3R425	322–3346–00			RES,FXD:METAL FILM;39.2K OHM,1%,0.2W,TC=100	91637	CCF50–2–G39201F
A3R426	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A3R427	322–3271–00			RES,FXD,FILM:6.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G–64900
A3R428	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R429	322–3218–00			RES,FXD:METAL FILM;1.82K OHM,1%,0.2W,TC=100	91637	CCF501G18200F
A3R430	322–3273–00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50–2–G68100F
A3R431	322–3218–00			RES,FXD:METAL FILM;1.82K OHM,1%,0.2W,TC=100	91637	CCF501G18200F
A3R432	322–3356–00			RES,FXD,FILM:49.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G49901F
A3R433	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R434	322–3150–00			RES,FXD,FILM:357 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G357R0F
A3R435	322–3246–00			RES,FXD,FILM:3.57K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G35700F
A3R436	322–3268–00			RES,FXD,FILM:6.04K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G60400F
A3R437	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R438	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A3R439	322–3261–00			RES,FXD,FILM:5.11K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50G5111FT
A3R440	322–3277–00			RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0	91637	CCF501G75000F
A3R441	322–3208–00			RES,FXD,FILM:1.43K OHM,1%,0.2W,TC=T0	91637	CCF501G14300F
A3R442	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R443	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R444	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R445	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R446	322–3250–00			RES,FXD:METAL FILM;3.92K OHM,1%,0.2W,TC=100	91637	CCF50–2F39200F
A3R447	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R448	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R449	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R450	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R451	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R452	322–3269–02			RES,FXD,FILM:6.19K OHM,0.2W,5%	91637	CCF501D61900D
A3R453	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R454	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R455	322–3226–00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W,TC=100	91637	CCF501G22100F
A3R456	322–3250–00			RES,FXD:METAL FILM;3.92K OHM,1%,0.2W,TC=100	91637	CCF50–2F39200F
A3R457	322–3306–00			RES,FXD:METAL FILM;15K OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1502F
A3R458	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R459	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R460	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R461	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G30100F
A3R462	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R463	322–3285–00			RES,FXD,FILM:9.09K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G90900F
A3R464	322–3265–00			RES,FXD:METAL FILM;5.62K OHM,1%,0.2W,TC=100	91637	CCF501G56200F
A3R465	322–3189–00			RES,FXD,FILM:909 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G909FOR
A3R466	322–3066–00			RES,FXD:METAL FILM;47.5 OHM,1%,0.2W,TC=100 PPM	09969	CCF502G47R50F
A3R467	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R468	311–2231–00			RES,VAR,TRMR:CERMET;1K OHM,20%,0.5W,0.197 SQ	TK2073	GF06UT2 102 M L
A3R469	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R470	322–3300–02			RES,FXD,FILM:13K OHM,0.5%,0.2W,TC=T2	91637	CCF501D13001D
A3R471	322–3051–00			RES,FXD:METAL FILM;33.2 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE33E2
A3R472	322–3306–00			RES,FXD:METAL FILM;15K OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1502F
A3R473	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R474	322–3318–00			RES,FXD,FILM:MET FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R475	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R476	322–3306–00			RES,FXD:METAL FILM;15K OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1502F
A3R477	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R478	322–3258–00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R479	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R480	322–3277–00			RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0	91637	CCF501G75000F
A3R481	322–3305–00			RES,FXD,FILM:14.7K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G1472FT
A3R482	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R483	322–3239–00			RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G30100F
A3R484	322–3306–00			RES,FXD:METAL FILM;15K OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1502F
A3R485	322–3277–00			RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0	91637	CCF501G75000F
A3R486	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R487	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A3R488	322–3210–00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A3R489	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R490	307–0023–00			RES,FXD,CMPSN:4.7 OHM,10%,0.5W	50139	EB47G1
A3T1	120–1057–00			TRANSFORMER,SIG:TRIFILAR;450–675UH,TOROID CORE 276–0614–00	0JR03	120–1057–00
A3T2	120–1057–00			TRANSFORMER,SIG:TRIFILAR;450–675UH,TOROID CORE 276–0614–00	0JR03	120–1057–00
A3TP1	214–4085–00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A3U1	156–2027–00			IC,DIGITAL:HCMOS,GATE;HEX INV	01295	SN74HC04N
A3U2	156–2460–00			IC,MISC:BIPOLAR,MOD/DEMOD;BALANCED	04713	MC1496P
A3U4	156–1335–00			IC,DGTL:LSTTL,MV;DUAL RETRIGMONOSTABLE	27014	DM96LS02N
A3U5	156–1373–00			IC,DIGITAL:LSTTL,BUFFER/DRIVER;QUAD, 3–STATE	01295	SN74LS125AN
A3U6	160–8083–01			IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,45MA	80009	160808301
				MOUNTING PARTS		

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
	136–0752–00			SOCKET,DIP:PCB;FEMALE,STR,2 X 10,0.3 CTR,0.210 H X 0.128 TAIL,TIN,PHOS BRONZE	00779	2–641602–3
				END MOUNTING PARTS		
A3U7	156–0230–02			IC,DIGITAL:ECL,FLIP FLOP;DUAL D–TYPE MASTER	04713	MC10131L
A3U8	156–0860–00			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE	04713	MC10116P
A3U9	156–2460–00			IC,MISC:BIPOLAR,MOD/DEMOD;BALANCED	04713	MC1496P
A3U10	156–0411–00			IC,LINEAR:BIPOLAR,COMPARATOR;QUAD,SGL SPLY,300NS	01295	LM339N
A3U11	156–0854–00			IC,LIN:BIPOLAR,OP–AMP;LOW INP BIAS CUR,LOW OFS V	27014	LM308AN
A3U12	156–1149–00			IC,LINEAR:BIFET,OP–AMP	27014	LF351N
A3U13	156–3972–00			IC,MISC:CMOS,ANALOG SW;QUAD SPST,100 OHM,400NS	17856	DG444DJ
A3U14	156–1225–00			IC,LINEAR:BIPOLAR,COMPTR;DUAL,OPEN COLL,300NS	01295	LM393P
A3U15	156–0912–00			IC,LINEAR:BIPOLAR,OP–AMP;TRANSCONDUCTANCE	27014	LM3080N
A3U16	156–0912–00			IC,LINEAR:BIPOLAR,OP–AMP;TRANSCONDUCTANCE	27014	LM3080N
A3U17	156–1149–00			IC,LINEAR:BIFET,OP–AMP	27014	LF351N
A3U18	156–0912–00			IC,LINEAR:BIPOLAR,OP–AMP;TRANSCONDUCTANCE	27014	LM3080N
A3U19	156–1225–00			IC,LINEAR:BIPOLAR,COMPTR;DUAL,OPEN COLL,300NS	01295	LM393P
A3U20	156–0048–00			IC,LINEAR:BIPOLAR,XSTR ARRAY;(5),NPN,(1)DIFF PAIR,(3)IND,15V,50MA,300MHZ,AMPL	34371	CA3046
A3U21	156–1225–00			IC,LINEAR:BIPOLAR,COMPTR;DUAL,OPEN COLL,300NS	01295	LM393P
A3U22	156–0411–00			IC,LINEAR:BIPOLAR,COMPARATOR;QUAD,SGL SPLY,300NS	01295	LM339N
A3U23	156–2460–00			IC,MISC:BIPOLAR,MOD/DEMOD;BALANCED	04713	MC1496P
A3U24	156–1200–00			IC,LINEAR:BIFET,OP–AMP;QUAD	01295	TL074CN
A3U25	156–2460–00			IC,MISC:BIPOLAR,MOD/DEMOD;BALANCED	04713	MC1496P
A3U26	156–2460–00			IC,MISC:BIPOLAR,MOD/DEMOD;BALANCED	04713	MC1496P
A3U27	156–0912–00			IC,LINEAR:BIPOLAR,OP–AMP;TRANSCONDUCTANCE	27014	LM3080N
A3U28	156–0912–00			IC,LINEAR:BIPOLAR,OP–AMP;TRANSCONDUCTANCE	27014	LM3080N
A3U29	156–2460–00			IC,MISC:BIPOLAR,MOD/DEMOD;BALANCED	04713	MC1496P
A3U30	156–1451–00			IC,LINEAR:BIPOLAR,VR;NEGATIVE,ADJUSTABLE,1.5A,4%	01295	LM337KC
A3U31	156–1161–00			IC,LINEAR:BIPOLAR,VR;POSITIVE,ADJUSTABLE,1.5A,4%	04713	LM317T
A3U32	156–3972–00			IC,MISC:CMOS,ANALOG SW;QUAD SPST,100 OHM,400NS	17856	DG444DJ
A3U33	156–2009–00			IC,DIGITAL:HCMOS,FLIP FLOP;DUAL D–TYPE	04713	MC74HC74AN
A3U34	156–0742–00			IC,LINEAR:BIPOLAR,OP–AMP;HIGH SLEW RATE	01295	LM318P
A3U35	156–3972–00			IC,MISC:CMOS,ANALOG SW;QUAD SPST,100 OHM,400NS	17856	DG444DJ
A3U36	156–2009–00			IC,DIGITAL:HCMOS,FLIP FLOP;DUAL D–TYPE	04713	MC74HC74AN
A3U37	156–2256–00			IC,DIGITAL:HCMOS,GATE;QUAD 2–INPUT NAND	01295	SN74HC00N
A3U38	156–0067–00			IC,LINEAR:BIPOLAR,OP–AMP	01295	UA741CP
A3U39	156–0048–00			IC,LINEAR:BIPOLAR,XSTR ARRAY;(5),NPN,(1)DIFF PAIR,(3)IND,15V,50MA,300MHZ,AMPLIFIER	34371	CA3046
A3U40	156–2761–00			IC,DGTL:HCMOS,MV;DUAL NON–RETRIG MONOSTABLE	0JR04	TC74HC221AP
A3U41	156–0048–00			IC,LINEAR:BIPOLAR,XSTR ARRAY;(5),NPN,(1)DIFF PAIR,(3)IND,15V,50MA,300MHZ,AMPLIFIER	34371	CA3046
A3U42	156–1850–00			IC,MISC:CMOS,ANALOG SWITCH;QUAD	17856	DG211CJ
A3U43	156–1850–00			IC,MISC:CMOS,ANALOG SWITCH;QUAD	17856	DG211CJ
A3U210	156–2460–00			IC,MISC:BIPOLAR,MOD/DEMOD;BALANCED	04713	MC1496P
A3VR1	152–0226–00			DIODE,ZENER:5.1V,5%,0.4W	14552	TD3810980
A3VR2	152–0226–00			DIODE,ZENER:5.1V,5%,0.4W	14552	TD3810980
A3VR3	152–0486–00			DIODE,ZENER:6.2V,2%,0.4W	04713	SZG20008RL
A3VR4	152–0688–00			DIODE,ZENER:2.4V,5%,0.4W	04713	1N4370A
A3VR5	152–0688–00			DIODE,ZENER:2.4V,5%,0.4W	04713	1N4370A
A3VR6	152–0226–00			DIODE,ZENER:5.1V,5%,0.4W	14552	TD3810980
A3VR7	152–0486–00			DIODE,ZENER:6.2V,2%,0.4W	04713	SZG20008RL
A3VR8	152–0486–00			DIODE,ZENER:6.2V,2%,0.4W	04713	SZG20008RL
A3VR9	152–0486–00			DIODE,ZENER:6.2V,2%,0.4W	04713	SZG20008RL
A3Y1	158–0308–00			XTAL UNIT,QTZ:14.31818MHZ,0.003%,PRL,CL=30PF	TK0978	53590
A3Y2	158–0270–00			XTAL UNIT,QTZ:17.734MHZ,0.001%	33096	CCAT101823
A3A1	671–1796–01			CIRCUIT BD ASSY:GRATICULE LIGHT	80009	671179600
A3A1DS100	150–0168–00			LAMP,INCAND:14V,0.08A,WEDGE BASE,T1.75 FOR SKT MT	55335	73W

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
				MOUNTING PARTS		
	136–1119–01			SOCKET,LPHLDR:PCB,LAMPHOLDER;FEM,STR,SGL,0.404 H X 0.218 TAIL,TIN,T–1.75 WEDGE BASE	65654	CIC 7500 A–VALO
				END MOUNTING PARTS		
A3A1DS200	150–0168–00			LAMP,INCAND:14V,0.08A,WEDGE BASE,T1.75 FOR SKT MT	55335	73W
				MOUNTING PARTS		
	136–1119–00			SOCKET,LPHLDR:PCB,LAMPHOLDER;FEM,STR,SGL,0.404 H X 0.218 TAIL,TIN,T–1.75 WEDGE BASE	65654	CIC 7500 A–VALO
				END MOUNTING PARTS		
A3A1DS300	150–0168–00			LAMP,INCAND:14V,0.08A,WEDGE BASE,T1.75 FOR SKT MT	55335	73W
				MOUNTING PARTS		
	136–1119–00			SOCKET,LPHLDR:PCB,LAMPHOLDER;FEM,STR,SGL,0.404 H X 0.218 TAIL,TIN,T–1.75 WEDGE BASE	65654	CIC 7500 A–VALO
				END MOUNTING PARTS		
A3A1J100	131–4530–00			CONN,HDR:PCB;MALE,STR,1 X 3,0.1 CTR,0.230MLG X 0.120 TAIL,30GOLD,BD RETENTION	00779	104344–1
A3A1P100	131–0993–00			CONN,BOX:SHUNT;FEMALE,STR,1 X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,JUMPER	22526	65474–006
A3A1P200	131–1806–00			CONN,HDR::PCB;MALE,RTANG,1 X 31,0.15 CTR,0.230 MLG X 0.120 TAIL,30 GOLD	22526	65595–131
A3A1P800	131–1806–00			CONN,HDR::PCB;MALE,RTANG,1 X 31,0.15 CTR,0.230 MLG X 0.120 TAIL,30 GOLD	22526	65595–131
A4	671–2000–02			CIRCUIT BD ASSY:CONTROL	80009	671200002
A4C100	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C102	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C103	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C104	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C107	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C108	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C109	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C110	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C112	281–0819–00			CAP,FXD,CERAMIC:MLC;33 PF,5%,50V,0.100 X 0.170	04222	SA102A330JAA
A4C113	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C114	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C115	281–0819–00			CAP,FXD,CERAMIC:MLC;33 PF,5%,50V,0.100 X 0.170	04222	SA102A330JAA
A4C118	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A4C119	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4C120	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A4C121	290–0973–03			CAP,FXD,ALUM:100UF,20%,35V,ESR=1.99 OHM (120HZ,20C)	55680	UVX1V101MPA1TD
A4C122	290–1311–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM (100KHZ,20C)	55680	UPL1H100MDH1TD
A4C124	281–0775–01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A4CR100	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR101	152–0400–00			DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A4J100	131–4187–00			CONN,HDR:PCB,MALE,1 X 3,0.1 CTR,0.240 MLG	58050	082–0343–AS10
A4P100	131–0993–00			CONN,BOX:SHUNT;FEMALE,STR,1 X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,JUMPER	22526	65474–006
A4P101	131–3364–00			CONN,HDR:PCB;MALE,STR,2 X 17,0.1 CTR,0.365D	53387	2534–6002UB
A4P102	174–2410–00			CA ASSY,SP,ELEC:34,28 AWG,17.5 L,RIBBON	80009	174241000
A4R100	322–3251–00			RES,FXD,FILM:4.02K OHM,1%,0.2W,TC=T0	91637	CCF501G40200F
A4R101	322–3254–00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT
A4R102	322–3402–00			RES,FXD:METAL FILM;150K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G15002F
A4R103	322–3402–00			RES,FXD:METAL FILM;150K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G15002F
A4R104	322–3322–00			RES,FXD:METAL FILM;22.1K OHM,1%,0.2W,TC=100	91637	CCF501G22101F
A4R105	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A4R106	322–3281–00			RES,FXD:METAL FILM;8.25K OHM,1%,0.2W,TC=100	91637	CCF501G82500F
A4R107	307–0446–00			RES NTWK,FXD,FI:10K OHM,20%,(9)RES	11236	750–101–R10K
A4R108	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A4R113	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A4R114	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A4R115	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A4R116	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A4R117	322–3097–00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A4U101	156–1126–00			IC,LINEAR:BIPOLAR,COMPARATOR;OPEN COLL,200NS	01295	LM311P
A4U102	156–0913–00			IC,DIGITAL:LSTTL,FLIP FLOP;OCTAL D–TYPE, ENABLE	01295	SN74LS377N
A4U103	156–0913–00			IC,DIGITAL:LSTTL,FLIP FLOP;OCTAL D–TYPE, ENABLE	01295	SN74LS377N
A4U104	156–0913–00			IC,DIGITAL:LSTTL,FLIP FLOP;OCTAL D–TYPE, ENABLE	01295	SN74LS377N
A4U106	156–2029–00			IC,MEMORY:NMOS,NVRAM;16 X 16, SERIALDATA	60395	X2444D
A4U107	156–1684–00			MICROCKT,DGTL:MICROCOMPUTER 8–BIT,SCRN8031	34649	P8031AH
A4U108	156–0991–02			IC,LINEAR:BIPOLAR,VR;POSITIVE,5.0V,100MA,5%	01295	UA78L05ACLPM
A4U109	156–3052–00			IC,MEMORY:CMOS,EPROM;32K X 8 W/3–STATE OUT *MOUNTING PARTS*	27014	NM27C256Q200
	136–0755–00			SKT,DIP:PCB;FEM,STR,2 X 14,28 POS,0.1 X 0.6 CTR,0.175 H X0.130 TAIL,BECU,TIN,ACCOM 0.008–0.0015 X 0.014–0.022 *END MOUNTING PARTS*	00779	2–641605–3
A4U110	156–1858–00			IC,DIGITAL:ALSTTL,LATCH;OCTAL D–TYPE TRANSPARENT	01295	SN74ALS573CN
A4U111	156–4082–00			IC,CONVERTER:CMOS,D/A;12 BIT,DUAL,VOLTAGE OUT,MPU COMPATIBLE,BYTE LOADING,REFERENCE	24355	AD7237JN
A4U113	156–2980–00			IC,DIGITAL:HCMOS,QUADRATURE DCDR/CNTR–BIT LCH	50444	HCTL–2000
A4U114	156–1373–00			IC,DIGITAL:LSTTL,BUFFER/DRIVER;QUAD, 3–STATE	01295	SN74LS125AN
A4W100	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA0207
A4W101	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA0207
A4W102	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA0207
A4Y100	158–0300–00			XTAL UNIT,QTZ:12.0 MHZ,50 PPM,SERIES	61429	FOX120X
A10	671–3637–00			CIRCUIT BD ASSY:CRT SOCKET BD	80009	671363700
A11	671–3761–00			CKT BD ASSY:SERIAL FILTER	80009	671376100
J18	196–3146–00			CA ASSY,SP:FLAT FLEX;FLX,27 AWG,1.0 L,PCB,TERM,STR BOTH ENDS	TK0196	FSN–1A,P OR K
J19	196–3146–00			CA ASSY,SP:FLAT FLEX;FLX,27 AWG,1.0 L,PCB,TERM,STR BOTH ENDS	TK0196	FSN–1A,P OR K
J20	196–3146–00			CA ASSY,SP:FLAT FLEX;FLX,27 AWG,1.0 L,PCB,TERM,STR BOTH ENDS	TK0196	FSN–1A,P OR K
J21	196–3146–00			CA ASSY,SP:FLAT FLEX;FLX,27 AWG,1.0 L,PCB,TERM,STR BOTH ENDS	TK0196	FSN–1A,P OR K
J22	196–3146–00			CA ASSY,SP:FLAT FLEX;FLX,27 AWG,1.0 L,PCB,TERM,STR BOTH ENDS	TK0196	FSN–1A,P OR K
J23	196–3146–00			CA ASSY,SP:FLAT FLEX;FLX,27 AWG,1.0 L,PCB,TERM,STR BOTH ENDS	TK0196	FSN–1A,P OR K
S1	260–2565–00			SWITCH,ROCKER:SPST,30V,30MA *ATTACHED PARTS*	80009	260256500
	174–2648–00			CA ASSY,SP:RIBBON,POWER SWITCH;MIXED/CRIMP, 2,26 AWG,3.5 L,0.1 CTR 2 POS RCPT X 0.2 INC H CUT/STRIP *END ATTACHED PARTS*	TK2469	174–2648–00
V1	154–0991–00			ELECTRON,TUBE:CRT,FINISHED,D14–375GH/991/A875 (STANDARD ONLY)	80009	154099100
V1	154–0991–16			ELECTRON,TUBE:CRT,FINISHED,D14–375WA/911 (OPTION 74 ONLY) *ATTACHED PARTS*	80009	154099116
	131–6014–00			CA ASSY,CRT:DISCRETE,ANODE LEAD;CRT,1,22 AWG, 30KV,UL3239,58MM DIA A NODE X 1.9 L,0.125 *END ATTACHED PARTS*	20093	131–6014–00
W1	179–2997–01			WIRE HARNESS:DESCRETE,CRT ASSY;CPD,5,24AWG,5,26 AWG,1X4,0.1CTR & 1X7,RCPT X 1X4 & 1X7,0.1 RCPT	80009	179299700

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
W3	174–3511–01			CA ASSY,SP:DESCRETE;CPD,4,26 AWG,8.0L,1X7,0.1CTR, RCPT X STRAIN RELIEF,PCB	9M860	174–3511–00
				ATTACHED PARTS		
	344–0111–00			INSUL,SPREADER:DEFL LEADS,POLYPROPYLENE	TK1617	NA
	343–0298–00			STRAP,RETAINING, 0.25 CABLE	85480	A1C25–A–C8
				END ATTACHED PARTS		

Diagrams/Circuit Board Illustrations

Section 9
Diagrams/Circuit Board Illustrations

Symbols

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

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

Overline, parenthesis, or leading slash indicate a low asserting state.

Example: $\overline{\text{ID CONTROL}}$, (ID CONTROL), or /ID CONTROL.

Abbreviations are based on ANSI Y1.1–1972.

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

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

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

Component Values

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

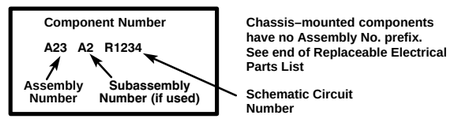
Capacitors: Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).
Resistors = Ohms (Ω).

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

Assembly Numbers

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the diagram (in circuit board outline), circuit board illustration title, and lookup table for the schematic diagram.

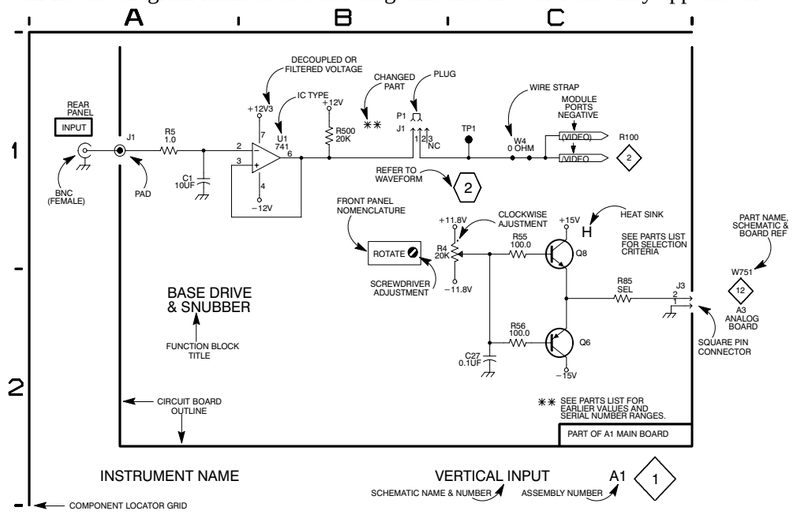
The Replaceable Electrical Parts List is arranged by assembly number in numerical sequence; the components are listed by component number. Example:



Grid Coordinates

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table.

When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration will only appear opposite the first diagram; the lookup table will list the diagram number of other diagrams that the other circuitry appears on.



Waveform Conditions

Waveforms appearing with the schematic diagrams were taken with a color bar signal input to Channel A input and with the front panel setup shown in Table 9-1, unless otherwise noted. Source of the siganls used for these waveform photos is a TEKTRONIX 1411-Series Television Signal Generator.

Table 9–1: 1725 Front Panel Selections for Waveform Photographs

Control	Settings
MODE	VECTOR
REF	INT
INPUT	CH-A
BARS	75%
VARIBLE	off
AUXILIARY	off

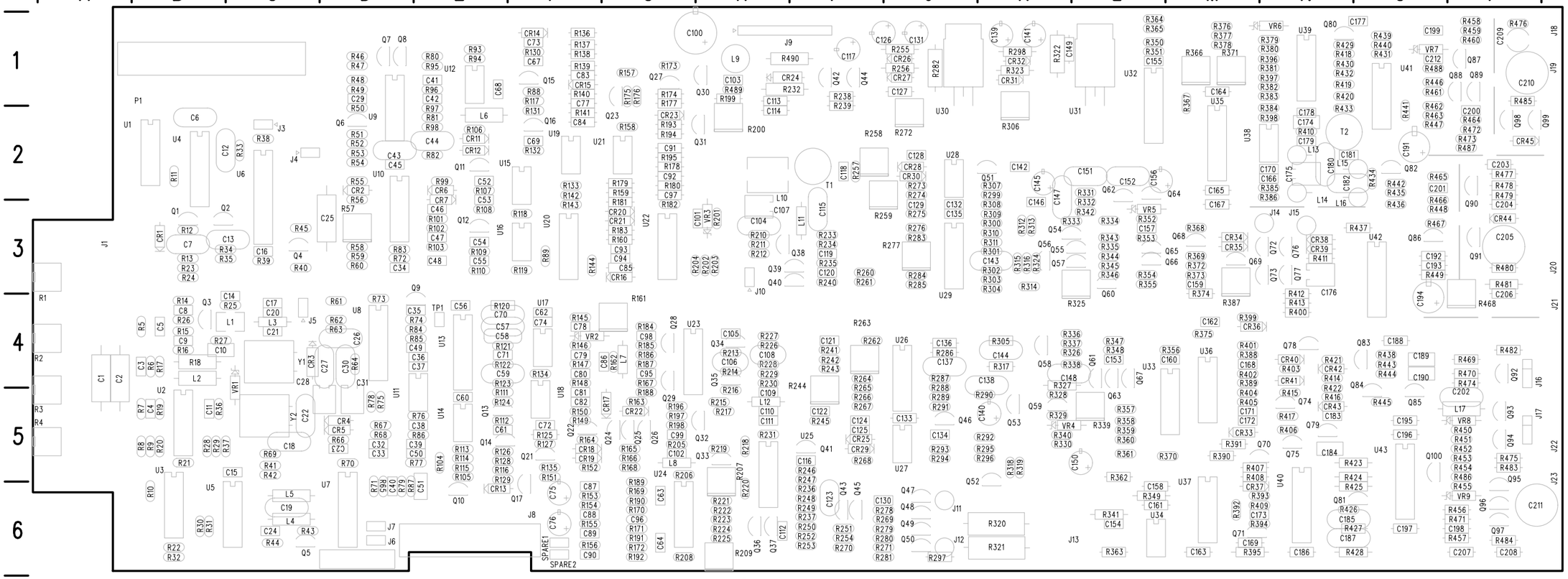
All waveform pictures, taken at subcarrier frequency (0.1μs), had the test oscilloscope externally triggered from the television test signal generator Subcarrier Out.

X Y INPUT 6
–X INPUT
+X INPUT
+X HI GAIN
–Y INPUT
+Y INPUT
+Y HI GAIN
X IN 6
Y IN 6
CH - A 1
CH - B 1
C A
C B
EXT REF 1
INT/EXT
LUM 2
CHROMA FILTER 1
GAIN CAL
VARIABLE
GAIN CELL 1
VAR 75% 100%
TIMING GENERATOR 2
BOWES OSCILLATOR 2
SYNC SEPARATOR 2
AUTO ZERO
INWINDOW
R–Y
B–Y
R–Y 5
DEMOD OUT
GRATICULE ILLUMINATION 8
SCALE
TRACE ROTATION 8
ROTATE
B–Y (U) DEMODULATOR 5
LOW PASS FILTER 5
B–Y (U) 5
HORIZONTAL CENTER DOT POSITION CLAMP 5
I'
X
X Y
HORIZ 6
EHT (4X) 10
NTSCSEL
QUAD PHASE 5
Q'
+V
V–AXIS SWITCHER 5
VERTICAL CENTER DOT POSITION CLAMP 5
Q'/ $\overline{Q'}$
R–Y (V) DEMODULATOR 5
LOW PASS FILTER 5
R–Y (V) 5
Y
X Y
VERT 6
AUXILIARY CONTROL 6
RXD
EXT STROBE IN
TXD
MICROCONTROLLER 7
NOVRAM 7
SIN
COS
SLOW
STANDARD DETECTOR 2
CHROMA 2
LOOP PHASE DETECTOR 3
LOW PASS FILTER 3
LOOP 3
BURST CLAMP 3
ERROR 3
UNLOCK 3
CAL
PHASE SHIFTER 4
PHASE
I Q
÷4 4
VOLTAGE CONTROLLED OSCILLATOR 4
NTSCSEL/ $\overline{NTSCSEL}$
4 F_{SC} PAL
4 F_{SC} NTSC
±45° 3
NTSCSEL
LOCK DETECTOR, BANDWIDTH SWITCH & PAL PHASE FLIPPER 3
SLOW
LOCK DETECTOR 3
LOW PASS FILTER 3
LOCK 3
CENTER DOT COMPARATOR 6
μP BLANK
CRT BLANKING 6
INTENSITY CONTROL 8
INTENS
HIGH VOLTAGE SUPPLY 10
FOCUS CONTROL 6
FOCUS
LINE SELECT 6
KEY
SIGNAL LINE
CONTROL LINE
SCHEMATIC DIAGRAM NUMBER n
FRONT PANEL SCREWDRIVER ADJ.
FRONT PANEL KNOB

1725 PAL / NTSC VECTORSCOPE

A3 Main Board Component Locator *(with cross-references to schematic diagrams 1, 2, 3, 4, 5, 6, and 8).*

Comp No	Diag No	Diag Loc	Bd Loc
C1	4	C5	A4
C2	4	C5	A4
C3	4	E3	B4
C4	4	E2	B5
C5	4	G2	B4
C6	6	E1	B2
C7	6	C2	B3
C8	4	G2	B4
C9	4	G1	B4
C10	4	F1	B4
C11	4	F1	B5
C12	6	E1	C2
C13	6	C1	C3
C14	4	G2	C4
C15	4	B5	C5
C16	6	D1	C3
C17	4	H2	C4
C18	4	B3	C5
C19	4	D2	C6
C20	4	H1	C4
C21	4	H2	C4
C22	4	B3	C5
C23	4	D1	D5
C24	4	D2	C6
C25	6	F3	D3
C26	4	C2	D4
C27	4	B3	D4
C28	4	B3	C5
C29	2	E4	D2
C30	4	A1	D4
C31	4	B2	D5
C32	4	B4	D5
C33	4	B4	D5
C34	4	H4	D3
C35	4	B2	D4
C36	4	B1	E4
C37	3	D3	E4
C38	3	C3	E5
C39	3	D3	E5
C40	4	B1	D6
C41	2	G4	E1
C42	2	G4	E2
C43	2	E4	D2
C44	2	E3	E2
C45	2	G5	D2
C46	4	G5	E3
C47	4	H3	E3
C48	4	G4	E3
C49	3	G2	E4
C50	3	E2	E5
C51	3	D2	E6
C52	4	F5	E2
C53	4	F5	E3
C54	4	F4	E3
C55	4	F4	E3
C56	3	G2	E4
C57	3	G5	E4
C58	3	G4	E4
C59	3	F5	E4
C60	3	F2	E5
C61	3	E4	E5
C62	3	G4	F4
C63	6	C3	G6
C64	6	C5	G6
C67	4	C5	F1
C68	3	E1	E1
C69	3	E1	F2
C70	3	G5	E4
C71	3	G4	E4
C72	3	E4	F5
C73	6	E1	F1
C74	3	G4	F4
C75	4	C5	F6
C76	4	C5	F6
C77	8	D2	F2
C78	3	G4	F4
C79	3	A1	F4
C80	3	B1	F4
C81	3	F4	F5
C82	3	F4	F5
C83	8	D2	F1
C84	4	B5	F2
C85	8	E1	G3
C86	3	D4	G4
C87	6	B3	F6
C88	6	B3	F6
C89	6	B4	F6
C90	6	B5	F6
C91	8	C4	G2
C92	8	C4	G2
C93	6	E4	G3
C94	6	E3	G3
C95	3	C5	G4
C96	4	B5	G6
C97	6	F4	G3
C98	3	D4	G4
C99	3	C3	G5
C100	8	D4	G1
C101	6	F4	H3
C102	3	C3	G5
C103	8	C4	H1
C104	5	B2	H3
C105	3	D5	H4
C106	3	B4	H4
C107	5	B4	H3
C108	3	B4	H4
C109	3	A4	H5
C110	3	C5	H5
C111	3	A3	H5
C112	3	A3	I6
C113	8	C5	H2
C114	8	C4	H2
C115	5	B1	I3
C116	3	B3	I5
C117	4	A5	I1
C118	5	B1	I2
C119	5	B2	I3
C120	5	B3	I3
C121	5	C3	I4
C122	5	B5	I5
C123	3	B3	I6
C124	5	C4	I5
C125	5	C5	I5
C126	4	D5	I1
C127	4	D5	J1
C129	5	C1	J3
C130	6	G5	I6
C131	4	D5	J1
C132	5	D2	J3
C133	5	C5	J5
C134	5	D5	J5
C135	5	C1	J3
C136	5	D4	J4
C137	5	E4	J4
C138	5	E4	K5
C139	4	D4	K1
C140	5	D4	K5
C141	4	D4	K1
C142	5	C1	K2
C143	5	E2	K3
C144	5	F4	K4
C145	5	E1	K2
C146	5	G3	K3
C147	5	E2	K3
C148	5	F4	K4
C149	4	D4	L1
C150	5	G4	L5
C151	5	F2	L2
C152	5	F2	L2
C153	5	G4	L4
C154	5	H2	L6
C155	1	D3	L1
C156	5	G1	L2
C157	5	G2	L3
C158	5	H1	L6
C159	6	H3	M3
C160	4	B5	M4
C161	5	H1	L6
C162	3	G2	M4
C163	4	C5	M6
C164	4	B5	M1
C165	4	B5	M2
C166	1	E2	N2
C167	4	B5	M3
C168	2	D2	M4
C169	6	D2	M6
C170	1	E2	N2
C171	2	E2	M5
C172	1	E5	M5
C173	1	D5	M6
C174	1	F1	N2
C175	1	F1	N2
C176	6	G3	N4
C177	1	E3	O1
C178	1	E5	N2
C179	1	F1	N2
C180	1	F1	N2
C181	1	F1	N2
C182	1	F1	O2
C183	2	E1	N5
C184	2	E2	N5
C185	6	E2	N6
C186	4	C5	N6
C187	2	G2	N6
C188	6	D4	O4
C189	2	C2	O4
C190	2	C2	O4
C191	1	C3	O2
C192	6	D4	O3
C193	6	E4	O3
C194	1	B4	O4
C195	2	B3	O5
C196	2	B3	O5
C197	2	B3	O6
C198	1	B5	P6
C199	1	B3	O1
C200	1	D4	P2
C201	1	G1	O2
C202	2	C4	P5
C203	1	B3	P2
C204	1	B3	P3
C205	1	B4	P3
C206	1	B4	P4
C207	1	B5	P6
C208	1	A5	P6
C209	1	B3	P1
C210	1	B3	P1
C211	1	B5	P6
C212	1	E3	O1
CR1	6	F2	B3
CR2	4	H4	D2
CR3	4	A2	C4
CR4	4	B3	D5
CR5	4	B3	D5
CR6	4	F4	E2
CR7	4	F4	E3
CR11	2	G3	E2
CR12	2	G4	E2
CR13	3	F4	E6
CR14	6	E1	F1
CR15	8	D2	F1
CR16	8	D1	G3
CR17	3	D2	G5
CR18	3	F2	F5
CR19	3	E2	F5
CR20	8	D1	G3
CR21	8	D1	G3
CR22	3	C1	G5
CR23	8	C2	G2
CR24	8	C4	H1
CR25	5	B5	I5
CR26	4	E5	J1
CR27	4	D5	J1
CR28	5	B1	J2
CR29	5	B5	I5
CR30	5	B1	J2
CR31	4	E4	K1
CR32	4	D4	K1
CR33	2	E2	M5
CR34	6	G2	M3
CR35	6	G2	M3
CR36	3	G2	M4
CR37	2	F1	M6
CR38	6	H2	N3
CR39	6	H2	N3
CR40	2	D2	N4
CR41	2	D2	N5
CR42	2	D1	N4
CR43	2	D2	N5
CR44	1	C4	P3
CR45	1	C3	P2
J1	8	D4	A3
J3	6	F1	C2
J4	8	D5	C2
J5	4	H2	C4
J6	6	B5	D6
J7	6	B3	D6
J8	6	A1	F6
J9	4	A5	I1
J10	5	A1	H4
J11	6	H4	J6
J12	6	H4	J6
J13	5	H1	L6
J14	6	H2	N3
J15	6	H2	N3
J16	2	B2	Q5
J17	2	C4	Q5
J18	1	A3	Q1
J19	1	A3	Q1
J20	1	A4	Q3
J21	1	A4	Q4
J22	1	A5	Q5
J23	1	A5	Q6
L1	4	G1	C4
L2	4	F1	B4
L3	4	H2	C4
L4	4	D2	C6
L5	4	C2	C6
L6	2	E4	E2
L7	3	D4	G4
L8	3	C3	G5
L9	8	D4	H1
L10	5	A2	H3
L11	5	A2	I3
L12	3	A5	H5
L13	1	F1	N2
L14	1	F1	N3
L15	1	F1	N2
L16	1	F1	N3
L17	2	C4	P5
P1	8	A2	
P16	2	B2	
P17	2	C4	
PS1	6	C5	
PS2	6	C5	
Q1	6	D2	B3
Q2	6	D1	C3
Q3	4	G2	B4
Q4	6	D1	C3
Q5	4	D2	C6
Q6	2	E5	D2
Q7	2	F3	D1
Q8	2	F3	D1
Q9	4	A1	E4
Q10	3	E3	E6
Q11	4	F5	E2
Q12	4	F4	E3
Q13	3	E4	E5
Q14	3	E4	E5
Q15	3	F1	F1
Q16	3	E1	F2
Q17	3	F4	F6
Q21	3	E2	F5
Q22	3	D1	F5
Q23	8	C2	G2
Q24	3	F2	G5
Q25	3	D1	G5
Q26	3	C1	G5
Q27	8	C1	G1
Q28	3	D4	G4
Q29	3	C4	G5
Q30	8	C4	H1
Q31	6	F1	H2
Q32	3	C4	H5
Q33	3	B2	H5
Q34	3	B5	H4
Q35	3	B4	H5
Q36	3	B2	H6
Q37	3	B2	H6
Q38	5	B4	I3
Q39	5	B2	H3
Q40	5	B3	H3
Q41	3	A2	I5
Q42	8	C5	I1
Q43	6	G5	I6
Q44	8	C5	I1
Q45	6	G5	I6
Q46	5	D5	J5
Q47	6	G5	J6
Q48	6	G4	J6
Q49	6	G4	J6
Q50	6	G5	J6
Q51	5	D1	K2
Q52	5	C3	J6
Q53	5	E4	K5
Q54	5	E2	K3
Q55	5	F3	K3
Q56	5	G3	K3
Q57	5	F3	K3
Q58	5	F4	K4
Q59	5	F5	K5
Q60	5	F5	L4
Q61	5	G4	L4
Q62	5	F2	L2
Q63	5	F4	L5
Q64	5	G2	M3
Q65	5	G2	M3
Q66	5	F2	M3
Q67	5	G4	L5
Q68	6	G3	M3
Q69	6	G3	M3
Q70	1	E5	N5
Q71	1	D5	M6
Q72	6	G2	N3
Q73	6	G3	N3
Q74	2	E2	N5
Q75	2	E2	N5
Q76	6	G2	N3
Q77	6	G3	N3
Q78	2	D2	N4
Q79	2	F2	N5
Q80	1	F5	N1
Q81	6	E2	N6
Q82	1	G1	O2
Q83	2	D2	O4
Q84	2	D2	O5
Q85	2	C2	O5
Q86	1	H1	O3
Q87	1	E3	P1
Q88	1	D3	P1
Q89	1	D3	P1
Q90	1	B3	P3
Q91	1	B4	P3
Q92	2	C2	P4
Q93	2	C4	P5
Q94	2	C4	P5
Q95	1	B5	P6
Q96	1	C5	P6
Q97	1	B5	P6
Q98	1	C2	P2
Q99	1	C3	Q2
Q100	2	D4	O5
R1	6	H5	A4
R2	6	H3	A4
R3	1	C1	A5
R4	8	C5	A5
R5	4	E3	B4
R6	4	E3	B4
R7	4	E2	B5
R8	4	E2	B5
R9	4	E2	B5
R10	4	F2	B6
R11	6	E1	B2
R12	6	D2	B3
R13	6	C2	B3
R14	4	G2	B4
R15	4	G1	B4
R16	4	F1	B4
R17	4	E3	B4
R18	4	B2	B4
R19	4	F3	B5
R20	4	E3	B5
R21	4	F3	B5
R22	4	F2	B6
R23	6	C2	B3
R24	6	F2	B3
R25	4	G2	C4
R26	4	G2	B4
R27	4	G1	B4
R28	4	E2	B5
R29	4	E2	B5
R30	4	E1	B6
R31	4	E1	B6
R32	4	E1	B6
R33	6	E1	C2
R34	6	C1	B3
R35	6	D1	B3
R36	4	F1	C5
R37	4	E2	C5
R38	6	F1	C2
R39	6	D1	C3
R40	6	F2	C3
R41	4	E1	C5
R42	4	E1	C6
R43	4	D2	C6
R44	4	D2	C6
R45	6	D1	C3
R46	2	F3	D1
R47	2	F3	D1
R48	2	E4	D1
R49	2	E4	D1
R50	2	E4	D2
R51	2	E5	D2
R52	2	E5	D2
R53	2	G5	D2
R54	2	G5	D2
R55	4	H4	D2
R56	4	H4	D3
R57	4	G3	D3
R58	4	G4	D3
R59	4	G4	D3
R60	4	G4	D3
R61	4	A1	D4
R62	4	C3	D4
R63	4	B3	D4
R64	4	B1	D4
R65	4	B1	D6
R66	4	B3	D5
R67	4	B3	D5
R68	4	B4	D5
R69	4	B4	C5
R70	4	C1	D5
R71	4	E2	D6
R72	4	G4	D3
R73	4	B2	D4
R74	4	A1	E4
R75	4	B1	D5
R76	3	D3	E5
R77	3	D3	E5
R78	4	A3	D5
R79	6	B1	D6
R80	2	F4	E1
R81	2	E4	E2
R82	2	E3	E2
R83	4	G4	D3
R84	4	A1	E4
R85	4	A1	E4
R86	3	C3	E5
R87	3	D2	E6
R88	3	F1	F1
R89	4	F4	F3
R93	3	F1	E1
R94	2	G4	E1
R95	2	F4	E1
R96	2	G4	E1
R97	2	E4	E2
R98	2	E4	E2
R99	4	F5	E2
R101	4	G5	E3
R102	4	G3	E3
R103	4	G4	E3
R104	3	E3	E5
R105	3	E3	E6
R106	2	G4	E2
R107	4	F5	E2
R108	4	F5	E3
R109	4	F4	E3
R110	4	F4	E3
R111	3	G1	E5
R112	3	E3	E5
R113	3	E2	E5
R114	3	E3	E5
R115	3	E3	E5
R116	3	F4	E5
R117	3	E1	F2
R118	4	F5	F3
R119	4	F3	F3
R120	3	G5	E4
R121	3	G4	E4
R122	3	G4	E4
R123	3	F5	E5
R124	3	F4	E5
R125	3	E4	F5
R126	3	F3	E5
R127	3	E4	F5
R128	3	E2	E5
R129	3	F5	E6
R130	8	C2	F1
R131	3	E1	F2
R132	3	E1	F2
R133	8	B2	F2
R134	3	G4	F4
R135	3	E2	F5
R136	8	B2	F1
R137	8	C1	F1
R138	8	D2	F1
R139	8	C2	F1
R140	8	D2	F1
R141	8	D2	F2
R142	8	B1	F3
R143	8	D2	F3
R144	8	D1	F3
R145	3	G4	F4
R146	3	A1	F4
R147	3	B1	F4
R148	3	B1	F5
R149	3	D2	F5
R150	3	E2	F5
R151	3	G4	F6
R152	3	D1	F5
R153	6	B3	F6
R154	6	B3	F6
R155	6	B4	F6
R156	6	B5	F6
R157	8	B4	G1
R158	8	B4	G2
R159	8	B3	G3
R160	8	D1	G3
R161	3	C4	G4
R162	3	D4	G4
R163	3	D2	G5
R164	3	D1	F5
R165	3	D1	G5
R166	3	C1	G5
R167	3	F3	G5
R168	3	D1	G5
R169	6	B3	G6
R170	6	B3	G6
R171	6	B4	G6
R172	6	B5	G6
R173	8	C4	G1
R174	6	E1	G1
R175	8	B2	G2
R176	8	B1	G2
R177	8	C1	G2
R178	8	B4	G2
R179	8	B4	G2
R180	8	B4	G2
R181	8	B3	G3
R182	6	F3	G3
R183	8	D1	G3
R184	3	C4	G4
R185	3	D4	G4
R186	3	C5	G4
R187	3	C5	G4
R188	3	C4	G5
R189	6	B3	G6
R190	6	C3	G6
R191	6	C4	G6
R192	6	B5	G6
R193	8	C2	G2
R194	6	F1	G2
R195	8	C4	G2
R196	3	C4	G5
R197	3	C4	G5
R198	3	B2	G5
R199	6	F1	H2
R200	8	C1	H2
R201	6	E3	H3
R202	6	E4	H3
R203	6	E4	H3
R204	6	E3	H3
R205	3	C2	G5
R206	6	C3	G6
R207	6	C3	H6
R208	6	C5	G6
R209	6	C4	H6
R210	5	B4	H3
R211	5	A4	H3
R212	5	A4	H3
R213	3	B5	H4
R214	3	C4	H4
R215	3	C5	H5
R216	3	C4	H5
R217	3	C5	H5
R218	3	A4	H5
R219	3	B2	H5
R220	3	B3	H6
R221	6	D3	H6
R222	6	C3	H6
R223	6	C4	H6
R224	6	C4	H6
R225	6	D4	H6
R226	3	B5	H4
R227	3	B5	H4
R228	3	B4	H4
R229	3	B4	H4
R230	3	B4	H5
R231	3	B3	H5
R232	8	D5	H1
R233	5	B2	I3
R234	5	B2	I3
R235	5	B2	I3
R236	3	A2	I6
R237	3	A3	I6
R238	8	C5	I1
R239	8	C5	I2
R240	5	B3	I3
R241	5	C3	I4
R242	5	C3	I4
R243	5	C4	I4
R244	5	B5	I5
R245	5	B5	I5
R246	3	A2	I5
R247	3	A2	I6
R248	3	B3	I6
R249	3	B3	I6
R250	3	A3	I6
R251	6	G5	I6
R252	3	B2	I6
R253	3	B2	I6
R254	6	G5	I6
R255	4	D5	J1
R256	4	D5	J1
R257	5	C4	I2
R258	5	B1	I2
R259	5	C2	I3
R260	5	C2	I3
R261	5	C2	I3
R262	5	C4	I4
R263	5	D4	I4
R264	5	D4	I4
R265	5	C4	I5
R266	5	C4	I5
R267	5	C4	I5
R268	5	B5	I5
R269	6	H4	I6
R270	6	G5	I6
R271	6	F4	I6
R272	4	D5	J2
R273	5	B1	J2
R274	5	B1	J3
R275	5	C2	J3
R276	5	C2	J3
R277	5	C2	J3
R278	6	G5	I6
R279	6	G4	I6
R280	6	H5	I6
R281	6	G5	I6
R282	4	D5	J1
R283	5	C2	J3
R284	5	C2	J3
R285	5	C4	J3
R286	5	D4	J4
R287	5	E4	J4
R288	5	E4	J5
R289	5	D5	J5
R290	5	E4	K5
R291	5	E4	J5
R292	5	E3	K5
R293	5	C5	J5
R294	5	C1	J5
R295	5	B4	K5
R296	5	B3	K5
R297	6	F5	J6
R298	4	D4	K1
R299	5	G1	K3
R300	5	E2	K3
R301	5	D2	K3
R302	5	E2	K3
R303	5	E3	K3
R304	5	F5	K4
R305	5	F4	K4
R306	4	D4	K2
R307	5	D1	K2
R308	5	E1	K3
R309	4	F4	K3
R310	5	E2	K3
R311	5	E2	K3
R312	5	G3	K3
R313	5	G3	K3
R314	5	E3	K4
R315	4	F5	K3
R316	5	G3	K3
R317	5	E4	K4
R318	5	C4	K5
R319	5	C3	K5
R320	6	G4	K6
R321	6	G4	K6
R322	4	D4	K1
R323	4	D4	K1
R324	5	G3	K3
R325	5	F3	L4
R326	5	G4	K4
R327	5	E4	K5
R328	5	F5	K5
R329	5	F5	K5



A3 Main Board

Static Sensitive Devices
See Maintenance Section

A3 Main Board Component Locator *(with cross-references to schematic diagrams 1, 2, 3, 4, 5, 6, and 8).*

Comp No	Diag No	Diag Loc	Bd Loc
R330	5	G5	K5
R331	5	E2	L3
R332	5	F2	L3
R333	5	E2	K3
R334	5	F2	L3
R335	5	G2	L3
R336	5	F4	K4
R337	5	F4	K4
R338	5	E4	K4
R339	5	F5	L5
R340	5	G4	K5
R341	5	G1	L6
R342	5	E2	L3
R343	5	F2	L3
R344	5	F3	L3
R345	5	F2	L3
R346	5	F5	L3
R347	5	F4	L4
R348	5	G5	L4
R349	5	H2	L6
R350	1	D3	L1
R351	1	D3	L1
R352	5	G2	L3
R353	5	G1	L3
R354	5	G2	L3
R355	5	G2	L3
R356	5	G5	M4
R357	5	G5	L5
R358	5	B2	L5
R359	5	B2	L5
R360	5	B3	L5
R361	5	B3	L5
R362	6	F5	L6
R363	5	H1	L6
R364	1	C1	L1
R365	1	C1	L1
R366	1	B1	M1
R367	1	C1	M2
R368	6	G2	M3
R369	6	G3	M3
R370	1	E5	L5
R371	1	C2	M1
R372	6	G3	M3
R373	6	G3	M3
R374	6	H3	M4
R375	3	H2	M4
R376	1	C2	M1
R377	1	C2	M1
R378	1	C2	M1
R379	1	E3	N1
R380	1	E3	N1
R381	1	F2	N1
R382	1	E2	N1
R383	1	E2	N1
R384	1	F4	N2
R385	6	G2	N2
R386	6	G2	N3
R387	6	F4	M4
R388	2	D2	M4
R389	2	E1	M5
R390	1	E5	M5
R391	2	E2	M5
R392	1	D5	M6
R393	1	E5	M6
R394	1	D5	M6
R395	6	D2	M6
R396	1	E3	N1
R397	1	E3	N1
R398	1	F4	N2
R399	3	G2	M4
R400	6	G4	N4
R401	2	D2	M4
R402	2	D2	M4
R403	2	D2	N4
R404	2	E2	M5
R405	2	E2	M5
R406	2	E1	N5
R407	6	E2	M5
R408	1	E5	M6
R409	2	F1	M6
R410	1	F1	N2
R411	6	H3	N3
R412	6	G3	N4
R413	6	G3	N4
R414	2	D1	N4
R415	2	D2	N5
R416	2	D1	N5
R417	1	E5	N5
R418	1	F5	N1
R419	1	F5	N1
R420	1	G3	N1
R421	2	D3	N4
R422	2	D2	N5
R423	2	F2	N5
R424	2	E2	N6
R425	2	F2	N6
R426	6	E2	N6
R427	6	E2	N6
R428	2	G2	N6
R429	1	F5	N1
R430	1	F5	N1
R431	1	G2	O1
R432	1	F5	N1
R433	1	F5	N2
R434	1	G1	O2
R435	1	G1	O3
R436	1	G1	O3
R437	6	H2	O3
R438	2	C2	O4
R439	1	H2	O1
R440	1	H2	O1
R441	1	F1	O2
R442	1	G1	O2
R443	2	C2	O4
R444	2	C2	O4
R445	2	F2	O5
R446	1	D3	O1
R447	1	C3	O2
R448	1	G1	O3
R449	1	B4	O3
R450	2	C4	P5
R451	2	C4	P5
R452	2	C4	P5
R453	2	C3	P5
R454	2	C4	P5
R455	1	C5	P6
R456	1	B5	P6
R457	1	B5	P6
R458	1	B3	P1
R459	1	B3	P1
R460	1	B3	P2
R461	1	D4	O1
R462	2	D4	O2
R463	1	D3	O2
R464	1	C3	P2
R465	1	G1	O2
R466	1	G1	O3
R467	1	H1	O3
R468	1	B4	P4
R469	2	C2	P4
R470	2	C2	P4
R471	1	B4	P6
R472	1	D4	P2
R473	1	E4	P2
R474	2	C2	P5
R475	2	C4	P5
R476	1	A3	P1
R477	1	B3	P2
R478	1	B3	P2
R479	1	B3	P3
R480	1	B4	P3
R481	1	A4	P3
R482	2	C2	P4
R483	1	B5	P5
R484	1	A5	P6
R485	1	C3	P2
R486	2	D4	P6
R487	2	B2	P2
R488	1	D3	O1
R489	8	C4	H1
R490	8	C3	H1
SPARE1	6	C5	F6
SPARE2	6	C5	F6
T1	5	A1	I2
T2	1	E1	N2
TP1	3	G4	E4
U1A	1	D2	A2
U1B	8	B5	A2
U1C	8	A5	A2
U1D	6	D3	A2
U1E	8	A5	A2
U1F	8	B5	A2
U2	4	F3	B5
U3	4	F2	B5
U4A	6	E1	B2
U4B	6	E2	B2
U5A	6	B1	B6
U5B	6	B1	B6
U5C	6	C1	B6
U6	6	G1	C2
U7A	4	C1	D6
U7B	4	C2	D6
U8A	4	B2	D4
U8B	4	B1	D4
U9	2	F4	D2
U10A	4	H4	D2
U10B	4	H4	D2
U10C	4	H4	D2
U10D	4	H5	D2
U11	3	D3	D5
U12	2	G4	E1
U13A	3	G2	E4
U13D	3	G4	E4
U14A	3	E2	E5
U14B	3	E3	E5
U15	4	F5	E2
U16	4	F4	F3
U17	3	G4	F4
U18	3	F4	F5
U19A	8	B2	F2
U19B	8	B1	F2
U20A	8	D1	F3
U20B	8	D1	F3
U20C	8	D2	F3
U21A	8	B4	F2
U21B	8	C4	F2
U22A	6	E4	G3
U22B	6	E4	G3
U22C	6	E3	G3
U22D	6	E3	G3
U23	3	C5	G4
U24A	6	C3	G5
U24B	6	C4	G5
U24C	6	D4	G5
U24D	6	D3	G5
U25	3	B3	I5
U26	5	D4	J4
U27	5	C5	J5
U28	5	C1	J2
U29	5	C2	J4
U30	4	D5	J2
U31	4	D4	L2
U32A	1	D2	L1
U32B	1	B1	L1
U32C	6	F3	L1
U33B	3	H1	L4
U34	5	H1	L6
U35A	1	D3	M2
U35B	1	C1	M2
U35C	1	D2	M2
U35D	1	D2	M2
U36A	5	A2	M4
U36B	3	G2	M4
U37A	2	G2	M6
U37B	2	B3	M6
U37D	2	F1	M6
U38	1	E2	M2
U39A	1	F3	N1
U39B	1	F3	N1
U39C	1	F5	N1
U39D	1	E3	N1
U40A	2	G2	N6
U40B	6	D2	N6
U41A	1	F2	O1
U41B	1	F2	O1
U41C	1	G2	O1
U41D	1	F2	O1
U42A	6	D4	O3
U42B	6	D4	O3
U42C	6	D3	O3
U42D	6	D3	O3
U43A	2	B3	O5
U43D	2	B2	O5
VR1	4	B2	C5
VR2	3	A1	F4
VR3	6	E4	H3
VR4	5	G4	K5
VR5	5	G1	L3
VR6	1	E3	N1
VR7	1	E3	O1
VR8	2	C3	P5
VR9	1	C4	P6
W2	4	H2	
Y1	4	B3	C4
Y2	4	B3	C5

Schematic Diagram <1> Component Locator Chart

The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

Assembly A3. Partial Assembly A3 also shown on Diagrams 2, 3, 4, 5, 6, and 8.

Comp No	Diag Loc	Bd Loc
C155	D3	L1
C166	E2	N2
C170	E2	N2
C172	E5	M5
C173	D5	M6
C174	F1	N2
C175	F1	N2
C177	E3	O1
C178	E5	N2
C179	F1	N2
C180	F1	N2
C181	F1	N2
C182	F1	O2
C191	C3	O2
C194	B4	O4
C198	B5	P6
C199	B3	O1
C200	D4	P2
C201	G1	O2
C203	B3	P2
C204	B3	P3
C205	B4	P3
C206	B4	P4
C207	B5	P6
C208	A5	P6
C209	B3	P1
C210	B3	P1
C211	B5	P6
C212	E3	O1
CR44	C4	P3
CR45	C3	P2
J18	A3	Q1
J19	A3	Q1
J20	A4	Q3
J21	A4	Q4
J22	A5	Q5
J23	A5	Q6
L13	F1	N2
L14	F1	N3
L15	F1	N2
L16	F1	N3
Q70	E5	N5
Q71	D5	M6
Q80	F5	N1
Q82	G1	O2
Q86	H1	O3
Q87	E3	P1
Q88	D3	P1
Q89	D3	P1
Q90	B3	P3
Q91	B4	P3
Q95	B5	P6
Q96	C5	P6
Q97	B5	P6
Q98	C2	P2
Q99	C3	Q2
R3	C1	A5
R350	D3	L1
R351	D3	L1
R364	C1	L1
R365	C1	L1
R366	B1	M1
R367	C1	M2
R370	E5	L5
R371	C2	M1
R376	C2	M1
R377	C2	M1
R378	C2	M1
R379	E3	N1
R380	E3	N1
R381	F2	N1
R382	E2	N1
R383	E2	N1
R384	F4	N2
R390	E5	M5
R392	D5	M6
R393	E5	M6
R394	D5	M6
R396	E3	N1
R397	E3	N1
R398	F4	N2
R408	E5	M6
R410	F1	N2
R417	E5	N5
R418	F5	N1
R419	F5	N1
R420	G3	N1
R429	F5	N1
R430	F5	N1
R431	G2	O1
R432	F5	N1
R433	F5	N2
R434	G1	O2
R435	G1	O3
R436	G1	O3
R439	H2	O1
R440	H2	O1
R441	F1	O2
R442	G1	O2
R446	D3	O1
R447	C3	O2
R448	G1	O3
R449	B4	O3
R455	C5	P6
R456	B5	P6
R457	B5	P6
R458	B3	P1
R459	B3	P1
R460	B2	P1
R461	D4	O1
R462	D4	O2
R463	D3	O2
R464	C3	P2
R465	G1	O2
R466	G1	O3
R467	H1	O3
R468	B4	P4
R471	B4	P6
R472	D4	P2
R473	E4	P2
R476	A3	P1
R477	B3	P2
R478	B3	P2
R479	B3	P3
R480	B4	P3
R481	A4	P3
R483	B5	P5
R484	A5	P6
R485	C3	P2
R488	D3	O1
T2	E1	N2
U1A	D2	A2
U32A	D2	L1
U32B	B1	L1
U35A	D3	M2
U35B	C1	M2
U35C	D2	M2
U35D	D2	M2
U38	E2	M2
U39A	F3	N1
U39B	F3	N1
U39C	F5	N1
U39D	E3	N1
U41A	F2	O1
U41B	F2	O1
U41C	G2	O1
U41D	F2	O1
VR6	E3	N1
VR7	E3	O1
VR9	C4	P6

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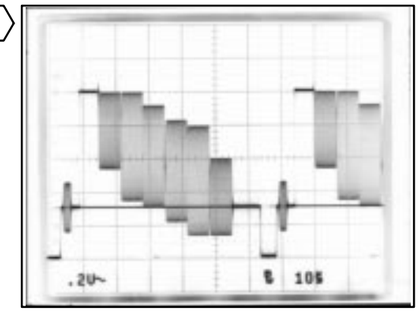

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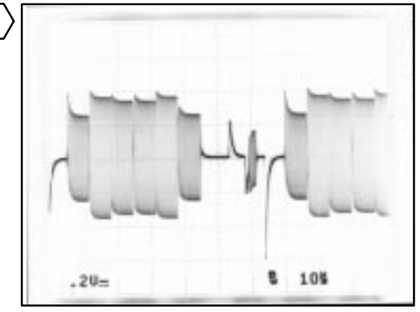

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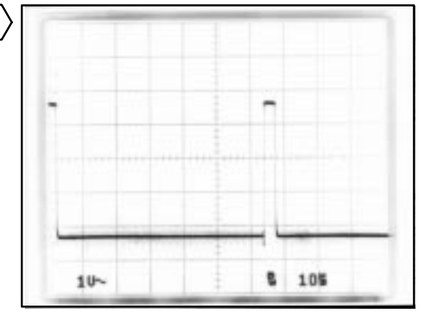

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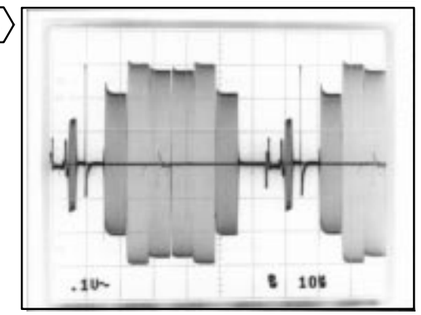

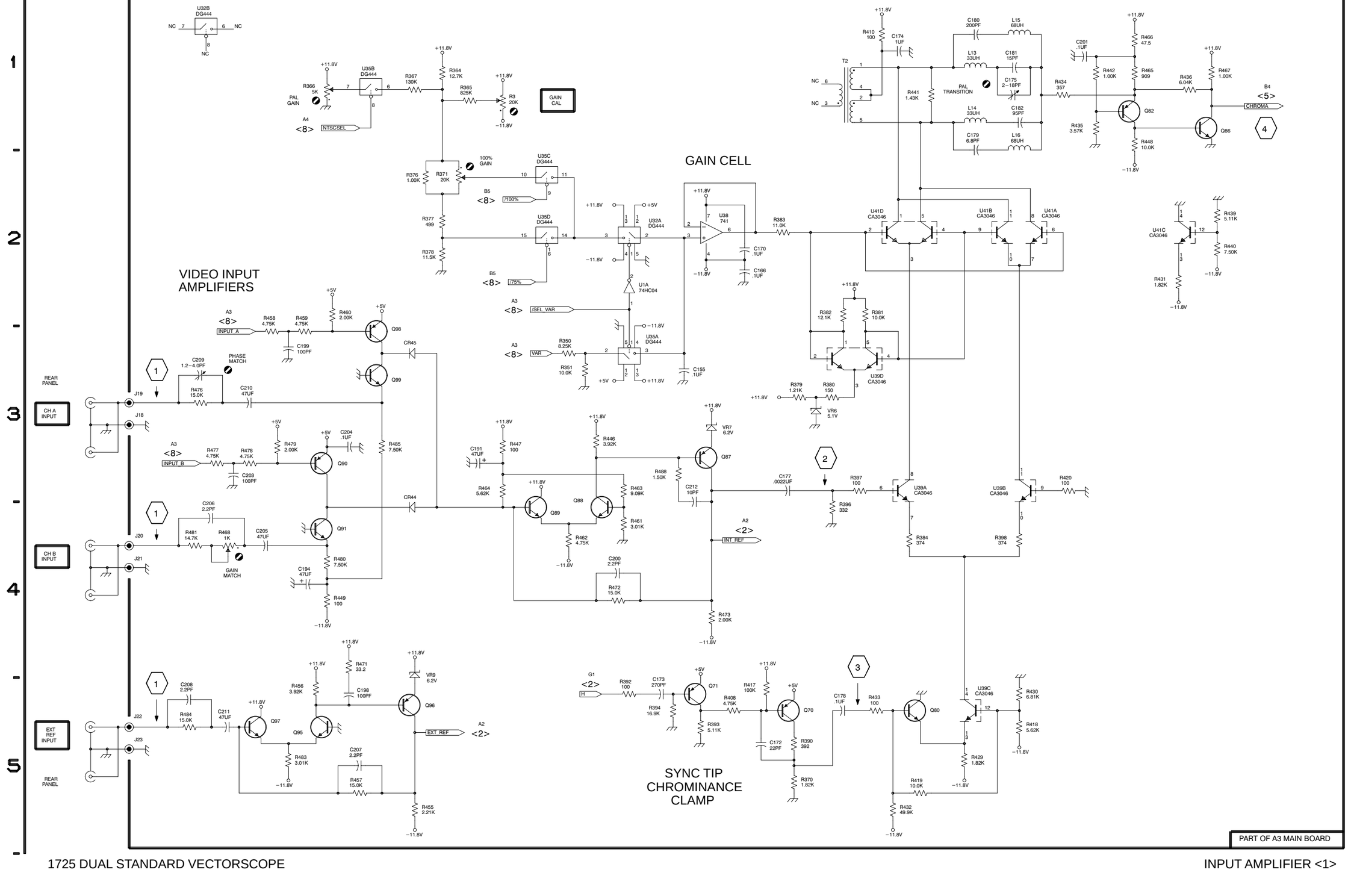

1725 DUAL STANDARD VECTORSCOPE

INPUT AMPLIFIER <1>

Schematic Diagram <2> Component Locator Chart

The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

Assembly A3. Partial Assembly A3 also shown on Diagrams 1, 3, 4, 5, 6, and 8.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C29	E4	D2				R414	D1	N4
C41	G4	E1	Q78	D2	N4			
C42	G4	E2	Q79	F2	N5	R415	D2	N5
C43	E4	D2	Q83	D2	O4	R416	D1	N5
C44	E3	E2	Q84	D2	O5	R421	D3	N4
			Q85	C2	O5	R422	D2	N5
C45	G5	D2				R423	F2	N5
C168	D2	M4	Q92	C2	P4			
C171	E2	M5	Q93	C4	P5	R424	E2	N6
C183	E1	N5	Q94	C4	P5	R425	F2	N6
C184	E2	N5	Q100	D4	O5	R428	G2	N6
						R438	C2	O4
C187	G2	N6	R46	F3	D1	R443	C2	O4
C189	C2	O4	R47	F3	D1			
C190	C2	O4	R48	E4	D1	R444	C2	O4
C195	B3	O5	R49	E4	D1	R445	F2	O5
C196	B3	O5				R450	C4	P5
			R50	E4	D2	R451	C4	P5
C197	B3	O6	R51	E5	D2	R452	C4	P5
C202	C4	P5	R52	E5	D2			
			R53	G5	D2	R453	C3	P5
CR11	G3	E2	R54	G5	D2	R454	C4	P5
CR12	G4	E2				R469	C2	P4
CR33	E2	M5	R80	F4	E1	R470	C2	P4
CR37	F1	M6	R81	E4	E2	R474	C2	P5
CR40	D2	N4	R82	E3	E2			
			R94	G4	E1	R475	C4	P5
CR41	D2	N5	R95	F4	E1	R482	C2	P4
CR42	D1	N4				R486	D4	P6
CR43	D2	N5	R96	G4	E1	R487	B2	P2
			R97	E4	E2			
J16	B2	Q5	R98	E4	E2	U9	F4	D2
J17	C4	Q5	R106	G4	E2	U12	G4	E1
			R388	D2	M4	U37A	G2	M6
L6	E4	E2				U37B	B3	M6
L17	C4	P5	R389	E1	M5	U37D	F1	M6
			R391	E2	M5			
P16	B2		R401	D2	M4	U40A	G2	N6
P17	C4		R402	D2	M4	U43A	B3	O5
			R403	D2	N4	U43D	B2	O5
Q6	E5	D2						
Q7	F3	D1	R404	E2	M5	VR8	C3	P5
Q8	F3	D1	R405	E2	M5			
Q74	E2	N5	R406	E1	N5			
Q75	E2	N5	R409	F1	M6			

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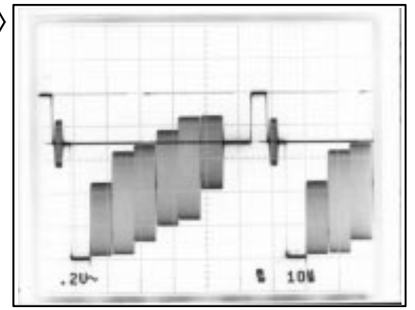

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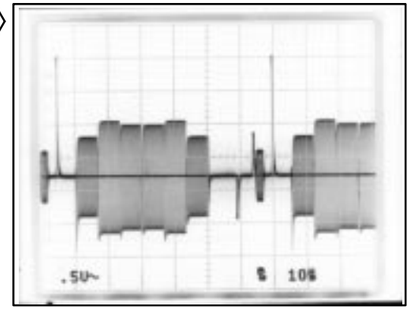

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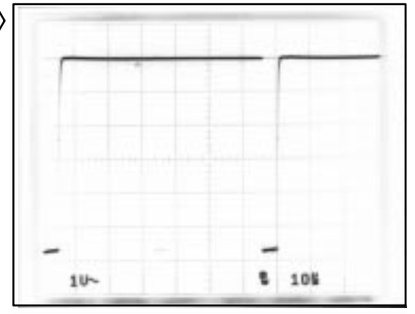

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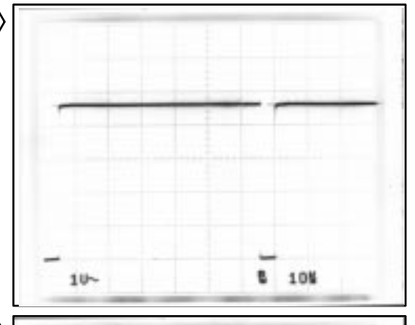

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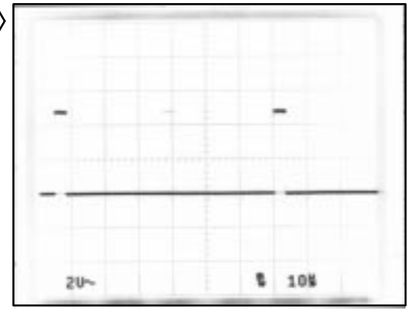
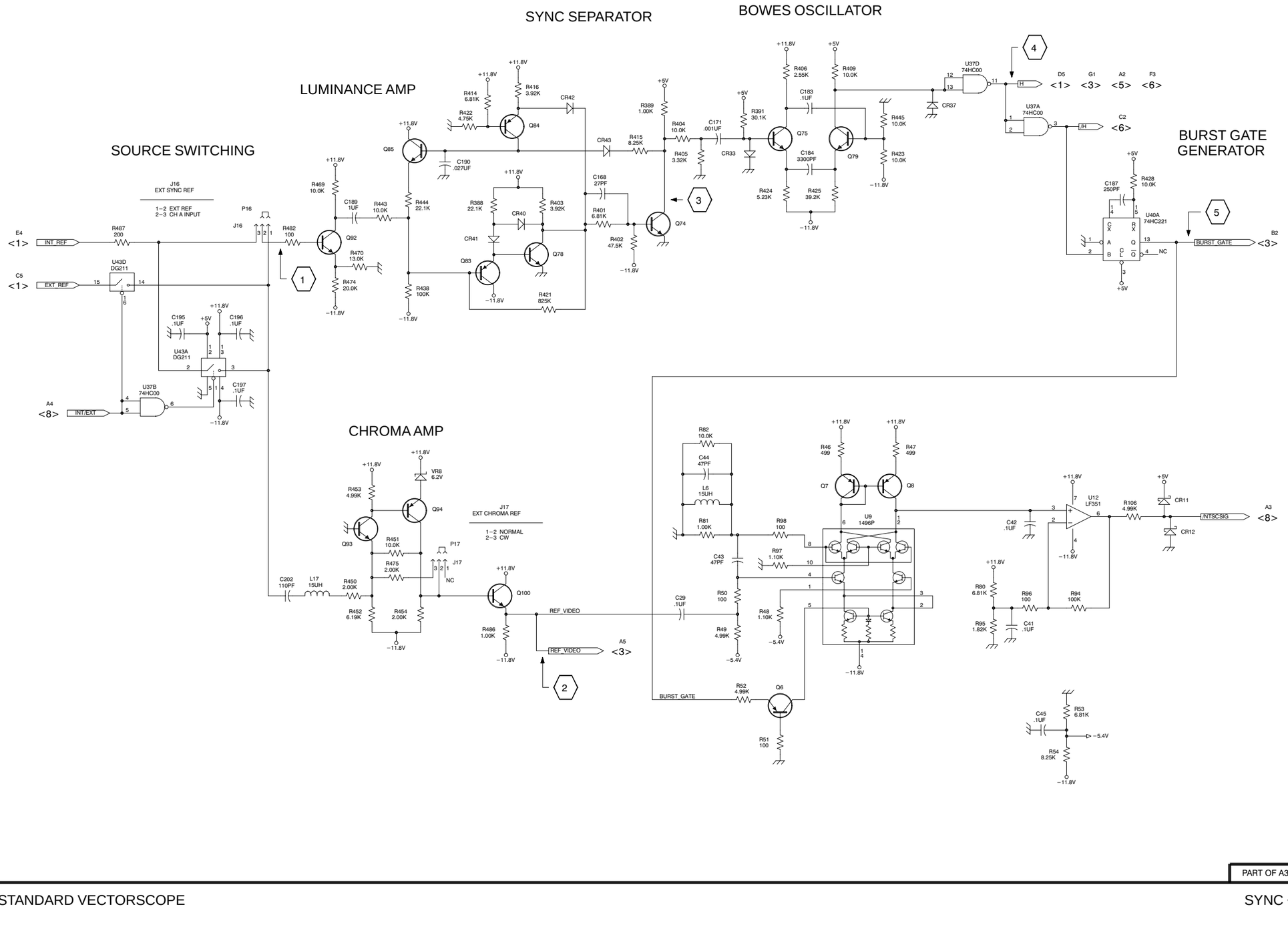




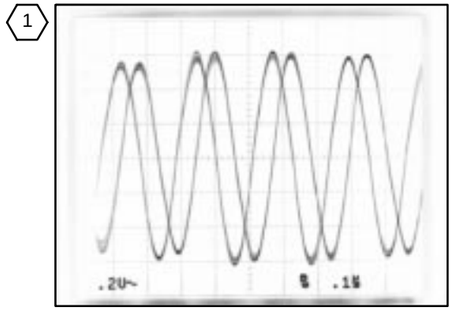
PART OF A3 MAIN BOARD

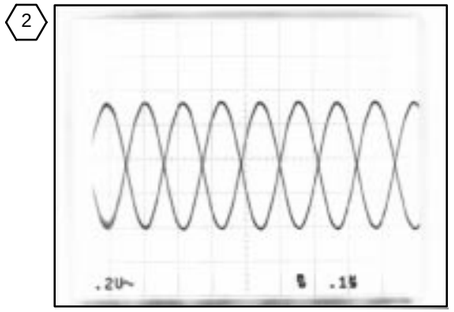
Schematic Diagram <3> Component Locator Chart

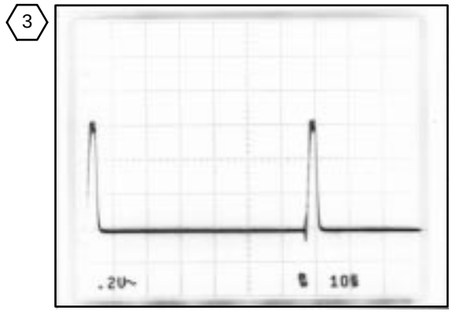
The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

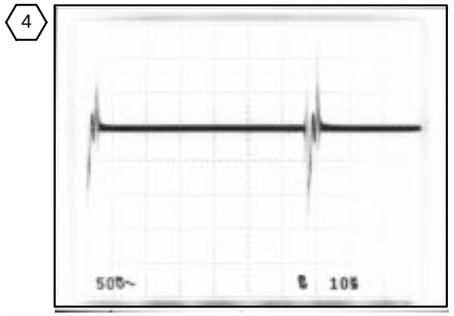
Assembly A3. Partial Assembly A3 also shown on Diagrams 1, 2, 4, 5, 6, and 8.

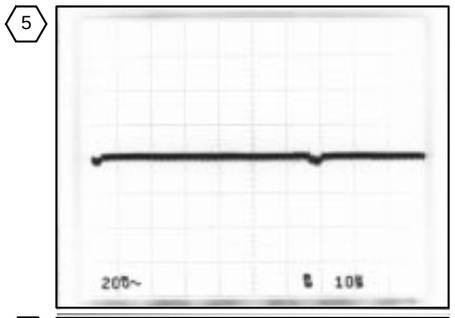
Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C37	D3	E4	Q21	E2	F5	R164	D1	F5
C38	C3	E5	Q22	D1	F5	R165	D1	G5
C39	D3	E5	Q24	F2	G5	R166	C1	G5
C49	G2	E4	Q25	D1	G5	R167	F3	G5
C50	E2	E5				R168	D1	G5
			Q26	C1	G5			
C51	D2	E6	Q28	D4	G4	R184	C4	G4
C56	G2	E4	Q29	C4	G5	R185	D4	G4
C57	G5	E4	Q32	C4	H5	R186	C5	G4
C58	G4	E4	Q33	B2	H5	R187	C5	G4
C59	F5	E4				R188	C4	G5
			Q34	B5	H4			
C60	F2	E5	Q35	B4	H5	R196	C4	G5
C61	E4	E5	Q36	B2	H6	R197	C4	G5
C62	G4	F4	Q37	B2	H6	R198	B2	G5
C68	E1	E1	Q41	A2	I5	R205	C2	G5
C69	E1	F2				R213	B5	H4
			R76	D3	E5			
C70	G5	E4	R77	D3	E5	R214	C4	H4
C71	G4	E4	R86	C3	E5	R215	C5	H5
C72	E4	F5	R87	D2	E6	R216	C4	H5
C74	G4	F4	R88	F1	F1	R217	C5	H5
C78	G4	F4				R218	A4	H5
			R93	F1	E1			
C79	A1	F4	R104	E3	E5	R219	B2	H5
C80	B1	F4	R105	E3	E6	R220	B3	H6
C81	F4	F5	R111	G1	E5	R226	B5	H4
C82	F4	F5	R112	E3	E5	R227	B5	H4
C86	D4	G4				R228	B4	H4
			R113	E2	E5			
C95	C5	G4	R114	E3	E5	R229	B4	H4
C98	D4	G4	R115	E3	E5	R230	B4	H5
C99	C3	G5	R116	F4	E5	R231	B3	H5
C102	C3	G5	R117	E1	F2	R236	A2	I6
C105	D5	H4				R237	A3	I6
			R120	G5	E4			
C106	B4	H4	R121	G4	E4	R246	A2	I5
C108	B4	H4	R122	G4	E4	R247	A2	I6
C109	A4	H5	R123	F5	E5	R248	B3	I6
C110	C5	H5	R124	F4	E5	R249	B3	I6
C111	A3	H5				R250	A3	I6
			R125	E4	F5			
C112	A3	I6	R126	F3	E5	R252	B2	I6
C116	B3	I5	R127	E4	F5	R253	B2	I6
C123	B3	I6	R128	E2	E5	R375	H2	M4
C162	G2	M4	R129	F5	E6	R399	G2	M4
CR13	F4	E6	R131	E1	F2	TP1	G4	E4
CR17	D2	G5	R132	E1	F2			
CR18	F2	F5	R134	G4	F4	U11	D3	D5
CR19	E2	F5	R135	E2	F5	U13A	G2	E4
CR22	C1	G5	R145	G4	F4	U13D	G4	E4
CR36	G2	M4				U14A	E2	E5
			R146	A1	F4	U14B	E3	E5
L7	D4	G4	R147	B1	F4			
L8	C3	G5	R148	B1	F5	U17	G4	F4
L12	A5	H5	R149	D2	F5	U18	F4	F5
			R150	E2	F5	U23	C5	G4
Q10	E3	E6				U25	B3	I5
Q13	E4	E5	R151	G4	F6	U33B	H1	L4
Q14	E4	E5	R152	D1	F5	U36B	G2	M4
Q15	F1	F1	R161	C4	G4			
Q16	E1	F2	R162	D4	G4	VR2	A1	F4
			R163	D2	G5			
Q17	F4	F6						

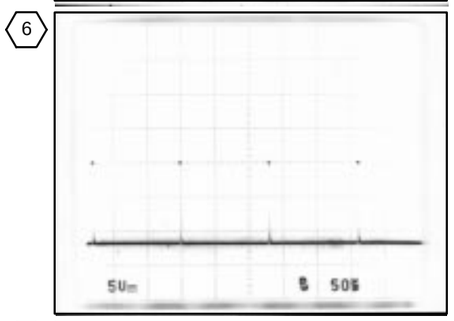


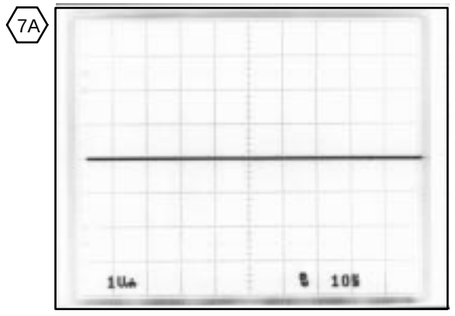


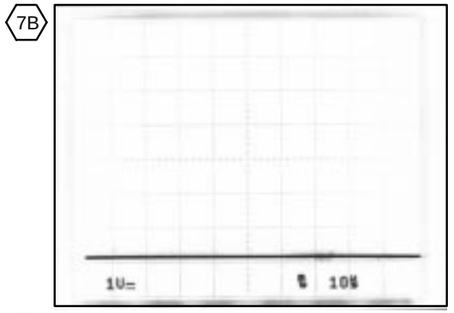


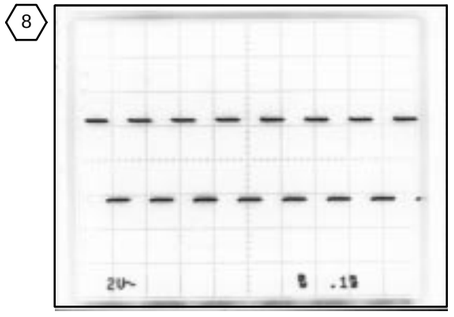


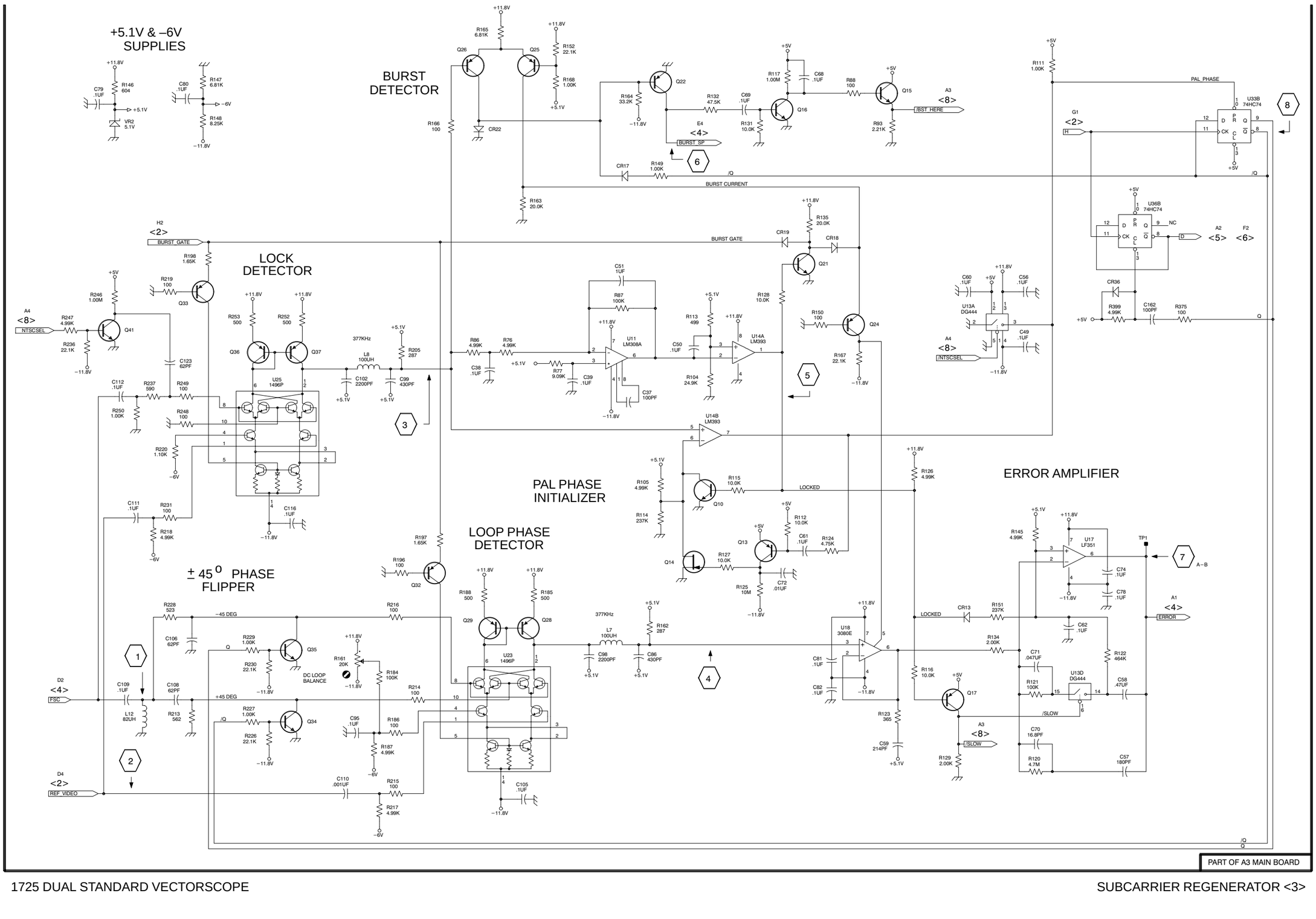











+5.1V & –6V SUPPLIES
BURST DETECTOR
LOCK DETECTOR
± 45 O PHASE FLIPPER
PAL PHASE INITIALIZER
LOOP PHASE DETECTOR
ERROR AMPLIFIER
BURST_GATE
BURST CURRENT
BURST GATE
/BST HERE
BURST SP
PAL_PHASE
LOCKED
/LOCKED
/SLOW
NTSCSEL
/NTSCSEL
FSC
REF VIDEO
ERROR
DC LOOP BALANCE
377KHz
+45 DEG
–45 DEG
U11 LM308A
U14A LM393
U14B LM393
U23 1496P
U25 1496P
U33B 74HC74
U36B 74HC74
U13A DG444
U13D DG444
U17 LF351
U18 3080E
Q10
Q13
Q14
Q15
Q16
Q17
Q21
Q22
Q24
Q25
Q26
Q28
Q29
Q32
Q33
Q34
Q35
Q36
Q37
Q41
CR17
CR18
CR19
CR22
CR36
TP1
A–B
/Q
PART OF A3 MAIN BOARD

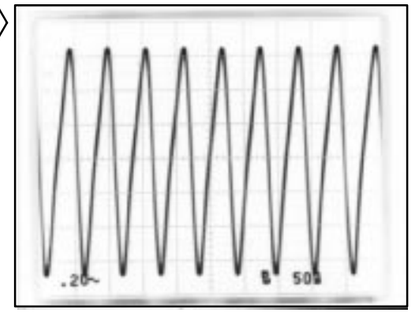
Schematic Diagram <4> Component Locator Chart

The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

Assembly A3. Partial Assembly A3 also shown on Diagrams 1, 2, 3, 5, 6, and 8.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C1	C5	A4	CR5	B3	D5			
C2	C5	A4	CR6	F4	E2	R65	B1	D6
C3	E3	B4				R66	B3	D5
C4	E2	B5	CR7	F4	E3	R67	B3	D5
C5	G2	B4	CR26	E5	J1	R68	B4	D5
			CR27	D5	J1	R69	B4	C5
C8	G2	B4	CR31	E4	K1			
C9	G1	B4	CR32	D4	K1	R70	C1	D5
C10	F1	B4				R71	E2	D6
C11	F1	B5	J5	H2	C4	R72	G4	D3
C14	G2	C4	J9	A5	I1	R73	B2	D4
						R74	A1	E4
C15	B5	C5	L1	G1	C4			
C17	H2	C4	L2	F1	B4	R75	B1	D5
C18	B3	C5	L3	H2	C4	R78	A3	D5
C19	D2	C6	L4	D2	C6	R83	G4	D3
C20	H1	C4	L5	C2	C6	R84	A1	E4
						R85	A1	E4
C21	H2	C4	Q3	G2	B4			
C22	B3	C5	Q5	D2	C6	R89	F4	F3
C23	D1	D5	Q9	A1	E4	R99	F5	E2
C24	D2	C6	Q11	F5	E2	R101	G5	E3
C26	C2	D4	Q12	F4	E3	R102	G3	E3
						R103	G4	E3
C27	B3	D4	R5	E3	B4			
C28	B3	C5	R6	E3	B4	R107	F5	E2
C30	A1	D4	R7	E2	B5	R108	F5	E3
C31	B2	D5				R109	F4	E3
C32	B4	D5	R8	E2	B5	R110	F4	E3
			R9	E2	B5	R118	F5	F3
C33	B4	D5	R10	F2	B6			
C34	H4	D3	R14	G2	B4	R119	F3	F3
C35	B2	D4	R15	G1	B4	R255	D5	J1
C36	B1	E4	R16	F1	B4	R256	D5	J1
C40	B1	D6				R272	D5	J2
			R17	E3	B4	R282	D5	J1
C46	G5	E3	R18	B2	B4			
C47	H3	E3	R19	F3	B5	R298	D4	K1
C48	G4	E3	R20	E3	B5	R306	D4	K2
C52	F5	E2	R21	F3	B5	R309	F4	K3
C53	F5	E3	R22	F2	B6	R315	F5	K3
			R25	G2	C4	R322	D4	K1
C54	F4	E3	R26	G2	B4	R323	D4	K1
C55	F4	E3	R27	G1	B4			
C67	C5	F1	R28	E2	B5	U2	F3	B5
C75	C5	F6				U3	F2	B5
C76	C5	F6	R29	E2	B5	U7A	C1	D6
			R30	E1	B6	U7B	C2	D6
C84	B5	F2	R31	E1	B6			
C96	B5	G6	R32	E1	B6	U8A	B2	D4
C117	A5	I1	R36	F1	C5	U8B	B1	D4
C126	D5	I1				U10A	H4	D2
C127	D5	J1	R37	E2	C5	U10B	H4	D2
			R41	E1	C5	U10C	H4	D2
C131	D5	J1	R42	E1	C6			
C139	D4	K1	R43	D2	C6	U10D	H5	D2
C141	D4	K1	R44	D2	C6	U15	F5	E2
C149	D4	L1				U16	F4	F3
C160	B5	M4	R55	H4	D2	U30	D5	J2
			R56	H4	D3	U31	D4	L2
C163	C5	M6	R57	G3	D3			
C164	B5	M1	R58	G4	D3	VR1	B2	C5
C165	B5	M2	R59	G4	D3			
						W2	H2	
C167	B5	M3	R60	G4	D3			
C186	C5	N6	R61	A1	D4	Y1	B3	C4
			R62	C3	D4	Y2	B3	C5
CR2	H4	D2	R63	B3	D4			
CR3	A2	C4	R64	B1	D4			
CR4	B3	D5						

1



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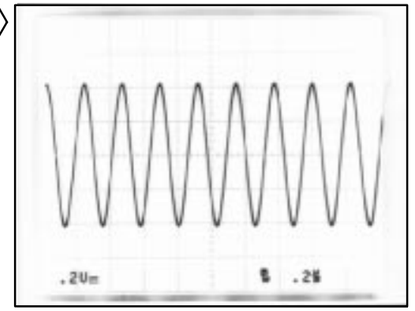

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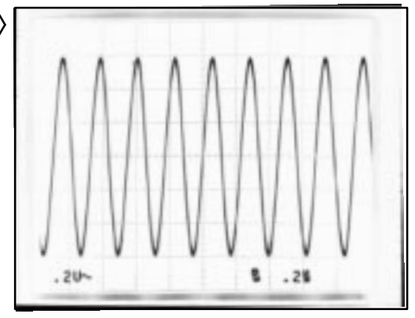
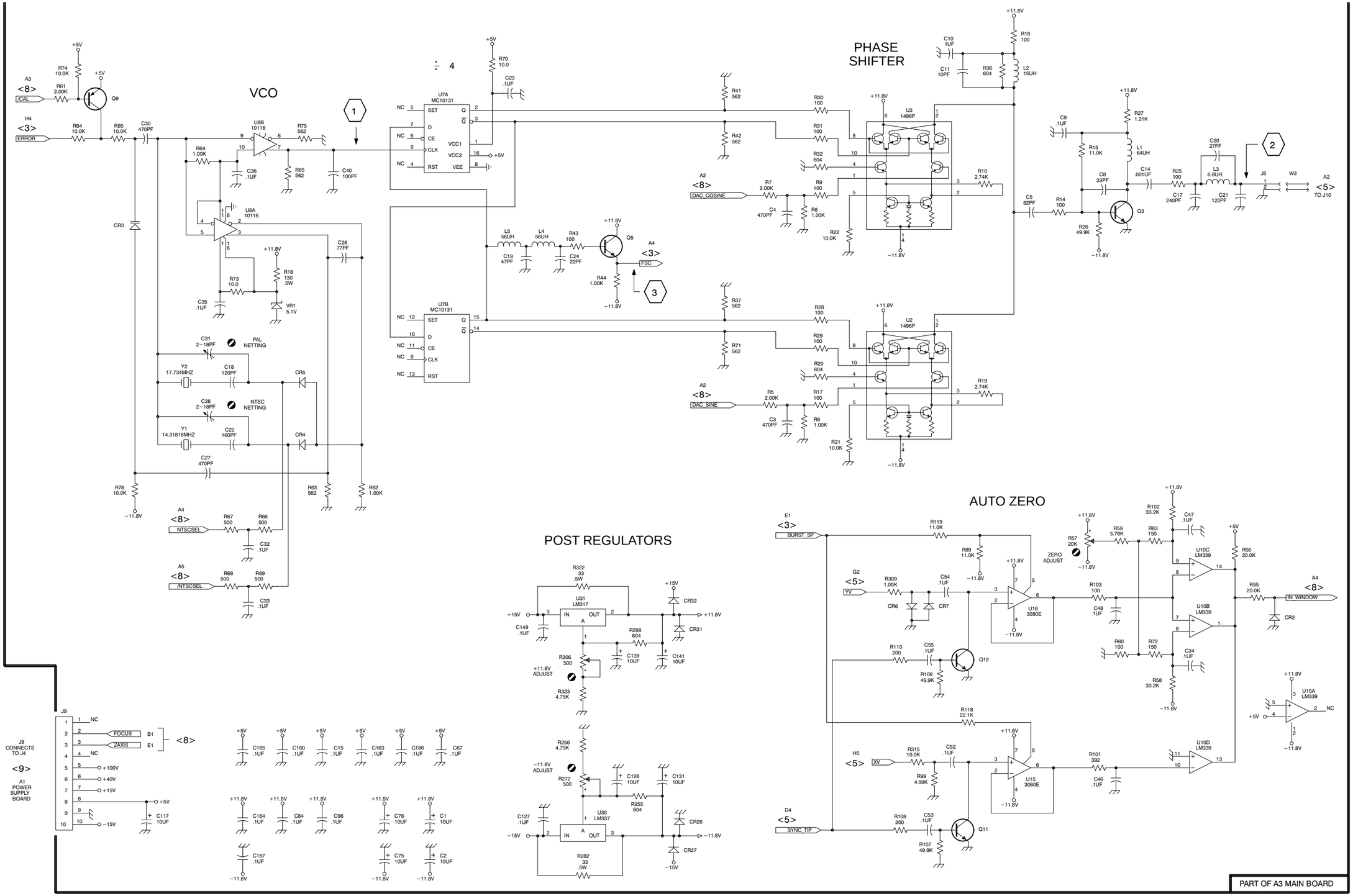




1725 DUAL STANDARD VECTORSCOPE

VCXO, PHASE SHIFTER, & AUTO ZERO <4>

Schematic Diagram <5> Component Locator Chart

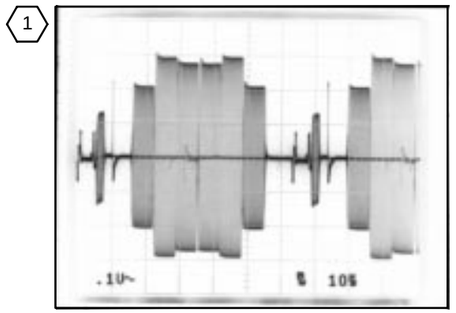
The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

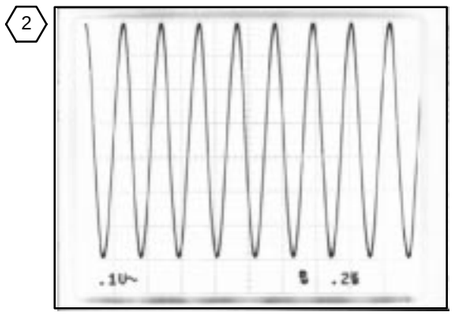
Assembly A3. Partial Assembly A3 also shown on Diagrams 1, 2, 3, 4, 6, and 8.

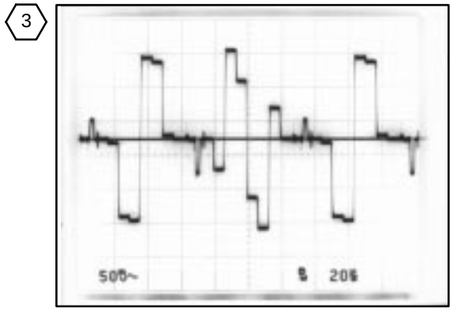
Comp No	Diag Loc	Bd Loc
C104	B2	H3
C107	B4	H3
C115	B1	I3
C118	B1	I2
C119	B2	I3
C120	B3	I3
C121	C3	I4
C122	B5	I5
C124	C4	I5
C125	C5	I5
C128	C4	J2
C129	C1	J3
C132	D2	J3
C133	C5	J5
C134	D5	J5
C135	C1	J3
C136	D4	J4
C137	E4	J4
C138	E4	K5
C140	D4	K5
C142	C1	K2
C143	E2	K3
C144	F4	K4
C145	E1	K2
C146	G3	K3
C147	E2	K3
C148	F4	K4
C150	G4	L5
C151	F2	L2
C152	F2	L2
C153	G4	L4
C154	H2	L6
C156	G1	L2
C157	G2	L3
C158	H1	L6
C161	H1	L6
CR25	B5	I5
CR28	B1	J2
CR29	B5	I5
CR30	B1	J2
J10	A1	H4
J13	H1	L6
L10	A2	H3
L11	A2	I3
Q38	B4	I3
Q39	B2	H3
Q40	B3	H3
Q46	D5	J5
Q51	D1	K2
Q52	C3	J6
Q53	E4	K5
Q54	E2	K3
Q55	F3	K3
Q56	G3	K3
Q57	F3	K3
Q58	F4	K4
Q59	F5	K5

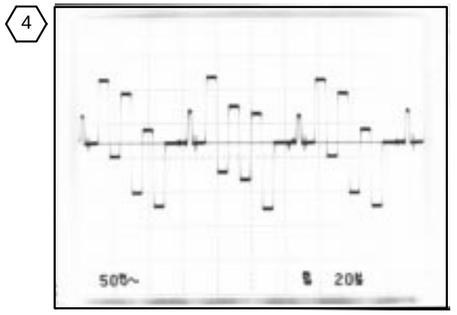
Comp No	Diag Loc	Bd Loc
Q60	F5	L4
Q61	G4	L4
Q62	F2	L2
Q63	F4	L5
Q64	G2	M3
Q65	G2	M3
Q66	F2	M3
Q67	G4	L5
R210	B4	H3
R211	A4	H3
R212	A4	H3
R233	B2	I3
R234	B2	I3
R235	B2	I3
R240	B3	I3
R241	C3	I4
R242	C3	I4
R243	C4	I4
R244	B5	I5
R245	B5	I5
R257	C4	I2
R258	B1	I2
R259	C2	I3
R260	C2	I3
R261	C2	I3
R262	C4	I4
R263	D4	I4
R264	D4	I4
R265	C4	I5
R266	C4	I5
R267	C4	I5
R268	B5	I5
R273	B1	J2
R274	B1	J3
R275	C2	J3
R276	C2	J3
R277	C2	J3
R283	C2	J3
R284	C2	J3
R285	C4	J3
R286	D4	J4
R287	E4	J4
R288	E4	J5
R289	D5	J5
R290	E4	K5
R291	E4	J5
R292	E3	K5
R293	C5	J5
R294	C1	J5
R295	B4	K5
R296	B3	K5
R299	G1	K3
R300	E2	K3
R301	D2	K3
R302	E2	K3
R303	E3	K3
R304	F5	K4
R305	F4	K4

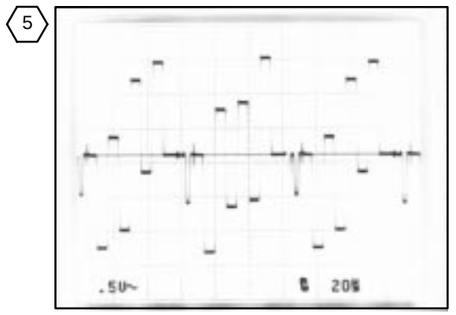
Comp No	Diag Loc	Bd Loc
R307	D1	K2
R308	E1	K3
R310	E2	K3
R311	E2	K3
R312	G3	K3
R313	G3	K3
R314	E3	K4
R316	G3	K3
R317	E4	K4
R318	C4	K5
R319	C3	K5
R324	G3	K3
R325	F3	L4
R326	G4	K4
R327	E4	K5
R328	F5	K5
R329	F5	K5
R330	G5	K5
R331	E2	L3
R332	F2	L3
R333	E2	K3
R334	F2	L3
R335	G2	L3
R336	F4	K4
R337	F4	K4
R338	E4	K4
R339	F5	L5
R340	G4	K5
R341	G1	L6
R342	E2	L3
R343	F2	L3
R344	F3	L3
R345	F2	L3
R346	F5	L3
R347	F4	L4
R348	G5	L4
R349	H2	L6
R352	G2	L3
R353	G1	L3
R354	G2	L3
R355	G2	L3
R356	G5	M4
R357	G5	L5
R358	B2	L5
R359	B2	L5
R360	B3	L5
R361	B3	L5
R363	H1	L6
T1	A1	I2
U26	D4	J4
U27	C5	J5
U28	C1	J2
U29	C2	J4
U34	H1	L6
U36A	A2	M4
VR4	G4	K5
VR5	G1	L3

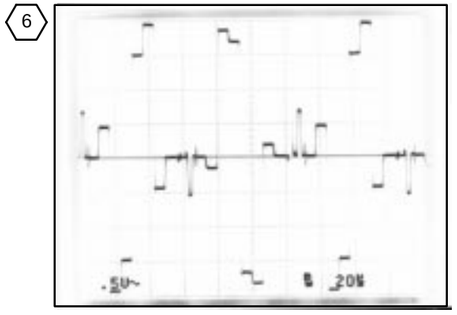


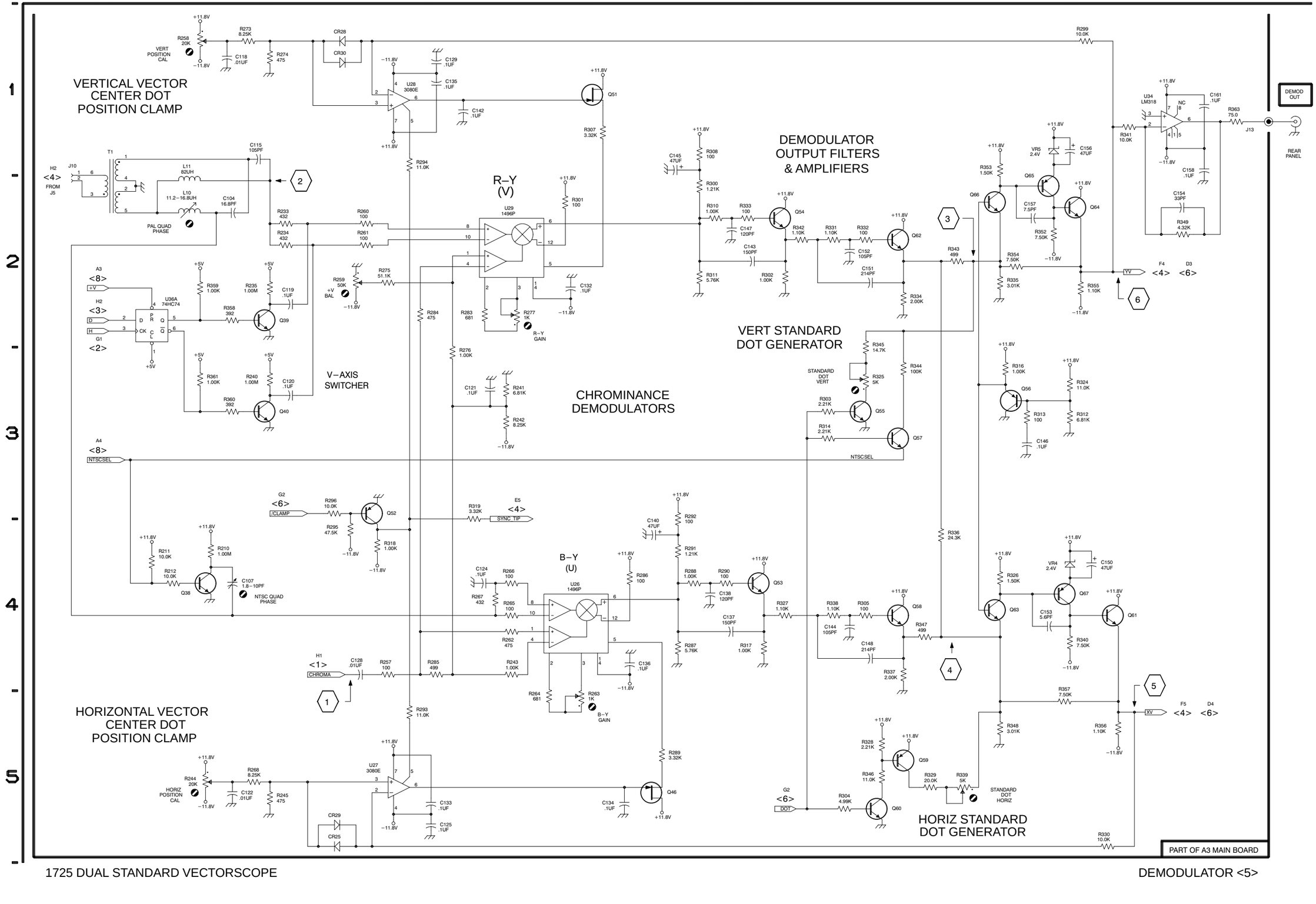











VERTICAL VECTOR CENTER DOT POSITION CLAMP
VERT POSITION CAL
R258 20K
R273 8.25K
R274 475
C118 .01UF
CR28
CR30
U28 3080E
C129 .1UF
C135 .1UF
C142 .1UF
Q51
R307 3.32K
R294 11.0K
R299 10.0K
DEMODULATOR OUTPUT FILTERS & AMPLIFIERS
R308 100
R300 1.21K
R310 1.00K
R333 100
C147 120PF
C143 150PF
R311 5.76K
R302 1.00K
Q54
R342 1.10K
R331 1.10K
R332 100
C152 105PF
C151 214PF
Q62
R334 2.00K
R343 499
C145 47UF
R353 1.50K
Q66
VR5 2.4V
C156 47UF
Q65
C157 7.5PF
Q64
R352 7.50K
R354 7.50K
R335 3.01K
R355 1.10K
U34 LM318
C161 .1UF
R363 75.0
J13
DEMOD OUT
REAR PANEL
R341 10.0K
C158 .1UF
C154 33PF
R349 4.32K
T1
L11 82UH
L10 11.2–16.8UH
C104 16.8PF
C115 105PF
PAL QUAD PHASE
H2 <4> FROM J5
J10
R233 432
R234 432
R260 100
R261 100
R259 50K
+V BAL
R275 51.1K
R284 475
R283 681
R277 1K
R–Y GAIN
C132 .1UF
R–Y (V)
U29 1496P
R301 100
R276 1.00K
C121 .1UF
R241 6.81K
R242 8.25K
V–AXIS SWITCHER
A3 <8> +V
H2 <3> D
H <3>
G1 <2>
U36A 74HC74
R359 1.00K
R235 1.00M
C119 .1UF
R358 392
Q39
R361 1.00K
R240 1.00M
C120 .1UF
R360 392
Q40
CHROMINANCE DEMODULATORS
VERT STANDARD DOT GENERATOR
STANDARD DOT VERT
R345 14.7K
R325 5K
R344 100K
R303 2.21K
Q55
R314 2.21K
Q57
NTSCSEL
R316 1.00K
Q56
R313 100
R324 11.0K
R312 6.81K
C146 .1UF
A4 <8> NTSCSEL
G2 <6> /CLAMP
R296 10.0K
R295 47.5K
Q52
R318 1.00K
R319 3.32K
E5 <4> SYNC TIP
R211 10.0K
R212 10.0K
R210 1.00M
Q38
C107 1.8–10PF
NTSC QUAD PHASE
B–Y (U)
U26 1496P
C124 .1UF
R266 100
R267 432
R265 100
R262 475
R264 681
R263 1K
B–Y GAIN
R286 100
C140 47UF
R292 100
R291 1.21K
R288 1.00K
R290 100
C138 120PF
C137 150PF
R287 5.76K
R317 1.00K
Q53
R327 1.10K
R336 24.3K
H1 <1> CHROMA
C128 .01UF
R257 100
R285 499
R243 1.00K
C136 .1UF
R293 11.0K
R289 3.32K
C134 .1UF
Q46
R338 1.10K
R305 100
C144 105PF
C148 214PF
Q58
R347 499
R337 2.00K
R326 1.50K
Q63
VR4 2.4V
C150 47UF
Q67
C153 5.6PF
Q61
R340 7.50K
R357 7.50K
R348 3.01K
R356 1.10K
XV
F5 <4> D4 <6>
HORIZONTAL VECTOR CENTER DOT POSITION CLAMP
HORIZ POSITION CAL
R244 20K
R268 8.25K
R245 475
C122 .01UF
U27 3080E
C133 .1UF
C125 .1UF
CR29
CR25
G2 <6> DOT
R328 2.21K
Q59
R346 11.0K
R329 20.0K
R339 5K
STANDARD DOT HORIZ
R304 4.99K
Q60
HORIZ STANDARD DOT GENERATOR
R330 10.0K
PART OF A3 MAIN BOARD
F4 <4> D3 <6>
YV
1
2
3
4
5
6

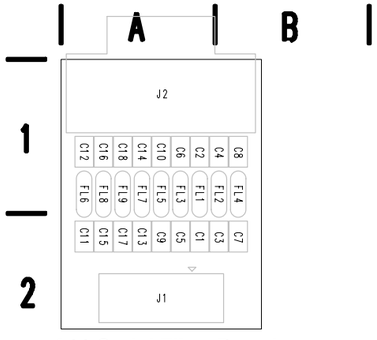
Schematic Diagram <6> Component Locator Chart

The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

Assemblies A3 and A11. Partial Assembly A3 also shown on Diagrams 1, 2, 3, 4, 5, and 8.

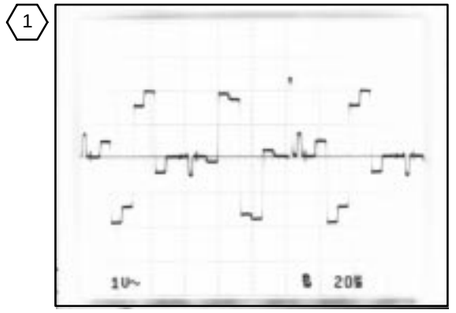
Comp No	Diag Loc	Bd Loc
C6	E1	B2
C7	C2	B3
C12	E1	C2
C13	C1	C3
C16	D1	C3
C25	F3	D3
C63	C3	G6
C64	C5	G6
C73	E1	F1
C87	B3	F6
C88	B3	F6
C89	B4	F6
C90	B5	F6
C93	E4	G3
C94	E3	G3
C97	F4	G3
C101	F4	H3
C130	G5	I6
C159	H3	M3
C169	D2	M6
C176	G3	N4
C185	E2	N6
C188	D4	O4
C192	D4	O3
C193	E4	O3
C213	C3	
CR1	F2	B3
CR14	E1	F1
CR34	G2	M3
CR35	G2	M3
CR38	H2	N3
CR39	H2	N3
J3	F1	C2
J6	B5	D6
J7	B3	D6
J8	A1	F6
J11	H4	J6
J12	H4	J6
J14	H2	N3
J15	H2	N3
PS1	C5	
PS2	C5	
Q1	D2	B3
Q2	D1	C3
Q4	D1	C3
Q31	F1	H2
Q43	G5	I6
Q45	G5	I6
Q47	G5	J6
Q48	G4	J6
Q49	G4	J6
Q50	G5	J6
Q68	G3	M3
Q69	G3	M3
Q72	G2	N3
Q73	G3	N3
Q76	G2	N3
Q77	G3	N3
Q81	E2	N6
R1	H5	A4
R2	H3	A4
R11	E1	B2
R12	D2	B3
R13	C2	B3
R23	C2	B3
R24	F2	B3
R33	E1	C2
R34	C1	B3
R35	D1	B3
R38	F1	C2
R39	D1	C3
R40	F2	C3
R45	D1	C3
R79	B1	D6
R153	B3	F6
R154	B3	F6
R155	B4	F6
R156	B5	F6
R169	B3	G6
R170	B3	G6
R171	B4	G6
R172	B5	G6
R174	E1	G1
R182	F3	G3
R189	B3	G6
R190	C3	G6
R191	C4	G6
R192	B5	G6
R194	F1	G2
R199	F1	H2
R201	E3	H3
R202	E4	H3
R203	E4	H3
R204	E3	H3
R206	C3	G6
R207	C3	H6
R208	C5	G6
R209	C4	H6
R221	D3	H6
R222	C3	H6
R223	C4	H6
R224	C4	H6
R225	D4	H6
R251	G5	I6
R254	G5	I6
R269	H4	I6
R270	G5	I6
R271	F4	I6
R278	G5	I6
R279	G4	I6
R280	H5	I6
R281	G5	I6
R297	F5	J6
R320	G4	K6
R321	G4	K6
R362	F5	L6
R368	G2	M3
R369	G3	M3
R372	G3	M3
R373	G3	M3
R374	H3	M4
R385	G2	N2
R386	G2	N3
R387	F4	M4
R395	D2	M6
R400	G4	N4
R407	E2	M5
R411	H3	N3
R412	G3	N4
R413	G3	N4
R426	E2	N6
R427	E2	N6
R437	H2	O3
SPARE1	C5	F6
SPARE2	C5	F6
U1D	D3	A2
U4A	E1	B2
U4B	E2	B2
U5A	B1	B6
U5B	B1	B6
U5C	C1	B6
U6	G1	C2
U22A	E4	G3
U22B	E4	G3
U22C	E3	G3
U22D	E3	G3
U24A	C3	G5
U24B	C4	G5
U24C	D4	G5
U24D	D3	G5
U32C	F3	L1
U40B	D2	N6
U42A	D4	O3
U42B	D4	O3
U42C	D3	O3
U42D	D3	O3
VR3	E4	H3

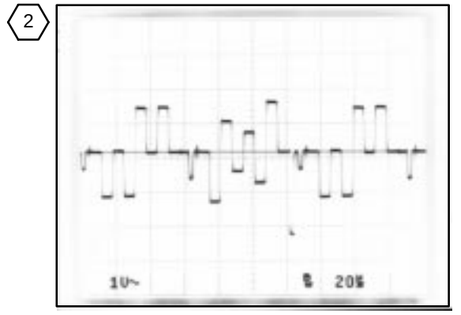
Comp No	Diag Loc	Bd Loc
A11		
C1	A5	A2
C2	A5	A1
C3	A5	B2
C4	A5	B1
C5	A5	A2
C6	A5	A1
C7	A4	B2
C8	A4	B1
C9	A4	A2
C10	A4	A1
C11	A4	A2
C12	A4	A1
C13	A4	A2
C14	A4	A1
C15	A3	A2
C16	A3	A1
C17	A3	A2
C18	A3	A1
FL1	A5	A1
FL2	A5	B1
FL3	A5	A1
FL4	A4	B1
FL5	A4	A1
FL6	A4	A1
FL7	A4	A1
FL8	A3	A1
FL9	A3	A1
J1	B4	A2
J2	A4	A1

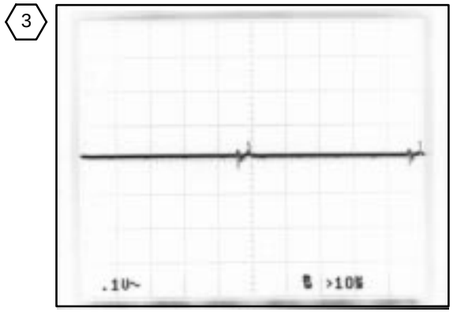


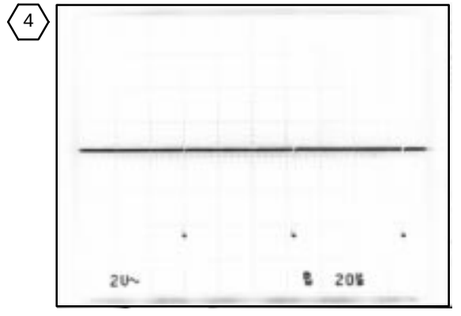
A11 Serial Filter Board

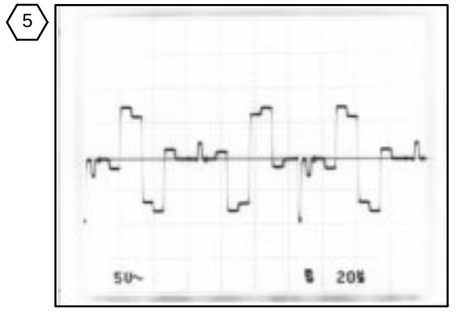
Static Sensitive Devices
See Maintenance Section

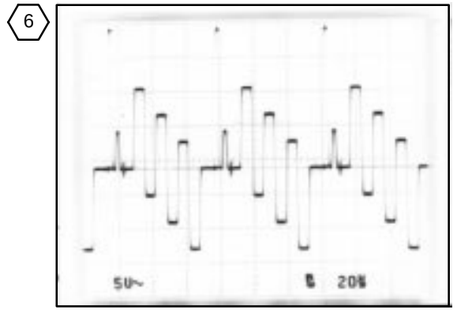


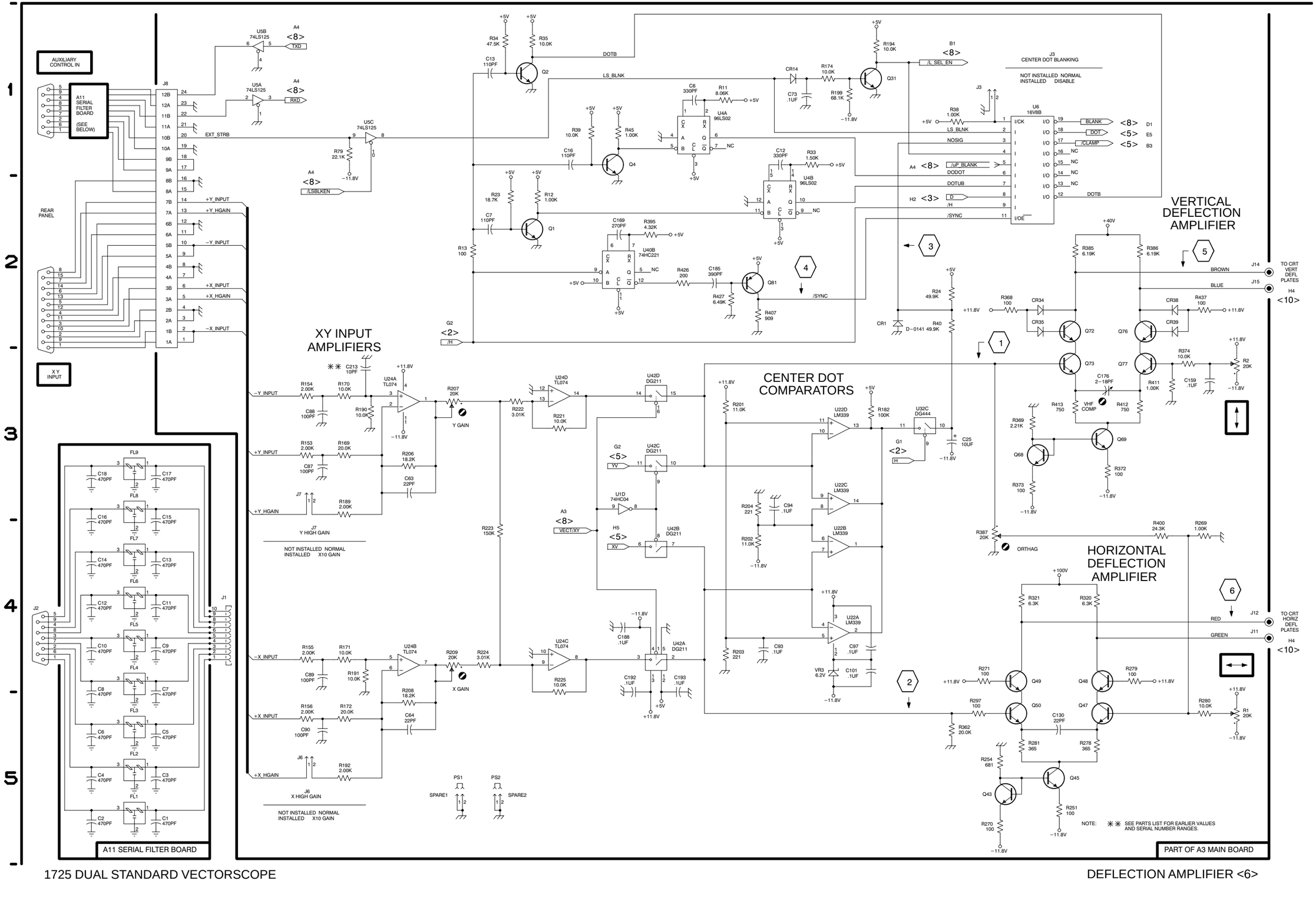


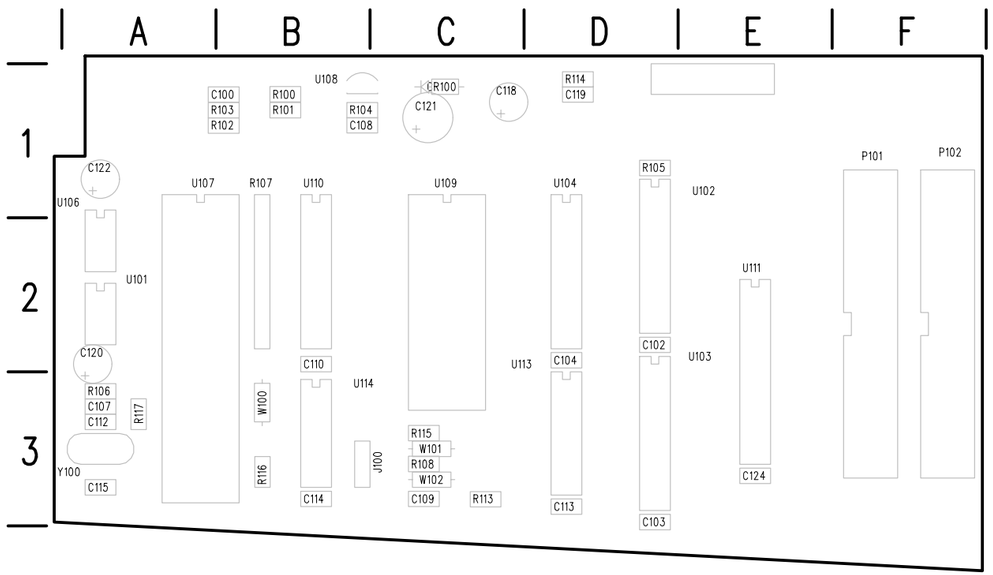









AUXILIARY CONTROL IN
A11 SERIAL FILTER BOARD
(SEE BELOW)
REAR PANEL
X Y INPUT
J8
U5B 74LS125
U5A 74LS125
U5C 74LS125
TXD
RXD
EXT_STRB
/LSBLKEN
+Y_INPUT
+Y_HGAIN
−Y_INPUT
+X_INPUT
+X_HGAIN
−X_INPUT
XY INPUT AMPLIFIERS
Y GAIN
X GAIN
Y HIGH GAIN
X HIGH GAIN
NOT INSTALLED NORMAL
INSTALLED X10 GAIN
DOTB
LS_BLNK
/L_SEL_EN
J3
CENTER DOT BLANKING
NOT INSTALLED NORMAL
INSTALLED DISABLE
U6 16V8B
BLANK
DOT
/CLAMP
NOSIG
/uP_BLANK
DODOT
DOTUB
/H
/SYNC
CENTER DOT COMPARATORS
VERTICAL DEFLECTION AMPLIFIER
BROWN
BLUE
TO CRT VERT DEFL PLATES
HORIZONTAL DEFLECTION AMPLIFIER
RED
GREEN
TO CRT HORIZ DEFL PLATES
VHF COMP
ORTHAG
VECT/XY
XV
YV
SPARE1
SPARE2
NOTE: ✳✳ SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES.
A11 SERIAL FILTER BOARD
PART OF A3 MAIN BOARD



A4 Control Board

Static Sensitive Devices
See Maintenance Section

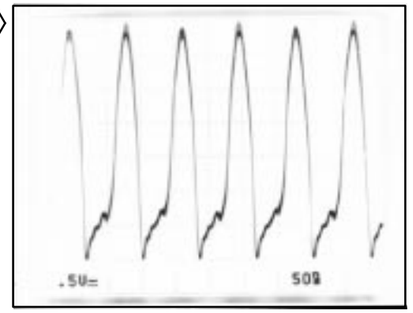
Schematic Diagram <7> Component Locator Chart

The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

Assembly A4.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
			R105	G4	D1			
C121	A2	C1	R106	B1	A3	U109	E1	C1
C122	A3	A1	R107	F1	B1	U110	D1	B1
C124	C5	E3	R108	C3	C3	U111	F1	E2
			R113	F2	C3	U113	E2	C3
CR100	A1	C1	R114	F3	D1	U114A	F2	B3
CR101	A1	C1						
			R115	F2	C3	U114B	D3	B3
J100	C3	C3	R116	D2	B3	U114C	F3	B3
			R117	C2	A3	U114D	C3	B3
P100	C3		U101	A2	A2			
P101	A3	F1	U102	F4	E1	W100	C1	B3
P102	H2	F1				W101	D2	C3
			U103	F5	E2	W102	D2	C3
R100	A2	B1	U104	F3	D1			
R101	A2	B1	U106	B2	A1	Y100	C1	A3
R102	A3	B1	U107	C1	A1			
R103	A2	B1	U108	A2	B1			
R104	A2	B1						

1



NOTE:

W100 IS NOT INSTALLED IF U107 IS A 8051.

W102 IS NOT INSTALLED IF U109 IS A 27C128.

NOTE:

DAC_GND PROVIDES SHIELDING FOR DAC_SIN AND DAC_COSINE.

J100

1–2 SINGLE PHASE (STD)

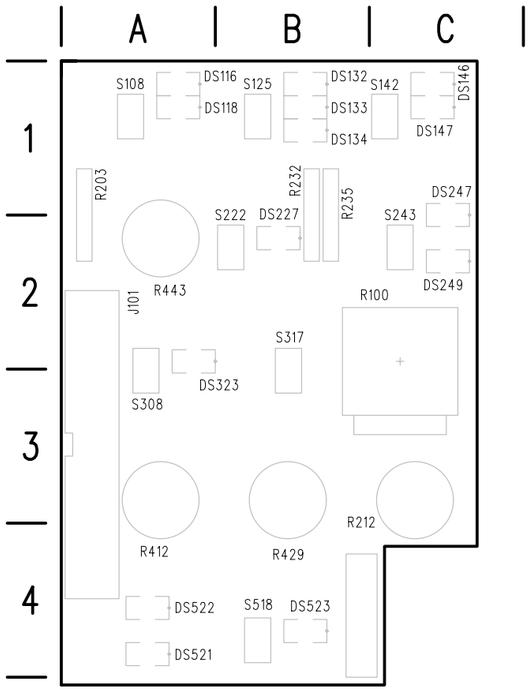
2–3 DUAL PHASE

PART	+5V	DGND
8031	40	20
74LS377	20	10
74LS125	14	7
HCTL2000	16	8
27C256	28	14

P101 CONNECTS TO J101 H3 <8> A2 FRONT FANEL BOARD

P102 CONNECTS TO P1 A2 <8> A3 MAIN BOARD

A4 CONTROL BOARD



A2 Front Panel Board

Static Sensitive Devices
See Maintenance Section

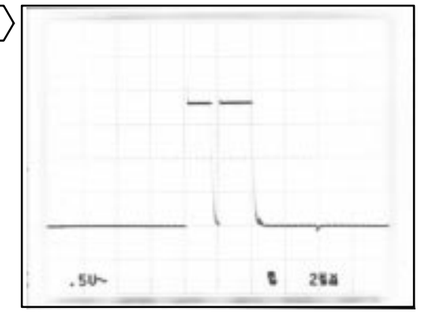
Schematic Diagram <8> Component Locator Chart

The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

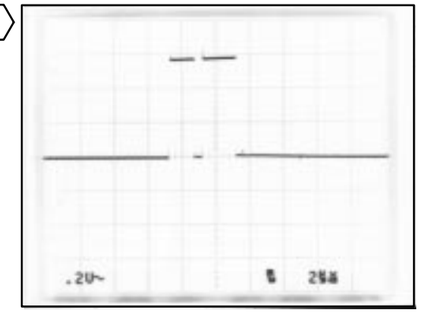
Assembly A3, A3A1, and A2. Partial Assembly A3 also shown on Diagrams 1, 2, 3, 4, 5, and 6.

Comp No	Diag Loc	Bd Loc
A3		
C77	D2	F2
C83	D2	F1
C85	E1	G3
C91	C4	G2
C92	C4	G2
C100	D4	G1
C103	C4	H1
C113	C5	H2
C114	C4	H2
CR15	D2	F1
CR16	D1	G3
CR20	D1	G3
CR21	D1	G3
CR23	C2	G2
CR24	C4	H1
J1	D4	A3
J4	D5	C2
L9	D4	H1
P1	A2	B2
Q23	C2	G2
Q27	C1	G1
Q30	C4	H1
Q42	C5	I1
Q44	C5	I1
R4	C5	A5
R130	C2	F1
R133	B2	F2
R136	B2	F1
R137	C1	F1
R138	D2	F1
R139	C2	F1
R140	D2	F1
R141	D2	F2
R142	B1	F3
R143	D2	F3
R144	D1	F3
R157	B4	G1
R158	B4	G2
R159	B3	G3
R160	D1	G3
R173	C4	G1
R175	B2	G2
R176	B1	G2
R177	C1	G2
R178	B4	G2
R179	B4	G2
R180	B4	G2
R181	B3	G3
R183	D1	G3
R193	C2	G2
R195	C4	G2
R200	C1	H2
R232	D5	H1
R238	C5	I1
R239	C5	I2
R489	C4	H1
R490	C3	H1
U1B	B5	A2
U1C	A5	A
2U1E	A5	A2
U1F	B5	A2
U19A	B2	F2
U19B	B1	F2
U20A	D1	F3
U20B	D1	F3
U20C	D2	F3
U21A	B4	F2
U21B	C4	F2
A3A1		
DS100	E4	A1
DS200	E4	B1
DS300	E4	C1
P100	D3	B1
P200	D4	A1
P800	D4	C1
A2		
DS116A	B1	G3
DS116B	A1	E4
DS132A	B1	F4
DS132B	B1	G4
DS132C	B1	G4
DS146A	C1	G5
DS146B	C1	G5
DS227	B2	F4
DS247A	C2	F5
DS247C	C2	F5
DS323	A2	G3
DS522A	A4	F3
DS522C	A4	E5
DS523	B4	F3
J101	A2	H3
R100	C2	G2
R203	A1	F3
R212	C3	H1
R232	B1	F3
R235	B1	F4
R412	A3	H1
R429	B3	H1
R443		H2
S108	A1	E1
S125	B1	F1
S142	C1	F1
S222	B2	E1
S243	C2	F1
S308	A3	F2
S317	B2	E2
S518	B4	F2

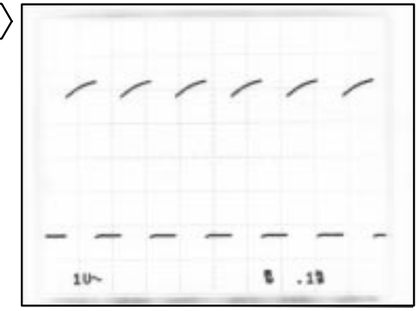
1



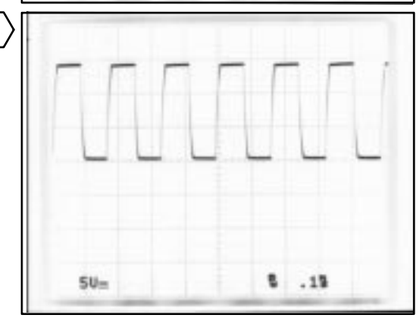
2



3



4



FOCUS CONTROL

Z–AXIS CONTROL

GRATICULE ILLUMINATION

TRACE ROTATION

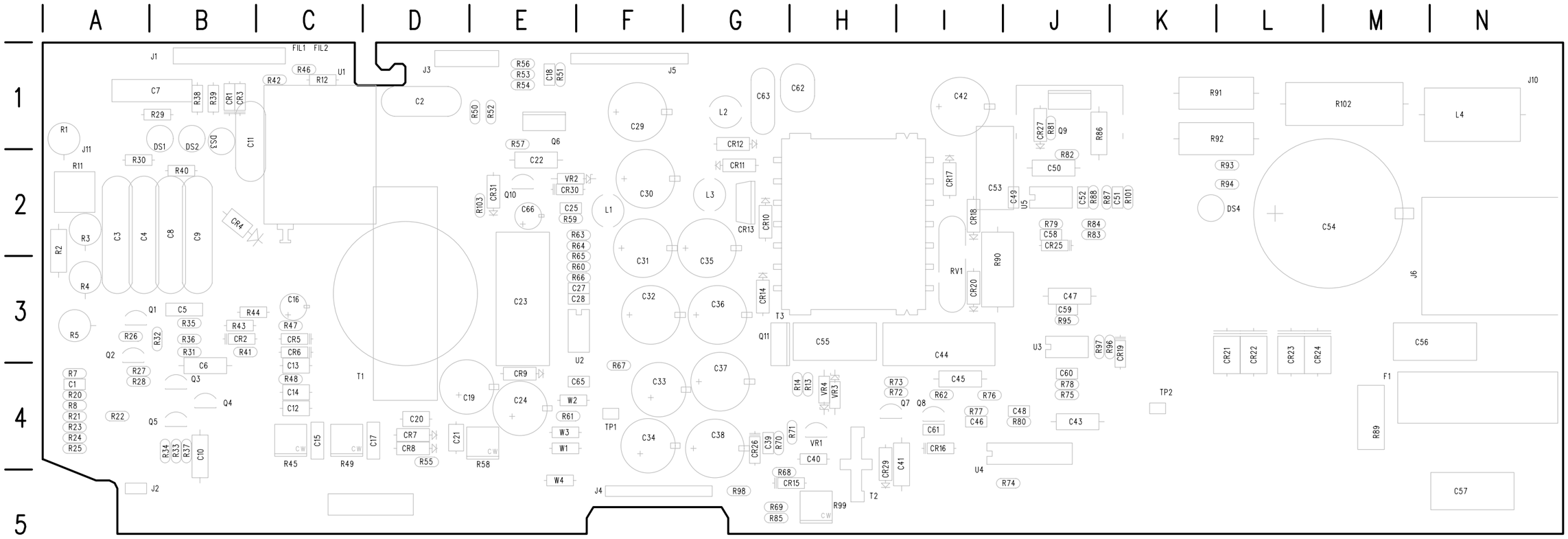
A3A1 GRATICULE LIGHT BOARD

PART OF A3 MAIN BOARD

A2 FRONT PANEL BOARD

1725 DUAL STANDARD VECTORSCOPE

FOCUS/Z–AXIS & FRONT PANEL <8>



Static Sensitive Devices
See Maintenance Section

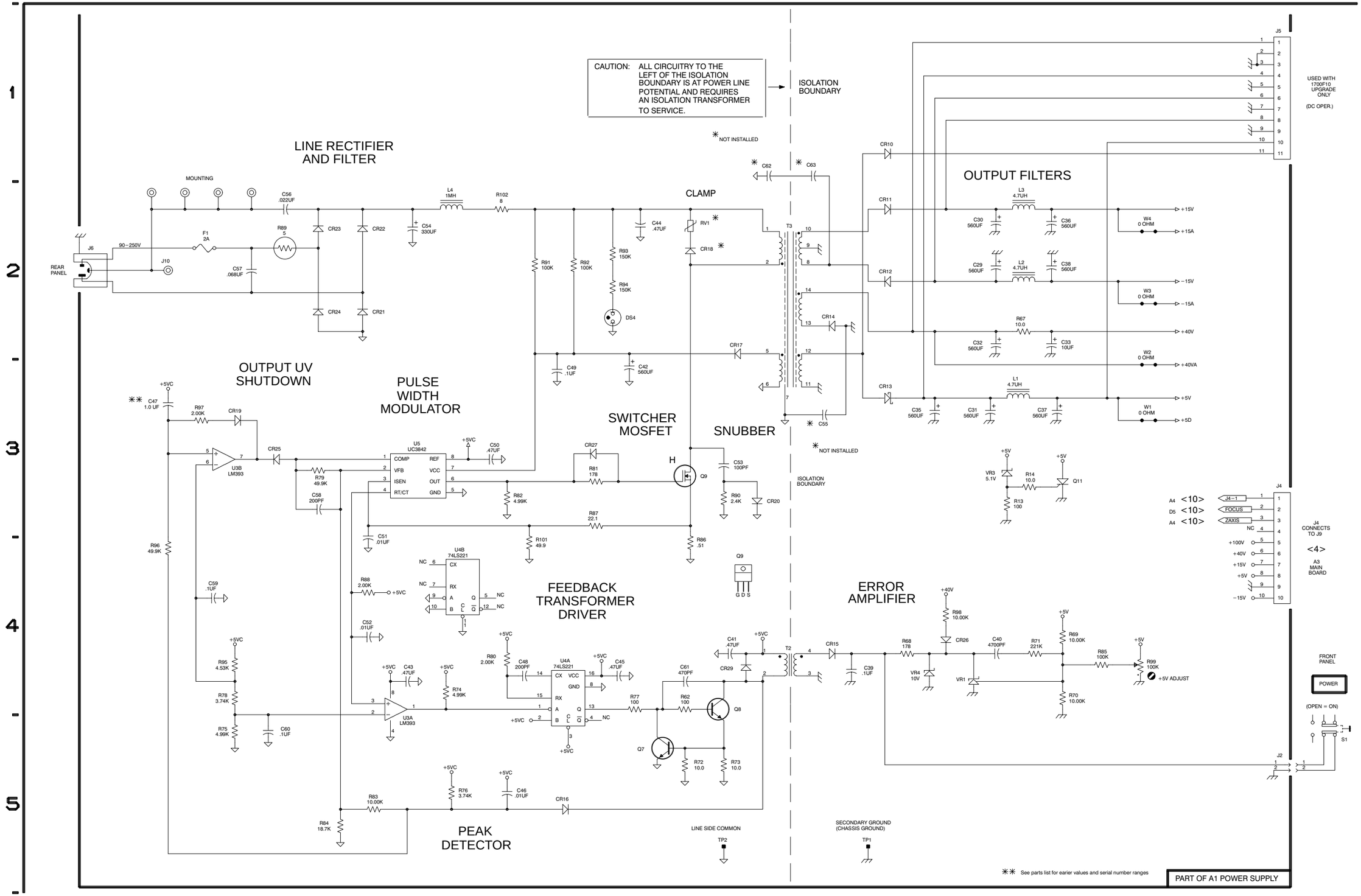
A1 Power Supply Board

Schematic Diagram <9> Component Locator Chart

The schematic diagram has an alphanumeric grid to assist in locating parts within that diagram.

Assembly A1. Partial Assembly A1 also shown on Diagram 10.

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C29	F2	F1	C57	B2	N5	CR28	G4	H5	R71	F4	H4	R96	A4	K3
C30	F2	F2	C58	B3	J2	CR29	E4	H5	R72	D5	H4	R97	A3	J3
C31	F3	F3	C59	B4	J3				R73	E5	I4	R98	F4	H4
C32	F2	F3	C60	B5	J4	DS4	D2	L2	R74	C4	J5	R99	G5	H5
C33	G2	F4	C62	E1	H1				R75	B5	J4	R101	C3	K2
C35	F3	G3	C63	E1	G1	F1	B2	M4	R76	C5	I4	R102	C2	M1
			C64	G4	G4									
C36	G2	G3				J2	H5	B5	R77	D4	I4	RV1	D2	I3
C37	G3	G4	CR10	F1	G2	J4	H3	F5	R78	B4	J4			
C38	G2	G4	CR11	F2	G2	J5	H1	F1	R79	B3	J2	T2	E4	H5
C39	E4	G4	CR12	F2	G1	J6	A2	M3	R80	C4	J4	T3	E2	G3
C40	F4	H4	CR13	F3	G2	J10	A2	N1	R81	D3	J1			
C41	E4	I4	CR14	E2	G3							TP1	F5	F4
C42	D3	I1	CR15	E4	G5	L1	F3	F2	R82	C3	J2	TP2	E5	K4
C43	C4	J4				L2	F2	G1	R83	C5	J2			
C44	D2	I3	CR16	D5	I4	L3	F2	G2	R84	B5	J2	U3A	C4	J3
C45	D4	I4	CR17	E2	I2	L4	C2	N1	R85	G4	H5	U3B	B3	J3
C46	C5	I4	CR18	D2	I2				R86	D3	J1	U4A	D4	I5
C47	A3	J3	CR19	B3	K3	Q7	D5	I4				U4B	C4	I5
C48	C4	J4	CR20	E3	I3	Q8	E4	I4	R87	D3	K2	U5	C3	J2
C49	D3	J2				Q9	D3	J1	R88	B4	J2			
C50	C3	J2	CR21	B2	L4	Q11	G3	G3	R89	B2	M4	VR1	F4	H4
C51	C3	K2	CR22	B2	L4				R90	E3	I3	VR3	F3	H4
			CR23	B2	L4	R13	F3	H4	R91	D2	K1			
C52	C4	J2	CR24	B2	L4	R14	F3	H4				W1	G3	E4
C53	E3	I2	CR25	B3	J2	R67	F2	F4	R92	D2	K1	W2	G3	E4
C54	C2	M2				R68	F4	G5	R93	D2	L2	W3	G2	E4
C55	E3	H3	CR26	F4	H4	R69	G4	G5	R94	D2	L2	W4	G2	E5
C56	B2	M3	CR27	D3	J1	R70	G4	G4	R95	B4	J3			


CAUTION: ALL CIRCUITRY TO THE LEFT OF THE ISOLATION BOUNDARY IS AT POWER LINE POTENTIAL AND REQUIRES AN ISOLATION TRANSFORMER TO SERVICE.
ISOLATION BOUNDARY
LINE RECTIFIER AND FILTER
MOUNTING
REAR PANEL
J6
J10
90~250V
F1 2A
C56 .022UF
C57 .068UF
R89 5
CR23
CR22
CR24
CR21
L4 1MH
R102 8
C54 330UF
CLAMP
NOT INSTALLED
C62
C63
C44 .47UF
RV1
CR18
R91 100K
R92 100K
R93 150K
R94 150K
DS4
T3
CR17
C49 .1UF
C42 560UF
C55
OUTPUT FILTERS
CR10
CR11
CR12
CR13
CR14
L3 4.7UH
L2 4.7UH
L1 4.7UH
C30 560UF
C36 560UF
C29 560UF
C38 560UF
C32 560UF
C33 10UF
C35 560UF
C31 560UF
C37 560UF
R67 10.0
W4 0 OHM
W3 0 OHM
W2 0 OHM
W1 0 OHM
+15V
+15A
-15V
-15A
+40V
+40VA
+5V
+5D
J5
USED WITH 1700F10 UPGRADE ONLY
(DC OPER.)
OUTPUT UV SHUTDOWN
PULSE WIDTH MODULATOR
SWITCHER MOSFET
SNUBBER
+5VC
C47 1.0 UF
R97 2.00K
CR19
U3B LM393
CR25
R79 49.9K
C58 200PF
U5 UC3842
COMP
VFB
ISEN
RT/CT
REF
VCC
OUT
GND
C50 .47UF
CR27
R81 178
Q9
C53 100PF
R90 2.4K
CR20
R82 4.99K
R87 22.1
C51 .01UF
R101 49.9
R86 .51
R96 49.9K
NOT INSTALLED
ISOLATION BOUNDARY
+5V
VR3 5.1V
R14 10.0
Q11
R13 100
A4 <10>
D5 <10>
A4 <10>
J4
J4-1
FOCUS
ZAXIS
NC
+100V
+40V
+15V
+5V
-15V
J4 CONNECTS TO J9
<4>
A3 MAIN BOARD
FEEDBACK TRANSFORMER DRIVER
U4B 74LS221
C59 .1UF
R88 2.00K
C52 .01UF
Q9
G D S
ERROR AMPLIFIER
+40V
R98 10.00K
C41 .47UF
T2
CR15
C39 .1UF
R68 178
CR26
C40 4700PF
R71 221K
R69 10.00K
R85 100K
R99 100K
+5V ADJUST
VR4 10V
VR1
R70 10.00K
FRONT PANEL
POWER
(OPEN = ON)
S1
J2
R95 4.53K
R78 3.74K
R75 4.99K
C60 .1UF
U3A LM393
C43 .47UF
R74 4.99K
U4A 74LS221
R80 2.00K
C48 200PF
C45 .47UF
C61 470PF
R77 100
R62 100
Q8
Q7
R72 10.0
R73 10.0
R76 3.74K
C46 .01UF
CR16
R83 10.00K
R84 18.7K
PEAK DETECTOR
LINE SIDE COMMON
TP2
SECONDARY GROUND (CHASSIS GROUND)
TP1
** See parts list for earier values and serial number ranges
PART OF A1 POWER SUPPLY

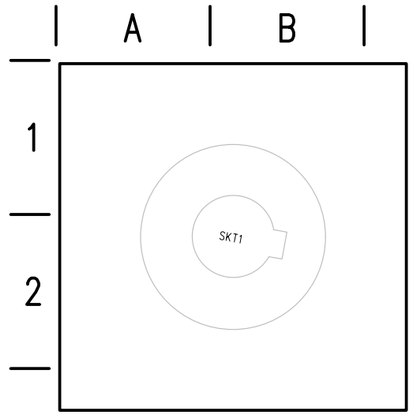
A1 Power Supply Board Component Locator

(with cross-references to schematic diagrams 9 and 10)

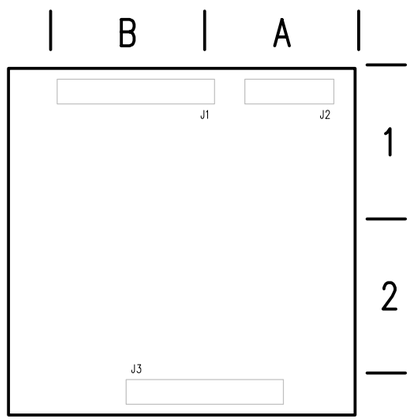
Comp No	Diag No	Diag Loc	Bd Loc
C1	10	C4	A4
C2	10	D3	D1
C3	10	D3	A2
C4	10	D3	A2
C5	10	D4	B3
C6	10	C4	B4
C7	10	F3	B1
C8	10	D3	B2
C9	10	E2	B2
C10	10	C5	B4
C11	10	E2	B1
C12	10	D2	C4
C13	10	D2	C4
C14	10	D2	C4
C15	10	F2	C4
C16	10	C2	C3
C17	10	F2	D4
C18	10	F3	E1
C19	10	C1	D4
C20	10	C2	D4
C21	10	C1	D4
C22	10	B2	E2
C23	10	B2	E3
C24	10	D1	E4
C25	10	A3	E2
C27	10	B1	E3
C28	10	B1	E3
C29	9	F2	F1
C30	9	F2	F2
C31	9	F3	F3
C32	9	F2	F3
C33	9	G2	F4
C34	10	D1	F4
C35	9	F3	G3
C36	9	G2	G3
C37	9	G3	G4
C38	9	G2	G4
C39	9	E4	G4
C40	9	F4	H4
C41	9	E4	I4
C42	9	D3	I1
C43	9	C4	J4
C44	9	D2	I3
C45	9	D4	I4
C46	9	C5	I4
C47	9	A3	J3
C48	9	C4	J4
C49	9	D3	J2
C50	9	C3	J2
C51	9	C3	K2
C52	9	C4	J2
C53	9	E3	I2
C54	9	C2	M2
C55	9	E3	H3
C56	9	B2	M3
C57	9	B2	N5
C58	9	B3	J2
C59	9	B4	J3
C60	9	B5	J4
C62	9	E1	H1
C63	9	E1	G1
C64	9	G4	G4
C65	10	B2	F4
C66	10	A2	E2

Comp No	Diag No	Diag Loc	Bd Loc
CR1	10	E2	B1
CR2	10	D4	B3
CR3	10	E2	B1
CR4	10	C2	B2
CR5	10	D2	C3
CR6	10	E2	C3
CR7	10	C2	D4
CR8	10	C2	D4
CR9	10	C1	E4
CR10	9	F1	G2
CR11	9	F2	G2
CR12	9	F2	G1
CR13	9	F3	G2
CR14	9	E2	G3
CR15	9	E4	G5
CR16	9	D5	I4
CR17	9	E2	I2
CR18	9	D2	I2
CR19	9	B3	K3
CR20	9	E3	I3
CR21	9	B2	L4
CR22	9	B2	L4
CR23	9	B2	L4
CR24	9	B2	L4
CR25	9	B3	J2
CR26	9	F4	H4
CR27	9	D3	J1
CR28	9	G4	H5
CR29	9	E4	H5
CR30	10	A2	E2
CR31	10	A2	E2
DS1	10	E2	B2
DS2	10	E2	B2
DS3	10	E3	B2
DS4	9	D2	L2
F1	9	B2	M4
FIL1	10	C3	C1
FIL2	10	C3	C1
J1	10	F3	B1
J2	9	H5	B5
J3	10	F2	D1
J4	9	H3	F5
J5	9	H1	F1
J6	9	A2	M3
J10	9	A2	N1
J11	10	F4	A2
L1	9	F3	F2
L2	9	F2	G1
L3	9	F2	G2
L4	9	C2	N1
Q1	10	E5	B3
Q2	10	E5	A3
Q3	10	D4	B4
Q4	10	D4	B4
Q5	10	C4	B4
Q6	10	B2	E1
Q7	9	D5	I4
Q8	9	E4	I4
Q9	9	D3	J1
Q10	10	A2	E2
R1	10	E3	A1

Comp No	Diag No	Diag Loc	Bd Loc
R2	10	E4	A2
R3	10	E4	A2
R4	10	E4	A3
R5	10	E5	A3
R7	10	B4	A4
R8	10	B4	A4
R11	10	F4	A2
R12	10	D3	C1
R20	10	C4	A4
R21	10	C5	A4
R22	10	D5	A4
R23	10	B4	A4
R24	10	D5	A4
R25	10	B4	A4
R26	10	E5	A3
R27	10	E5	A4
R28	10	E5	A4
R29	10	D2	B1
R30	10	D2	A2
R31	10	D4	B3
R32	10	E5	B3
R33	10	C4	B4
R34	10	C4	B4
R35	10	D4	B3
R36	10	D4	B3
R37	10	C5	B4
R38	10	E2	B1
R39	10	E2	B1
R40	10	D2	B2
R41	10	D4	B3
R42	10	E3	C1
R43	10	E2	B3
R44	10	D2	B3
R45	10	F2	C4
R46	10	E3	C1
R47	10	D2	C3
R48	10	C2	C4
R49	10	F2	C4
R50	10	F2	E1
R51	10	F3	E1
R52	10	F2	E1
R53	10	F2	E1
R54	10	F2	E1
R55	10	D2	D4
R56	10	F3	E1
R57	10	B2	E1
R58	10	D2	E4
R59	10	B1	E2
R60	10	C1	E3
R61	10	D1	E4
R63	10	A2	E2
R64	10	C2	E2
R65	10	B1	E3
R66	10	B1	E3
R67	9	F2	F4
R68	9	F4	G5
R69	9	G4	G5
R70	9	G4	G4
R71	9	F4	H4
R72	9	D5	H4
R73	9	E5	I4
R74	9	C4	J5



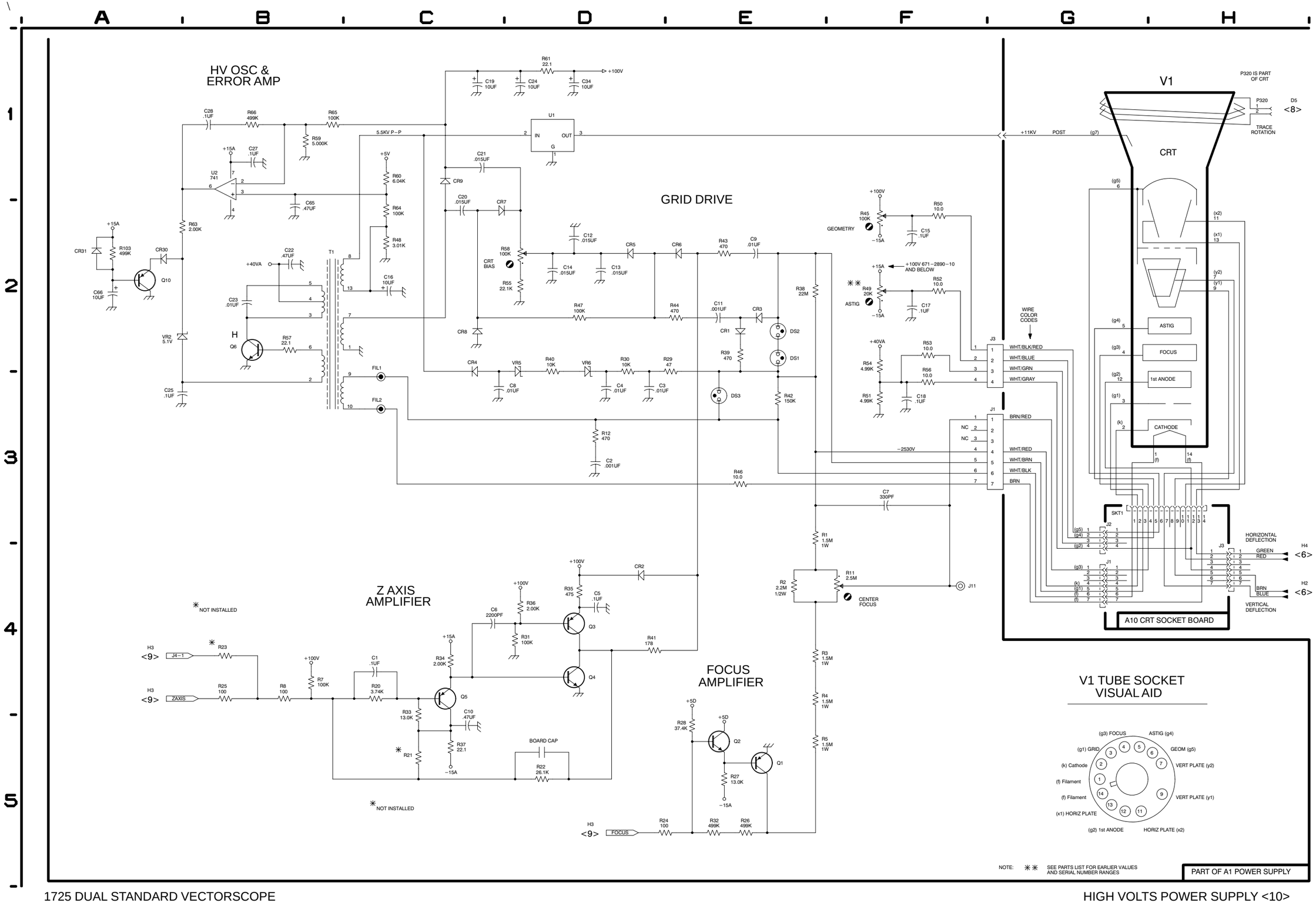
A10 CRT Socket Board (Front of Board)



A10 CRT Socket Board (Back of Board)

Comp No	Diag No	Diag Loc	Bd Loc
R75	9	B5	J4
R76	9	C5	I4
R77	9	D4	I4
R78	9	B4	J4
R79	9	B3	J2
R80	9	C4	J4
R81	9	D3	J1
R82	9	C3	J2
R83	9	C5	J2
R84	9	B5	J2
R85	9	G4	H5
R86	9	D3	J1
R87	9	D3	K2
R88	9	B4	J2
R89	9	B2	M4
R90	9	E3	I3
R91	9	D2	K1
R92	9	D2	K1
R93	9	D2	L2
R94	9	D2	L2
R95	9	B4	J3
R96	9	A4	K3
R97	9	A3	J3
R98	9	F4	H4
R101	9	C3	K2
R102	9	C2	M1
R103	10	A2	E2

Comp No	Diag No	Diag Loc	Bd Loc
RV1	9	D2	I3
T1	10	B2	C4
T2	9	E4	H5
T3	9	E2	G3
TP1	9	F5	F4
TP2	9	E5	K4
U1	10	D1	C1
U2	10	B1	F4
U3A	9	C4	J3
U3B	9	B3	J3
U4A	9	D4	I5
U4B	9	C4	I5
U5	9	C3	J2
VR1	9	F4	H4
VR2	10	A2	E2
VR5	10	D2	B2
VR6	10	D2	B2
W1	9	G3	E4
W2	9	G3	E4
W3	9	G2	E4
W4	9	G2	E5



1725 DUAL STANDARD VECTORSCOPE

HIGH VOLTS POWER SUPPLY <10>

Replaceable Mechanical Parts

Replaceable Mechanical Parts

This section contains a list of the components that are replaceable for the 1725. Use this list to identify and order replacement parts. There is a separate Replaceable Mechanical Parts list for each instrument.

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. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument 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.

Using the Replaceable Mechanical Parts List

The tabular information in the Replaceable Mechanical Parts list is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replaceable parts.

Cross Index–Mfr. Code Number to Manufacturer

The Mfg. Code Number to Manufacturer Cross Index for the mechanical parts list is located immediately after this page. The cross index provides codes, names, and addresses of manufacturers of components listed in the mechanical parts list.

Abbreviations

Abbreviations conform to American National Standards Institute (ANSI) standard Y1.1.

Chassis Parts

Chassis-mounted parts and cable assemblies are located at the end of the Replaceable Electrical Parts list.

Column Descriptions

Figure & Index No. (Column 1)

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

Tektronix Part No. (Column 2)

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

Serial No. (Column 3 and 4)

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

Qty (Column 5)

This indicates the quantity of mechanical parts used.

Name and Description (Column 6)

An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.

Following is an example of the indentation system used to indicate relationship.

1 2 3 4 5 Name & Description
Assembly and/or Component
Mounting parts for Assembly and/or Component
MOUNTING PARTS/*END MOUNTING PARTS*
Detail Part of Assembly and/or Component
Mounting parts for Detail Part
MOUNTING PARTS/*END MOUNTING PARTS*
Parts of Detail Part
Mounting parts for Parts of Detail Part
MOUNTING PARTS/*END MOUNTING PARTS*

Mounting 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. **Mounting parts must be purchased separately, unless otherwise specified.**

Mfr. Code (Column 7)

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

Mfr. Part Number (Column 8)

Indicates actual manufacturer's part number.

Cross Index – Mfr. Code Number To Manufacturer

Mfr. Code	Manufacturer	Address	City, State, Zip Code
S3109	FELLER U.S. CORPORATION	72 Veronica Ave Unit 4	Summerset NJ 08873
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK1547	MOORE ELECTRONICS INC (DIST)	19500 SW 90TH COURT PO BOX 1030	TUALATIN OR 97062
TK1572	RAN–ROB INC	631 85TH AVE	OAKLAND CA 94621–1254
TK2364	ARROW/KIERULFF ELECTRONICS	1800 NW 167TH PLACE SUITE 145	BEAVERTON OR 97006
0KBZ5	MORELLIS Q & D PLASTICS	1812 16TH AVE PO BOX 487	FOREST GROVE OR 97116–0487
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
07416	NELSON NAME PLATE CO	3191 CASITAS	LOS ANGELES CA 90039–2410
18677	SCANBE MFG CO DIV OF ZERO CORP	3445 FLETCHER AVE	EL MONTE CA 91731
2K262	BOYD CORP	6136 NE 87th AVE PO BOX 20038	PORTLAND OR 97220
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
3L462	QUALITY PLASTICS DIV. OF MOLL PLASTICRAFTERS L.P.	2101 CRESTVIEW DRIVE	NEWBERG, OR 97132–9518
34785	DEK INC	3480 SWENSON AVE	ST CHARLES IL 60174–3450
5F520	PANEL COMPONENTS CORP	PO BOX 115	OSKALOOSA, IA 52557
55335	JKL COMPONENTS CORP	13343 PAXTON STREET	PACOIMA CA 91331
56501	THOMAS & BETTS CORP	1555 LYNNFIELD RD	MEMPHIS, TN
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076–9749
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
80126	PACIFIC ELECTRICORD CO	747 W REDONDO BEACH PO BOX 10	GARDENA CA 90247–4203
85471	BOYD CORP	13885 RAMOMA AVE	CHINO CA 91710
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108–5181

Replaceable Mechanical Parts

Fig. & Index No.	Tektronix Part No.	Serial Number Effective	Serial Number Dscont	Qty	Name & Description	Mfr. Code	Mfr. Part No.
1–1	426–2102–00			1	FRAME,CRT:BEZEL *MOUNTING PARTS*	3L462	ORDER BY DESC
–2	211–0690–02			2	SCREW,MACHINE:6–32 X 0.875,PNH,SST *END MOUNTING PARTS*	93907	B20–70430
–3	333–3306–00			1	PANEL,FRONT:	80009	333330600
–4	378–0258–00			1	FLTR,CONTRASTIN:GRAY,POLYCARBONATE	80009	378025800
–5	333–3923–01			1	PANEL,FRONT:1725 *MOUNTING PARTS*	80009	333392301
–6	211–0721–00			2	SCREW,MACH:6–32 X 0.375,PNH,STL,CDPL,T–15 TORX DR *END MOUNTING PARTS*	0KB01	ORDER BY DESC
–7	————————			1	CIRCUIT BD ASSY:FRONT PANEL (SEE A2 REPL) *MOUNTING PARTS*		
–8	211–0721–00			4	SCREW,MACH:6–32 X 0.375,PNH,STL,CDPL,T–15 TORX DR *END MOUNTING PARTS*	0KB01	ORDER BY DESC
	426–2101–04			1	FRAME SECT,CAB:FRONT *MOUNTING PARTS*	3L462	ORDER BY DESC
–10	211–0721–00			3	SCREW,MACH:6–32 X 0.375,PNH,STL,CDPL,T–15 TORX DR *END MOUNTING PARTS*	0KB01	ORDER BY DESC
–11	————————			1	SWITCH,ROCKER:SPST,30V,30MA (SEE S1 REPL) *MOUNTING PARTS*		
–12	210–0405–00			2	NUT,PLAIN,HEX:2–56 X 0.188,BRS CD PL	73743	12157–50
–13	211–0100–00			2	SCREW,MACHINE:2–56 X 0.750,PNH,STL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
–14	————————			1	CURCUIT BD ASSY:MAIN (SEE A3 REPL) *MOUNTING PARTS*		
–15	211–0721–00			8	SCREW,MACH:6–32 X 0.375,PNH,STL,CDPL,T–15 TORX DR *END MOUNTING PARTS*	0KB01	ORDER BY DESC
–16	671–1796–00			1	CIRCUIT BD ASSY:GRATICULE LIGHT (SEE A3A1 REPL)	80009	671179600
–17	337–3321–00			1	SHIELD,ELEC:CKT BD 1730	85471	337–3321–00
–18	————————			1	CIRCUIT BD ASSY:POWER SUPPLY (SEE A1 REPL) *MOUNTING PARTS*		
–19	211–0721–00		B041412	7	SCREW,MACH:6–32 X 0.375,PNH,STL,CDPL,T–15 TORX DR	0KB01	ORDER BY DESC
–19	211–0721–00	B041413		6	SCREW,MACH:6–32 X 0.375,PNH,STL,CDPL,T–15 TORX DR	0KB01	ORDER BY DESC
–20	211–0014–00			2	SCREW,MACHINE:4–40 X 0.5,PNH,STL	TK0435	ORDER BY DESC
–21	337–3796–01			1	SHIELD,ELEC:0.032 BRASS,C26000,0.5 HARD *END MOUNTING PARTS*	80009	337379601
–22	131–3573–00			1	CONN,PLUG,ELEC:MALE,W/LOCKING ADAPTER	80126	B–0779
–23	337–3257–00			2	SHIELD,CKT BD:LV PWR SUPPLY	2K262	ORDER BY DESC
–24	337–3931–00			1	SHIELD,ELEC:ALUMINUM	80009	337393100
–25	175–9872–01			1	CA ASSY,SP,ELEC:2,18 AWG,2.5 L,0–N	TK2364	175–9872–01
–26	333–3309–03			1	PANEL,REAR:REAR PANEL *MOUNTING PARTS*	80009	333330903
–27	211–0721–00			3	SCREW,MACH:6–32 X 0.375,PNH,STL,CDPL,T–15 TORX DR *END MOUNTING PARTS*	0KB01	ORDER BY DESC
–28	131–0106–02			7	CONN,RF JACK:BNC,;50 OHM,FEMALE,STR,SLDR CUP/FRT PNL,0.520 MLG X0.403 TAIL,0.04 L SLDR CUP,0.380,D/1 FLAT	24931	28JR178–1
–29	174–0335–01			1	LEAD,ELECTRICAL:22 AWG,9.75 L,9–N	80009	174033501
–30	210–0255–00			3	TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL	TK1572	ORDER BY DESC
–31	174–0123–02			1	CABLE ASSY SP:ELEC,24,26 AWG,21.0 L, RIBBON *MOUNTING PARTS*	80009	174012302

Fig. & Index No.	Tektronix Part No.	Serial Number Effective	Serial Number Dscont	Qty	Name & Description	Mfr. Code	Mfr. Part No.
–32	214–3903–01			2	SCREW,JACK:4–40 X 0.312 EXT THD,4–40 INT THD,0.188 HEX,STEEL,CADPLATE *END MOUNTING PARTS*	0KB01	214–3903–01
–33	————————			1	CKT BD ASSY:SERIAL FILTER (SEE A11 REPL) *MOUNTING PARTS*		
–34	214–3903–01			2	SCREW,JACK:4–40 X 0.312 EXT THD,4–40 INT THD,0.188 HEX,STEEL,CADPLATE *END MOUNTING PARTS*	0KB01	214–3903–01
–35	348–1464–00			1	MANCHET:CRT,END RUBBER MANCHET,31.5MM THK X 63MM OD,50.5 ID	80009	348146400
–36	407–4395–00			1	BRACKET,CRT:BACK,0.062,AL *MOUNTING PARTS*	80009	407439500
–37	210–0457–00			2	NUT,PL,ASSEM WA:6–32 X 0.312,STL CD PL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
–38	————————			1	CIRCUIT BD ASSY:CRT SOCKET BD (SEE A10 REPL)		
–39	346–0133–00			1	STRAP,TIEDOWN,E:14.0 X 0.091,NYLON	56501	TY234M EURO DIR
–40	337–4064–00			1	SHIELD, ELEC:MU–METAL CRT SHIELD	80009	337406400
–41	334–1379–00			1	MARKER,IDENT:MKD HI VACUUM	07416	ORDER BY DESC
–42	386–4443–00			1	SUPPORT,SHIELD:CRT,FRONT,PLASTIC	80009	386444300
–43	————————			1	ELECTRON,TUBE:CRT,FINISHED (SEE V1 REPL)		
–44	————————			1	CIRCUIT BD ASSY:CONTROL (SEE A4 REPL) *MOUNTING PARTS*		
–45	211–0721–00			2	SCREW,MACH:6–32 X 0.375,PNH,STL,CDPL,T–15 TORX DR *END MOUNTING PARTS*	0KB01	ORDER BY DESC
–46	351–0688–00			1	GUIDE,CKT BOARD:NYLON,12.0 L	18677	11633–5
–47	348–0171–00			1	GROMMET,PLASTIC:BLACK,U–SHAPED,0.276 ID	0KBZ5	NA
–48	343–0916–00		B041412	1	CLAMP,LOOP:0.5 ID,NYLON	34785	029–500
–48	343–0013–00	B041413		1	CLAMP,LOOP:0.5 ID,NYLON	34785	029–500
–49	426–2103–06			1	FRAME, CHASSIS:ALUMINUM	80009	426210306
–50	211–0720–01		B041412	2	SCREW,MACH:6–32 X 0.50,PNH,STL,TORX T–15WITH SLOT	0KB01	211–0720–01
–50	211–0720–01	B041413		3	SCREW,MACH:6–32 X 0.50,PNH,STL,TORX T–15WITH SLOT	0KB01	211–0720–01
–57	129–1308–00	B041413		1	SPACER,POST:6–32X0.75 HEX,STL,CAD PL	0570	4538-632-s-3
					STANDARD ACCESSORIES		
–51	012–1422–01			1	CA ASSY,SP,ELEC:MLD,1720	TK1547	012–1422–01
	070–7635–02			1	MANUAL,TECH:INSTRUCTION,1725 DUAL STANDARD	80009	070763502
	150–0168–00			3	LAMP,INCAND:14V,0.08A,WEDGE BASE,T1.75 FOR SKT MT	55335	73W
	159–0021–00			1	FUSE,CARTRIDGE:3AG,2A,250V,FAST BLOW	71400	AGC–2
–52	161–0216–00			1	CABLE ASSY,PWR,:3,18 AWG,2.5M L,BLACK (STANDARD ONLY)	80126	C7120–25M–BL
					OPTIONAL ACCESSORIES		
–53	161–0215–00			1	CABLE ASSY,PWR:3,0.75MU,2.5MM L,GREY (EUROPEAN OPTION A1 ONLY)	80126	0–5335–008–GY
–54	161–0066–10			1	CA ASSY,PWR:3,0.1MM SQ,250V/10A,2.5 METER,STR, IEC320,RCPT X 13A,FUSED UK PLUG(13A FUSE),UNITED KINGDOM,SAFTEY CONTROLLED (UNITED KINGDOM OPTION A2 ONLY)	S3109	BS/13–H05VVF3G0

Fig. & Index No.	Tektronix Part No.	Serial Number Effective	Serial Number Dscont	Qty	Name & Description	Mfr. Code	Mfr. Part No.
–55	161–0066–11			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,STR, IEC320,RCPT,AUSTRALIA,SAFTEY CONTROLLED (AUSTRALIAN OPTION A3 ONLY)	S3109	198–000
–56	161–0212–00			1	CABLE ASSY,PWR,:3,1.0MM SQ,220V,2.5 METERS (SWISS OPTION A5 ONLY)	5F520	86542000
	016–0475–00			1	VIEWING HOOD:1740	80009	016047500
	200–3897–01			1	COVER,FRONT:1700F02,HOT STAMPED	80009	200389701
	————————			1	CAMERA,SCOPE:C9 (OPTION 20 ONLY)		
	————————			1	PLAIN CASE ASSY:1700F00		
	————————			1	PTD CASE ASSY:1700F02		
	————————			1	RACK ADAPTER:1700F05		
	————————			1	FILLER PANEL:1700F06		
	————————			1	DRAWER,UTILITY:1700F07		

FIG. 1 EXPLODED VIEW