

# Instruction Manual



## ECO422D SD/HD Changeover Unit

**071-0859-01**

### **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.

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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.*

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

## 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.

**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:



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

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

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**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 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.



# Preface

This manual contains operating and servicing information for the ECO422D.

The information included in this manual explains how to operate, verify, service, troubleshoot, and repair the system to the component level:

- *Getting Started* describes the instrument, included accessories, installation, configuration and first time operation.
- *Operating Basics* explains the controls, indicators, connectors and how to operate the instrument.
- *Specifications* describes functional characteristics and performance requirements for the ECO422D.
- *Theory of Operation* explains how the ECO422D operates to a level sufficient to perform component level service.
- *Performance Verification* describes how to verify the functional performance of the ECO422D.
- *Adjustment Procedures* gives the field adjustment procedures.
- *Maintenance* contains the following information:
  - How to safely handle static sensitive modules and components
  - How to remove and replace replaceable parts
  - Corrective maintenance information
- *Replaceable Electrical Parts* provides a list of the replaceable electrical parts in the ECO422D.
- *Diagrams/Circuit Board Illustrations* contains schematics and component locator diagrams for the circuit boards in the ECO422D.
- *Replaceable Mechanical Parts* lists all replaceable mechanical parts in the ECO422D. Parts are identified on an indexed illustration to make them easier to identify.
- *Appendices*
  - *Options* lists the available options for the ECO422D.

## Contacting Tektronix

<b>Phone</b>	1-800-833-9200*
<b>Address</b>	Tektronix, Inc. Department or name (if known) 14200 SW Karl Braun Drive P.O. Box 500 Beaverton, OR 97077 USA
<b>Web site</b>	<a href="http://www.tektronix.com">www.tektronix.com</a>
<b>Sales support</b>	1-800-833-9200, select option 1*
<b>Service support</b>	1-800-833-9200, select option 2*
<b>Technical support</b>	Email: <a href="mailto:techsupport@tektronix.com">techsupport@tektronix.com</a> 1-800-833-9200, select option 3* 6:00 a.m. - 5:00 p.m. Pacific time

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\* **This phone number is toll free in North America. After office hours, please leave a voice mail message. Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.**





# Getting Started



# Getting Started

## Product Description

The ECO422D SD/HD Changeover Unit (Figure 1-1 and Figure 1-2) provides automatic selection of reference sources. Automatic changeover may occur upon fault detection in any active source. Automatic transfer ensures uninterrupted signals for critical applications. The ECO422D is an in-line device without internal buffers. Switching is by mechanical relay. The ECO422D also provides internal termination for unused inputs.

There are 11 channels. Each consists of a Primary Input, a Backup Input, and an Output. All relays switch in unison upon fault detection in any active channel, front-panel command, or remote command. -

The ECO422D bases error checking on signal amplitude. You can configure each channel to check for a different type of input. There are six predefined checking levels (seven levels on channels one through six): no checking, PAL analog black burst, NTSC analog black burst, high definition tri-level sync, serial digital high definition and standard definition component video, NTSC serial digital composite video, and serial digital audio. A fault occurs when the signal is between 2 and 6 dB down from nominal, depending on the predefined level chosen. There are also two user-defined checking thresholds available.

Separate indicators on the front-panel display faults for both the primary and backup generator. These indicators remain on until cleared by the operator.

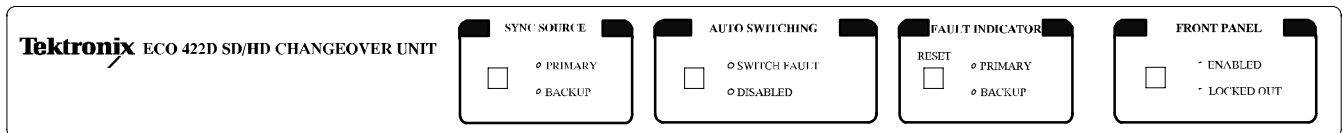


Figure 1-1: Front panel of the ECO422D

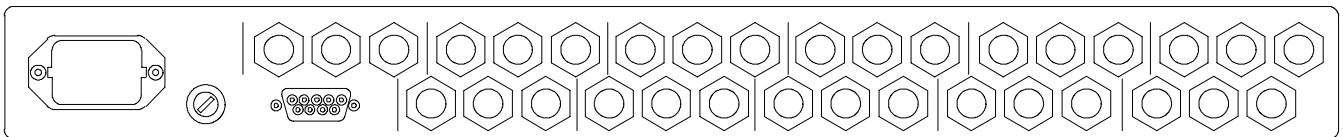


Figure 1-2: Rear panel of the ECO422D

## Accessories

The ECO422D comes with three accessories:

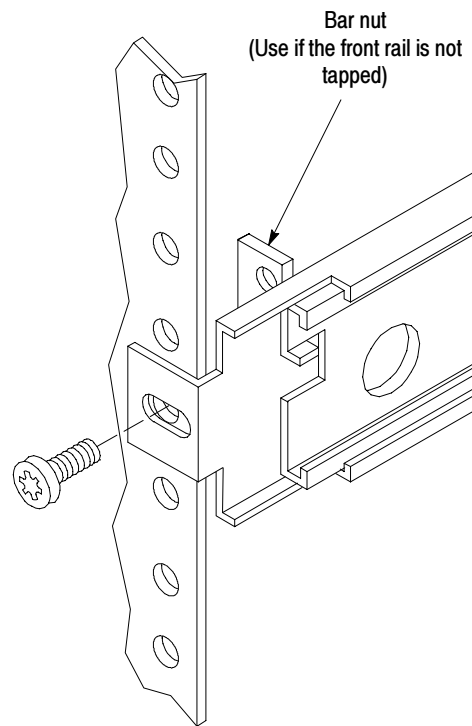
1. Rack slides (351-0751-01, 351-0104-03)
2. Reference card (061-4234-00)
3. This manual (071-0859-00)

## Installation

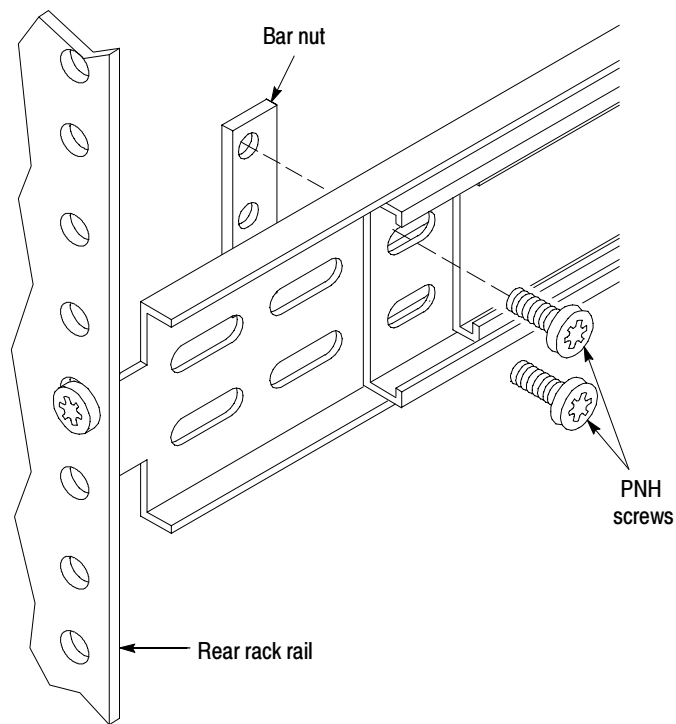
### Mechanical Installation

**Rackmounting.** The ECO422D is shipped with the hardware for rackmounting. The instrument fits in a standard 19-inch rack. Spacing between the front rails of the rack must be at least 17- $\frac{3}{4}$  inches to allow clearance for the slide-out tracks. Rack slides conveniently mount in any rack that has a front-to-rear rail spacing between 15- $\frac{1}{2}$  and 28 inches. The ECO422D requires six inches of clearance between the instrument rear panel and any rear cabinet panel for connector space and to provide adequate air circulation.

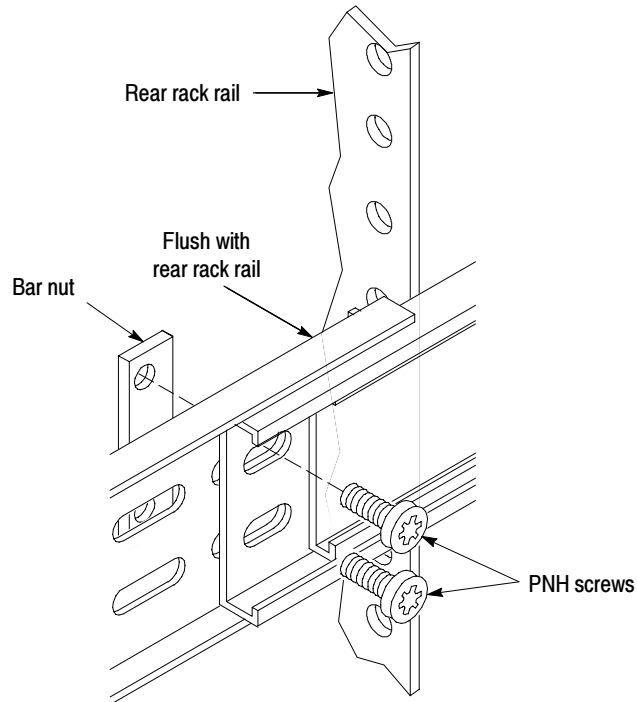
**Mounting the Slide Tracks.** Mount the rails using the enclosed hardware as shown in Figure 1-6. Figures 1-4 and 1-5 show the rail mounting details for both deep and shallow racks. Figure 1-3 shows the front mounting details. Make sure that the stationary sections are horizontally aligned, level, and parallel.



**Figure 1-3: Front rail mount**

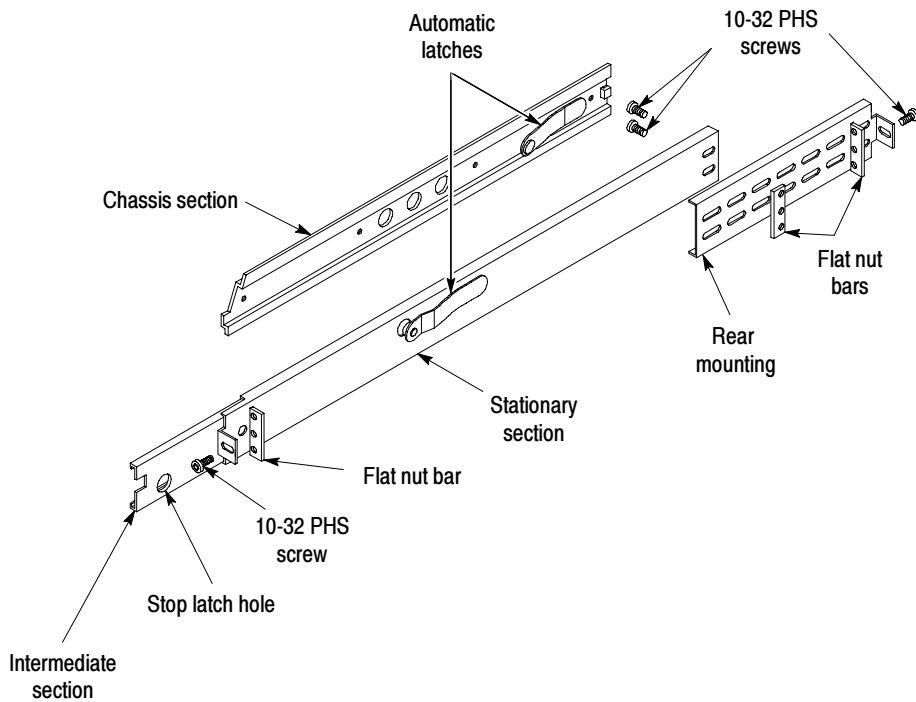


**Figure 1-4: Deep rackmount**



**Figure 1-5: Shallow rackmount**

**NOTE:** Right hand and left hand stationary section is designated by the RH and the LH marked on the rails. Stop latch holes should be towards the bottom when slides are in place. (The right hand rail is shown above.)



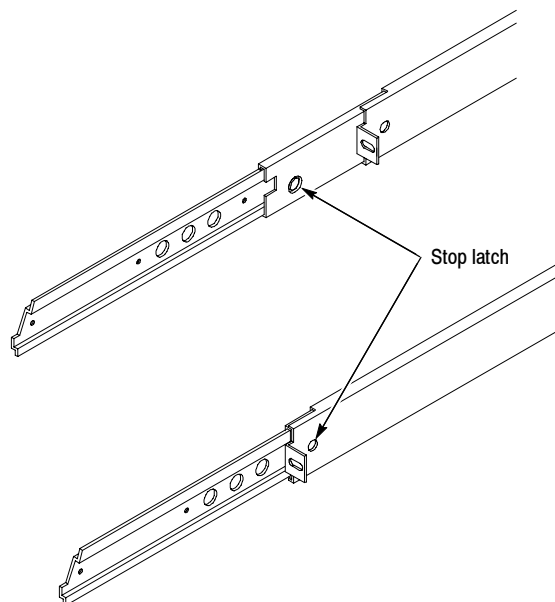
**Figure 1-6: Assembly of rackmounting hardware**

**Installing the Instrument.** Refer to Figure 1-7 to install the instrument into the rack.

1. Pull the slide-out track section to the fully extended position.
2. Insert the instrument chassis sections into the slide-out sections.
3. Press the stop latches and push the instrument toward the rack until the latches snap into their holes.
4. Again press the stop latches and push the instrument fully into the rack.
5. Tighten the front-panel retaining screws.

**Removing the Instrument.** Refer to Figure 1-7 to remove the instrument from the rack.

1. Loosen retaining screw and pull instrument outward until the stop latches snap into the holes.
2. Press stop latches and remove instrument.



**Figure 1-7: Installing or removing the rack slides**

**Rack Adjustments.** After installation, if not properly adjusted, the slide tracks may bind. To adjust the tracks, slide the instrument out about 10 inches, slightly loosen the screws holding the tracks to the front rails, and allow the tracks to seek an unbound position. Retighten the screws and check the tracks for smooth operation by sliding the instrument in and out of the rack several times.

Once the instrument is in place within the rack, tighten the knurled retaining screw to fasten it securely into the rack.

**Rack Slide Maintenance.** The slide-out tracks do not require lubrication. The dark gray finish on the tracks is a permanent, lubricated coating.

**Removing the Instrument.** First, loosen the front-panel knurled retaining screw. See Figure 1-7. Grasp the front handles and pull the instrument out until all three slide sections latch. The instrument is firmly held in this position.

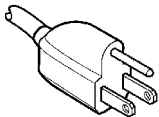
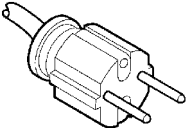
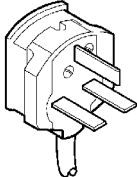
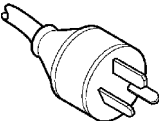
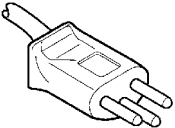
To completely remove the instrument, first be sure to disconnect all cabling. Then, press both release-latch buttons (visible in the stop-latch holes) and carefully slide the instrument free from the tracks.

## **Electrical Installation**

You can order any of the following power cord options for the ECO422D. If no power cord option is ordered, the instrument is shipped with a North American 125 V power cord and one replacement fuse.



**Table 1-1: Power cord identification**

Plug configuration	Normal usage	Option number
	North America 125 V/15 A Plug NEMA 5-15P	Standard
	Europe 230 V	A1
	United Kingdom 230 V	A2
	Australia 230 V	A3
	Switzerland 230 V	A5

Unless otherwise specified, power cords for use in North America are UL listed and CSA certified. Cords for use in areas other than North America are approved by at least one test house acceptable in the country to which the product is shipped. Power cord part numbers are shown in the Standard Accessories list at the end of the Replaceable Mechanical Parts List, in Section 11.

After you have installed the instrument for stand-alone or rackmount use, you are ready to connect the power and signal cables to the instrument. Figure 1-2 shows the instrument rear panel.

### Connecting Power

To supply power to the ECO422D, connect the power cord to the power-input connector on the rear-panel of the instrument, and then connect the power cord to the local mains supply.

You can operate the ECO422D using a grounded, mains supply with a line-voltage range of 90 VAC to 264 VAC and a frequency range of 50 Hz to 60 Hz. The ECO422D is grounded through the power cord.

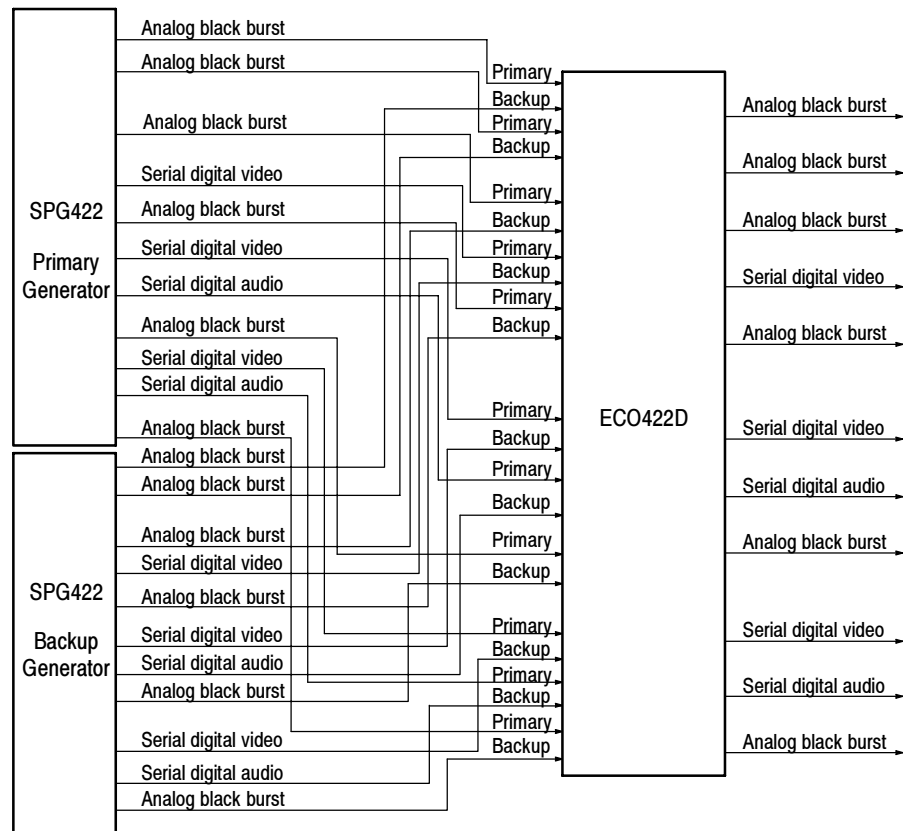
Refer to Appendix A for a listing of the optional power cords available to connect the ECO422D to your local mains supply.

## Cable Installation

**NOTE.** The BNC connectors are tightly spaced on the ECO422D rear panel. You may find it necessary to use a BNC Cable Tool to remove or install cables (example: Trompeter RT-1L).

There are many different ways to configure the ECO422D. The illustration below is only one example. One thing to keep in mind, the ECO422D will automatically change to the Primary signals whenever it loses power. Therefore, always power the Backup source and the ECO422D by the same source and the Primary source separately. Using this scheme both power sources would have to go down before you would lose your signals.

Use the Channel Configuration Switches Table on page 1-11 to record what type of signals you have connected to each set of outputs on the rear panel. Then use the DIP selection guide to make sure that the DIP switches are correctly configured. There is also a reference card available to keep track of how the ECO422D is configured and aid in setting up the instrument.



**Figure 1-8: Example of ECO422D connections**

**Hints on Using the User Configuration Switches**

There are the several different types of signal checking already available but you may need to feed a different signal through the ECO422D. This section gives one example, analog active video.

**Active Analog Video.** The ECO422D will pass active analog video by using the no checking mode, but there will be times when you need to check for the presence of an active video signal. You have at least two options. First, you can set up a custom checking level using one of the “user-defined” levels. This is great if you are always passing color bars or some other test signal where the average picture level remains constant and never fades to black. If the average picture level drops below the custom set level then an error occurs, causing the ECO422D to switch sources. The set level could easily be well above black burst. The second option is to use the predefined black burst level. This works very well when your goal is to check for “present/not present” active video. It will accept long periods of black without generated an error, but it will switch if the signal goes “completely” away.

Again, to summarize the three options available, if you want active video to pass through the ECO422D:

1. No checking.
2. Set a user-defined level -- best for a constant test signal.
3. Use the predefined black setting -- best for video with a wide variation of average picture levels or regular fades to blacks.

## Configuration

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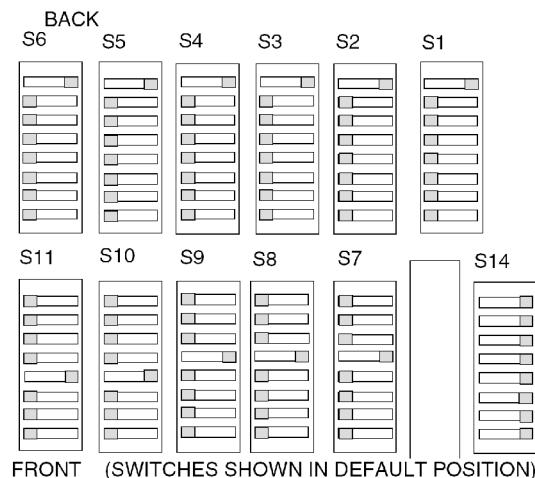
**NOTE.** Make sure that any channel not in use has checking disabled. If checking is not disabled, errors will always be generated. No error checking also allows the maximum voltage, current, and frequency to pass through the ECO422D.

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Photocopy the list of the DIP switches, shown in Table 1-3, to log the configuration of your system and use it as a quick reference. If using one of the “user-defined” levels, write the definition on the line as a reminder.

All of these switches are available through a small access panel on top of the ECO422D, eliminating any need to remove the top cover just to change the function of the outputs.

There is also a Mode switch, switch S14-8. Set it for either Normal or Override operation. If set for Normal operation, it will not allow you to manually switch to a bad signal, unless both signals are “bad.” For example: you are set for manual operation and the Primary signal is in error while the Backup is good. Press the Sync Source button to change to the Backup source. No matter how many times you press the Sync Source button again, the ECO422D will not allow you to return to the Primary source because it is in error. The only time that you can switch to an “error” signal in Normal mode is when both of the signals are bad. In that case, you can manually switch between the two signals. In Override mode, you can always manually switch to a bad signal. The other positions of S14 are only used for testing purposes.



**Figure 1-9: Default position of the User Configuration and Mode switches**

**Table 1-2: Default configuration of switches**

DIP Switch	Input signal
All open	Disabled (signal not checked)
1	NTSC black burst
2	PAL black burst
3	NTSC serial digital video (143 Mb/s)
4	Serial digital video (270 Mb/s) Analog tri-level sync
5	NTSC serial digital audio
6	User defined
7	User defined
8	Serial digital video (1.485 Gb/s) (Channels 1-6) Attenuation (Channels 7-11)

**Table 1-3: Channel configuration switch log (S1 - S11)**

Output # / Switch #	Setting (see above)	Attenuation (set with Sx-8)		Type of signal attached
		On	Off1	
1 / S1			X	
2 / S2			X	
3 / S3			X	
4 / S4			X	
5 / S5			X	
6 / S6			X	
7 / S7				
8 / S8				
9 / S9				
10 / S10				
11 / S11				

<sup>1</sup> Attenuation cannot be set on switches S1-S6.

## Functional Check and First Time Operation

This section steps through how the ECO422D will react under its most common operating circumstances: two good signals, loss and then return of the Primary signal, loss and return of the Backup signal, and loss of power. Only two input signals are used here to avoid confusion.

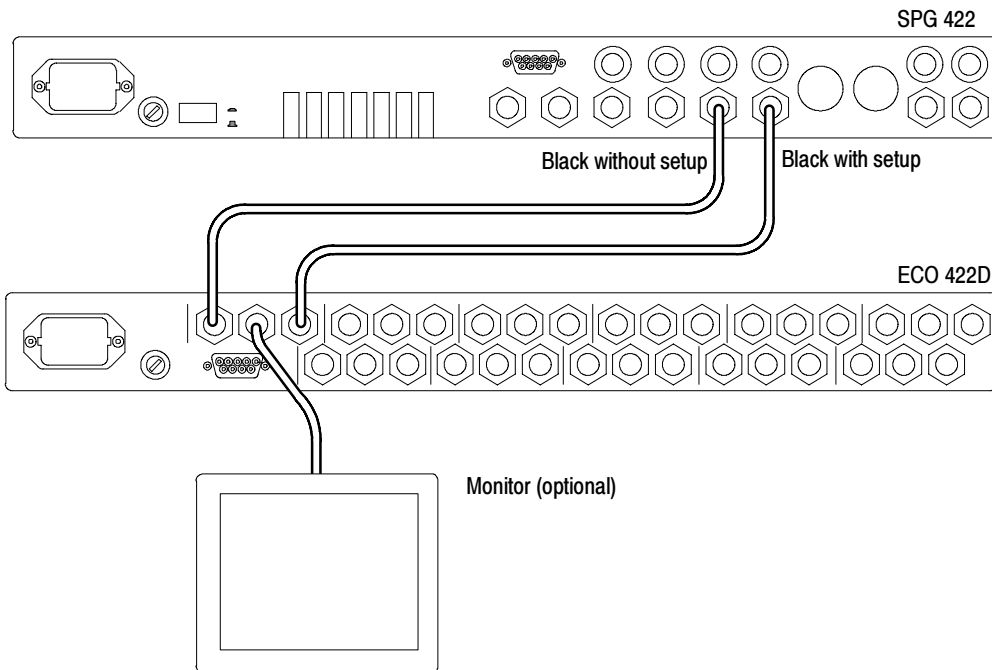
For more details on the controls, what they do, and how they interact, see *Operating Basics*, Section 2.

To check out the entire instrument, repeat these procedures for each of the eleven sets of inputs and outputs.

### Two Good Signals

Power down all instruments.

Connect the ECO422D as shown in Figure 1-10.



**Figure 1-10: Setup for the functional check**

Set all of the DIP switches (S1 - S11) to open, except for S1-1, which should be set to closed (NTSC black burst). Note that Primary input is black burst without setup and the Backup input is black burst with setup. (This is just to illustrate which signal is the Output.)

Set the user switch (S14-8) to Normal (closed).

Power up all instruments.

Enable the front panel, using the Front Panel button.

Set the ECO422D to “Switch on Fault” using front-panel buttons. (This is the default at power on.)

If Primary is not already the source, press the Sync Source button to make Primary the source. (This is the default at power on.)

Note that the output signal is the Primary input signal (black burst with setup) and that none of the fault indicators light.

Press the Sync Source button to change to the Backup source.

Note that the signal changes to black burst without setup (Backup).

Check that there is no error on either signal.

Press the Sync Source button again, to switch back to the Primary input.

### **Loss of the Primary Signal**

Disconnect the Primary signal source. (Remove the cable between the SPG422 and the Primary 1 input of the ECO422D.)

Note the signal automatically switches to the Backup input and the Primary fault indicator lights.

Reconnect the Primary signal source. (Replace the cable between the SPG422 and the Primary 1 input of the ECO422D.)

Note that the Primary fault indicator remains on and the Sync Source remains the Backup (the ECO422D does not automatically switch back to Primary).

Press the Reset button.

Note that the Primary fault indicator turns off.

Press the Sync Source button to return to the Primary as the source.

Press the Auto Switching button to disable the “Switch on Fault” function.

Remove the Primary input signal. (Again, remove the cable between the SPG422 and the Primary 1 input of the ECO422D.)

Note that no switching occurs, but that the Primary fault indicator lights.

Press the Sync Source button to change to the Backup signal.

Press the Sync Source button again to try to change back to the Primary input. (It should not let you change to a bad input.)

Reconnect the Primary input source. (Replace the cable between the SPG422 and the Primary 1 input of the ECO422D.)

Press the Reset button to clear the fault indicator LED.

Return the auto switching to “Switch on Fault.”

Note that the sync source is still Backup.

### **Loss of the Backup Signal**

Disconnect the Backup signal. (Remove the cable between the SPG422 and the Backup 1 input of the ECO422D.)

Note that the output signal has changed to the Primary input signal and the Backup fault indicator LED lights.

Reconnect the Backup signal. (Replace the cable between the SPG422 and the Backup 1 input of the ECO422D.)

Clear the fault indicator by pressing the Reset button.

Press the Sync Source button to return to Backup sync source.

### **Loss of Power to the ECO422D**

Remove the power source from the ECO422D.

Note that the output signal switches to the Primary input signal.

Return the power source.





# **Operating Basics**



# Operating Basics

## Controls and Indicators

Figure 2-1 shows the layout of the ECO422D front-panel controls and indicators.

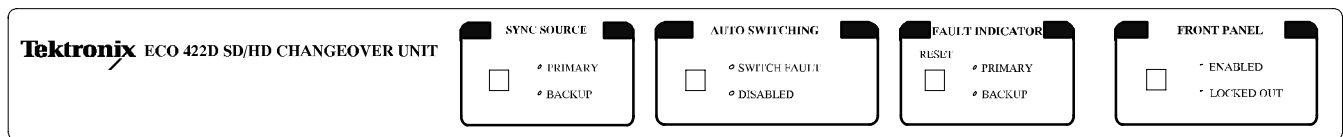


Figure 2- 1: Front-panel controls

**Sync Source - Primary/Backup.** The LED indicates the current Output (whether it is from the Primary or Backup input). It can be manually changed using the Sync Source button. (If the ECO422D is in Normal mode, this is only true when the other input is good or both inputs are bad. Refer to *User Configuration Switch (S14-8)* on page 2-3.) Only one of these LEDs can be on. Primary is the default at power-up.

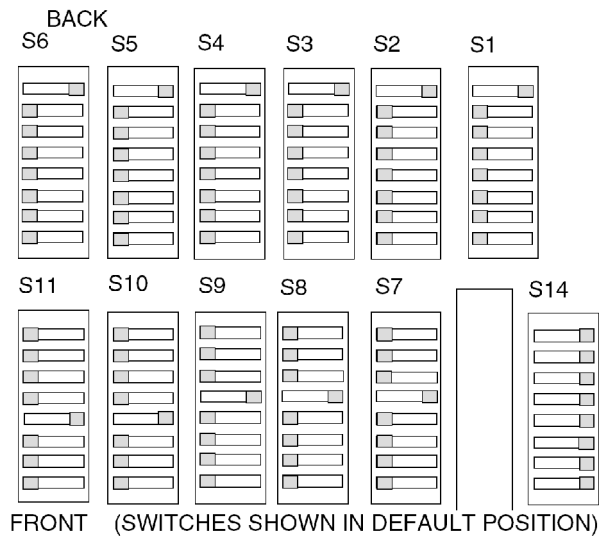
**Auto Switching - Switch on Fault/Disabled.** This selects whether the ECO422D will automatically switch to the other input source whenever it detects a fault (Switch on Fault) or not switch (Disabled). Only one of these LEDs can be on after the power-up delay. Switch on Fault is the default setting. During power-up, the disable LED slowly blinks to indicate disabled front panel and error detection.

**Fault Indicator (Reset) - Primary/Backup.** Either one or both of these LEDs could be on. They indicate that a fault has occurred on the input. Press the Reset button to clear the fault indicators (turn off the LEDs) after the fault has been corrected. The fault indicator does not automatically reset after an error condition improves. At power-up, the LEDs are reset.

**Front Panel - Enabled/Locked Out.** This control determines whether or not the operator has access to the other front-panel controls. If it is Enabled, then the user can control the instrument from the front panel. If it is Locked Out, then the user can only toggle back to Enabled and no other front-panel controls are available. The ECO422D will automatically lock out after about 1 minute of inactivity to prevent accidental switching. The front panel is automatically locked out at power-up (during power up, both LEDs are lit).

## Internal Controls

**Channel Configuration Switch (11 dip switches S1 - S11; see Figure 2-2).** These switches select the signal type checked on a channel by setting the amplitude comparison level. Only one switch from each DIP package should be enabled (closed) for each channel, except for attenuation (DIP 8 on switches S7 through S11), which is allowed to be combined with either of the user-defined levels.



**Figure 2-2: Default position of the user configuration and mode switches**

Below is a list of the functions for each of the switches.

DIP Switch	Input signal
All open	Disabled (signal not checked)
1	NTSC black burst
2	PAL black burst
3	NTSC serial digital video (143 Mb/s)
4	Serial digital video (270 Mb/s) Analog tri-level sync
5	NTSC serial digital audio
6	User defined
7	User defined
8	Serial digital video (1.485 Gb/s) (Channels 1-6) Attenuation (Channels 7-11)

Table 2-1 lists the factory setting of the switches. (NTSC or PAL black burst is determined by the power cord option ordered with the instrument.)

**Table 2-1: Factory settings of channel configuration switches (S1 - S11)**

Output # / Switch #	Setting (see above)	Attenuation (set with Sx-8)		Type of signal attached
		On	Off	
1 / S1	1 or 2		✓	Black Burst
2 / S2	1 or 2		✓	Black Burst
3 / S3	1 or 2		✓	Black Burst
4 / S4	1 or 2		✓	Black Burst
5 / S5	1 or 2		✓	Black Burst
6 / S6	1 or 2		✓	Black Burst
7 / S7	4		✓	Serial Digital Video (Component)
8 / S8	4		✓	Serial Digital Video (Component)
9 / S9	4		✓	Serial Digital Video (Component)
10 / S10	5		✓	Serial Digital Audio
11 / S11	5		✓	Serial Digital Audio

**User Configuration Switch (S14-8) - closed- -Normal-**

**Attenuation.** Attenuation allows larger signals to have their signal level checked. The attenuator adds about 14 dB (x5) attenuation to the signal level being checked. This has no effect on the level of the output signal and only extends the range of the check circuitry. Use this in conjunction with large H sync pulses to increase the accuracy on the level check. Only use this switch in conjunction with the User Defined Levels.

**User Configuration Switch (S14 - 8).** This switch determines how the ECO422D responds to faulty signals - either Normal or Override.

For Normal operation, the user cannot switch to a bad signal whether the instrument is in manual or auto switch mode. For example, the ECO422D is in manual mode and the Primary signal is bad, while the Backup signal is good. If the user presses the Sync Source button, the output will be the Backup signal. If the user presses the Sync Source button again, the output continues to be the Backup signal. It will not change to Primary until the signal is good and the fault indicator is reset.

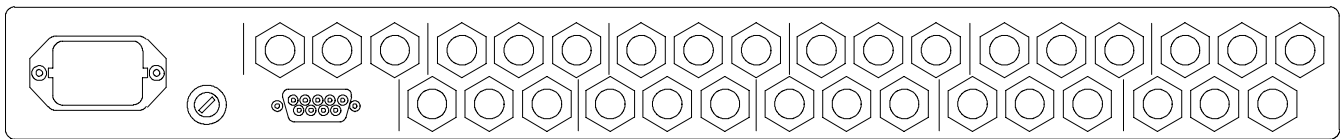
In the Override mode, the user can manually switch to a “bad” signal, with Auto mode disabled.

**Reference Level Adjustments R266 and R265.** These two adjustments set the reference level for the two user-defined signal options. Select these levels with DIPs 6 (R266) and 7 (R265) of the Channel Configuration switches. These allow the user to set their own signal switching level for special applications. Two examples of signals that may require checking are an active video signal or an H Sync signal.

The procedure used to set these levels is on page 2-8.

## Connectors

Figure 2-3 shows the layout of the rear panel of the ECO422D.



**Figure 2-3: Rear panel of the ECO422D**

**Power** This instrument is designed 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. Mains frequency is 50 or 60 Hz. The operating voltage range is continuous from 100 to 240 VAC  $\pm 10\%$ .



**WARNING.** To prevent personal injury, do not connect power to the ECO422D if the top cover is not installed. Dangerous potentials are present on the Power Supply board.

### Video Signals (11 Channels)

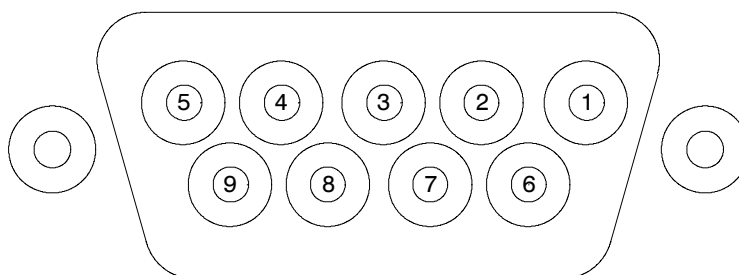
There are 33 video connectors on the rear panel. Eleven are for the Primary input, 11 are for the Backup input, and 11 are for the Output. A general overview of each one is below.

**Primary.** Input from the primary sync generator. It can be PAL black burst, NTSC black burst, analog tri-level sync, serial digital video, or serial digital audio if signal checking is desired. There are also two user-defined levels available. If no signal checking is required, almost any signal can pass through the unit (within the bandwidth and voltage/current limitations). This should be the same signal type as its Backup signal pair.

**Output.** Signal output. It is either from the Primary or the Backup source. How the ECO422D is configured determines under what conditions the source changes.

**Backup.** Input from the backup sync generator. This should be the same signal type as its Primary signal pair.

**Remote.** The rear-panel connector is a 9-pin female D-connector, with one pin tied to ground (see Figure 2-4).



**Figure 2-4: Remote connector pins**

The pin-out is shown in Table 2-2.

**Table 2-2: Remote connector pin-out**

Pin	Signal function
1	Auto switching (input)
2	Toggle sync source (input)
3	Indicate primary sync source active (output)
4	Indicate backup sync source active (output)
5	Fault alarm (output)
6	Fault reset
7	Fault reporting +
8	Fault reporting -
9	Ground

Auto Switching (active low) If low, the automatic switching function from the front panel is disabled. The front panel cannot override this remote command.

Toggle Sync Source (active low) Operates the same as the Sync Source button on the front panel. A low pulse will cause the ECO422D to toggle between Primary and Backup as the output signal.

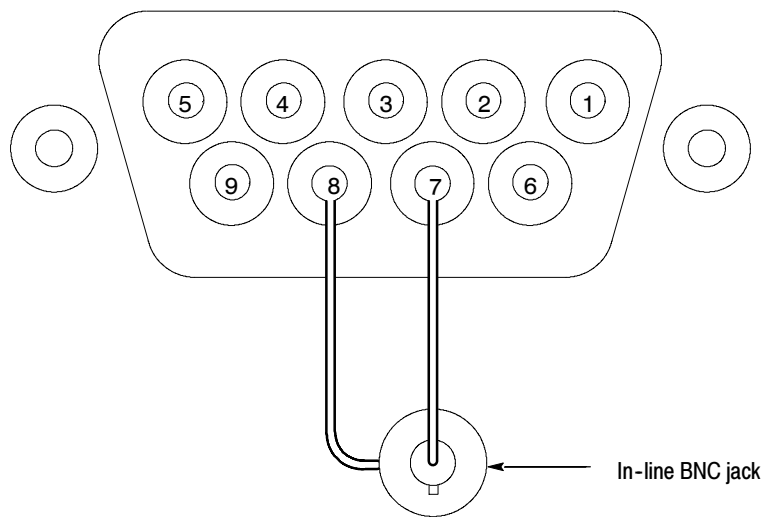
Indicate Primary Sync Source Active (active high) Indicates that the Primary signals are the sync source.

Indicate Backup Sync Source Active (active high) Indicates that the Backup signals are the sync source.

Fault Alarm (active high) Indicates that at least one of the Primary or Backup input signals is “bad.” This alarm signal is latched and will remain high until the error is cleared and the Reset button is pressed.

Fault Reset (active low) This operates like the front-panel Reset button. It clears the fault indicators (turns off the LEDs) after the fault has been corrected.

Fault Reporting - and + It is normally open, indicating that everything is good. It will close in the cases of: loss of power to the ECO422D or one (or more) input signals are bad. The fault is latched and will remain until the fault is cleared. This fault reporting system follows SMPTE 269M guidelines except the interface is 2 pins of the Remote connector (7 & 8) instead of the standard isolated BNC connector and there is no pulsing. When in the open state, the leakage across the closure is less than 100  $\mu$ A at any voltage from 0 to 5 VDC. The closure is able to withstand 24 VDC in the open state without damage. In the closed state, the maximum voltage drop across the closure should not exceed 2 V at 20 mA. The sensing device should not supply more than 20 mA of current to the reporting device. To provide compliance with the standard, wire a BNC connector adapter as shown in Figure 2-5.



**Figure 2-5: Wiring required to conform with SMPTE fault reporting**



## Operating Basics

In normal operation, the ECO422D is basically a switch that triggers whenever an error occurs in any channel. All 11 Channels switch at the same time.

If any channel is not being used, it is mandatory that its checking function be disabled. Otherwise it will always trigger an error and the ECO422D will not operate properly.

This section covers the state machine discussions (what will happen when some signals go bad) and how to adjust the user-defined inputs.

## State Machine Description

Table 2-3 is a truth table that gives the various states the ECO422D outputs based on the state of the inputs. Note that Primary is set to check a given level.

Power - the state of the power supply.

User Config - the state of the user configuration switch. It can either be N (Normal) or O (Override). In Normal mode, the ECO422D will not switch to a “bad signal.” In Override operation, the user is allowed to manually switch to a “bad signal.”

Switch - Indicates whether or not the Sync Source button on the front panel or the Toggle Sync Source on the remote control has been selected. Note that the front panel and the remote control commands are ANDed together (active low) to produce the switch results.

P - Primary input. It outputs to Output.

B - Backup input. It is part of the Output set.

O Auto - Output signal with the ECO422D set to “Auto Switching” (switch on error). It can either output Primary or Backup.

O Manual - Output signal with the ECO422D set to “Manual” (no switching on error). It can either output Primary or Backup.

0 - bad signal.

1 - good signal.

↑ - switch (change the current output signal).

↓ - no switch (stay with the current signal).

X - Don't care.

**Table 2-3: Truth table for ECO422D switching**

Power	User config	Switch	P	B	O auto	O manual
1	N	↓	0	0	↓	↓
1	N	↓	0	1	B	↓
1	N	↓	1	0	P	↓
1	N	↓	1	1	↓	↓
1	N	↑	0	0	↑	↑
1	N	↑	0	1	B	B
1	N	↑	1	0	P	P
1	N	↑	1	1	↑	↑
1	O	↓	0	0	↓	↓
1	O	↓	0	1	B	↓
1	O	↓	1	0	P	↓
1	O	↓	1	1	↓	↓
1	O	↑	0	0	↑	↑
1	O	↑	0	1	B	↑
1	O	↑	1	0	P	↑
1	O	↑	1	1	↑	↑
0	X	X	X	X	P	P

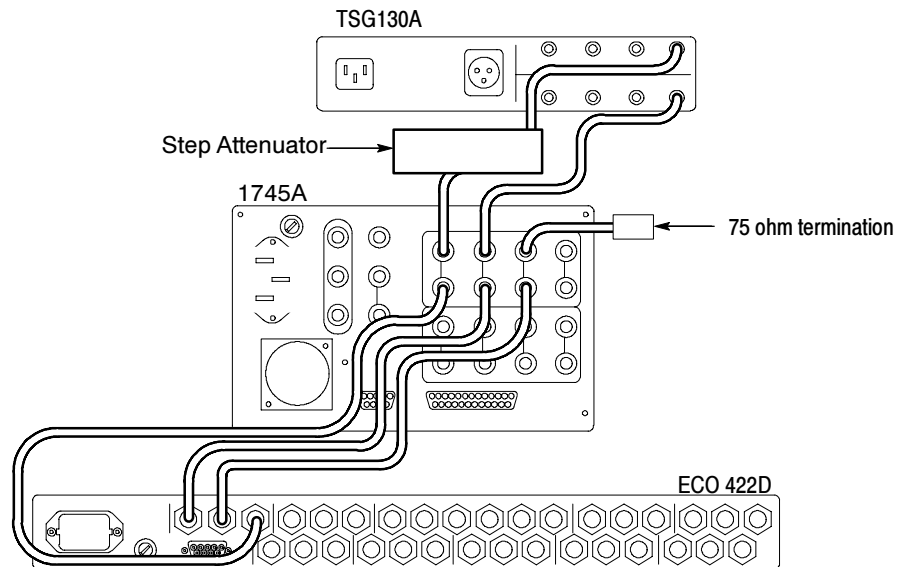
**How to Adjust the User-Defined Threshold Levels**

The User-defined Threshold Levels are the two levels available from User Configuration switches 6 and 7. They are available so that the user can trigger on signal levels other than the seven predefined levels.

In order to set the Threshold Levels, you need:

- Two good versions of the type of signal you want to check
- A step attenuator (example: 847 Attenuator from KAY Elemetrics)
- A waveform monitor or oscilloscope (optional)
- The ECO422D

The example sets switch 7 for NTSC active video with the threshold set for a 3 dB down color bar. It uses a TSG 170D as the signal source, a 1780R waveform monitor/vectorscope (optional) to view the signal level, and a step attenuator.



**Figure 2-6: Setup for adjusting R265 (the user level for SX-7)**

1. Connect the equipment as shown in Figure 2-6.
2. Set all of the User Configuration switches to “open” except for S1-7 (for channel 1).
3. Set all S14 switches “closed.”
4. Set the ECO422D to Primary Sync Source.
5. Set the ECO422D Auto Switching to “Switch on Fault.”
6. Set the step attenuator to 0 dB of attenuation.
7. Turn the potentiometer R265 fully. (You are attempting to allow the minimum signal level to pass through before the threshold is reached.)
8. Press the fault indicator Reset button. (This clears any errors.)
9. Check the fault indicator for an error indication on either the Primary or Backup channels. If there are no faults, then proceed to the next step. Otherwise, try rotating the potentiometer in the other direction. (You are trying to get the minimum signal level to pass through before reaching the switching threshold.)
10. Set the step attenuator to 3 dB of attenuation (or whatever attenuation is required for your application).
11. Check to see that the sync source has not changed to Backup and no faults are on the Primary channel.

12. Slowly adjust R265 until the ECO422D switches to the Backup sync source and a fault occurs on the Primary channel. Press Reset to verify that the fault is still preset. If the Primary fault indicator LED goes out, continue adjusting the potentiometer. If the LED remains on, S1-7 through S11-7 are set for your user-defined level.

---

**NOTE.** *If you cannot adjust R265 satisfactorily, move the cables from Channel 1 to Channel 7, open S1-7, close S7-7 and activate the Channel 7 attenuator by closing S1-8. Repeat the adjustment steps starting with step 6.*

---

Adjust R266 in the same manner to set a user-defined level for S1-6 through S11-6.

## Exterior Cleaning

Clean the instrument often enough to prevent dust or dirt from accumulating. Dust accumulating in the instrument acts as an insulating blanket, preventing proper cooling, and possibly causing overheating and component breakdown. Under high humidity conditions, accumulated dust can also provide an electrical conduction path.



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**CAUTION.** *To avoid damage to the instrument, do not expose it to sprays, liquids, or solvents. Do not use chemical cleaning agents; they can damage the instrument. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.*

---

Clean the exterior surfaces of the instrument with a dry, lint-free cloth or a soft-bristle brush. If dirt remains, use a cloth or swab dampened with a 75% isopropyl alcohol solution. A swab is useful for cleaning in narrow spaces around the controls and connectors. Do not use abrasive compounds on any part of the instrument.



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**CAUTION.** *Avoid getting moisture inside the instrument during exterior cleaning and use only enough solution to dampen the cloth or swab. Use a 75% isopropyl alcohol solution as a cleanser, and rinse with deionized water.*

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# Specifications



# Specifications

## Introduction

The items listed in the following tables describe the performance of the ECO422D Changeover Unit. Performance Requirements are generally quantitative and can be tested by a Performance Verification procedure contained in the service part of this manual.

Supplemental Information is valuable data pertaining to the operation and output capabilities of this instrument. Only a few items listed in this category may be tested in the Performance Verification procedure.

Performance Conditions - The requirements listed in the electrical specification apply over an ambient temperature range of 0 °C to +40 °C. The rated accuracies are valid when the instrument is calibrated at an ambient temperature range of +20 °C to +30 °C, after a warm-up time of 20 minutes. Test equipment used to verify Performance Requirements must be calibrated and working within the limits specified under the Equipment Required list.

These instruments are intended to operate from an AC power source that will not apply more than 264 V<sub>RMS</sub> between the supply conductors or either supply conductor and ground. A protective ground connection by way of the grounding conductor is essential for safe operation.

Environmental specifications are listed toward the back of the following tables. In addition a list of appropriate safety and electromagnetic interference (EMI) standards also can be found there.

**Table 3- 1: General characteristics**

<b>Characteristics</b>	<b>Performance requirements</b>	<b>Supplemental information</b>
Return Loss (All Inputs and Outputs)		
Channels 1-6		30 dB, 0 to 10 MHz 15 dB, 10 to 750 MHz 10 dB, 750 MHz to 1.5 GHz
Channels 7-11		30 dB, 0 to 10 MHz 15 dB, 10 to 270 MHz 12 dB, 270 to 360 MHz (15 dB typical)
Insertion Loss (Channels 1-6)		0.2 dB DC to 10 MHz 10 MHz to 1.5 GHz <sup>2</sup>
(Channels 7-11)		0.2 dB, DC to 10 MHz 0.5 dB, 10 to 200 MHz 1.0 dB, 200 to 360 MHz
Maximum Switched Voltage		±5 V
Maximum Switched Current		100 mA
Crosstalk (unselected input to output or channel to channel)		
Channels 1-6		-60 dB to 10 MHz -30 dB to 1.0 GHz -20 dB to 1.5 GHz
Channels 7-11		-60 dB to 10 MHz -30 dB to 200 MHz -15 dB to 360 MHz
Relay Switch Time		Time that it takes for the relays to switch and settle. Approximately 10 msec.
Power-up delay		> 4 minutes, to allow source generator signals to stabilize

<sup>2</sup> Approximates less than 20 meters of Belden 1694A cable.



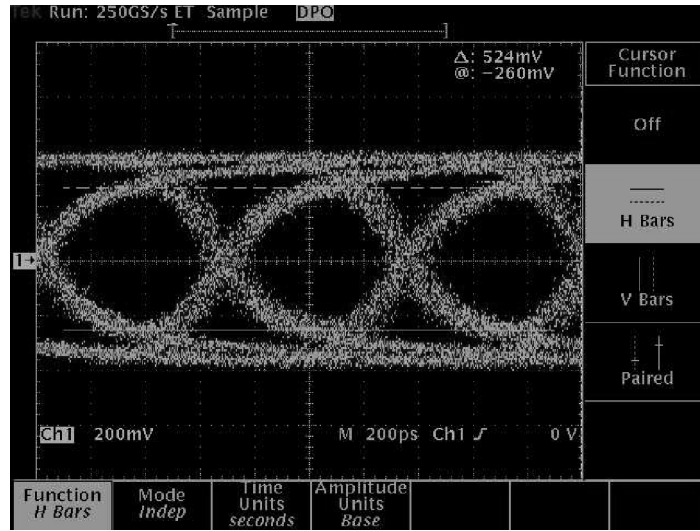


Figure 3-1: Typical eye-pattern of 20 m of Belden 1694A cable

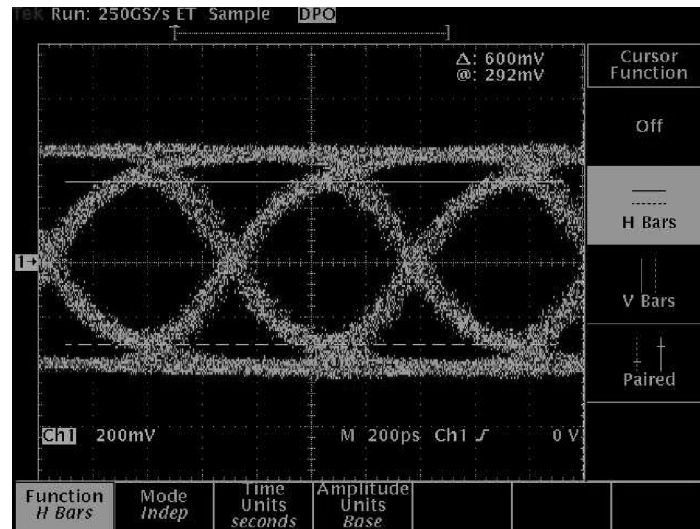


Figure 3-2: Typical eye-pattern of Channels 1-6 HD output

**Table 3-2: Signal loss detection**

Characteristics	Performance requirements	Supplemental information	Performance Ver. step
Input Signal	Switching Level within:	These are the defined switching thresholds set with the internal Channel Configuration switch.  Between 2 and 4 dB down from nominal.	
NTSC Black Burst (sync level)	-180 to -230 mV	-200 mV	2 & 4
PAL Black Burst (sync level)	-190 to -240 mV	-210 mV	3 & 5
Serial Digital Video (NTSC Composite)	450 to 630 mV	540 mV (between 2 and 5 dB down)	10 & 11
Serial Digital Video (270 Mb/s)	450 to 630 mV	540 mV (between 2 and 5 dB down)	7 & 8
Serial Digital Video (1.485 Gb/s)	450 to 630 mV	540 mV (between 2 and 5 dB down)	16 & 17
Serial Digital Audio	630 to 790 mV	710 mV	13 & 14
User Adjustable	-100 to -700 mV  -700 to -3500 mV	Using the two user-defined Channel Configuration switches.  Using the user-defined Channel Configuration switch with the attenuator on.	
Attenuation		approximately x5	
Analog tri-level sync	400 to 565 mV	475 mV (between 3 and 6 dB down)	<sup>3</sup>

<sup>3</sup> Performance is verified indirectly by completing Performance Verification steps 2-5 & 10-11.

**Table 3-3: Power supply**

Characteristics	Performance requirements	Supplemental information
External Power Voltage	100 to 240 VAC $\pm$ 10%	Full range, no selector
Input Frequency Range		48 Hz to 62 Hz
Power Consumption		20 Watts, typical 40 VA, maximum
Supply Accuracy +5 V -5 V		+5 V $\pm$ 200 mV -5 V $\pm$ 200 mV
Hum +5 V -5 V		Typical values: 10 mV 10 mV
Noise +5 V -5 V		(5 MHz measurement bandwidth) $\leq$ 50 mV $\leq$ 50 mV
Crest Factor		$\geq$ 1.35
Fuse Required		1 ampere medium blow fuse for all applications.

**Table 3-4: Mechanical (physical) characteristics**

Characteristics	Supplemental information
Rackmount Dimensions	
Height	1.734 inches (4.4 cm)
Width	19.0 inches (48.3 cm)
Length	22.1 inches (56.1 cm)
Net Weight	10.8 lbs (4.9 kg)
Shipping Weight	18 lbs, 5 oz (8.3 kg)

**Table 3-5: Environmental characteristics**

Characteristics	Supplemental information
Temperature Nonoperating Operating	-40 °C to +65 °C 0 °C to +40 °C.
Altitude Nonoperating Operating	to 12,192 meters (40,000 feet) to 2,000 meters (6,562 feet).
Humidity	5 - 95% humidity, noncondensing
Vibration Operating	From 5 to 350 Hz: 0.0002 g <sup>2</sup> /Hz Acceleration Power Spectral Density (APSD). From 350 to 500 Hz: -3 dB/Octave Slope. At 500 Hz: 0.00014 g <sup>2</sup> /Hz APSD. 0.31 overall GRMS. 10 minutes/axis.
Nonoperating	From 5 to 100 Hz: 0.020 g <sup>2</sup> /Hz (APSD). From 100 to 200 Hz: -3 dB/Octave Slope. From 200 to 350 Hz: 0.010 g <sup>2</sup> /Hz APSD. From 350 to 500 Hz: -3 dB/Octave Slope. At 500 Hz: 0.007 g <sup>2</sup> /Hz APSD. 2.46 overall GRMS. 10 minutes/axis.
Shock (nonoperating)	Half Sine Wave Shock levels: 50 g's (instrument), 11 msec duration, 3 shocks per direction.
Transportation	Qualified under NTSB Test Procedure 1A, Category II (24-inch drop).
Vehicle Vibration (Random Vibration)	Vibrate along all three axes at an overall vibration level of 1.33 GRMS. One hour per axis.
Second Manual Handling (Shock)	Drop on all sides once from a height of 24 inches. Drop on the bottom from a height of 48 inches.
Equipment Type	Measurement
Equipment Class	Class I (grounded product), as defined in IEC 1010-1, Annex H.
Installation Category	Installation Category II, as defined in IEC 1010-1, Annex J. Rated for indoor use only.
Pollution Degree	Pollution Degree 2, as defined in IEC 1010-1.

**Table 3-6: Certifications and compliances**

Category	Standards or description
EC Declaration of Conformity - EMC	<p>Meets the 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 Communities:</p> <p>EN 55103                      Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use.<sup>4</sup></p> <p>Environment                      E2 - commercial and light industrial</p> <p>Part 1 Emission</p> <p>    EN 55022                      Class B radiated and conducted emissions</p> <p>    EN 55103-1, Annex A      Radiated magnetic field emissions</p> <p>    EN 55103-1, Annex B      Inrush current, I<sub>pk</sub> = 3.7 A.</p> <p>Part 2 Immunity</p> <p>    IEC 61000-4-2              Electrostatic discharge immunity</p> <p>    IEC 61000-4-3              RF electromagnetic field immunity</p> <p>    IEC 61000-4-4              Electrical fast transient / burst immunity</p> <p>    IEC 61000-4-5              Power line surge immunity</p> <p>    IEC 61000-4-6              Conducted RF Immunity</p> <p>    IEC 61000-4-11             Voltage dips and interruptions immunity</p> <p>    EN 55103-2, Annex A      Radiated magnetic field immunity</p> <p>    EN 55103-2, Annex B      Balanced ports common mode immunity</p> <p>EN 61000-3-2                      AC power line harmonic emissions</p>
Australia / New Zealand Declaration of Conformity - EMC	<p>Complies with EMC provision of Radiocommunications Act per the following standard(s):</p> <p>AS/NZS 2064.1/2                      Industrial, Scientific, and Medical Equipment: 1992</p>
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits.

<sup>4</sup> **High quality shielded cables must be used to ensure compliance to the above listed standards.**

**Table 3-6: Certifications and compliances (cont.)**

Category	Standards or description
EC Declaration of Conformity - Low Voltage	<p>Compliance was demonstrated to the following specification as listed in the Official Journal of the European Union:</p> <p>Low Voltage Directive 73/23/EEC, amended by 93/69/EEC</p> <p>EN 61010-1/A2:1995 Safety requirements for electrical equipment for measurement control and laboratory use.</p>
U.S. Nationally Recognized Testing Laboratory Listing (Test House)	<p>UL3111-1 (ETL) Standard for electrical measuring and test equipment.</p>
Canadian Certification	<p>CAN/CSA C22.2 No. 1010.1 Safety requirements for electrical equipment for measurement, control, and laboratory use.</p>
Additional Compliance	<p>ANSI/ISA S82.02.01:1999 Safety standard for electrical and electronic test, measuring, controlling, and related equipment.</p> <p>IEC61010-1 /A2:1995 Safety requirements for electrical equipment for measurement, control, and laboratory use.</p>
<b>Safety Certification Compliance</b>	
Temperature, operating	0 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)
Installation (Overvoltage) Category Definition	<p>Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:</p> <p>CAT III Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location.</p> <p>CAT II Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected.</p> <p>CAT I Secondary (signal level) or battery operated circuits of electronic equipment.</p>

**Table 3-6: Certifications and compliances (cont.)**

Category	Standards or description
Pollution Degree	Pollution Degree 2 (as defined in IEC 1010-1). Note: Rated for indoor use only.
Pollution Degree Definition	<p>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.</p> <p>Pollution Degree 1      No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.</p> <p>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.</p> <p>Pollution Degree 3      Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.</p>





**WARNING**

***The following servicing instructions are for use only by qualified personnel. To avoid injury, do not perform any servicing other than that stated in the operating instructions unless you are qualified to do so. Refer to all safety summaries before performing any service.***







# **Theory of Operation**



# Theory of Operation

This section provides information on how the ECO422D circuitry works, in order to troubleshoot the instrument.

## Logic Conventions

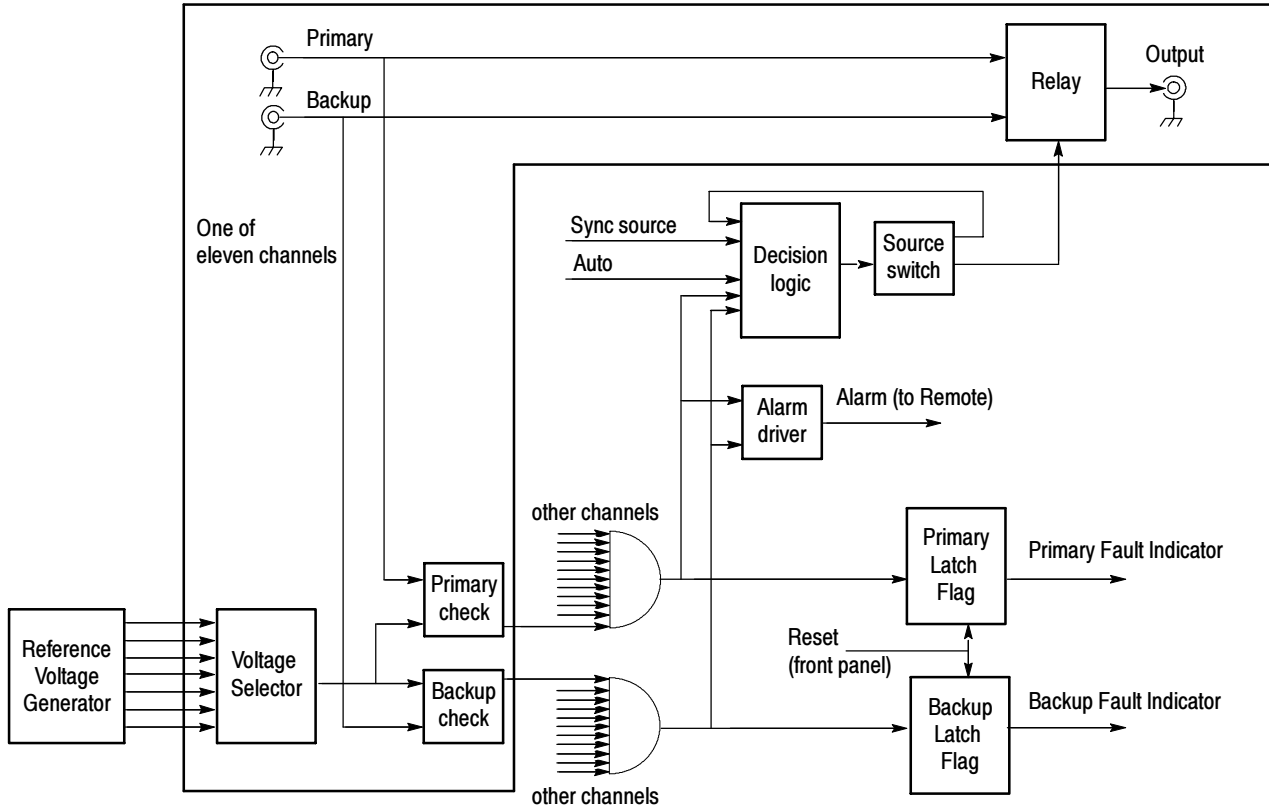
Signal names are all capital letters. For example, SIGNAL.

An active low signal (normally denoted by an overscore) is a signal name enclosed in parentheses. For example, (SIGNAL).

The aside of a signal name is always in square brackets. For example, [SIGNAL].

The aside of an active-low signal is the signal name in parentheses and then enclosed in square brackets. For example, [(SIGNAL)].

## ECO422D Block Level Description



**Figure 4- 1: Block diagram of the ECO422D**

The Primary and Backup signals enter through the BNCs. The signal goes directly to the Relay where one switches through to the rear-panel Output and the other terminates in 75  $\Omega$ . The rest of the circuitry determines which signal goes to the Output.

A copy of the Primary and Backup signals go to the Primary and Backup Check circuitry. This block consists of a peak detector that compares the peak level of the incoming signal with a predefined level from the Reference Voltage Generator that is selected by the Voltage Selector. The result of this check is ANDed with the results from the ten other input sets and sent to the Decision Logic circuit that determines the state of the relays. Additional circuitry runs the Alarm Driver for the remote output and the fault indicators on the front panel.

## ECO422D Detailed Circuit Description

### Input and Comparators 1 through 3 of the A2 Main Board

The Input and Comparator circuit takes the input signals, selects between them, and prepares the peak signals for the Decision Logic circuit. There are five input signal sets on the Main board and six input signal sets on the Connector board. All of the Input and Comparator circuits are similar for each signal set, therefore only Channel 7 (on the Main board) is discussed.

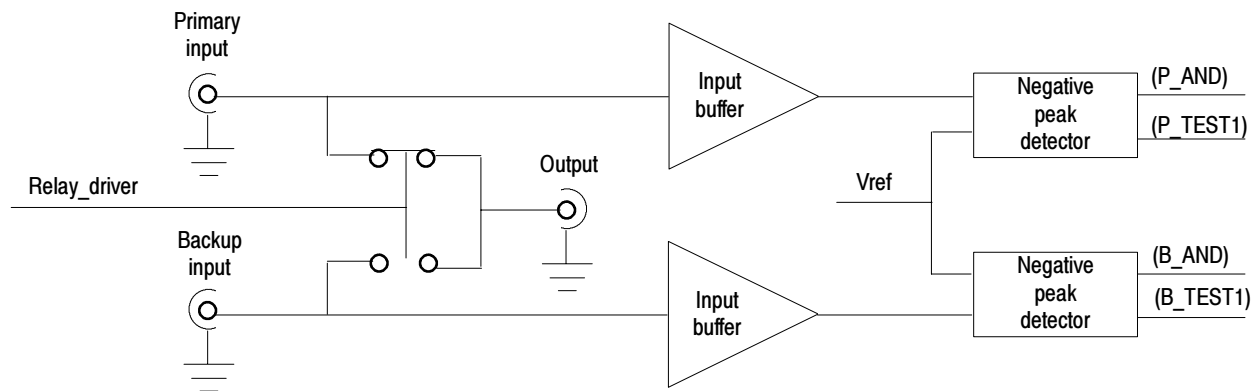


Figure 4-2: Block diagram of the Input Comparator

**RF Relay.** The Primary input signal connects to 75  $\Omega$  BNC, J14. The signal passes through a 75  $\Omega$  microstrip to the RF relay, K5. Meanwhile the Backup signal enters J13 and connects to the other side of relay K5 also through a 75  $\Omega$  microstrip. This relay switches the signal to either two 37.5  $\Omega$  resistors in series for 75  $\Omega$  termination, or to the J15 output BNC. A 1.5 k $\Omega$  resistor (R215 for Primary and R214 for Backup) AC coupled with 47 and 0.01  $\mu$ F parallel capacitors (C212 and C106 for Primary and C213 and C105 for Backup) samples the input signals. This signal then goes to the Input Buffer.

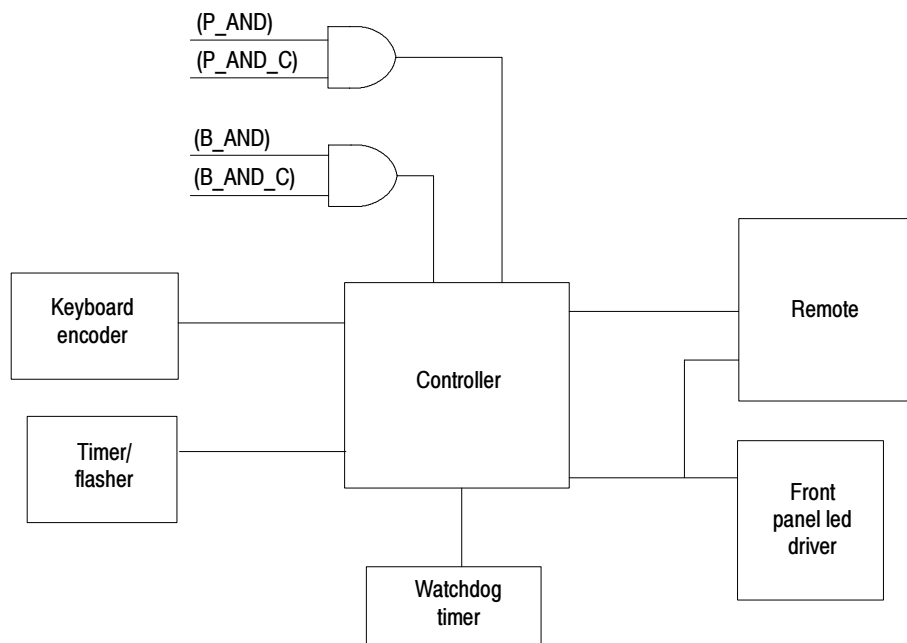
**Input Buffers.** The Emitter-follower Input Buffer (Q26 for Primary and Q27 for Backup) reduces the input capacitance that could degrade the return loss at high frequencies. The signal may be attenuated by Q30 for the Primary circuit and Q31 for the Backup circuit. If the ATTEN7 from the Selector Switch signal is high, it turns on the transistor that reduces the amplitude of the signal. This allows checking a broader range of signals without the Negative Peak Detectors being overdriven or saturated. The output of the Input Buffers goes to the Negative Peak Detectors.

**Negative Peak Detectors.** The Negative Peak Detector circuit begins with a transistor that inverts the input signal. The Peak Detector circuit picks off the input signal peaks, which charge the memory capacitor, C114 or C113. When no peaks are present, the memory capacitor is discharged by R213 or R212. The DC output of the peak detector is buffered by a low drift op-amp, U9A and B.

**Voltage Comparator.** The Voltage Comparator takes the output of the Negative Peak Detector and compares it to a DC reference voltage, VREF7, selected from eight possible choices: off, five presets, or two user-defined values. When the input negative peaks generate a voltage less than the selected reference, the output of the comparator goes low, signaling a fault to the control circuit. The resulting signal is (P\_AND\_C) for the Primary and (B\_AND\_C) for the Backup. (P\_TEST7) and (B\_TEST7) are only for automated testing purposes. All the Primary signals are wire-ANDed together as the (P\_AND\_C) signal and then ANDed with the Connector board (P\_AND\_C) with U17A. The result is sent to controller U16.. The same is done with all the Backup signals and U17D.

## Control and Remote 4 of the A2 Main Board

The Primary and Backup signals from the Voltage Comparators on the Main board are ANDed with like signals coming from the Connector board and passed to the Controller PLD that then generates the control signals for the switching relays.



**Figure 4-3: Block diagram for the Control and Remote circuit**



**Keyboard Encoder.** The front panel is connected to the Main board through J16. The input from the front panel is scanned by the Keyboard encoder, U11. The outputs are active high and chosen so that only one can be active at a time. The KEY\_VALID signal is ANDed with each output inside the controller to provide switch debouncing.

**Front-panel LED Driver.** U12 outputs the signals to drive the LEDs on the front panel. It drives the LEDs to +5 V.

U12 outputs the signals to driver the LEDs on the front panel. It drives the LEDs to +5 V. The timer, U13, provides the pulsing necessary to flash the front-panel fault LEDs and clock the front panel Time Out circuit in the Controller. When (TIMER\_DIS) is low, the timer is prevented from pulsing. When the input goes high, the timer output goes low, turning on and allowing the Controller to flash the LEDs.

**Remote.** The Remote port, J17, provides three inputs and four outputs from the Controller. (R\_AUTO) controls auto switching, (R\_SOURCE) is a manual source switch, and (R\_RESET) resets the fault indicator LEDs. These signals are buffered by U18B that is always enabled. The input has six diodes for ESD protection.

The buffer drives the two input source light outputs through resistors to ground because there is no remote power on the rear-panel connector. The inversion of the select lines is accomplished by cross wiring P\_LED and B\_LED, through the buffer to (B\_O) and (P\_O), which are complimentary.

The high current (ALARM) output is provided by Q32 and a high wattage 22  $\Omega$  resistor. A 10 k $\Omega$  pull-down is provided for test purposes.

The fault reporting output, U15 and Q33, provide a method of fault indication that also includes remote indication of instrument failure. A 24 V, 20 mA current limited input and ground are connected to J17-2 and J17-4. When the controller detects an input fault or suffers a power failure, the LED in U15 shuts off. The transistor opens up allowing Q33 to saturate to less than 1.5 V, signaling the fault. When the LED is on, Q33 is cut off leaving less than 100 nA of leakage. The diodes, CR48 and VR1, are provided for reverse voltage and ESD protection.

**Controller.** The Controller has five main functions:

- Encode the keyboard signals.
- Send the correct signals to the LED Driver.
- Generate the ALARM signal for the Remote circuit.
- Generate the Switch or Auto Switch command.
- Keep track of the Time Out circuit.

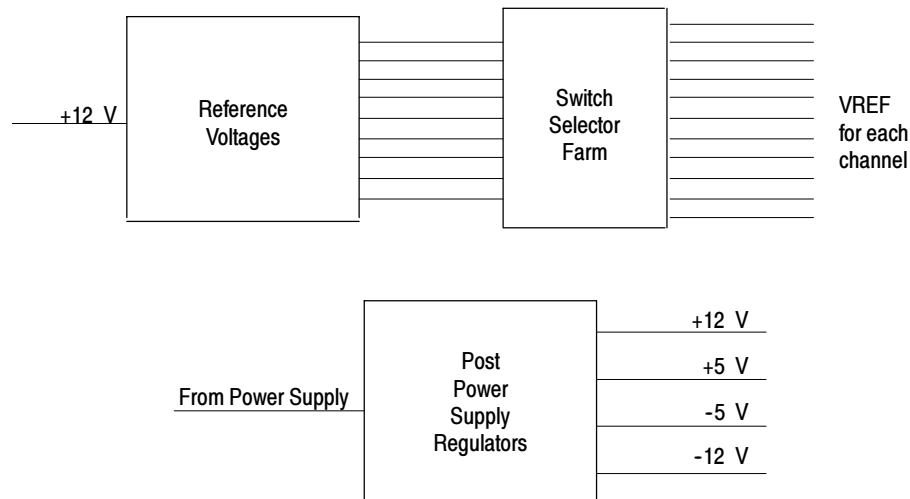
The five inputs from the Keyboard Encoder enter the Controller. KEY\_VALID is internally delayed three clock cycles to allow key data setup. The ENABLE and the delayed KEY\_VALID signal clock a toggle flip-flop high to enable the three input gates. Once enabled, the combination of delayed KEY\_VALID and each input produces a control signal for the Controller LED Driver circuit, the Lockout circuit, and the Fault circuit.

The fault block of the Controller uses four input signals (PFAULT), (BFAULT), (TIMER), and RESET. These signals determine whether the (ALARM) signal needs to be sent to the Remote, if the Primary or Backup front panel Alarm LEDs should be on, and if the auto switch function should be activated. The RESET command turns off the LEDs and the Remote Alarm output. The (TIMER) signal is Nanded with the LED fault signal to make it flash.

The automatic source change with fault detection function is enabled by the (AUTO\_O) signal from the Keyboard Encoder circuitry. This signal and some other controls generate (AUTO\_ON). (AUTO\_ON) can be switched off by the (R\_AUTO) control from the rear-panel Remote connector. The (AUTO\_ON) signal is also used to derive the (P\_SELECT) and (B\_SELECT) signals. (AUTO\_ON) and (AUTO\_OFF) are sent to drive the front-panel LED circuit.

After the front panel is enabled, the ECO422D will only allow the front panel approximately 60 seconds of inactivity before it will automatically disable the front panel. The Controller gets a timing signal from the Timer circuit. It counts this signal to check the inactivity of the front panel. Every time that a front-panel key is pressed the internal counter is reset. If the counter reaches one minute, the front panel is automatically locked out.

## Reference Voltage and Selector Switch Farm 5 of the A2 Main Board



**Figure 4-4: Reference voltage and selector switch farm block diagram**

**Reference Voltages.** The +2.5 V reference voltage is provided by U31. This signal is used to produce the  $-2.5V_{REF}$  and the Attenuation signals.

The +2.5 V signal from U31 is combined with ATTEN\_SW and buffered by U23B and U20B. The resulting signal is set to the Switch Farm as ATTEN\_M and ATTEN\_C to control the input attenuators.

The -5 V signal is inverted and buffered by U20A, resulting in the  $-2.5V_{REF}$  signal. This signal drives five inverting amplifiers, each with a DC output equivalent to the recovered DC from the Peak Detector Buffers for a specific type of input. It also drives two adjustable amplifiers whose amplitude is adjusted by R266 and R265. The results are the BUF<sub>X</sub> signals that are connected to the Switch Farm by S14-1 through S14-7.

The reference voltage for 1.485 Gb/s is provided on the Connector board and is selected when the eighth switch is closed for that channel and one through seven are open. The switched attenuator is not implemented on the Connector board.

**Switch Farm.** The Switch Farm, S1-S11, is a set of 11 eight-bit DIP switches, one for each channel. The user selects which reference amplifier, VREF, for each channel using the switches and whether or not the attenuator, ATTEN, is inserted. Opening the seven reference amplitude switches allows VREF to go to a negative voltage. Since the peak detector will never produce a negative voltage, the comparators will be disabled.

**Post Regulated Power Supply**

Power is supplied to the Main and Connector boards through J21 from an OEM supply which provides +15 V, -15 V and +5 V logic level voltage. The 15 V supplies are regulated to +5 and -5 V. The +15 V is reduced by resistors R335 and R336 and then used directly by the relays.

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**NOTE.** *There are two fuses in the instrument. One is accessible through the rear panel and the other is on the power supply. Make sure to check both internal and external fuses if the instrument will not power up. The replacement fuse on the power supply should be a 3.15 A, 250 V fuse. The rear panel fuse requirements are listed in Replaceable Electrical Parts.*

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# **Performance Verification**



# Performance Verification

This section consists of checklists and detailed procedures to use in verifying performance parameters and adjusting it to within tolerances.

The order of these procedures has been chosen to minimize changes in equipment setups. Performance parameters may be checked in any order.

## Calibration Data Report

The Calibration Data Report that follows can be used to document instrument performance. In addition, it can be used as a short-form Performance Check for those familiar with the Performance Verification Procedure. Only steps that have numeric Performance Requirements are included in this report form. (Some steps have been omitted.)

### Calibration Data Report

Instrument ECO422D

Cal. Date \_\_\_\_\_

Serial Number \_\_\_\_\_

Certificate Number<sup>1</sup> \_\_\_\_\_

Technician \_\_\_\_\_

Procedure 070-8472-00

Revision Date \_\_\_\_\_

STEP	OPERATION	MINIMUM TOLERANCE	MAXIMUM TOLERANCE	INCOMING	OUTGOING
1	Overall Switching Disabled				
	<b>Channel 1:</b>				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
16	Serial Digital 1.485 Gb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
17	Serial Digital 1.485 Gb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
	<b>Channel 2: (swap S2 for S1)</b>				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		

<sup>1</sup>Certificate number is not provided, unless "Certificate of Traceability" is issued.



STEP	OPERATION	MINIMUM TOLERANCE	MAXIMUM TOLERANCE	INCOMING	OUTGOING
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
16	Serial Digital 1.485 Gb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
17	Serial Digital 1.485 Gb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
	<b>Channel 3: (swap S3 for S1)</b>				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
16	Serial Digital 1.485 Gb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
17	Serial Digital 1.485 Gb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
	<b>Channel 4: (swap S4 for S1)</b>				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		

STEP	OPERATION	MINIMUM TOLERANCE	MAXIMUM TOLERANCE	INCOMING	OUTGOING
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
16	Serial Digital 1.485 Gb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
17	Serial Digital 1.485 Gb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
	<b>Channel 5: (swap S5 for S1)</b>				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
16	Serial Digital 1.485 Gb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
17	Serial Digital 1.485 Gb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
	<b>Channel 6: (swap S6 for S1)</b>				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		

STEP	OPERATION	MINIMUM TOLERANCE	MAXIMUM TOLERANCE	INCOMING	OUTGOING
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
16	Serial Digital 1.485 Gb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
17	Serial Digital 1.485 Gb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
	<b>Channel 7: (swap S7 for S1)</b>				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
	<b>Channel 8: (swap S8 for S1)</b>				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		

STEP	OPERATION	MINIMUM TOLERANCE	MAXIMUM TOLERANCE	INCOMING	OUTGOING
	<b>Channel 9:</b> (swap S9 for S1)				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
	<b>Channel 10:</b> (swap S10 for S1)				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		
	<b>Channel 11:</b> (swap S11 for S1)				
2	NTSC Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
4	NTSC Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
3	PAL Black Burst Switch - Primary	switch at 2 dB down	switch at 4 dB down		
5	PAL Black Burst Switch - Backup	switch at 2 dB down	switch at 4 dB down		
7	Serial Digital 270 Mb/s Switch - Primary	switch at 2 dB down	switch at 5 dB down		

STEP	OPERATION	MINIMUM TOLERANCE	MAXIMUM TOLERANCE	INCOMING	OUTGOING
8	Serial Digital 270 Mb/s Switch - Backup	switch at 2 dB down	switch at 5 dB down		
10	NTSC Serial Digital Composite Switch - Primary	switch at 2 dB down	switch at 5 dB down		
11	NTSC Serial Digital Composite Switch - Backup	switch at 2 dB down	switch at 5 dB down		
13	Serial Digital Audio Switch - Primary	switch at 2 dB down	switch at 4 dB down		
14	Serial Digital Audio Switch - Backup	switch at 2 dB down	switch at 4 dB down		

## Equipment Required

Signal Source - SPG422. Must be able to generate black burst signal (NTSC and PAL), serial digital video (component), and serial digital audio. Also requires two outputs of each signal.

Signal Source - TG700 DVG7 Composite Signal Set. Must be able to output serial digital composite video.

Signal Source - TG700 HDVG7 1.485 Gb/s Signal Set.

Step Attenuator - The step attenuator must be able to attenuate a signal at least 6 dB and step from 1 to 5 dB in 0.5 dB steps. (Example: 847 Attenuator from KAY Elemetrics Corp.)

Oscilloscope or waveform monitor. Used only to monitor the signals. (Oscilloscope should have a 1 GHz bandwidth, for example, a TDS7000 Series oscilloscope; Example waveform monitor: 1745A Waveform Monitor.)

75  $\Omega$  terminators. (Example: Tektronix part number 011-0163-00 for serial digital video or 011-0102-01 for analog and audio)

75  $\Omega$  Cables. (Example: Tektronix part number 012-0074-00)

## Performance Verification Procedure

### Signal Checking Disabled

#### 1. Check Overall Switching Disabled

Disconnect all signals (if any) from the ECO422D and power down the instrument.

Set all switches on S1 through S11 to “open” to disable switches on all channels.

Power the ECO422D up. (No inputs or outputs are required at this point.)  
Wait for the power-up delay to complete (over 4 minutes).

**CHECK** - that there are no error shown on the front panel.

### Black Burst Checks

#### 2. NTSC Black Burst Check for Channel 1 Primary Switch between 2 and 4 dB down from nominal

Connect the equipment as shown in Figure 5-1.

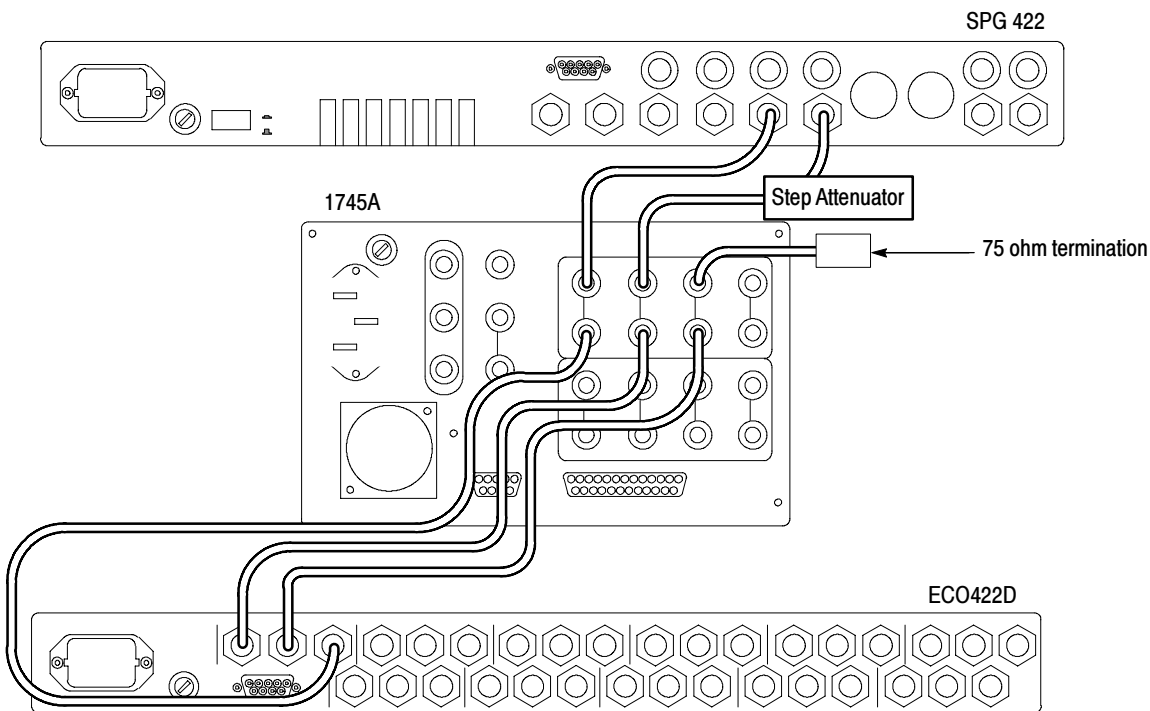


Figure 5- 1: Setup to check Black Burst levels

Power down all equipment.

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all DIP switches on S1 through S11 to “open”).

Set the Channel Configuration switch to NTSC Black Burst for Channel 1 (set S1-1 to “closed” and S1-2 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Power up all equipment.

Set the SPG422 to output an NTSC black burst signal.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D to “Primary” Sync Source and Auto Switch “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Primary input signal until the signal source switches to the Backup.

Press the Reset button on the front panel and try to return the signal source to Primary.

**CHECK** - that the Primary signal still shows an error and automatically switches back to Backup. If the ECO422D doesn't continue to show the Primary signal in error after the reset, continue adding attenuation until the Primary signal switches to Backup again.

**CHECK** - that the ECO switches between 2 and 4 dB down.

### **3. PAL Black Burst Check for Channel 1 Primary Switch between 2 and 4 dB down from nominal**

Connect the equipment as shown in Figure 5-1.

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S2 through S11 to “open”).

Set the Channel Configuration switch to PAL Black Burst for Channel 1 (set S1-1 to “open,” S1-2 “closed,” and S1-3 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Set the SPG422 to output a PAL black burst signal.

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D to “Primary” Sync Source and Auto Switch “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Primary input signal until the signal source switches to the Backup.

Press the Reset button on the front panel and try to return the signal source to Primary.

**CHECK** - that the Primary signal still shows an error and automatically switches back to Backup. If the ECO422D does not continue to show the Primary signal in error after the reset, continue adding attenuation until the Primary signal switches to Backup again.

**CHECK** - that the ECO switches between 2 and 4 dB down.

#### **4. NTSC Black Burst Check for Channel 1 Backup Switch between 2 and 4 dB down from nominal**

Connect the equipment as shown in Figure 5-1, except swap the Primary and Backup input signals so that the step attenuator is on the Backup channel.

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S1 through S11 to “open”).

Set the Channel Configuration switch to NTSC Black Burst for Channel 1 (set S1-1 to “closed” and SW1-2 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Set the SPG422 to output an NTSC black burst signal.

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D to “Backup” Sync Source and Auto Switch to “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Backup input signal until the signal source switches to the Primary.

Press the Reset button on the front panel and try to return the signal source to Backup.

**CHECK** - that the Backup signal still shows an error and automatically switches back to Primary. If the ECO422D does not continue to show the Backup signal in error after the reset, continue adding attenuation until the Backup signal switches to Primary again.

**CHECK** - that the ECO switches between 2 and 4 dB down.



### 5. PAL Black Burst Check for Channel 1 Backup Switch between 2 and 4 dB down from nominal

Connect the equipment as shown in Figure 5-1, except swap the Backup and Primary input signals so that the step attenuator is on the Backup input signal.

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S2 through S11 to “open”).

Set the Channel Configuration switch to PAL Black Burst for Channel 1 (set S1-1 to “open,” S1-2 “closed,” and S1-30 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Set the SPG422 to output a PAL black burst signal.

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D to “Backup” Sync Source and Auto Switch to “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Backup input signal until the signal source switches to the Primary.

Press the Reset button on the front panel and try to return the signal source to Backup.

**CHECK** - that the Backup signal still shows an error and automatically switches back to Primary. If the ECO422D does not continue to show the Backup signal in error after the reset, continue adding attenuation until the Backup signal switches to Primary again.

**CHECK** - that the ECO422D switches between 2 and 4 dB down.

**6. Check the NTSC & PAL Black Burst for Channels 2 - 11  
Switch between 2 and 4 dB down from nominal**

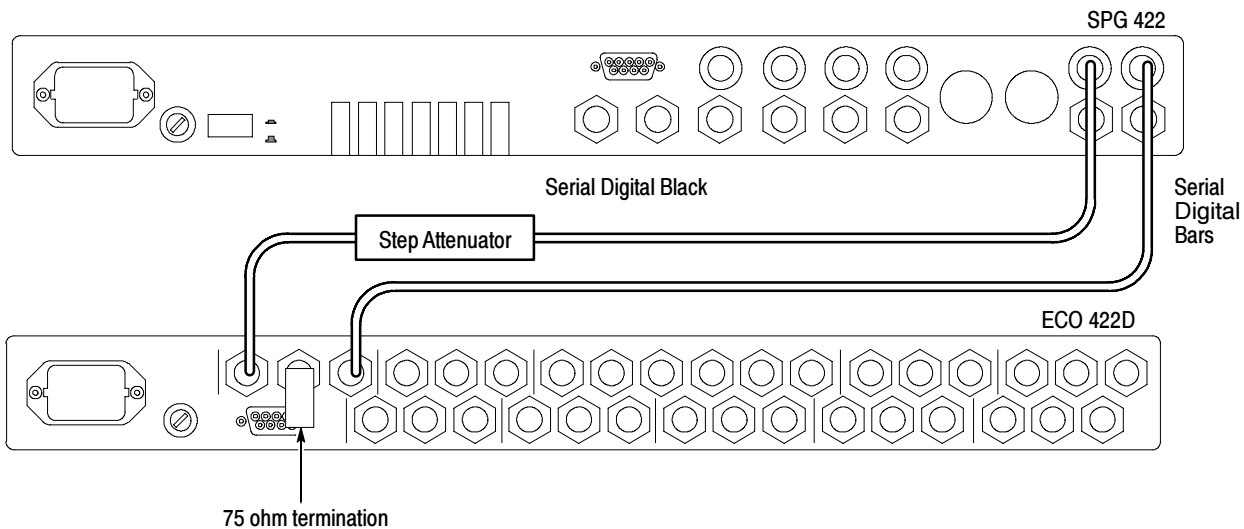
Repeat the four previous procedures for Channels 2 - 11 of the ECO422D. Move the cables from Channel 1 to the channel under test. Replace the switch setting for S1 as given in the following Table.

Channel No.	Switch No.
2	S2
3	S3
4	S4
5	S5
6	S6
7	S7
8	S8
9	S9
10	S10
11	S11

**Serial Digital Video Checks**

**7. Serial Digital Component Check for Channel 1 Primary  
Switch between 2 and 5 dB down from nominal**

Connect the equipment as shown in Figure 5-2.



**Figure 5-2: Setup to check the component serial digital video levels**

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S1 through S11 to “open”).

Set the Channel Configuration switch to Serial Digital Video Component for Channel 1 (set S1-4 to “closed,” S1-1 through S1-3 “open,” and S1-5 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Set the SPG422 to output any serial digital bars signal using the 525/59.94 standard.

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D (using the front panel) to “Primary” Sync Source and Auto Switch “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Primary input signal until the signal source switches to Backup.

Press the Reset button on the front panel and try to return the signal source to Primary.

**CHECK** - that the Primary signal still shows an error and automatically switches back to Backup. If the ECO422D does not continue to show the Primary signal in error after the reset, continue adding attenuation until the Primary signal switches to Backup again.

**CHECK** - that the ECO switches between 2 and 5 dB down.

Repeat using the 625/50 standard bars signal as the input.

#### **8. Serial Digital Component Check for Channel 1 Backup Switch between 2 and 5 dB down from nominal**

Connect the equipment as shown in Figure 5-2, except swap the Primary and Backup input signals so that the step attenuator is on the Backup input.

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S1 through S11 to “open”).

Set the Channel Configuration switch to Serial Digital Video Component for Channel 1 (set S1-4 to “closed,” S1-1 through S1-3 “open,” and S1-5 through S1-8 “open”).

Set the SPG422 to output any serial digital bars signal using the 525/59.94 standard.

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D (using the front panel) to “Backup” Sync Source and Auto Switch “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Backup input signal until the signal source switches to Primary.

Press the Reset button on the front panel and try to return the signal source to Backup.

**CHECK** - that the Backup signal still shows an error and automatically switches back to Primary. If the ECO422D does not continue to show the Backup signal in error after the reset, continue adding attenuation until the Backup signal switches to Primary again.

**CHECK** - that the ECO switches between 2 and 5 dB down.

Repeat using a 625/50 bars signal as the input.

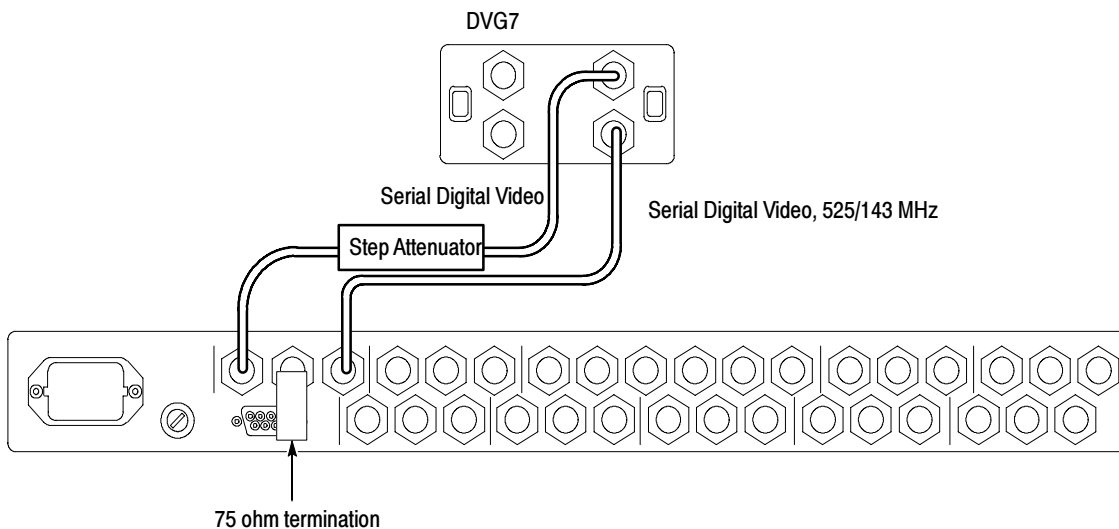
**9. Check Serial Digital Video (Component) for Channels 2 through 11 Switch between 2 and 5 dB down from nominal**

Repeat the previous two procedures for Channels 2 through 11 of the ECO422D. Move the cables from Channel 1 to the channel under test. Replace the switch setting for S1 as given in the following table.

<b>Channel No.</b>	<b>Switch No.</b>
2	S2
3	S3
4	S4
5	S5
6	S6
7	S7
8	S8
9	S9
10	S10
11	S11

### 10. NTSC Serial Digital Composite Check for Channel 1 Primary Switch between 2 and 5 dB down from nominal

Connect the equipment as shown in Figure 5-3.



**Figure 5-3: Setup to check the serial digital video composite levels**

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S1 through S11 to “closed”).

Set the Channel Configuration switch to NTSC Serial Digital Video Composite for Channel 1 (set S1-3 to “closed,” S1-1 and S1-2 “open,” and S1-4 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Set the TG700 DVG7 to output any serial digital composite signal of 525/143 MHz format (do not use the SDI Check Field signal).

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D to “Primary” Sync Source and Auto Switch to “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Primary input signal until the signal source switches to Backup.

Press the Reset button on the front panel and try to return the signal source to Primary.

**CHECK** - that the Primary signal still shows an error and automatically switches back to Backup. If the ECO422D does not continue to show the Primary signal in error after the reset, continue adding attenuation until the Primary signal switches to Backup again.

**CHECK** - that the ECO switches between 2 and 5 dB down.

**11. NTSC Serial Digital Composite Check for Channel 1 Backup Switch between 2 and 5 dB down from nominal**

Connect the equipment as shown in Figure 5-3, except swap the Primary and Backup signals, so that the step attenuator is on the Backup input.

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S1 through S11 to “closed”).

Set the Channel Configuration switch to Serial Digital Video Composite for Channel 1 (set S1-3 to “closed,” S1-1 and S1-2 “open,” and S1-4 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Set the TG 700 DVG7 to output any serial digital composite signal. (Do not use the SDI Check Field signal.)

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D to “Backup” Sync Source and Auto Switch “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Backup input signal until the signal source switches to Primary.

Press the Reset button on the front panel and try to return the signal source to Backup.

**CHECK** - that the Backup signal still shows an error and automatically switches back to Primary. If the ECO422D does not continue to show the Backup signal in error after the reset, continue adding attenuation until the Backup signal switches to Primary again.

**CHECK** - that the ECO switches between 2 and 5 dB down.

## 12. Check Serial Digital Video (Composite) for Channels 2 through 11 Switch between 2 and 5 dB down from nominal

Repeat the previous two procedures for Channels 2 through 11 of the ECO422D. Move the cables from Channel 1 to the channel under test. Replace the switch setting for S1 as given in the following table.

Channel No.	Switch No.
2	S2
3	S3
4	S4
5	S5
6	S6
7	S7
8	S8
9	S9
10	S10
11	S11

## Serial Digital Audio Checks

### 13. Serial Digital Audio Check for Channel 1 Primary Switch between 2 and 4 dB down from nominal

Connect the equipment as shown in Figure 5-4.

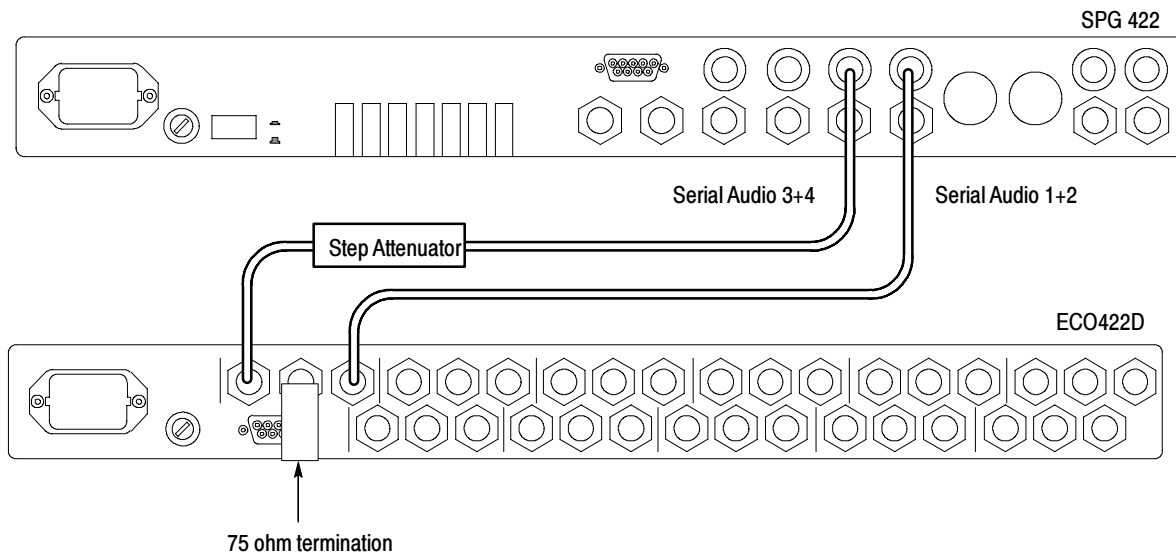


Figure 5-4: Setup to check the serial audio levels

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S1 through S11 to “open”).

Set the Channel Configuration switch to Serial Digital Audio for Channel 1 (set S1-5 to “closed,” S1-1 through S1-4 “open,” and S1-6 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Set the SPG422 to output either a 1000 or 800 Hz serial digital audio tone on all four channels.

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D to “Primary” Sync Source and Auto Switch to “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Primary input signal until the signal source switches to Backup.

Press the Reset button on the front panel and try to return the signal source to Primary.

**CHECK** - that the Primary signal still shows an error and automatically switches back to Backup. If the ECO422D does not continue to show the Primary signal in error after the reset, continue adding attenuation until the Primary signal switches to Backup again.

**CHECK** - that the ECO switches between 2 and 4 dB down.

#### **14. Serial Digital Audio Check for Channel 1 Backup Switch between 2 and 4 dB down from nominal**

Connect the equipment as shown in Figure except swap the Primary and Backup cables so that the attenuator is on the Backup side.

Set the Channel Configuration switches to Disabled (Signal not checked) for all channels. (set all the DIP switches on S1 through S11 to “open”).

Set the Channel Configuration switch to Serial Digital Audio for Channel 1 (set S1-5 to “closed,” S1-1 through S1-4 “open,” and S1-6 through S1-8 “open”).

Set the step attenuator to 0 dB of attenuation.

Set the SPG422 to output either a 1000 or 800 Hz serial digital audio tone on all four channels.

Press Reset.



**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D to “Backup” Sync Source and Auto Switch to “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Backup input signal until the signal source switches to Primary.

Press the Reset button on the front panel and try to return the signal source to Backup.

**CHECK** - that the Backup signal still shows an error and automatically switches back to Primary. If the ECO422D does not continue to show the Backup signal in error after the reset, continue adding attenuation until the Backup signal switches to Primary again.

**CHECK** - that the ECO switches between 2 and 4 dB down.

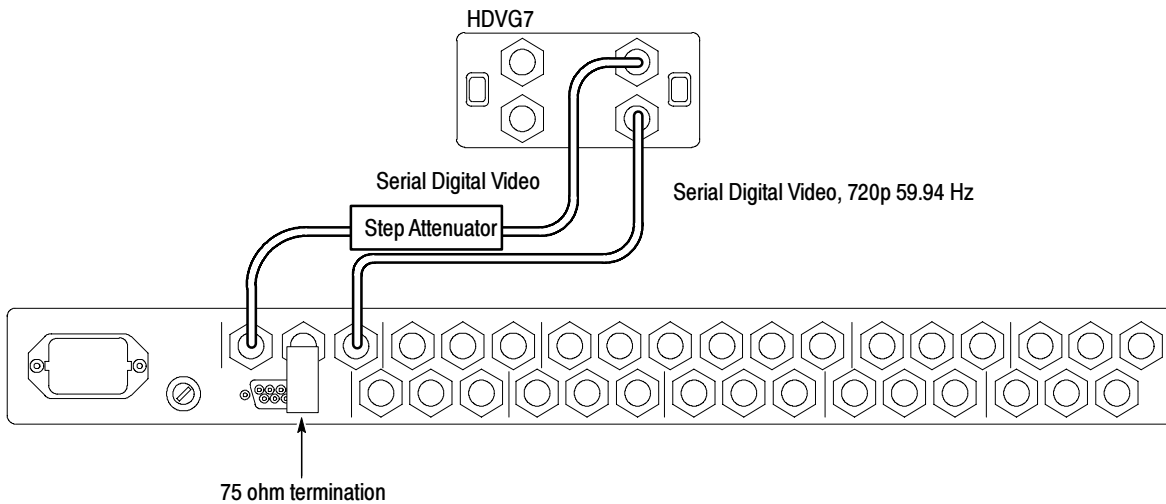
#### **15. Check Serial Digital Audio for Channels 2 through 11 Switch between 2 and 4 dB down from nominal**

Repeat the previous two procedures for Channels 2 through 11 of the ECO422D. Move the cables from Channel 1 to the channel under test. Replace the switch setting for S1 as given in the following table.

<b>Channel No.</b>	<b>Switch No.</b>
2	S2
3	S3
4	S4
5	S5
6	S6
7	S7
8	S8
9	S9
10	S10
11	S11

**16. HD Serial Digital Component Check for Channel 1 Primary Switch between 2 and 5 dB down from nominal**

Connect the equipment as shown in Figure 5-5.



**Figure 5-5: Setup to check the component serial digital video levels**

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S1 through S11 to “open”).

Set the Channel Configuration switch to Serial Digital Video 1.485 Gb/s for Channel 1. (Set S1-8 to “closed,” S1-1 through S1-7 to “open.”)

Set the step attenuator to 0 dB of attenuation.

Set the HDVG7 to output any serial digital bars signal using the 720p/59.94 Hz standard.

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D (using the front panel) to “Primary” Sync Source and Auto Switch “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Primary input signal until the signal source switches to Backup.

Press the Reset button on the front panel and try to return the signal source to Primary.

**CHECK** - that the Primary signal still shows an error and automatically switches back to Backup. If the ECO422D does not continue to show the Primary signal in error after the reset, continue adding attenuation until the Primary signal switches to Backup again.

**CHECK** - that the ECO switches between 2 and 5 dB down.

#### **17. HD Serial Digital Component Check for Channel 1 Backup Switch between 2 and 5 dB down from nominal**

Connect the equipment as shown in Figure 5-5, except swap the Primary and Backup input signals so that the step attenuator is on the Backup input.

Set the Channel Configuration switches to Disabled (signal not checked) for all channels (set all the DIP switches on S1 through S11 to “open”).

Set the Channel Configuration switch to Serial Digital Video Component for Channel 1 (set S1-8 to “closed,” and S1-1 through S1-7 to “open.”)

Set the step attenuator to 0 dB of attenuation.

Press Reset.

**CHECK** - that there are no errors shown for either the Primary or Backup ECO422D sync sources.

Set the ECO422D (using the front panel) to “Backup” Sync Source and Auto Switch “Switch on Fault.”

Add attenuation, 0.5 dB at a time, to the Backup input signal until the signal source switches to Primary.

Press the Reset button on the front panel and try to return the signal source to Backup.

**CHECK** - that the Backup signal still shows an error and automatically switches back to Primary. If the ECO422D does not continue to show the Backup signal in error after the reset, continue adding attenuation until the Backup signal switches to Primary again.

**CHECK** - that the ECO switches between 2 and 5 dB down.





# **Adjustment Procedure**



# Adjustment Procedure

The only adjustment required for the ECO422D is the user-defined threshold levels.

## Adjustment Procedure

### **How to Adjust the User-Defined Threshold Levels**

The user-defined threshold levels are the two levels available from User Configuration switches SX-6 (R266) and SX-7 (R265). They are available so that the user can check the levels of signals other than the five predefined levels.

The procedure to adjust these levels is an operator adjustment, not a service adjustment. Therefore it is given in the user portion of this manual; see page 2-9.







# Maintenance



# Maintenance

This section discusses the various options available for servicing the Tektronix ECO422D. It also contains instructions for preventive maintenance, general troubleshooting, and corrective maintenance. If the instrument does not function properly, troubleshooting and corrective measures should be taken immediately to circumvent additional problems.

## Service Options

A number of servicing options are available. They range from returning the instrument to Tektronix for repair and/or recalibration, to a major assembly exchange, to full component level servicing by the customer (at the installation site). Each of these options should be investigated as to which will be the most time efficient and cost effective.

### **Tektronix Service**

Tektronix maintains service centers around the world to provide quick turn-around repair and recalibration services. When this service is used, even during the warranty period, the instrument should be tagged and repackaged according to the instructions at the end of this section.

## Preparation

- Read the Safety Summary and the Service Strategy
- Read Operating Basics

## Inspection and Cleaning

Preventive maintenance consists of cleaning, lubricating, visual inspection, checking performance, and readjusting the ECO422D on a regular schedule. The Inspection and cleaning schedule should be established based on the amount of use and the surrounding environment of the ECO422D. Under average conditions, a preventive maintenance check should be performed on a one year interval (severe environmental conditions may dictate a shorter time interval).

## Cleaning

Clean the instrument often enough to prevent dust or dirt from accumulating. Dust accumulating in the instrument acts as an insulating blanket, preventing proper cooling, and possibly causing overheating and component breakdown. Under high humidity conditions, accumulated dust can also provide an electrical conduction path.

Clean the instrument often enough to prevent dust or dirt from accumulating. Dust accumulating in the instrument acts as an insulating blanket, preventing proper cooling, and possibly causing overheating and component breakdown. Under high humidity conditions, accumulated dust can also provide an electrical conduction path.



**CAUTION.** To avoid damage to the instrument, do not expose it to sprays, liquids, or solvents. Do not use chemical cleaning agents; they can damage the instrument. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

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Clean the exterior surfaces of the instrument with a dry, lint-free cloth or a soft-bristle brush. If dirt remains, use a cloth or swab dampened with a 75% isopropyl alcohol solution. A swab is useful for cleaning in narrow spaces around the controls and connectors. Do not use abrasive compounds on any part of the instrument.



**CAUTION.** Avoid getting moisture inside the instrument during exterior cleaning and use only enough solution to dampen the cloth or swab. Use a 75% isopropyl alcohol solution as a cleanser, and rinse with deionized water.

---

## Visual Inspection

Visually inspect the instrument during the preventive maintenance routine for signs of damage, scorched components, and loose or disconnected pin connectors. If you discover heat damaged parts, try to determine the cause of the overheating before replacing the damaged parts; otherwise, the damage may repeat.

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



**CAUTION.** *Static discharge can damage or degrade many semiconductor components.*

This instrument contains electrical components that are susceptible to damage or degradation from static discharge. See Table 7-1 for relative susceptibility of various classes of semiconductors. Higher static discharge voltages than the levels listed in Table 7-1 can degrade the performance and reliability of the semiconductor components. Static voltages of 1 kV to 30 kV are common in unprotected environments.

**Table 7-1: Static-sensitive components**

Semiconductor classes	Relative susceptibility levels
MOS or CMOS microcircuits or discrete or linear microcircuits with MOS inputs (most sensitive)	100 to 500 V
EL, 74F, 74ALS, and 155- P/N parts	200 to 500 V
Schottky Signal Diodes	250 V
Schottky TTL	500 V
High-frequency Bipolar Transistors and ICs	400 to 600 V
JFETs	600 to 800 V
Low-frequency Linear Microcircuits	400 to 1000 V
Low-power Schottky TTL	900 V
TTL (least sensitive)	1200 V

**NOTE.** *Static discharges of less than 2 kV are seldom felt.*

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 or on nonconductive surfaces.
3. Discharge the static voltage from your body by wearing a grounded wrist strap while handling these components. Service static-sensitive components or assemblies only at a static free workstation by qualified personnel. If soldering is involved, use a soldering iron connected to earth ground and special antistatic desoldering tools.

4. Avoid handling components in areas that have a floor or work surface covering capable of generating a static charge. Carpeted floors should be sprayed to reduce static problems. Also nothing capable of generating or holding a static charge should be allowed on the workstation surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up the components by the body, never the leads.
7. Do not slide the components over any surface.
8. Use a soldering iron that is connected to earth ground.
9. Use only special antistatic, suction, or wick-type desoldering tools.

### **Performance Verification and Readjustments**

Instrument performance should be checked after each 2000 hours of operation, or every 12 months. This will help to ensure maximum performance and assist in locating defects that may not be apparent during regular operation. The Performance Verification and Adjustment Procedures are included in this manual.

## **Corrective Maintenance**

The following procedure is designed to assist in isolating problems, which in turn expedites repairs and minimizes down time. There are no specific troubleshooting procedures for this instrument because it is a very simple instrument.

---

**NOTE.** *There are two fuses in this instrument. One is accessible through the rear panel and the other is on the power supply. Make sure to check the internal fuse if the instrument will not power up. The replacement fuse on the power supply should be a 3.15 A, 250 V fuse. The rear panel fuse requirements are listed in Replaceable Electrical Parts.*

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### **General Troubleshooting Procedures**

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 Basics), and by checking that a malfunction has not occurred upstream from the ECO422D.

Determine and evaluate all trouble symptoms. This is accomplished by isolating the problem to a general area, such as an assembly. The block diagram, given with the schematics or the Theory of Operation, is a valuable aid in signal tracing and circuit isolation.



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**CAUTION.** *Use extreme care when probing with meter leads or probes. The components are very dense and there is only 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.*

---

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.

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.

Use successive electrical checks to locate the source of the problem. The primary tool for the problem isolation is the oscilloscope. Use the Performance Verification procedure 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.

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 in this section.



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**CAUTION.** *Always remove the assembly from the instrument, prior to attempting to replace a solder-in component. See this section for the correct procedure.*

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## Tektronix Service Offerings

Tektronix maintains a service organization that can provide a number of services to assist in maintaining instrument operation at its specified levels. They range from complete repair and adjustment, at a convenient location, to supplying replacement parts. In addition, there are training programs that are available for service technicians.

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**NOTE.** *When considering which service offerings best suit the current need, remember that Tektronix provides a limited parts and service warranty for all its products. No customer repairs should be attempted during the warranty period.*

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### Service Training

Tektronix provides service training in a number of programs. In addition to classes held at our Beaverton campus, special classes at convenient locations can be arranged. To find out more about service training programs, contact your local Tektronix field office or representative.

### Field Service Centers

Tektronix maintains service centers worldwide. These centers provide repair and calibration services for Tektronix instruments. They can be contacted through your Tektronix field office or representative. Not all service centers are equipped to repair or calibrate all instruments; be ready to give the operator the instrument type and operating options when calling for assistance.

### Module Exchange

The module exchange program provides an easily accessible means of returning an instrument to operational status. The defective module is exchanged for a calibrated module at a cost less than the new module price. The process begins by contacting one of the module exchange centers. They can be contacted through your Tektronix field office or representative. The center will provide information on the cost of the module and returning the failed module.

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**NOTE.** *Circuit boards that are damaged due to mishandling or containing modifications not originated by Tektronix are not acceptable for the exchange program.*

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When calling to arrange for a circuit board exchange it is essential that you have some information ready to relay to our technician. The instrument type and serial number, along with installed options are absolutely essential. In addition, the Assembly number (A#) and the nine-digit circuit board part number (67#-####-##) will help ensure that you are getting a direct replacement. Finally, if you know or are able to provide the software version number it will further ensure that the circuit board you receive will return instrument performance to what it was before the failure occurred.



The following paragraphs and Table 7-2 are intended to assist in ordering the exact circuit board replacement. Note that this information is important whether you are ordering a circuit board from the Module Exchange Center or as a new replacement part from Tektronix.

**Table 7-2: Assemblies in the ECO422D**

Assembly name	Circuit board assembly No.	First seven digits of the part no.	Part no. suffix
Front Panel	A1	671-3241	-01
Main	A2	671-5385	-00
Connector	A3	671-5274	-00
Power	A4	119-4112	-00

**Circuit Board Assembly Number.** This is the number used in the Replaceable Electrical Parts list, circuit board illustrations, and on the schematic diagrams to identify the assembly.

**Assembly Name.** The actual name applied to the circuit board. It will usually be related to the function of the assembly.

**First Seven Digits of the Part Number.** These digits make up the general part number. They are often the same for several members of the same instrument family. Always look up this number in the parts list. Be sure that it is for the serial number of your instrument. See the Replaceable Electrical Parts list Serial Number/Assembly Effective/Discontinued column for the range in which your instrument serial number falls.

**Part Number Suffix.** This portion of the part number often varies between members of the same family to denote various types or because the circuit board contains factory-modified circuitry. Always look up this number in the parts list. Be sure that it is for your instrument serial number. See the Replaceable Electrical Parts list Serial Number/Assembly Effective/Discontinued column for the range in which your instrument serial number falls.

Having these pieces of information from Table 7-2 plus the instrument type, serial number, and software version number (if applicable) ensures that you will receive the module required to return the instrument to complete operation.

### **Factory Replacement Parts**

Replacement parts are available through the local Tektronix field office or representative. However, many common electric 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)

### **Etched Circuit Boards**

The instrument consists of etched circuit boards. All of the circuit boards are designed as assemblies. Each assembly has an alphanumeric designation (A1 through A4). These assemblies are listed at the beginning of the Replaceable Electrical Parts list of this manual.

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**NOTE.** *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.*

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## Removal/Replacement Instructions

### Removal/Replacement Instructions

In general, the boards are held down with Torx screws. Please make sure to use a Torx tip to remove or replace the screws. Also, check that you have removed all screws (or nuts on the BNC connector) before trying to remove a board.

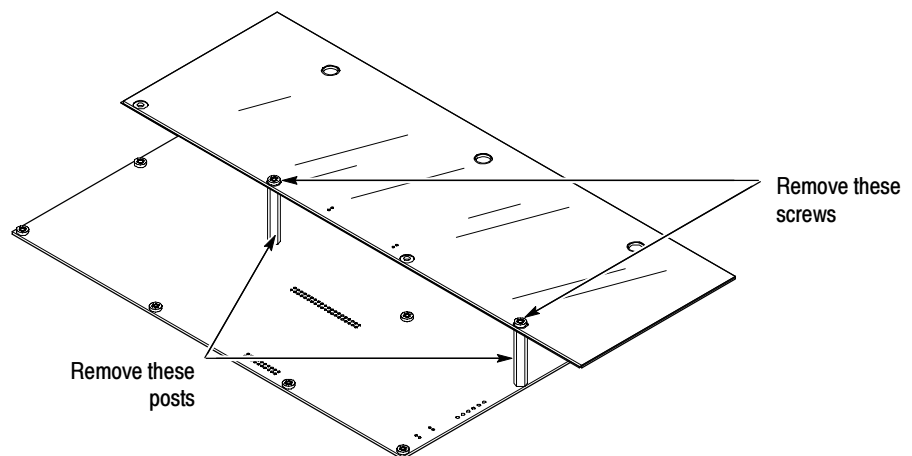
### Special Instructions for the Connector Board

To remove the Connector board, first remove all the nuts from the top row of BNCs. Then remove the two screws from the posts (see Figure 7-1). Next, unscrew the posts from the Main board and remove them (see Figure 7-1). Finally, keeping the board level, slide the board towards the front of the instrument until the BNCs clear both the rear panel and the clips (see Figure 7-2).

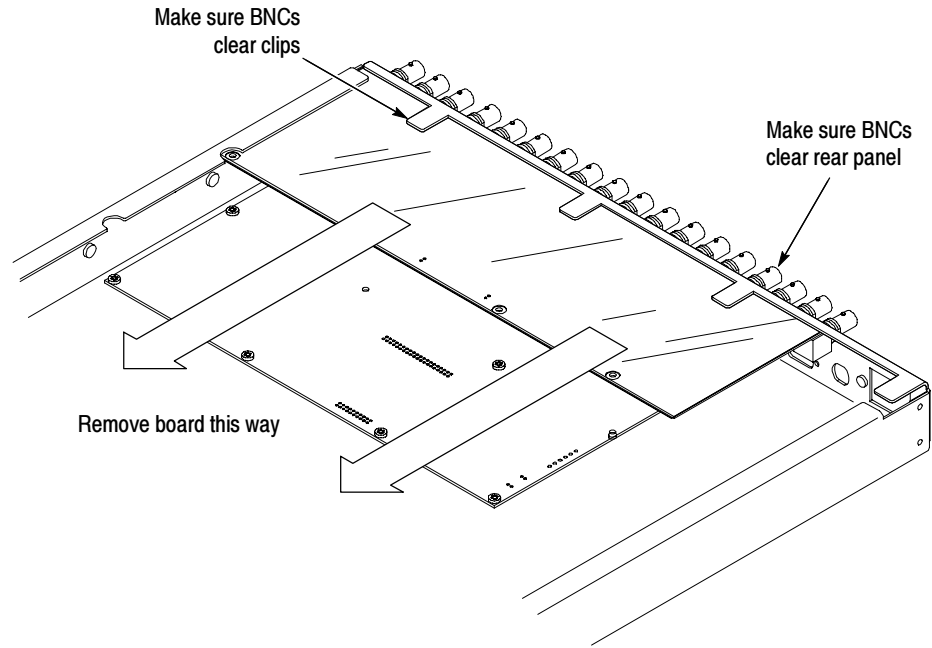
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**NOTE.** During installation, remember to include the spacer strip on the BNC connectors.

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**Figure 7-1: Remove these screws and posts before attempting to remove the Connector board**



**Figure 7-2: Slide the Connector board out this way**



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**CAUTION.** Use extreme care when sliding any of the boards to clear the rear panel because there are components on both sides of the boards.

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## Repackaging Instructions

### Identification Tag

If the instrument is to be shipped to 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 to provide adequate protection (see Figure ). If the original packaging is not available or is unfit for use, repackage the instrument as follows:

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 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.





# **Replaceable Electrical Parts**





# Replaceable Electrical Parts

This section contains a list of the components that are replaceable for the ECO422D. 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.

## 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.

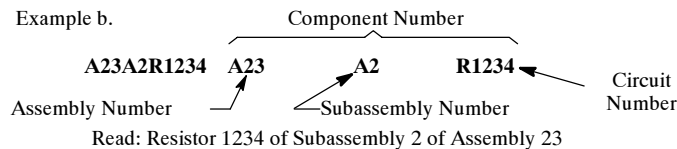
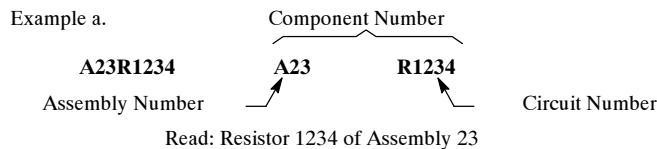
### List of Assemblies

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.

<b>Tektronix Part No. (Column 2)</b>	Indicates part number to be used when ordering replacement part from Tektronix.
<b>Serial/Assembly No. (Column 3 and 4)</b>	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.
<b>Name and Description (Column 5)</b>	<p>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.</p> <p>The mechanical subparts are shown as *ATTACHED PARTS* / *END ATTACHED PARTS* or *MOUNTING PARTS* / *END MOUNTING PARTS* in column five (5).</p>
<b>Mfr. Code (Column 6)</b>	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.)
<b>Mfr. Part No. (Column 7)</b>	Indicates actual manufacturer's part number.

## Cross Index - Mfr. Code Number To Manufacturer

Mfr. code.	Manufacturer	Address	City, state, zip code
TK1547	MOORE ELECTRONICS INC (DIST)	19500 SW 90TH COURT PO BOX 1030	TUALATIN OR 97062
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
TK1857	HIROSE ELECTRIC USA INC	2688 WESHILLS COURT	SIMI VALLEY, CA 93065-6235
TK1955	COMPUTER PRODUCTS BOSCHERT INCORPORATED	1331 CALIFORNIA CIRCLE	MILPITAS CA 95035
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
0B0A9	DALLAS SEMICONDUCTOR CORP	4350 BELTWOOD PKWY SOUTH	DALLAS TX 75244
0JR04	TOSHIBA AMERICA INC ELECTRONICS COMPONENTS DIV	9775 TOLEDO WAY	IRVINE CA 92718
0JR05	TRIQUEST CORP	3000 LEWIS AND CLARK HWY	VANCOUVER WA 98661-2999
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
0MS63	QUALITY TECHNOLOGIES CORP	610 N MARY AVENUE	SUNNYVALE CA 94086
00213	MSD INC	700 ORANGE ST	DARLINGTON, SC 29532
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
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
06090	RAYCHEM CORP	300 CONSTITUTION DRIVE	MENLO PARK CA 94025-1111
13764	MICRO PLASTICS INC	HWY 178 N	FLIPPIN AR 72634
15513	DATA DISPLAY PRODUCTS	301 CORAL CIR	EL SEGUNDO CA 90245-4620
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
26364	COMPONENTS CORP	6 KINSEY PLACE	DENVILLE NJ 07834-2611
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051-0606
27264	MOLEX INC	2222 WELLINGTON COURT	LISLE IL 60532-1613
30161	AAVID ENGINEERING INC	ONE KOOL PATH PO BOX 400	LACONIA NH 03247
34371	HARRIS CORP HARRIS SEMICONDUCTOR PRODUCTS GROUP	200 PALM BAY BLVD PO BOX 883	MELBOURNE FL 32919
50434	HEWLETT-PACKARD CO OPTOELECTRONICS DIV	370 W TRIMBLE RD	SAN JOSE CA 95131-1008
53387	3M COMPANY ELECTRONIC PRODUCTS DIV	3M AUSTIN CENTER	AUSTIN TX 78769-2963
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195-4526

<b>Mfr. code.</b>	<b>Manufacturer</b>	<b>Address</b>	<b>City, state, zip code</b>
57668	ROHM CORPORATION	15375 BARRANCA PARKWAY SUITE B207	IRVINE CA 92718
61429	FOX ELECTRONICS DIV OF FOX ELECTRONICS INC	5842 CORPORATION CIRCLE	FOR MEYERS FL 33905
61529	AROMAT CORP	629 CENTRAL AVE	NEW PROVIDENCE NJ 07974
61935	SCHURTER INC	1016 CLEGG COURT	PETALUMA CA 94952-1152
66958	SGS THOMSON MICROELECTRONICS	1000 E BELL RD	PHOENIX AZ 85022-2649
67183	ALTERA CORP	3525 MONROE ST	SANTA CLARA CA 95051
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
81073	GRAYHILL INC	561 HILLGROVE AVE PO BOX 10373	LA GRANGE IL 60525-5914
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	Serial / assembly number discontinued	Name & description	Mfr. Code	Mfr. part number
A1	671-3241-01			CKT BD ASSY:FRONT PANEL	80009	671324101
A2	671-5385-00			CKT BD ASSY:MAIN BOARD	80009	671538500
A3	671-5274-01	B010100	B010196	CKT BD ASSY:CONNECTOR BD	80009	671527401
A3	671-5274-02	B010197		CKT BD ASSY:CONNECTOR BD	80009	671527402
A4	119-4112-00			POWER SUPPLY:SWITCHING,AUTO IN 85-264VAC, 47-440HZ,OUT 5VDC 5A,+15V2A, -15V 0.5A	TK1955	NFS40-7610
A1	671-3241-01			CKT BD ASSY:FRONT PANEL	80009	671324101
A1DS1	150-1223-00			DIODE,OPTO:LED;GRN,565NM,1.6MCD AT 10MA	50434	HLMP-3502
A1DS2	150-1223-00			DIODE,OPTO:LED;GRN,565NM,1.6MCD AT 10MA	50434	HLMP-3502
A1DS3	150-1223-00			DIODE,OPTO:LED;GRN,565NM,1.6MCD AT 10MA	50434	HLMP-3502
A1DS4	150-1223-00			DIODE,OPTO:LED;GRN,565NM,1.6MCD AT 10MA	50434	HLMP-3502
A1DS5	150-1059-00			DIODE,OPTO:LED;RED,626NM,20MCD AT 10MA,35 DEG VIEW ANGLE	15513	HLMP-3316
A1DS6	150-1059-00			DIODE,OPTO:LED;RED,626NM,20MCD AT 10MA,35 DEG VIEW ANGLE	15513	HLMP-3316
A1DS7	150-1223-00			DIODE,OPTO:LED;GRN,565NM,1.6MCD AT 10MA	50434	HLMP-3502
A1DS8	150-1223-00			DIODE,OPTO:LED;GRN,565NM,1.6MCD AT 10MA	50434	HLMP-3502
A1J1	174-3266-00			CA ASSY,SP:RIBBON;IDC,20,28 AWG,17.0L,2X10,0.1 CTR, RCPT,NON PLZ X 2X10,0.1 CTR PCB	80009	174326600
A1S1	260-2442-00			SWITCH,PUSH:SPST;MOM,NO,100 GRM FRC,COND RUBBER CONTACTS,GRN LED,W/KEYCAP	TK1857	HL20-LSG
	366-0672-00			*ATTACHED PARTS* PUSH BUTTON:W/O LENS,HL20-0101	TK1857	HL20-0101
				*END ATTACHED PARTS*		
A1S2	260-2442-00			SWITCH,PUSH:SPST;MOM,NO,100 GRM FRC,COND RUBBER CONTACTS,GRN LED,W/KEYCAP	TK1857	HL20-LSG
	366-0672-00			*ATTACHED PARTS* PUSH BUTTON:W/O LENS,HL20-0101	TK1857	HL20-0101
				*END ATTACHED PARTS*		
A1S3	260-2442-00			SWITCH,PUSH:SPST;MOM,NO,100 GRM FRC,COND RUBBER CONTACTS,GRN LED,W/KEYCAP	TK1857	HL20-LSG
	366-0672-00			*ATTACHED PARTS* PUSH BUTTON:W/O LENS,HL20-0101	TK1857	HL20-0101
				*END ATTACHED PARTS*		
A1S4	260-2442-00			SWITCH,PUSH:SPST;MOM,NO,100 GRM FRC,COND RUBBER CONTACTS,GRN LED,W/KEYCAP	TK1857	HL20-LSG
	366-0672-00			*ATTACHED PARTS* PUSH BUTTON:W/O LENS,HL20-0101	TK1857	HL20-0101
				*END ATTACHED PARTS*		
A2	671-5385-00			CKT BD ASSY:MAIN BOARD	80009	671538500
A2C1	281-0773-00			CAP,FXD,CERAMIC:MCL;0.01UF,10%,100V	TK1743	CGB103KEX
A2C2	281-0773-00			CAP,FXD,CERAMIC:MCL;0.01UF,10%,100V	TK1743	CGB103KEX
A2C3	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C4	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C7	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C8	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C9	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C10	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2C11	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C12	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C13	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C14	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C15	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C16	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C17	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C18	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C19	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C20	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C21	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C22	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C23	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C24	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C25	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C27	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V,,	TK1743	CGB103KEX
A2C28	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V,,	TK1743	CGB103KEX
A2C29	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RAD IAL,NONPOLAR,BULK	55680	USP1C470MCA1TP
A2C30	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RAD IAL,NONPOLAR,BULK	55680	USP1C470MCA1TP
A2C33	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C34	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C35	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C36	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C37	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C38	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C39	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C40	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C41	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C42	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C43	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C44	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C45	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C46	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C47	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C48	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C49	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C50	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C52	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C53	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C54	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C55	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C56	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C59	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C60	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA

## Replaceable Electrical Parts

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2C61	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C62	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C63	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C64	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C65	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C66	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C67	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C68	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C69	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C70	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C71	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C72	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C73	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C74	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C75	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C76	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C77	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C79	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C80	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C81	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C82	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C85	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C86	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C87	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C88	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C89	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C90	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C91	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C92	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C93	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C94	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C95	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C96	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C97	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C98	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C99	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C100	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C101	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C102	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C103	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C105	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C106	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C107	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C108	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP



Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2C111	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C112	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C113	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C114	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C115	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C116	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C117	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C118	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C119	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C120	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C121	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C122	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C123	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C124	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C125	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C126	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON- POLAR,BULK	55680	USP1C470MCA1TP
A2C127	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C128	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C129	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C131	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C132	281-0563-00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X0.290	04222	SA305E474MAA
A2C133	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C134	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C135	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C136	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C137	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C138	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C139	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C140	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C141	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C142	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C143	281-0563-00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X0.290	04222	SA305E474MAA
A2C144	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C145	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C146	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C147	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C148	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C149	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C150	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C151	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C152	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C153	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C154	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C155	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C156	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C157	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD
A2C158	290-1311-00			CAP,FXD,ALUM:10UF,20%,50V,ESR=1.4 OHM(100KHZ,20C), 5X11MM,105C,5000HRS	55680	UPL1H100MDH1TD

## Replaceable Electrical Parts

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2C159	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C169	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C170	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C176	290-1315-00			CAP,FXD,ALUM:47UF,20%,35V,ESR=0.34 OHM(100KHZ,20C),6X11MM,LOW IMP	55680	UPL1V470MEH1TD
A2C177	290-1315-00			CAP,FXD,ALUM:47UF,20%,35V,ESR=0.34 OHM(100KHZ,20C),6X11MM,LOW IMP	55680	UPL1V470MEH1TD
A2C180	290-1315-00			CAP,FXD,ALUM:47UF,20%,35V,ESR=0.34 OHM(100KHZ,20C),6X11MM,LOW IMP	55680	UPL1V470MEH1TD
A2C181	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C182	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C183	290-1315-00			CAP,FXD,ALUM:47UF,20%,35V,ESR=0.34 OHM(100KHZ,20C),6X11MM,LOW IMP	55680	UPL1V470MEH1TD
A2C186	290-1315-00			CAP,FXD,ALUM:47UF,20%,35V,ESR=0.34 OHM(100KHZ,20C),6X11MM,LOW IMP	55680	UPL1V470MEH1TD
A2C189	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C190	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C193	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C196	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C199	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C202	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C203	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C204	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C205	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C206	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C207	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C208	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C209	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C210	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C211	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C212	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C213	290-1289-00			CAP,FXD,ALUM:47UF,20%,16V,0.250 X 0.276;RADIAL,NON-POLAR,BULK	55680	USP1C470MCA1TP
A2C214	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V,,	TK1743	CGB103KEX
A2C215	290-0778-01			CAP,FXD,ALUM:1UF,20%,50V,ESR=198.94 OHM (120HZ,20C)	55680	UVP1H010MAAITD
A2C216	290-0778-01			CAP,FXD,ALUM:1UF,20%,50V,ESR=198.94 OHM (120HZ,20C)	55680	UVP1H010MAAITD
A2C217	290-0778-01			CAP,FXD,ALUM:1UF,20%,50V,ESR=198.94 OHM (120HZ,20C)	55680	UVP1H010MAAITD
A2C218	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C219	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C220	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C221	281-0773-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V	TK1743	CGB103KEX
A2C222	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C223	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C224	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C225	281-0563-00			CAP,FXD,CERAMIC:MLC;0.47UF,20%,50V,0.150 X0.290	04222	SA305E474MAA
A2C226	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C227	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2C228	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C229	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C230	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C231	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C232	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C233	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C234	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C235	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C236	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C237	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C238	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C239	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C240	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C241	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C242	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C243	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V,Z5U,0.170	04222	SA105E104MAA
A2C244	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C245	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C246	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C247	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C248	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C249	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C250	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C251	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C252	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C253	281-0770-00			CAP,FXD,CER DI:1000PF,20%,100V	04222	SA101C102MAA
A2C254	281-0773-00			CAP,FXD,CERAMIC:MCL;0.01UF,10%,100V	TK1743	CGB103KEX
A2C255	281-0775-01			CAP,FXD,CERAMIC:MCL;0.1UF,20%,50V	80009	281-0755-01
A2CR1	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR2	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR5	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR6	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR7	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR8	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR9	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR10	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR11	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR14	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR15	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR16	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR17	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR18	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR19	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR20	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR23	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR24	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR25	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR26	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR27	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR28	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR29	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR32	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR33	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR34	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR35	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427

## Replaceable Electrical Parts

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2CR36	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR37	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR38	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR41	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR42	152-0951-00			DIODE,SIG:SCHTKY;60V,2.25PF	66958	1N6263
A2CR43	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR44	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR45	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR46	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR47	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR48	152-0601-01			DIODE,RECT:ULTRA FAST;150V,25NS,35A IFSM	04713	MUR115RL
A2CR49	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR50	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR51	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR52	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR53	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR54	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR55	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR56	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR57	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR66	152-0601-01			DIODE,RECT:ULTRA FAST;150V,25NS,35A IFSM	04713	MUR115RL
A2CR67	152-0601-01			DIODE,RECT:ULTRA FAST;150V,25NS,35A IFSM	04713	MUR115RL
A2CR68	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR69	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR70	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR71	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR72	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR73	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR74	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR75	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR77	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR78	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR80	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR81	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR82	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR83	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR84	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR85	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR86	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR87	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2CR88	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2J1	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J2	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J3	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J4	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J5	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J6	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J7	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2J8	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J9	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J10	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J11	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J12	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J13	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J14	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J15	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A2J16	131-3360-01			CONN,HDR:PCB;MALE,STR,2 X 10,0.1 CTR,0.365D,BD RETENTION	53387	2520-60K2UB
A2J17	131-3520-00			CONN,HDR:PCB;MALE,STR,2 X 5,0.1 CTR,0.365 H X 0.112 TAIL,SHRD/4 SIDES,MIL PLZ,30 GOLD	53387	2510-6002UB
A2J18	131-3323-00			CONN,HDR:PCB;MALE,STR,2 X 20,0.1 CTR,0.365D	22526	66506-025
A2J20	131-3360-01			CONN,HDR:PCB;MALE,STR,2 X 10,0.1 CTR,0.365D,BD RETENTION	53387	2520-60K2UB
A2J21	131-5227-00			CONN,HDR PWR:PCB;MALE,STR,1 X 6,0.156 CTR,0.450 MLG X 0.140 TAIL,TIN,NON PLZ,BD RETENTION PEGS	27264	26-64-2060
A2J22	131-3360-01			CONN,HDR:PCB;MALE,STR,2 X 10,0.1 CTR,0.365D,BD RETENTION	53387	2520-60K2UB
A2J23	131-3152-00			CONN,HDR:PCB;MALE,STR,2 X 8,0.1 CTR,0.365 H X 0.112 TAIL,SHRD/4 SIDES,CTR PLZ,30 GOLD	53387	2516-6002UB
A2J24	131-3362-00			CONN,HDR:PCB;MALE,STR,2 X 13,0.1 CTR,0.365D	53387	2526-6002UB
A2K1	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A2K2	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A2K3	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A2K4	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A2K5	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A2Q1	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q2	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q3	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q4	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q5	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q6	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q7	151-0254-03			XSTR,SIG:BIPOLAR,NPN;30V,500MA,125MHZ,AMPL,DARLINGTON	0JR04	MPSA14, TPE2
A2Q8	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q9	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q10	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q11	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q12	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z

## Replaceable Electrical Parts

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2Q13	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q14	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q15	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q16	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q17	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q18	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q19	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q20	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q21	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q22	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q23	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q24	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q25	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q26	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q27	151-0712-02			TRANSISTOR,SIG:BIPOLAR,PNP,20V,50MA,600MHZ,AMPLIFIER,MPSH81,TO-92 BEC,T&A	04713	MPSH81RLRP
A2Q28	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q29	151-0711-02			XSTR,SIG:BIPOLAR,NPN;25V,50MA,650MHZ,AMPL	04713	MPSH10RLRP
A2Q30	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q31	151-0207-01			XSTR,SIG:BIPOLAR,NPN;45V,300MA,250MHZ,AMPL	27014	PN100A/D75Z
A2Q32	151-0164-01			XSTR,SIG:BIPOLAR,PNP;60V,600MA,200MHZ,AMPL	04713	MPS2907ARLRP
A2Q33	151-0254-03			XSTR,SIG:BIPOLAR,NPN;30V,500MA,125MHZ,AMPL,DARLINGTON	OJR04	MPSA14, TPE2
A2Q34	151-0254-03			TRANSISTOR,SIG:BIPOLAR,NPN,30V,500MA,125MHZ,AMPLIFIER,DARLINGTON,MPSA14,TO-92 EBC,T&A	04713	MPSA14RLRP
A2R1	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R2	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R3	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R4	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R5	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R6	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SM BODY	91637	CCF50-1G24900F
A2R7	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SM BODY	91637	CCF50-1G24900F
A2R8	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SM BODY	91637	CCF50-1G2320F
A2R9	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R10	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SM BODY	91637	CCF501G13301F
A2R11	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R12	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A2R13	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SM BODY	91637	CCF50-1G2320F
A2R14	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R15	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R16	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SM BODY	91637	CCF501G13301F
A2R17	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A2R18	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R19	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R20	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R21	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R22	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R23	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R24	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R25	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2R26	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R27	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R28	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R29	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R30	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R31	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMAL L BODY	91637	CCF501G25500F
A2R32	322-3485-00			RES,FXD,FILM:5.0K OHM,1%,0.2W,TC=TOSMALL BODY	91637	CCF501G50000F
A2R33	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R37	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R39	322-3481-00			RES,FXD,FILM:1M OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R40	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R41	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R42	322-3481-00			RES,FXD,FILM:1M OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R43	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R44	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R45	315-0205-00			RES,FXD,FILM:2M OHM,5%,0.25W	80009	315020500
A2R46	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R47	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R48	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R49	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R50	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R51	322-3271-00			RES,FXD,FILM:6.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-2-G-64900
A2R52	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R53	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R54	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R55	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R56	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R57	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G24900F
A2R58	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G24900F
A2R59	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G2320F
A2R60	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R61	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A2R62	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R63	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200R0F
A2R64	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G2320F
A2R65	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R66	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R67	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A2R68	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200R0F
A2R69	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R70	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R71	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R72	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R73	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R74	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R75	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R76	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R77	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R78	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R79	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R80	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R81	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R82	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G25500F
A2R83	322-3485-00			RES,FXD,FILM:5.0K OHM,1%,0.2W,TC=TO,SMALL BODY	91637	CCF501G50000F
A2R84	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F

## Replaceable Electrical Parts

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2R88	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R90	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R91	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC-T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R92	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC-T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R93	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R94	315-0205-00			RES,FXD,FILM:2M OHM,5%,0.25W	80009	315020500
A2R95	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R96	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R97	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R98	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R99	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R100	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R101	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R102	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R103	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R104	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G24900F
A2R105	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G24900F
A2R106	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G2320F
A2R107	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R108	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A2R109	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R110	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A2R111	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G2320F
A2R112	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R113	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R114	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A2R115	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A2R116	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R117	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R118	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R119	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R120	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R121	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R122	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R123	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R124	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R125	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R126	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R127	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R128	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R129	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G25500F
A2R130	322-3485-00			RES,FXD,FILM:5.0K OHM,1%,0.2W,TC=T0SMALL BODY	91637	CCF501G50000F
A2R131	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R135	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R137	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R138	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC-T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R139	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC-T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R140	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R141	315-0205-00			RES,FXD,FILM:2M OHM,5%,0.25W	80009	315020500
A2R142	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R143	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R144	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R145	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R146	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R147	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F



Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2R148	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R149	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R150	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R151	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G24900F
A2R152	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G24900F
A2R153	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G2320F
A2R154	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R155	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A2R156	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R157	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A2R158	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G2320F
A2R159	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R160	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R161	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A2R162	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A2R163	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R164	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R165	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R166	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R167	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R168	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R169	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R170	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R171	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R172	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R173	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R174	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R175	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R176	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G25500F
A2R177	322-3485-00			RES,FXD,FILM:5.0K OHM,1%,0.2W,TC=TOSMALL BODY	91637	CCF501G50000F
A2R178	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R182	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R184	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R185	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R186	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R187	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R188	315-0205-00			RES,FXD,FILM:2M OHM,5%,0.25W	80009	315020500
A2R189	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R190	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R191	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R192	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R193	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R194	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R195	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R196	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R197	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A2R198	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G24900F
A2R199	322-3231-00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G24900F
A2R200	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G2320F
A2R201	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R202	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A2R203	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R204	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A2R205	322-3228-00			RES,FXD,FILM:2.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-1G2320F
A2R206	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F

## Replaceable Electrical Parts

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2R207	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G76R80F
A2R208	322-3301-00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A2R209	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A2R210	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R211	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R212	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R213	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R214	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R215	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A2R216	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R217	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R218	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R219	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R220	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R221	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R222	322-3158-00			RES,FXD,FILM:432 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB2D FXE 432
A2R223	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G25500F
A2R224	322-3485-00			RES,FXD,FILM:5.0K OHM,1%,0.2W,TC=TOSMALL BODY	91637	CCF501G50000F
A2R225	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R229	322-3450-00			RES,FXD,FILM:475K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2G47502F
A2R231	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R232	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC-T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R233	322-3326-00			RES,FXD,FILM:24.3K OHM,1%,0.2W,TC-T0MI,SMALL BODY	91637	CCF50-2F24301F
A2R234	322-3481-00			RES,FXD,FILM:1M OHM.1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10003F
A2R235	315-0205-00			RES,FXD,FILM:2M OHM,5%,0.25W	80009	315020500
A2R236	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R237	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R238	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R239	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A2R240	308-0269-00			RES,FXD,VW:22 OHM,5%,3W	00213	1240S-22R00J
A2R242	322-3377-00			RES,FXD:METAL FILM;82.5K OHM,1%,0.2W,TC=100	91637	CCF50-2F82501F
A2R244	322-3183-00			RES,FXD,FILM:787 OHM,1%,0.2W,TC-T0MI,SMALL BODY	91637	CCF501G787ROF
A2R245	322-3114-00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50-2-G1500F
A2R246	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R247	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R248	322-3226-00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W,TC=100	91637	CCF501G22100F
A2R249	322-3130-00			RES,FXD:METAL FILM;221 OHM,1%,0.2W,TC=100 PPM	57668	RB20FX221E
A2R250	322-3130-00			RES,FXD:METAL FILM;221 OHM,1%,0.2W,TC=100 PPM	57668	RB20FX221E
A2R251	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R252	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R253	322-3469-00			RES,FXD,FILM:750K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G75002F
A2R254	322-3097-00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A2R255	322-3097-00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A2R256	322-3097-00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A2R257	322-3097-00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A2R258	322-3097-00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A2R260	322-3097-00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A2R261	322-3097-00			RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A2R262	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R,SM BODY	91637	CCF501C10001B
A2R263	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R,SM BODY	91637	CCF501C10001B
A2R264	322-3485-00			RES,FXD,FILM:5.0K OHM,1%,0.2W,TC=TOSMALL BODY	91637	CCF501G50000F
A2R265	311-2235-00			RES,VAR,TRMR:CERMET;10K OHM,20%,0.5W,0.197 SQ, TOP ADJUST	TK2073	GF06UT2 103 M L
A2R266	311-2235-00			RES,VAR,TRMR:CERMET;10K OHM,20%,0.5W,0.197 SQ, TOP ADJUST	TK2073	GF06UT2 103 M L

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2R267	322-3226-00			RES,FXD:METAL FILM;2.21K OHM,1%,0.2W,TC=100	91637	CCF501G22100F
A2R268	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R,SM BODY	91637	CCF501C10001B
A2R269	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9,SMALL BODY	91637	CCF501C20000B
A2R270	322-3221-00			RES,FXD,FILM:1.96K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50-2F19600F
A2R271	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R,SM BODY	91637	CCF501C10001B
A2R272	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9,SMALL BODY	91637	CCF501C20000B
A2R273	322-3223-00			RES,FXD,FILM:2.05K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G20500F
A2R274	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9,SMALL BODY	91637	CCF501C20000B
A2R275	322-3208-00			RES,FXD,FILM:1.43K OHM,1%,0.2W,TC=T0	91637	CCF501G14300F
A2R276	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9,SMALL BODY	91637	CCF501C20000B
A2R277	322-3244-00			RES,FXD,FILM:3.4K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G34000F
A2R278	322-3485-07			RES,FXD,FILM:5K OHM,0.1%,0.2W,TC=T9,SMALL BODY	91637	CCF501C50000B
A2R279	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R,SM BODY	91637	CCF501C10001B
A2R280	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R,SM BODY	91637	CCF501C10001B
A2R281	322-3289-07			RES,FXD,FILM:10K OHM,0.1%,0.2W,TC=T9,T&R,SM BODY	91637	CCF501C10001B
A2R283	322-3252-00			RES,FXD,FILM:4.12K OHM,1%,0.2W,TC=T0	91637	CCF501G41200F
A2R284	322-3252-00			RES,FXD,FILM:4.12K OHM,1%,0.2W,TC=T0	91637	CCF501G41200F
A2R285	322-3273-00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50-2-G68100F
A2R286	322-3207-00			RES,FXD,FILM:1.4K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G14000F
A2R287	322-3207-00			RES,FXD,FILM:1.4K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G14000F
A2R288	322-3273-00			RES,FXD:METAL FILM;6.81K OHM,1%,0.2W,TC=100	91637	CCF50-2-G68100F
A2R290	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R292	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R293	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R294	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R295	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R296	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A2R297	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A2R300	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R301	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R302	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R303	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R304	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R305	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R306	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R307	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R308	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R309	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R310	322-3056-00			RES,FXD,FILM:37.4 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50-2F37R40F
A2R311	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A2R312	322-3030-00			RES,FXD:METAL FILM;20 OHM,1%,0.2W,TC=100 PPM	91637	CCF50G20R00F
A2R313	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R314	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R315	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R316	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R317	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R318	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R319	322-3147-00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A2R320	322-3147-00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A2R321	322-3147-00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A2R322	322-3147-00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A2R323	322-3147-00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A2R324	322-3147-00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A2R325	322-3147-00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A2R326	322-3147-00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F

## Replaceable Electrical Parts

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2R327	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R328	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2R329	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R330	322-3155-00			RES,FXD,FILM:402 OHM,1%,0.2W,TC=TOMI,SMALL BODY	91637	CCF501G402ROF
A2R331	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R332	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2R333	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R334	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R335	308-0269-00			RES,FXD,WW:22 OHM,5%,3W	00213	1240S-22R00J
A2R336	308-0050-00			RES,FXD,WW; 10 OHM, 10, 3W	00213	1240S-22R00J
A2R337	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R338	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R339	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2R340	322-3183-00			RES,FXD,FILM:787 OHM,1%,0.2W,TC-TOMI,SMALL BODY	91637	CCF501G787ROF
A2R341	322-3161-00			RES,FXD,FILM:464 OHM,1%,0.2W,TC=TOMI,SMALL BODY	91637	CCF50-2G464R0F
A2R342	322-3288-00			RES,FXD,FILM:9.76K OHM,1%,0.2W,TC=TOMI,SMALL BODY	91637	CCF501G97600F
A2R343	322-3134-00			RES,FXD,FILM:243 OHM,1%,0.2W,TC=TOMI,SMALL BODY	91637	CCF501G243ROF
A2R344	322-3289-00			RES,FXD:METAL FILM,10K OHM,1%,0.2W,TC=100 PPM,AXIAL,T&R,SMALL BODY	57668	CRB20T29EFX1002
A2R345	322-3271-00			RES,FXD,FILM:6.49K OHM,1%,0.2W,TC=T0 MI,SMALL BODY	91637	CCF50-6491F-R36
A2R346	322-3289-00			RES,FXD:METAL FILM,10K OHM,1%,0.2W,TC=100 PPM,AXIAL,T&R,SMALL BODY	57668	CRB20T29EFX1002
A2S1	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S2	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S3	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S4	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S5	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S6	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S7	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S8	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S9	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S10	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S11	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2S14	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A2TP1	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
A2TP2	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
A2TP3	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
A2TP4	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
A2TP5	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
A2TP6	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
A2TP7	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
A2U1	156-1699-00			IC,LINEAR:BIFET,OP-AMP;DUAL,LOW OFFSET,LOW DRIFT	27014	LF412CN
A2U2	156-1225-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,300NS	01295	LM393P
A2U3	156-1699-00			IC,LINEAR:BIFET,OP-AMP;DUAL,LOW OFFSET,LOW DRIFT	27014	LF412CN
A2U4	156-1225-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,300NS	01295	LM393P
A2U5	156-1699-00			IC,LINEAR:BIFET,OP-AMP;DUAL,LOW OFFSET,LOW DRIFT	27014	LF412CN

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A2U6	156-1225-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,300NS	01295	LM393P
A2U7	156-1699-00			IC,LINEAR:BIFET,OP-AMP;DUAL,LOW OFFSET,LOW DRIFT	27014	LF412CN
A2U8	156-1225-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,300NS	01295	LM393P
A2U9	156-1699-00			IC,LINEAR:BIFET,OP-AMP;DUAL,LOW OFFSET,LOW DRIFT	27014	LF412CN
A2U10	156-1225-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,300NS	01295	LM393P
A2U11	156-1215-01			IC,DIGITAL:CMOS,MUX/ENCODER	27014	MM74C923N
A2U12	156-3305-00			IC,DGTL:ACTCMOS,BFR;NONINV, OCTAL, LINE DRVR, 3-STATE	0JR04	TC74ACT244P
A2U13	156-1408-00			IC,MISC:CMOS,TIMER	34371	ICM7555IPA
A2U15	156-0907-00			CPLR,OPTOELECTR:LED,2500V ISOLATION	0MS63	4N26
A2U16	163-0375-02			IC, DIGITAL; PRGM, CMOS, PLD;ISP EEPLD, MAX 7000S FAMILY, 7064S, 64 M/C, 36 I/O, 4IN, 10NS;7064S-10, PLCC44	80009	163037502
	136-1047-00			*MOUNTING PARTS* SKT,PLCC:PCB;44 POS,0.05 CTR,0.360H X 0.125 TAIL,TIN	00779	821575-1
				*END MOUNTING PARTS*		
A2U17	156-3369-00			IC,DIGITAL:ACMOS,GATE;QUAD 2-INPUT AND	04713	MC74AC08N
A2U18	156-3305-00			IC,DIGITAL:ACTCMOS,BUFFER;NONINV, OCTAL, LINE DRIVER, 3-STATE	0JR04	TC74ACT244P
A2U20	156-0853-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358P
A2U21	156-0853-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358P
A2U22	156-0853-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358P
A2U23	156-0853-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358P
A2U24	156-0853-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358P
A2U28	156-0277-00			IC,LINEAR:BIPOLAR,VR;POSITIVE,5.0V,1.0A,4%	01295	UA7805CKC
	214-3796-00			*ATTACHED PARTS* HTSK,SEMIC:ALUM,TO-220;VERT ECB MT,TINNED TAB	30161	576802B03900
				*END ATTACHED PARTS*		
A2U29	156-0846-00			IC,LINEAR:BIPOLAR,VR;NEGATIVE,-5.0V,1.0A,4.0%	27014	LM320T-5.0
	214-3796-00			*ATTACHED PARTS* HTSK,SEMIC:ALUM,TO-220;VERT ECB MT,TINNED TAB	30161	576802B03900
				*END ATTACHED PARTS*		
A2U30	156-4521-00			IC,MISC:CMOS,PWR SUPPLY SUPERVISOR;MPU RESET GEN,5V SUPPLY SENSING,10%,350MS RESET TIME	0B0A9	DS1233-10
A2U31	156-1173-00			IC,LINEAR:BIPOLAR,V REF;POS,2.5V,1.0%,40PPM,SERIES	04713	MC1403U
A2VR1	152-0147-00			DIODE,ZENER:27V,5%,0.4W	04713	SZ50622KRL
A2Y1	158-0391-00			OSC,XTAL CLOCK:8.0 MHZ,+/-0.01% HCMOS,CL 15PF,4 PIN 14 PIN COMPATIBLE PKG	61429	F5C-8.0 MHZ
A3	671-5274-01	B010100	B010196	CKT BD ASSY:CONNECTOR BD	80009	671527401
A3	671-5274-02	B010197		CKT BD ASSY:CONNECTOR BD	80009	671527402
A3J2	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J3	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J4	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J5	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J6	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J7	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1

## Replaceable Electrical Parts

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
A3J8	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J9	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J10	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J11	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J12	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J13	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J14	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J15	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J16	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J17	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J18	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3J19	131-5414-00			CONN,RF JACK:BNC;75 OHM,FEMALE,RTANG,PCB/REAR PNL,0.625 H X 0.187TALL W/O MTG FLANGE,W/MTG POSTS	00779	222092-1
A3K1	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K2	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K3	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K4	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K5	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K6	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K7	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K8	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K9	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K10	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K11	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A3K12	148-0232-00			RELAY,ARM:2 FORM C,75 OHM,COIL,12V 411 OHM,CONTACTS,24VDC 1A,INSERTION LOSS 1DB MAX @900MHZ	61529	RG2E-12V
A4	119-4112-00			POWER SUPPLY:SWITCHING,AUTO IN 85-264VAC, 47-440HZ,OUT 5VDC 5A,+15V2A, -15V 0.5A	TK1955	NFS40-7610
F100	159-0022-00			FUSE,CARTRIDGE:3AG,1A,250V,FAST BLOW *ATTACHED PARTS*	71400	AGC-1
	162-0531-00			INSUL SLVG,ELEC:HT SHRINK,0.165 IDPOLYOLEFIN,BLK, 0.02 THK W	06090	VERSAFIT

Component number	Tektronix part number	Serial / assembly number		Name & description	Mfr. Code	Mfr. part number
		effective	discontinued			
	196-3419-00			LEAD,ELECTRICAL:DESCRETE;CUT,18 AWG,1000V,8-01,GRAY W/BLK&BRM STRIPES,0.25 STRIP BOTH	TK2469	196-3419-00
	200-0237-04			COVER,FUHLR:PLASTIC	0JR05	ORDER BY DESC
	200-2264-00			CAP,FUSEHOLDER:3AG FUSES	61935	FEK 031 1666
	204-0832-00			BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	61935	031 1673 (FEU M
	220-0187-00			NUT,HEX:4-40,NYLON	13764	0500440CN
				*END ATTACHED PARTS*		
FL100	119-1536-00			FILTER,RFI:3A,250VAC,50/60HZ	TK2058	ZUB2203-00
				*ATTACHED PARTS*		
	174-3369-00			CA ASSY,SP:DESCRETE;CPM,2,18 AWG,9-01,13.0250 CUT & STRIP (CONNECTED @ FL100 TO A4J1)	80009	174336900
	196-3418-00			LEAD,ELECT:DESCRETE;PSC,18 AWG,5-4,4.0 L,0.25 CUT & STRIP X 0.146 ID,RING TONGUE,45 DEG ANGLE,SAF CONT	80009	196341800
	211-0503-00			SCREW, MACHINE; 6-32 X 0.188, PNH, STL CD PL, POZ	0KB01	ORDER BY DESC
				*END ATTACHED PARTS*		
J100	175-9877-00			CA ASSY,SP,ELEC:10,28 AWG,12.5 L,RIBBON (CONNECTED @ "REMOTE" REAR PANEL TO A2J17)	TK1547	ORDER BY DESC
				*MOUNTING PARTS*		
	214-3903-01			SCREW,JACK:4-40 X 0.312 EXT THD,4-40 INT THD,0.188 HEX,STEEL,CADPLATE (QUANTITY 2)	0KB01	214-3903-01
				*END MOUNTING PARTS*		
W18	174-1495-00			CA ASSY,SP,ELEC:20,28 AWG,3.0 L,RIBBONSAF CONT (CONNECTED @ A2J18 & A3J19)	TK1547	174-1495-00
W21	174-3370-00			CA ASSY,SP:DESCRETE;PSC,6,18 AWG,12.0 L,0.156 CTR,1X6,0.156 CTR,RCPT,W/FRICTION LOCK BOTH ENDS,GOLD PL (CONNECTED @ A2J21 & A4J2)	80009	174337000







# Diagrams



# Diagrams

## 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

To obtain copies of ANSI standards, contact the American National Standards Institute at:

American National Standard Institute  
11 West 42nd Street, New York, NY 10036  
Telephone: 212.642.4900; Fax: 212.398.0023

## Component Values

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

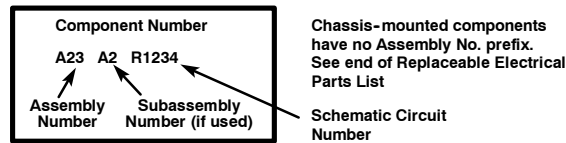
- |            |   |
|------------|---|
| Capacitors | Values one or greater are in picofarads (pF).<br>Values less than one are in microfarads ( $\mu\text{F}$ ). |
| Resistors  | Ohms ( $\Omega$ ).  |

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.

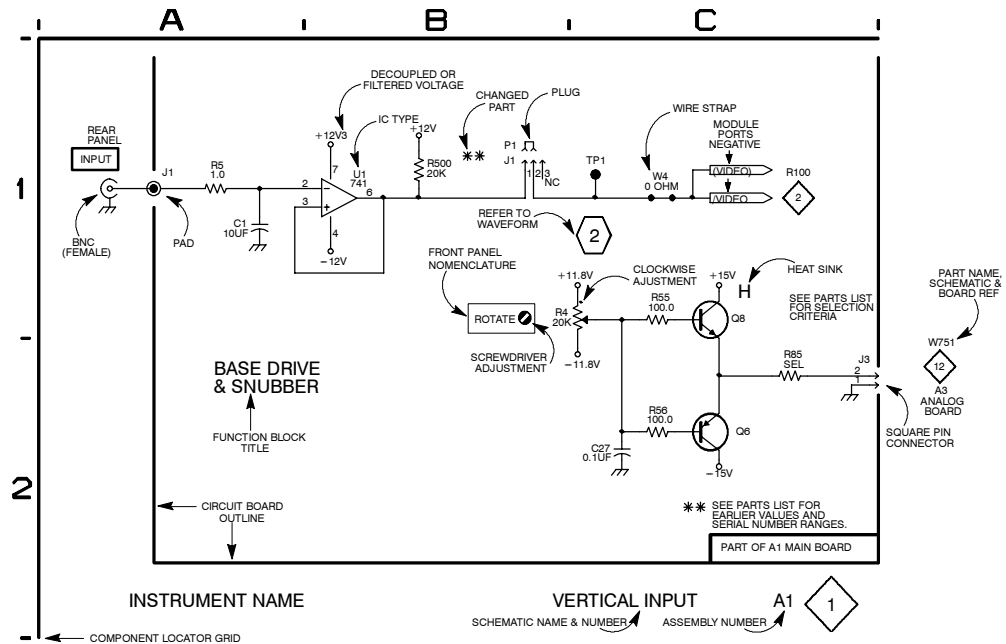
The Replaceable Electrical Parts List is arranged by assembly number in numerical sequence; the components are listed by component number. Example:

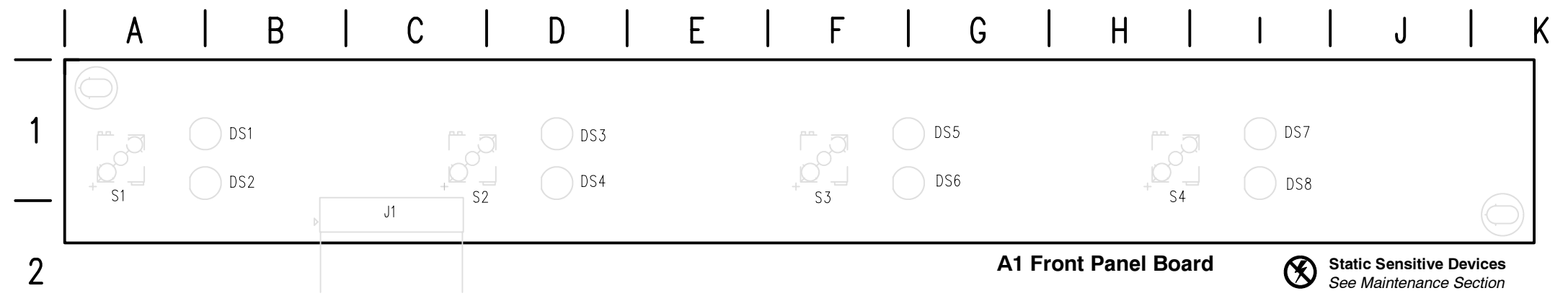


## Grid Coordinates

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.





**Front Panel Board and  
Schematic Diagram <1>  
Component Locator Chart**

*A1 Front Panel Board.*

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
DS1	B2	B1	S1A	B3	A1
DS2	B3	B1	S1B	D4	A1
DS3	D2	D1	S2A	C3	C1
DS4	D3	D1	S2B	D4	C1
DS5	E2	G1	S3A	D3	F1
DS6	E3	G1	S3B	D5	F1
DS7	F2	I1	S4A	E3	H1
DS8	F3	I1	S4B	D5	H1
J1	H3	B2			

A B C D E F G H

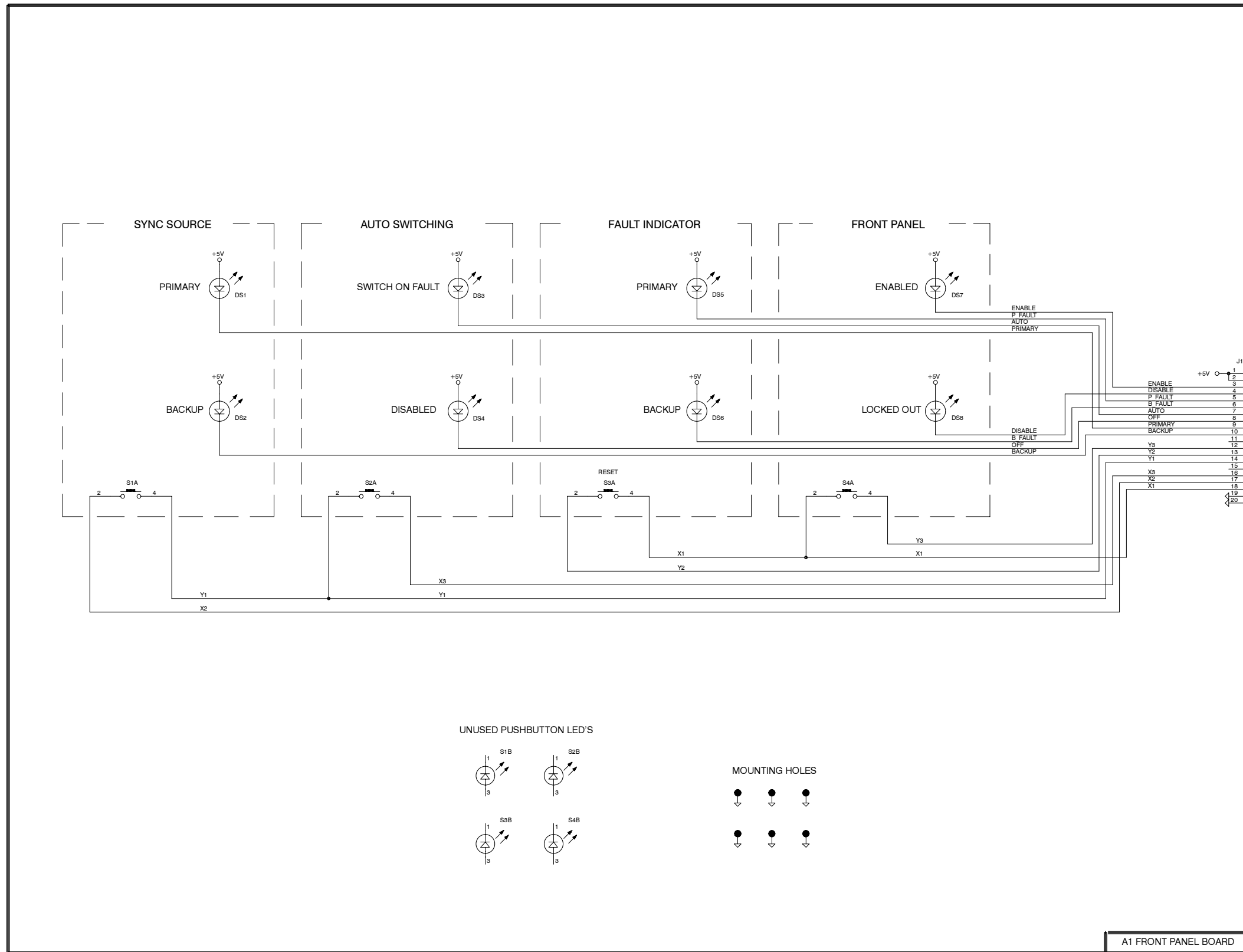
1

2

3

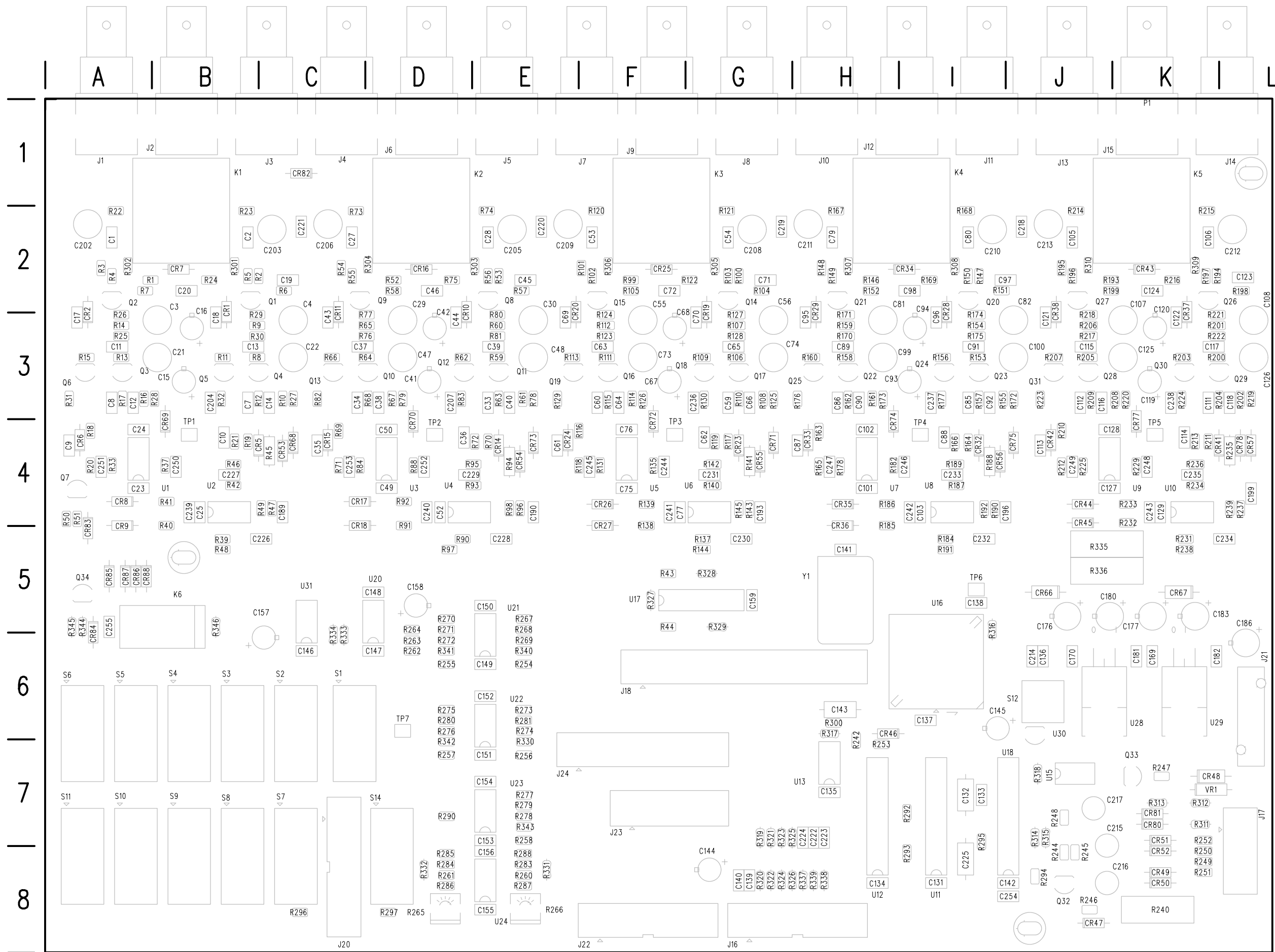
4

5



**A2 Main Board Component Locator** (with cross-references to schematic diagrams 1, 2, 3, 4, and 5.)

Comp No	Diag No	Diag Loc	Bd Loc	Comp No	Diag No	Diag Loc	Bd Loc	Comp No	Diag No	Diag Loc	Bd Loc	Comp No	Diag No	Diag Loc	Bd Loc	Comp No	Diag No	Diag Loc	Bd Loc	Comp No	Diag No	Diag Loc	Bd Loc	Comp No	Diag No	Diag Loc	Bd Loc	Comp No	Diag No	Diag Loc	Bd Loc	Comp No	Diag No	Diag Loc	Bd Loc				
C1	3	B4	A2	C89	1	D5	H3	C186	5	B4	L5	CR23	2	E1	G4	K1	3	B3	B1	R31	3	C3	A3	R109	2	D1	G3	R188	1	F4	I4	R266	5	D5	E8	R344*	4	E4	A5
C2	3	B3	B2	C90	1	E5	H3	C189	3	F3	C4	CR24	2	E2	E4	K2	2	B4	E1	R32	3	D3	B3	R110	2	E1	G3	R189	1	G5	I4	R267	5	C2	E5	R345*	4	E4	A6
C3	3	D3	B2	C91	1	D5	I3	C190	2	F4	E4	CR25	2	B2	F2	K3	2	B1	G1	R33	3	F4	A4	R111	2	E2	F3	R190	1	G4	I4	R268	5	C2	E6	R346*	4	G5	B5
C4	3	D2	C2	C92	1	E5	I3	C193	2	F2	G4	CR26	2	H2	F4	K4	1	B4	I1	R37	3	F3	B4	R112	2	D2	F3	R191	1	G4	I5	R269	5	C2	E6	S1	5	F2	C6
C7	3	E3	B3	C93	1	F5	H3	C196	1	F4	J4	CR27	2	H1	F5	K5	1	B1	K1	R39	3	G2	B5	R113	2	D2	E3	R192	1	G4	I4	R270	5	C3	D5	S2	5	F2	C6
C8	3	E3	A3	C94	1	F5	I2	C199	1	F2	L4	CR28	1	C4	I3	P1	3	E5	K1	R40	3	G2	B5	R114	2	E2	F3	R193	1	C2	J2	R271	5	C3	D6	S3	5	F3	B6
C9	3	F4	A4	C95	1	F5	H3	C202	3	B4	A2	CR29	1	C5	H3	R41	3	G3	B4	R39	3	G2	B5	R115	2	E2	F3	R194	1	C1	L2	R272	5	C3	D6	S4	5	F4	B6
C10	3	F3	B4	C96	1	F5	I3	C203	3	B2	C2	CR32	1	E4	I4	R42	3	G3	B4	R43	3	H3	F5	R116	2	E2	F4	R195	1	C2	J2	R273	5	C3	E6	S5	5	F4	A6
C11	3	D4	A3	C97	1	E5	I2	C204	3	C3	B3	CR33	1	E5	H4	R43	3	H3	F5	R44	3	H2	F5	R117	2	E1	G4	R196	1	C2	J2	R274	5	C3	E6	S6	5	F5	A6
C12	3	E4	A3	C98	1	E5	I2	C205	2	B4	E2	CR34	1	B4	H2	Q1	3	C3	C2	R45	3	F3	C4	R118	2	F2	F4	R197	1	C1	K2	R275	5	C3	D6	S7	5	H2	C7
C13	3	D4	B3	C99	1	D5	I3	C206	2	B5	C2	CR35	1	H5	H4	Q2	3	C3	A2	R46	3	G4	B4	R119	2	F1	G4	R198	1	C1	L2	R276	5	C4	D6	S8	5	H2	B7
C14	3	E4	C3	C100	1	D4	J3	C207	2	C4	D3	CR36	1	H4	H5	Q3	3	E4	A3	R47	3	G3	C4	R120	2	B2	F2	R199	1	C2	J2	R277	5	C4	E7	S9	5	H3	B7
C15	3	F4	B3	C101	1	G5	H4	C208	2	B1	G2	CR37	1	C1	K3	Q4	3	E3	C3	R48	3	G3	C4	R121	2	B1	G2	R200	1	E1	K3	R278	5	C4	E7	S10	5	H4	A7
C16	3	F4	B3	C102	1	G5	H4	C209	2	B2	E2	CR38	1	C2	J3	Q5	3	D3	B3	R49	3	G3	C4	R122	2	C1	F2	R201	1	D1	K3	R279	5	C4	E7	S11	5	H4	A7
C17	3	E4	A3	C103	1	G5	I4	C210	1	B4	I2	CR41	1	E1	L4	Q6	3	D4	A3	R48	3	G3	C4	R123	2	C1	F2	R202	1	E1	L3	R280	5	C4	D6	S12	4	C2	J6
C18	3	E4	B3	C105	1	B2	J2	C211	1	B5	H2	CR42	1	E2	J4	Q7	4	E4	A5	R49	3	G3	C4	R124	2	D2	F3	R203	1	D1	K3	R281	5	C3	E6	S14	5	E2	D7
C19	3	D4	C2	C106	1	B1	K2	C212	1	B1	L2	CR43	1	B2	K2	Q8	2	C4	E2	R50	4	E4	A4	R125	2	E1	G3	R204	1	E1	L3	R283	5	D4	E8				
C20	3	D4	B2	C107	1	D2	K2	C213	1	B2	J2	CR44	1	H2	J4	Q9	2	C5	D2	R51	4	E4	A4	R126	2	E2	F3	R205	1	E2	J3	R284	5	D5	D8	TP1	3	E3	B4
C21	3	D3	B3	C108	1	D1	L2	C214	4	C2	J6	CR45	1	H1	J5	Q10	2	E5	D3	R52	2	E4	A4	R127	2	D1	G3	R206	1	D2	J3	R285	5	D5	D8	TP2	2	E4	D4
C22	3	D2	C3	C111	1	E1	K3	C215	4	G2	J7	CR46	4	E2	H6	Q11	2	E4	E3	R53	2	C4	E2	R128	2	D1	G3	R207	1	D2	J3	R286	5	D5	D8	TP3	2	E2	F4
C23	3	G4	A4	C112	1	E2	J3	C216	4	G1	K8	CR47	4	G3	J8	Q12	2	D4	D3	R54	2	C5	C2	R129	2	C2	E3	R208	1	E2	K3	R287	5	D5	E8	TP4	1	E4	I4
C24	3	F4	A4	C113	1	F2	J4	C217	4	G2	J7	CR48	4	G3	K7	Q13	2	D5	C3	R130	2	D2	G3	R130	2	D2	G3	R209	1	E2	J3	R288	5	D5	E8	TP5	1	E2	K4
C25	3	G4	B4	C114	1	F1	K4	C218	3	A4	J2	CR49	4	G1	K8	Q14	2	C1	G2	R131	2	F2	F4	R131	2	F2	F4	R210	1	E2	J4	R289	5	C2	D7	TP6	4	D3	I5
C27	2	B5	C2	C115	1	D3	J3	C219	3	B4	G2	CR50	4	G1	K8	Q15	2	C2	F2	R132	2	F2	F4	R132	2	F2	F4	R211	1	E1	K4	R290	5	C2	D7	TP7	5	E3	D6
C28	2	B4	E2	C116	1	E3	J3	C220	3	B4	E2	CR51	4	G1	K7	Q16	2	E2	F3	R133	2	F2	F4	R133	2	F2	F4	R212	1	F2	J4	R291	4	C5	I7	U1A	3	F3	B4
C29	2	D5	D2	C117	1	D3	K3	C221	3	B4	C2	CR52	4	G2	K8	Q17	2	E1	G3	R134	2	F2	F4	R134	2	F2	F4	R213	1	F1	K4	R292	4	F1	J8	U1B	3	F3	B4
C30	2	D4	E2	C118	1	E3	L3	C222	4	B5	H8	CR53	3	F3	C4	Q18	2	D1	F3	R135	2	G1	G5	R135	2	G1	F5	R214	1	B2	J2	R293	4	F2	I8	U2A	3	G3	B4
C33	2	E4	E3	C118	1	E3	L3	C222	4	B5	H8	CR53	3	F3	C4	Q19	2	D2	E3	R136	2	G1	F5	R136	2	G1	F5	R215	1	B1	K2	R294	4	F2	I8	U2B	3	G4	B4
C34	2	E5	C3	C119	1	F3	K3	C223	4	B5	H8	CR54	2	F4	E4	Q20	1	C4	I2	R137	2	G2	F4	R137	2	G2	F4	R216	1	C1	K2	R295	4	F2	I8	U3A	2	F4	D4
C35	2	F5	C4	C120	1	F3	K3	C224	4	B5	H8	CR55	2	F2	G4	R61	2	E4	E3	R138	2	G2	G4	R138	2	G2	G4	R217	1	D2	J3	R296	5	H1	C8	U3B	2	F5	D4
C36	2	F4	D4	C121	1	F3	J3	C225	4	C5	I8	CR56	1	F4	I4	Q21	1	C5	H2	R139	2	G2	G4	R139	2	G2	G4	R218	1	D2	J3	R297	5	H1	D8	U4A	2	G4	D4
C37	2	D5	C3	C122	1	F3	K3	C226	3	G3	B5	CR57	1	F2	L4	Q22	1	E5	H3	R140	2	D4	D3	R140	2	D4	D3	R219	1	E1	K3	R300	4	E3	H6	U4B	2	G5	D4
C38	2	E5	D3	C123	1	E3	L2	C227	3	G4	B4	CR58	5	C5	J5	Q23	1	E4	I3	R141	2	F2	G4	R141	2	F2	G4	R220	1	E2	K3	R301	3	C3	B2	U5A	2	F1	F4
C39	2	D5	E3	C124	1	E3	K2	C228	2	G4	E5	CR59	5	C5	J5	Q24	1	D4	I3	R62	2	D4	C3	R142	2	G2	G4	R221	1	D1	K3	R302	3	C3	A2	U5B	2	F2	F4
C40	2	E5	E3	C125	1	D1	L3	C229	2	G5	D4	CR60	3	E3	C4	Q25	1	D5	G3	R63	2	E4	E3	R143	2	G2	G4	R222	1	D1	K3	R303	2	C4	E2	U6A	2	G1	G4
C41	2	F5	D3	C126	1	D1	L3	C230	2	G1	G5	CR61	3	E4	B4	Q26	1	C1	L2	R64	2	E5	C3	R144	2	G1	G5	R223	1	D1	K3	R304	2	C4	D2	U6B	2	G2	G4
C42	2	F5	D3	C127	1	G3	J4	C231	2	G2	G4	CR62	3	E3	C4	Q27	1	C2	J2	R65	2	D4	C3	R145	2	G2	G4	R224	1	D1	K3	R305	2	C1	G2	U7A	1	F4	H4
C43	2	F5	C3	C128	1	G3	J4	C232	1	G4	I5	CR63	3	E4	B4	Q28	1	E2	J3	R66	2	D5	C3	R146	1	C4	H2	R225	1	F2	J4	R306	2	C2	F2	U7B	1	F5	H4
C44	2	F5	D3	C129	1	G3	K4	C233	1	G5	I4	CR64	3	E4	B4	Q29	1	E1	L3	R67	2	E4	D3	R147	1	C4	I2	R226	1	F2	J4	R307	1	C4	H2	U8A	1	G4	I4
C45	2	E5	E2	C131	4	D5	I8	C234	1	G1	K5	CR65	2	E2	F4	Q30	1	D1	K3	R68	2	E5	C4	R148	1	C5	H2	R227	1	F2	J4	R308	1	C4	I2	U8B	1	G5	I4
C46	2	E5	D2	C132	4	C5	I7	C235	1	G2	K4	CR66	5	C5	J5	Q31	1	D2	J3	R69	2	E4	E4	R149	1	C5	H2	R228	1	F2	J4	R309	1	C1	K2	U9A	1	F1	K4
C47	2	D5	D3	C133	4	C5	I7	C236	2	C2	G3	CR67	5	C5	J5	Q32	4	F3	J8	R70	2	E4	E4	R150	1	C4	I2	R229	1	F2	K4	R310	1	C2	J2	U9B	1	F2	K4
C48	2	D4	E3	C134	4	E5	H8	C237	1	C4	I3	CR68	4	F4	B5	Q33	4	G3	K7	R71	2	F4	E4	R151	1	C4	I2	R230	1	G1	K5	R311	4	G2	K7	U10A	1	G1	K4
C49	2	G5	D4	C135	4	E3	H7	C238	1	C2	K3	CR69	4	G2	K7	Q34*	4	E4	A5	R72	2	B5	C2	R152	1	C4	H2	R231	1	G1	K5	R312	4	G3	K7	U10B	1	G2	K4
C50	2	G5	D4	C136	4	D3	J6	C239	3	G4	B4	CR70	3	E3	C4	R73	2	B4	E2	R73	2	B4	E2	R153	1	E4	I3	R232	1	G1	K5	R313	4	G2	K7	U11	4	C5	I8
C52	2	G5	D4	C137	4	D4	I6	C240	2	G5	D4	CR71	2	E2	G4	R74	2	B4	E2	R74	2	B4	E2	R154	1	D4	I3	R233	1	G2	K4	R314	4	G1	J8	U12			



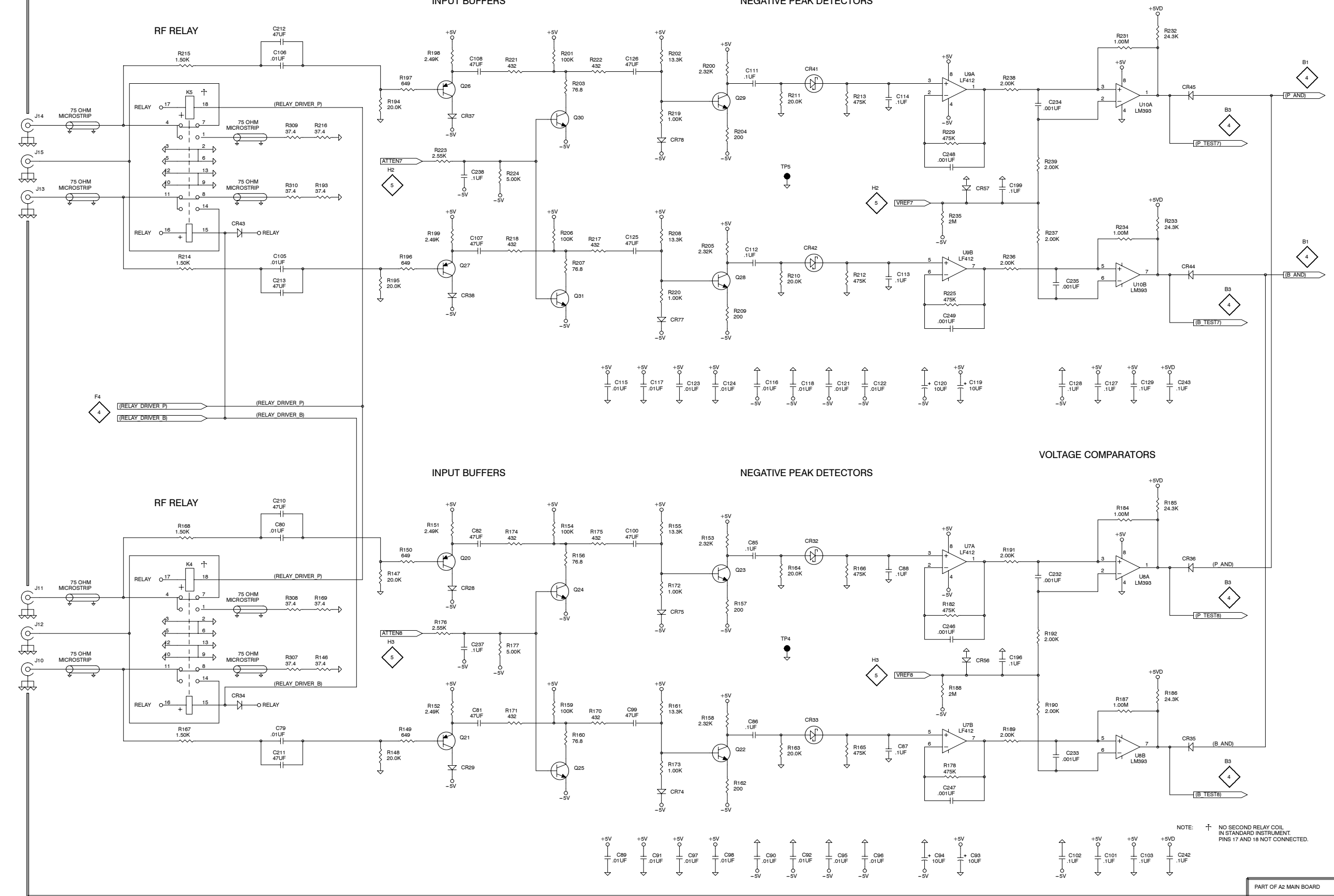
A2 Main board locator chart on front of this page.

ECO422D

**A2 Main Board**

 **Static Sensitive Devices**  
See Maintenance Section



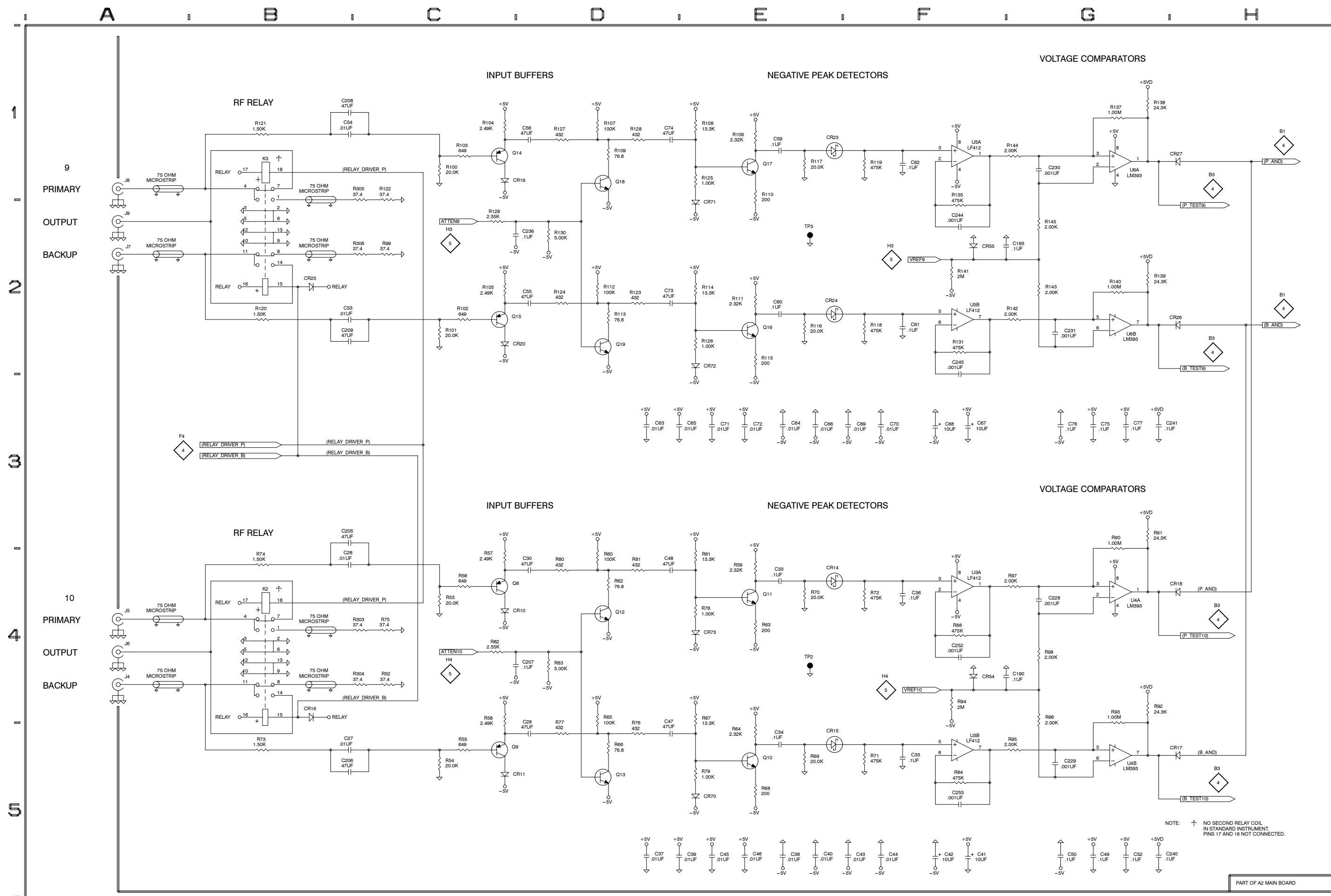


NOTE: † NO SECOND RELAY COIL IN STANDARD INSTRUMENT. PINS 17 AND 18 NOT CONNECTED.

**Main Board Schematic Diagram <2>  
Component Locator Chart**

*A2 Main Board. Partial A2 also shown on Schematics 1, 3, 4, and 5.*

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C27	B5	C2	C209	B2	E2				R107	D1	G3
C28	B4	E2	C228	G4	E5	R52	C4	D2	R108	E1	G3
C29	D5	D2	C229	G5	D4	R53	C4	E2	R109	D1	G3
C30	D4	E2				R54	C5	C2	R110	E1	G3
C33	E4	E3	C230	G1	G5	R55	C5	C2			
			C231	G2	G4	R56	C4	E2	R111	E2	F3
C34	E5	C3	C236	C2	G3				R112	D2	F3
C35	F5	C4	C240	G5	D4	R57	C4	E2	R113	D2	E3
C36	F4	D4	C241	G3	F4	R58	C4	D2	R114	E2	F3
C37	D5	C3				R59	E4	E3	R115	E2	F3
C38	E5	D3	C244	F2	F4	R60	D4	E3			
			C245	F2	F4	R61	E4	E3	R116	E2	F4
C39	D5	E3	C252	F4	D4				R117	E1	G4
C40	E5	E3	C253	F5	C4	R62	D4	D3	R118	F2	F4
C41	F5	D3				R63	E4	E3	R119	F1	G4
C42	F5	D3	CR10	C4	D3	R64	E5	C3	R120	B2	F2
C43	F5	C3	CR11	C5	C3	R65	D4	C3			
			CR14	E4	E4	R66	D5	C3	R121	B1	G2
C44	F5	D3	CR15	E5	C4				R122	C1	F2
C45	E5	E2	CR16	B4	D2	R67	E4	D3	R123	D2	F3
C46	E5	D2				R68	E5	D3	R124	D2	F3
C47	D5	D3	CR17	H5	C4	R69	E5	C4	R125	E1	G3
C48	D4	E3	CR18	H4	C5	R70	E4	E4			
			CR19	C1	G3	R71	F5	C4	R126	E2	F3
C49	G5	D4	CR20	C2	E3				R127	D1	G3
C50	G5	D4	CR23	E1	G4	R72	F4	E4	R128	D1	G3
C52	G5	D4				R73	B5	C2	R129	C2	E3
C53	B2	F2	CR24	E2	E4	R74	B4	E2	R130	D2	G3
C54	B1	G2	CR25	B2	F2	R75	C4	D2			
			CR26	H2	F4	R76	D5	C3	R131	F2	F4
C55	D2	F2	CR27	H1	F5				R135	F2	F4
C56	D1	G2	CR54	F4	E4	R77	D5	C3	R137	G1	G5
C59	E1	G3				R78	E4	E3	R138	G1	F5
C60	E2	F3	CR55	F2	G4	R79	E5	D3	R139	G2	F4
C61	F2	E4	CR70	E5	D4	R80	D4	E3			
			CR71	E2	G4	R81	D4	E3	R140	G2	G4
C62	F1	G4	CR72	E2	F4				R141	F2	G4
C63	D3	F3	CR73	E4	E4	R82	C4	C3	R142	G2	G4
C64	E3	F3				R83	D4	D3	R143	G2	G4
C65	D3	G3	J4	A4	C1	R84	F5	C4	R144	G1	G5
C66	E3	G3	J5	A4	E1	R88	F4	D4			
			J6	A4	D1	R90	G3	D5	R145	G2	G4
C67	F3	F3	J7	A2	F1				R303	C4	E2
C68	F3	F3	J8	A1	G1	R91	G3	D5	R304	C4	D2
C69	F3	E3	J9	A2	F1	R92	G4	D4	R305	C1	G2
C70	F3	G3				R93	G4	D4	R306	C2	F2
C71	E3	G2	K2	B4	E1	R94	F4	E4			
			K3	B1	G1	R95	G5	D4	TP2	E4	D4
C72	E3	F2							TP3	E2	F4
C73	D2	F3	Q8	C4	E2	R96	G4	E4			
C74	D1	G3	Q9	C5	D2	R97	G4	D5	U3A	F4	D4
C75	G3	F4	Q10	E5	D3	R98	G4	E4	U3B	F5	D4
C76	G3	F4	Q11	E4	E3	R99	C2	F2	U4A	G4	D4
			Q12	D4	D3	R100	C1	G2	U4B	G5	D4
C77	G3	F4							U5A	F1	F4
C190	F4	E4	Q13	D5	C3	R101	C2	F2	U5B	F2	F4
C193	F2	G4	Q14	C1	G2	R102	C2	F2	U6A	G1	G4
C205	B4	E2	Q15	C2	F2	R103	C1	G2	U6B	G2	G4
C206	B5	C2	Q16	E2	F3	R104	C1	G2			
			Q17	E1	G3	R105	C2	F2			
C207	C4	D3	Q18	D1	F3						
C208	B1	G2	Q19	D2	E3	R106	E1	G3			



NOTE: † NO SECOND RELAY COIL IN STANDARD INSTRUMENT. PINS 17 AND 18 NOT CONNECTED.

PART OF A2 MAIN BOARD

**Main Board Schematic Diagram <3>  
Component Locator Chart**

*A2 Main Board. Partial A2 also shown on Schematics 1, 2, 4, and 5.*

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C1	B4	A2	C220	B4	E2	Q6	D4	A3	R27	E3	C3
C2	B3	B2							R28	E4	B3
C3	D3	B2	C221	B4	C2	R1	C3	A2	R29	D2	B3
C4	D2	C2	C226	G3	B5	R2	C3	C2	R30	D2	B3
C7	E3	B3	C227	G4	B4	R3	C4	A2			
			C239	G4	B4	R4	C4	A2	R31	C3	A3
C8	E3	A3	C250	F3	B4	R5	C3	B2	R32	D3	B3
C9	F4	A4	C251	F4	A4				R33	F4	A4
C10	F3	B4				R6	C2	C2	R37	F3	B4
C11	D4	A3	CR1	C3	B3	R7	C3	A2	R39	G2	B5
C12	E4	A3	CR2	C4	A3	R8	E2	B3			
			CR5	E3	C4	R9	D2	B3	R40	G2	B5
C13	D4	B3	CR6	E3	A4	R10	E2	C3	R41	G3	B4
C14	E4	C3	CR7	B3	B2				R42	G3	B4
C15	F4	B3				R11	D3	B3	R43	H3	F5
C16	F4	B3	CR8	H4	A4	R12	E3	C3	R44	H2	F5
C17	E4	A3	CR9	H3	A5	R13	E3	A3			
			CR53	F3	C4	R14	D3	A3	R45	F3	C4
C18	E4	B3	CR68	E3	C4	R15	D3	A3	R46	G4	B4
C19	D4	C2	CR69	E4	B4				R47	G3	C4
C20	D4	B2				R16	E3	A3	R48	G3	B5
C21	D3	B3	J1	A3	A1	R17	E4	A3	R49	G3	C4
C22	D2	C3	J2	A3	A1	R18	E4	A4			
			J3	A3	C1	R19	E3	B4	R301	C3	B2
C23	G4	A4				R20	F4	A4	R302	C3	A2
C24	F4	A4	K1	B3	B1						
C25	G4	B4				R21	F3	B4	TP1	E3	B4
C189	F3	C4	P1	E5	K1	R22	B4	A2			
C202	B4	A2				R23	B3	B2	U1A	F3	B4
			Q1	C3	C2	R24	C3	B2	U1B	F3	B4
C203	B2	C2	Q2	C3	A2	R25	D3	A3	U2A	G3	B4
C204	C3	B3	Q3	E4	A3				U2B	G4	B4
C218	A4	J2	Q4	E3	C3	R26	D3	A3			
C219	B4	G2	Q5	D3	B3						

A B C D E F G H

1

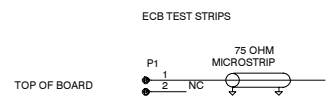
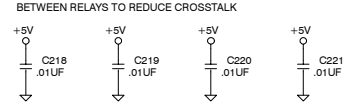
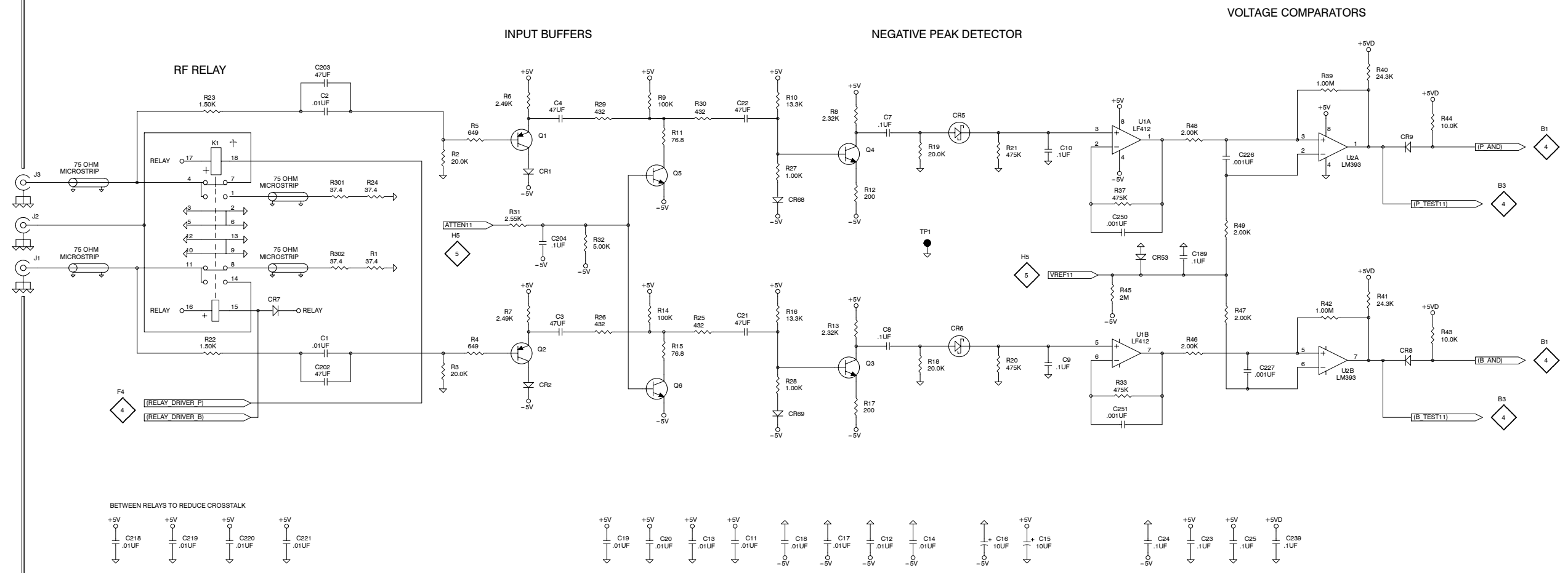
2

3

4

5

11  
PRIMARY  
OUTPUT  
BACKUP



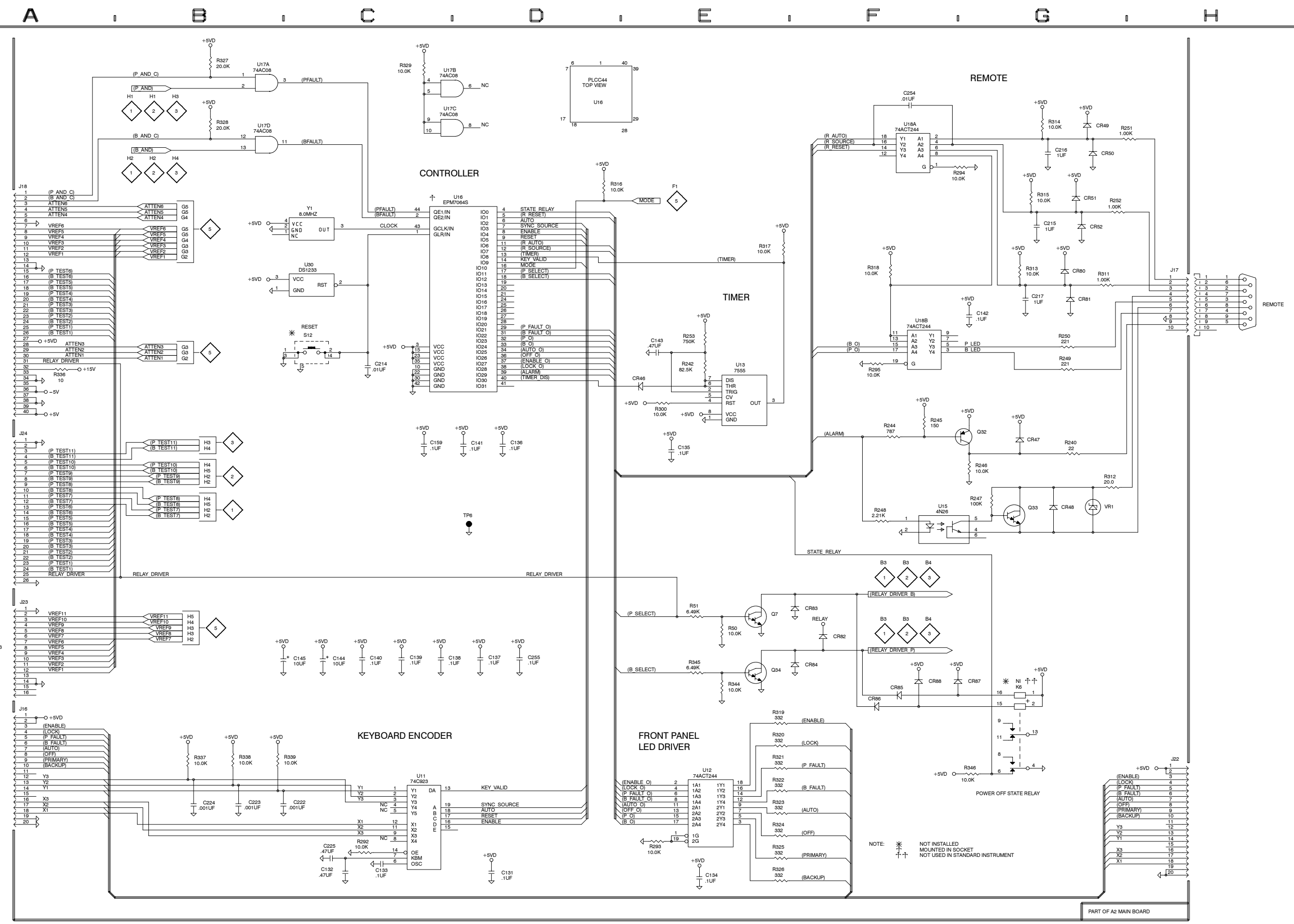
NOTE: † NO SECOND RELAY COIL IN STANDARD INSTRUMENT. PINS 17 AND 18 NOT CONNECTED.

PART OF A2 MAIN BOARD

**Main Board Schematic Diagram <4>  
Component Locator Chart**

*A2 Main Board. Partial A2 also shown on Schematics 1, 2, 3, and 5.*

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C131	D5	I8	CR51	G1	K7	R248	F3	J7	R344 *	E4	A5
C132	C5	I7	CR52	G2	K8	R249	G2	K8	R345 *	E4	A6
C133	C5	I7	CR80	G2	K7				R346 *	G5	B5
C134	E5	H8	CR81	G2	K7	R250	G2	K8			
C135	E3	H7	CR82 *	F4	C1	R251	G1	K8	R336	A2	J5
			CR83 *	E4	A5	R252	G2	K7	R337	B5	H8
C136	D3	J6	CR84 *	E4	A6	R253	E2	H7			
C137	D4	I6	CR85 *	F4	A5	R292	C5	I7	R338	B5	H8
C138	D4	I5	CR86 *	F4	A5				R339	B5	H8
C139	C4	G8	CR87 *	F4	A5	R293	E5	I8			
C140	C4	G8	CR88 *	F4	A5	R294	F1	J8	S12	C2	J6
						R295	F2	I8			
C141	D3	H5				R300	E3	H6	TP6	D3	I5
C142	G2	I8	J16	A4	G8	R311	G2	K7	U11	C5	I8
C143	E2	H6	J17	H2	L7				U12	E5	H8
C144	C4	G8	J18	A1	F6	R312	G3	K7	U13	E2	H7
C145	C4	I6	J22	H5	F8	R313	G2	K7	U15	F3	J7
			J23	A4	F7	R314	G1	J8			
C159	C3	G5	J24	A3	E7	R315	G1	J7	U16	C2	I5
C214	C2	J6				R316	D1	I6	U17A	B1	F5
C215	G2	J7	Q7	E4	A5				U17B	C1	F5
C216	G1	K8	Q32	F3	J8	R317	E2	H6	U17C	C1	F5
C217	G2	J7	Q33	G3	K7	R318	F2	J7	U17D	B1	F5
			Q34 *	E4	A5	R319	E4	G8			
C222	B5	H8	R82 *	E4	C1	R320	E4	G8	U18A	F1	I8
C223	B5	H8				R321	E5	G8	U18B	F2	I8
C224	B5	H8							U30	C2	J6
C225	C5	I8	R50	E4	A4	R322	E5	G8			
C254 *	F1	I8	R51	E4	A4	R323	E5	G8	VR1	G3	K7
C255 *	D4	A5	R240	G3	K8	R324	E5	G8			
			R242	E2	H7	R325	E5	H8	Y1	C2	H5
			R244	F3	J8	R326	E5	H8			
CR46	E2	H6									
CR47	G3	J8									
CR48	G3	K7	R245	F3	J8	R327	B1	F5			
CR49	G1	K8	R246	G3	J8	R328	B1	G5			
CR50	G1	K8	R247	G3	K7	R329	C1	G5			

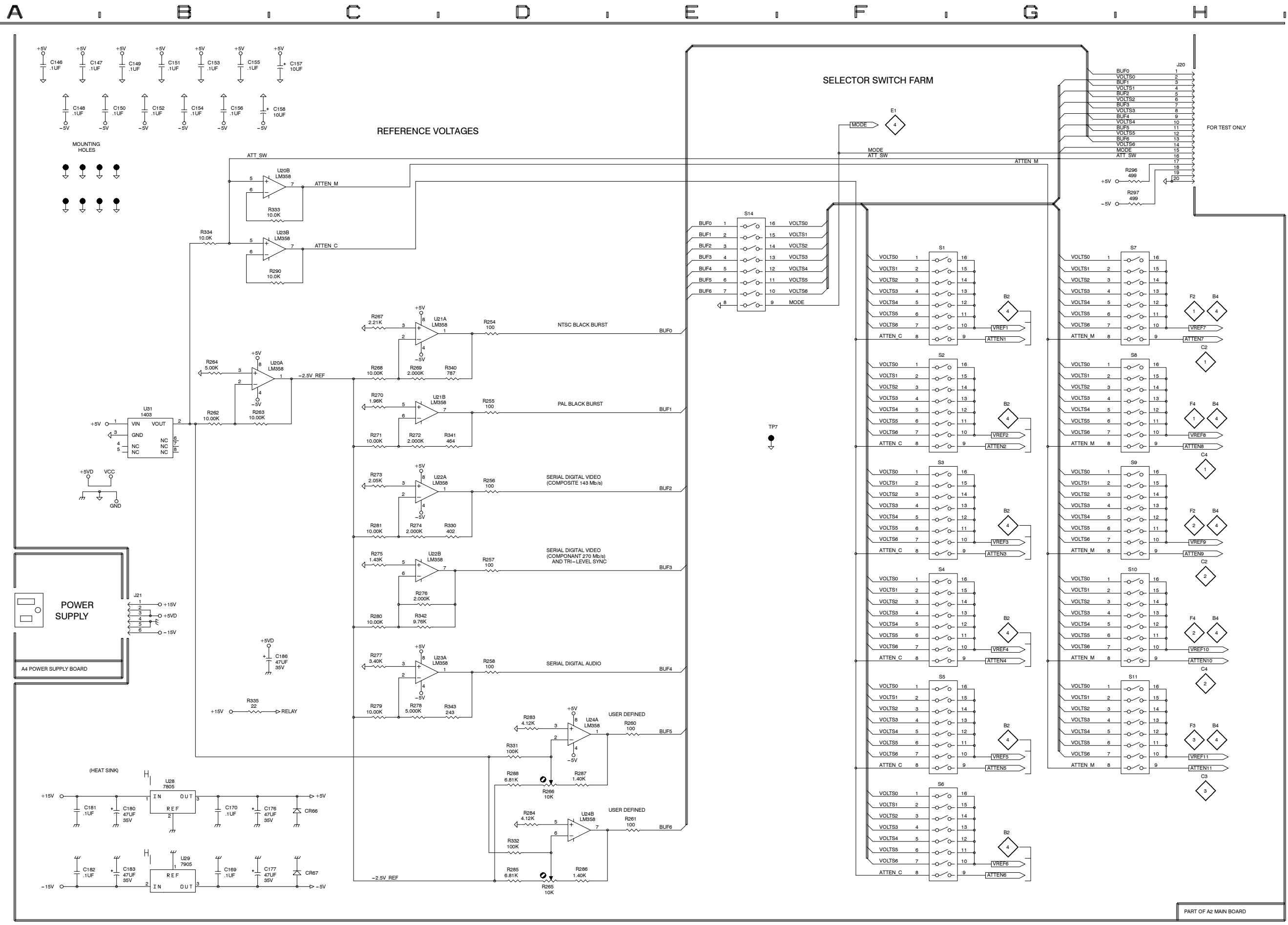


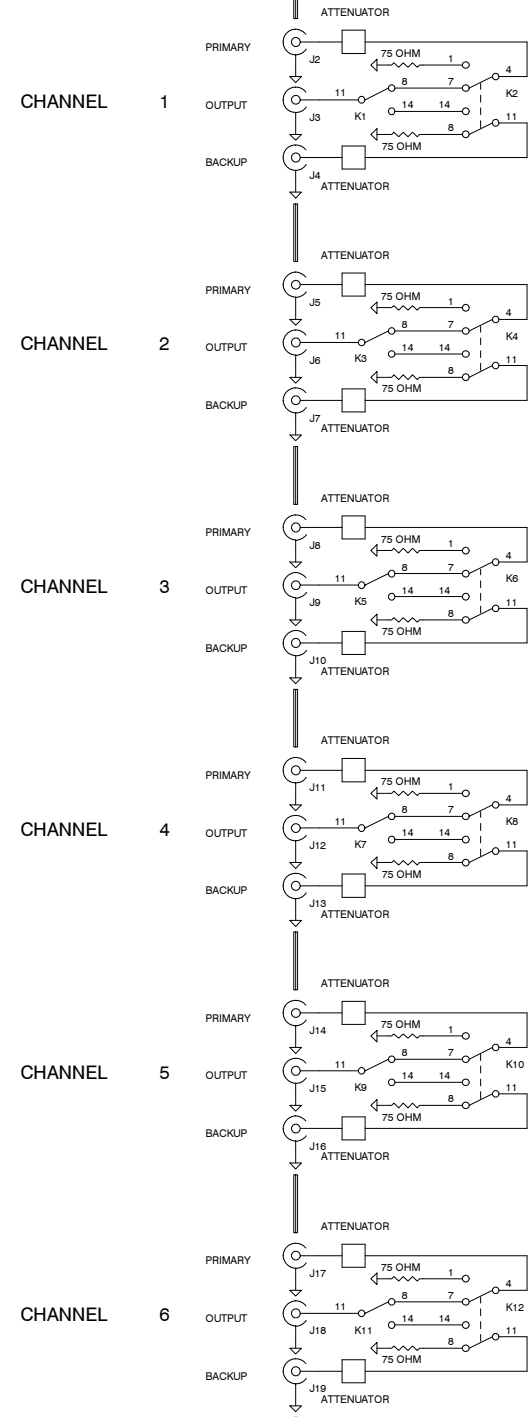
**Main Board Schematic Diagram <5>  
Component Locator Chart**

*A2 Main Board. Partial A2 also shown on Schematics 1, 2, 3, and 4.*

Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc	Comp No	Diag Loc	Bd Loc
C146	A1	C6	J21	B4	L6						
C147	A1	D6				R280	C4	D6	S6	F5	A6
C148	A1	D5	R254	D2	E6	R281	C3	E6	S7	H2	C7
C149	B1	E6	R255	D3	D6	R283	D4	E8	S8	H2	B7
C150	B1	E5	R256	D3	E7	R284	D5	D8	S9	H3	B7
			R257	D4	D7	R285	D5	D8	S10	H4	A7
			R258	D4	E7						
C151	B1	E7				R286	D5	D8	S11	H4	A7
C152	B1	E6				R287	D5	E8	S14	E2	D7
C153	B1	E7	R260	E4	E8	R288	D5	E8			
C154	B1	E7	R261	E5	D8	R290	C2	D7	TP7	E3	D6
C155	B1	E8	R262	B3	D6	R296	H1	C8			
			R263	B3	D6				U20A	B2	D5
			R264	B2	D6				U20B	B1	D5
C156	B1	E8				R297	H1	D8	U21A	C2	E5
C157	C1	B5	R265	D5	D8	R330	D3	E7	U21B	C3	E5
C158	B1	D5	R266	D5	E8	R331	D5	E8	U22A	C3	E6
C169	B5	K6	R267	C2	E5	R332	D5	D8			
C170	B5	J6	R268	C2	E6	R333	C2	C6			
			R269	C2	E6				U22B	C3	E6
C176	B5	J5				R334	B2	C6	U23A	C4	E7
C177	B5	K5				R335	B4	J5	U23B	B2	E7
C180	B5	J5	R270	C3	D5	R340	D2	E6	U24A	D4	E8
C181	A5	K6	R271	C3	D6	R341	D3	D6	U24B	D5	E8
C182	A5	L6	R272	C3	D6	R342	C4	D7			
			R273	C3	E6	R343	D4	E7	U28	B5	K6
C183	B5	K5	R274	C3	E6				U29	B5	K6
C186	B4	L5							U31	B3	C5
			R275	C3	D6	S1	F2	C6			
CR66	C5	J5	R276	C4	D6	S2	F2	C6			
CR67	C5	K5	R277	C4	E7	S3	F3	B6			
			R278	C4	E7	S4	F4	B6			
J20	H1	C8	R279	C4	E7	S5	F4	A6			







COMPONENT LEVEL INFORMATION  
UNAVAILABLE

(P AND C)	1
(B AND C)	2
ATTEN6	3
ATTEN5	4
ATTEN4	5
	6
VREF6	7
VREF5	8
VREF4	9
VREF3	10
VREF2	11
VREF1	12
	13
(P TEST6)	14
(B TEST6)	15
(P TEST5)	16
(B TEST5)	17
(P TEST4)	18
(B TEST4)	19
(P TEST3)	20
(B TEST3)	21
(P TEST2)	22
(B TEST2)	23
(P TEST1)	24
(B TEST1)	25
	26
ATTEN3	+5V 27
ATTEN2	28
ATTEN1	29
RELAY DRIVER	30
	31
+12V	32
	33
	34
	35
-5V	36
	37
	38
	39
+5V	40

J1  
CONNECTS  
TO J18  
A2  
MAIN  
BOARD

A3 CONNECTOR BOARD



# **Replaceable Mechanical Parts**



# Replaceable Mechanical Parts

This section contains a list of the components that are replaceable for the ECO422D. 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.

## 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

<b>Figure &amp; Index No. (Column 1)</b>	Items in this section are referenced by figure and index numbers to the illustrations.
<b>Tektronix Part No. (Column 2)</b>	Indicates part number to be used when ordering replacement part from Tektronix.
<b>Serial No. (Column 3 and 4)</b>	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.
<b>Qty (Column 5)</b>	This indicates the quantity of mechanical parts used.
<b>Name and Description (Column 6)</b>	<p>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.</p> <p>Following is an example of the indentation system used to indicate relationship.</p> <pre> <b>1 2 3 4 5      Name &amp; Description</b> 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*                 </pre> <p>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. <b>Mounting parts must be purchased separately, unless otherwise specified.</b></p>
<b>Mfr. Code (Column 7)</b>	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.)
<b>Mfr. Part Number (Column 8)</b>	Indicates actual manufacturer's part number.

## Cross Index - Mfr. Code Number To Manufacturer

<b>Mfr. code</b>	<b>Manufacturer</b>	<b>Address</b>	<b>City, state, zip code</b>
S3109	FELLER	72 Veronica Ave Unit 4	Summerset NJ 08873
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609-3320
TK0941	BEARINGS INC (DIST)	2720 NW 29TH PO BOX 3005	PORTLAND OR 97210-1702
TK1955	COMPUTER PRODUCTS BOSCHERT INCORPORATED	1331 CALIFORNIA CIRCLE	MILPITAS CA 95035
0J4C1	TVT DIECASTING AND MFG INC	7330 SW LANDMARK LANE	PORTLAND OR 97223
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
06666	GENERAL DEVICES CO INC	1410 S POST RD PO BOX 39100	INDIANAPOLIS IN 46239-9632
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

## Replaceable Mechanical Parts

Fig. & index no.	Tektronix part no.	Serial number		Qty	12345	Name & Description	Mfr. code	Mfr. part no.
		effective	discontinued					
1-1	200-4678-00			1		COVER, TOP: ALUMINUM, ECO422D *MOUNTING PARTS*	80009	200467800
-2	211-0538-00			16		SCREW, MACHINE: 6-32 X 0.312, FLH, 100 DEG, STL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
-3	200-4679-00			1		COVER, TOP: SMALL DOOR; ALUMINUM, *MOUNTING PARTS*	80009	200467900
-4	211-0538-00			4		SCREW, MACHINE: 6-32 X 0.312, FLH, 100 DEG, STL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
-5	367-0437-03			1		HANDLE: ALUMINUM *MOUNTING PARTS*	OJ4C1	367-0437-03
-6	211-0538-00			2		SCREW, MACHINE: 6-32 X 0.312, FLH, 100 DEG, STL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
-7	367-0437-01			1		HANDLE: ALUMINUM *MOUNTING PARTS*	OJ4C1	367-0437-01
-8	211-0538-00			2		SCREW, MACHINE: 6-32 X 0.312, FLH, 100 DEG, STL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
-9	213-0216-00			1		THUMBSCREW: 10-32 X 0.85, 0.375 OD HD, SST	0KB01	213-0216-00
-10	354-0025-00			1		RING, RETAINING: EXTERNAL, U/O 0.187 DIA SFT	TK0941	555-18MI
-11	426-2512-00			1		FRONT FRAME: ALUMINIUM *MOUNTING PARTS*	80009	426251200
-12	211-0538-00			4		SCREW, MACHINE: 6-32 X 0.312, FLH, 100 DEG, STL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
-13	333-4400-00			1		FRONT, PANEL: FRONT PANEL, ECO422D *MOUNTING PARTS*	80009	333440000
-14	211-0324-00			10		SCR, ASSEM WSHR: 4-40 X 0.188, PNH, SST, PASS, T-9 TORX DR, MACHINE *END MOUNTING PARTS*	0KB01	ORDER BY DESC
-15	-----			1		CKT BD ASSY: FRONT PANEL (SEE A1 REPL)		
-16	-----			1		POWER SUPPLY: SWITCHING, AUTO IN 85-264VAC, 47-440HZ, OUT 5VDC 5A, +15V2A, -15V 0.5A (SEE A4 REPL) *MOUNTING PARTS*		
-17	211-0408-00			3		SCR, ASSEM WSHR: 4-40 X 0.250, PNH, STL, ZINC, T-10 TORX DR, SEMS *END MOUNTING PARTS*	0KB01	ORDER BY DESC
	220-0187-00			1		NUT, HEX; CAP NUT, 4-40, NYLON SAFETY CONTROLLED		ORDER BY DESC
	211-0101-00			1		SCREW, MACHINE; 4-40 X 0.25, FLH, 100 DEG, STL CD PL, POZ		ORDER BY DESC
-18	337-3738-00			1		SHIELD, ELEC: POWER SUPPLY,	85471	337-3738-00
-19	-----			1		CKT BD ASSY: CONNECTOR BD (SEE A3 REPL) *MOUNTING PARTS*		
-20	211-1117-00			2		SCREW, MACHINE; 4-40 X 0.187, PAN HEAD, STL, CD PL, T-10, TORX DR	0KB01	ORDER BY DESC
-21	129-1449-00			2		SPACER, POST: ECO422D, 1.282 L	80009	129144900
-22	220-0256-00			18		NUT, NICKEL PLATED, VENDOR P/N B90010	73743	ORDER BY DESC
-23	210-0199-00			18		WASHER, LOCK; NICKEL PLATED, VENDOR P/N B91008 *END MOUNTING PARTS*	0KB01	ORDER BY DESC
-24	337-4007-00			1		SHIELD, ELECT: ECO422D	80009	337400700
-25	-----			1		CKT BD ASSY: MAIN BOARD (SEE A2 REPL) *MOUNTING PARTS*		



Fig. & index no.	Tektronix part no.	Serial number		Qty	12345	Name & Description	Mfr. code	Mfr. part no.
		effective	discontinued					
-26	211-1117-00			6		SCREW, MACHINE; 4-40 X 0.187, PAN HEAD, STL, CD PL, T-10, TORX DR	0KB01	ORDER BY DESC
-27	220-0497-00			15		NUT,PLAIN,HEX:0.5-28 X 0.562 HEX,BRS CD PL	73743	ORDER BY DESC
-28	210-1039-00			15		WASHER,LOCK:0.521 ID,INT,0.025 THK,SST *END MOUNTING PARTS*	0KB01	1224-02-00-0541
-29	337-4008-00			1		SHIELD,ELEC:ECO422D	80009	337400800
-30	131-4131-00			1		CONN,PLUG,ELEC:MALE W/LOCKING ADPTR,EXT MTG *MOUNTING PARTS*	80126	B-0778
-31	211-0012-00			2		SCREW,MACHINE:4-40 X 0.375,PNH,STL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
-32	351-0104-03			1		SL SECT,DWR EXT:12.625 L,W/O HARDWARE *MOUNTING PARTS*	06666	C-720-3 (WITHOU
-33	212-0158-00			8		SCREW,MACH:8-32 X 0.375,PNH,STL,CDPL,T-20 TORX DR *END MOUNTING PARTS*	0KB01	ORDER BY DESC
-34	441-2268-00			1		CHASSIS:ECO422D	80009	441226800
						STANDARD ACCESSORIES		
	061-4234-00			1		CARD,INFO:REFERENCE,ECO422D	80009	061423400
	071-0859-01			1		MANUAL,TECH:INSTRUCTION, EC0422D	80009	071085901
-35	351-0751-01			1		TRK SL OUT SECT:STATIONARY & INTERMEDIATE SAFETY CONTROLLED	06666	CC3442-99-0005
-36	161-0216-00			1		CABLE ASSY,PWR,:3,18 AWG,2.5M L,BLACK (STANDARD ONLY)	80126	C7120-25M-BL
						OPTIONAL ACCESSORIES		
	161-0215-00			1		CABLE ASSY,PWR,:3,0.75MU,2.5MM L,GREY (EUROPEAN OPTION A1 ONLY)	80126	0-5335-008-GY
	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
	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
	161-0154-00			1		CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,STR, IEC320,RCPT,SWISS,SAFTEY CONTROLLED (SWISS OPTION A5 ONLY)	S3109	12-H05VVF3G 00-
-37	386-7347-00			1		PLATE, SPACER; REAR PANEL, BNC, 0.090 AL, 5052-H3X	80009	386734700



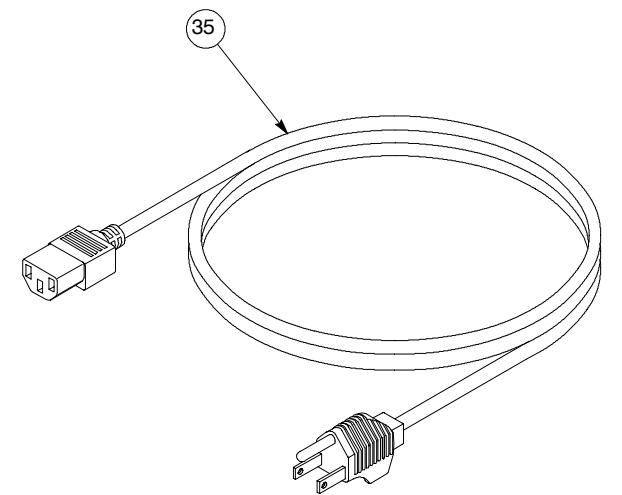
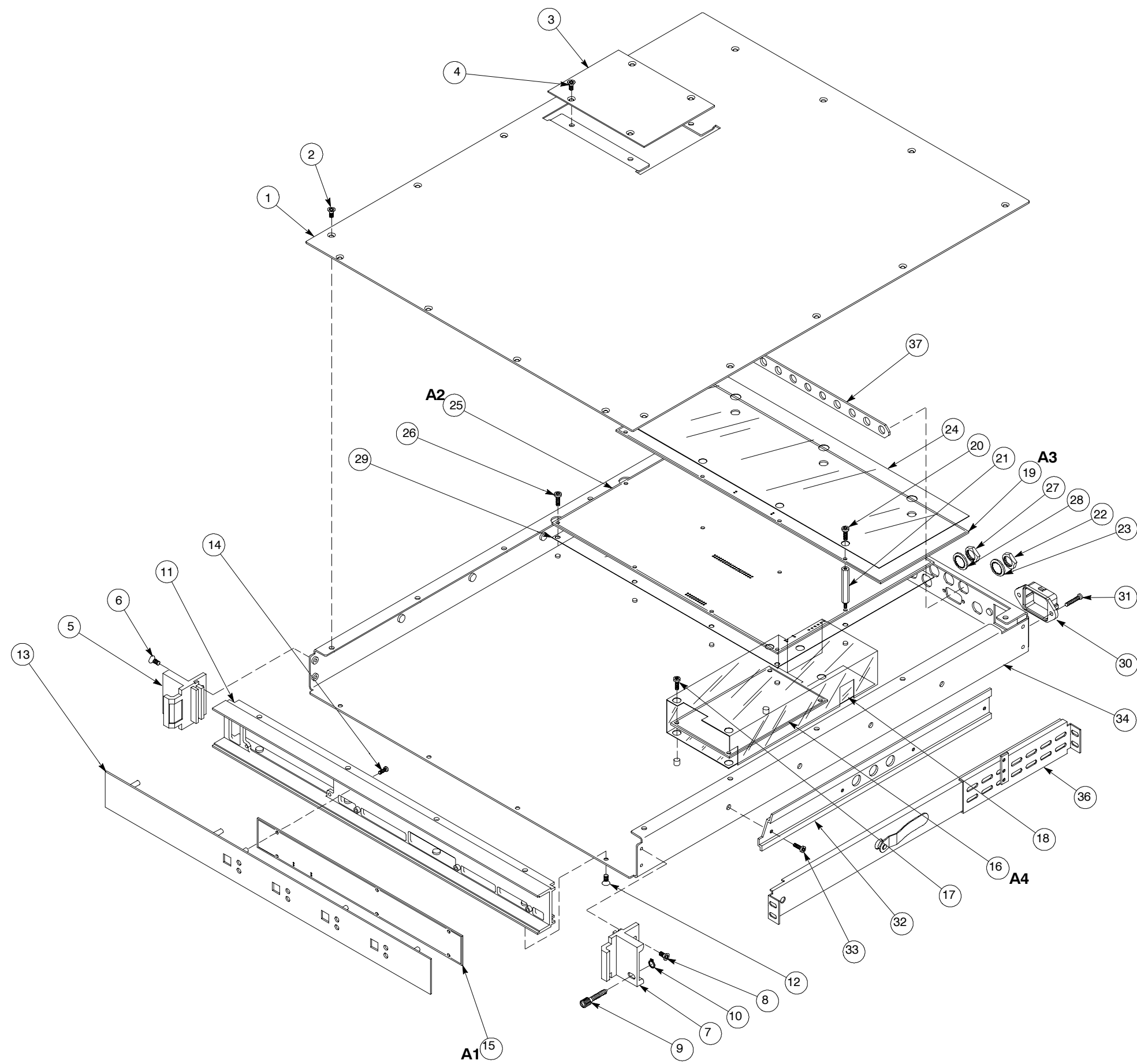


FIG. 1 EXPLODED VIEW



# Appendices



# Appendix A: Options

This instrument is orderable with an “A” option to accommodate the various national electrical power connections.

## Power Cord Options

Any of the following power cord options can be ordered for the ECO422D. If no power cord option is ordered, instruments are shipped with a North American 125 V power cord.

Option A1. Universal Europe, 220 V Power Plug (power cord and one replacement fuse)

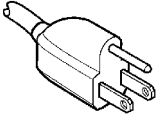
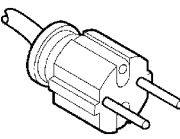
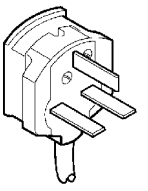
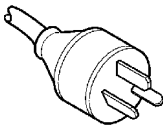
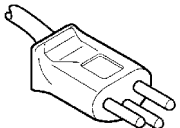
Option A2. United Kingdom, 240 V Power Plug (power cord and one replacement fuse)

Option A3. Australian, 240 V Power Plug (power cord and one replacement fuse)

Option A5 Switzerland, 230 V Power Plug (power cord and one replacement fuse)

Unless otherwise specified, power cords for use in North America are UL listed and CSA certified. Cords for use in areas other than North America are approved by at least one test house acceptable in the country to which the product is shipped. Power cord part numbers are shown on the “Accessories” pull-out.

**Table A-1: Power cord identification**

Plug configuration	Normal usage	Option number
	North America 125 V/15 A Plug NEMA 5-15P	Standard
	Europe 230 V	A1
	United Kingdom 230 V	A2
	Australia 230 V	A3
	Switzerland 230 V	A5