ECO422D
SD/HD Changeover Unit
S/N C050000 and above
Installation and Safety

Instructions

071-2683-00

Tektronix

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SD/HD Changeover Unit
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Installation and Safety Instructions

www.tektronix.com
071-2683-00

Tektronix

Contacting Tektronix

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USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

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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 a larger system. Read the safety sections of the other component 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.

Power Disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

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

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

Do Not Operate With Suspected Failures. If you suspect that 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.

Symbols and Terms

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

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

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

Symbols and 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.

The following symbol(s) may appear on the product:

Preface

This document contains the following information:

- Important safety precautions to avoid injury and prevent damage to this product or any products connected to it
- EMC (electromagnetic compliance), safety, and environmental standards with which the instrument complies
- Voltage, power, and environmental requirements to use the product
- Installation procedure
- Power-on and power-off procedure
- Front- and rear-panel controls and connectors

Product Description

The ECO422D SD/HD Changeover Unit 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.

NOTE. *A source transition can occur if the channel output amplitude is reduced. This can be caused by over-termination, cable damage, or an accidental short to ground. A channel's selected input and its output are directly connected through an internal relay, therefore the ECO422D detects an output reduction as an input reduction. This does not apply to the three Option ELSW channels, which are buffered.*

To avoid this problem, work on an output only when the ECO422D is not in operation. Disconnect the output cable from the ECO422D before working on the cable, and verify proper termination before reconnecting the cable to the ECO422D.

Option ELSW provides electronic switching on channels 4, 5, and 6, instead of the mechanical relays, for faster switching on NTSC or PAL black burst, or trilevel sync. With Option ELSW the channel 4, 5, and 6 inputs and outputs are internally terminated. A relay is provided to switch the primary input to the output in case of power failure.

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 trilevel 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.

Power Up Delay

The ECO422D has a delay between the time power is applied and the time the ECO422D starts error detection. This delay allows source equipment to become operational before detection begins. In early units this delay was greater than four minutes. With the addition of S13 the delay is adjustable, in approximately 30 second increments, from 0 to approximately eight minutes.

Product Documentation

The following table lists the documentation that is available for the product and shows where you can find it: in a printed manual, on the product documentation CD-ROM, or on the Tektronix Web site at www.tektronix.com.

Table 1: Product documentation

Item	Purpose	Location
ECO422D SD/HD Changeover Unit Installation and Safety Instructions (this manual) 071-2683-XX	Provides safety and compliance information with hardware installation instructions to present the associated safety warnings.	Printed manual and also available in electronic form on the Product Documentation CD and at www.tektronix.com/manuals
ECO422D SD/HD Changeover Unit Instruction Manual 077-0354-XX	Provides operation and application information.	Electronic format on the Product Documentation CD and at www.tektronix.com/manuals
ECO422D SD/HD Changeover Unit Reference Card 061-4234-XX	Provides a summary of factory default and user switch settings.	Printed format and also available in electronic form on the Product Documentation CD and at www.tektronix.com/manuals

Compliance Information

This section lists the EMC (electromagnetic compliance), safety, and environmental standards with which the instrument complies.

EMC Compliance

EC Declaration of Conformity – EMC

Meets intent of Directive 2004/108/EC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 55103:1996. Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. [1] [2]

- Environment E2 – commercial and light industrial
- Part 1 Emission
  - EN 55022:1987. Class B radiated and conducted emissions
  - EN 55103-1:1996 Annex A. Radiated magnetic field emissions
- Part 2 Immunity
  - IEC 61000-4-2:2001. Electrostatic discharge immunity
  - IEC 61000-4-3:2006. RF electromagnetic field immunity
  - IEC 61000-4-4:2004. Electrical fast transient / burst immunity
  - IEC 61000-4-5:2005. Power line surge immunity
  - IEC 61000-4-6:2003. Conducted RF Immunity
  - IEC 61000-4-11:2004. Voltage dips and interruptions immunity
  - EN 55103-2:1996 Annex A Radiated magnetic field immunity

EN 61000-3-2:2006. AC power line harmonic emissions

EN 61000-3-3:1995. Voltage changes, fluctuations, and flicker

European Contact.

Tektronix UK, Ltd.
Western Peninsula
Western Road
Bracknell, RG12 1RF
United Kingdom

1 To ensure compliance with the EMC standards listed here, high quality shielded interface cables should be used.

2 Inrush Current: Up to 4A peak

Australia / New Zealand Declaration of Conformity – EMC

Complies with the EMC provision of the Radiocommunications Act per the following standard, in accordance with ACMA:

- EN 55022:1987. Radiated and conducted emissions, Class B, in accordance with EN 55103-1:1996.

Australia / New Zealand contact.

Baker & McKenzie
Level 27, AMP Centre
50 Bridge Street
Sydney NSW 2000, Australia

Safety Compliance

EC Declaration of Conformity – Low Voltage

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:

Low Voltage Directive 2006/95/EC.

- EN 61010-1: 2001. Safety requirements for electrical equipment for measurement control and laboratory use.

U.S. Nationally Recognized Testing Laboratory Listing

- UL 61010-1:2004, 2nd Edition. Standard for electrical measuring and test equipment.

Canadian Certification

- CAN/CSA-C22.2 No. 61010-1:2004. Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1.

Additional Compliances

- IEC 61010-1: 2001. Safety requirements for electrical equipment for measurement, control, and laboratory use.

Equipment Type

Test and measuring equipment.

Safety Class

Class 1 – grounded product.

Pollution Degree Description

A measure of the contaminants that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.

- Pollution Degree 1. No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.
- 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.
- 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.
- Pollution Degree 4. Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

Pollution Degree

Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only.

Installation (Overvoltage) Category Descriptions

Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:

- Measurement Category IV. For measurements performed at the source of low-voltage installation.
- Measurement Category III. For measurements performed in the building installation.
- Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.
- Measurement Category I. For measurements performed on circuits not directly connected to MAINS.

Overvoltage Category

Overvoltage Category II (as defined in IEC 61010-1)

Environmental Considerations

This section provides information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

Equipment Recycling. Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.

This symbol indicates that this product complies with the applicable European Union requirements according to Directives 2002/96/EC and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Support/Service section of the Tektronix Web site (www.tektronix.com).

Restriction of Hazardous Substances

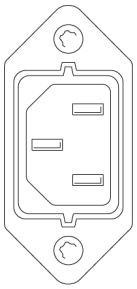
This product is classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

Operating Requirements

This section provides the specifications that you need to know to operate your product safely and correctly. Refer to the complete product specifications for additional information.

Electrical Ratings

Power Requirements



Power connector

The instrument has the following power requirements:

- A single-phase power source with one current-carrying conductor at or near earth-ground (the neutral conductor).

NOTE. *Systems with both current-carrying conductors live with respect to ground (such as phase-to-phase in multiphase systems) are not recommended as power sources.*

- The mains supply frequency must be 50 Hz or 60 Hz.
- The mains supply voltage must be in the range from 100 VAC to 240 VAC.

WARNING. *To reduce risk of fire and shock, ensure the mains supply voltage fluctuations do not exceed 10% of the operating voltage range.*

- The power consumption is 40 W maximum.

Fuses

The instrument does not contain any user-replaceable fuses.

Batteries

The instrument does not contain any user-replaceable batteries.

Input Ratings

Table 2: Maximum input voltage

Input	Rating
Maximum Switched Voltage	±5 V
Channels 4-6 (Opt. ELSW only)	±1 V (designed to use NTSC/ PAL Black Burst or TriLevel sync only)
Maximum Switched Current	100 mA

Environmental Ratings

Table 3: Environmental specifications

Characteristic		Description
Temperature	Operating	0 °C to +40 °C
	Nonoperating	–40 °C to +65 °C
Humidity		5% – 95% humidity, noncondensing
Altitude	Operating	to 2,000 meters (6,562 feet)
	Nonoperating	to 12,192 meters (40,000 feet)
Vibration	Operating	From 5 to 350 Hz: 0.0002 g^2/Hz Acceleration Power Spectral Density (APSD). From 350 to 500 Hz: -3 dB/Octave Slope. At 500 Hz: 0.00014 g2/Hz APSD. 0.31 overall GRMS. 10 minutes/axis.
	Nonoperating	From 5 to 100 Hz: 0.020 g^2/Hz (APSD). From 100 to 200 Hz: -3 dB/Octave Slope. From 200 to 350 Hz: 0.010 g2/Hz APSD. From 350 to 500 Hz: -3 dB/Octave Slope. At 500 Hz: 0.007 g2/Hz APSD. 2.46 overall GRMS. 10 minutes/axis.
Shock (nonoperating)		Half Sine Wave Shock levels: 50 g's (instrument), 11 ms 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.

Physical Specifications

Table 4: Physical specifications

Characteristic		Description
Dimensions	Height	1.734 inches (4.4 cm)
	Width	19.0 inches (48.3 cm)
	Length	22.1 inches (56.1 cm)
Weight	Net	10.8 lbs (4.9 kg)
	Shipping	18.3 lbs (8.3 kg)

Cleaning

Cleaning is not required for the safe operation of the instrument. However, if you want to perform routine cleaning on the exterior of the instrument, the instructions are located in the *ECO422D Instruction Manual*.

Front-Panel Controls and Connectors

The following figure shows the layout of the ECO422D front-panel controls and indicators. There are no front-panel connectors. (See Figure 1.)

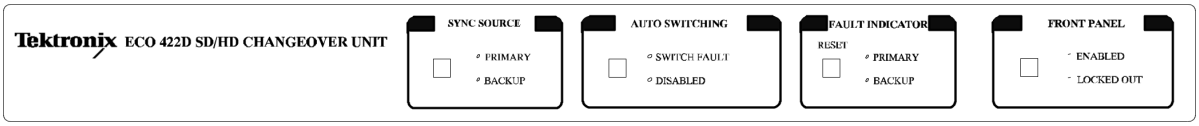


Figure 1: ECO422D front panel

Sync Source - Primary/Backup

The LED indicates the source of the current output, whether it is from the primary or backup input. Press the **Sync Source** button to manually change the signal source. (If the ECO422D is in Normal mode, this is only true when the other input is good or both inputs are bad. (See page 25, *User Configuration Switch (S14-8)*.) Only one of these LEDs can be on. Primary is the default source when the instrument is powered on.

Auto Switching - Switch Fault/Disabled

This switch 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-on delay. Switch on Fault is the default setting. During power-on, the DISABLED LED slowly blinks to indicate that the front panel is disabled and error detection during the power-on delay.

Fault Indicator (Reset) - Primary/Backup

Either one or both of these LEDs can 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-on, 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-on (during power-on, both LEDs are lit).

Rear-Panel Controls and Connectors

The following figure shows the rear-panel layout of the ECO422D. (See Figure 2.)

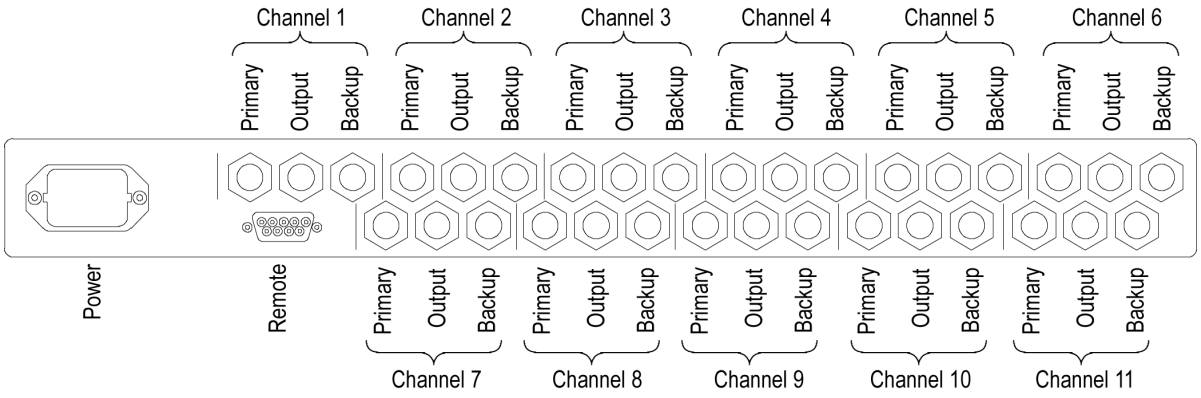


Figure 2: ECO422D rear panel

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 ±10%.

WARNING. *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, arranged into a Primary input, a Backup input, and an Output for each of the 11 channels. 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 trilevel 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.

Opt. ELSW. With Opt. ELSW, channels 4, 5, and 6 are designed for use only with NTSC or PAL black burst, or trilevel sync.

Remote

The rear-panel connector is a 9-pin female D-connector, with one pin tied to ground. (See Figure 3.)

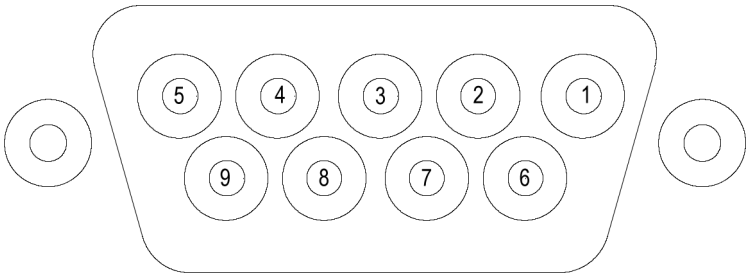


Figure 3: Remote connector pins

The pinout is shown in the following table. (See Table 5.)

Table 5: Remote connector pinout

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 and 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 μA 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 the following figure. (See Figure 4.)

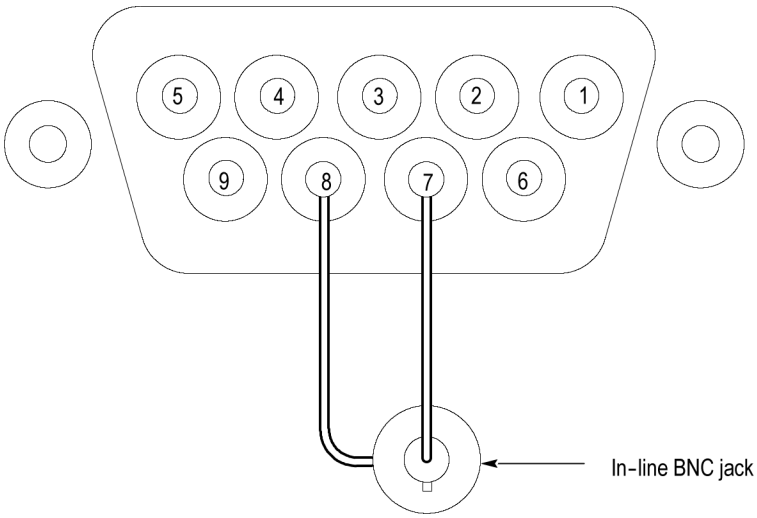


Figure 4: Wiring required to conform with SMPTE fault reporting

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 17.75 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 15.5 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. (See Figure 8.) Rail mounting details for both deep and shallow racks are also shown. (See Figure 6.) and (See Figure 7.) Front mounting details are also shown below. (See Figure 5.) Make sure that the stationary sections are horizontally aligned, level, and parallel.

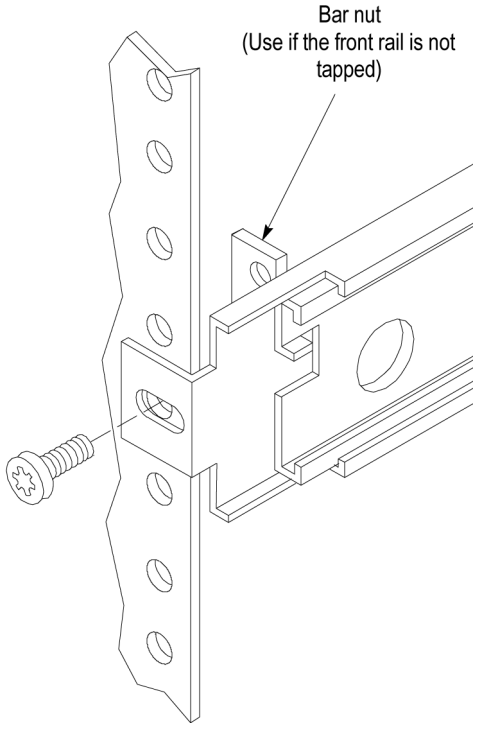


Figure 5: Front rail mount

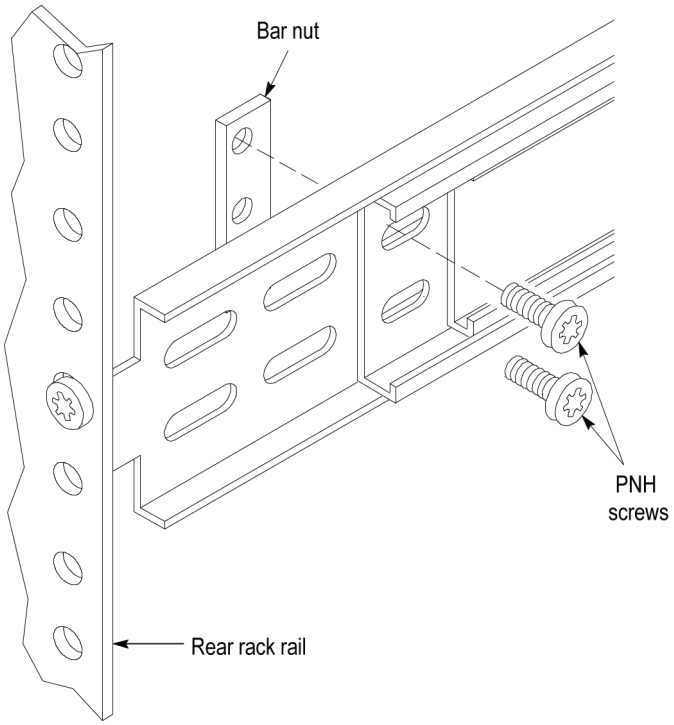


Figure 6: Deep rackmount

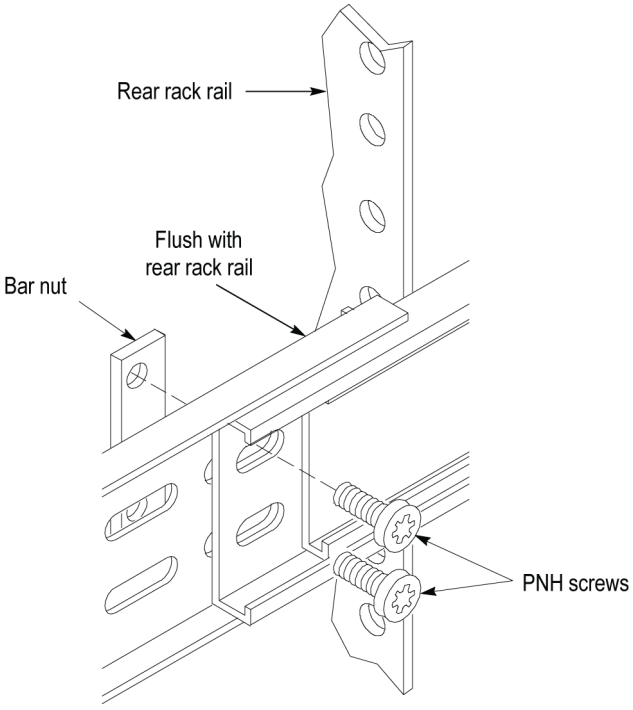


Figure 7: Shallow rackmount

NOTE: Right hand and left hand stationary sections are designated by the RH and the LH markings on the rails. Stop latch holes should be toward the bottom when slides are in place. (The right hand rail is shown here.)

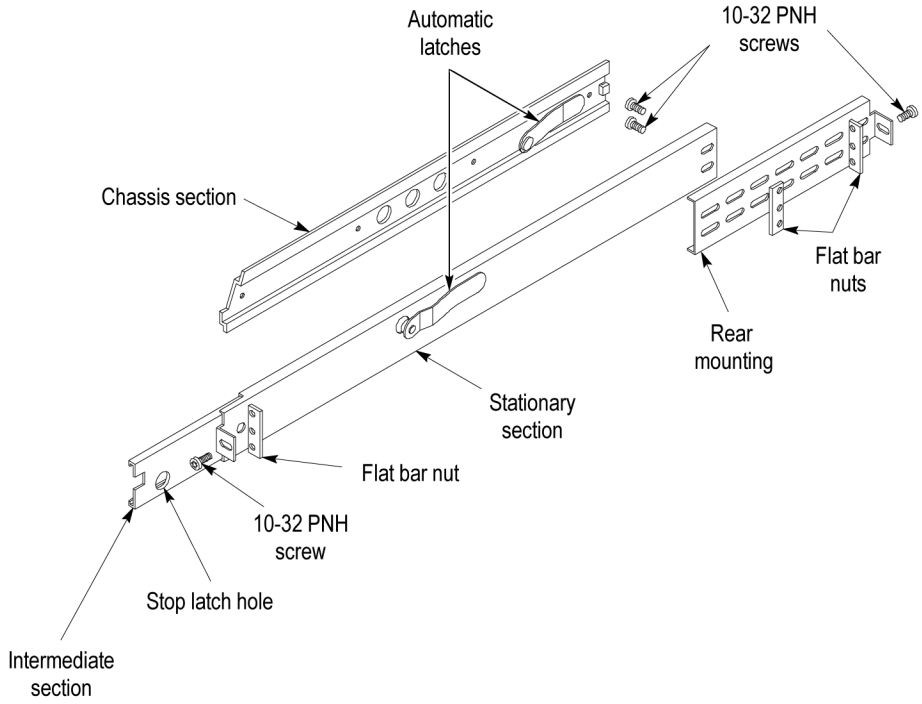


Figure 8: Assembly of rackmounting hardware

Installing the Instrument

Perform the following steps to install the instrument in an equipment rack. (See Figure 9.)

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 knurled retaining screw.

Removing the Instrument

Perform the following steps to remove the instrument from an equipment rack. (See Figure 9.)

1. Loosen the front-panel knurled retaining screw.
2. Grasp the front handles and pull the instrument out until the slide sections latch. The instrument is firmly held in this position.
3. To completely remove the instrument from the rack, first be sure to disconnect all cabling.
4. Press both stop latches (visible in the stop-latch holes), and then carefully slide the instrument free from the rackmount tracks.

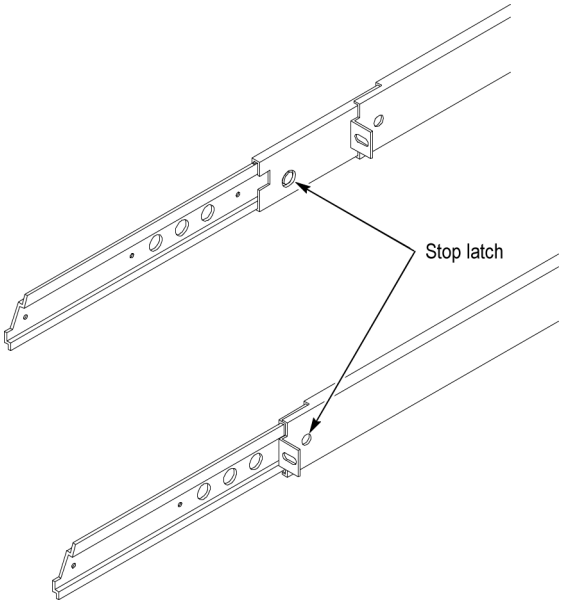


Figure 9: Installing or removing the rack slides

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.

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.

- Opt. A0 - North America power
- Opt. A1 - Universal EURO power
- Opt. A2 - United Kingdom power
- Opt. A3 - Australia power
- Opt. A5 - Switzerland power
- Opt. A6 - Japan power
- Opt. A99 - No power cord or AC adapter
- Opt. AC - China power

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 listed at the end of the Replaceable Mechanical Parts section in the *ECO422D Instruction Manual* (Tektronix part number 077-0354-XX).

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. (See Figure 2 on page 13.)

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).*

NOTE. *A source transition can occur if the channel output amplitude is reduced. This can be caused by over-termination, cable damage, or an accidental short to ground. A channel's selected input and its output are directly connected through an internal relay, therefore the ECO422D detects an output reduction as an input reduction. This does not apply to the three Option ELSW channels, which are buffered.*

To avoid this problem, work on an output only when the ECO422D is not in operation. Disconnect the output cable from the ECO422D before working on the cable, and verify proper termination before reconnecting the cable to the ECO422D.

Depending on how you configure the user switches, there are different ways to connect the signal cables to the ECO422D. (See page 22, *User Switch Configuration*.) The following illustration is only one example. (See Figure 10.)

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 blank table provided to record what type of signals you have connected to each set of outputs on the rear panel. (See Table 6 on page 23.) 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 help in setting up the instrument.

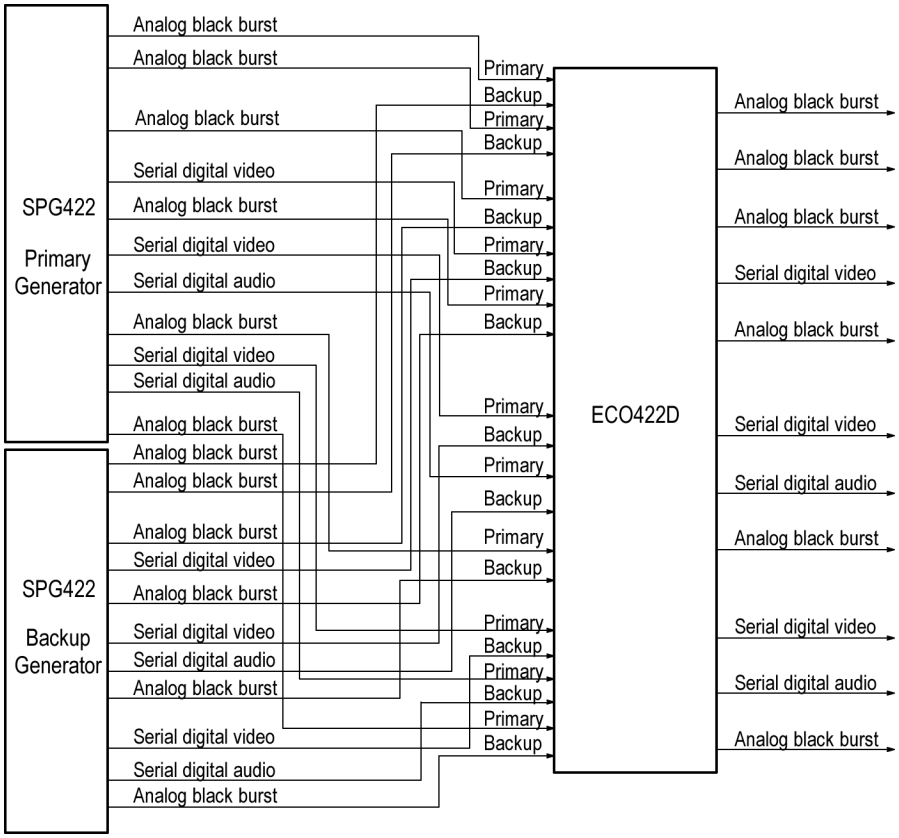


Figure 10: Example of ECO422D connections

User Switch Configuration

Remove the small panel on the top cover of the instrument to access the user configuration switches. (See Figure 11.) 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.

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.*

The gray shading on the illustration of the switches indicates the down position of the rocker switch. (See Figure 11.)

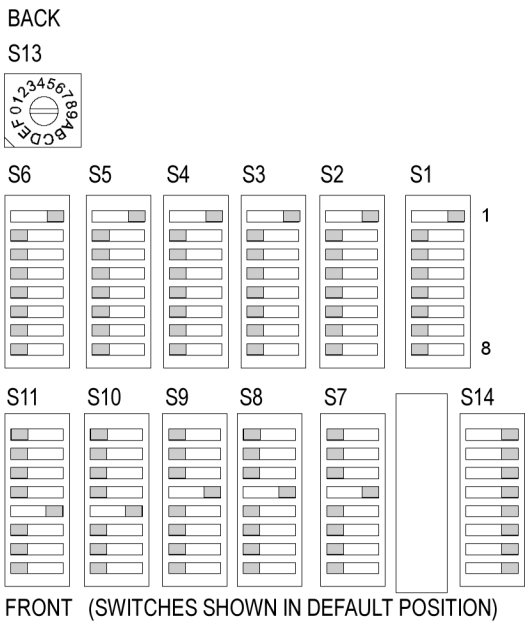


Figure 11: User configuration switches

Make of copy of this page to log the configuration of your system and use it as a quick reference. The tables on the following page list the functions for each switch position and the factory default positions for each switch.

Table 6: Channel configuration switch log (S1 - S11)

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

[1] Attenuation cannot be set on switches S1-S6.

The following table lists the functions for each of the switches.

Table 7: Configuration and mode switch functions

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 trilevel 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)

The following table lists the factory setting of the switches. (NTSC or PAL black burst is determined by the power cord option ordered with the instrument.) (See Table 8.)

Table 8: Factory settings of channel configuration switches (S1 - S11) [1]

Output # / Switch #	Setting (see above)	Attenuation (set with Sx-8) On	Attenuation (set with Sx-8) Off	Type of signal attached
1 / S1	1 or 2	n/a	✗	Black burst
2 / S2	1 or 2	n/a	✗	Black burst
3 / S3	1 or 2	n/a	✗	Black burst
4 / S4	1 or 2	n/a	✗	Black burst
5 / S5	1 or 2	n/a	✗	Black burst
6 / S6	1 or 2	n/a	✗	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

[1] User Configuration Switch (S14-8) - closed - Normal

User Configuration Switch (S14-8)

This switch determines how the ECO422D responds to faulty signals, either Normal or Override.

For Normal operation, you 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 you press the Sync Source button, the output will be the Backup signal. If you press 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, you can manually switch to a “bad” signal, with Auto mode disabled.

The other positions of switch 14 are used only for testing; they must be closed for normal operation.

Power-on Delay Switch (S13)

This hex switch sets the delay duration between the time power is applied and the time the ECO422D starts error detection. This delay allows source equipment to become operational before detection begins.

The delay is adjustable in approximately 30 second increments, from 0 to approximately eight minutes (position 0 = no delay). The factory setting is position 5, which provides a delay of slightly under three minutes. (See Figure 11 on page 22.)

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, active analog 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.

To summarize, here are 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.

Power-On and Power-Off Procedure

This instrument operates from a single-phase power source with the neutral conductor at or near earth ground. The line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the power cord is essential for safe operation.

Power-On

1. Connect the supplied power cord to the rear-panel power connector.
2. Turn the power supply on.
3. When power is first applied, the front panel AUTO SWITCHING DISABLED LED will flash during the power-on delay.
4. When the ECO422D has completed the power-on delay, the SWITCH ON FAULT LED should come on.

   The length of the power-on delay is user adjustable. Use S13 to adjust the delay in approximately 30 second increments, from zero delay to approximately eight minutes. (See page 25, *Power-on Delay Switch (S13)*.)

NOTE. *For test purposes, the power-on delay can be defeated by pressing the front panel ENABLED button while connecting the power cord.*

Power-Off

1. Remove power completely from the instrument by disconnecting the power cord from the rear-panel of the instrument.

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 instrument controls, refer to the Operating Basics section in the *ECO422D Instruction Manual*.

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

Two Good Signals

1. Power down all instruments.
2. Connect the ECO422D as shown in the following figure. (See Figure 12.)

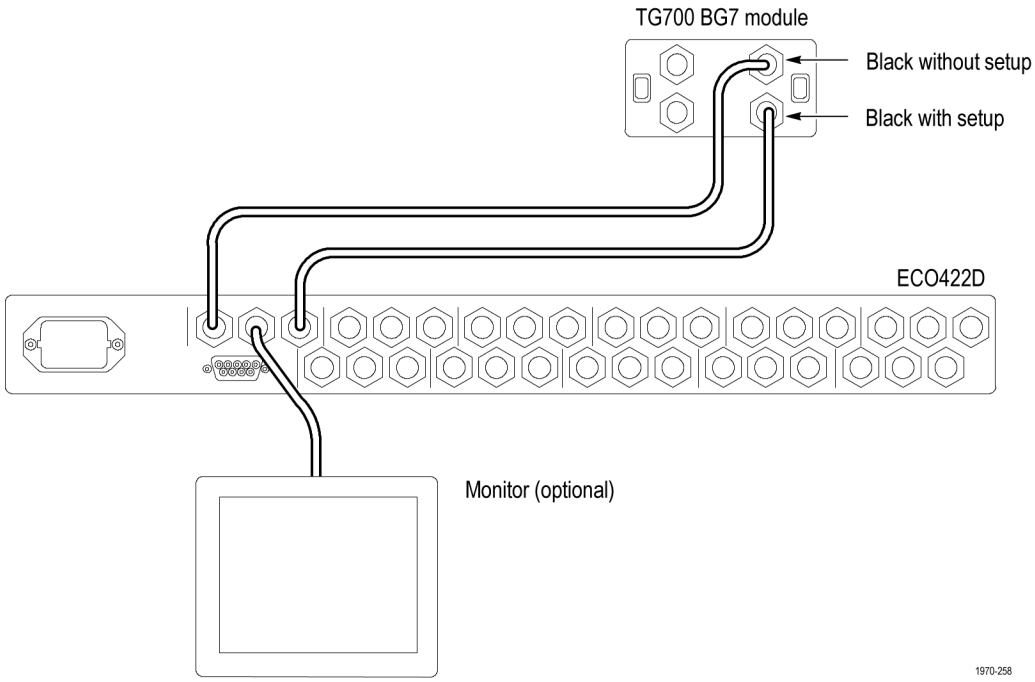


Figure 12: Equipment setup for the functional check

3. Set all of the DIP switches (S1 - S11) to open, except for S1-1, which should be set to closed (NTSC black burst). (See Figure 11 on page 22.) 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.)
4. Set the user switch (S14-8) to Normal (closed).
5. Power up all instruments.

6. Enable the front panel, using the Front Panel button.
7. Set the ECO422D to "Switch on Fault" using front-panel buttons. (This is the default at power on.)
8. If Primary is not already the source, press the Sync Source button to make Primary the source. (This is the default at power on.)
9. Note that the output signal is the Primary input signal (black burst without setup) and that none of the fault indicators light.
10. Press the Sync Source button to change to the Backup source.
11. Note that the signal changes to black burst with setup (Backup).
12. Check that there is no error indicated for either signal.
13. Press the Sync Source button again, to switch back to the Primary input.

Loss of the Primary Signal

1. Disconnect the Primary signal source. (Remove the cable between the BG7 and the Primary 1 input of the ECO422D.)
2. Note the signal automatically switches to the Backup input and the Primary fault indicator lights.
3. Reconnect the Primary signal source. (Replace the cable between the BG7 and the Primary 1 input of the ECO422D.)
4. Note that the Primary fault indicator remains on and the Sync Source remains the Backup (the ECO422D does not automatically switch back to Primary).
5. Press the Reset button.
6. Note that the Primary fault indicator turns off.
7. Press the Sync Source button to return to the Primary as the source.
8. Press the Auto Switching button to disable the "Switch on Fault" function.
9. Remove the Primary input signal. (Again, remove the cable between the BG7 and the Primary 1 input of the ECO422D.)
10. Note that no switching occurs, but that the Primary fault indicator lights.
11. Press the Sync Source button to change to the Backup signal.
12. 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.)
13. Reconnect the Primary input source. (Replace the cable between the BG7 and the Primary 1 input of the ECO422D.)
14. Press the Reset button to clear the fault indicator LED.
15. Return the auto switching to "Switch on Fault."
16. Note that the sync source is still Backup.

Loss of the Backup Signal

1. Disconnect the Backup signal. (Remove the cable between the BG7 and the Backup 1 input of the ECO422D.)
2. Note that the output signal has changed to the Primary input signal and the Backup fault indicator LED lights.
3. Reconnect the Backup signal. (Replace the cable between the BG7 and the Backup 1 input of the ECO422D.)
4. Clear the fault indicator by pressing the Reset button.
5. Press the Sync Source button to return to Backup sync source.

Loss of Power to the ECO422D

1. Remove the power source from the ECO422D.
2. Note that the output signal switches to the Primary input signal.
3. Return the power source.