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DATASHEET

TEKTRONIX® ECO8000 Automatic Changeover Unit

The ECO8000 is a highly versatile automatic sync and signal changeover unit with configurations and capabilities required to address modern master sync application and other advanced sync timing application. This changeover unit offers exceptional reliability, stability and high availability and is designed with optional high bandwidth input changeover capabilities for 3G/HD/SD SDI signal environments.

The Tektronix ECO8000 Automatic Changeover Unit, available directly from Grass Valley® is used in conjunction with a pair of Tektronix SPG8000A Master Sync/Master Clock Reference Generators for most broadcast facility, studio, mobile and post-production timing applications.

Instrument Configuration

The ECO8000 provides up to nine user-configurable BNC channels. Each channel consists of primary and backup inputs, and an output.

The ECO8000-GV-STD configuration has six 50 MHz Electronic Fast Switch and three 3 GHz Relay Switch channels.

The 50 MHz Electronic Fast Switch channels support black burst, HD tri-level sync, AES/DARS, and word clock signals. The 3 GHz Relay Switch channels support SD/HD/3G-SDI signals as well as most analog reference signals.

For applications that require more than nine BNC channels, two ECO8000 instruments can be configured to work as a single system which practically doubles the number of channels available (up to 18 BNC channels).

Channel Configuration

Channel configuration can be set either via the front panel or the ECO8000 Web User Interface. Signal amplitude fault detection level follows the setting of the channel configuration. Detection on individual channel may be disabled, giving the option of disabling switching to the backup unit on failure of signals not critical to the facility operation.

Changeover Switching

When operated in the switch-on-fault mode, the ECO8000 will automatically select the backup sync source should any of the primary inputs fail. However, in the unlikely event both sync sources are faulty, the ECO8000 will not alternate between the two sources. If necessary, this function may be overridden with the manual sync source selection. Manual source selection also facilitates periodic testing of the changeover function.

50 MHz Electronic Fast Switch Channels

The Electronic Fast Switch function significantly improves the changeover switching speed and thus minimizes disturbance of the reference sync signals when switching between primary and

Key Features

- Switches analog blackburst, HD tri-level sync, AES/DARS, word clock, LTC, as well as SD/HD/3G-SDI signals – all the timing and synchronization signals required in modern broadcast, production and post production facilities
- Scalable product architecture to fit various application needs
- Electronic Fast Switch function for near glitch-less sync source switching, minimizing disruption in operations
- Automatic or Manual changeover mode
- Front panel LED fault indicators for each individual channel as well as the status of the power supplies
- Dual hot-swappable power supplies ensure continuous availability of reference signals
- Easy to manage with Web-based interface for configuration and SNMP for status and alert information

backup inputs. The Electronic Fast Switch channels have latching relay backups that engage on loss of power to maintain the selected signal path.

3 GHz Relay Switch Channels

The 3 GHz Relay Switch channels are optimized for SD/HD/3G-SDI signals, but are also usable for most reference signals. These channels utilize high bandwidth latching relays to preserve the selected signal path upon a loss of power.

In addition, these channels are equipped with the Tektronix patent-pending "Relay Check" function*[1]. When this function is enabled, the instrument automatically checks the signal level on each 3 GHz Relay Switch channel before and after every changeover switch to determine the condition of the relay contacts of these channels. If it is determined that the relay contacts may have nonconductive coating (such as oxide) buildup, the instrument will cycle the relay rapidly for 20 times to wear through the layer of nonconductive coating in an attempt to restore the relay connections (relay self-cleaning attempt).

LTC Channels

The 4x LTC channel connections are pin-compatible with the Tektronix SPG8000 generators, so these signals can be connected with standard 15 pin D-SUB cables. An adapter cable is also included to provide 4 XLR male connectors for LTC outputs and BNC male connectors for GPI outputs.

Front Panel Controls

In association with the LCD display, front-panel controls are provided for source selection, operating mode, resetting the fault indicators, and for disabling the front-panel controls. LED fault indicators are also provided for each individual channels as well as the status of the power supplies. When the unit is connected to an Ethernet network, these functions are also available from the ECO8000 Web User Interface using a Web browser on a computer connected to the same network.

Backup Power Supply

The hot-swappable, redundant (backup) dual power supply system virtually removes the risk of sync loss due to power supply unit failure, minimizing disruption in operations. Unique to the ECO8000, the unit periodically tests the backup power supply to verify its performance. If the test fails, a fault will be indicated on the LED fault indicator as well as an error message for backup power supply replacement – providing extra assurance that the backup power supply will be ready when needed.

Each power supply module has both AC and DC indicator LEDs. These LEDs continue to operate for 10 minutes after the loss of power. This allows quick troubleshooting in the event of supply or AC power failure.

Alarm and Status Reporting

Alarm and status information can be reported through SNMP, GPI, email notification, and/or the ECO8000 Web User Interface.

Rackmount slides and rails kit (1 RU height, standard full depth) are included in the configuration.

1 The Relay Check function on the 3 GHz Relay Switch channels operates only on channels that are connected (terminated).

Specifications

Typical Return Loss

Base 50 MHz Electronic Fast Switch channels:

- 35 dB, 300 kHz to 6 MHz
- 25 dB, 6 MHz to 30 MHz

3 GHz Relay Switch channels:

- 40 dB, 300 kHz to 6 MHz
- 30 dB, 6 MHz to 30 MHz
- 15 dB, 30 MHz to 1.5 GHz
- 10 dB, 1.5 GHz to 3 GHz

Insertion Loss

Base 50 MHz Electronic Fast Switch channels:

- < ±0.2 dB DC to 10 MHz
- Typical < –1 dB DC to 50 MHz

3 GHz Relay Switch channels:

- < –0.1 dB DC to 10 MHz
- Typical < –3 dB DC to 3 GHz
- Equivalent to approx. 5m (16.4 ft.) of Belden 1694 cable

Maximum Switched Voltage

Base 50 MHz Electronic Fast Switch channels: –3V to +5V

3 GHz Relay Switch channels: ±2.5V peak, 1.5V RMS

Maximum Switched Current

100 mA

Crosstalk

Unselected input to output or channel to channel

Base 50 MHz Electronic Fast Switch channels:

- < –60 dB, 300 kHz to 6 MHz
- < –40 dB, 6 MHz to 50 MHz

3 GHz Relay Switch channels:

- < –48 dB, DC to 1.5 GHz
- < –40 dB, 1.5 GHz to 3 GHz

Relay Switch Interruption Time

Time that it takes for the relays to switch and settle

Typically 0.5 ms to 2 ms

Channel Switch Settling Time (base only with identical signals on both inputs)

Time that it takes for the channel to switch and settle

Bi-level and tri-level sync: Typically 5 ns glitch, then 125 ns to 90% of final value

AES and 1V word clock: Typically 5 ns glitch, then 250 ns to 90% of final value

5V word clock: Typically 25 ns glitch, then 500 ns to 90% of final value

Preset Threshold Signal Types

Base 50 MHz Electronic Fast Switch channels: NTSC, PAL, tri-level, AES, 1V word clock, 5V word clock, custom

3 GHz Relay Switch channels: NTSC, PAL, tri-level, AES, 1V word clock, SD-SDI, HD-SDI, 3G-SDI, custom

Signal Level Range to Detect Fault with Preset Thresholds: –2 dB to –4 dB from the nominal level for the selected signal type

LTC Channels

LTC threshold presets:

- 0.5 to 5V p-p in 0.5V steps, differential or single-ended LTC load range
- 600Ω to open circuit

Crosstalk: <-60 dB for LTC signals

Switching interruption duration: Typically 1 ms

Power Source

Mains Ranges:

- Voltage: 100 to 240 VAC
- Frequency: 50/60 Hz
- Power consumption: 50 VA maximum

Environmental

Temperature:

- Operating: 0° C to +50° C (+32° F to +122° F)
- Nonoperating: –20° C to +60° C (-4° F to +140° F)

Altitude:

- Operating: To 3,000m (9,842 ft.)

Regulatory

EMC: Complies with EMC Directive 2004/108/EC

Safety:

- Approved to: UL61010-1, CAN/CSA-C22.2 No.61010-1
- Complies with: EN61010-1, IEC61010-1

Physical Characteristics

Dimensions:

Height: 43.7 mm (1.72 in.)

Width: 483 mm (19.0 in.)

Depth: 557 mm (21.9 in.)

Weight:

Net: 4.5 kg (10.0 lbs.)

Ordering

ECO8000-GV-STD

ECO8000 Automatic Changeover Unit with 6x 50 MHz Fast Switch channels, 3x 3 GHz Relay Switch channels, 4x LTC channels with XLR adapter cable, redundant power supply and rackmount rails kit.