

# Automatic Changeover Unit

## ECO8020 Datasheet

### Features & Benefits

- Switches analog black burst, 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

### Applications

- Sync generator and time reference generator system for broadcast, studio, mobile, and post-production facilities
- Master or slave (genlock) operation for distributed system architectures

The ECO8020 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. The ECO8020 offers exceptional reliability, stability and high availability and is designed with optional high bandwidth input changeover capabilities for HD/SD and/or 3G-SDI signal environments.

Each ECO8020 unit can be used with the following signal generators to form the complete sync generator system, which offers extra redundancy for the critical timing and synchronization system in the facilities.

- A pair of Tektronix Master Sync / Master Clock Reference Generators (SPG8000) for most broadcast facility timing applications.
- A pair of Tektronix Test Signal Generators (TG8000) for more advanced post production facility timing applications.

### Instrument Configuration

The ECO8020 provides up to 20 user-configurable channels with high density BNC connectors and four LTC channels through the breakout cable. Each channel consists of primary and backup inputs, and an output.

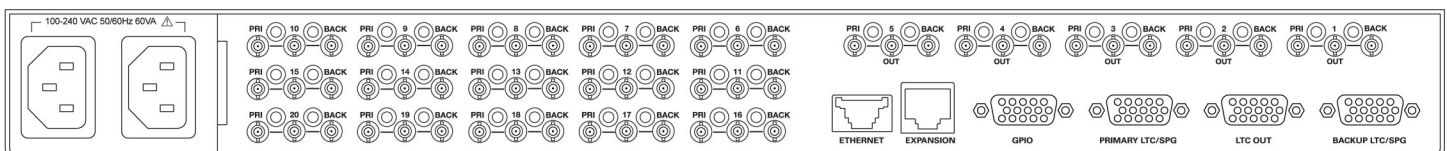
The base configuration has five 50 MHz Electronic Fast Switch channels with options for 15 more 50 MHz Electronic Fast Switch or 3 GHz Relay Switch channels in groups of five channels each, plus four optional LTC channels.

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 20 high-density BNC channels, two ECO8020 instruments can be configured to work as a single system which practically doubles the number of channels available (up to 40 high-density BNC channels and eight LTC channels).

### Channel Configuration

Channel configuration can be set either via the front panel or the ECO8020 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.



ECO8020 Automatic Changeover Unit front panel and back panel.

### Changeover Switching

When operated in the switch-on-fault mode, the ECO8020 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 ECO8020 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, which comes standard with all 50 MHz Electronic Fast Switch channels, significantly improves the changeover switching speed and thus minimizes disturbance of the reference sync signals when switching between primary and backup inputs. The Electronic Fast Switch channels have latching relay backups that engage on loss of power to maintain the selected signal path.

### Optional 3 GHz Relay Switch Channels

The optional 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.

### Optional LTC Channels

The optional LTC channel connections are pin-compatible with the Tektronix SPG8000 and TG8000\*1 generators, so these signals can be connected with standard 15 pin D-SUB cables. The same cable can be used to carry GPI connections, which allow the SPG8000 to trigger a changeover on certain error conditions such as loss of genlock.

\*1 The TG8000 generator must have a GPS7 module installed in order to support LTC generation.

### 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 ECO8020 Web User Interface using a Web browser on a computer connected to the same network.

### Optional Backup Power Supply

The optional hot-swappable, redundant (backup) dual power supply system (Option DPW) virtually removes the risk of sync loss due to power supply unit failure, minimizing disruption in operations. Unique to the ECO8000 and ECO8020, 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 ECO8020 Web User Interface.

## Characteristics

### Inputs and Outputs

#### Typical Return Loss –

Base and Option REF 50 MHz Electronic Fast Switch channels:

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

Option HREF 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 and Option REF 50 MHz Electronic Fast Switch channels:

- $\leq \pm 0.2$  dB DC to 10 MHz.
- Typical  $< -1$  dB DC to 50 MHz.

Option HREF 3 GHz Relay Switch channels:

- $< 0.1$  dB DC to 10 MHz.
- Typical  $< -3$  dB DC to 3 GHz
- Equivalent to approx 5 m of Belden 1694 cable.

#### Maximum Switched Voltage –

Base and Option REF 50 MHz Electronic Fast Switch channels:

- $-3$  V to  $+5$  V

Option HREF 3 GHz Relay Switch channels:

- $\pm 2.5$  V peak, 1.5 V RMS.

#### Maximum Switched Current (Option HREF only) – 100 mA.

**Crosstalk (Unselected input to output or channel to channel) –**

Base and Option REF 50 MHz Electronic Fast Switch channels:

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

Option HREF 3 GHz Relay Switch channels:

- $< -48$  dB, DC to 1.5 GHz.
- $< -40$  dB, 1.5 GHz to 3 GHz.

**Relay Switch Interruption Time (Option HREF only) –** Time that it takes for the relays to switch and settle. Typically 0.5 ms to 2 ms.

**Channel Switch Settling Time (Base and Option REF 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 4 ns glitch then 125 ns to 90% of final value.

AES and 1 V word clock:

- Typically 4 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 and Option REF 50 MHz Electronic Fast Switch channels:

- NTSC, PAL, Tri-level, AES, 1V word clock, 5v word clock, custom.

Opt HREF 3 GHz Relay Switch channels:

- NTSC, PAL, Tri-level, AES, 1 V 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 5  $V_{p-p}$  in 0.5 V steps. Differential or single ended.

LTC Load Range:

- 600  $\Omega$  to open circuit

Crosstalk:

- $< -60$  dB for LTC signals

Switching interruption:

- $< 1$  ms typical

## 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.

Nonoperating: -20 °C to +60 °C.

### Altitude –

Operating: To 9842 feet (3000 meters).

## 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

Dimension	mm	in.
Height	43.7	1.72
Width	483	19.0
Depth	557	21.9
Weight	kg	lb.
Net	4.5	10.0

## Ordering Information

### ECO8020

ECO (automatic changeover) base unit.  
Includes: 5 x 50 MHz Electronic Fast Switch channels using high-density BNC connectors (black burst, HD tri-level sync, AES/DARS, word clock) and a Quick Start User Manual (Tektronix part number 071-3221-xx).

### Product Options

Option	Description
DPW	Add a second hot-swappable redundant (backup) power supply (a second power cord option is required)
REF *2	Add 5 x 50 MHz Electronic Fast Switch channels using high-density BNC connectors (black burst, HD tri-level sync, AES/DARS, word clock)
HREF *2	Add 5 x 3 GHz Relay Switch channels using high-density BNC connectors (3G-SDI, HD-SDI, SD-SDI, as well as black burst, HD tri-level sync, AES/DARS, word clock)
LTC	Add 4 x LTC channels
CBL	Add coaxial adapter cables from high-density male BNC connector to standard male BNC connector (a set of 10 cables, 75 Ω, 18 inches long)
XLR	Add adapter cable (6 feet long) from 15-pin D-sub LTC OUT connector on the ECO8020 to 4 XLR male connectors (for LTC outputs) and BNC male connectors (for General Purpose Interface outputs)
RACK	Add rackmount slides and rails kit for ECO8020 (1 RU height, standard full depth)

\*2 You can add any combination of Option REF and HREF modules, but the total number of additional modules is limited to three.

### Power Cord Options \*3

Option	Description
A0	North American power
A1	Universal European power
A2	United Kingdom power
A3	Australia power
A5	Switzerland power
A6	Japan power
A10	China power
A11	India power (no locking cable)
A12	Brazil power (no locking cable)
A99	No power cord

\*3 All power cords include a locking mechanism except as otherwise noted.

### Service Options

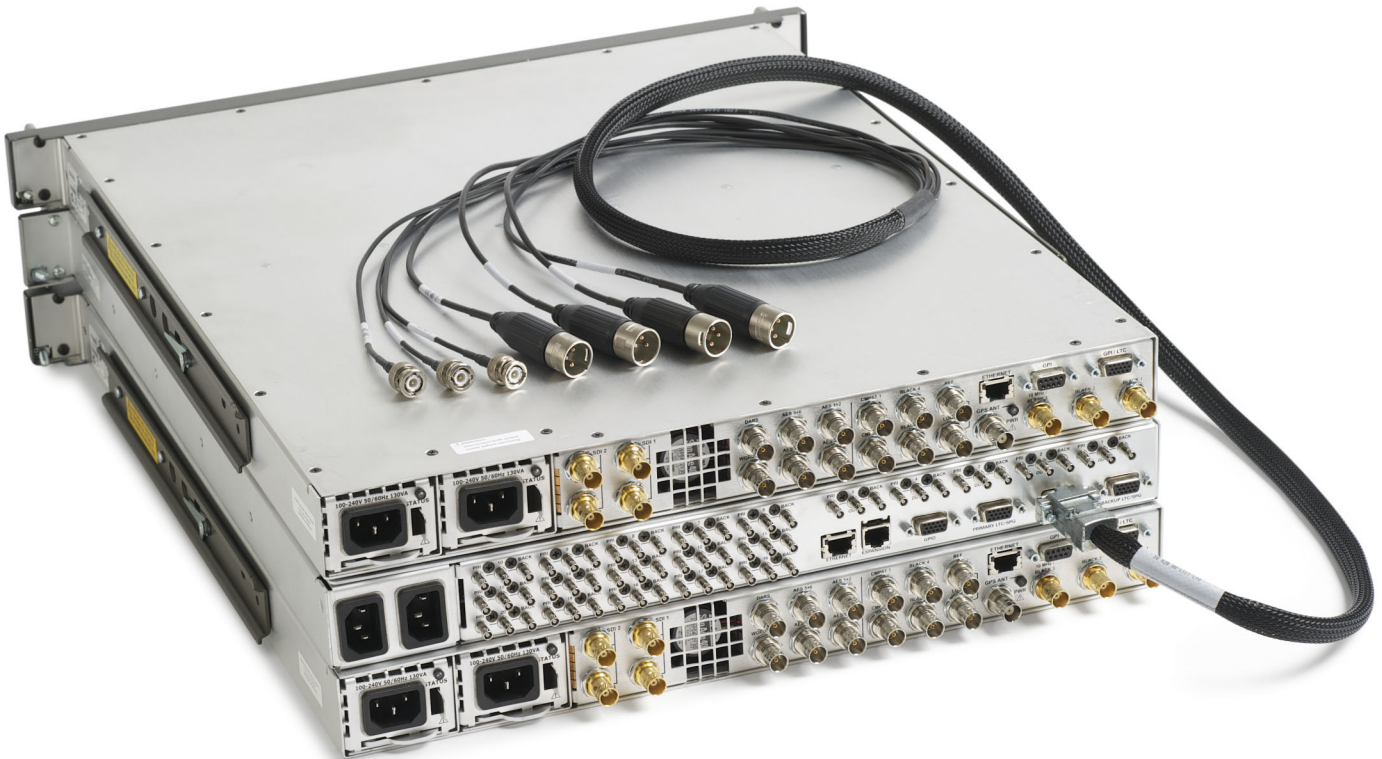
Option	Description
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
D1	Calibration Data Report
D3	Calibration Data Report 3 Years (with Opt. C3)
D5	Calibration Data Report 5 Years (with Opt. C5)
G3	Complete Care 3 Years (includes expedited repair, loaner, scheduled calibration and more)
G5	Complete Care 5 Years (includes expedited repair, loaner, scheduled calibration and more)
R3	Repair Service 3 Years (including warranty)
R5	Repair Service 5 Years (including warranty)

**ECO802UP**

Field upgrade kit for the ECO8020.

**ECO802UP Options**

Option	Description
DPW	Add a second hot-swappable redundant (backup) power supply. A power cord option must also be specified. (See Power Cord Options.)
LTC	Add 4 x LTC channels (software upgrade option)
CBL	Add coaxial adapter cables from high-density male BNC connector to standard male BNC connector (a set of 10 cables, 75 $\Omega$ , 18 inches long)
XLR	Add adapter cable (6 feet long) from 15-pin D-sub LTC OUT connector on the ECO8020 to 4 XLR male connectors (for LTC outputs) and BNC male connectors (for General Purpose Interface outputs)
RACK	Add rackmount slides and rails kit for ECO8020 (1 RU height, standard full depth)
IF	Add upgrade installation service
IFC	Add service installation and calibration



Option XLR adapter cable



Option DPW backup power supply



Option CBL adapter cable



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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**For Further Information.** Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit [www.tektronix.com](http://www.tektronix.com)



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