



## DS1 Retimer/Filter

### TEK-150



- Reconstitutes network timing accuracy
- Simple, economical timing solution
- Eliminates timing transients
- Allows for timing of edge/remote elements
- For remote switching node timing
- Ensures effective data/call continuity
- Automatic cut-thru on failure
- Mounts in existing switch cabinet
- Rack mount optional
- 5-Year limited warranty
- NEBS level III certified
- RoHS compliant

In today's evolving network topologies, edge aggregation element deployments have increased while still employing DS1 network interfaces. These remote switches are connected through various transport and routing elements, rather than through dedicated copper cable. Maintaining accurate timing of edge and remote switches is therefore difficult because the timing traceability and stability can become corrupted or untraceable within these transit elements. Spectracom's Timing Enhancement Kit (TEK™) provides a simple, economical solution to this problem.

Core and host systems accept timing references from a Building Integrated Timing Supply (BITS). Edge devices and remote switches generally do not have external clock inputs, instead deriving their timing from the host via the network DS1 line(s). The remote acts as a slave clock following the input. This makes the stability of this element susceptible to buffer delay, TDMoIP variations, wander, and pointer adjustment. These timing deviations can cause the clock in the remote switch to lose sync with the core network or host element, compromising effective data/voice delivery.

The TEK-150 Retimer/Filter reconstitutes the timing accuracy and stability of the network DS1. The device employs a unique line retiming buffer that ensures the DS1 stream is delivered at the accuracy of the local reference. Accurate rate is established and phase transients are removed from the DS1 line at the point of use. If the reference is lost, the TEK-150 reverts to its embedded filtering algorithm, ensuring DS1 line continuity while mitigating detrimental transients.

Installing a TEK-150 is a simple method for reconstituting and maintaining network standard frequency for edge/remote devices that does not require specific transport network topology knowledge or assignment. The TEK is a compact, hard-wired device designed to mount inside the physical cabinet of the remote switch. Unlike external timing units, the TEK has no need for east/west coding, making the input and output designations more intuitive. This design also minimizes the risk of cascading errors caused by improper connections.

For installations external to the remote switch, Spectracom offers a rack kit for mounting in 19 inch EIA racks or 23 inch WeCo racks.

## PHYSICAL & ENVIRONMENTAL

### DIGITAL PLL OPERATION:

**Bandwidth:** 0.1 Hz (wide) or 0.01 Hz (narrow); switch-selectable

**Phase Buildout:** Input phase changes of  $\geq 3.5$   $\mu$ sec over an interval of  $\leq 0.1$  second are absorbed by DPLL without causing  $\geq 0.05$  UI (32 nsec at DS1 rate) phase change on the output.

Input phase changes of  $\leq 1.0$   $\mu$ sec over interval of  $\leq 0.1$  second are not built-out.

### JITTER FILTERING:

When synced to an ideal (jitter-free) signal, the output jitter is  $< 32$  nsec (0.05 UI at DS1 rate) peak-to-peak

### WANDER TRANSFER:

When receiving an input signal whose TDEV is less than or equal to the following levels:

Integration Time $\tau$ (seconds)	Input TDEV (nanoseconds)
$0.05 \leq \tau < 10$	100
$10 \leq \tau < 1000$	$31.6 \times \tau^{0.5}$
$1000 \leq \tau$	N/A

The TDEV of the output signals is less than or equal to the following levels:

Integration Time $\tau$ (seconds)	Output TDEV (nanoseconds)
$\tau < 0.05$	N/A
$0.05 \leq \tau < 0.1$	$1020 \times \tau$
$0.1 \leq \tau < 10$	102
$10 \leq \tau < 1000$	$32.2 \times \tau^{0.5}$
$1000 \leq \tau$	N/A

### RELIABILITY:

Estimated MTBF  $> 400,000$  hours

## INPUTS/OUTPUTS

### POWER INPUT:

Dual (A & B) -48 VDC nominal; isolated lugs with protective covering

### AMI INPUT & OUTPUT, ALARM RELAY CONTACTS:

Tip/ring; 0.045" wire-wrap leads with protective covering; alarm closure rated at 2A max. relay contacts

### INPUT FRAMING:

Operates with either Super-Frame (SF) or Extended Super Frame (ESF).

### LINE CODING SELECTION:

AMI or zero-suppression

### INPUT SELECTION:

BITS input automatically selected if signal is present and valid; if no valid BITS signal available, unit filters AMI input signal.

### OUTPUT IMPEDANCE:

DS1: 100 ohm  $\pm 6\%$

### OUTPUT LEVEL (DS1):

0 dB (default) or -7.5 dB

### OUTPUT SQUELCH

User settable output squelching on fault or loss of timing reference

## PHYSICAL & ENVIRONMENTAL

### SUPPLY VOLTAGE:

-36 to -72 VDC,  $\pm 2$  VDC

### SUPPLY CURRENT:

**Steady-state:** Less than 100 mA (at -48 VDC)

**Start-up:** Less than 125 mA (at -48 VDC)

### START-UP VOLTAGE TRANSIENTS:

0 V to -75 V

### ENVIRONMENTAL:

**Operating Range:** 23° to 158°F (-5° to 70°C)

**Rate of Change:**  $\pm 86^\circ\text{F}/\text{hour}$  ( $\pm 30^\circ\text{C}/\text{hour}$ )

**Storage Range:** -40° to 185°F (-40° to 85°C)

**Relative Humidity:** 95% max., non-condensing

**Vibration:** 0.008 g<sup>2</sup>/Hz @ 5-20 Hz; 0.05 g<sup>2</sup>/Hz @ 20-100 Hz

### SIZE/WEIGHT:

6.8125" W x 1.875" H x 4.0" D, 1.0 lbs  
 (173.0 mm W x 48.0 mm H x 102.0 mm D, 0.45 kg)

## WARRANTY

### FIVE YEAR LIMITED WARRANTY:

Extended warranty is available

## ORDERING INFORMATION

- Timing Enhancement Kit**  
 TEK-150 Filter  
 19" EIA /23" WeCo Rack Mounting Kit

## ADDITIONAL ACCESSORIES

- Service Options**  
 Premium Support Package  
 Extended Warranty