



E1 Filter

TEK-200



- Ensures network timing cohesion
- Simple, economical timing solution
- Eliminates timing transients
- Stabilizes timing of edge remote elements
- Improves data/call continuity
- Stabilizes base station/base station controller operation
- Automatic cut-thru on failure
- Mounts in existing switch cabinet
- Rack mount optional
- 5-Year Limited Warranty
- CE certified
- RoHS compliant

The TEK-200 E1 Filter ensures network timing cohesion for remote and edge elements. In today's evolving network topologies, edge and remote network element deployments have increased. Most remotes, however, are still connected through E1 lines, which traverse various SDH multiplexers rather than physical copper wire or conventional E13 multiplexers. The extracted E1 timing can become corrupted by pointer adjustments and multiplexing queues. Spectracom's Timing Enhancement Kit (TEK™) provides a simple, economical solution to this problem.

The TEK-200 uses a timing filter to maintain the phase integrity of the clock during pointer adjustments and other timing anomalies caused by multiple multiplexer hops. With Spectracom's TEK, the client's clock does not lose lock, producing effective data movement and ensuring a graceful system recovery on rearrangement.

Core or host systems accept references from a Synchronisation Supply Unit (SSU). Edge aggregation and remote switches generally do not have external clock inputs, instead deriving their timing from the E1 line connected to the host. The remote acts as a slave clock following the line input. This makes it susceptible to timing anomalies introduced by pointer adjustments or multiplexing schemes, which can cause the clock in the remote switch to lose sync.

When the TEK-200 detects the phase shifts that occur on the E1 line, it removes those phase shifts, maintaining less than 0.05 UI of phase movement on the delivered E1 line. Removing the phase shifts allows the input circuits of downstream client devices to maintain their locks on the host's clock.

The TEK-200 employs phase build-out techniques coupled with proprietary adaptive Frequency Locked Loop (FLL) algorithms. This prevents the client network element from falsely locking to multiple phase movements and from de-coupling caused by rapid or large magnitude transients. This ensures network timing cohesion for all edge elements connected to a master system.

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 mounting solutions for ETSI cabinets/racks.

PHYSICAL & ENVIRONMENTAL**DIGITAL PLL OPERATION:**

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

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

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

JITTER FILTERING:

When tracking an ideal (jitter-free) signal, the output jitter is < 24 nsec (0.05 UI at E1 rate) peak-to-peak

WANDER TRANSFER:

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

Integration Time τ (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 τ (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:

RJ connectors, alarm relay contacts rated at 2A max.

INPUT FRAMING:

Operates with either Channel Associated Signaling (CAS) or Common Channel Signaling (CCS) on E1 line

SWITCH SELECTION:

AMI or zero-suppression

OUTPUT IMPEDANCE:

E1: 75 ohm $\pm 6\%$ or 120 ohm $\pm 6\%$, switch selectable

OUTPUT SQUELCH

User settable output squelching on fault

PHYSICAL & ENVIRONMENTAL**SUPPLY VOLTAGE:**

-36 to -60 VDC, ± 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: -5° to 70°C (-23° to 158°F)

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

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

Relative Humidity: 95% max., non-condensing

Vibration: $0.008 \text{ g}^2/\text{Hz}$ @ 5-20 Hz; $0.05 \text{ g}^2/\text{Hz}$ @ 20-100 Hz

SIZE/WEIGHT:

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

WARRANTY**FIVE YEAR LIMITED WARRANTY:**

Extended warranty is available

ORDERING INFORMATION

- Timing Enhancement Kit**
TEK-200 Filter

ADDITIONAL ACCESSORIES

- Mounting**
480mm/580mm (19"/23") Rack Mount Kit
- Service Options**
Premium Support Package
Extended Warranty