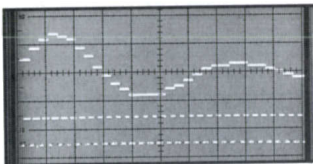


# INSTANTANEOUS TIME-INTERVAL TO VOLTAGE CONVERTER

**A** clear view into digital control systems

- Real-time Scope Display of Time-Interval Variations vs. Time
- Time Delay, Pulse Width, and Period Measurements
- >2 Million Uninterrupted Event-by-Event Measurements/second



The TVC 501 instantaneously and continuously converts consecutive timing measurements to a time-interval vs. time waveform. The top trace (TVC output) shows the pulse-to-pulse width vs. time variations of the lower stream of pulses.

## ORDERING INFORMATION

**TVC 501** Instrument Module **\$2,500**  
Includes: 2 monitor cables; 1 P6109 10X readout probe; operator's manual (070-7991-00); service manual (070-7992-00). Requires a TM 500/5000 Power Module. See page 241.

## RECOMMENDED ACCESSORIES

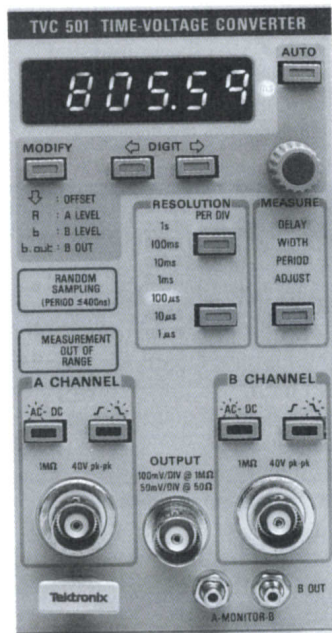
**Monitor cable** - 42 in SMB-BNC (012-0532-00) **\$55**  
**Output cable** - 42 in BNC-BNC (012-0057-01) **\$25**  
**50Ω BNC feed through termination** - (011-0049-01) **\$35**  
**P6408** 16-bit Word Recognizer **\$375**  
Use the P6408 when time-intervals are defined by a bus address.  
**P6420** RF Probe, 10 kHz-1 GHz **\$195**  
Demodulates RF bursts for pulsed RF timing measurements  
**P6009** 100X Readout Probe **\$250**  
Extends trigger voltage range to ±125V for high voltage pulses  
See probes section for other readout probes and input terminations.

## THE NEED FOR TIME-INTERVAL MEASUREMENTS

Measuring parameters is no longer as simple as recording voltage vs. time. In digital or switching systems, signals are sampled, pulse-coded, or pulse-width modulated. Relevant information is in the varying time intervals between the signal transitions. It is in these time intervals that failures often occur. For example, control pulse widths in a switching power supply can be too long or short which can overdrive output transistors. Or an embedded controller's interrupt latency can be too long which can cause a system crash.

Timing variations typically appear as left-to-right motion or jitter on a scope. Timebase or trigger holdoff adjustments may improve display stability but do not show timing dynamics. The TVC 501 untangles the often

confusing waveforms in digital systems and delivers a coherent and real-time view.



## TVC 501

and instantaneously generates a voltage proportional to the measurement. Timing measurements are made with crystal controlled accuracy using digital counters. Conversions are performed pulse-to-pulse without averaging. The TVC output goes to any scope. The TVC 501 provides seven vertical scales from 1 μsec to 1 sec per division. Up to 30,000 divisions of offset permit small timing variations to be viewed on events with large average values.

## REAL TIME

There is no resetting or re-arming. The continuous TVC output becomes another trace on your scope that can be correlated, measured, and analyzed with waveforms on other channels. Since the TVC generates voltages proportional to time-intervals, you can set your scope to trigger on timing violations such as a time-delay that exceeds a threshold or an incorrectly narrow pulse or glitch.

## QUICK RESULTS

On power-up, the TVC generates a scale calibration waveform to set the scope's gain and offset. One key press can automatically set the trigger level or the measurement range. You can use the monitor output signal to verify that the TVC is measuring what you actually want it to measure. The TVC can also generate demonstration signals to quickly familiarize you with its operation.

## FLEXIBLE CONFIGURATION

The TVC 501 can be used with other TM 500/5000 modular instruments in a suitable power module mainframe. See page 241.

## CHARACTERISTICS

### A AND B CHANNEL INPUTS (BNC)

**Impedance** - 1 MΩ, ≤50 pF.

**Coupling** - ac or dc selectable.

**Trigger Slope** - Rising or falling edge selectable.

**Trigger Level** - Adjustable in 10 mV steps in ±1.25V window, 100 mV steps in ±12.5V window when using 10X probes. Digital trigger level readout decodes Tektronix readout probes.

**Sensitivity** - ~10 nsec pulses at 250 mV.

## SAME SCOPE, MORE POWER

The TVC 501 adds three measurement functions to your scope's voltage vs. time capability: time-delay vs. time, pulse-width vs. time, and period vs. time.

The TVC continuously measures the timing parameter

## TIMING MEASUREMENTS

**Functions** - A-Period, A-Width, A-to-B Delay.

**Scope Viewing Range** - ±4 divisions around Conversion Offset, out-of-range LED flags conversions outside of viewing range.

**Conversion Offset** - Adjustable to 30,000 divs in 0.1 div increments.

**Conversion Scale** - 1 μsec/div to 1 sec/div in 7 decade steps.

**Best Timing Resolution** - 33 nsec at 1 μsec scale (1/30th of a division).

**Uninterrupted Rate** - Up to 2.5 MHz (400 nsec between events), random sampling LED flags missed measurements.

## MEASUREMENT OUTPUT (BNC)

**Voltage range** - ±400 mV into 1 MΩ. Corresponds to ±4 vertical scope divisions when scope set to 100 mV/div. Automatically clips outside of ±4 division range.

**Response time** - voltage settles <500 nsec after end of event.

## A AND B MONITOR OUTPUTS (SMB)

**Voltage range** - -0-500 mV into 1 MΩ. Goes high when input meets trigger slope and level criteria.

**B monitor prescaler** - Can generate one pulse every 100 or every 1000 triggers to measure high frequency oscillators (>100 MHz).

**B monitor demonstration** - Can generate 5 different digital demonstration signals.