

Programmable tachometer conditioner for engine monitoring and testing systems.

# TSC-4800A

## TACHOMETER SIGNAL CONDITIONER

- Tachometer Generators
- Long-tooth signals
- Short-tooth signals
- Offset tooth signals
- Laser Tachometers
- 1/Rev signal outputs
- Load and recall predefined parameter settings
- Ethernet control Interface



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# A modern signal conditioner for all types of engines

*The TSC-4800A is a complete speed signal conditioning unit capable of working with all types of engine speed signals. Whether you are testing engines with a long tooth or short tooth embedded N1 signal, if you have engines with older high-voltage tachometer generators, or if you are testing engines with the new offset tooth design, the TSC-4800A will condition all of these types of signals.*

**Condition three individual speed signals** – The TSC-4800A can be configured to condition up to three (3) individual speed signals. Labeled Channel A, Channel B and Channel C, each channel can be assigned to a different engine speed signal (for example N1, N2, N3) and each channel can be individually controlled and programmed to condition different types of speed signals.



**Select between primary and secondary input signals** – Many engines have primary and secondary speed signals. Consequently, the TSC-4800A permits the selection of multiple input sources for each channel. Primary and secondary inputs are via three pin MS connectors where a full differential signal can be accepted.

**Select test signals** – The TSC-4800A also allows speed signals to be selected from a third input labeled “Test” for each channel. These signals may come from laser tachometers, or other types of speed sensing devices. The isolated BNC connector also makes this input useful for system testing and calibration checks.

**Select internal test signal** – The TSC-4800A generates an internal test signal on every channel. This 100 Hz test signal is used as part of the automatic power-up system test, and can also be selected at any time to serve as a quick operational test.

## TSC-4800A rear view

Configured with three channels and all optional buffer outputs

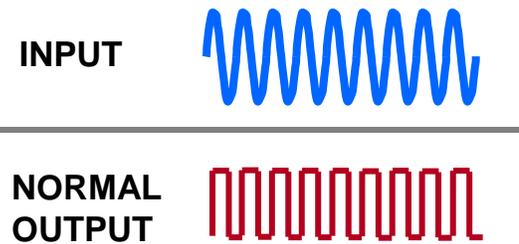


# Unsurpassed features and capabilities for engine testing

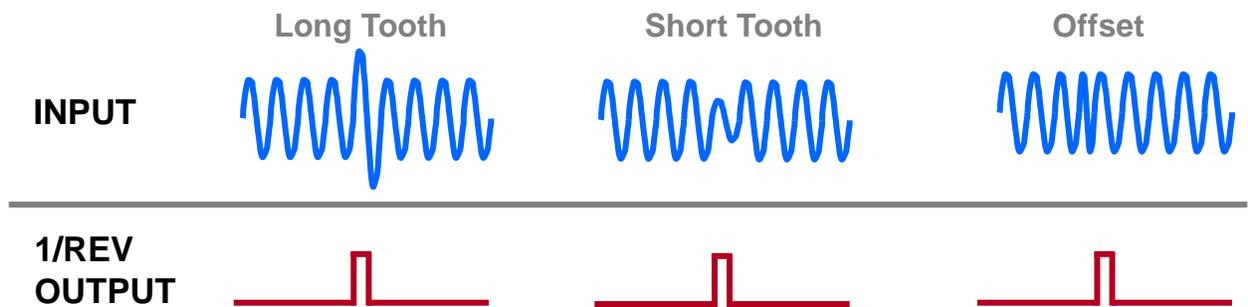
# Useful output signals from all types of inputs

The base configuration TSC-4800A provides users with three different conditioned output signals.

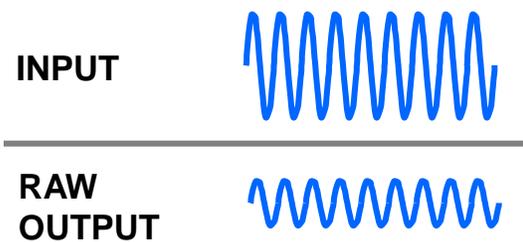
**NORMAL OUTPUT - Pulses coincident with the input signal** – For engines with N1 tachometer generators and for most N2 and N3 signals, the TSC-4800A generates a “Normal” output signal. This output is a series of TTL level pulses that are coincident with every input pulse of the speed signal.



**1/REV OUTPUTS - Pulses coincident with the 1/revolution signal** – Most new engines have an “embedded” 1/revolution signal within the N1 speed signal as illustrated below. The TSC-4800A extracts these “embedded” signals and produces an easy to use 1/revolution pulse which is required for engine balancing.



**RAW OUTPUT - Raw analog signal proportional to the input signal** – The TSC-4800A also provides an analog signal that is approximately 1/10 of the input speed signal.



**Condition other signal types** – The TSC-4800A can also condition other types of signals that may come from engine FADEC systems or other instrumentation. These signals can be square wave signals, triangle waves, and short-duration pulse type signals produced by magnetic sensors. The TSC-4800A will also accept signals from optical and laser sensors.

Use the Ethernet link to program and control the TSC-4800A

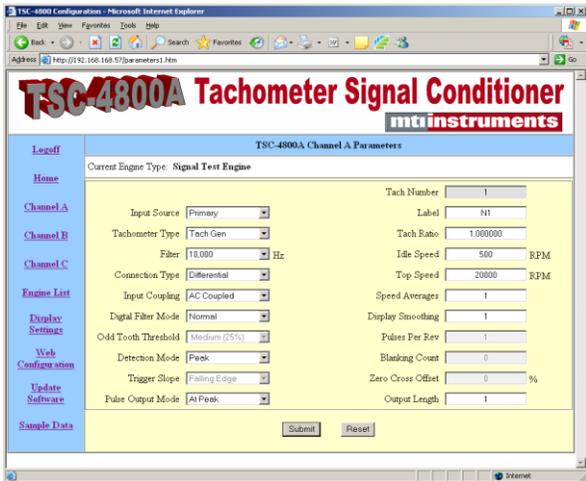


# High-Speed digital signal processing ensures accuracy and performance

**Advanced signal processing** - Each channel of the TSC-4800A utilizes a dedicated 14-bit high speed signal processor. These processors independently sample speed signals 20 million times per second to ensure that every change in the signal is detected. This allows the TSC-4800A to reliably detect critical amplitude and timing changes in the speed signal, maintain accurate phasing of the output pulses, and track rapid speed changes of the engine.



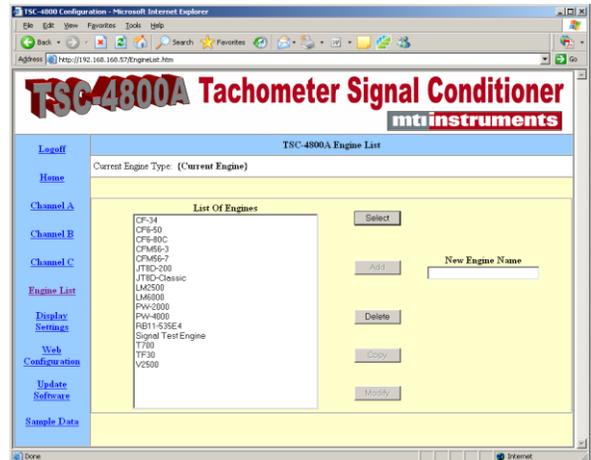
## Ethernet Control Interfaces



**Web Controls** - The TSC-4800A features a full Ethernet control interface for configuration, control and testing of the unit. A WEB style interface offers users easy access to the unit from any computer running an Internet browser program. Other computers can directly control the TSC-4800A using a simple yet complete machine interface language.

- Select input channels
- Select signal type (long tooth, Short tooth etc.)
- Define signal filters
- Establish signal thresholds
- Control trigger points

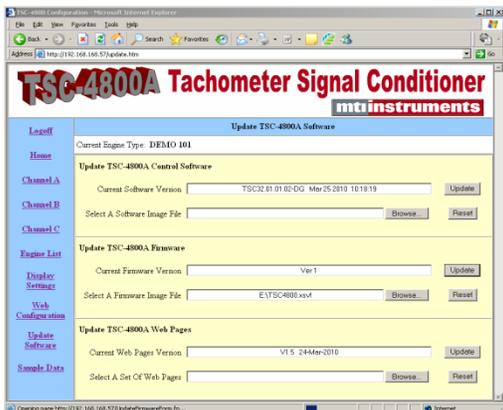
**Pre-Programmed Settings** – The TSC-4800A has the ability to store pre-defined conditioner settings. These settings can be selected from a list which speeds up the process of configuring the TSC-4800A. The last used settings are re-enabled when the power is applied to the TSC-4800A. An unlimited number of pre-defined configurations can be saved.



# Automatic power-up self test ensure reliable operation of the TSC-4800A



# Firmware based design for easy upgrades



*As engine designs evolve, and conditioning requirements change, the TSC-4800A will be able to be re-programmed to meet the demands. As new conditioning requirements are defined, the TSC-4800A conditioning algorithms and web server software can be upgraded with new software supplied by MTI Instruments. Within minutes the TSC-4800A can be running to meet your new testing needs.*

# Optional Outputs for enhanced functionality

*With an optional Buffered Output card installed, the TSC-4800A provides 20 additional output signals from each input channel for other test cell equipment. Up to three buffer options can be installed in a system. Individual line drivers for each output signal ensure isolation and short circuit protection.*

**Buffered Raw Signal Output** – Provides a buffered 1/10 scale representation of the actual input signal. This analog signal has an output range of  $\pm 10$  volts.



**Buffered Odd Tooth TTL Outputs** – Two additional TTL level 1/revolution outputs for test cell instrumentation.

**Buffered Normal TTL Outputs** – Twelve (12) of these buffered “Normal” signals are TTL compatible, and capable of driving long lines to reach other instrumentation.

**Buffered Normal Open Collector Outputs** – Two (2) of these signals are for use with instrumentation where up to 30 volts can be supplied to the TSC-4800A open collector output.

**Buffered Odd Tooth Zero Cross Outputs** – Useful for triggering instruments, two (2) of these 1/revolution signals are pulses that cross zero volts with an excursion from -2.5 volts to +5 volts.

**Buffered Normal Zero Cross Output** – This single output is also useful for triggering instruments. The signal is a buffered square wave “Normal” pulse that cross zero volts with an excursion from -2.5 volts to +5 volts.



# A wide variety of controls ensures that all signals can be conditioned

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# Specifications

## SIGNAL INPUTS

Input Voltage Range	50 millivolts to 200 Volts pk-pk 100K Ohm
Input Impedance	2 Hz to 100KHz
Input Frequency Range	AC or DC
Input Coupling – all channels individually controlled	Single Ended or Differential
Input Configuration – all channels individually controlled	
Engine Speed Range	120 – 150,000 RPM
Signal Amplitude Resolution	14 bit A/D
System Auto Gain	Auto Gain – Seamless gain changes

## INPUT CONNECTORS

Primary Input Connector	MS 3470W8-33P
Secondary Input Connector	MS 3470W8-33P
Shield Drain to Chassis	Switchable On and Off
Test Input Connector	Isolated BNC

## STANDARD OUTPUT SIGNALS

Raw Output	Approx 1/10 of input signal
Normal Output	Buffered TTL Short circuit Protected 100 ma max
1/Revolution Output	Buffered TTL Short circuit Protected 100 ma max

## OUTPUT CONNECTORS

Isolated BNC	50 ohms
Optional Buffered Outputs	Miniature DB44 (sockets)

## INTERNAL TEST SIGNAL

100 Hz sine wave	1.4 volts Pk-Pk
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## CONTROLS

Front Panel Display	Graphical, 128x64 pixel, B&W transfective LCD backlight Displays self test status, settings and current IP address
Ethernet Port	RJ45 connector – rear panel
USB 2.0 Ports	2 on front panel 2 on rear panel
On/Off switch	Rear panel maintenance safety and front panel momentary press

## CONFIGURATION CONTROLS – individual for each channel via Ethernet

Input Channel	Primary, Secondary or Test
Input configuration	Single Ended or Differential
Input coupling	AC or DC
Low pass filter	100, 200, 500, 1K, 2K, 5K, 10K, 20K, 80KHz
Tachometer Types	Tach Gen, Long tooth, Short tooth, Offset tooth, Multi-tooth, Optical, Once per Rev, Sine pulse, Square pulse
Detection modes	Peak or Zero-Cross
Trigger Slope	Positive or Negative
Zero-Cross Offset	None to 30% of Full Scale
Odd tooth Threshold	12%, 25%, or 50% of normal voltage level
Low Signal Threshold voltage	None, 50, 100, 150, 200, 250, 300, 350, 400 millivolts
Low Speed threshold	User entered RPM value
Pulse Output Timing	At peak, 10% after peak, at next peak
Output Length	User entered number of pulses
Speed Averages	1 to 10
Display Smoothing	1 to 10
Output Length	User entered number of pulses

## OPTIONAL BUFFERED OUTPUTS – all short circuit protected

Raw Signal	Approx 1/10 of input signal
1/Rev	Buffered TTL 100 ma max
Normal	Buffered TTL 100 ma max
Zero Cross Normal	Signal ranging between -2.5 and +5 volts 100 ma max
Zero Cross 1/Rev	Signal ranging between -2.5 and +5 volts 100 ma max
Open Collector Normal	Maximum 30 volt external supply 100 ma max

## DIMENSIONS

19"W x 7"H x 15"D (48cm x 18cm x 38cm)

## POWER

115/230VAC, 50-60Hz  
Approx 50 watts

Operating range is 0-50°C. Specifications are stated at 25°C under open load conditions. Specifications are subject to change without notice.

# mti instruments

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TSC-4800A Doc. 7001-0132 03-01-2018

Contact MTI Instruments for more information about the TSC-4800A system or to discuss your particular needs.

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MTI Instruments is a world leader in advanced technology products for manufacturing, computer and aerospace industries. MTI has gained world-wide recognition with over 45 years of experience designing and manufacturing leading-edge products.

The TSC-4800A line of products are sold around the world to engine manufacturers, engine and aircraft maintenance organizations, commercial airlines and military organizations.