Optional Accessories

TPI offers a complete line of...

- Handheld Oscilloscopes
- Digital Multimeters
- Digital Clamp-on Meters
- Gas Detection Instruments
- Combustion Analyzers
- Refrigeration Leak Detectors
- Digital Manometers
- Contact and Infrared Temperature Instruments
- Oscilloscope Probes
- Surface Mount Test Clips
- BNC-BNC Molded Coax Cables
- F-series Cables
- Full Line of Accessories

Protective Boot
A403
Protect against impact and wear.
Hanging Boot Hook
A103
Work hands free with the 440's protective boot and hook.

PC Software & RS232 Cable
A402
Download data and waveforms from the 460 to any PC using Microsoft Windows.

Soft Zipper Case
A900
Keep your 440, AC/DC charger, test leads and optional accessories at the ready. Moveable partitions and adjustable shoulder strap.

Clamp-on Adapters
A251
Measure up to 400 AC amps.
A256
Measure up to 400 AC/DC amps.
A296
Measure up to 2,000 AC/DC amps.

Low Current Adapter
A254
Measures from 10mA to 60 amps AC/DC.

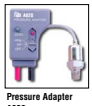
Current Shunt Adapter
A130
Allows any DMM with AC/DC millivolt range to measure up to 30 amps.

Temperature Adapter
A301
Measure -40° to 500° F.
For K-type thermocouple probes.

Fused Test Leads
FTLK1
Reduce your risk of electrical shocks and/or instrument damage.

High Voltage Probe
HV40C
Measure up to 40 KV DC.

Test Lead Kits w/Silicone Insulation
TLS2000B
Shuttered plug
TLS2000RB
Right angle plug



Pressure Adapter
A620
Measure up to 500 PSI.
A630
Measure up to 10,000 PSI.

Cigarette Lighter DC Adapter
A408
Charge the 440 while on the road or in remote locations.

To learn about the entire TPI product line visit www.tpi-thevalueleader.com

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Your Tools at Work

460 Handheld Oscillsope

TPI 460 Applications

- Power Quality
- Variable Speed Drives
- Industrial Motor Controls
- Battery Testing
- Programmable Logic Controls
- NC/CNC Machines
- Uninterruptable Power Supplies
- Audio
- Video
- Industrial Lighting Controls
- Factory Automation
- Line Conditioners
- Voltage Regulators
- Inverters
- Gaming Industry

See page two for technical information.

The Value Leader™

Dual Channel, 20MHz Oscillscope with True RMS DMM.

Technicians appreciate the bright backlight of the 3" x 3" cold cathode flourescent display and rugged construction inside and out.

New with the 460

- **Cursor Readout**
- **Decibels**
- **Pre and Post Triggering**
- **cULus 3111**

INCLUDED
Two Test Leads, two Banana to BNC Adapters, one DC-60 MHz x 1 x 10 Passive Oscilloscope Probe, Power Supply and Instruction Manual

460 FEATURES

20 MHz Bandwidth
Capture signals from AC/DC drive motors, sensors, actuators, line and control voltages, UPS and industrial machines.

Cursor Readout
Measure the width and amplitude of the signal and display it on the screen instead of trying to figure it out manually.

Decibels
Accurately measure sound signals.

Pre and Post Triggering
View the waveform before and after the point the scope triggers at to find glitches and other anomalies with the signal.

Trend Mode
Graph readings over a predetermined time period to check for surges or dropouts.

Dual Input
View two waveforms on the display for comparison and troubleshooting.

True RMS DMM
Measure AC/DC volts up to 600V, frequency to 20 MHz, and resistance to 20 Meg ohm. Obtain accurate measurements of non-sinusoidal AC voltage and current waveforms found in controls and circuits with True RMS.

Real Time Sample Rate
Capture spikes and dropouts of industrial signals with real time sampling of 25 megasamples per second.

Bright LCD Backlight
Adjust brightness levels for clarity in any light condition.

Optically Isolated RS232 Output
Transfer data safely without a direct connection to your computer's circuitry.

Continuous Autoset
Feature automatically determines the correct vertical and horizontal settings for optimum waveform viewing. Autoset provides hands free operation while moving between test points.

COMPARE	TPI 460	Fluke 123
Screen Size	**76mm x 76mm (3" x 3")**	72mm x 72mm (2.8" x 2.8")
Backlight LCD	cold cathode flourescent	cold cathode flourescent
Bandwidth	20MHz	20MHz
Cursor Readout	yes	**no**
Resolution	8 bit	8 bit
True RMS	yes	yes
Charger	yes	yes
Banana to BNC Adapters (2)	yes	**no**
DC-60 MHz x1x10 Probe	yes	yes

The above information is provided to the best of TPI's knowledge and is not guaranteed.
The above information is subject to change at any time.

Dual Channel, 20Mhz Oscilloscope with True RMS DMM

Specifications and Frequently Asked Questions

Included
Two Test Leads, two Banana to BNC Adapters, one DC-60 MHz X1 X10 Passive Oscilloscope Probe, Power Supply and Instruction Manual

Technicians appreciate the bright backlight of the 3" x 3" cold cathode flourescent display and rugged construction inside and out.

Cursor Readout
cULus

FEATURES

20 MHz Bandwidth
Capture signals from AC/DC drive motors, sensors, actuators, line and control voltages, UPS and industrial machines.

Cursor Readout
Allows you to measure the width and amplitude of the signal and display it on the screen instead of trying to figure it out manually.

Decibels
Allows you to accurately measure sound signals.

Pre and Post Triggering
View the waveform before and after the point the scope triggers at to find glitches and other anomalies with the signal.

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View two waveforms on the display for comparison and troubleshooting.

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Adjust brightness levels for clarity under any light condition.

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Transfer data safely without a direct connection to your computer's circuitry.

Continuous Autoset
Feature automatically determines the correct vertical and horizontal settings for optimum waveform viewing. Autoset provides hands free operation while moving between test points.

APPLICATIONS

Industrial motor control View start-up in rush currents, waveform symmetry, SCR trigger pulses, variable frequency drive signals, pulse width modulation, noise, misc. AC/DC speed control signals.

Power quality Noise on industrial feeds, AC voltage waveshape, current waveforms, machine start-up/power quality interference and noise.

Programmable logic controls PLC input and output signals, control signals, signal conditioning circuits, communications lines and power supplies.

NC machines Power quality, sensor outputs, control circuits, safety circuits, calibration and adjustments.

Uninterruptable power supplies Sensing and monitoring circuits, switching circuits, output waveforms and current waveforms.

Audio Public address feeds, amplifiers, mixers and preamps.

Video Horizontal and vertical scan rates, z-axis blanking, sync pulses and luminance.

Industrial lighting controls SCR and other solid state designs.

Factory automation Robot control signals, machine vision, machine control and sensing circuits, calibration of positioning systems, analog controllers and servo controls.

Line conditioners Noise and quality.

Voltage regulators Noise and stability.

Inverters Waveform quality.

CERTIFICATION OF CALIBRATION, CERTIFICATE OF COMPLIANCE
For details and related fees, call 800-368-5719.

SPECIFICATIONS

VERTICAL	
Bandwidth	20 MHz w/SP60B 10:1 Probe 10 MHz w/Shielded Test Leads
Sample Rate	
Real Time	25 Megasamples per Second up to 2 MHz
Equivalent Time	500 Megasamples per Second > 2 MHz
Sensitivity	50mV TO 200V/div 1,2,5 Sequence
Coupling	AC, DC, GND
Resolution	8 bits
Accuracy	± (3% + 0.05 range/div)
HORIZONTAL	
Modes	Single, Normal, Auto
Samples per Division	25
Accuracy	Equivalent Time: ± (0.5% + 0.08 time/div) Real Time: ± (0.1% + 0.04 time/div)
TRIGGER	
Source	Internal
Modes	Free Run, Normal
Sensitivity	Equivalent Time: 3 divisions or more Real Time: 2 divisions or more
TREND MODE	
Plot Time	30 sec/div to 1 hour/div
Plot Data Type	Max/Min Selectable
Memory	2 Screens
TRUE RMS DMM	
DCV (CH1, CH2)	400mV, 4, 40, 400, 600V
Basic Accuracy:	± (0.5% + 5 digits)
ACV (CH1, CH2)	400mV, 4, 40, 400, 600V
Basic Accuracy:	± (1% + 10 digits)
Frequency (CH1, CH2)	1 Hz to 20 MHz
Basic Accuracy:	± (0.5% + 5 digits)
Ohm (CH1 only)	400, 4k, 40k, 400k, 4M, 20M
Basic Accuracy:	± (0.5% + 5 digits)
Continuity (CH1 only)	Sounds < 0.1k ohm, ± (2% + 5 digits)

International Version: 220V 50/60Hz AC/DC adapter is included when specifying model no. **460X.**

FAQ

Why do you need a 20 MHz oscilloscope?
To measure signals and voltage anomalies, and to look for glitches that may damage or even shut down electronic machinery. View sine waves on power supplies, motors, and bead board circuitry. Pinpoint certain glitches on the sine wave to zero in on the problem and monitor changing patterns or distortion in electrical currents.

What are the different waveform patterns displayed on your handheld oscilloscopes?
An AC waveform known as **sine wave** displays voltage against time in the shape of a sine curve. The **saw tooth** waveform displays a ramped angle and a sharp downward return to its earlier value. (Its display pattern resembles the cutting edge of a saw.) A **square waveform** graphically plots a series of vertical square shapes repeated with spacing between peaks.

Why is it important to have Trend Mode?
Trend Mode is great for monitoring sudden intermittents caused by loose connections, dirt, or damaged wires. By setting the minimum and maximum parameters, you can monitor, even record the changes.

What is the purpose of triggering?
Simply zoom in on certain parts of the sine wave and "hold" to measure and monitor that particular part you are reading. A must have when searching for glitches and distortion on all measurements.

OPTIONAL ACCESSORIES

Temperature Adapter A301
Measure -40° to 500° F. For K-type thermocouple probes, refer to pages 18-19.

Clamp-on Adapters A251
Measure up to 400 AC amps.
Clamp-on Adapter A256
Measure up to 400 AC/DC amps.
Clamp-on Adapter A296
Measure up to 2,000 AC/DC amps.

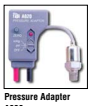
PC Software & RS232 Cable A404
Download data and waveforms from the 460 to any PC using Microsoft® Windows®.

Low Current Adapter A254
Measure below one amp AC/DC.

Current Shunt Adapter A130
Extend amp range to 30 amps.

Soft Zipper Case A905
Protect and organize your 460.

Protective Boot A405
Guard against inevitable impacts. Unique rear cut-out design allows deployment of 460's rear tilt stand.



Pressure Adapter A620
Measure up to 500 PSI.

Surface Mount Test Clips
Multicolored clips to access 0.3 pitch leads. See page 26.

High Voltage Probe HV15HFA
Measure accurately up to 15KV DC. See page 11.

60 MHz Oscilloscope Probe
Three monolithic interchangeable probes in 60, 100, and 250 MHz bandwidth. See page 25.