

## **Optional Accessories**



Handheld Oscilloscopes Diaital Multimeters **Digital Clamp-on** Meters

Protective Boot

Protect against impact

Hanging Boot Hook

Work hands free with

**Temperature Adapter** 

thermocouple probes.

Measure -40° to

the 440's protective

boot and hook

A403

A103

A301

500° F

For K-type

and wear.

**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



Fused Test Leads

Reduce your risk of

electrical shocks

and/or instrument

HV40C

DC.

FTLK1

damage

PC Software & RS232 Cable A900 A402 Download data and waveforms from the 460 to any PC using Microsoft Windows able shoulder strap.



Clamn-on Adapters A251 Keep your 440, AC/DC Measure up to 400 AC charger, test leads and amps. optional accessories A256 at the ready. Moveable partitions and adjust-AC/DC amps.



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



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



Cigarette Lighter DC Adapter A108 Charge the 440 while on the road or in remote locations.



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**A**Dī

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scope triggers at to find glitches and other

Ch.A CON Tax Scope Plus 480

## **[P] 460** plication

**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

## The Value Leader

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** 

20 MHz Bandwidth

Trend Mode

anomalies with the signal.

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.

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Measure up to 400 A296 Measure up to 2.000 AC/DC amps. TLS2000RB

High Voltage Probe Test Lead Kits w/Silicone Insulation

Measure up to 40 KV TI \$2000B Shuttered plug TLS2000RB Right angle plug

Pressure Adapter A620 Measure up to 500 PSI. A630 Measure up to 10.000 PSI

# Your Tools at Work 460 Handheld Oscillsope



## **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

**Beal Time Sample Bate** 

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

Capture signals from AC/DC drive motors,	Capture spikes and dropouts of industrial signals with real time
sensors, actuators, line and control voltages, UPS and industrial machines.	sampling of 25 megasamples per second.
Cursor Readout	Bright LCD Backlight Adjust brightness levels for clarity in any light condition.
Measure the width and amplitude of the signal and display it on the screen instead of trying to figure it out manually.	<b>Optically Isolated RS232 Output</b> Transfer data safely without a direct connection to your computer's circuitry.
Decibels Accurately measure sound signals.	Continuous Autoset
<b>Pre and Post Triggering</b> View the waveform before and after the point the scope triggers at to find glitches and other	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

# Dual Channel, 20Mhz Oscilloscope with True RMS DMM



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

### **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.

#### 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.

#### 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. True RMS allows you to obtain accurate measurements of non-sinusoidal AC voltage and current waveforms found in controls and circuits.

#### **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 under 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.

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.



# Specifications and Frequently Asked Questions

#### ECIFICATIONS

VERTICAL	
Bandwidth	20 MHz w/SP60B 10:1 Pro
	10 MHz w/Shielded Test L
Sample Rate	
Real Time	25 Megasamples per Seco
Equivalent Time	500 Megasamples per Sec
Sensitivity	50mV TO 200V/div 1,2,5 S
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%
	Real Time: ± (0.1%
TRIGGER	
Source	Internal
Modes	Free Run, Normal
Sensitivity	Equivalent Time: 3 divisio
	Real Time: 2 divisio
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:	<u>+ (1% + 10 digits)</u> 1 Hz to 20 MHz
Frequency (CH1, CH2)	
Basic Accuracy:	± (0.5% + 5 digits)
Ohm (CH1 only)	400, 4k, 40k, 400k, 4M, 2
Basic Accuracy:	± (0.5% + 5 digits)
Continuity (CH1 only)	Sounds < 0.1k ohm, ± (2%

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

#### **OPTIONAL ACCESSORIES**



**Temperature Adapter** 

Measure -40° to 500° F.

For K-type thermo-

couple probes, refer

to pages 18-19.

A301

A620





**Clamp-on Adapters** A251 Measure up to 400

AC amps. **Clamp-on Adapter** A256 Measure up to 400



**Clamp-on Adapter** A296 Measure up to 2,000 AC/DC amps

Pressure Adapter Measure up to 500 PSI. PC Software & RS232 Cable Download data and waveforms from the

**Δ404** 

A254



AC/DC amps.



460 to any PC using

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.ea	ds

ond up to 2 MHz cond > 2 MHzSequence

+ 0.08 time/div) + 0.04 time/div)

ons or more ons or more

0M

% + 5 digits)

#### 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.



Low Current Adapter

Measure below one amp AC/DC.



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



Current Shunt Adapter A130 Extend amp range to 30 amps.



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



Soft Zipper Case A905 Protect and organize vour 460.



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



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