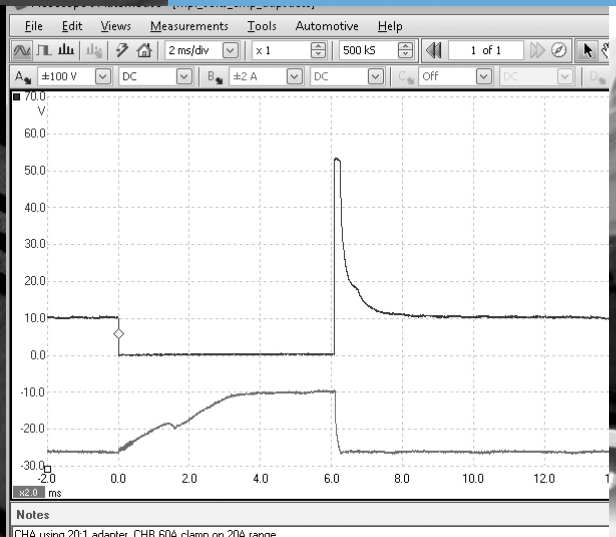
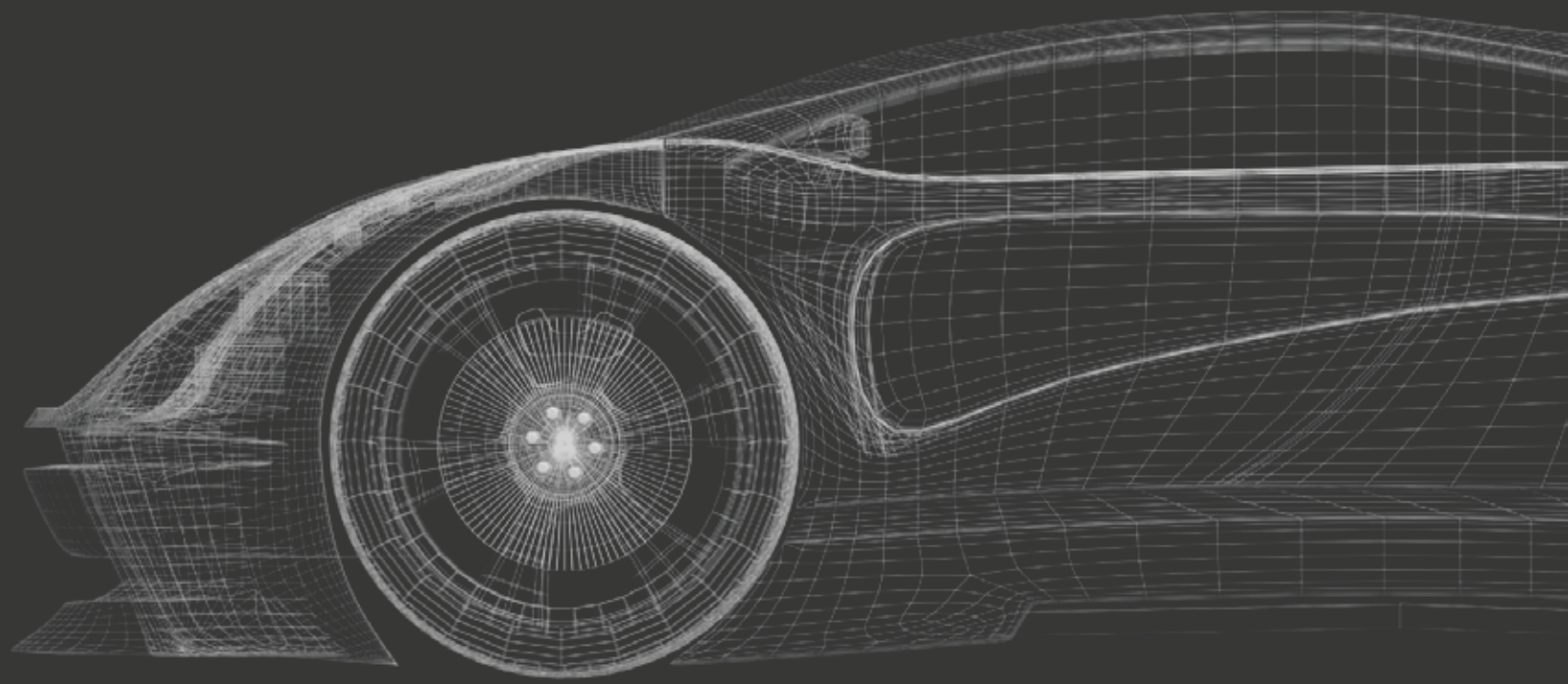
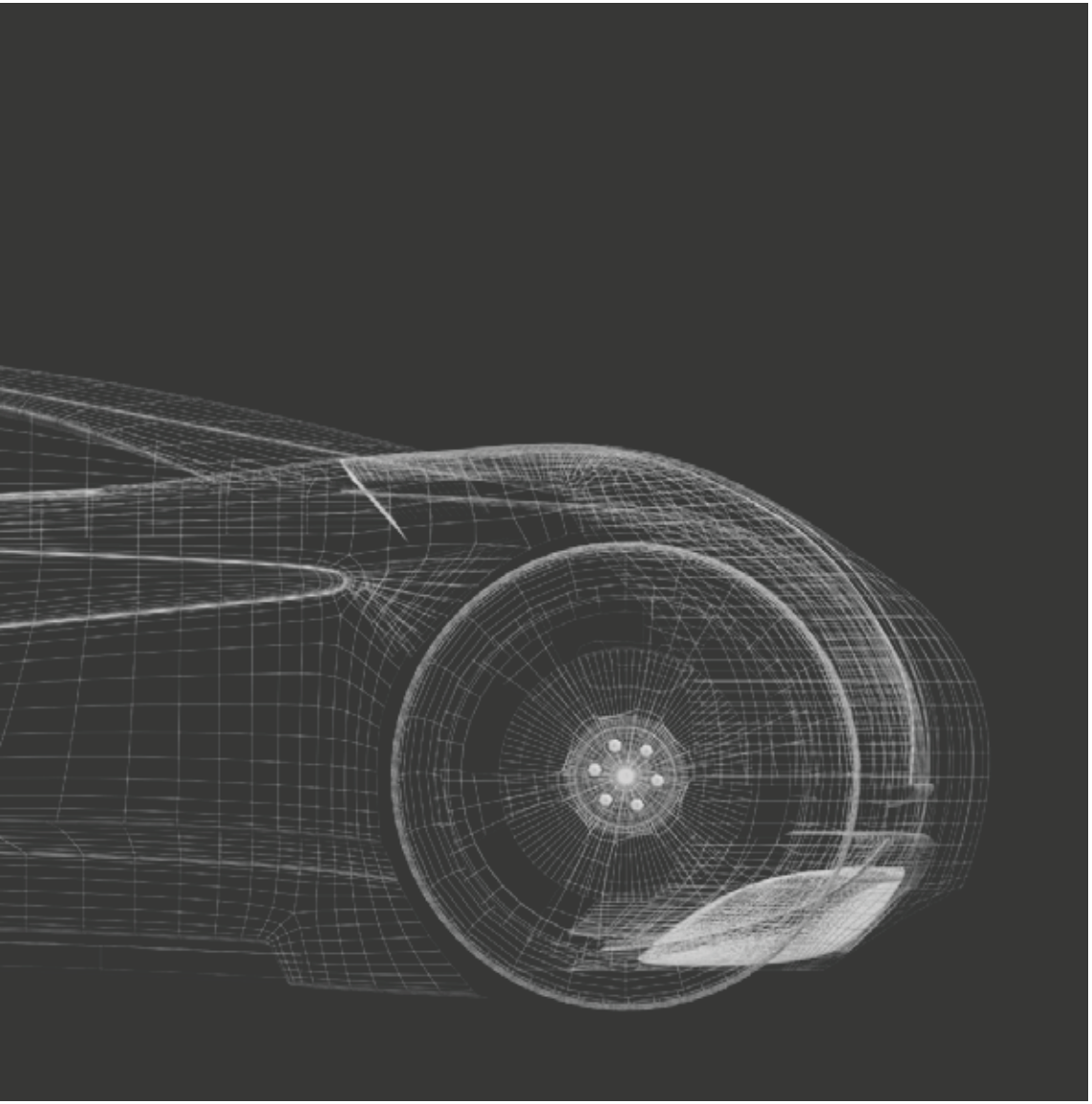
PicoScope®
Diagnostic Oscilloscope

One-click tests to advanced analysis in a single kit.
From a world-leading scope diagnostics company.



Established in 1991, Pico Technology is the world's leading manufacturer of automotive oscilloscopes. The Oscilloscope Diagnostics Kit regularly wins industry awards, see page 36 for details.





CONTENTS

PICO PC-BASED DIAGNOSTICS: ALL YOU NEED IN ONE KIT

PicoScope is a diagnostics kit that shows you what is really going on inside your vehicle.
The kit contains everything you need to start work;
all you have to supply is a PC.

PICOSCOPE HARDWARE

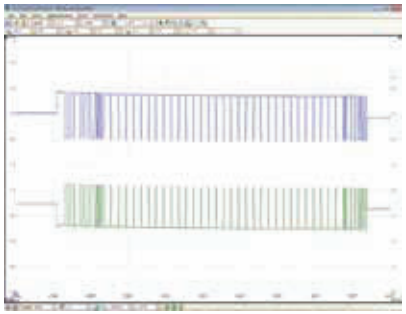
Kit includes 4000 Series scope and accessories.

PICODIAGNOSTICS SOFTWARE

One-click access to a range of tests.

PICOSCOPE SOFTWARE

Scope software for diagnostics.



ALL YOU NEED TO SUPPLY

WINDOWS PC

Either laptop or desktop PC.

DO I NEED A SCOPE OR A SCAN TOOL

The short answer is 'both', but read on...
PicoScope oscilloscopes are not designed to replace scan tools.
Scan tools and scopes do very different jobs, so a well-equipped workshop needs both.

Here's how a typical PicoScope diagnosis works:
1. Read the fault report or listen to the customer's story.
2. Test the vehicle until you see the problem for yourself.
3. If the MIL is on, use a scan tool to look for fault codes (DTCs).
4. If the DTCs point to a faulty component, use PicoScope to check that the component really is faulty before replacing it.
5.If the DTCs are inconclusive, or no fault is logged, use PicoScope to rule out the correctly functioning parts of the electrical system until you find the fault.
It's just like the procedure you have always used but without any unnecessary part-swapping, so you save time and money.

CAN IT...		
Diagnose all electrical components?	**– YES –** Can be used to test all the electrical and electronic components, wiring and connectors found on modern vehicles.	**– NO –** Can often quickly identify problem areas. Component-level testing depends on the vehicle and capabilities of the scan tool.
Work when no fault code is set?	**– YES –**	**– NO –**
Test wiring and connectors?	**– YES –**	**– NO –**
Be used on all makes and models?	**– YES –** One scope works on all vehicles.	**– NO –** Coverage varies between manufacturers. You may need to buy several different models to work on a wide range of vehicles.
Save me money?	**– YES –** One-off purchase with unlimited free software updates.	**– NO –** Repeated payments usually required for software updates.
Reprogram or remap a control unit (ECU or PCM)?	**– NO –**	**– YES –**
Show fuel trims and other information held inside a control unit?	**– NO –**	**– YES –**
Automatically test batteries, alternators and starter motors?	**– YES –**	**– NO –**
Test relative compression?	**– YES –**	**– SOME –**
Test cylinder balance?	**– YES –**	**– SOME –**
Be used as a general-purpose oscilloscope ("lab scope")?	**– YES –**	**– NO –**

PICOSCOPE 6

A WIDE RANGE OF DIAGNOSTIC TESTS

PicoScope 6 is our latest PC Oscilloscope software. Supplied with all Pico Technology Diagnostics Kits, the PicoScope Automotive software is a powerful tool for capturing and viewing waveforms from almost any electrical or electronic system in today's motor vehicles.

EASY TO SET UP

The automotive menu lists the different sensors and circuits that can be tested with the oscilloscope kit. When you select a test, the software automatically:

- Loads a reference waveform into PicoScope.
- Loads a help page showing how to connect the scope, what the waveform should look like, and general technical information that you will need.
- Loads the required settings into PicoScope, ensuring a quick setup.

If you would like to try PicoScope 6 before you purchase it, download the free demo from our website, www.picoauto.com.

SEE MORE DETAIL FOR LONGER

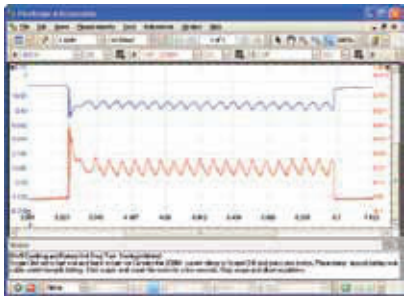
PicoScope can sample at high speeds, letting you capture fast-moving signals like FlexRay, CAN and LIN bus lines. Equipped with a deep 'Always on' memory, PicoScope enables you to capture long sequences to check for missing or distorted pulses over a whole engine revolution. You can use the entire screen of your computer to view hugely detailed waveform patterns, leaving space to add your own notes at the bottom of the screen. If you need to see more detail, just zoom in.

DIGITAL AIR MASS METER TEST

PicoScope can now test digital air mass meters with pulsed frequency outputs. Simply select the test from the drop-down menu and see an easy-to-read airflow waveform.

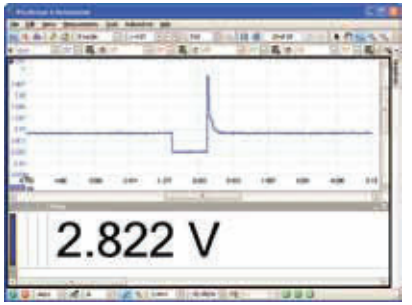
REFERENCE LIBRARY

One of PicoScope's most valuable features is the detailed library of waveforms, photographs, illustrations and reference information. It contains over 140 pre-loaded tests and reference waveforms under a simple automotive menu. Each one launches a detailed help topic, and automatically sets up the oscilloscope and the software ready to acquire the waveform. You can also easily save new waveforms to create your own personal reference library.



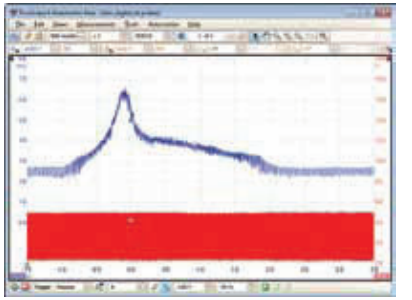
OSCILLOSCOPE

The oscilloscope is the X-ray machine of diagnostics, letting you see the changing signals inside wires. Start with the built-in library of waveforms and then, when you get more confident, add more of your own. Test primary and secondary ignition, injectors, pumps, temperature sensors, MAP and MAF sensors, crankshaft and camshaft sensors, glow plugs... and the rest.



AUTOMATIC MEASUREMENTS

With PicoScope's automatic measurements, you can stack up as many measurements as you need on the screen and watch them change in real time. This feature can replace a whole collection of multimeters.



WAVEFORMS

The reference library contains over 140 waveforms showing how each signal should look. There are examples of starting & charging circuits, sensors, actuators, ignition systems, communication buses, pressure sensors and more, all from real vehicles.

PICODIAGNOSTICS

SIMPLE TO USE

PicoDiagnostics is a self-contained software package for use with the PicoScope 4000 Series automotive oscilloscopes. With PicoDiagnostics you can quickly check the health of most petrol and diesel engines. There are no complicated procedures — simply connect one channel of your oscilloscope to the battery of the vehicle to be tested, run PicoDiagnostics, select your test and click a button.

EASY TO SEE YOUR RESULTS

Once PicoDiagnostics has completed the test, the results are displayed in a bar graph that makes it easy for anybody to understand. Using this report printing feature you can then produce a professional quality report suitable for presenting to customers.

COMMON TESTS

Tests that can be carried out using PicoDiagnostics include:

- Cylinder Balance
- Misfire Detection
- Compression Test
- Battery Test
- Alternator Test
- Starter Motor Test

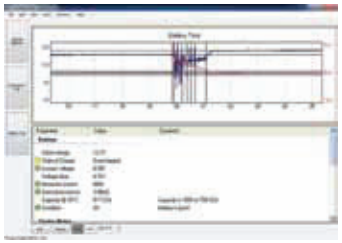
This program is included free with PicoScope 6.

CYLINDER BALANCE ANALYSER

With just a pair of crocodile clips connected to the battery, PicoDiagnostics shows you in seconds if any cylinder is underperforming or misfiring.

COMPRESSION TESTER

Show relative compression with just a simple connection to the battery. Add an optional pressure transducer to measure absolute compression.



ELECTRICAL SYSTEMS TEST

More than just a battery tester: as well as measuring state of charge, condition and cold cranking amps, it also checks the starter motor, the alternator and the wiring. Hook up the scope to the battery and start the engine. PicoDiagnostics does the rest, giving you graphical results that you can print and give to your customer.

FIX ALL OF THESE WITH PICOSCOPE

Anything with an engine:

PETROL

DIESEL

HYBRID

ELECTRIC

GAS

Hybrid

Petrol

Any make, model or type:

CARS

BIKES

COMMERCIAL VEHICLES

AGRICULTURAL

MARINE

PLANT AND EQUIPMENT

Diesel

Bikes

Commercial vehicles

Agricultural

WHY USE PICOSCOPE?

SIMPLE TO USE

PicoScope connects to your PC using a simple, reliable USB cable. It also gets its power through this cable, so there's no extra power adaptor. We have made everything else as
simple as possible.

FIND INTERMITTENT FAULTS EASILY

By easily pinpointing connection and wiring faults, scopes can save time and money by helping to avoid replacement of parts that are not faulty. In addition to complex engine management components, a scope is often the best way to check basic systems such as starting and charging, battery condition, and parasitic current draws that cause flat batteries.

FREE SOFTWARE UPDATES

PicoScope gives you free software updates for life and the system is easily upgraded via internet or media.

QUALITY GUARANTEED

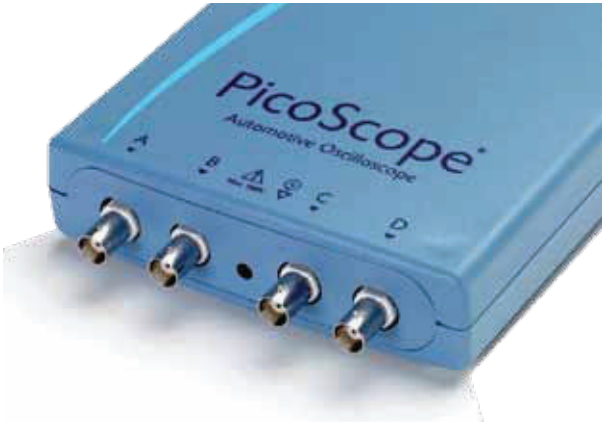
We have been refining and testing the PicoScope concept for 20 years. Everything you get in a PicoScope Diagnostics kit has been selected by our own automotive experts. If a component fails, falls apart or just annoys us, we redesign it. The result is a kit that is used by independent garages, vehicle manufacturers and dealer networks all over the world.

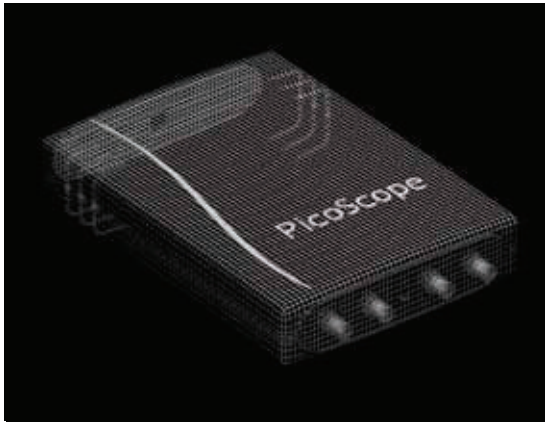
SAVE YOUR OWN WAVEFORMS

PicoScope PC oscilloscopes are good at communicating, so you can send waveforms by email, print them or save them to your network. The familiar Windows environment makes them easier to use, set up and share.

TWO YEAR WARRANTY

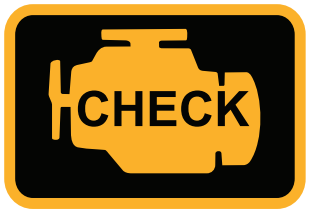
For your peace of mind we provide a two year warranty with Pico Technology manufactured products.



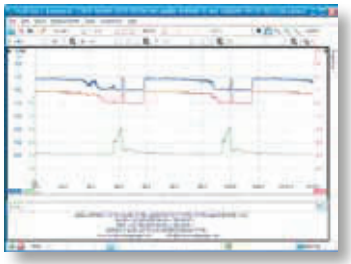


CASE STUDY: MISFIRE ON A TOYOTA AVENSIS

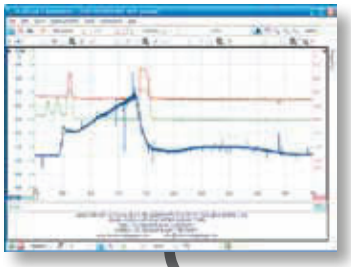
Diagnosed with the PicoScope oscilloscope software.



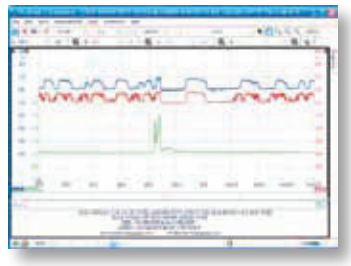
The MIL light was on, and the fault code reader showed: `P0171 and P0174: System Too Lean on banks 1 and 2.` The short-term fuel trims were up to 18% and 19%, also suggesting a problem.



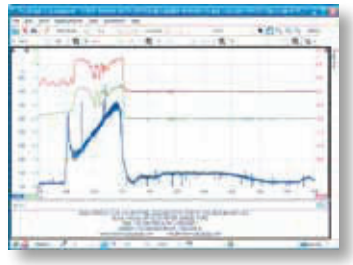
PicoScope showed a glitch in the O_2 (red and blue) and MAF (green) sensors when the throttle was snapped open.



Here we can see that the MAF sensor (now blue) had a low peak output of less than 3.5 V, and both O_2 sensors remained lean throughout the wide-open throttle test.



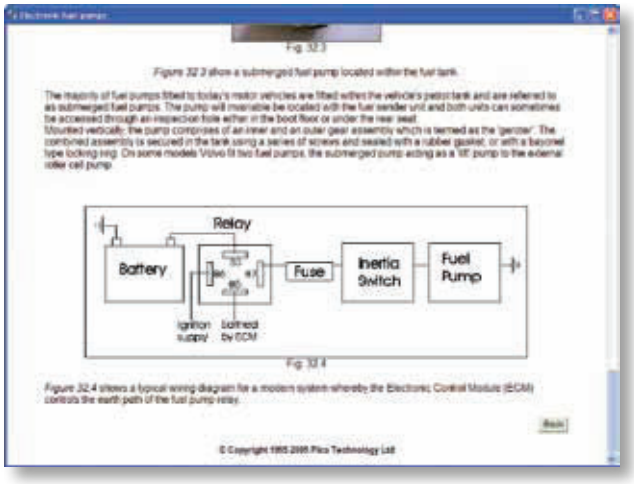
On inspection, the MAF sensor elements turned out to be dirty, so we cleaned them with carb cleaner. After the sensor was refitted, PicoScope showed that the O_2 sensors went rich, as expected, during the throttle test and recovered more quickly.



Finally, a new scope capture of the complete test showed a healthier inflow of air. The engine revved more responsively, and the short-term fuel trims had returned to zero.

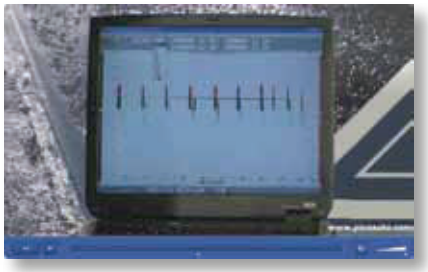
PICOSCOPE ONLINE HELP

Every built-in test has its own instruction page, with wiring diagrams, photos and diagnostic information.
There are more than 120 detailed pages like these.

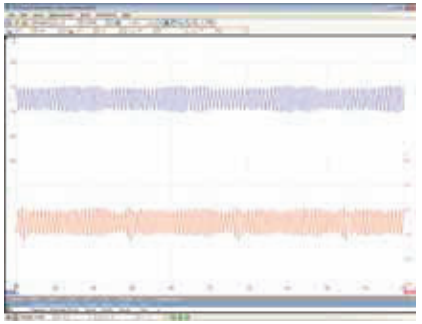


AUTOMOTIVE DIAGNOSTICS VIDEOS

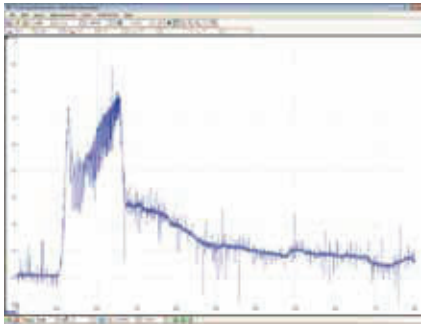
On picoscope.tv, our oscilloscope training channel, you will find a wealth of video material designed to help you use your scope more effectively. The videos explain some of the more specialised aspects of PicoScope Automotive Diagnostics such as CAN Bus Decoding, Coil-on-Plug Ignition and Air Mass Meters. There are also videos on the general use of the PicoScope software. Please help us improve our content by leaving your comments below the videos.



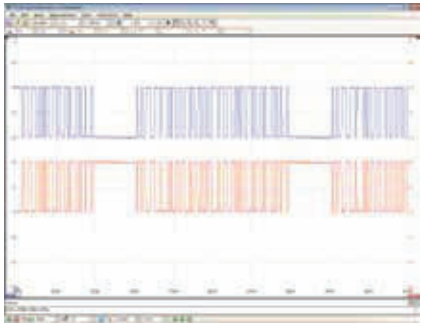
EXAMPLE WAVEFORMS AND TESTS



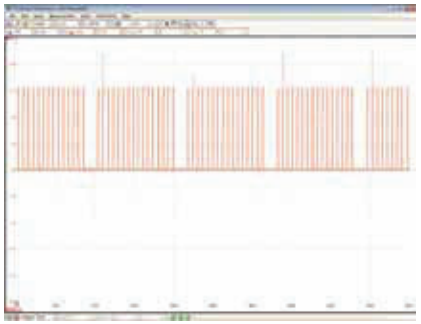
ABS



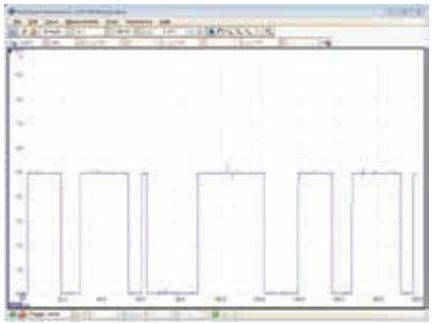
Air Flow Meter (hot wire)



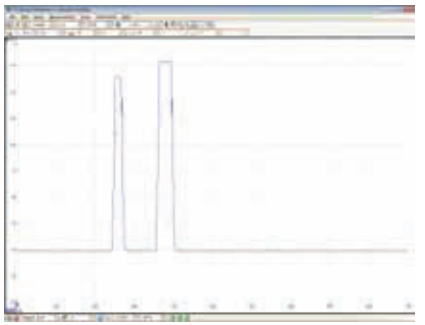
CAN bus



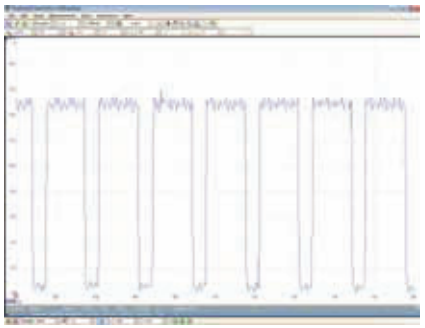
Crank sensor (Hall effect)



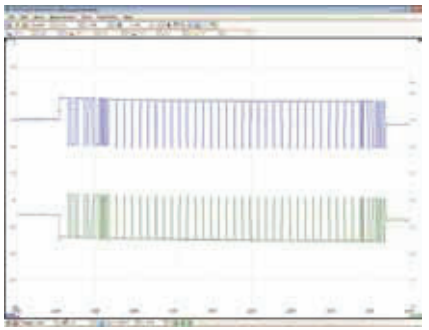
Cylinder ID (Hall effect)



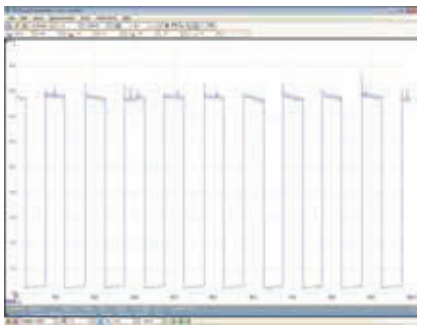
Diesel injectors



EGR valve

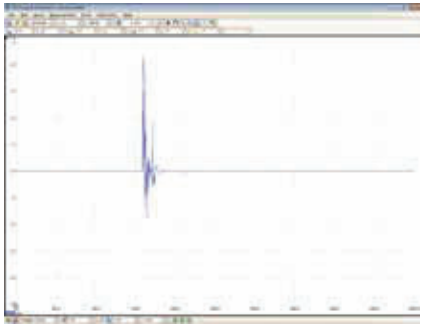


FlexRay network

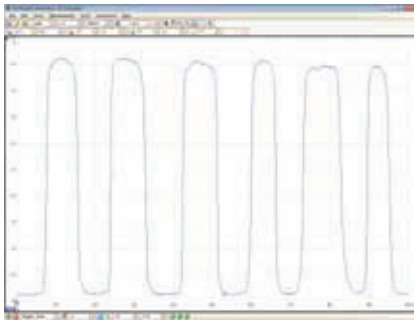


Idle speed control valve

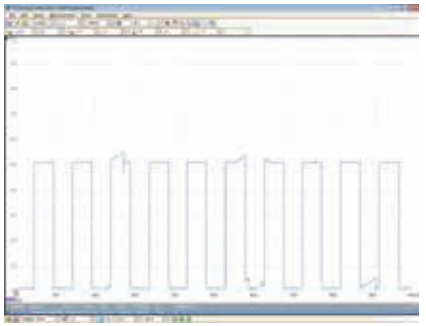
EXAMPLE WAVEFORMS AND TESTS



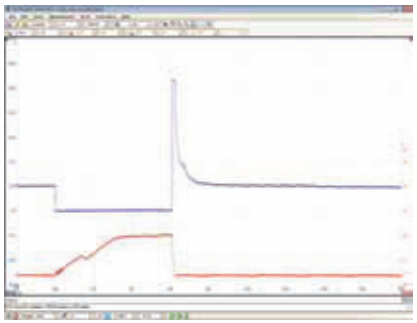
Knock sensor



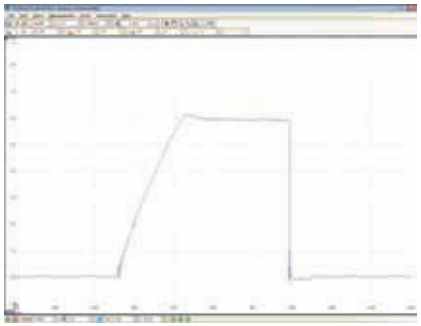
Lambda sensor (titania)



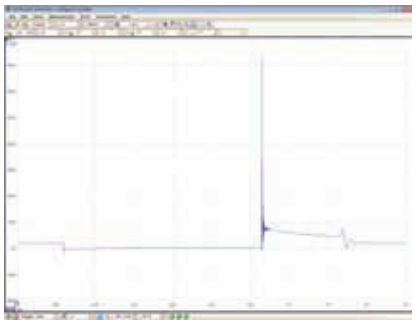
MAP sensor (Digital)



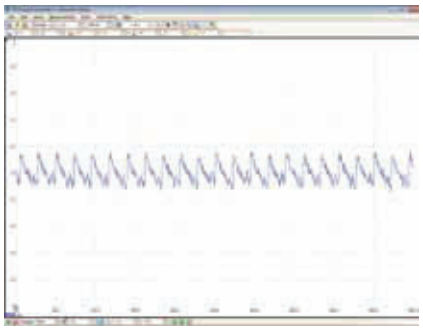
Petrol injectors



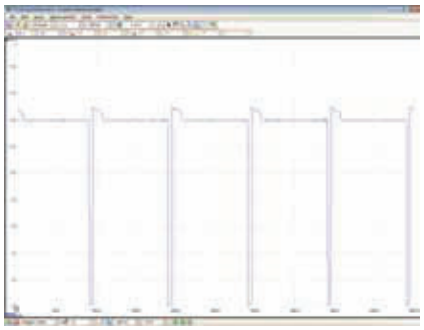
Primary ignition (amps)



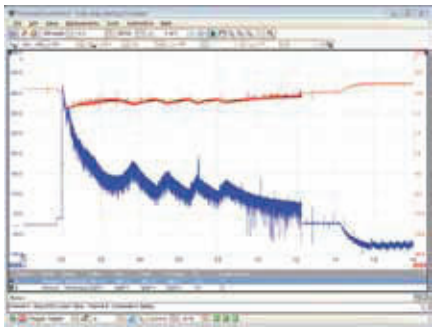
Primary ignition (volts)



Alternator ripple



Carbon canister solenoid



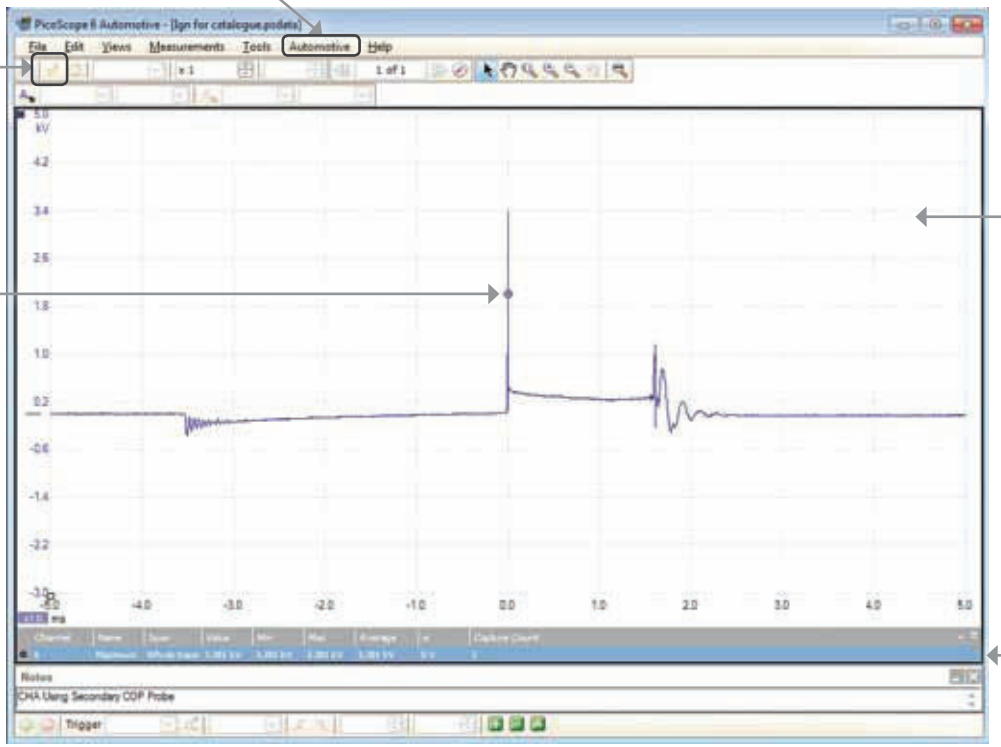
Starter negative volt drop

MAKE IT AS SIMPLE OR AS COMPLICATED AS YOU WANT

Just select a built-in test from this menu, and PicoScope sets up everything for you.

Auto setup button sets up voltage ranges and timebases automatically.

Clear, high-resolution display of your waveform.



There are no old-fashioned knobs and dials. We leave most of the space free for what matters: your waveforms.

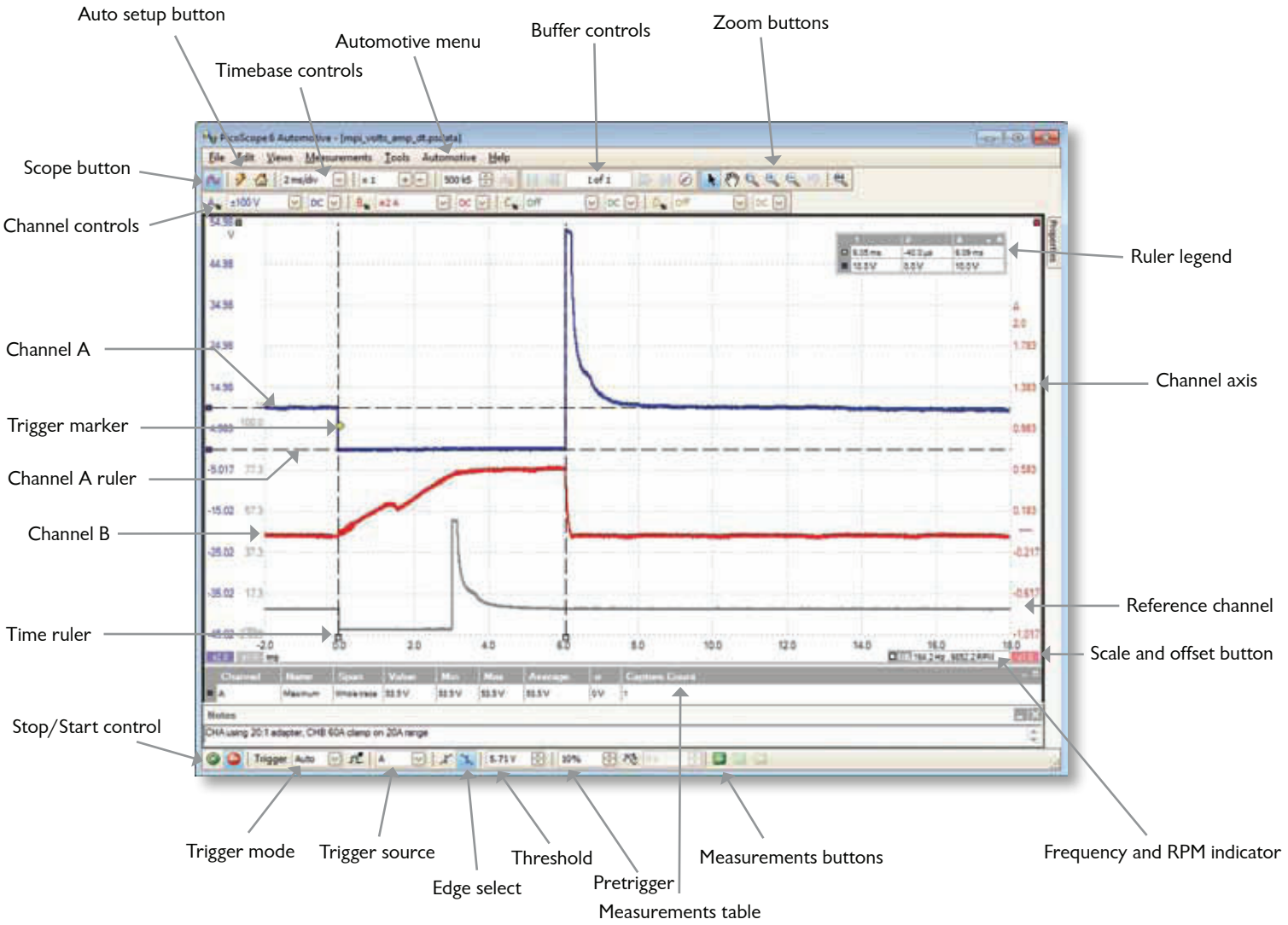
Show as many measurements as you want here.

Because PicoScope runs on your PC, it can use the whole width of the computer screen. The display size is not limited by the size of the scope.

WHY "PICOSCOPE 6"?

This is the 6th generation of our oscilloscope software. It has been continuously improving since 1991 to keep up with developments in computer technology and our customers' needs.

ADVANCED FEATURES WHEN YOU NEED THEM

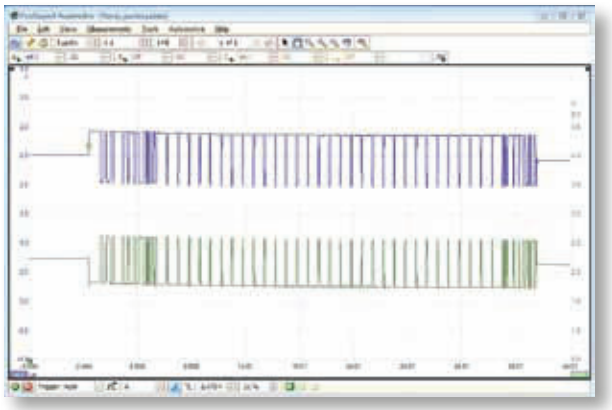


PICOSCOPE FOR CAN BUS, LIN BUS AND FLEXRAY

PicoScope is compatible with the main vehicle data bus standards.

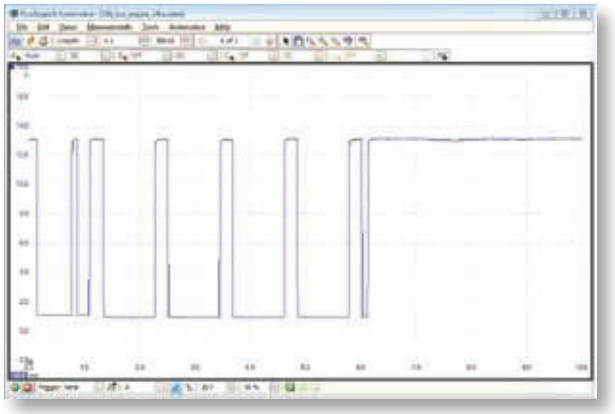
PicoScope is fast enough and accurate enough to look at the electrical signals on CAN bus, LIN bus and the new FlexRay interface. By looking at the electrical waveform you can check for short circuits, open circuits, missing termination resistors, noise and interference.

In fact, at the time of writing, PicoScope is the only automotive scope that is fast enough for FlexRay. You may not be using FlexRay today, but it is on its way. Why buy a different scope that will be out of date in a couple of years?



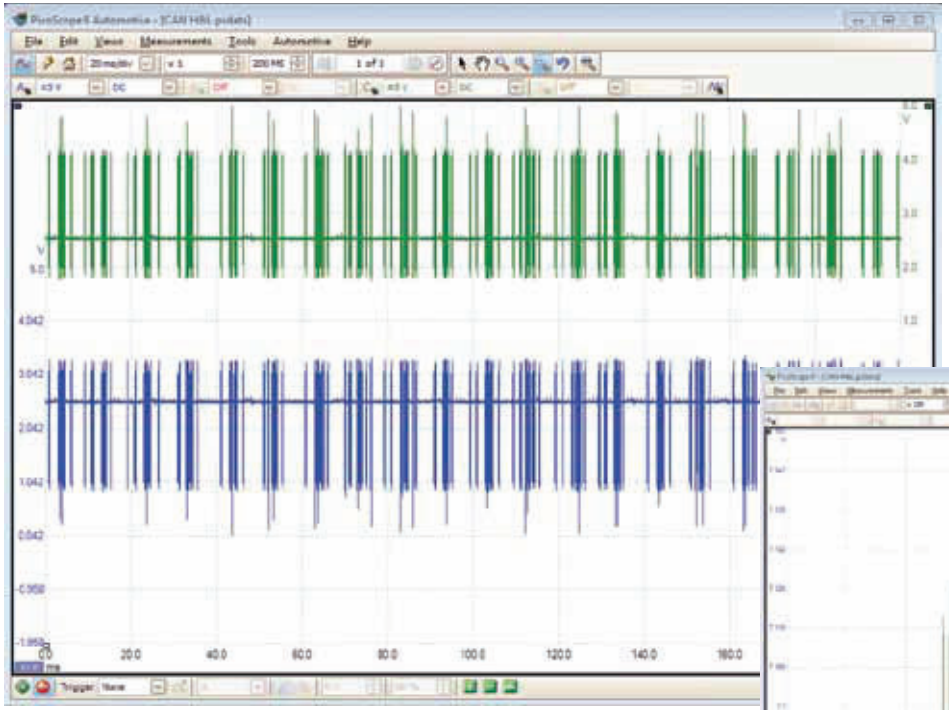
FLEXRAY

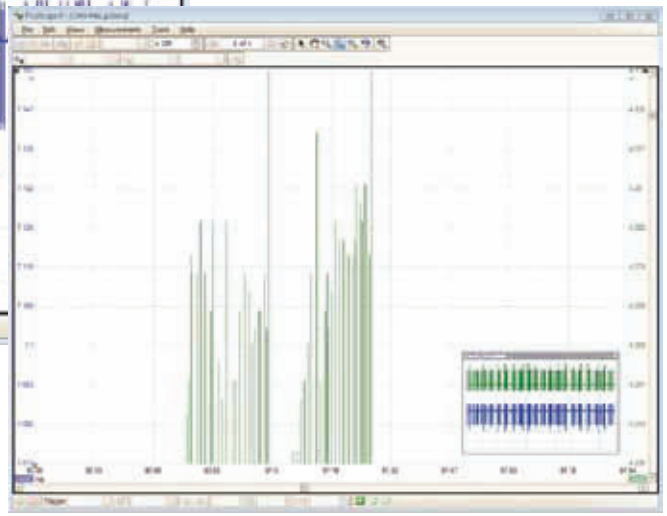
PicoScope is the only scope fast enough to display FlexRay signals accurately. FlexRay is a new vehicle data bus standard used in active suspension systems. Its high speed means that signal quality is critical, and only a scope can reveal problems like reflections and ringing.



LIN BUS

LIN bus is a low-speed serial bus used to control non-critical components such as door mirrors and electric windows. With PicoScope, you can check that the signal levels are correct.





CAN BUS

CAN bus is part of the OBD II standard used by the emissions control computer in all modern vehicles. With PicoScope you can check that the two wires, CAN H and CAN L, are mirror images of each other. You can also see if either wire is shorted or broken.

SERIAL DECODING

For advanced users such as vehicle designers and aftermarket equipment engineers, PicoScope can decode the CAN data and display it in graphical and tabular formats. This feature is free of charge and is built in to the standard software.

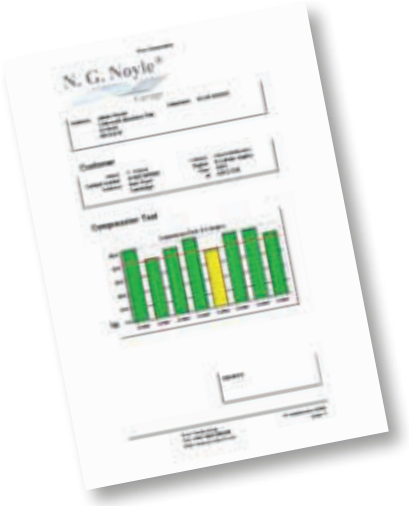
PICODIAGNOSTICS SOFTWARE

Does most of the work for you.

The PicoDiagnostics software is included with every PicoScope, whether you buy a kit or just the scope.
It contains a range of tests that require almost no user intervention apart from connecting a few test leads, but which give professional-quality results that you can print out and show to the customer. It's the perfect software to use when you're in a hurry.

CUSTOMISED TO YOUR GARAGE

PicoDiagnostics gives a professional appearance to your reports by customizing them with your business name and logo.

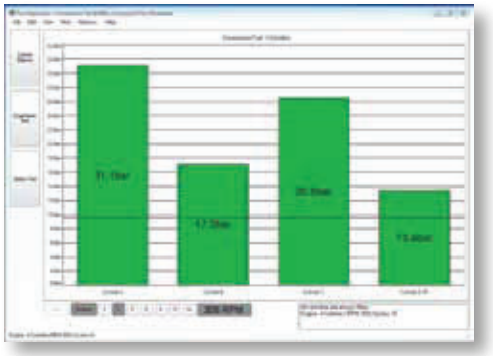


COMPRESSION TEST

Clip a test lead on the battery, crank the engine for a few seconds, and PicoDiagnostics calculates how hard each cylinder is working. You can run this test with or without a pressure transducer.

RELATIVE COMPRESSION TEST

A useful first test of engine condition.
See immediately if any cylinder has poor compression.



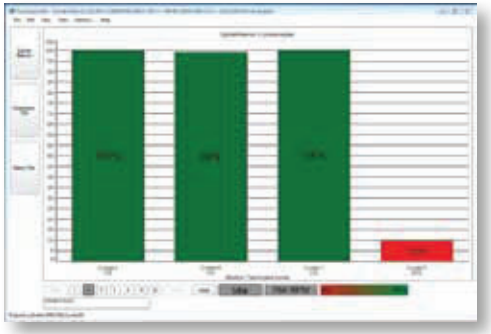
ABSOLUTE COMPRESSION TEST

If you connect a pressure sensor in place of one of the spark plugs, PicoDiagnostics adds pressure readings to the display (in bar or psi) and shows the cylinder numbers.

PICODIAGNOSTICS SOFTWARE

CYLINDER BALANCE

STANDARD TEST
Hook up one test lead to the battery and start the engine. Pico Diagnostics shows you how hard each cylinder is working, making it possible to spot misfires and fueling problems.



ADVANCED OPTIONS
Misfire (red and orange bars): PicoDiagnostics shows the relative number of misfires counted on each cylinder. This enables you to distinguish frequent and occasional misfires.

Variation (blue bars): PicoDiagnostics shows the range of measurements obtained from each cylinder. A highly variable cylinder has an intermittent misfire, while a consistently misfiring cylinder could be suffering from a blocked injector or poor compression.

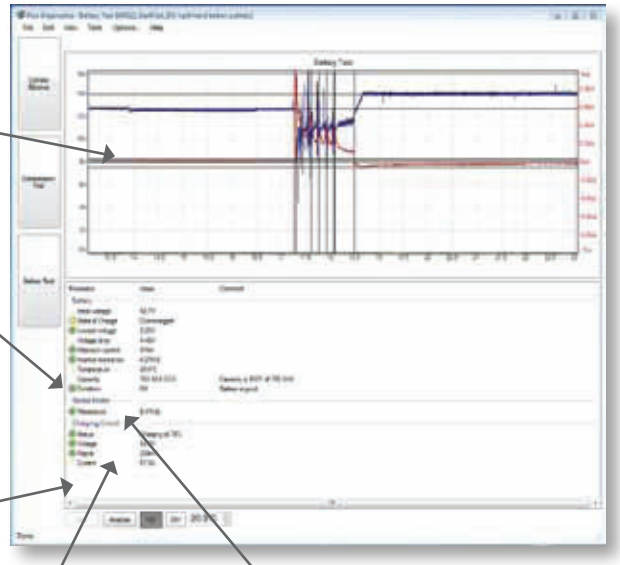
ELECTRICAL SYSTEM TEST

Check the battery, starter alternator and wiring all in one test. All the equipment you need is included in the kit, so there's no longer any need to buy an expensive battery tester. Just connect a test lead and a current clamp to the battery and then start the engine. As the test is done under high load during starting, the results are repeatable and accurate.

VOLTAGE AND CURRENT
See at a glance whether the battery and starter motor are performing correctly.

BATTERY CONDITION
Red/amber/green indicators, and comments in simple text, tell you if the battery needs replacing.

VOLTAGE DROP TEST
PicoDiagnostics automatically displays extra information to help localize the fault to the battery, the starter motor or the wiring.



CHARGING TEST
Checks that the alternator is correctly charging the battery, and spots problems such as overcharging and excessive ripple due to a blown diode.

STARTER MOTOR
No need for extra equipment. PicoDiagnostics measures the coil resistance using a few simple connections.

THE PICOSCOPE OSCILLOSCOPE

So easy to use, nobody reads the manual.

ERGONOMIC

Notice how simple the PicoScope oscilloscope looks. There are no switches, dials or knobs (not even hidden round the back), and just a bare minimum of connectors. You don't even have to switch it on and off, as the software does that for you.

What sets PicoScope apart is the clever design of its hardware and software. When you run an oscilloscope test, the program sets up the scope automatically, so you get a waveform on the screen right away. All the advanced adjustments are there, but in many cases you won't need them. And with the fully automated PicoDiagnostics software, you don't even need to know how to use a scope - the results are displayed in plain language and illustrated with performance charts.

FUTURE-PROOF

Vehicles equipped with CAN bus networks are now commonplace. FlexRay is a new network designed to be faster and more reliable, and is starting to replace CAN networks in newer vehicles. PicoScope is currently the only diagnostic scope with enough performance to cope with both CAN bus and FlexRay. Don't buy a scope that will soon be out of date - buy a PicoScope and be future-proof!

ROBUST

In the kit you will find a range of accessories and probes. They all fit on the same standard BNC connectors on the front of the scope, so there are no expensive adaptors to buy, or complex cables to break.

We know that mistakes will happen when connecting up test leads, so your PicoScope is protected against overloads and short circuits.

POWERFUL

The PicoScope has more memory than you are ever likely to need. The details are in the specifications, but all you need to know is that the PicoScope will carry on displaying high-quality waveforms, no matter which test you run. Some competing scopes save on costs by using a smaller memory, but when this fills up, they have to cut down the sampling rate so that you see less detail on the screen. And then there are scopes that become less responsive as you use more memory. Again, with PicoScope, you don't need to worry about that, as the scope automatically manages its memory usage so that it never slows down.

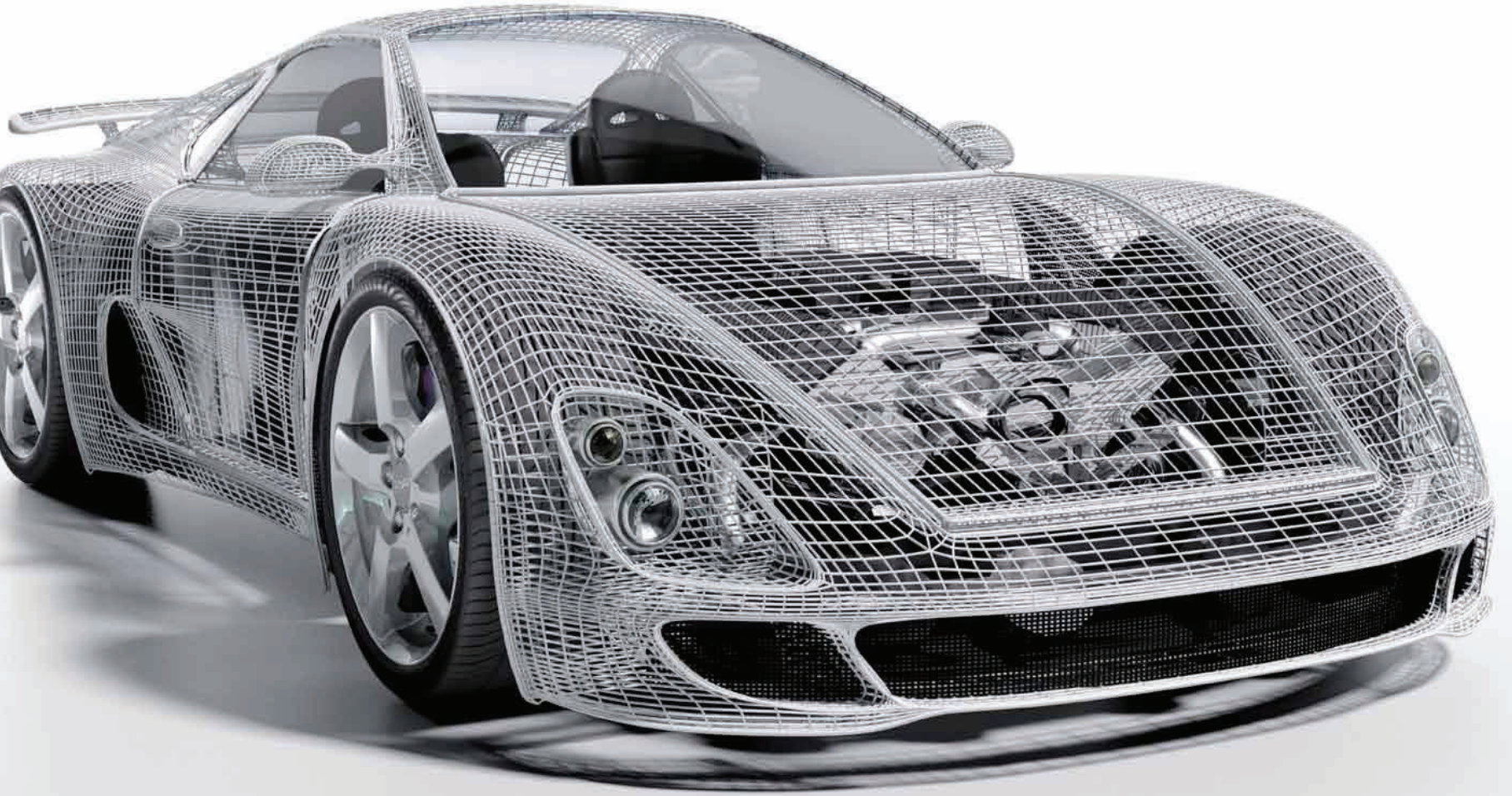
We could tell you more about the 80 MS/s sampling and the 32 M memory but all this information is in the specification table. We feel it is important to list the technical specifications, but you don't need to understand them all in order to use the scope. If you prefer, you can just trust its reputation as the best diagnostic scope in the industry. It's a reputation we are proud of.

PicoScope 4423
80 MS/s sampling rate
32,000,000 sample memory
+/- 100V input range
1% accuracy

PicoScope 4223
Two-channel version also available

Full specifications on page 23


DELL



TECHNICAL SPECIFICATIONS OF THE PICOSCOPE 4423 & 4223 DIAGNOSTIC SCOPE

MAIN FEATURES	
Vertical resolution	12 bits (16 bits in resolution enhance mode)
Channels	4 or 2
Bandwidth	20 MHz (10 MHz on ±50 mV range)
Accuracy	1%
Sensitivity	10 mV/div to 20 V/div
Input ranges (full scale)	±50 mV to ±100 V in 11 ranges
Input impedance	1 MΩ in parallel with 22 pF
Input type	Single-ended, BNC connector
Input coupling	Software selectable AC/DC
Overload protection	±200 V on single input
Maximum sampling rate (single shot) 1 or 2 channels in use 3 or 4 channels in use	 80 MS/s 20 MS/s
Buffer memory	32 M samples shared between active channels
Waveform buffer	Up to 1000 waveforms
Timebase ranges	100 ns/div to 200 s/div
Advanced features	Low-pass filtering, math channels, measurements, reference waveforms
TRIGGERS	
Source	Any input channel
Basic triggers	Auto, repeat, single, none
Advanced triggers	Rising edge, falling edge, edge with hysteresis, pulse width, runt pulse, dropout, windowed
Maximum pre-trigger delay	10 x per-division timebase setting
Maximum post-trigger delay	50 s
SPECTRUM ANALYZER	
Bandwidth	20 MHz
Frequency range	DC to 20 MHz
Display modes	Magnitude, peak hold, average
ENVIRONMENTAL	
Operating temperature range	0 °C to 45 °C (15 °C to 40 °C for quoted accuracy)
Storage temperature range	-20 to +60°C
Storage humidity range	5 to 95% RH, non-condensing
PHYSICAL CHARACTERISTICS	
Dimensions	200 x 140 x 35 mm (approx 7.9 x 5.5 x 1.4 in)
Weight	<500 g (approx 1.1 lb)
GENERAL	
Additional hardware (supplied)	USB 2.0 cable, user manuals, software CD-ROM Also available in Standard, Commercial and Advanced Kits
PC interface	USB 2.0 (USB 1.1 compatible) - cable supplied
Power requirements	Powered from USB port
Compliance	FCC (EMC), CE (EMC and LVD), RoHS
Total satisfaction guarantee	In the event that this product does not fully meet your requirements, you can return it for an exchange or refund. It must be returned in good condition within 14 days.
Warranty	2 years

WHAT DOES IT ALL MEAN?

The main specifications explained.

VERTICAL RESOLUTION

The number of dots in the waveform from top to bottom. "12 bits" means 4,096 dots, which is more detail than you can see on the screen all at once. PicoScope stores the extra detail for when you zoom in.

BUFFER MEMORY

The number of dots in the waveform from left to right. If you don't have enough memory then the waveform won't show all the detail in the signal. PicoScope has more than enough memory, so you can zoom in thousands of times and still see a clear display and spot intermittent glitches.

WAVEFORM BUFFER

A memory that collects your most recent waveforms. If a waveform disappears off the screen, you can look back through the waveform buffer to find it.

TRIGGER

This ensures that the scope captures the waveform at the right time and keeps it in a stable position on the screen. PicoScope usually sets up the trigger automatically, but if you want you can select special trigger modes to catch unusual waveforms that you might otherwise miss.

BANDWIDTH

Not something that you need to worry about most of the time, but for faster signals, more bandwidth gives a more faithful reproduction of the signal shape on the screen. PicoScope has enough bandwidth to display CAN bus and FlexRay signals accurately.

SAMPLING RATE

Like bandwidth, this is more important for fast signals. A high sampling rate gives more detail across the screen, so you can zoom in to see the high-frequency details of the signal.

POWERFUL

The PicoScope 4000 Series scopes turn any PC or laptop with a USB port into a powerful automotive tool. The two main diagnostic techniques, ECU Fault codes and scopes, both have advantages but used together are very powerful. Scopes enable the actual signals to be viewed on your monitor ensuring a large high-quality display.

DEEP MEMORY

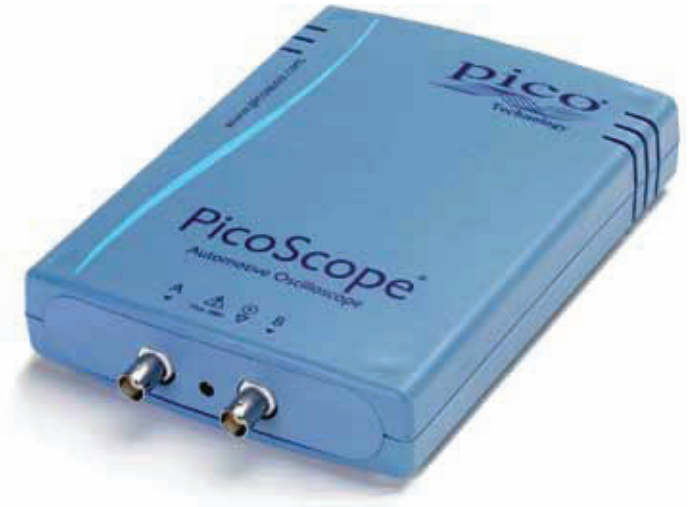
The PicoScope has more memory than you are ever likely to need. The details are in the specifications (pg. 23), but all you need to know is that the PicoScope will carry on displaying high-quality waveforms, no matter which test you run. Some competing scopes save on costs by using a smaller memory, but when this fills up, they have to cut down the sampling rate so that you see less detail on the screen. And then there are scopes that become less responsive as you use more memory. Again, with PicoScope, you don't need to worry about that, as the scope automatically manages its memory usage so that it never slows down.

AUTOMATED SET-UP

What sets PicoScope apart is the clever design of its hardware and software. When you run an oscilloscope test, the program sets up the scope automatically, so you get a waveform on the screen right away. All the advanced adjustments are there, but in many cases you won't need them. And with the fully automated PicoDiagnostics software, you don't even need to know how to use a scope - the results are displayed and illustrated with performance charts.

FUTURE-PROOF

Vehicles equipped with CAN bus networks are now commonplace. FlexRay is a network designed to be faster and more reliable, and is starting to replace CAN networks in newer vehicles. PicoScope is currently the only diagnostic scope with enough performance to cope with both CAN bus and FlexRay. Don't buy a scope that will soon be out of date - buy a PicoScope and be future-proof.



PICOSCOPE DIAGNOSTICS KIT

In the kit you will find a range of accessories and probes. They all fit on the same standard BNC connectors on the front of the scope, so there are no expensive adaptors to buy, or complex cables to break.

We know that mistakes will happen when connecting up test leads, so your PicoScope is protected against overloads and short circuits.

The kit can be used to test and measure virtually all of the electrical and electronic components and circuits in the modern vehicle, including:

- Ignition (primary & secondary)
- Injectors & fuel pumps
- Starter & charging currents
- ABS sensors, crank & cam sensors
- Lambda (oxygen), airflow, knock & MAP sensors
- Glow plugs/timer relays
- Relative compression tests
- FlexRay, CAN and LIN bus waveforms

For more information see our Advanced Kit brochure online at www.picoauto.com.

2 CHANNEL STANDARD KIT

PicoScope 4223 oscilloscope
60 A current clamp
600 A current clamp
1 x red & 1 x black small croc clips
2 x Secondary ignition pick-up leads
1 x red & 1 x black dolphin clips
2 x BNC to 4mm test leads
Insulation-piercing probes
1 x red & 1 x black multimeter probes
Two-pin breakout lead
Acupuncture probe set
2 x 20:1 attenuators
USB Cable
Quick start guide
S-Hook
Carry case
Automotive software CD
Vehicle Electronics course CD

£975 $1,608.75 €1,179.75

ORDER CODE PP494 Standard 2 Channel Scope Kit

4 CHANNEL STANDARD KIT

PicoScope 4423 oscilloscope
60 A current clamp
600 A current clamp
2 x red & 2 x black small croc clips
4 x Secondary ignition pick-up leads
1 x red & 1 x black dolphin clips
4 x BNC to 4mm test leads
Insulation-piercing probes
2 x red & 2 x black multimeter probes
Two-pin breakout lead
Acupuncture probe set
4 x 20:1 attenuators
USB Cable
Quick start guide
S-Hook
Carry case
Automotive software CD
Vehicle Electronics course CD

£1395 $2,301.75 €1,687.95

ORDER CODE PP495 Standard 4 Channel Scope Kit

4 CHANNEL ADVANCED KIT

Contains all the items in the standard kit, plus:

Extra 60 A current clamp
2 x Fuse extension leads
COP probe
4 x Spark plug extension leads
2 x 60 MHz scope probes
Set of 4 breakout cables
Protective rubber case
Professional carry case
Premium test lead:
BNC to 4mm blue
(fixed ground)
Premium test lead:
BNC to 4mm red
(removable ground)
Premium test lead:
BNC to 4mm green
(removable ground)
Premium test lead:
BNC to 4mm yellow
(removable ground)

£1995 $3,291.75 €2,413.95

ORDER CODE PP537 Advanced 4 Channel Scope Kit

COMMERCIAL VEHICLE KIT

PicoScope 4423 oscilloscope
2000 A current clamp
60 A current clamp
4 x BNC to 4mm test leads
2-pin breakout lead
4 x 20:1 attenuators
8 x Multimeter probes
(4 black, 4 red)
4 x Small crocodile clips
(2 black, 2 red)
2 x Dolphin clips
(1 black, 1 red)
Acupuncture probe set
2 x Secondary ignition pickup leads
Automotive software CD
Vehicle Electronics Diagnostic
Course CD-ROM
Quick start guide
Carry case

£1395 $2,301.75 €1,687.95

ORDER CODE PP540 CV 4 Channel Scope Kit

All prices exclude VAT

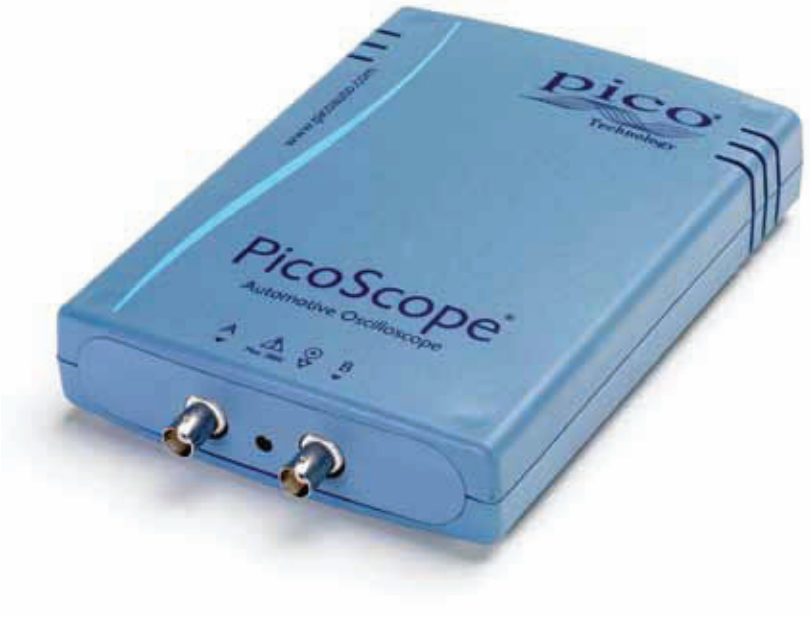
4 CHANNEL OSCILLOSCOPE

Most people buy the scope as part of a kit, but we offer the option to buy the scope separately for those who wish to put together a kit for their own specific requirements.

The specifications for the 4 channel scope are listed below.

4 Channels
12 bit high resolution
Deep 32M "always-on" memory
±100 V maximum input range
Supplied with PicoScope and Pico Diagnostics software
DC to 20 MHz frequency range
80 MS/s sampling rate
Connected to and powered by USB 2.0
Runs on Windows 7, Vista and XP.

ORDER CODE PP503 4 Channel Scope **£799 $1318 €968**



2 CHANNEL OSCILLOSCOPE

Most people buy the scope as part of a kit, but we offer the option to buy the scope separately for those who wish to put together a kit for their own specific requirements.

The specifications for the 2 channel scope are listed below.

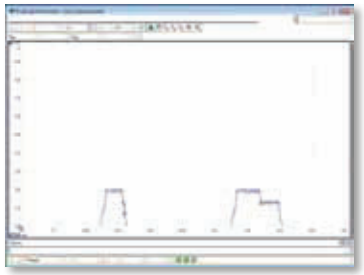
2 Channels
12 bit high resolution
Deep 32M "always-on" memory
±100 V maximum input range
Supplied with PicoScope and Pico Diagnostics software
DC to 20 MHz frequency range
80 MS/s sampling rate
Connected to and powered by USB 2.0
Runs on Windows 7, Vista and XP.

ORDER CODE PP502 2 Channel Scope **£499 $823 €604**

KEY ACCESSORIES

The following accessories are those that are included in the kits. They have a colour coded circle next to them to indicate which kit they are included in: 🔴 2 Channel standard kit 🟡 4 Channel standard kit 🟢 4 Channel advanced kit 🔵 Commercial vehicle kit
For the full range of accessories visit www.picoauto.com or see the accessories catalogue

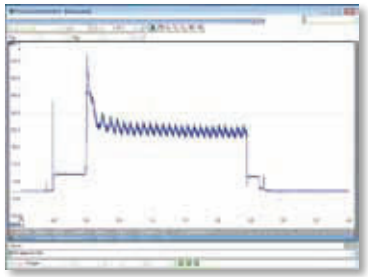
60 AMP CURRENT CLAMP



The 60 A current clamp allows you to measure current up to 60 amps in a wire without cutting, disconnecting or stripping the wire. It plugs directly into the PicoScope. When the correct preset test is selected, PicoScope shows current readings in amps.

🔴🟡🟢🔵 BNC 60 A current clamp PP264 **£99 $163.55 €119.79**
4mm 60 A current clamp PP218 **£80 $132 €96.80**

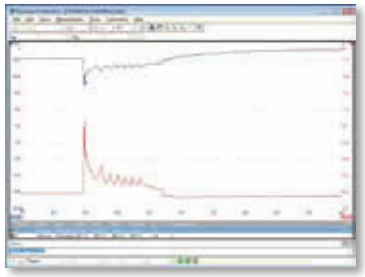
600 AMP CURRENT CLAMP



The 600 A current clamp allows you to measure current up to 600 amps in a wire without cutting, disconnecting or stripping the wire. It plugs directly into the PicoScope. When the correct preset test is selected, PicoScope shows current readings in amps.

🔴🟡🟢 BNC 600 A current clamp PP266 **£99 $163.55 €119.79**
4mm 600 A current clamp PP179 **£80 $132 €96.80**

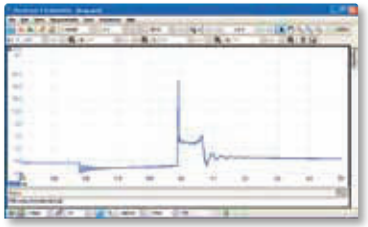
2000 AMP CURRENT CLAMP



The 2000 A current clamp allows you to measure current up to 2000 amps in a wire without cutting, disconnecting or stripping the wire. Use a TA000 test lead to connect it to the PicoScope. When the correct preset test is selected, PicoScope shows current readings in amps.

🔵 4mm 2000 A current clamp PP253 **£99 $163.55 €119.79**

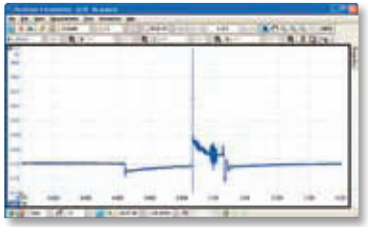
SECONDARY IGNITION PICKUP



The secondary ignition pickup enables the PicoScope to measure high-tension (HT) voltages in secondary ignition circuits. It clips onto the HT lead with no need to disconnect the lead. The lead includes a ground clip that you must always connect to battery negative (earth) to prevent stray voltages from damaging the PicoScope.

Secondary ignition pickup PP178 **£35 $57.75 €42.35**

COIL-ON-PLUG PROBE

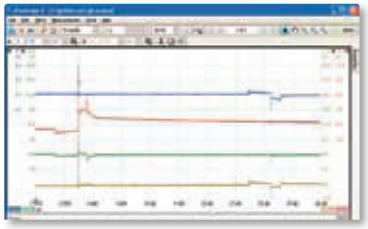


The Coil-on-Plug (COP) probe can pick up secondary ignition waveforms from most coil-on-plug or coil-per-cylinder systems where there are no exposed HT leads. The signal is displayed in PicoScope as kilovolts (kVs).

- Coil-on-plug probe only PP338 **£95 $156.75 €114.95**
- BNC to BNC cable with ground clip TA033 **£15 $24.75 €18.15**

Coil-on-plug probe kit PP357 **£105 $173.25 €127.05**

COIL-ON-PLUG PROBE EXTENSION LEADS



These extension leads give access to the HT (secondary) ignition circuit in coil-on-plug engines. Fit the COP Extension Lead between the coil and the plug, then place a PP178 Secondary Ignition Pickup on the lead to pick up the HT pattern on your PicoScope. Includes an earth (ground) wire to ensure safety.

COP extension leads each PP399 **£24.99 $41.23 €30.24**

- COP extension leads x4 PP400 **£95 $156.73 €114.94**

ACUPUNCTURE PROBE SET

The acupuncture probes slide under the insulation of multi-plug terminals from behind the plug, allowing you to pick up signals without stripping wires or disconnecting plugs. This technique is sometimes called back-pinning. Each probe fits onto the 4 mm plug of a TA000 or similar test lead. A storage box containing spare pins and screws is included.

Acupuncture probe set TA008 **£29 $47.85 €35.09**

MULTIMETER PROBES

These probes fit all our BNC-to-4-mm test cables. They are used to make contact with exposed wires and terminals

Multimeter probe (black) TA001 **£4 $6.60 €4.84**
Multimeter probe (red) TA002 **£4 $6.60 €4.84**

SMALL CROCODILE CLIPS

These clips fit all our BNC-to-4-mm test cables. They are used to make contact with exposed wires and terminals. Jaw opening 8 mm. For larger terminals, including battery terminal posts, use the TA005 and TA006 large crocodile clips.

Small croc clip (black) TA003 **£3 $4.95 €3.63**
Small croc clip (red) TA004 **£3 $4.95 €3.63**

INSULATION PIERCING CLIPS

When there is no other way to get to a wire, clamp one of these on and a sharp pin pierces the insulation. Accepts 4mm plugs. Sold as a pair (1 red, 1 black)

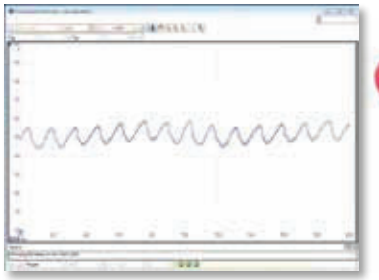
Insulation piercing clips TA007 **£25 $41.25 €30.25**

LARGE DOLPHIN CLIPS

These clips fit all our BNC-to-4-mm test cables. They are used to make contact with exposed wires and terminals, including battery terminals. Jaw opening 32 mm. For smaller terminals, use the TA003 and TA004 small crocodile clips.

Large dolphin clip (black) TA005 **£5 $8.25 €6.05**
Large dolphin clip (red) TA006 **£5 $8.25 €6.05**

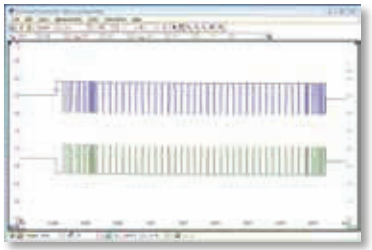
FUSE EXTENSION LEADS



ATS and mini-ATS sizes for all common fuses. Use with the 60 amp clamp to measure fuse current.

Fuse extension leads PP408 **£29.50 $48.67 €35.70**

60 MHZ OSCILLOSCOPE PROBE



This 60 MHz oscilloscope probe is used for acurately measuring fast signals like CAN bus and FlexRay. Standard BNC plug 1.2m long.

60 MHz oscilloscope probe MI007 **£15 $24.75 €18.15**

2-PIN BREAKOUT LEAD

For standard 2-pin sensors and actuators. With 4mm plugs to connect to PicoScope test leads.

2-pin breakout lead TA012 **£25 $41.25 €30.25**

20:1 ATTENUATOR

Increases the input range to 300 V. For measuring fuel injector and primary ignition voltages.

20:1 Attenuator (each) PP198 **£49 $80.85 €59.29**

BNC TO 4MM TEST LEAD

Custom-made for automotive diagnostics. 3m and 5m long versions available. Fully screened to reduce noise pickup.

3m test lead TA000 **£20 $33 €24.20**
5m test lead TA020 **£30 $49.50 €36.30**

PREMIUM TEST LEADS

- Premium test lead: BNC to 4mm blue (fixed ground) TA125 **£30 $49.50 €36.30**
- Premium test lead: BNC to 4mm red (removable ground) TA126 **£30 $49.50 €36.30**
- Premium test lead: BNC to 4mm green (removable ground) TA127 **£30 $49.50 €36.30**
- Premium test lead: BNC to 4mm yellow (removable ground) TA128 **£30 $49.50 €36.30**

Set of four premium test leads (one of each) PP718 **£100 $165 €121**

S-HOOK

Use this S-hook to keep test leads tidy in the engine bay.

S-hook MI168 **£2 $3.30 €2.42**

CABLE IDENTIFIER KIT

Fit these coloured clips on both ends of your screened test leads. Helps to avoid confusion, especially when using all 4 channels of your scope.

Cable identifier kit. Supplied in all Oscilloscope Diagnostics kits

PROTECTIVE RUBBER CASE

A rubber case to protect your PicoScope from accidental damage. The boot incorporates a hanging bracket allowing you to hang your scope under the hood.

- Rubber boot PP691 **£20 $33 €24.20**
- Replacement hanging bracket MI254 **£2 $3.30 €2.42**

CARRY CASES

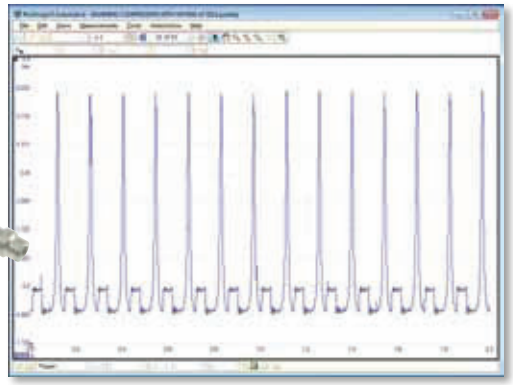
The hard outer shell of these cases protects your kit from the inevitable knocks and bumps of workshop life.

- Standard carry case PP207 **£50 $82.50 €60.50**
- Professional carry case PP607 **£99 $163.35 €119.79**
- Commercial Vehicle carry case PP608 **£50 $82.50 €60.50**

WPS500X PRESSURE TRANSDUCER

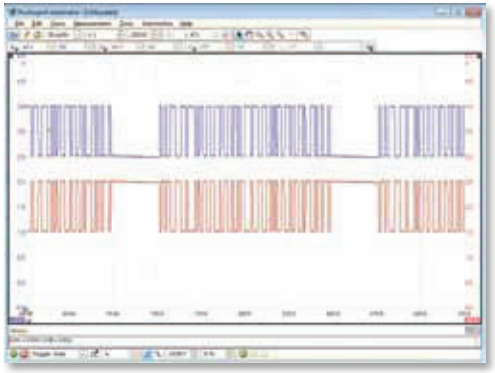
With the uncompromising resolution and accuracy of the WPS500X Automotive Pressure Transducer you can perform quick and accurate pressure analysis of many automotive systems.

- Accurately measure up to 500 psi
- Ultra-fast 100 µs response time
- Zoom function for enhanced analysis capabilities
- Rechargeable LiPo battery
- Intergrated pressure relief / bleed-off valve
- Auto zeroing
- High noise immunity
- Temperature compensated



The WPS5000X features an extremely fast 100 µs response rate from 0% to 90% of full scale and sensitivity down to about 0.07 psi (5 mbar).
This provides you with an accurate representation of rapidly changing signals that span across a broad pressure range.
The product includes: • WPS500X Pressure Transducer • Carry case • USB cable • BNC to BNC cable

ORDER CODE PP652 WPS500X Pressure Transducer **£465 $767.25 €562.65.**
PP836 WPS500X Pressure Transducer kit **£655 $1080.75 €792.55**



CAN TEST BOX

Breakout box for the 16 pin diagnostic connector. LEDs show which protocols are in use. Pass-through connector for connecting a scan tool.

The CAN Test Box uses numbered backlit LEDs which illuminate when signal data is present on the corresponding pin of the Data Link Connector (subject to the vehicle manufacturer's specification). Pulsing LEDs indicate signals alternating high and low.

The CAN Test Box allows you to connect your PicoScope oscilloscope, or any other compatible scope, enabling you to monitor any signals present, such as the CAN High and Low signals. The CAN Test Box terminal pin ports are accessible with standard 4 mm plugs.

The CAN Test Box is fitted with a 2.5 metre (8.2 foot) cable so that you can work in a convenient location away from the diagnostic connector, and an additional pass-through connector so that you can hook up your scan tool at the same time as your scope. The box is powered by the diagnostic connector, so no batteries or mains adaptor are needed.

THE LEDS INDICATE THE FOLLOWING SIGNALS:

- LED 1/9 — 485A/485B
- LED 3/8/12/13 — FUTURE UPGRADE
- LED 5 — SIGNAL GND
- LED 7/15 — K/L LINES OF ISO9141-2 AND KEYWORD 2000
- LED 16 — BATT+ (VOLTAGE SUPPLY)
- LED 2/10 — BUS+/BUS- LINES J1850
- LED 4 — CHASSIS GND (GROUND)
- LED 6/14 — CAN HIGH/LOW OF SAE J2284
- LED 11 — CLOCK

ORDER CODE PP619 CAN Test Box **£149 $245.85 €180.29**

2-YEAR WARRANTY

If anything goes wrong with any part of your PicoScope kit within the first 2 years, we will fix or replace it.

NEWSLETTER

Our monthly newsletter keeps you up to date with Pico product releases, and includes case studies and technical tips written by diagnostics experts.

To sign up, just type your email address in the box on our home page.

We won't send you spam you or sell your email address.

CASE STUDIES

On our website you will find a whole range of detailed, illustrated diagnostic case studies, plus tutorials, videos, manuals, waveforms and articles, all free of charge.

TRAINING COURSES

Focusing on engine management diagnostics, our courses will show you how to get the best from the PicoScope software and diagnostics kit. The areas covered include the basic working principles of Engine Management systems, testing components and system diagnostics using oscilloscopes. Find out more about our upcoming courses and where your closest venue is by visiting our website.

LIFETIME TECHNICAL SUPPORT

Free lifetime technical support is available for all customers, whether you would like one of our team of experts to answer your query or to advise you on the best products to suit your needs.

AUTOMOTIVE TECHNICAL EXPERTS

Our team of technical experts are on hand to assist you with your purchase and answer any technical queries you may have.

FREE SOFTWARE UPGRADES

Free software upgrades for the lifetime of the product are available on our website.

WORLDWIDE SUPPORT

Our software is supplied in English, Français, Deutsch, Italiano, Español, 中文（简体）, 正體中文（繁體）, Ceština, Dansk, suomi, Ελληνικά, Magyar, 日本語, Norsk, Polski, Português, românâ, Русский, Svenska and Türkçe.

HELP FORUM

Our online help forum is the easy way to get advice from our dedicated team of technical experts.

AWARDS

Our products regularly win industry awards, with our past achievements including: Commercial Vehicle Top Products, MOTOR Top 20 Tools and TechShop Top 5 Tools.

MARKET LEADERS IN AUTOMOTIVE OSCILLOSCOPES

Picoscope kits are standard dealer equipment for many manufacturers including. Aston Martin, CNH, Iveco, Lexus, LTI Vehicles, Maserati, Mazda, Tesla, Toyota and Volvo.

We aim to despatch orders within 24 hours of receiving payment for products in stock ordered between 9am and 5pm (Monday to Friday).

ORDERING

Pico Technology supports a network of distributors in 40 countries worldwide who are helping to build and maintain its enviable reputation in the industry. Details of your local distributor who will be happy to help you can be found at
www.picoauto.com/automotive-distributors.html

Customers from the UK and those from countries without a local distributor can also place orders direct with Pico Technology by phone, fax or secure e-commerce.

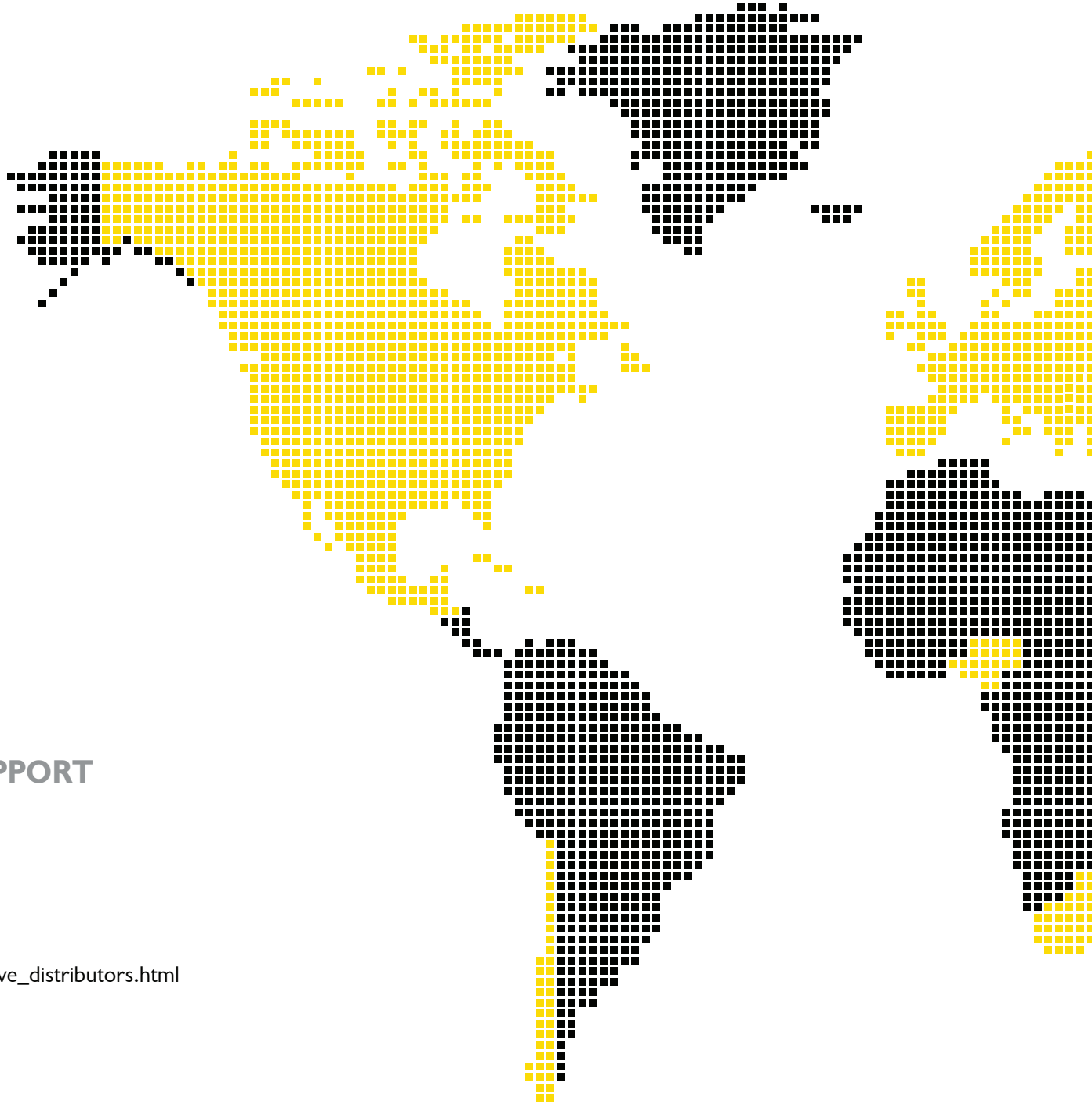
PAYMENT

We accept payment in Sterling, Euros and US Dollars. Payment is also accepted by credit card
(Visa or MasterCard) or debit card (Maestro/Switch or Delta).

Please note that all sales are subject to our standard terms and conditions. Prices are believed to be correct at the time of printing but are subject to change without notice.

Please check the current Euro and Dollar prices on our website before ordering.

Errors and omissions excepted. All prices exclude VAT.

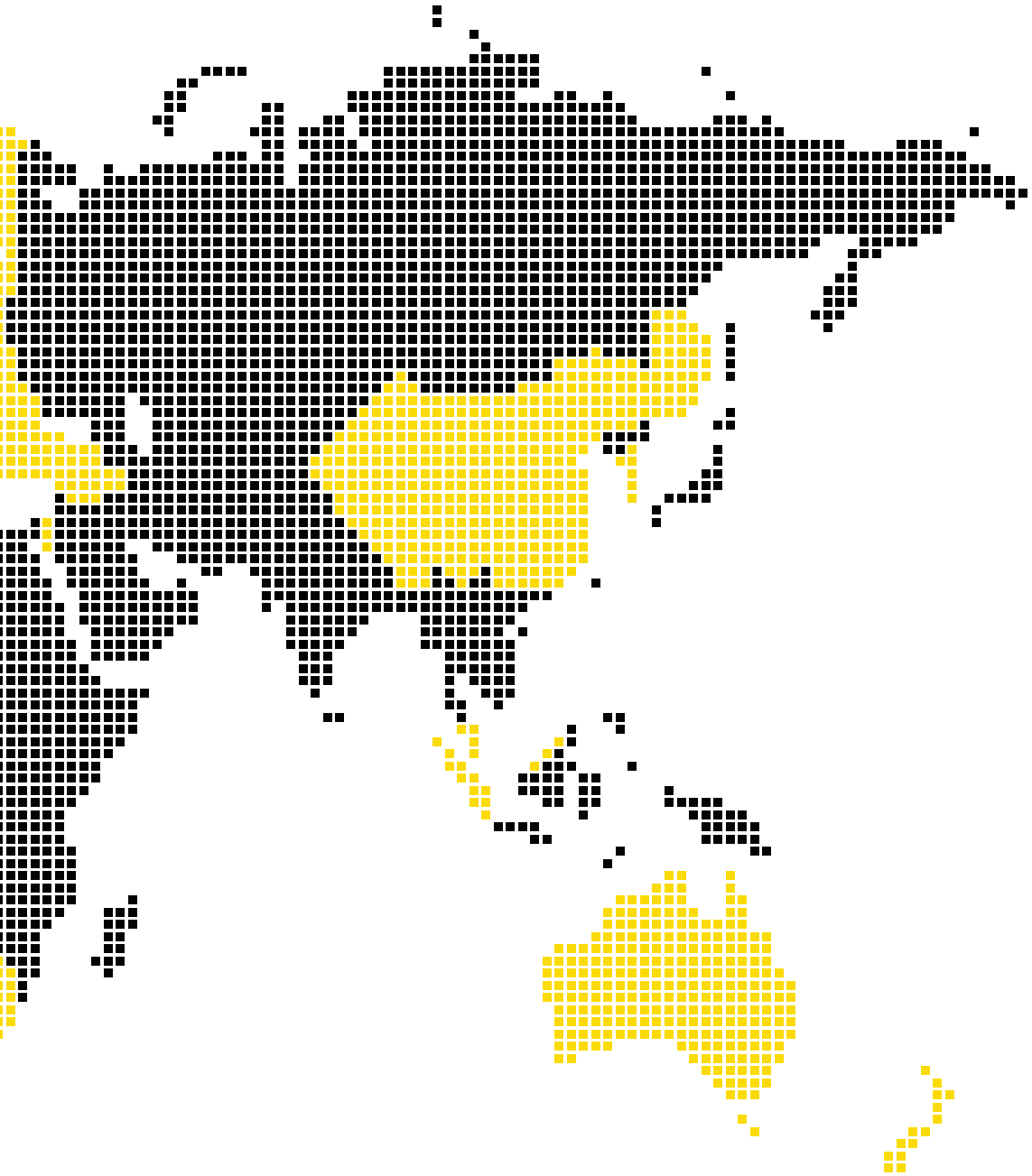


WORLDWIDE SUPPORT

DISTRIBUTORS
AUTHORISED FOR SALES
AND TRAINING

PICO DIRECT

www.picoauto.com/automotive_distributors.html

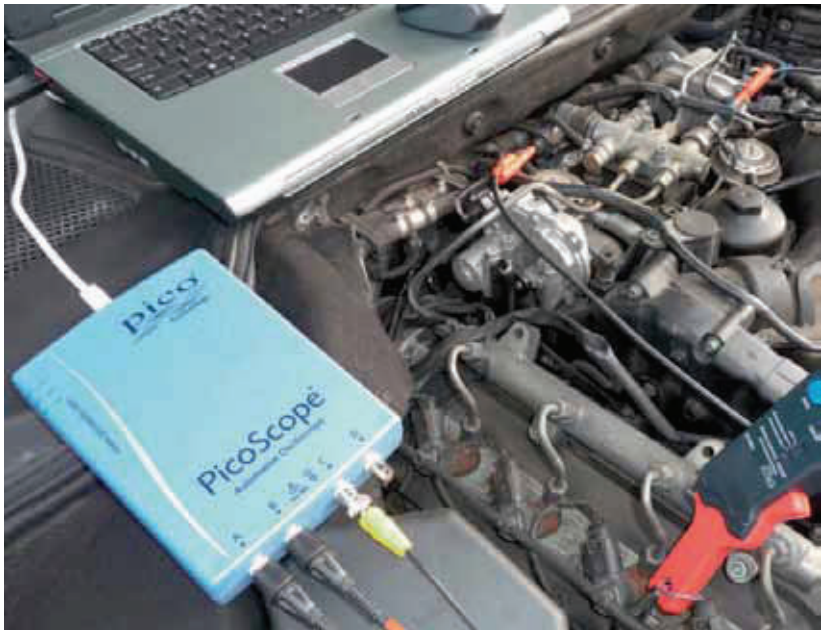


DISTRIBUTORS IN

AUSTRALIA
AUSTRIA
BELGIUM
CANADA
CHILE
CHINA
CROATIA
CYPRUS
CZECH REPUBLIC
DENMARK
EIRE
ESTONIA
FINLAND
FRANCE
GERMANY
GREECE
HONG KONG
HUNGARY
IRELAND
ISRAEL
ITALY
MALAYSIA
MEXICO
NETHERLANDS
NEW ZEALAND
NIGERIA
POLAND
PORTUGAL
ROMANIA
SINGAPORE
SLOVAKIA
SLOVENIA
SOUTH AFRICA
SOUTH KOREA
SPAIN
SWEDEN
SWITZERLAND
TURKEY
UNITED KINGDOM
UNITED STATES

"SCOPE BREEDS ETERNAL"

Product test by Professional Motor Mechanics Magazine



MARK SCOPES OUT THE PICO 4000 KIT AND GIVES US HIS CONSIDERED VERDICT.

As a regular PicoScope user I believe the automotive kit is at the forefront of vehicle testing technology and user-friendliness. Ask any Pico user for their opinion of the kit and I am sure you will never hear a bad word said about the company or its products. When I heard about the new Pico 4000 kit I was intrigued to see how they could possibly improve the best Oscilloscope I have ever used? Well they have! Available in 2 or 4 channel options, the Pico automotive kit can be used to test the voltage or current of any circuit, sensor, actuator, ignition signal or data bus transfer message. The comprehensive scope kit comes in a protective carry case and includes all you need to get started and a detailed training DVD from Frank Massey. The Scope module is powered directly by the USB 2.0 lead from your laptop which makes the system very versatile and portable to use.

WHAT A MEMORY

The Pico 4000 spec improvements include an increased input voltage to ±100 V before the use of an attenuator is required. The 'always on' memory buffer has been increased 64-fold and ensures that when fault finding, no vital information is missed and that when the scope capture is paused, up to the previous 1000 screens can be reviewed, saved and printed.

The extended bandwidth and real time sample rates mean the performance of this scope is much greater than before and high speed CANBus and Flexray systems are easily catered for. This future-proofs the Pico kit against forthcoming vehicle network system developments, giving peace of mind if you invest in it.

The scope screen is presented in a clear and workable format with a large display for waveforms and drop down menus are used to set the testing options, triggers and probe types. Advanced cursor measurements and signal calculations can be displayed onscreen in many options. The automotive tab leads to extensive pages of specific system info, testing methods and channel presets. The duration of time-base that can be displayed across the X axis can be as super fast as 1 microsecond (100 nanoseconds per division) allowing for extreme detail, or as long as 33 minutes 20 seconds (200 seconds per division), which is great for monitoring varying signals over time. The voltage scale (Y axis) can be set as sensitive as 10 mV per division right up to 50 kV for secondary ignition.

MULTI-COLOURED

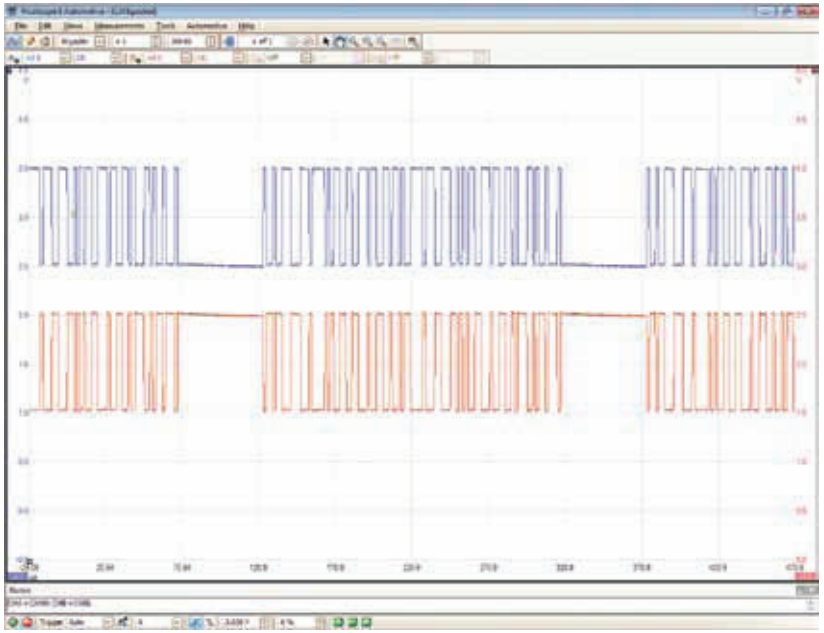
Each of the four channels are represented by different colour traces on screen – blue, red, green and amber, which eases identification on complex multi-channel testing. I like the windowed zoom function where any part of a captured waveform can be selected by dragging a box around the area of interest then the screen instantly zooms in to display the highlighted zone.

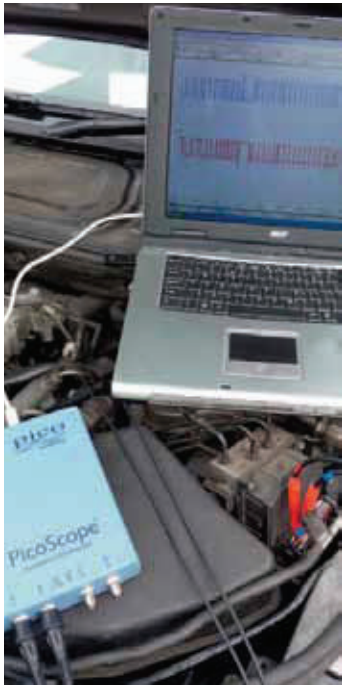
Onscreen help is provided by the user's guide and the beauty of working with this oscilloscope, especially on a system that you are not sure about, is that you cannot damage anything by probing a wrong wire. I particularly like the way that testing with a scope on any automotive system opens up the whole story of events and makes it so much easier to understand the relationships between various components. In some cases testing with the amps clamps can give much more reliable results monitoring current rather than voltage in a circuit.

CONSTANT DEVELOPMENT

The PicoScope operating software is constantly being developed and the latest available version is always free to download from www.picoauto.com. Even if you are not in the market for a scope it is well worth logging on to the website as it is a great resource for technical info and also hosts a user's forum which has some very experienced contributors. Monthly automotive e-mail news letters are great and always feature real life repair case studies by highly respected technicians.

Existing PicoScope users can upgrade the spec of their automotive kit by buying the latest Pico 4000 module only, as all the rest of the test kit contents are compatible. A great range of PicoScope accessories can be obtained to cover any testing eventuality.





VERDICT

It has been hard to do the Pico 4000 kit justice in the space of this review and it must really be seen to be appreciated – the best oscilloscope I have ever used!

WHAT OUR CUSTOMERS HAD TO SAY ABOUT THE MARKET-LEADING OSCILLOSCOPE

10/10

Uses it for: Evaluating component operation and general test procedures.

It's an ideal robust, reliable piece of equipment that can be used by a novice (myself) or an experienced user and give faultless, trustworthy results with little worry about correct setting up procedures or readings due to its excellent guides and reference material built in.

10/10

Uses it for: Automotive diagnosis.

Simple and easy to use/great support.

10/10

Uses it for: Automotive diagnostics.

It is one of the most user friendly scopes on the market.

10/10

Uses it for: Mobile Vehicle service. Component Testing and Battery Start and Charge system testing.

I like the good selection of acupuncture probes and their replaceable design. I like the confidence Picoscope gives me in diagnosing problems. I can show customers problems or confirm component operation in a way which they understand. I print results off for customers to keep with their service history. It is all good PR and builds customer confidence and loyalty.

10/10

Uses it for: Engine diagnostics.

I love my Pico and the software and support is free. After getting huge bills for software updates from every other company this is where Pico shine. Thank you for a good product and good support.

WHAT OUR CUSTOMERS HAD TO SAY ABOUT THE MARKET-LEADING OSCILLOSCOPE

10/10

Uses it for: Automotive diagnostics in my auto shop.

I am very happy with my product. The resolution and accuracy is incredible.

10/10

Uses it for: Diagnostics and fun!

Very user friendly and down to earth. Right down to the nitty gritty - no messing. Technicalities down to a minimum when necessary.

10/10

Uses it for: Automotive diagnostics. It is an extremely powerful and use tool.

I can't see any flaws as you guys seem to be right on point with everything. The software keeps getting better and better.

9/10

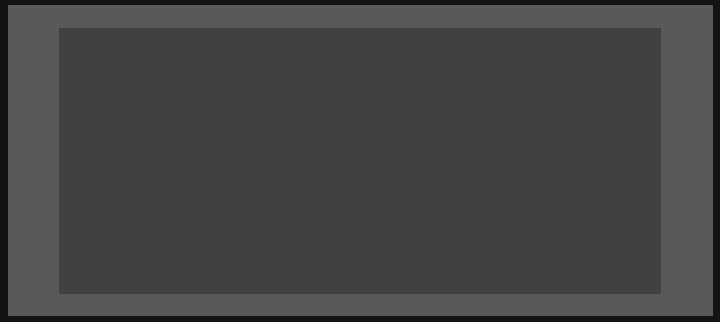
Uses it for: To read and record engine crank case pressure, the action on engine valves & the performance of fuel injectors within diesel engines.

We are impressed with the performance of the PicoScope & its software, which we have been working with on several diesel powered vehicles. The information we have been able to record has been a great aid in knowing the condition of the engines we have tested. Thank you for developing a solid product for the diesel engine marketplace.

10/10

Uses it for: : I am a mechanic by trade and acquired scope for using all lines of work.

I like how easy it is to use and setup. Great graphs and colors.



Pico Technology
James House
Colmworth Business Park
St. Neots
Cambridgeshire
PE19 8YP

United Kingdom

Tel: +44 (0)1480 396395
Fax: +44 (0)1480 396296
E-mail: sales@picoauto.com

www.picoauto.com

DO122-7