Pico Diagnostics Automotive Software

User Guide

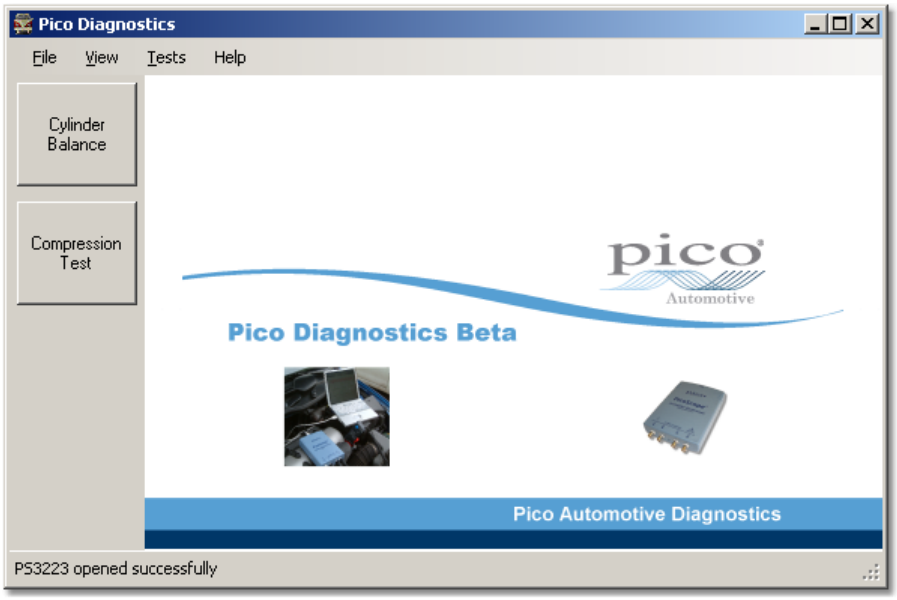
PD044-1

Table of Contents

1 Welcome

Welcome to Pico Diagnostics, the automotive diagnostics software from Pico Technology Limited.

With an automotive oscilloscope from Pico Technology, Pico Diagnostics turns your PC into an automotive diagnostics station.



Software version: Pico Diagnostics beta v1.0.1.0.

2 Introduction

Pico Diagnostics is a comprehensive software application for Pico Technology Automotive Oscilloscopes. Used with an Automotive Oscilloscope from Pico Technology, it turns your PC into an automotive diagnostics station.

Pico Diagnostics supports the following PicoScope 3000 Series Automotive Oscilloscopes:

- PicoScope 3223 2-Channel Automotive Oscilloscope
- PicoScope 3423 4-Channel Automotive Oscilloscope

Pico Diagnostics runs on any 32-bit computer with Windows 98SE, ME, 2000 or XP. (See System requirements 4 for further recommendations.)

How to use Pico Diagnostics

- Getting started: see Using Pico Diagnostics for the first time 5.
- For further information: see descriptions of Menus 6.

2.1 Contact information

Address:	Interworld Electronics Inc. 145 Tyee Drive PO Box 1280 Point Roberts WA 98281 United States
Phone:	1-877-902-2979 or 604-925-6150
Fax:	1-877-FAX-IECI or 604-925-6170
Office hours:	09:00 to 17:00 Mon-Fri
Technical support email:	support@interworldna.com
Sales email:	sales@interworldna.com
Web site:	www.interworldna.com

2.2 Legal statement

The material contained in this release is licensed, not sold. Pico Technology Limited grants a licence to the person who installs this software, subject to the conditions listed below.

Access

The licensee agrees to allow access to this software only to persons who have been informed of these conditions and agree to abide by them.

Usage

The software in this release is for use only with Pico products or with data collected using Pico products.

Copyright

Pico Technology Limited claims the copyright of, and retains the rights to, all material (software, documents etc) contained in this release. You may copy and distribute the entire release in its original state, but must not copy individual items within the release other than for backup purposes.

Liability

Pico Technology and its agents shall not be liable for any loss, damage or injury, howsoever caused, related to the use of Pico Technology equipment or software, unless excluded by statute.

Fitness for purpose

No two applications are the same: Pico Technology cannot guarantee that its equipment or software is suitable for a given application. It is your responsibility, therefore, to ensure that the product is suitable for your application.

Mission-critical applications

This software is intended for use on a computer that may be running other software products. For this reason, one of the conditions of the licence is that it excludes usage in mission-critical applications, for example life-support systems.

Viruses

This software was continuously monitored for viruses during production, but you are responsible for virus-checking the software once it is installed.

Support

If you are dissatisfied with the performance of this software, please contact our technical support staff, who will try to fix the problem within a reasonable time. If you are still dissatisfied, please return the product and software to your supplier within 14 days of purchase for a full refund.

Upgrades

We provide upgrades, free of charge, from our web site at www.picotech.com. We reserve the right to charge for updates or replacements sent out on physical media.

Trademarks

Windows is a registered trademark of Microsoft Corporation. Pico Technology Limited and PicoScope are internationally registered trade marks.

2.3 How to use this manual

This manual is divided into topics. For example, the topic you are now reading is called "How to use this manual". Notice the tabs on the left labelled Contents, Index and Search. If you click the Contents tab, you will see a table of contents listing all the topics in the manual. Double-click any one of these topics to read it. Use the Index and Search tabs if you want to look up a particular word or phrase.

Also, look out for the Forward and Back buttons. These allow you to retrace your steps in the trail of topics that you have read since opening the manual.

While you are using Pico Diagnostics, you will often see Help buttons. Clicking these will take you to the relevant topic in this manual.

For your first introduction to Pico Diagnostics, we suggest that you start with the topic 'Using Pico Diagnostics for the first time'. 5

2.4 System requirements

Pico Diagnostics runs on any PC with the following specifications.

Operating system	Windows 98SE, ME, 2000 or XP
Processor	Any 32-bit Intel or Intel-compatible CPU
RAM	At least 256 MB

2.5 Using Pico Diagnostics for the first time

We have designed Pico Diagnostics to be as easy as possible to use, even for newcomers to automotive diagnostics. Once you have followed the introductory steps listed below, we hope that you will soon become an expert.

1. Install the software. Load the CD-ROM that is included with your scope device, then click the "Install Software" link and follow the on-screen instructions.

2. Plug in your automotive oscilloscope. Windows will recognise it and make the necessary changes to allow your computer to work with it. Wait until Windows tells you that the device is ready to use.

3. Click the new Pico Diagnostics icon on your Windows desktop.

4. Pico Diagnostics will detect your Automotive Oscilloscope. The start button will be enabled once your oscilloscope is ready to use.

5. Follow the instructions of how to connect your oscilloscope for the specific test you want to perform.

"It didn't do what I expected!"
Help is at hand! Our technical support staff are always ready to answer your telephone call during office hours (see our Contact Details 2). At other times, you can contact our support forum or send us an email.

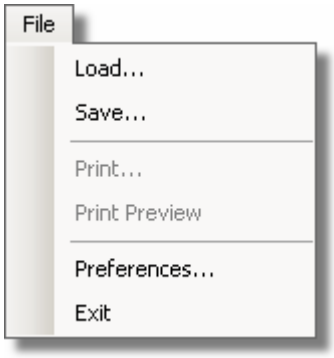
3 Menus

Menus are the quickest way to get to Pico Diagnostics' main features. The Menu bar is always present at the top of the PicoScope main window, just below the window's title bar. You can click any of the menu items, or press the Alt key and then navigate to the menu using the cursor keys, or press the Alt key followed by the underlined letter in one of the menu items.

The list of items in the menu bar may vary depending on the windows that you have open within Pico Diagnostics.

3.1 File menu

Click File on the Menu bar. 6



Load. Allows you to load a test from disk to review the result. You can save test results using the Save command described below.

Loading a test result from disk will clear any captured data and results.

Save. Allows you to save test data to disk.

Print. Opens a standard Windows print dialog, which allows you to choose a printer, set printing options and then print the selected view.

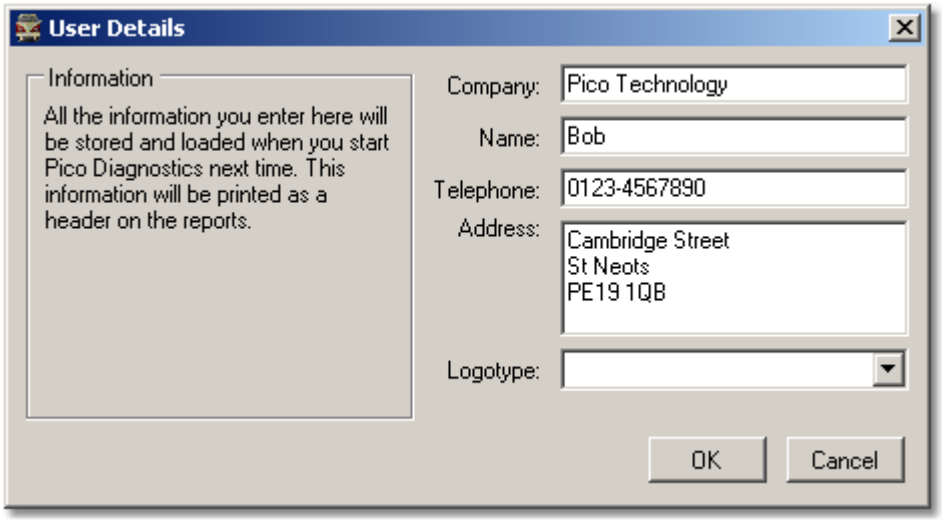
Print Preview. Opens the Print Preview window, which allows you to preview the report before printing it with the Print command.

Preferences. Opens up the User Details dialog. 7

Exit. Close Pico Diagnostics without saving any data.

3.1.1 User Details dialog

This dialog appears when you select Preferences on the File menu 6. It allows you to enter details about your company and your name. These will appear on the report.



How to use the dialog
Enter all the values you want.

Click OK to close the dialog and save the changes.

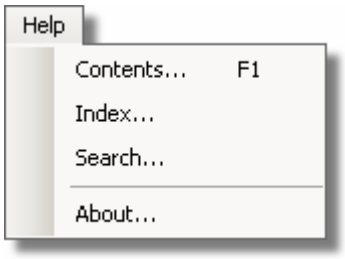
Click Cancel to close the dialog and discard the changes.

The items in the dialog.

- Company The name of your company. This will be displayed on the report if no logo has been selected.
- Name Name of the technician, or the contact name, to appear on the report.
- Telephone The contact number that the customer will see on the report.
- Address The address of your company. There is space for four lines.
- Logo Allows you to select a picture for your company logo.

3.2 Help menu

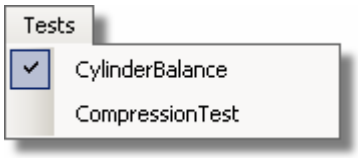
Click Help on the Menu bar. 6



These are the standard Windows options for access to this help file.

3.3 Tests menu

Click Tests on the Menu bar. 6

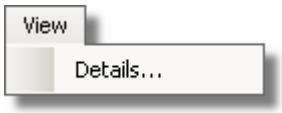


This menu lists all the tests available. Click one of the tests to proceed.

For more information about the specific tests available go to Tests 10 or click one of the tests in the image above.

3.4 View menu

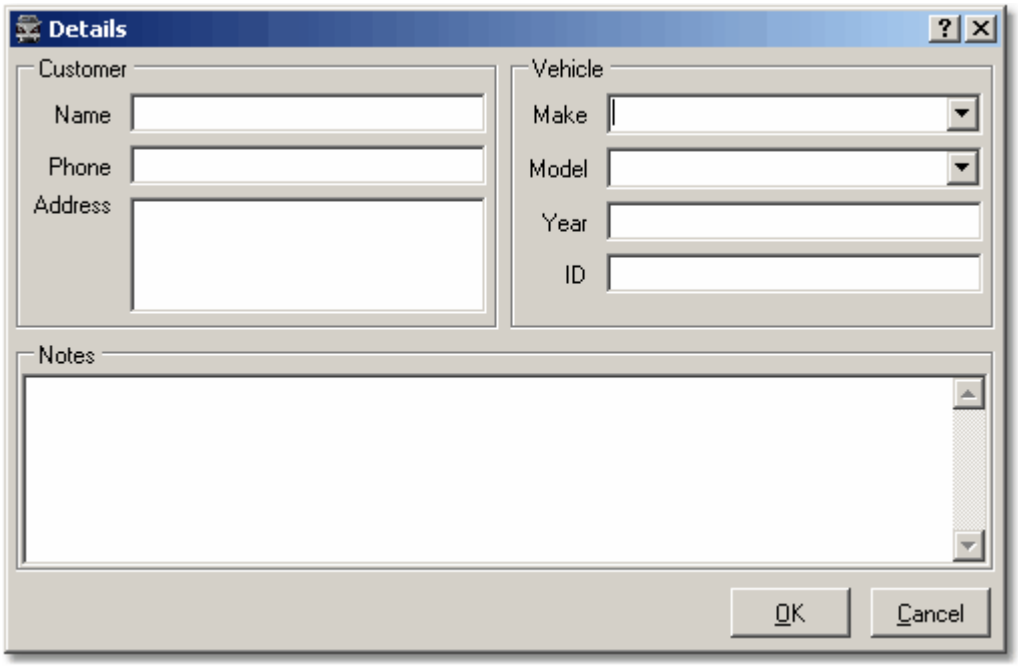
Click View on the Menu bar. 6



Details. Edit the customer and vehicle details and notes 8.

3.4.1 Details dialog

This dialog appears when you select Details on the View menu 8. It allows you to enter details about the customer and the vehicle you are testing. There is also a space for entering notes about the test.

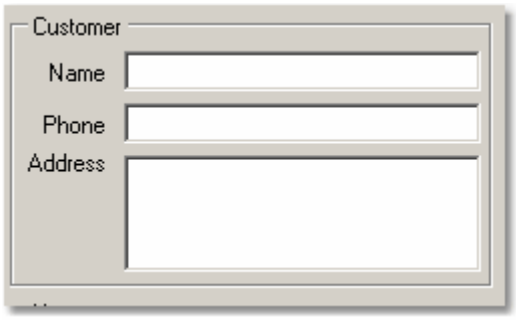


How to use the dialog
This dialog is for you to store data about the customer and the vehicle that the test applies to. The data in this dialog will be saved with the test and printed on the report.

Click OK to close the dialog and save the changes.

Click Cancel to close the dialog and discard the changes.

Customer details

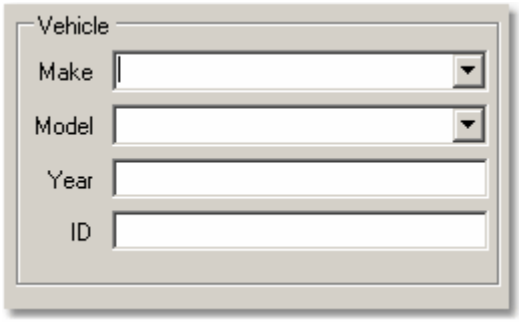


Name. The customer's name.

Phone. The customer's phone number.

Address. The customer's address. There is space for 4 lines.

Vehicle details



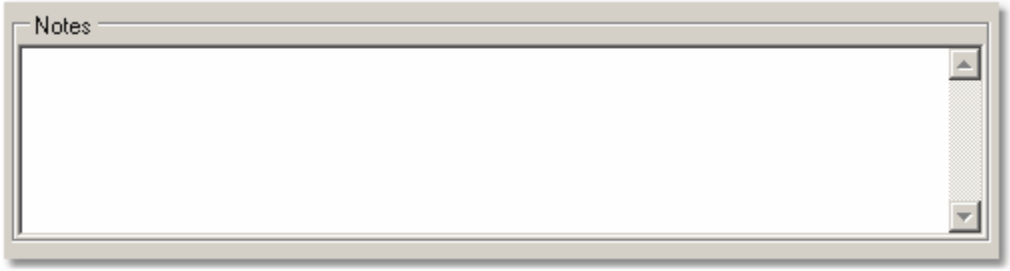
Make. The make of the vehicle. The makes of vehicles are stored in a database. If you manually enter a make which is not already saved, a message box will pop up.

Model. The model of the vehicle. When a make has been selected, this list is populated with all the currently known models of that make.

Year. The year of the vehicle.

ID. An identification number for the vehicle. Can be the licence number or anything else you choose.

Notes



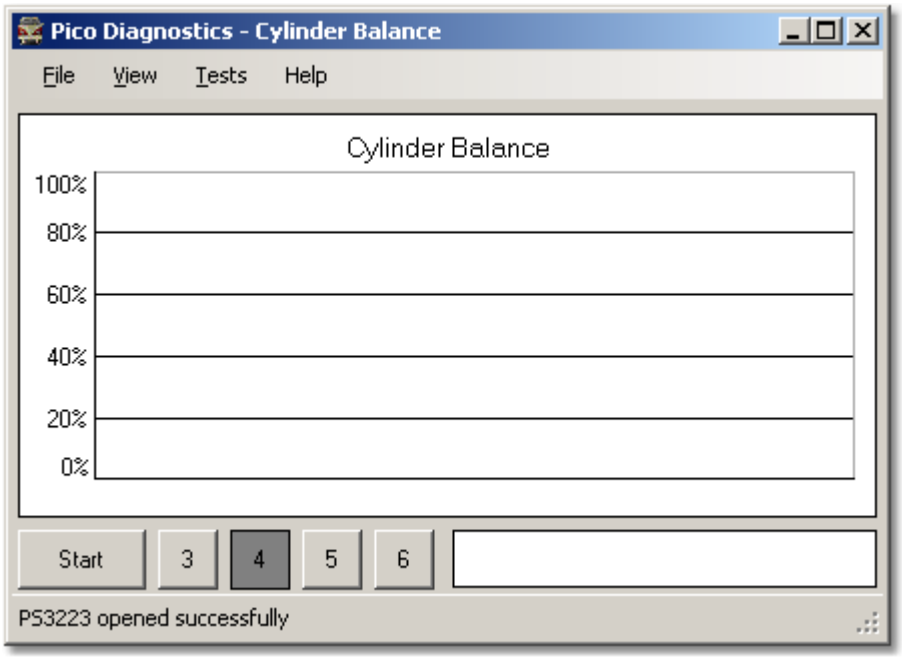
In the Notes field you can enter additional information that you want stored with the test.

4 Tests

Pico Diagnostics is a collection of specific automotive tests. They are all designed to be easy to use, even if you have no or very little experience of automotive diagnostics.

These tests are available with this installation of Pico Diagnostics:

4.1 Cylinder Balance



Screenshot of the cylinder balance test

The cylinder balance measures how much each cylinder is contributing to the engine's total power output. There are a number of things that can cause a cylinder to contribute less than the other cylinders. These include but are not limited to:

- low compression
- faulty injector
- faulty spark plug.

A slightly uneven balance does not necessarily mean that there is a fault in the engine. During warm-up, most engines run slightly uneven. Deposits may have an effect on the engine's performance. If the engine is slightly worn, this may be the cause.

To use the cylinder balance, start Pico Diagnostics and load the test using the Tests menu 8. Follow the instructions below to connect your Automotive Oscilloscope to the vehicle and run the test.

- Connect the oscilloscope
- Start the engine
- Run the test
- If the result is blank

Connect the oscilloscope

Connect the oscilloscope to a free USB port on your PC using the USB cable.

Connect one of the general test BNC cables to Channel A on your oscilloscope. On the other end, connect a large red crocodile clip to the red cable and a large black crocodile clip to the black cable. Connect the red clip to the battery positive (+) and the black clip to the battery negative (-) as shown in the picture above.

Start the engine.

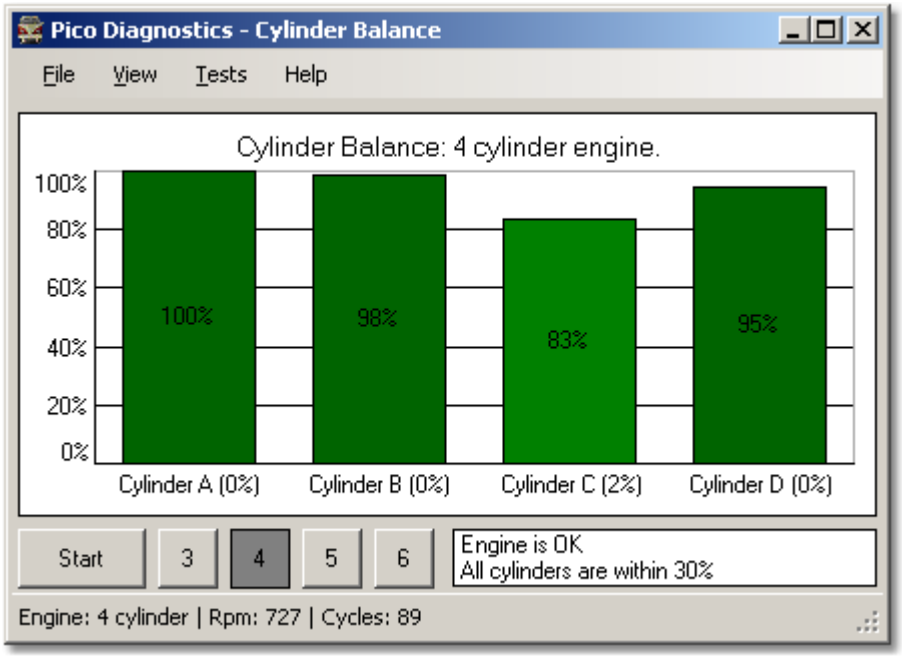
To get a good result from the cylinder balance you need to turn on as many of the following components as possible:

If you do not turn any of these on, the cylinder balance test will not be able to analyse the data.

- Headlights
- Fog lights
- Rear window heater
- A/C compressor

Run the test

To start the test click the button labelled Start at the lower left corner of the window. A new window with a progress indicator and instructions will appear on the screen. Do not turn off the engine until the progress indicator reaches 100%. The data is now analysed and, if the test was successful, the result will appear in the bar graph as shown below.



The result

If the test could not produce a result see: Failed cylinder balance.

The result is always scaled to show the highest cylinder at 100%.

Frequently asked questions

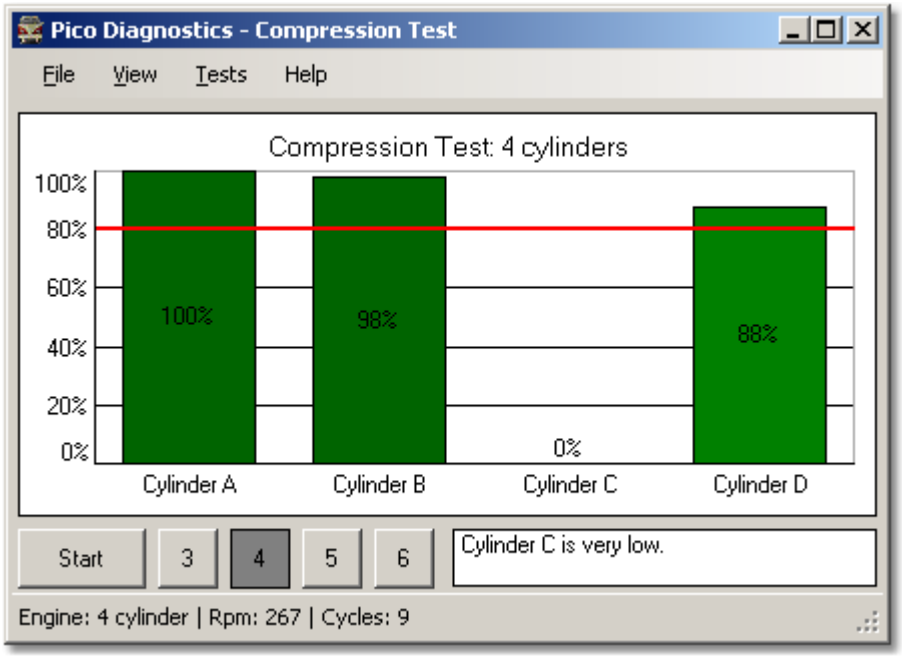
Why can't the program analyse the data?

If the data from the oscilloscope cannot be analysed, the bar graph will be empty.

Why is the low cylinder in different places when capturing several times?

With only a connection to the battery, the software has no way of knowing which cylinder is number one. This may cause the result to be shifted if you run the test on the same engine more than once.

4.2 Compression Test



Screenshot of the compression test

The compression test is meant to be a first check. If the compression looks good, you can quickly move on and investigate other components which might be the cause of the fault. If the test detects a low cylinder, you should perform a manual compression test to verify the results and to find the specific cylinder which is low.

To use the compression test, start Pico Diagnostics and load the test using the Tests menu 8. Follow the instructions below to connect your Automotive Oscilloscope to the vehicle and run the test.

- Connect the oscilloscope
- Disable the engine
- Run the test
- If the result is blank

Connect the oscilloscope

Connect the oscilloscope to a free USB port on your PC using the USB cable.

Connect one of the general test BNC cables to Channel A on your oscilloscope. On the

other end, connect a large red crocodile clip to the red lead and a large black crocodile clip to the black lead. Connect the red clip to the battery positive (+) and the black clip to the battery negative (-) as shown in the picture above.

Disable the engine

The compression test can be done only when cranking, so the engine must be prevented from starting. This can be done by disabling either the fuel system or the ignition system.

Disable injection

This way of disabling the engine works on both petrol and diesel engines.

You can disable the injection system by unplugging the fuse for the fuel pump. Make sure there is no fuel in the system by cranking the engine until it does not start.

If the engine is equipped with electronic injection, another way of disabling the injection system is to unplug the injectors. This works on both single-point injection (SPI) and multi-point injection (MPI) systems.

Disable ignition

Note: Be careful with disabling the engine this way as the engine can easily fill up with fuel.

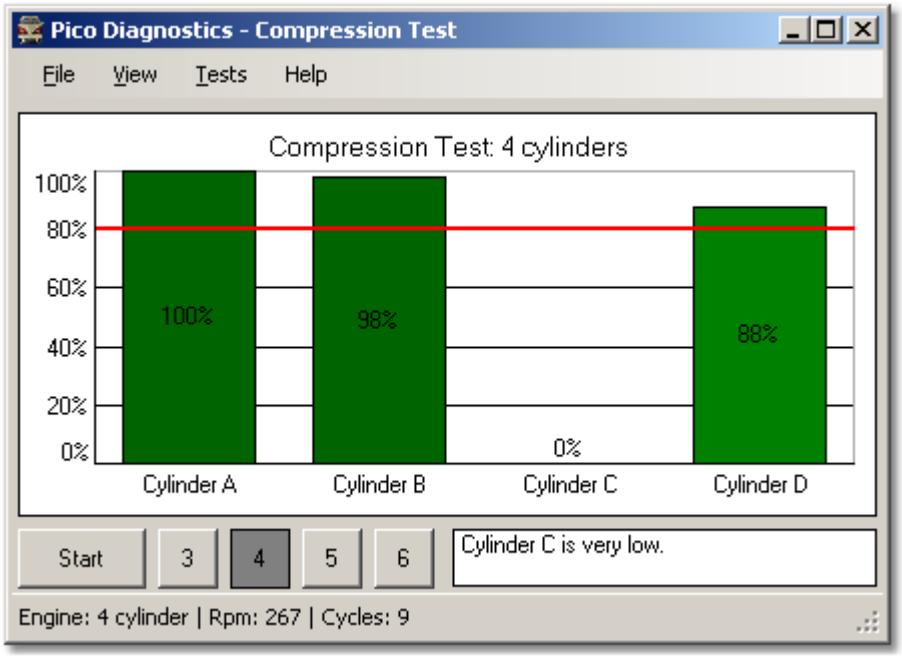
If the engine has a distributor, you can disconnect the king lead (coil lead) from the distributor and ground it.

On wasted spark (DIS) and multi-coil (coil-on-plug, or COP) systems, disconnect the coil pack(s) on the primary side.

Run the test

The compression test should be performed according to the vehicle manufacturer's specification. Generally, the compression test should be performed on a warm engine with wide open throttle (WOT).

To start the test, click the button labelled Start at the lower left corner of the window. A new window with a progress indicator and instructions will appear on the screen. Wait until the message in the window is "Crank engine". Crank the engine until the progress indicator reaches 100%. The data is now analysed and, if the test was successful, the result will appear in a bar graph as shown below.



The result

If the test could not produce a result, see Failed compression test.

The result is always scaled to show the highest cylinder at 100%. The bars are ordered according to the engine's firing order. The cylinders are named A, B, C and so on, because with only a connection to the battery the software has no way of knowing which cylinder is number one. This may cause the result to be shifted if you run the test on the same engine more than once.

Index

Pico Technology Ltd

The Mill House
Cambridge Street
St Neots PE19 1QB
United Kingdom
Tel: +44 (0) 1480 396 395
Fax: +44 (0) 1480 396 296
Web: www.picotech.com

PD044-1 23.10.06