

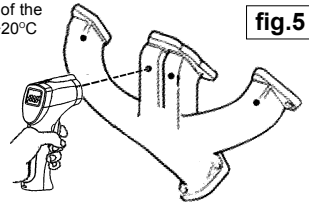
5.5 Misfiring Cylinder.

A misfiring cylinder (petrol or diesel) can be located by taking temperature readings of each branch of the exhaust manifold (fig.5). The cool branch will indicate the misfiring cylinder. The temperature difference will be most marked before the engine has warmed up and heat transfer has warmed the cool branch. One exhaust branch hotter than the rest (petrol) suggests weak mixture to that cylinder, which should be investigated (faulty injector, inlet manifold gasket leak, etc.).

5.6 Catalytic Converter.

With the engine at normal operating temperature and running at 1000rpm the inlet of the catalytic converter should be cooler than the outlet by >55°C (2-way converter) or >20°C (3-way converter).

- 1) If the outlet temperature is lower than the inlet then the converter is 'plugged' and must be replaced.
- 2) If the outlet temperature is the same as the inlet then the converter has reached the end of its service life (say 150,000 miles) or the converter material has broken up due to damage or has become contaminated. Always determine the cause of failure, and rectify if appropriate, before fitting a replacement.



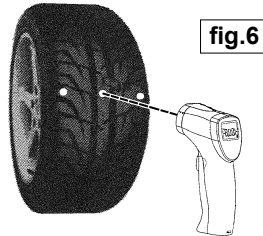
5.7 Brakes.

The thermometer can be used to check comparative brake performance. The brakes should be brought up to operating temperature, by braking the vehicle from 30mph to a halt five times in quick succession, and the brake disc/drum temperatures then measured immediately. Brakes on the same axle should not differ by more than 3°C and front brakes should be hotter than rear brakes by about 30°C. In the case of temperatures not meeting these criteria further investigation will be required - noting that it is normally the cooler brake which is faulty (seized, contaminated, etc.).

5.8 Tyres

A correctly inflated tyre will have the same temperature across the tread, within 10°C. To check, drive the car for a few miles and then measure the tread in three places as shown in fig.6.

If the readings from the sides of the tread are higher than that from the centre the tyre is probably under-inflated. Conversely over-inflation causes the centre to be hotter than the edges. In either case, adjust the tyre pressure in 2psi steps until even temperatures are achieved. If the resulting pressure is significantly different from that recommended by the vehicle/tyre manufacturer look for another cause of the temperature difference (worn, damaged or misaligned suspension). Note that edge-of-tread temperatures which are significantly different from each other indicate a suspension fault.



6. MAINTENANCE

6.1 Battery Replacement (fig.7).

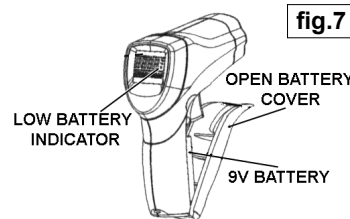
- 6.1.1 When the battery is exhausted the LCD will display the '⊕' battery symbol.
- 6.1.2 Open the battery cover (fig.7) by pulling forward.
- 6.1.3 Replace the 9V (PP3) battery and snap the cover back into place.

6.2 Cleaning.

- 6.2.1 Use a damp cloth only to clean the casing.

6.3 Storage.

- 6.3.1 Store in a safe dry childproof location.



Environmental Protection.



Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycle centre and disposed of in a manner which is compatible with the environment.



When the product is no longer required, it must be disposed of in an environmentally protective way.

6. DECLARATION OF CONFORMITY

INFRARED TWIN-SPOT LASER DIGITAL THERMOMETER Model: VS905

EN 60825-1 Laser safety
93/68/EEC CE Marking Directive
2002/96/EC WEEE Directive
89/336/EEC EMC Directive

Declaration of Conformity We, the sole importer into the UK, declare that the product listed here is in conformity with the following standards and directives.



The construction file for this product is held by the Manufacturer and may be inspected, by a national authority, upon request to Jack Sealey Ltd.

Signed by Tim Thompson *[Signature]* 26th June 2007

For Jack Sealey Ltd. Sole importer into the UK of Sealey Professional Tools.

NOTE: It is our policy to continually improve products and as such we reserve the right to alter data, specifications and component parts without prior notice.

IMPORTANT: No liability is accepted for incorrect use of product.

WARRANTY: Guarantee is 12 months from purchase date, proof of which will be required for any claim.

INFORMATION: For a copy of our latest catalogue and promotions call us on 01284 757525 and leave your full name and address, including postcode.



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INSTRUCTIONS FOR: INFRARED TWIN-SPOT LASER DIGITAL THERMOMETER 12:1

Model: VS905

Thank you for purchasing a Sealey product. Manufactured to a high standard this product will, if used according to these instructions and properly maintained, give you years of trouble free performance.



IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY. NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS AND CAUTIONS. USE THE PRODUCT CORRECTLY AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY. PLEASE KEEP INSTRUCTIONS SAFE FOR FUTURE USE.

1. SAFETY INSTRUCTIONS

1.1 GENERAL SAFETY

- WARNING!** Ensure that Health & Safety, local authority and general workshop practice regulations are adhered to when using this equipment.
- WARNING!** DO NOT aim the laser beams at your or another person's or animal's eye and beware of reflections from mirrors or other shiny surfaces.
- ✓ Familiarise yourself with the applications, limitations, and potential hazards of the thermometer.
- ✓ Keep the thermometer clean and in good condition.
- ✓ Protect the thermometer from the following:
 - Electro-magnetic fields from engine components closer than 125mm.
 - Static electricity.
 - Thermal shock caused by large and/or rapid ambient temperature change.
 - High temperatures.
- DO NOT** get the thermometer wet or use in damp or wet locations or areas where there is condensation.
- DO NOT** use the thermometer for any purpose other than that for which it is designed.
- DO NOT** allow untrained persons (particularly children) to operate the thermometer.
- DO NOT** operate the thermometer when you are tired or under the influence of alcohol, drugs or intoxicating medication.
- WARNING!** The warnings, cautions and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood that common sense and caution are factors which cannot be built into this product, but must be applied by the operator.

1.2 LASER SAFETY.

The VS905 utilises a Class II laser that emits low levels of visible radiation (i.e. wavelengths between 400 and 700 nanometres) which are safe for the skin but not inherently safe for the eyes. The Class II emission limit is set at the maximum level for which eye protection is normally afforded by natural aversion responses to bright light. Accidental eye exposure is therefore normally safe, although the natural aversion response can be overridden by deliberately staring into the beam, and can also be influenced by the use of alcohol or drugs.

- WARNING!** Do not look or stare into the laser beam as permanent eye damage could result.
- DO NOT** direct the laser beam at any person's (or animal's) eyes as eye damage could result.
- DO NOT** operate the thermometer when you are tired or under the influence of alcohol, drugs or intoxicating medication.
- ✓ Be aware that reflections of the laser beam from mirrors or other shiny surfaces can be as hazardous as direct eye exposure.



2. INTRODUCTION/SPECIFICATION

High resolution laser thermometer suitable for a wide range of garage and workshop applications. Twin-spot laser targeting enables accurate readings by guiding user to the unit's optimum targeting distance - when the two laser dots merge into one, unit is reading a 13mm disc of temperature. This makes the unit especially suited for work where space is at a premium and accurate focus on the target is required such as in engine bays and on circuit boards. Temperature is displayed on back-lit LCD screen which features hold function for ease of use. Temperature can be shown in either °C or °F. Powered by 9Volt PP3 battery. Supplied with belt pouch.

SPECIFICATION.

Temperature Range -50 to 550°C (-58 to 1022°F)
Ambient Operating Range 0 to 50°C (32 to 122°F)
Response Time 150ms
Spectral Response 8~14um

Assumes ambient operating temperature of 23 to 25°C (73 to 77°F).

Target Temperature Accuracy
-50 to -20°C (-58 to 68°F) ±2.5°C (4.5°F)
20 to 300°C (68 to 572°F) ±1% ±1.0°C (1.8°F)
300°C to 550°C (572 to 1022°F) ± 1.5%
Over Range Indication LCD will show ' ____ '

Diode Laser Output <1mW, Wavelength 630-670nm
Class II

Operating Temp. 0 to 50°C (32 to 122°F)
Storage Temp. 0 to 60°C (14 to 140°F)
Relative Humidity 10%~90%RH operating, <80%RH storage
Battery 9V



GENERAL DESCRIPTION (fig.1)

- 1 Infrared sensor
- 2 LCD Display
- 3 Measurement trigger
- 4 Handle grip
- 5 Battery cover



fig.1

DISPLAY DESCRIPTION (fig.2)

- 1 Data hold
- 2 Laser 'ON' symbol
- 3 °C/°F symbol
- 4 Low power symbol
- 5 Emissivity symbol and value
- 6 MAX temperature value recorded while trigger held
- 7 MAX symbol
- 8 Current temperature value

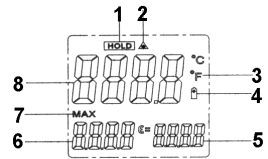


fig.2

Distance & spot size (fig.3)

As the distance (D) from the object increases, the diameter (S) of the area measured by the unit becomes larger.

fig.3

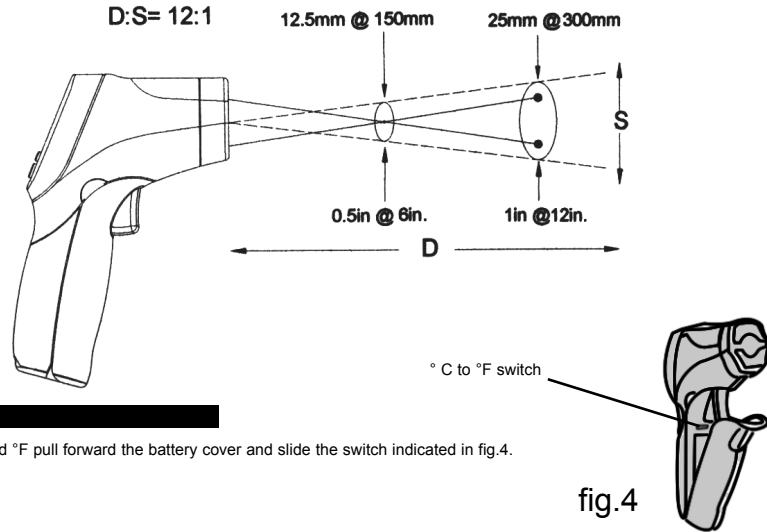


fig.4

3. SET UP

To switch between °C and °F pull forward the battery cover and slide the switch indicated in fig.4.

4. OPERATION

4.1 Measurement Operation.

- 4.1.1 Hold the thermometer by the handle grip and point it towards the surface to be measured. The meter will compensate automatically for temperature deviations from the ambient temperature.
- 4.1.2 Pull and hold the trigger to turn the thermometer on and begin testing.
- 4.1.3 Release the trigger and the 'hold' display icon will appear on the LCD indicating that the reading is held.
- 4.1.4 The thermometer will automatically power down seven seconds after the trigger has been released.

4.2 Measurement Considerations.

- 4.2.1 Make sure the target is larger than the thermometer's spot size. The smaller the target, the closer you should be to it.
- 4.2.2 When accuracy is critical, make sure the target is at least twice the size of the spot.

4.3 Locating Hot Spots.

- 4.3.1 To find a hot spot, aim the thermometer outside the area of interest, then scan across with an up and down motion until you locate the hot spot indicated by the highest reading on the LCD display.

- NOTES!** - Not recommended for use in measuring shiny or polished metal surfaces (stainless steel, aluminium etc.) see Emissivity chart below.
- The unit cannot measure through transparent surfaces such as glass. It will measure the surface temperature of the glass instead.
 - Steam, dust, smoke etc. can prevent accurate measurement by obstructing the laser beam.

4.4 Emissivity.

- 4.4.1 Emissivity is a term used for the ability of a surface to radiate energy. Most (90% of typical applications) organic materials and painted or oxidised surfaces have an emissivity of 0.95 (pre-set in the thermometer).
- 4.4.2 Inaccurate readings will result from measuring shiny or polished surfaces. To compensate, cover the surface to be measured with masking tape or flat black paint.
- 4.4.3 Allow time for the tape to reach the same temperature as the material underneath it. Measure the temperature of the tape or painted surface.

Emissivity Chart

Substance	Thermal emissivity	Substance	Thermal emissivity
Asphalt	0.90 to 0.98	Cloth (black)	0.98
Concrete	0.94	Human skin	0.98
Cement	0.96	Lather	0.75 to 0.80
Sand	0.90	Charcoal (powder)	0.96
Earth	0.92 to 0.96	Lacquer	0.80 to 0.95
Water	0.92 to 0.96	Lacquer (matt)	0.97
Ice	0.96 to 0.98	Rubber (black)	0.94
Snow	0.83	Plastic	0.85 to 0.95
Glass	0.90 to 0.95	Timber	0.90
Ceramic	0.90 to 0.94	Paper	0.70 to 0.94
Marble	0.94	Chromium oxides	0.81
Plaster	0.80 to 0.90	Copper oxides	0.78
Mortar	0.89 to 0.91	Iron oxides	0.78 to 0.82
Brick	0.93 to 0.96	Textiles	0.90

5. TYPICAL APPLICATIONS

WARNING! When working on vehicle systems, take all the precautions necessary to ensure the safety of yourself and others - always refer to vehicle manufacturer's handbook/service manual. The purpose of this tool dictates that it will be used close to very hot equipment and therefore extreme care should be exercised.

5.1 Air Conditioning.

With the air conditioning set to maximum cooling, the temperature of the output air should be at least 15°C colder than the outside ambient once the system has stabilised. Do not place the thermometer directly in the cold air stream (thermal shock) but rather hold it to one side and take the temperature of the air duct. If the air temperature differential is less than 15°C have the A/C system checked.

5.2 Heater.

With the engine running, and at normal operating temperature, A/C 'off' and heater controls 'on' measure the temperatures of the heater inlet and outlet hoses/pipes at the engine compartment bulkhead. The outlet hose/pipe should be approximately 10°C cooler than the inlet. If the differential is significantly more than this the flow through the heater core is restricted and the system should be investigated.

5.3 Radiator.

When the engine is running at normal operating temperature, there should be an even temperature drop between the radiator inlet and outlet. Check the whole radiator surface for any 'cold' spots which would indicate a blockage.

5.4 Thermostat.

Under normal operation the thermostat will open as the engine reaches operating temperature, releasing hot coolant into the hose linking the thermostat housing to the radiator.

Use the thermometer to monitor the hose temperature, adjacent to the thermostat housing, as the engine warms up to operating temperature (85-105°C).

- 1) If the hose temperature abruptly and quickly increases the thermostat is functioning correctly.
- 2) If the temperature increases gradually and does not reach operating level the thermostat has failed in the open condition (or is missing).
- 3) If the temperature does not rise at all the thermostat has failed in the closed position or coolant is not flowing for some other reason (air lock, pump failure etc.) and further investigation is required.
- 4) A fluctuating temperature indicates a weak thermostat spring or air in the system.