

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



**DANGER! BE AWARE, LEAD-ACID BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON IT IS VERY IMPORTANT TO READ AND FOLLOW THESE INSTRUCTIONS CAREFULLY EACH TIME YOU USE THE VOLTMETER/AMMETER.**

Follow these instructions and those published by the battery and vehicle manufacturers and the maker of any equipment you intend to use in the vicinity of the battery. Remember to review warning marks on all products and on engines.



### 1.1. PERSONAL PRECAUTIONS

- ✓ Ensure that there is another person within hearing of your voice and close enough to come to your aid should a problem arise when working near a lead-acid battery.
- ✓ Wear safety eye protection and protective clothing. Avoid touching eyes while working near battery.
- ✓ Have fresh water and soap nearby in case battery acid contacts skin, clothing or eyes.
- ✓ Wash immediately with soap and water if battery acid contacts skin or clothing. If acid enters eye, flush eye immediately with cool, clean running water for at least 15 minutes and seek immediate medical attention.
- ✓ Remove personal metallic items such as rings, bracelets, necklaces and watches. A lead-acid battery can produce a short-circuit current which is high enough to weld a ring or the like to metal, which would cause severe burns.
- ✓ Ensure hands, clothing (especially belts) are clear of fan blades and other moving or hot parts of engine, remove ties and contain long hair.
- x **DO NOT** smoke or allow a spark or flame in the vicinity of battery or engine.

### 1.2. GENERAL SAFETY INSTRUCTIONS

- ✓ Familiarise yourself with the application, limitations and potential hazards of the meter. Also refer to the vehicle manufacturer's handbook. **IF IN ANY DOUBT, CONSULT A QUALIFIED VEHICLE TECHNICIAN.**
- ✓ Ensure that the voltmeter/ammeter is in good condition before use. If in any doubt do not use the unit and contact an electrician.
- ✓ Use only recommended attachments and parts. The use of unauthorised items may be dangerous and will invalidate your warranty.
- ✓ Keep tools and other items away from the engine and ensure that you can see the battery and working parts of the engine clearly.
- ✓ If the voltmeter/ammeter receives a sharp knock or blow it must be checked by a qualified service agent before being used.
- ✓ If the battery terminals are corroded or dirty, clean them before attaching the clamps.
- ✓ Keep children and unauthorised persons away from the work area.
- x **DO NOT** disassemble the voltmeter/ammeter for any reason. The voltmeter/ammeter must only be checked by qualified service personnel.
- **WARNING!** To prevent the risk of sparking, short circuit and explosion **DO NOT** drop metal tools in the battery area, or allow them to touch the battery terminals.
- x **DO NOT** cross-connect leads from voltmeter/ammeter to battery. Ensure positive (+/RED) is to positive and negative (-/BLACK) is to negative. If the symbols cannot be distinguished, remember that the battery negative terminal is normally the one directly connected to the vehicle bodywork.
- x **DO NOT** pull the cables or clamps from the battery terminals.
- x **DO NOT** use the voltmeter/ammeter outdoors, or in damp, or wet locations and **DO NOT** use in the vicinity of flammable liquids or gases.
- ✓ Ensure that there is effective ventilation to prevent a build-up of explosive gases.
- x **DO NOT** use the voltmeter/ammeter for a task for which it is not designed.
- ✓ When not in use, store the voltmeter/ammeter carefully in a safe, dry, childproof location.

## 2. INTRODUCTION

The BT91/5 is a steel cased Voltmeter/Ammeter designed to accurately check battery, alternator and feed voltage, voltage drops, earth contacts, electrical system shutdowns and battery condition. It has two large meter read-outs and is supplied with two pairs of leads with crocodile clips and full operating instructions. Optional trolley available - Sealey Model BT91/6.

## 3. OPERATION

- **WARNING!** Ensure that you read, understand and apply the safety and operational instructions before connecting the voltmeter/ammeter. Only when you are sure that you understand the procedures is it safe to proceed with testing.

Note: Numbers in brackets refer to items indicated in fig.1.

### 3.1. BATTERY VOLTAGE TEST

- 3.1.1. Turn off the vehicle's engine and remove the keys.
- 3.1.2. Clean battery terminals.
- 3.1.3. Set the corresponding scale on the voltmeter in accordance with the battery voltage, using the switch (4).
- 3.1.4. Connect the red clamp (7) to the positive (+) terminal and the black clamp (7) to the negative (-) terminal of the battery.
- 3.1.5. The voltmeter (3) will display the voltage.
- 3.1.6. A voltage level less than 5V, 10V and 20V for 6V, 12V and 24V batteries respectively, is evidence that the battery is run down.

### 3.2. ALTERNATOR VOLTAGE TEST

- 3.2.1. Set the corresponding scale on the voltmeter using the switch (4).
- 3.2.2. Connect the red clamp (7) to the positive (+) terminal and the black clamp (7) to the negative (-) terminal of the battery.
- 3.2.3. Observe the reading on the voltmeter (3).
- 3.2.4. Start the vehicle's engine and maintain its speed at 2000rpm. You should notice an increase in voltage to between 13.5V and 14.5V for 12V vehicles and to between 27V and 29V for 24V vehicles. A voltage higher than 15V or 30V respectively indicates a faulty regulator.

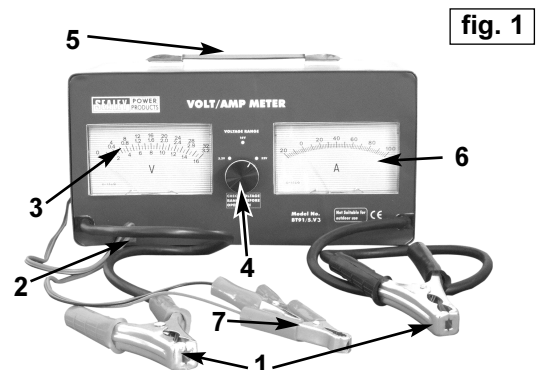


fig. 1

- 3.2.5. If you do not notice a voltage increase, or only a very slight increase, attach the red clamp (7) to terminal B+ on the alternator and the black clamp (7) to an earth point.
- 3.2.6. If the voltmeter (3) indicates a voltage in accordance with the alternators specifications (not observed in para 3.2.4. above), there is an excessive voltage drop in the line from the alternator to the positive battery terminal, or in the earth connection. Insufficient voltage is a consequence of a defect in the alternator, probably due to a defective rectifier diode or a defect in the regulator.
- 3.3. FEED VOLTAGE TEST (Headlights, coil, etc)**
- 3.3.1. Connect the black clamp (7) to an earth or the negative (-) terminal on the battery.
- 3.3.2. Connect the red clamp (7) to a point on the device you wish to check.
- 3.3.3. Observe the voltage on the voltmeter (3)
- 3.4. CHECKING VOLTAGE DROP OR FAULTY CONTACTS BETWEEN THE BATTERY AND STARTER MOTOR**
- 3.4.1. Disconnect the positive (+) feed to the coil so that the engine does not start.
- 3.4.2. Select 3.2V on the voltmeter (3) using the switch (4).
- 3.4.3. Connect the black clamp (7) to the negative (-) terminal on the battery.
- 3.4.4. Connect the red clamp (7) to the starter motor housing.
- 3.4.5. Turn the ignition key to activate the starter motor. Press button (2) and observe the voltage drop on the voltmeter (3). The voltage drop observed should be no more than 0.25V for 6V systems, 0.5V for 12V systems and 1.0V for 24V systems.
- 3.5. CHECKING VOLTAGE DROP IN THE DIFFERENT INTAKE AND CHARGING CONNECTIONS OF THE SYSTEM**
- 3.5.1. Select the 24V range using the selector switch (4).
- 3.5.2. Connect the red clamp (7) to the positive (+) terminal of the battery and the black clamp (7) to the positive (+) terminal of the accessory to be examined.
- 3.5.3. Turn on the accessory (ie headlights) and you should observe a slight change in the indicated voltage.
- 3.5.4. Select the 3.2V range using the selector switch (4), press the button (2) and observe the voltage drop. The maximum allowable voltage drop is 0.25V for 6V systems, 0.5V for 12V systems and 1.0V for 24V systems.
- 3.6. ELECTRICAL SYSTEM SHUTDOWNS**
- 3.6.1. Set the voltmeter (3) using the selector switch (4) according to the system voltage.
- 3.6.2. Connect the black clamp (7) to the negative (-) terminal of the battery or the vehicle frame.
- 3.6.3. Connect the red clamp (7) to the positive (+) terminal of the component to be checked. Note: It may be necessary to switch the ignition and the accessory on in order to get a reading on the voltmeter (3).
- 3.6.4. If the voltmeter (3) does not show a reading, there is probably a defect in the contact switch.
- 3.7. BATTERY CHARGING CURRENT**
- 3.7.1. Disconnect the battery cable from the negative (-) terminal of the battery.
- 3.7.2. Connect the red clamp (1) to the negative (-) battery terminal.
- 3.7.3. Connect the black clamp (1) to the disconnected battery cable.
- 3.7.4. Touch the negative (-) battery cable to the negative (-) terminal on the battery and start the vehicle.
- 3.7.5. Remove the negative (-) cable from the negative (-) terminal of the battery, keeping the engine running at medium speed and observe the current on the ammeter (6). After a few seconds the current will drop gradually and stabilise. **Note:** It is recommended that all accessories be switched off during this test.
- 3.7.6. To make simultaneous use of the voltmeter, connect the red clamp (7) to the positive (+) battery terminal and the black clamp (7) to the negative (-) battery terminal.
- 3.7.7. The voltage indicated on the voltmeter should be between 13.5V and 14.5V for 12V batteries and between 27V and 29V for 24V batteries, if the alternator is functioning correctly.
- 3.8. BATTERY DISCHARGE CURRENT**
- 3.8.1. Ensure that the vehicle's engine is switched off and the starter motor remains deactivated.
- 3.8.2. Disconnect the the battery cable from the negative (-) terminal of the battery.
- 3.8.3. Connect the black clamp (1) to the disconnected negative (-) battery cable.
- 3.8.4. Connect the red clamp (1) to the negative (-) terminal of the battery.
- 3.8.5. Switch on the ignition (ensuring the starter motor remains deactivated) and the consuming accessory you wish to test.
- 3.8.6. The current consumption will be indicated on the ammeter (6).
- 3.9. EQUALISING**
- 3.9.1. Carry out paragraphs 3.7.1. to 3.7.5.
- 3.9.2. Turn on the corresponding devices (lights and accessories).
- 3.9.3. The ammeter (6) will indicate "0" if the alternator is supplying the same current as the existing consumption.
- 3.9.4. The ammeter (6) will indicate from "0" towards the right if the alternator is supplying more current than the existing consumption.
- 3.9.5. The ammeter (6) will indicate from "0" towards the left if the current consumption is greater than that being supplied by the alternator.

## 4. DECLARATION OF CONFORMITY

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

**Voltmeter/Ammeter - 9 Function**  
**Model: BT91/5.V3**  
 89/336/EEC EMC Directive  
 93/68/EEC CE Marking Directive



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 Mark Sweetman

16th November 2005

For Jack Sealey Ltd. Sole UK importer 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 this product.

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

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



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