



Digital Multimeter

Owners Manual

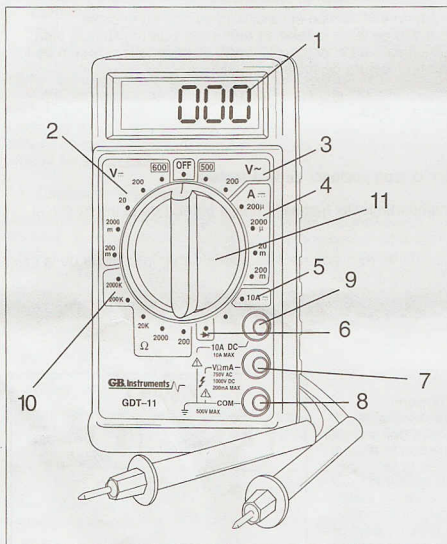
- Read this owners manual thoroughly before use and save

Instruments

GDT-11

Milwaukee, WI 53209
1.800.822.9220
www.gardnerbender.com
ZX000136 Rev. C

1.0 METER FUNCTIONS



- | | | |
|--|---|--|
| 1. 3 1/2 Digit LCD Display
Pantalla LCD de 3 1/2 dígitos
Écran ACL de 3 1/2 chiffres | 5. 10 Amps DC
10 amperios DC
10 A c.c. | 8. Common (black)
Común (negro)
Commun (noir) |
| 2. DC Volts
Voltaje DC
Tension c.c. | 6. Diode test function
Prueba de diodos
Fonction de test de diodes | 9. 10 amp DC
10 amperios CC
10 A c.c. |
| 3. AC Volts
Voltaje AC
Tension c.a. | 7. Input Jacks AC Volts & amps (red)
Tomas de entrada de CA
volts y amperios (rojo)
Prises d'entrée volts c.a. et
ampères (rouge) | 10. Resistance
Resistencia
Résistance |
| 4. DC Amps
Amperage DC
Intensité c.c. | | 11. Function Range Switch
Interruptor de gama de
funcionamiento
Sélecteur de plage de
fonction |

Ranges: 18 measuring ranges
DC Voltage: 200mV-2000mV-20-200-600 Volts
AC Voltage: 200-500 Volts
DC Current: 200µA-2000µA-20mA-200mA
 0-10 Amps on a separate jack (unfused)
 200-2000-20K-200K-2 Megohms
Diode Check: Used for checking condition of diodes
Accuracy: DC voltage +/- (0.7% + 2 digit)
 AC voltage +/- (1.2% RDG + 5 digit)
 DC current +/- 1.5%
 Resistance +/- (0.8% RDG + 2 digit)

Function/Range switch: 5 functions, 20 positions, 18 measuring ranges

Display: 3.5 digit LCD readout
Polarity Indication: "-" is displayed for negative polarity
Weak Battery Indicator: "BATT" is displayed when insufficient battery life remains
Battery Life: 100 hours with carbon-zinc cells, 200 hours with alkaline cells under normal conditions.
Battery Type: Uses one 9 volt carbon-zinc or alkaline battery
Overrange Indication: The three least significant digits are blank and the number "1" is displayed at the left when the range capacity is exceeded by the input.

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2.0 READ FIRST: IMPORTANT SAFETY INFORMATION



Read this operators manual thoroughly before using this multimeter. This manual is intended to provide basic information regarding this meter and to describe common test procedures which can be made with this unit. Many types of appliance, machinery and other electrical circuit measurements are not addressed in this manual and should be handled by experienced service technicians.



Use extreme caution when using this multimeter. Improper use of this meter can result in severe damage to property, severe personal injury or death. Follow all instructions and suggestions in this operators manual as well as observing normal electrical safety precautions. Do not use this meter if you are unfamiliar with electrical circuits and proper test procedures.

2.1 For Your Safety

- 1) Use extreme caution when checking electrical circuits.

WARNING 2) Do not stand in wet or damp work areas when working with electricity. Wear rubber soled boots or shoes.

WARNING 3) Do not apply more voltage or current than the set range of the multimeter will allow

WARNING 4) Do not touch the metal probes of the test leads when making a measurement.

⚠ WARNING 5) Replace worn test leads. Do not use test leads with broken or tattered insulation.

- 6) Discharge a capacitor before measuring it.
- 7) Remove the test leads from the circuit being measured as soon as the test is completed. Never reset the function/range switch to another range while the leads are still in contact with a circuit.
- 8) Do not measure voltage when the function/range switch is set on the resistance (ohms) or the current (10 Amp) settings. Do not measure current when the meter is set on the resistance range. Never measure AC voltage when the meter is set on DC voltage or the 10 Amp range. Setting the meter on the incorrect function may burn out some of the internal circuitry and may pose a safety hazard.
- 9) Damaged meters are not repairable nor is calibration possible. Damaged meters should be disposed of.

3. Operating Suggestions

- 1) Set the function/range switch to the proper position before making a measurement. When the voltage or current is not known, it MUST be determined that the capacity of the selected range will handle the amount of voltage or current in the circuit (See #3 under "For Your Safety").
- 2) Avoid placing the meter in areas where vibration, dust or dirt are present. Do not store the meter in excessively hot, humid or damp places. This meter is a sensitive measuring device and should be treated with the same regard as other electrical and electronic devices.
- 3) When the meter is not in use, keep the function/range switch in the OFF position to keep the batteries from discharging.
- 4) When disconnecting the test leads from the unit, always grasp the leads where the input jacks meet the tester housing. Do not pull the leads out of the jacks by the insulated wire or transport the tester using the test leads as a carrying strap.
- 5) **⚠ WARNING** Do not immerse the meter in water or solvents. To clean the housing use a damp cloth with a minimal amount of mild soap.

NOTE: With any measurement made by this meter, there will be some fluctuation of the digital display. This is due to the meter's sampling method. This unit samples at a rate of 2 times per second, thus the fluctuation of the readout.

4. Common DC Voltage Measurements

- 1) Set the function/range switch to the DC voltage range. V_{DC}
- 2) Black test lead in com socket. Red test lead in $V_{\Omega mA}$ socket.
- 3) If the polarity of the circuit to be tested is known, touch the black test lead to the negative side. If the polarity is unknown, touch the test leads to opposite sides of the circuit. If the test leads are reversed, the "(-)" indicator will appear on the display. Reverse the test leads for proper polarity and read the value indicated on the display.

4.1 Automotive Batteries

⚠ WARNING Always wear safety goggles and gloves when working near batteries.

⚠ WARNING Batteries contain sulfuric acid. Avoid contact with clothing, skin, and eyes. If electrolyte comes in contact with eyes, flush with water for at least 15 minutes and seek immediate medical attention. If electrolyte comes in contact with skin rinse it off immediately with water.

⚠ WARNING Batteries release hydrogen gas that is very explosive. Keep sparks and flames away from battery and never smoke while working with or near a battery.

⚠ WARNING Always disconnect the negative battery terminal first and reattach it last to prevent sparks.

⚠ WARNING Running an engine produces carbon monoxide which can cause serious injury or death. Keep the service area well ventilated or attach an exhaust gas extraction system.

4.1a Battery Voltage Test

To remove the battery's surface charge and ensure an accurate reading, turn the headlights on high for 15 seconds, turn them off, then let the vehicle sit for a few minutes before making the measurement. With the engine and all accessories turned off, disconnect the battery's black (-) negative cable. Next remove the red (+) positive battery cable.

Set the function dial on the meter to the 20 volt DC setting. Touch the negative (-) probe of the meter to the (-) negative battery terminal and the (+) positive probe of the meter to the (+) positive battery terminal (see fig. 2). The display should read at least 12.4 volts on a 12 volt DC battery. If it reads less than 12.4 volts the battery should be charged before proceeding with any other tests.

Reinstall and tighten the positive (+) cable first. Next reinstall and tighten the negative (-) battery cable.

4.1b Running Voltage Test

This test provides a quick indication of whether the charging system is functioning properly.

⚠ WARNING Use caution not to contact cooling fan or belts as serious personal injury may result. Always fully engage the parking brake and place the automatic transaxle in P (Park) or manual transaxle in N (Neutral) before performing tests with the engine running.

Start the engine, and increase the RPM to approximately 2000. Set the function dial on the meter to 20V DC. Red test lead in $V_{\Omega mA}$ socket. Black test lead in com socket. Check the battery voltage by touching the negative (-) probe of the meter to the negative (-) battery terminal and the positive (+) probe of the meter to the positive (+) battery terminal. With the engine running the battery voltage should be between 14-15 volts. If the voltage is over 15 volts there may be a problem with the voltage regulator. See a troubleshooting manual specific to your vehicle for additional information.

4.2 Household Batteries

Set the function/range switch to the 20 volt DC V_{DC} setting. Touch the red (+) lead to the (+) terminal of the battery and the black (-) lead to the (-) terminal of the battery. Read the voltage level of the battery on the display. Generally speaking, if a battery's output voltage falls below 60% - 70% of its original rating, it should be replaced.

5. DC 10 Amp Measurement

A separate input jack is provided for measurement of DC current up to 10 Amps. Red test lead in 10ADC socket. Black test lead in com socket. This range is not fused so it is imperative that the circuit under test does not exceed 10 Amps. Additionally, this function is designed for intermittent use only. Maximum contact time of the test leads with the circuit is 15 seconds, with a minimum intermission time of 30 seconds between tests.

- 1) Set the function/range switch to the 10 Amp range with the leads in their proper jacks.
- 2) Touch the test leads to the circuit in series (in line with the circuit) so that the circuit current passes through the multimeter. That means the test leads and the meter are a "conductor" in the circuit. Read the amperage value on the display.

5.1 Common DC Amperage Measurements

The DC 10 Amp range of this tester is primarily used in automotive circuit measurements which use battery power. Frequent applications encountered with the 10 Amp feature include troubleshooting headlight wiring, trailer wiring, auto stereo and speaker systems, RV appliance wiring and other automotive accessories that draw current from 1 to 10 Amps. Any circuit powered by batteries or DC generators which generate 1 to 10 Amps can be measured with this unit.

WARNING DO NOT APPLY VOLTAGE TO THE TEST LEADS WHILE THE TESTER IS SET IN THE 10 AMP RANGE. See "For Your Safety"

6. AC Voltage Measurement

- 1) Set the function/range switch to the appropriate AC V range. Red test lead in V mA socket. Black in com socket.
- 2) Touch the test leads to the circuit under test. With AC voltage, the polarity of the test leads is not a factor. Read the voltage level of the circuit on the display.

6.1 Common AC Voltage Measurements Wall Receptacles

If the receptacle is controlled by a switch, make sure the switch is ON. Set the function/range switch to the 200 AC V setting. Touch the test leads to the "hot" and "neutral" slots of the receptacle (see fig. 1A). The tester should read 120 V AC. To test for proper grounding of the receptacle, touch one test lead to the "hot" (narrow) side of the receptacle, and the other test lead to the ground slot (fig. 1B). The tester should read 120 V AC as before. To test for proper grounding of non-polarized receptacles (fig. 2), alternately touch the test leads between the receptacle slots and the wall plate screw. The tester should indicate 120 V AC when one test lead contacts the "hot" side of the receptacle. If ground contact cannot be made on the wall plate screw, remove the wall plate and touch the electrical box with the test lead in the same manner as before. The tester should read 120 V AC with one test lead touching the electrical box and the other touching the live side of the receptacle. If not, the receptacle is not properly grounded.

6.2 Appliance Receptacles

Set the function/range switch to the 500 V AC setting. Touch the test leads to the receptacle slots. The tester should read 240 V AC between the two "hot" sides of the receptacle, and 120 V AC between the neutral slot and either of the two "hot" sides (fig. 3).

7. Resistance/Continuity Measurement

For resistance and circuit continuity testing with power OFF: Red test lead in V ma socket. Black test lead in com socket.

- 1) Set the function/range switch to the appropriate ohms setting. If basic circuit continuity tests are being made, any of the ohms settings will do.
- 2) Touch the test leads to the resistor or non-energized component to be measured. Use the 2000K range when testing for resistance values in electronic components such as resistors and potentiometers. If the value of the component falls within the range of another setting, reset the function/range switch to that setting for a more accurate reading.

Common resistance and continuity measurements

Continuity tests are probably the most frequently performed electrical troubleshooting procedures around the home. Always remember that continuity checks are to be made with the power to the circuit turned OFF. Polarity of the test leads is not a factor in making continuity checks.

7.1 Extension Cords

Unplug the cord. Set the function/range switch to any of the ohms () settings. Touch one of the test leads to one of the metal prong ends of the cord and insert the other lead in either one of the receptacle slots on the other end of the cord, making sure both leads are making good contact (see fig. 4). If the display does not change, switch one of the test leads to the opposite receptacle or prong, making sure of good contact. If the display still does not change, the cord may need to be replaced.

7.2 Fuses

Note: With the power OFF, always remove a fuse from its socket before testing it. With cartridge fuses, touch the test leads to each end of the fuse (see fig. 5). If the fuse is good, the display should read -0- ohms. If the display doesn't change at all, replace the fuse. On plug-type fuses, touch the test lead on the bottom contact and the other on the threaded metal contact (see fig. 6). On time-delay/tamper-proof fuses, the other metal contact is at the top of the ceramic threads.

7.3 Switches

Cut off the power source to the switch. If necessary, remove the switch. Turn the switch to the ON position and touch the test leads to the switches terminals (see fig. 7). If the switch is good, the display should read -0- ohms. If the display doesn't change at all, replace the switch. On other than two-way SPST (single pole, single throw) switches or double pole double throw (ON-OFF-ON) switches, in each ON position you will need to alternate the test leads between the switches terminals to determine which two terminals control that ON position.

8. Diode Check

Diodes should be tested with both forward and reverse voltages applied:

- 1) Plug the red (+) test lead into the (VQmA) input jack, and the black (-) test lead into the COM input jack. Set the function/range switch to the diode test setting.
- 2) Touch the test leads to the diode, one lead on the anode and the other on the cathode. The indication of a diode in good condition is a low resistance reading when the red lead (+) is on the anode and the black (-) lead is on the cathode. The cathode is the wire lead closest to the silver band on the diode. When the test leads are reversed (reverse voltage is being applied), a high resistance reading should be displayed.

NOTE: A low resistance in both directions indicates a shorted diode; a high resistance in both directions indicates an open diode. In either case the diode is defective and should be replaced.

9. Battery Replacement

- 1) Remove the screws in the back cover of the tester and carefully separate the back cover from the front.
- 2) Note the polarity of the battery terminals when removing it from its connector and replace.3) Carefully replace the back cover and tighten the screws. Do not overtighten the screws as this may strip the threads in the tester housing.

