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DM-46 **Instruction Manual**

Automotive Multimeter and Inductive Amp Probe

The DM-46 is the auto industry's answer to pocket portability in a professionally accurate meter.

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MAINTENANCE and CLEANING

- Periodically wipe the case with a damp cloth and detergent; do not use abrasives or solvents.
- Use the hand strap to avoid accidental dropping. Negligent use of your meter will void the warranty.
- Keep away from heat and liquid solvents.
- Keep in a protective place when not in use.

SERVICE

For service send your product to Auto Meter in a well-packed shipping carton. Please include a note explaining what the problem is along with your phone number. If you are sending the product back for Warranty adjustment, you must include a copy (or original) of your sales receipt from the place of purchase.

12 MONTHS FROM DATE OF PURCHASE-CABLES 90 DAYS

The manufacturer warrants to the consumer that this product will be free from defects in material or workmanship for a period of twelve (12) months from the date of original purchase. Products that fail within this 12 month warranty period will be repaired or replaced at the manufacturer’s option to the consumer, when determined by the manufacturer that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of parts and the necessary labor by the manufacturer to effect the repair or replacement of the product. In no event shall the manufacturer be responsible for special, incidental or consequential damages or costs incurred due to the failure of this product.

Improper use, accident, water damage, abuse, unauthorized repairs or alterations voids this warranty. The manufacturer disclaims any liability or consequential damages due to breach of any written or implied warranty on its test equipment.

WARRANTY AND SERVICE INFORMATION

Warranty claims to the manufacturer’s service department must be transportation prepaid and accompanied with dated proof of purchase. This warranty applies only to the original purchaser and is non-transferable. Shipper damage incurred during return shipments is not covered under this warranty. It is the responsibility of the shipper (the customer returning the Test Equipment) to package the tester properly to prevent any damage during return shipment. Repair costs for such damages will be charged back to shipper (customer returning the Test Equipment). Protect the product By shipping in original carton or add plenty of over-pack cushioning such as crumpled up newspaper.

SPECIFICATIONS CONTINUED

DUTY:

Range (<10KHz)	Resolution (Hz)	Accuracy	Sensitivity
1-99%	0.1%	10d	10V

DIODE TEST:

Range	Resolution	Accuracy	Overload Protection
0-1.999V	0.001V	±2.5% ± 5dgts	AC 600V

SAFETY

- Carefully read all operating instructions before using the DM-46
- Wear eye protection when working around batteries.
- Keep sparks, flames, or cigarettes away from batteries.
- Keep hair, hands, and clothing as well as tester leads and cords away from moving blades and belts.
- Provide adequate ventilation to remove car exhaust.
- **WARNING:** If the clamp meter is used in a manner not specified by the manufacture, the protection provided by the clamp meter may be impaired.

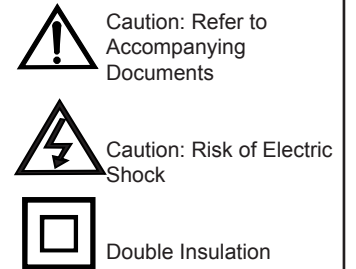


Overvoltage Category I (CAT I):
Equipment for connection to circuits in which measures are taken to limit the transient overvoltages to an appropriate low level.

Overvoltage Category II (CAT II):
Energy-consuming equipment to be supplied from the fixed installation.

Overvoltage Category III (CAT III):
Equipment in fixed installations.

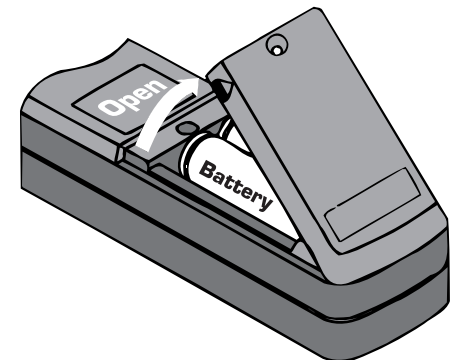
Definition of Symbols on the DM-46 and in the manual.



BATTERY REPLACEMENT

When the low battery symbol is displayed on the LCD or the LCD is dark, replace the old batteries with two (AA) batteries.

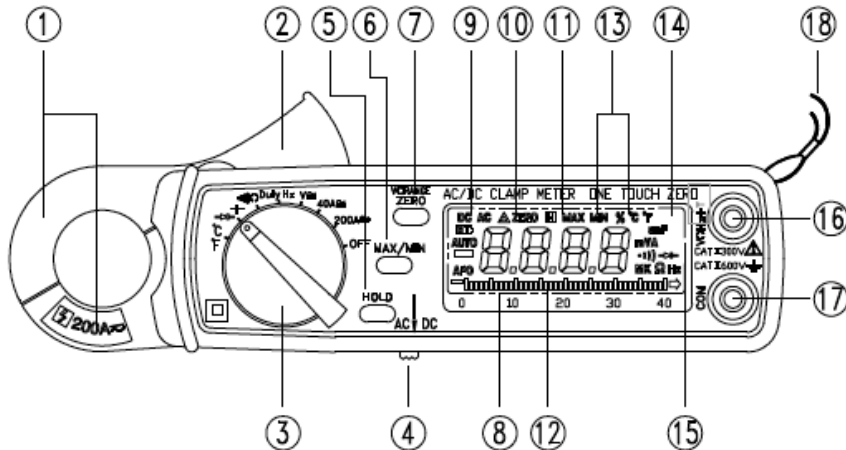
1. Turn the power off and remove the test leads from the clamp meter.
2. Remove the screw of the battery cover.
3. Lift and remove the battery cover.
4. Remove the old batteries.
5. Insert two (AA) batteries.
6. Replace the battery cover and secure the screw.



FEATURES

- 10mA high resolution on 40A DC/AC range.
- Temperature (Degrees C or F) and Capacitance
- One touch zero for DCA adjustment.
- Auto-range for V, A, Ω , F, and temperature
- Frequency (Hz).
- 23 mm diameter jaw.
- Fast bar graph display (30 times/sec.) for transient observation.
- Continuity and frequency measurements.
- Max/Min and Data Hold functions.
- 600V overload protection for ohm measurement.
- Ideal for working in crowded switch box or cable areas.

CONTROLS AND FUNCTIONS



- 1. Transformer Jaw** is used to pick up current signal. It measures DC/AC current. The jaw must enclose the conducting wire.
- 2. Transformer Trigger** is used to open the jaw.
- 3. Function Selector Switch** is used to select the function such as DCA, ACA, DCV, ACV, Hz, Ohm and Continuity.
- 4. AC/DC select switch.** This is used to select AC or DC voltage or current, Hz or Duty, Ohm or Continuity, Capacitance or Diode, °F or °C.
- 5. Data Hold Button** holds the LCD reading when pushed. Press again to release it. This button is not available in continuity or diode function.
- 6. Max/Min Hold Button.** This button is used to enable the maximum or minimum value to be displayed and updated during measurement. Press once, minimum value shall be display and updated. Press again, maximum value shall be displayed and updated. Zero function will be disabled if MAX/MIN is enabled. This button is not available in Duty, Hz, Continuity, Diode or Capacitance function.

SPECIFICATIONS CONTINUED

RESISTANCE (Ω):(open voltage 0.4V)

Range	Resolution	Accuracy	Overload Protection
400 Ω	0.1 Ω	$\pm 1.5\% \pm 2$ dgts	AC 600V
4K Ω	1 Ω	$\pm 1.5\% \pm 2$ dgts	AC 600V
40K Ω	10 Ω	$\pm 1.5\% \pm 2$ dgts	AC 600V
400K Ω	100 Ω	$\pm 1.5\% \pm 2$ dgts	AC 600V
4M Ω	1K Ω	$\pm 1.5\% \pm 2$ dgts	AC 600V
40M Ω	10K Ω	$\pm 1.5\% \pm 2$ dgts	AC 600V

CONTINUITY (open voltage 0.4V, Overload Protection Ac600V)

Range	Resolution	Accuracy	Beeping
40-400 Ω	0.1 Ω	$\pm 1.0\% \pm 2$ dgts	<10.0 Ω (approx)

FREQUENCY: (Auto, sensitivity selected by pressing RANGE Button)

Range (Hz)	Resolution (Hz)	Accuracy	Sensitivity	Overload Protection
1-100K	0.001-100Hz	$\pm 0.5\% \pm 2$ dgts	5V	AC 600V

TEMPERATURE (K Type Thermal Couple w/ Adapter, °C or °F):

Range	Resolution	Accuracy	Overload Protection
-40-0°C	0.1 °C	$\pm 2.0\% \pm 2$ °C	AC 600V
0-400°C	0.1 °C	$\pm 0.5\% \pm 2$ °C	AC 600V
400-1000°C	1°C	$\pm 0.5\% \pm 2$ °C	AC 600V
-40-0°F	0.1°F	$\pm 2.0\% \pm 4$ °F	AC 600V
0-400°F	0.1°F	$\pm 0.5\% \pm 4$ °F	AC 600V
400-1800°F	1°F	$\pm 0.5\% \pm 4$ °F	AC 600V

CAPACITANCE:

Range	Resolution	Accuracy	Overload Protection
40nF	10pF	$\pm 5.0\% \pm 0.2$ nF	AC 600V
400nF	0.1nF	$\pm 3.0\% \pm 0.2$ nF	AC 600V
4 μ	1nF	$\pm 3.0\% \pm 0.02$ μ F	AC 600V
40 μ F	10nF	$\pm 3.0\% \pm 0.02$ μ F	AC 600V
400 μ F	100nF	$\pm 3.0\% \pm 0.02$ μ F	AC 600V

SPECIFICATIONS (23°C ± 5°C)

DC Current

Range	Resolution	Accuracy	Overload Protection
40A	10mA	±1.5% ±2dgts	DC 400A
0-150A	100mA	±1.5% ±2dgts	DC 400A
150-200A	100mA	±2.2% ±2dgts	DC 400A

AC Current

Range	Resolution	Accuracy		Overload Protection
		50/60 Hz	40-1 KHz	
40A	10mA	±1.5% ±2dgts	±2.5% ±2dgts	AC 400A
0-150A	100mA	±1.5% ±2dgts	±2.5% ±2dgts	AC 400A
150-200A	100mA	±2.2% ±2dgts	±2.5% ±2dgts	AC 400A

DC Voltage: (Overload Protection: 600V)

Range	Resolution	Accuracy	Input Impedance
400mV	0.1mV	±1.5% ±3dgts	2.3MΩ
4V	1mV	±1.5% ±3dgts	2.3MΩ
40V	10mV	±1.5% ±3dgts	2.3MΩ
400V	100mV	±1.5% ±3dgts	2.3MΩ
600V	1V	±1.5% ±3dgts	2.3MΩ

AC Voltage: (Input Impedance 2.3MΩ)

Range	Resolution	Accuracy		Overload Protection
		50/60 Hz	40-1 KHz	
0.01-4V	1mV	±1.5% ±5dgts	±2.0% ±5dgts	AC 800V
40V	10mV	±1.5% ±5dgts	±2.0% ±5dgts	AC 800V
400V	100mV	±1.5% ±5dgts	±2.0% ±5dgts	AC 800V
600V	1V	±1.5% ±5dgts	±2.0% ±5dgts	AC 800V

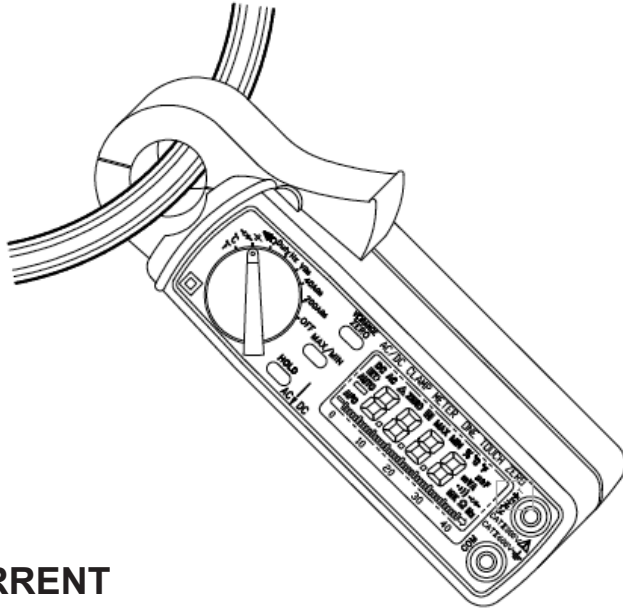
CONTROLS AND FUNCTIONS

- VΩRANGE Zero/Relative Button.** On voltage or ohm function, press this button to select manual range. On other functions, once this button is pressed, the current reading shall be set to zero and be used as a zero reference value for all other subsequent measurement. The function is also used to remove offset value caused by residual magnetism remaining in the core for the DC current measurement. The Zero/Relative function will be disabled if the MAX/MIN button is pressed. This button is not available in Duty, Hz, Continuity, Diode function.
- LCD** is a 3 3/4 digit Liquid Crystal Display with a maximum indication of 3999. The functions included are units, symbols, bar graph, sign, decimal points, low battery symbols, max/min symbols, and zero symbol. Press the zero button again to disable this function.
- Battery Symbol** appears if the battery voltage drops below the minimum required voltage. Refer to page 3 for battery replacement.
- Zero/Relative Symbol** means a reference value has been subtracted from the actual reading. The reading shown is an offset value. Press the zero button again to disable this function.
- Data Hold Symbol** appears on the LCD when the hold button is pressed.
- Bar Graph** has forty segments. It displays segments proportional to the actual reading. Each segment represents one count.
- MAX** or **MIN** is displayed on the LCD when the MIN/MAX button is pressed.
- Continuity Symbol.** If continuity function is selected, this symbol shall appear on LCD.
- Units** are displayed on the LCD when a function is selected. The corresponding symbols are: V, A, Ω, and Hz.
- V, Ω, Hz, Capacitance, Temperature input Terminal.** This terminal is used as input for voltage, ohm/continuity, frequency, capacitance or temperature measurements..
- COM Terminal (Black)** is used as a common reference input.
- Hand Strap** allows you to put your hand through to avoid accidentally dropping the clamp meter.

DC/AC CURRENT MEASUREMENTS

SPECIFICATIONS

WARNING: Make sure that all the test leads are disconnected from the meter's terminals for current measurement.



DC CURRENT

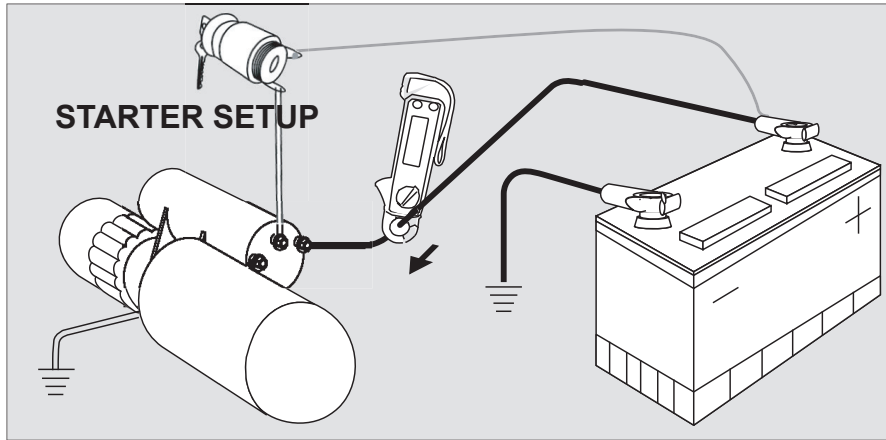
1. Set the rotary switch at 40A --- or 200A --- and move the sliding switch to DC.
2. Push the zero button to zero reading the Amp reading.
3. Press the trigger to open the jaw and fully enclose the conducting wire to be measured. Be sure there is no air gap between the two half jaws.
4. Read the measured value from the LCD.

AC CURRENT

1. Set the rotary switch at 40A \sim or 200A \sim , and move the sliding switch to AC.
2. Press the trigger to open the jaw and fully enclose the conducting wire to be measured. Be sure there is no air gap between the two half jaws.
3. Read the measured value from the LCD.

Conductor Size:	23mm max. (approx.)
Battery Type:	two 1.5V AA
Display:	3 3/4 LCD with 40 seg. bar graph
Range Selection:	manual
Overload Indication:	OL
Power Consumption:	10mA (approx.)
Low battery Indication:	B
Sampling Time:	3 times/sec. (display) 30 times/sec. (bar graph)
Auto-Power-Off:	15 Minutes
Operating Temperature:	-10° C to 50° C
Operating Humidity:	less than 85% relative
Altitude:	up to 2000M
Storage Temperature:	-20° C to 60° C
Storage Humidity:	less than 75% relative
Dimension:	7.2" x 2.5" x 1.4"
Weight:	190g (battery included)
Accessories:	Adapter for Capacitance and K-type Thermal Couple Carrying bag Instruction Manual

STARTER DRAW TEST



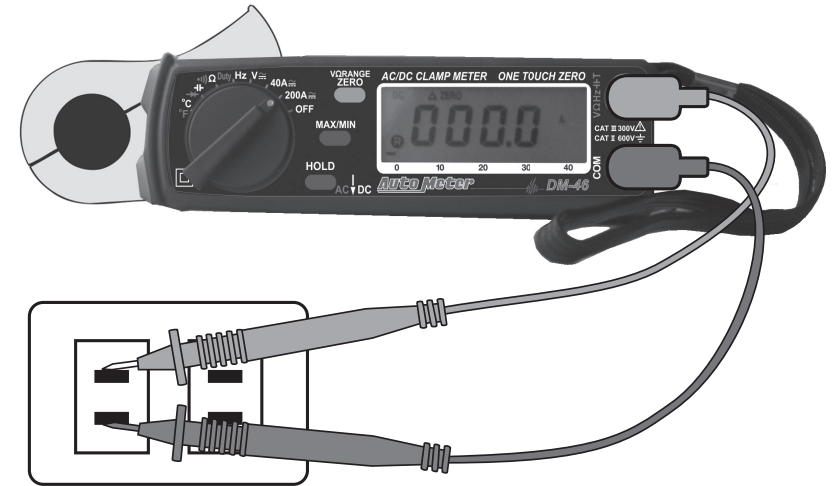
1. Check with manufacturer's proper procedure to disable ignition if needed. Improper methods could cause damage to vehicles that are computer controlled.
2. Determine the manufacturer's Starter Draw specifications. If not available use the following chart as a guide.

4 Cyl Gas 120-250A	6 Cyl Gas Up to 250A	8 Cyl Gas Up to 250A
4 Cyl Dsl Up to 350A	6 Cyl Dsl Up to 450A	8 Cyl Dsl Up to 650A

3. Select DC 200 Amp and zero the DM-46 by pressing the yellow button.
4. Press the MAX/MIN button twice and make sure the display reads HOLD MAX.
5. Clamp the DM-46 around the positive conductor leading to the starter (See illustration above). Make sure the small arrow inside the clamp is pointing in the direction of the current towards the starter. Also make sure the DM-46 is clear of any moving belts, fan blades or anything that might damage the meter.
6. Crank the engine for 3 to 5 seconds.
7. Read the DM-46 and compare with manufacturer's specifications.
8. High Amp reading indicates a faulty starter or engine timing that would put an extra load upon the starter. Possible starter problems are shorted windings, bent armature, broken housing or bad bearings.

DC/AC VOLTAGE MEASUREMENTS

WARNING: Maximum input for DC V is 600, and for AC V is 600. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage to the meter.

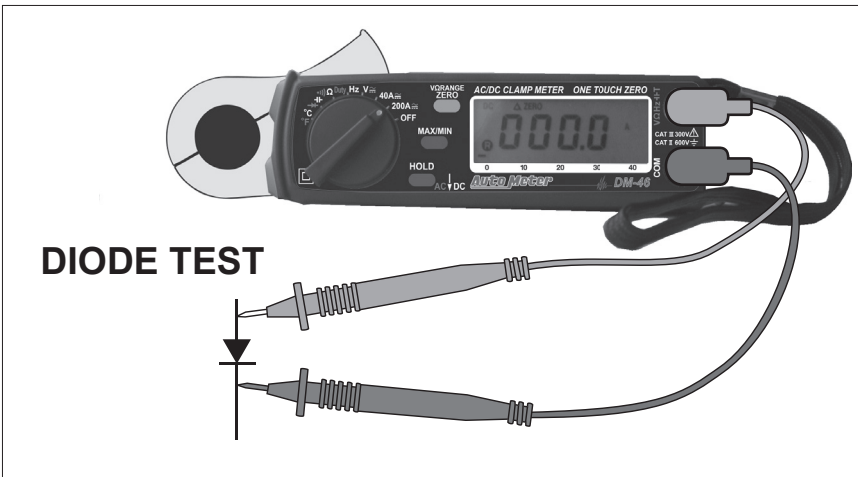


DC VOLTAGE

1. Set the rotary switch at V --- and move the sliding switch to DC.
2. Insert the test leads into the input jack.
3. Connect the test prods of the test leads in PARALLEL to the circuit to be measured.
4. Read the measured value from the LCD display.

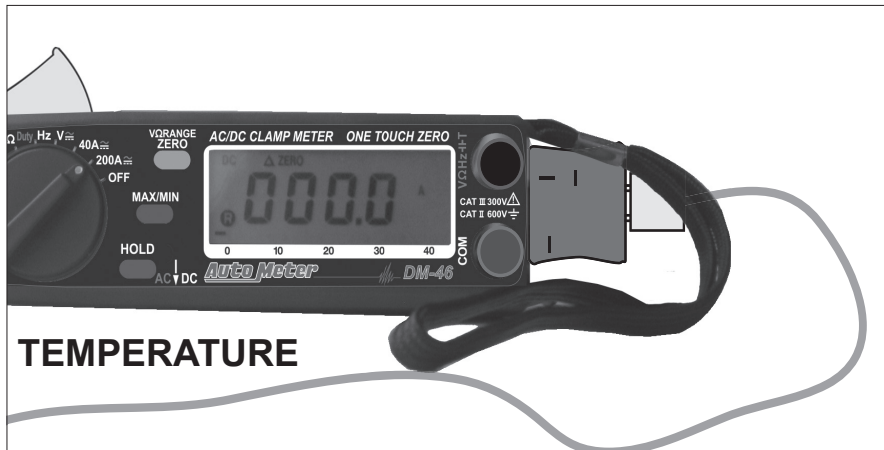
AC VOLTAGE

1. Set the rotary switch at V \sim and move the sliding switch to AC.
2. Insert the test leads into the input jack.
3. Connect the test prods of the test leads in PARALLEL to the circuit to be measured.
4. Read the measured value from the LCD display.



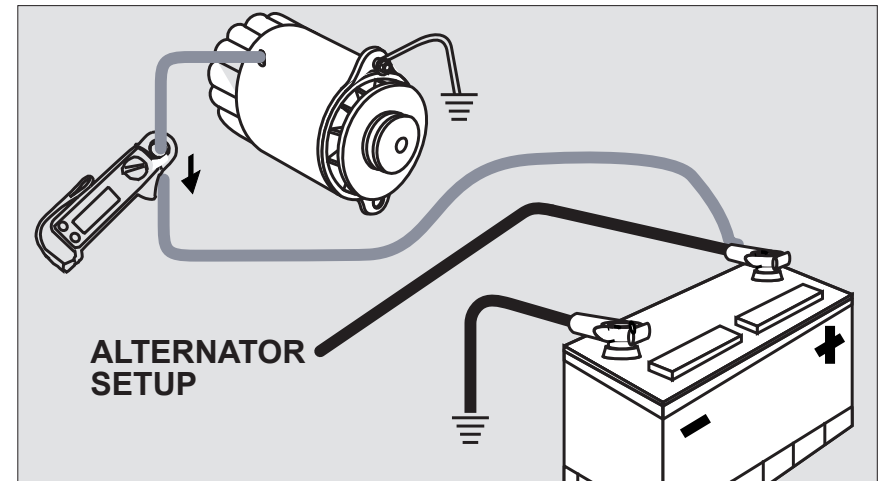
DIODE TEST

1. Plug the adapter into the terminal.
2. Insert the the capacitor into the adapter.
3. If the capacitance is less than 4nF press zero (capacitance) button to zero the residual capacitance.
4. Read the capacitance from the LCD.



TEMPERATURE

1. Plug the adapter into the terminal.
2. Insert the K-type thermal couple into the adapter
3. Read the temperature from the LCD.



ALTERNATOR SETUP

1. Select DC Volts on the DM-46.
2. Start the engine.
3. Place the Volt leads to the red (+) positive and black (-) battery terminals.
4. Allow voltage to stabilize. The reading should be from 13.0 to 15 Volts DC.
5. Turn on all accessories including the headlights.
6. The reading should be from 12.8 to 15 Volts DC. If the reading is low the alternator is not charging. If the reading is high the alternator is over charging and could damage the battery.
7. Switch the DM-46 to DC 200 Amps.
8. Clamp the DM-46 around the positive alternator conductor leading to the positive terminal of the battery (See illustration above).
9. Make sure the small arrow inside the clamp is pointing in the direction of the current towards the battery. Also make sure the DM-46 is clear of any moving belts, fan blades or anything that might damage the meter.
10. If output is lower in DC Amps than the accessories would draw then the alternator may not be charging. Repeat step 6 to see if the voltage has dropped.
11. Select the AC 40 Amp on the DM-46.
12. Clamp the DM-46 as shown above.
13. With the engine still running and all accessories on, the current ripple should be less than 10 Amps AC. If more, the diodes are bad.



The following section shows what you can do with the DM-46 in testing your charging system

State of Charge

1. Select DC Volts on the DM-46.
2. Place the Volt leads to the red (+) positive and black (-) battery terminals.
3. If the Volts are less than 12.5 Volts the battery needs charging.

Amp Draw Check

4. Turn off ignition and all accessories.
5. Select DC 40 Amps on the DM-46.
6. Zero the DM-46 by pressing the yellow button.
7. Clamp the DM-46 around the positive (+) battery cable . Make sure it is clamped around all wires.
8. If the display is above 2 Amps there is probably a draw upon the battery by the electrical system. This will drain the battery. Isolate and follow a suspected circuit and repeat reading until the problem is found. Consider a negligible drain with an on board computer.

WARNING: Before taking any in-circuit resistance measurement, remove power from the circuit being tested and discharge all the capacitors.

1. Set the rotary switch to Ω .
2. Insert the test leads into the input jack.
3. Connect the test probes of the test leads to the two ends of the resistor or circuit to be measured.
4. Read the measured value from the LCD.

CONTINUITY TEST

1. Turn the rotary switch to Ω position and move the sliding switch to AC position.
2. Insert the test leads into the input jack.
3. Connect the test probes of the test leads to the two ends of the resistor or circuit to be measured.
4. Read the measured value from the LCD.
5. If the resistance is lower than 10 Ω , a beeping sound will be heard.

FREQUENCY (Hz) MEASUREMENT

1. Set the rotary switch at Hz.
2. Insert the test leads into the input jack.
3. Connect the test prods of the test leads in PARALLEL to the signal or circuit being measured.
4. Read the measured value from the LCD display.

DUTY MEASUREMENT

1. Set the rotary switch at Duty.
2. Insert the test leads into the input jack.
3. Connect the test prods of the test leads in PARALLEL to the signal or circuit to be measured.
4. Read the measured value from the LCD display.

DIODE TEST

1. Set the rotary switch at diode.
2. Insert the test leads into the input jack.
3. Connect the test prods of the test leads to the two ends of a diode.
4. Read the diode voltage from LCD.

RELATIVE READING MEASUREMENTS

The zero button also can be used to make a relative measurement. Once the button is pushed, the current reading is set to zero and a zero symbol will be displayed on LCD. All the subsequent measurement shall be displayed as a relative value with respect to the value being zeroed. Press the zero button again to return to normal mode. But this function is disabled if MAX/MIN function is enabled. Please watch for symbol displayed on LCD.

HOLDING THE LCD READING

Press the HOLD button and the reading will be held on the LCD.

FINDING THE MAX/MIN VALUE

Press the MAX/MIN button to enable the maximum and minimum values to be recorded and updated during measurement. Push the button once, the maximum value will be displayed and updated. The LCD display toggles between the MAX and MIN values. To exit MAX/MIN function, press and hold the MAX/MIN button for more than 2 seconds. If MAX/MIN button is pressed, the ZERO function will be disabled and the ZERO symbol will disappear from LCD.

CHANGE AUTO RANGE MODE TO MANUAL

If users want to select certain range for specific measurement, they can press the $V\Omega$ RANGE button to select appropriate range. To return to auto-range, press and hold the $V\Omega$ RANGE button for 2 seconds.

DISABLE AUTO-POWER-OFF

The meter will turn itself off 15 minutes after power-on (A symbol of APO is displayed in LCD). Also pressing any button or turning the rotary switch will reset the 15 minute timer. To disable the Auto-Power-Off function, hold the HOLD button while turning on power.