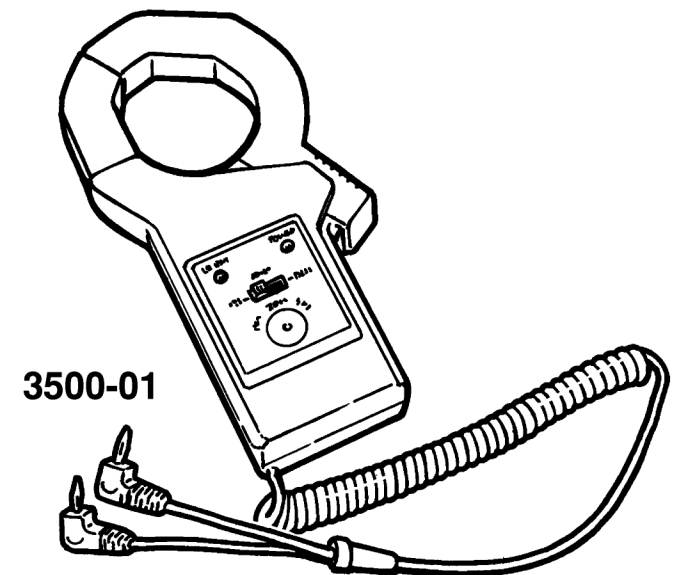

OTC

OTC

655 Eisenhower Drive
Owatonna, MN 55060
Telephone: (507) 455-7000
Tech Serv.: (800) 533-6127
Tech. Serv. Fax: (800) 955-8329



Current Clamp

DCA and ACA

Safety Precautions



DANGER:



Automotive batteries contain sulfuric acid and produce explosive gases that can result in serious injury or death. Engines produce carbon monoxide, which is odorless, causes slower reaction time, and can lead to serious injury. Take the following precautions to help prevent serious personal injury or death:



- Keep lighted cigarettes, sparks, flames, and other ignition sources away from the battery at all times.
- Keep service areas well ventilated, or attach the vehicle exhaust system to an exhaust disposal system.



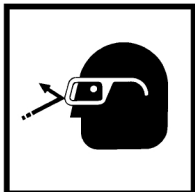
- Never use a wrench on the ungrounded battery terminal until the grounded terminal has been disconnected. Contact between the vehicle body metal and the "hot" terminal can cause sparks or even weld tools into a battery short circuit.



- Remove finger rings and metal wristbands, which can short terminals and become very hot from electric current.
- If you spill battery acid on your skin, flush the burned area with generous amounts of water. Treat the burn with a neutralizing solution of baking soda and more water, and seek medical attention if necessary.



- Set the vehicle's parking brake and block the wheels.



- Wear safety glasses when testing vehicles.

WARRANTY

THIS WARRANTY IS EXPRESSLY LIMITED TO PERSONS WHO PURCHASE OTC PRODUCTS FOR PURPOSES OF RESALE OR USE IN THE ORDINARY COURSE OF THE BUYER'S BUSINESS.

OTC electronic products are warranted against defects in materials and workmanship for three years (36 months) from date of delivery to the user. This warranty does not cover any part that has been abused, altered, used for a purpose other than that for which it was intended, or used in a manner inconsistent with instructions regarding use. The exclusive remedy for any electronic tester found to be defective is repair or replacement, and OTC shall not be liable for any consequential or incidental damages. Final determination of defects shall be made by OTC in accordance with procedures established by OTC. No agent, employee, or representative of OTC has any authority to bind OTC to any affirmation, representation, or warranty concerning OTC electronic testers, except as stated herein.

DISCLAIMER

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

ORDER INFORMATION

Replaceable and optional parts can be ordered directly from your OTC authorized tool supplier. Your order should include the following information:

1. Quantity
2. Part number
3. Item description

CUSTOMER SERVICE

If you have questions on the operation of the product, call the OTC Technical Services Dept. at:

(800) 533-6127

If your unit requires repair service, return it to the manufacturer with a copy of the sales receipt and a note describing the problem. If the unit is determined to be in warranty, it will be repaired or replaced at no charge and returned freight pre-paid. If the unit is determined to be out of warranty, it will be repaired for a nominal service charge plus return freight. Send the unit pre-paid to:

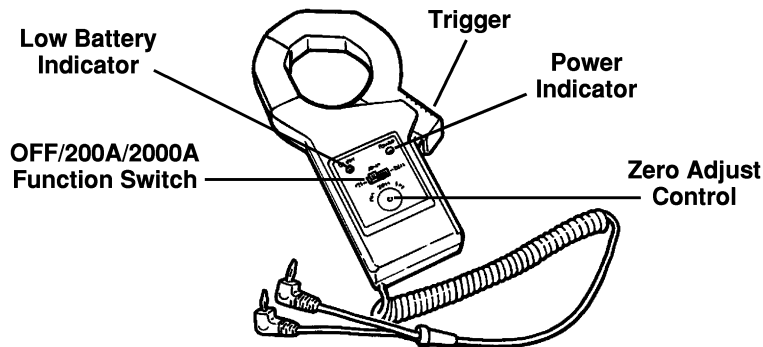
Bosch Service Repair
755 Eisenhower Drive, Owatonna MN 55060
Attn.: Electronic Repair

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Features

The battery-powered OTC Current Clamp (3500-01) is used with a digital multimeter to measure alternating or direct current. The jaws clamp around the cable, so it is not necessary to break any connections.



OFF/200A/2000A Function Switch

Turn the current clamp ON by moving the function switch to the 200A or 2000A position, depending on the highest anticipated amperage. Turn the current clamp OFF by moving the switch to the OFF position. **Important: To prolong the life of the battery inside the current clamp, turn the clamp OFF after every use.**

Low Battery Indicator

The LO BAT indicator lights up when the current clamp's internal battery requires replacement. **Important: When the LO BAT indicator lights up, replace the battery within 30 minutes to ensure accurate measurements.**

Zero Adjust Control

The DCA ZERO ADJ. zeroes the display for direct current measurements.

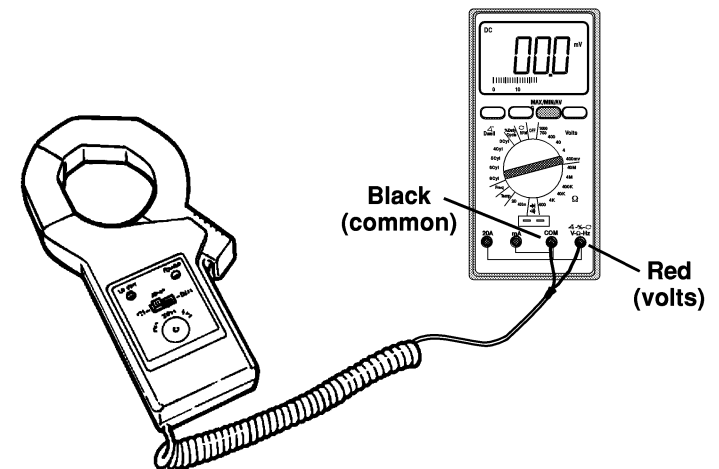
Notes

Specifications

Range:	AC amps - 2 to 2,000 Two ranges (200 ACA or 2000 ACA) DC amps - 2 to 2,000 Two ranges (200 DCA or 2000 DCA)
Output:	AC - 1 AC mV per 1AC amp DC - 1 DC mV per 1DC amp
Accuracy:	$\pm (2\% \text{ rdg} + 2 \text{ mV})$ -2 to 1200A $\pm (2.5\% \text{ rdg})$ - 1201 to 1500A
Battery:	9V heavy duty alkaline battery
Power Consumption:	Approximately 15 mA
Operating Temperature:	0° C to 50° C (32° F to 122° F)
Operating Humidity:	Less than 90% RH
Dimension:	196 x 65 x 35 mm (jaw width 94 mm) 7.7 x 2.6 x 1.4 inch (jaw width 3.7 inch)
Weight:	500 g/1.1 lb. (without battery)

Setup

1. Connect the RED output lead from the current clamp to the volts (V Ω) jack on any digital multimeter.
2. Connect the BLACK output lead from the current clamp to the common (COM) jack on the multimeter.
3. Set the function switch on the multimeter to the DC or AC millivolt (mV) or volt (V) range.
4. Turn the multimeter ON.



Setup (cont'd)

AC Current Measurement

1. On an auto-ranging meter, select the AC volts (V) range. On a manual-ranging meter, select a range that will display voltage in 1 millivolt (.001) increments.
2. Turn the current clamp power switch ON, setting the range scale on the current clamp at 200A or 2000A. (If you are not sure of the amperage, use the 2000A scale.) **Note: If the LO BAT light is illuminated, replace the battery.**
3. Squeeze the current clamp trigger to open the jaws. Place the open jaws around one cable to be tested. Release the handle and allow the jaws to close completely. Read the value displayed on the multimeter. (*millivolts = current in amps; 1mV = 1 amp*)

Replacing the Battery

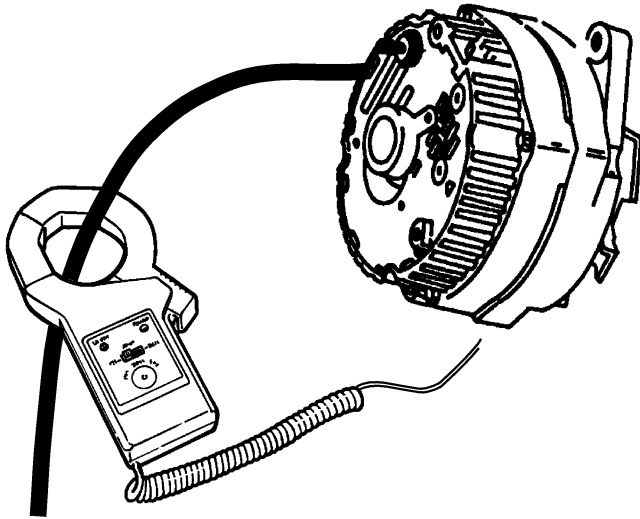
1. Remove the Phillips hd. screw on the back side of the current clamp.
2. Slide the battery cover OFF.
3. Lift the back end of the battery and slide it partially out.
4. Remove the battery strap, and pull the battery completely out.
5. Attach a new heavy duty alkaline 9-volt battery to the battery strap, and place it back in the battery compartment.
6. Replace the battery cover and Phillips hd. screw.

Maintenance

1. Keep the mating surfaces of the jaws clean. If the jaws cannot close completely, the current readout will be wrong.
2. Regularly test the battery inside the current clamp. If the clamp is not used over a long period of time, remove the battery.

Alternator Output Test

Note: The drive belt must be correctly tensioned, and all connections must be clean and secure.



1. Place the current clamp jaws around the alternator output lead.
2. Start the engine and run to about 2000 RPM.
3. Turn on heavy draw accessories, such as the maximum A/C setting, rear window defroster, and headlights.
4. Watch the output current on the meter. If the output amperage is close to specification, the test is complete.

If the output current reading is low, determine if the alternator is the problem. Refer to the vehicle service manual for the procedure to full field test the alternator. **Important: Turn all accessories and lights OFF before performing the full field test.**

Setup (cont'd)

DC Current Measurement

1. On an auto-ranging meter, select the DC volts (V) range. On a manual-ranging meter, select a DC range that will display voltage in 1 millivolt (.001) increments.
2. Turn the current clamp power switch ON, setting the range scale on the current clamp at 200A or 2000A. (If you are not sure of the amperage, use the 2000A scale.) **Note: If the LO BAT light is illuminated, replace the battery.**
3. Adjust the DCA Zero Adj. knob until the display reads "0".
Note: The core of the jaws may hold some magnetic force after the current clamp has been used for a current measurement. If you cannot zero adjust the display, open the jaws and snap them closed several times.
4. Squeeze the current clamp trigger to open the jaws. Place the open jaws around one cable to be tested. Release the handle and allow the jaws to close completely. Read the value displayed on the multimeter. (*millivolts = current in amps; 1mV = 1 amp*)
5. If the reading is negative, disconnect the current clamp, turn it over, and test again.

Current Measurement

Quick Test

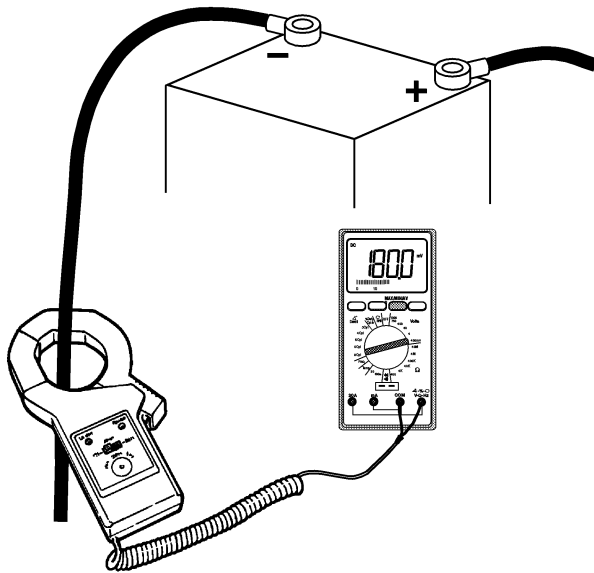
The current clamp measures amps in the direction of electrical flow. Before testing a vehicle cable, use this quick test to determine if the current clamp is set up to measure current flow and direction.

1. Turn the ignition and all accessories OFF.
2. Place the current clamp jaws around the battery cable.
3. Turn the headlights ON.

If the reading on the multimeter is positive, disconnect the clamp, turn it over and test again.

Measuring Current Flow

Place the current clamp jaws around the negative battery cable. If the reading on the multimeter is positive, the battery is charging. If the reading is negative, the battery is discharging.



Starter Motor Test

Note: Perform the starter test only after verifying that the vehicle battery is in good condition and fully charged.

Important: To prevent permanent damage to the starter, do not crank the engine for more than 15 seconds. Allow one minute between tests for the starter to cool.

Starter current requirements vary with temperature, engine displacement and the number of cylinders. Refer to the vehicle service manual for the correct specifications. On a warm engine, starter current draw can be estimated as follows:

Estimated Current Draw

Multiply the displacement in cubic inches by:

- 0.5 for 8 cylinders
- 0.8 for 6 cylinders
- 1.5 for 4 cylinders

For example, if displacement is 350 cubic inches, and the vehicle has an 8-cylinder engine: $350 \times 0.5 = 175$ amps.

This method of estimating produces a test value within 25 amps for most gasoline engines.

1. Disable the ignition or fuel system to prevent the engine from starting. Refer to the vehicle service manual for the procedure.
2. Calculate the current draw, and select the 200A or 2000A range on the current clamp.
3. Zero the current clamp, and clamp the jaws around the vehicle's negative battery cable.
4. Crank the engine and observe the meter reading.

