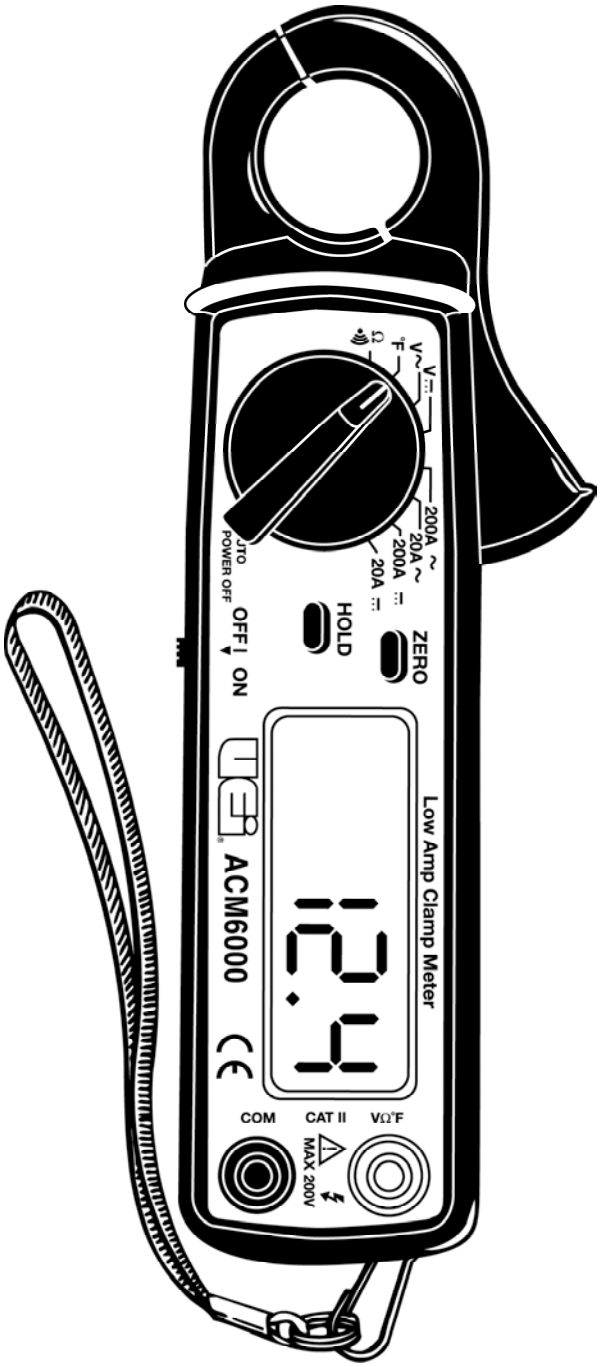
INSTRUCTION MANUAL

ACM6000

Low Amp Clamp-On DMM



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Introduction

The ACM6000 DC/AC Clamp Meter instrument allows pocket sized convenience for testing voltage, current flow, resistance, continuity and temperature.

A voltage measurement does not always provide complete information about the behavior of a circuit. A current measurement, in addition to the voltage measurement, provides additional information to help you make a correct diagnosis.

The instructions, recommendations and illustrations in this manual are intended the basic information necessary to get you started on the path to automotive electrical diagnostics.

State-of-the-art electronic test tools are not very effective without understanding basic automotive electrical diagnostics and basic electrical circuits. Training courses are usually available from local schools. For additional information on domestic field training, contact the *UEI Automotive Field Training Center at (770) 476 -1431 (8-5 PM, EST)*. Custom contract training can be provided in your area.

Safety Notes

Before using this meter, read all safety information carefully. In this manual the word "**WARNING**" is used to indicate conditions or actions that may pose physical hazards to the user. The word "**CAUTION**" is used to indicate conditions or actions that may damage this instrument.

WARNING!
Follow appropriate work area safety precautions

Automotive safety
When performing vehicle maintenance, work in a well-ventilated area - route exhaust gases out of work area. Work in a well-lit environment. Use supplemental work lights in service area.

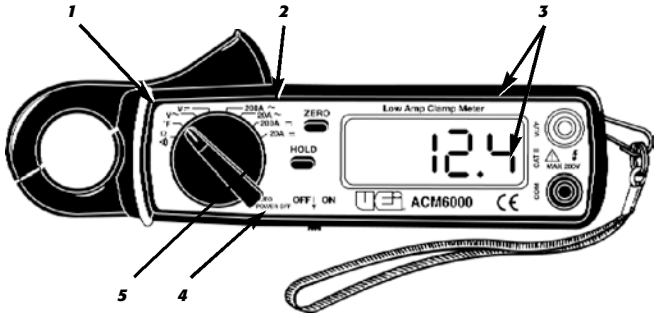
- **DO NOT** wear jewelry (rings, watches, etc.) when working on vehicles
- Wear approved safety eyewear at all times
- Avoid rotating fan blades, drive-belts and pulleys on running engines
- Beware of electrical shock when working on vehicle wiring and electrical systems
- Keep open flames and sparks away from batteries, engine fuels and oils
- Even moderate amounts of current can cause ventricular fibrillation
  - Use insulated tools and gloves to avoid electrical shock
  - Disconnect wiring from supply voltage before performing continuity tests
  - Disconnect the negative battery terminal when removing and replacing starters, alternators, and other components that have direct connections to the battery

Multimeter Safety Precautions
When making resistance measurements, ensure no voltage is present in the component or wire being tested. When making voltage or current measurements, ensure you don't exceed the maximum rating of the ACM6000.

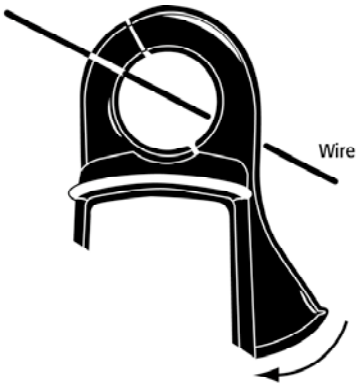
International Symbols

⚠	Dangerous Voltage	⏚	Ground
~	AC Alternating Current	⚠	Warning or Caution
⎓	DC Direct Current	▣	Double Insulation (Protection Class II)
≂	Either AC or DC	⎯	Fuse
⊘	Not Applicable to Identified Model	⎓	Battery

Controls and Indicators



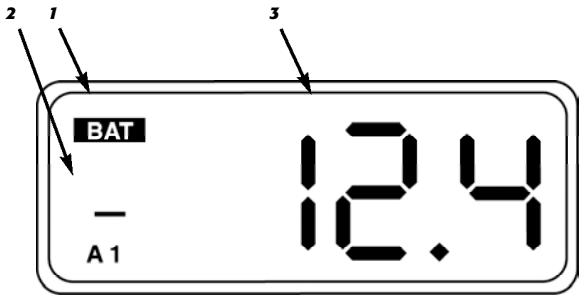
1. **Rotary Selector Knob:** Switches measurement function.
2. **ZERO button:** In the DC AMP's mode, this control zero's the display, so the user can get the most accurate DC current reading.
3. **Test lead input terminals**
   - Positive input (red terminal) for:
     - Voltage
     - Temperature
     - Resistance
   - Negative input (black terminal) for: used as common, ground or low-side input for all test lead measurements.
4. **ON/OFF switch:** Slide the switch forward to turn the instrument on, slide it back to turn the instrument off.
5. **HOLD button:** Freezes the display.



Wire to be tested must pass through the opening when clamp-jaw is shut.

Press there to open clamp-jaw.

Display



1. **Battery Low Indicator:** If the letters "**BAT**" are displayed, turn off the meter and replace the battery.
2. **Minus Sign (-):** Indicates negative polarity.
3. **Measurement Display:** This meter can display numbers up to 199.9 on the LCD. The units (ohms, volts, etc.) are displayed as symbols to the right of the digital value.
   NOTE: *A 1 on the left side of the display indicates that the input has exceeded the selected range.*

Features

AC and DC current testing
Frayed wiring, corroded or degraded connections, failing switches, etc. may test OK for voltage but may not allow sufficient current for the circuit to function properly. Technicians can make better informed diagnostic decisions when circuit current (amperage) is also tested.

The ACM6000 can be used to test for both AC and DC current. The user selectable range switch allows for measurement up to 200 Amps.

Clamp-on techniques for current testing
Traditional current measurement involves opening a suspect circuit and connecting the meter in series. However, opening a circuit to perform a current flow test creates its own set of problems such as:

- Accessing/removing/replacing a computer, module or other device from a hard-to-get area
- Cutting and then repairing a wire
- Reprogramming data that was lost when a circuit was opened

The ACM6000 Clamp Meter allows the technician to quickly and easily make a non-intrusive current flow measurement by clamping the jaw around a wire.

AC and DC voltage testing
Automotive technicians routinely use a DMM to make voltage checks of the battery and various circuits. The ACM6000 permits the user to make standard AC/DC voltage tests, resistance and continuity tests, temperature tests and non-intrusive current tests, while enjoying shirt pocket convenience.

- Use the DC Voltage Measurement capability (⎓V) to test any circuit or device that is powered by battery or regulated voltage
- Use the AC Voltage Measurement capability (~V) to test any circuit that generates its own voltage, such as a magnetic type trigger pickup, ABS, or crank-sensor

Resistance measurement (Ohms - Ω) testing
The ACM6000 can be used to measure how much electrical resistance is present in a circuit or across a connector. The meter sends a small current through the circuit being tested to calculate resistance.

Continuity testing
In order to assist the technician who may not be able to see the meter display at the same time he is making test lead connections, the instrument sounds a buzzer when measured resistance is approximately 25 Ohms or less, which indicates there is continuity and not an open circuit.

ZERO adjustment
DC Current Measurement is most accurate when the instrument is zeroed before making the measurement. By pressing the **ZERO** button for one or two seconds, the display reading is reset to approximately 00.0. Note: Some flicker of the least significant digit – the rightmost digit – is normal due to the presence of electrical and magnetic forces present from shop lighting, wiring, and other live electrical sources near the test area.

Data hold

- Press the **HOLD** button to freeze the display reading
- Press the **HOLD** button again to resume real time readings

Low battery indicator
The **LOW BATTERY** indicator displayed in the upper left hand corner of the display screen alerts the operator to replace the ACM6000 battery.

- See "Battery Replacement" for detailed instructions

Temperature measurement
Automotive repair and maintenance often involves checking the temperature of A/C and heating duct air as well as engine coolant temperature. The operator may read temperature by connecting any standard K type thermocouple to the input jacks, through the supplied temperature probe adapter.

Hand strap
A Hand Strap is provided to avoid accidentally dropping the ACM6000 Clamp Meter.

Pouch
A pouch is provided for storage of the ACM6000 Clamp Meter, the accessories and the operator's manual.

Operating Instructions

AC/DC current testing
The procedure for measuring current using the ACM6000 is different from measuring voltage.

- To measure VOLTAGE, the meter leads are connected to the points in the circuit being tested
- To measure CURRENT, the jaws of the Clamp Meter are placed around a wire or cable to make the measurement (Ensure test leads are not connected to the meter)

1. **To measure high AC CURRENT:** Turn the rotary function switch to the 200 Amps AC setting (200A~).
   To measure high DC CURRENT: Turn the rotary function switch to the 200 Amps DC setting (200A⎓).
2. Slide the ACM6000 power switch to the ON position.
3. Press the **ZERO** button (DC current measurements, only). This will zero the instrument for the most accurate reading.
4. Place the jaws of the ACM6000 around the conductor being tested.
   - Verify that the instrument and its strap do not touch moving pulleys or belts
   - Failure to obey the current flow polarity indicator arrow located on the inner jaw face will result in a minus sign to the left of the amps readout
   - Be sure the jaws are closed, leaving no air gap between the two jaws.

   A. Remove the instrument from the conductor
   B. Turn the rotary switch to the 20A scale
   C. Follow steps 3 and 4
5. When testing is completed move the instrument power switch to OFF.

Measuring AC voltage
NOTE: *Observe safety rules.*

WARNING!
- *Be certain that wires and leads, as well as clothing and hands are clear of moving parts*
- *When checking ABS wheel speed sensors be sure the wheels are free to rotate and will not move the vehicle or cause damage*

1. Slide the ACM6000 power switch to the **ON** position.
2. Turn the rotary function switch to ~V.
3. Connect the test leads to the meter.
   A. Plug the black lead into the COM input
   B. Plug the red lead into the VΩ°F input
4. Connect the probe tips to the circuit under test. For automotive AC voltage measurements using a multimeter not necessary to observe polarity.

   NOTE: *If the voltage readout is not stable, further evaluation of the circuit using a labscope is recommended.*
5. When testing is completed move the instrument power switch to **OFF**.

Measuring DC voltage

1. Slide the ACM6000 power switch to the **ON** position.
2. Turn the rotary function switch to ⎓V.
3. Connect the test leads to the meter.
   A. Plug the black lead into the COM input
   B. Plug the red lead into the VΩ°F input
4. Connect the black COM probe tip to the ground (-) side of the circuit under test.
5. Connect the red prove tip to the positive (+) side of the circuit.
   - The voltage present in the circuit is shown on the display panel readout
   - Instrument will indicate the polarity of the red lead connection displayed on the left side of the voltage readout
   NOTE: *If the voltage reading is not stable, further evaluation of the circuit using a labscope, model ADL7000 or ADL7100, is recommended.*
6. When testing is completed move the instrument power switch to **OFF**.

Resistance measurement

- The ACM6000 supplies a small current to the circuit under test which is used to determine the circuit's resistance
- Displays circuit resistance in Ohms (W)

WARNING!
*The circuit being tested must be turned **OFF**!*
(NO VOLTAGE PRESENT).

- Use the built-in DMM to verify that the circuit under test is turned **OFF** and no voltage is present.

Measuring resistance (Ohms Ω)

1. Slide the ACM6000 power switch to the **ON** position.
2. Turn the rotary function switch to Ω.
3. Connect the test leads to the meter.
   A. Plug the black lead into the COM input
   B. Plug the red lead into the VΩ°F input
4. Verify that the circuit under test has no voltage applied.
5. Connect the test leads across the load or circuit to be tested.
6. Read the circuit resistance displayed in Ohms.
7. When testing is completed move the instrument power switch to **OFF**.

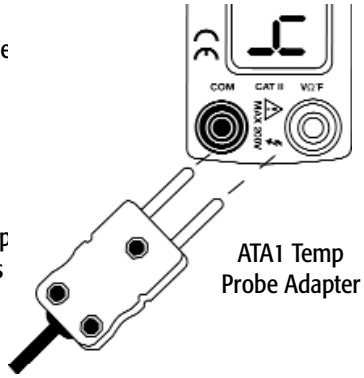
Testing continuity
Continuity is the measure of a circuit's ability to conduct current as opposed to resisting current flow.

- The Audible Continuity buzzer will sound when resistance is under approximately 25Ω
- To set for continuity, follow the same procedures prescribed for measuring resistance
- The same precautions apply

Measuring temperature

1. Slide the ACM6000 power switch to the **ON** position.
2. Turn the rotary function switch to **°F**.
3. Connect the banana plugs of the thermocouple adapter into the meter inputs (Fig. 1). Observe polarity.
4. Connect the K-type thermocouple to the thermocouple adapter.
5. The temperature reading can be read on the display panel.
6. When testing is comple move the instrument power switch to **OFF**.

Plug the standard K-typ thermocouple into this side of the adapter.



ATA1 Temp Probe Adapter

(Fig 1)

DC current testing
When investigating electrical circuit problems the tools most often used by the automotive technician are the trouble light and the volt/ohm meter or DMM. The trouble light is often the tool used to test for current. However, most trouble lights have severe limitations:

1. The operator must guess at the amp draw based upon the brightness of the bulb. Modern automotive circuits require precise current loads. Accurate current measurements are crucial.
2. Many trouble lights require up to 2 amps to shine brightly. If used to test a circuit designed for less amperage, the 2 amp draw can over load the circuit resulting in damage.
3. Some DMMs have a built-in current testing feature. When using most DMM's to measure amps, it is necessary to open the system under test and connect the DMM in series. While the test result is accurate, the hook-up is time consuming and often impractical.

The ACM6000 Clamp Meter is a preferred alternative. By simply placing the Clamp Meter around a power – or ground - wire of the circuit being tested, the connection is made. No back probing or intrusion of insulation is necessary. Additionally, the sensitivity and resolution of the ACM6000 gives a precise amperage readout rather than an estimate based upon bulb brightness. Because no direct connection is required, there is no danger of overloading the circuit. Re-connecting or reattaching wires is unnecessary.

***NOTE:** The ACM6000 Clamp Meter is designed to give accurate measurement of continuous current flow. If the device being tested is pulsed (like solenoids and relays) the readout will show the average current.*

For testing recommendations of pulsed circuits contact the UEi Training Coordinator at 770/476-1431.

Starter current draw
Most starters draw several hundred amps initially, to start the crankshaft turning. After about one half second the starter current will stabilize for the duration of cranking. Typical starter current draw (after the initial surge is):

- 4 cylinder - 120 amps
- 6 cylinder - 150 amps
- 8 cylinder - 180 amps

Test procedure:

1. Disable ignition or fuel, this is a cranking test.
2. Turn the ACM6000 rotary function switch to 200A⎓.
3. Slide the instrument power switch to **ON**.
4. Verify that the vehicle ignition switch is in the **OFF** position.
5. Place the jaws of the ACM6000 around the starter cable and be sure the jaws are closed.
6. Press the ACM6000 **ZERO** button. The display screen should read approximately 00.0.

WARNING!
Observe proper safety procedure for step 7. Be certain the vehicle cannot move during the cranking portion of the test.

7. Crank the engine while observing the meter reading.

CAUTION!
Avoid overheating the starter limit cranking time to 15 seconds.

8. When testing is completed move the instrument power switch to **OFF**.

Abnormally high current can indicate:

- Over-advanced engine timing
- Seized engine
- Faulty starter

Abnormally low current can indicate:

- Low compression engine
- High resistance in starter circuit or connections
- Faulty battery - to check the condition of the battery, use the voltmeter to perform a cranking voltage test

Parasitic load
Parasitic Load is the small amount of current drawn from the battery after the ignition switch is turned OFF and the various electronically controlled devices have phased from "Awake" to "Asleep" mode. Typically, the parasitic load will be under 20 milliamps. In some applications parasitic load will reach 40 milliamps and still be normal. Check the vehicle service manual for exact specifications.

Test procedure:

1. Turn the ignition switch and all accessories **OFF**.
2. Disable the under-hood light.
3. Allow sufficient time for all the electronic devices to be asleep.
   - Some devices take hours
   - Refer to the vehicle service manual for exact time
4. Turn the ACM6000 rotary function switch to 20A⎓.
5. Slide the instrument power switch to **ON**.
6. Press the ACM6000 ZERO button. The display should read approximately 00.0.
7. Place the jaws of the ACM6000 around the battery positive cable(s) or the battery negative cable(s). Either way will work. Be sure the jaws are closed.
8. Because the display readout can vary up to 60mA, add 60mA to the highest expected reading for parasitic load of the vehicle under test. If the display readout exceeds that amount, further testing is recommended.
   Example: Normal highest parasitic load for vehicle under test is 40mA. Add 60mA to the expected 40mA for a total of 100mA. If the display is 0.10A (100mA) the parasitic load can be considered normal. However, a reading of 0.11 A (110mA) or more would be too high.

Alternator output
Problems involving hard starting because of low battery current can be caused by a faulty alternator. The alternator is responsible for keeping the battery charged. The ACM6000 provides an easy way to check alternator current output.

Test procedure:

1. This test should be conducted with the battery fully charged.
   - Charge the battery if necessary
2. Start engine and run at about 1800 RPM.
3. Allow sufficient time for all the electronic devices to be asleep.
4. Turn the ACM6000 rotary switch to 200A⎓.
5. Slide the instrument power switch to **ON**.
6. Press the ACM6000 ZERO button. The display should read approxiametly 00.0.
7. Using CAUTION to avoid moving belts, etc., place the jaws of the ACM6000 around the alternator output wire. Be sure that the jaws are closed.
8. Compare reading with manufacturers specifications.
9. When testing is completed move the instrument power switch to **OFF**, and remove the meter from the wire.

Measuring amp output is only a partial indicator of alternator function and ability to keep the battery charged. Performing a Regulator – Operating Voltage test is also recommended.

Blower motor current draw
Modern automotive heating and air conditioning systems can be quite complicated. Diagnosing these systems may require the use of a service manual to help isolate the exact problem. However, it is often possible to make quick work of pin-pointing some problems by using the ACM6000 to measure current flow. Blown A/C fuses or insufficient cooling/heating caused by a faulty blower motor are easy to find using the ACM6000.

Test procedure:

1. To test the blower motor: disconnect the vehicles electrical harness from the blower motor.
2. Connect a fused jumper lead set from the battery to the blower motor.
3. Turn the ACM6000 rotary function switch to 200A⎓.
4. Slide the instrument power switch to **ON**.
5. Press the ACM6000 **ZERO** button. The display should read approximately 00.0.
6. Place the jaws of the ACM6000 around one of the two wires, either one will work.

7. Most blower motors draws about 25 amps at battery voltage. Verify normal current draw specifications for the type of motor you are testing.
    - Excessive amperage indicates a faulty blower motor probably due to an internal short
    - Insufficient amperage indicates a faulty blower motor probably due to high electrical resistance, either internally or in the connector paths
8. When testing is complete move the instrument power switch to **OFF**, and remove the meter from the wire.

Fuel pump current draw

Diagnosing fuel pump problems can sometimes be difficult. The ACM6000 can be used to make a quick check for fuel pump current draw during cranking. A fuel pump related problem possibly exists if current flow is 2 amps or less during cranking. Additional testing may be necessary if current flow is more than 2 amps.

Test procedure:

1. Disable the ignition system. This is a cranking test.
2. Turn the ACM6000 rotary function switch to 20A⎓.
3. Slide the instrument power switch to **ON**.
4. Press the ACM6000 ZERO button. The display should read 00.0.
5. Place the jaws of the ACM6000 around the power wire to the fuel pump. Be sure the jaws are closed.

WARNING!

Observe proper safety procedures for step 6. Be certain the vehicle cannot move during the cranking portion of this test.

6. Observe the fuel pump current draw reading while an assistant cranks the engine:
    - Press the ACM6000 **HOLD** button to freeze the reading
    - Press the **HOLD** button again to release the **HOLD** feature
7. When testing is complete, move the instrument power switch to **OFF**.

Detailed evaluation of fuel pump performance can be made using the Automotive Labscope.

Lamps, lights and electric motors

Devices such as headlamps, stop lights and interior lights as well as electric motors (wiper, seat, mirror, etc.) draw current at a steady rate. The ACM6000 can be used to verify the current flow powering these devices.

Measuring current in suspect circuit:

1. Turn the ACM6000 rotary function switch to 200A⎓.
2. Slide the instrument power switch to **ON**.
3. Press the ACM6000 **ZERO** button. The display should read approximately 00.0.
4. Place the jaws of the ACM6000 around the positive (+) wire of the circuit under test.
5. Note the display readout. Lights and motors should not draw whole amps of current until switched **ON**.
6. Switch power to the suspect circuit **ON** and verify that current draw does not exceed normal limits for that circuit.
7. When testing is complete, move the instrument power switch to **OFF**, and remove the meter from the wire.

AC voltage testing

Some sensors produce their own voltage as an AC output. AC devices include: The ABS Sensor, the Magnetic Crank Sensor, Magnetic Distributor Pickup, and the Alternator. These devices operate at speeds that are too fast for a meter to be able to give exact measurements of each pulse. The meter reading is an averaged measurement. When more detailed analysis of an AC device it is necessary, use a Labscope.

Measuring AC Voltage:

1. Slide the ACM6000 power switch to **ON**.
2. Turn the rotary function switch to ~V.
3. Connect the test leads to the meter.
    A. Plug the black lead into the COM input
    B. Plug the red lead into the VΩF input
4. Connect the probe tips to the circuit under test. For AC sensor voltage measurements with a multimeter, it is not necessary to observe polarity.

WARNING!

- *Be certain that wires and leads, as well as clothing and hands are clear of moving parts*
- *When checking ABS wheel speed sensors be sure the wheels are free to rotate and will not move the vehicle or cause damage*

5. When testing is complete move the instrument power switch to **OFF**.

Diagnostic tips:

- Heat and vibration can degrade sensor magnets, causing reduced voltage or erratic voltage and current output
- Cracked magnets create unstable signals and erratic computer responses
- Frayed wiring and poor connections frequently cause voltage and current flow problems on AC sensors
- Check clearance between magnet and pickup against manufacturer's specifications

DC voltage testing
Most electric/electronic devices in an automobile rely upon Direct Current. Voltage will always have a direct relationship to current. It is important that the voltage be appropriate for the need.

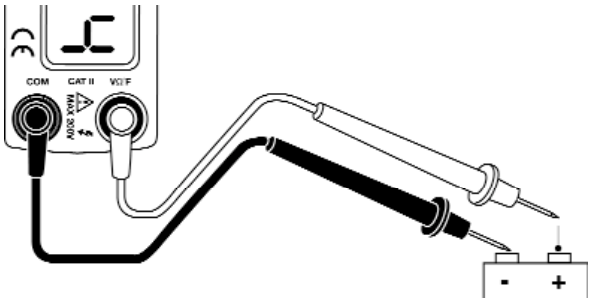
- When voltage is too low, insufficient power can cause problems - Bulbs become dim, motors can slow down, and relays will often malfunction
- When voltage is too high, devices are overpowered and bulbs will burn out prematurely, motors can run too fast and fail early, relays with fine wiring may overheat and fail

Use the DMM DC Voltage Testing capability of the ACM6000 to make these important voltage tests.

NOTE: *Modern automotive engine management systems utilize computers and pulsed electronic solenoids in order to achieve the best combination of power, fuel efficiency and low emissions. Those pulsed devices are often on for only a few thousandths of a second at a time. In some situations the on pulse lasts only a few millionth of a second. The tool of choice to test pulsed circuits is a high-performance Labscope, like the ADL7000 or ADL7100. These Labscopes sample the circuit millions of times per second.*

Battery - state of charge
When conducting starting and charging system tests the first step is to verify that the battery is fully charged.

1. Place the vehicle ignition switch in the OFF position.
2. Turn the headlights ON for 30 seconds to dissipate the battery surface charge.
3. Slide the ACM6000 power switch to the ON position.
4. Turn the ACM6000 rotary function switch to ⎓V.
5. Connect the test leads to the meter (Fig 2).
   A. Connect the black COM lead probe tip to the battery negative (-) post
   B. Connect the red VΩ°F lead probe tip to the battery positive (+) post
      - A fully charged battery will read 12.6 volts or more
      - A reading of 12.4 to 12.5 is considered about 75% charged
      - If the reading is 12.3 volts or less, charge the battery before making further starting and charging system tests
6. When testing is complete, move the instrument power switch to **OFF**, and disconnect the test leads.



Battery

(Fig 2)

Battery - cranking voltage
By comparing the Battery – Cranking Voltage test result with the Starter Current Draw test result, the technician can determine if a battery should be replaced.

Test procedure:

1. Verify that the battery state of charge is ok.
2. Disable ignition or fuel so the engine will crank but not run.
3. Slide the ACM6000 power switch to the ON position.
4. Turn the ACM6000 rotary function switch to ⎓V.
5. Connect the test leads to the meter.
   A. Connect the black COM lead probe tip to the battery negative (-) post
   B. Connect the red VΩ°F lead probe tip to the battery positive (+) post

WARNING!
Observe safety procedures for step 7. Be certain the vehicle can not move during the cranking portion of the test.

6. Crank the engine while observing the meter reading. To avoid overheating the starter, limit cranking to 15 seconds.
   - Look for a reading of 9.6 volts or higher when testing at 70°F
   - In colder conditions allowing 0.1 volt less for each 10°F drop in temperature is accepted practice
7. When testing is complete, move the instrument power switch to **OFF**.

NOTE: *If the cranking voltage drops below 9.0 volts (on 12 volts systems) the vehicle will not start reliably.*

Regulator - operating voltage
The voltage regulator must maintain sufficient voltage to keep the vehicle battery properly charged. The Charging Voltage can be tested using the ACM6000.

Test procedure:

1. Start the vehicle engine.
   - All accessories OFF
   - Run until engine is at operating temperature
2. Slide the ACM6000 power switch to the ON position.
3. Turn the ACM6000 rotary function switch to ⎓V.
4. Connect the test leads to the meter.
   A. Connect the black COM lead probe tip to the battery negative (-) post
   B. Connect the red VΩ°F lead probe tip to the battery positive (+) post

5. System voltage reading should be 13.1 volts to 14.2 volts.
   • Check the vehicle service manual for exact specifications
7. When testing is complete, move the instrument power switch to **OFF** and disconnect the test leads.

NOTE: *See the illustration on page 22 for test lead hookup instructions.*

TIP: *Low Voltage - Check connections, drive belt, faulty voltage regulator.*
High Voltage - Usually indicates a faulty voltage regulator.

Potentiometer tests
Automotive computer engine management systems depend upon signals from potentiometer to determine fuel distribution and ignition timing. If these devices fail or become intermittently faulty, erroneous data is fed to the computer resulting in poor fuel economy and driveability complaints. A typical example of a potentiometer is the Throttle Position Sensor (TPS). To test a throttle position sensor:

Test procedure:

1. Slide the ACM6000 power switch to the **ON** position.
2. Turn the rotary function switch to ⎓V.
3. Connect the test leads to the meter.
   A. Connect the black COM lead probe tip to the battery negative (-) post
   B. Connect the red VΩ˚F lead probe tip to the battery positive (+) post
4. Turn the ignition switch on. **DO NOT** start the engine.
5. Look for a 5 volt reading. (Some vehicles may differ. Verify the correct reference voltage for the vehicle being tested.)
   • If the reference voltage is too high or low, look for a problem with the wiring harness, connectors or the computer
6. After establishing that the reference voltage is OK, connect the red lead probe tip to the TPS output wire.
7. Look for low voltage at idle position which should smoothly increase as throttle is increased. Any erratic voltage readout indicates a bad sensor. Verify the factory specs for the low voltage (idle) setting. As little as one tenth of one volt off can make a difference in vehicle performance. The high voltage (full throttle voltage) should reach at least 80% of the reference voltage. For example, it should reach at least 4 volts with a 5 volt reference.
8. Turn the vehicle switch OFF.
9. When testing is complete, move the instrument power switch to **OFF** and disconnect the meter leads.

Measuring resistance
Resistance measurements are frequently made as a part of automotive circuit and component testing. Additionally, continuity testing is used to establish that a circuit is complete (no opens). Continuity testing is a quick verification that resistance is below a certain level. Levels can vary from meter to meter. A buzzer sounds when measured resistance is below approximately 25 Ohms.

Ohms and audible continuity measurements:

1. Slide the ACM6000 power switch to the **ON** position.
2. Turn the rotary function switch to Ω •)).
3. Connect the test leads to the meter.
   A. Plug the black lead into the **COM** input
   B. Plug the red lead into the VΩ˚F input
4. Verify that the circuit under test is completely OFF.
5. Connect the test leads across the lead or circuit to be tested.
6. Read the circuit resistance, displayed in Ohms.
   • If the display shows an over-range indication ("1" at the left side of the display) the circuit resistance is either above the meter's 2000Ω range, or the circuit is open

   NOTE: *The audible continuity feature allows the operator to do quick resistance tests without looking at the meter display.*

   • The audible continuity buzzer will sound if resistance is under approximately 25Ω
7. When testing is complete, move the instrument power switch to **OFF** and disconnect the meter leads.

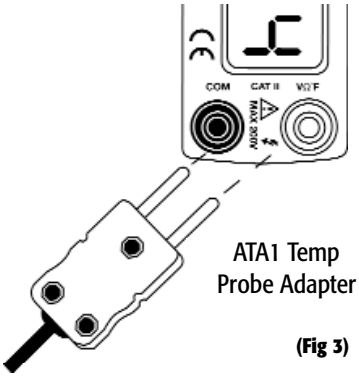
NOTE: *Any circuit tested that has a voltage applied will not provide an accurate reading.*

Temperature measurement
A standard accessory with the ACM6000 is a temperature probe adapter and a K-Type thermocouple. Use the thermocouple probe tip to contact the component to be measured. Additional probes for air, fluids, and surface
contact measurements are available.

Air conditioning/heating duct temperature measurement:

1. Insert the thermocouple connector into the adapter. Observe polarity.
2. Connect the banana plug thermocouple adapter to the ACM6000 black COM and red VΩ˚F inputs (Fig. 3). Observe polarity.
3. Turn the rotary function switch to ˚F.
4. Slide the instrument power switch to the ON position.
5. Position the probe tip in the airflow of an A/C-heating duct.
6. Start the engine and set the vehicle temperature controls for the test. Look for the change in temperature to meet manufacturers specifications.

7. Because of the sensitivity and quick response time of the ACM6000 and K-Type thermocouple the readings will reveal higher highs and lower lows than are possible with dial type thermometers.
8. When testing is complete move the instrument power switch to OFF, and remove the thermocouple.



ATA1 Temp Probe Adapter

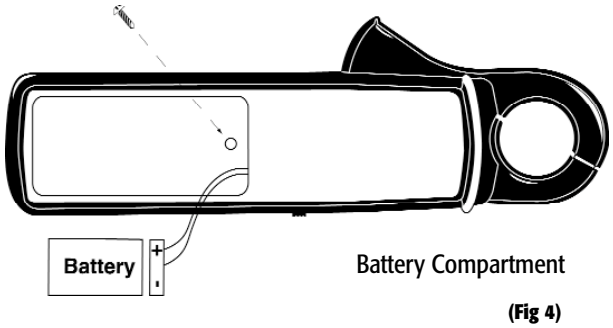
(Fig 3)

Battery replacement

When the low battery symbol is displayed on the LCD, replace the battery with a new one.

Dispose of batteries in accordance with your local solid-waste disposal regulations. Never expose batteries to high temperature or incineration.

1. Turn the ADM6000 power switch OFF.
2. Remove test leads from the meter.
3. Remove the battery cover screw (Fig. 4).
4. Remove the battery cover.
5. Remove the depleted battery.
6. Insert a fresh 9V NEDA1604, IEC6F22 Battery, observe polarity markings in the battery compartment.
7. Replace the battery cover.
8. Replace and secure the battery cover screw.
9. Resume normal use of the instrument.



Battery Compartment

(Fig 4)

Specifications

1. DC current

Range	Resistance	Accuracy
20A	10mA	±3.5% ±6 digits
200A	100mA	±3.5% ±3 digits

2. AC current

		Accuracy			
Range	Resolution	50-60Hz	60-100Hz	100-400Hz	100-400Hz
20A	10mA	±3%±4dgts	±3%±7dgts	±3%±10dgts	±3%±10dgts
200A	200mA	±3%±4dgts	±3%±7dgts	±3%±10dgts	±3%±10dgts

3. DC Voltage (Input impedance 10mΩ)

Range	Resolution	Accuracy
200V	0.1V	±1% ±2 digits

4. AC Voltage

		Accuracy		
Range	Resolution	50-60Hz	60-400Hz	400-1000Hz
200V	0.1V	±1.5%	±2.0%±10dgts	±3.0%
		±3dgts		±25dgts

5. Temperature (K-Type thermocouple)

Range	Resolution	Accuracy
40˚F to 1000˚F	1˚F	±3% ±6dgts(<302˚F) ±3%(>302˚F) at 50-90˚F ambient Temperature

6. Resistance

Range	Resistance	Accuracy	Continuity Tone
2000Ω	1Ω	±1%±2dgts	≈<25Ω

Environmental operating conditions

This clamp meter was designed to be used in temperature and humidity that remains within the range of 60˚ to 90˚F and 30 to 85% Relative Humidity (RH). Excessive temperatures (hot or cold) or excessive humidity can cause the meter to give erroneous readings.

If the humidity raises to the point of causing condensation on the ACM6000, the meter can become dangerous to use and can give erroneous readings. Most test equipment in use today use sensitive digital electrical components. These components are extremely sensitive to heat and humidity.

NOTE: *Whenever the meter undergoes a rapid or extreme change of temperature or humidity, it should be left on for about 5 minutes to allow the internal temperature to stabilize. This will ensure that your measurements are as accurate as possible.*

Standard and Optional Accessories

Standard

Soft carrying case ACM6100P
Standard test lead ATL55
Temperature probe ATA1/ATH2329

Optional

Rigid temperature probes with handles
- Surface probe ATH2336
- Liquid/Immersion probe ATH2338
- Air/Gas probe ATH2350

Screw on Alligator ends AAC3
Extended test leads
- 7.5" leads ADL7100A107
- 11.5" leads ADL7100A108

Premium silicon test leads ATL300

ACM6000
Low Amp Clamp-On DMM

Limited Warranty

The ACM6000 is warranted to be free from defects in materials and workmanship for a period of one year from the date of purchase. If within the warranty period your instrument should become inoperative from such defects, the unit will be repaired or replaced at UEi's option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Batteries and consequential damage resulting from failed batteries are not covered by warranty.

Any implied warranties, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the express warranty. UEi shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expenses or economic loss. A purchase receipt or other proof of original purchase date will be required before warranty repairs will be rendered. Instruments out of warranty will be repaired (when repairable) for a service charge. Return the unit postage paid and insured to:

1-800-547-5740 • FAX: (503) 643-6322
www.ueiautomotive.com • Email: info@ueitest.com

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

PLEASE
RECYCLE