

PARASITIC CURRENT DRAIN

Testing Methods Have Changed!

With the introduction of on-board computers, memory radios, memory seats, and other accessories, current is required to maintain memories when the ignition switch is in the off position. As a result of the required continuous energy supply, testing methods have changed. If we use the conventional means, inaccurate conclusions can result in condemning good parts and circuits, and wasting a lot of diagnostic time.

TESTING FOR ELECTRICAL DRAINS

The desired test instrument is a Digital Ammeter capable of reading as low as one milliamp and up to 20 amps. Meters of a lower amp range can be used by forming a shunt using two jumper wires connected by alligator clips. Reason: the wake-up call necessary to charge the capacitors in a full option state-of-the-art automotive electrical system can require as much as 6 amps for one minute. Many digital meters are fused at 2 amps and therefore have withdrawal symptoms when subjected to this much current. The shunt allows the system to properly power up the capacitors while protecting the meter from excessive current loads. Once the capacitors are charged, disconnect the shunt and read the ammeter for actual drain. (See *illustrations*)

HOW MUCH IS TOO MUCH?

Some tech manuals which include a Battery Testing Section reflect acceptable current drains.

Listed is a typical example of a parasitic drain (load) for a General Motors Vehicle.

EXAMPLES OF PARASITIC LOADS

<u>Device</u>	<u>Milliamp Draw</u>
Voltage Regulator	1 - 2
Digital Clock	3 - 4.5
Quartz Clock	7
ECM	6.5 - 8
ETR Radio & Clock	7
Load Leveling	4
Memory Seat	3
Twilight Sentinel	3

CONVENTIONAL TESTING METHODS MAY BE ILLUSIVE

Conventional electrical drain test procedures may not identify the cause of the condition. Vehicles equipped with Electronic Control Modules can exhibit a failure mode within the ECM which can result in a high parasitic current drain on the battery. Conventional testing methods may not detect the cause. Reason: when the battery cable is disconnected, the solid state circuit which caused the excessive drain may not re-occur once the electrical circuit continuity is restored. Cycling the ignition switch to the run position, then back to the off position may cause the electrical drain to re-occur. Caution: the ignition switch should not be turned to the accessory, run, or start position with the ammeter installed in series with the battery terminal

and battery cable as damage to the meter may result. Only turn the switch to the run position after first installing a shunt across the ammeter.

A full option GM vehicle can experience a parasitic load of 25-35 milliamps. Remember, a milliamp is one thousandth of an amp. Twenty-five thousandths of an amp is not much current. Should you determine the current draw exceeds the allowable limit as specified by the manufacturer, it will be necessary to identify the circuit which is creating the draw. It's best to use the process of elimination. Look for the obvious. Check the lamp circuits (courtesy, glove box, trunk lamp, etc.) for bulbs illuminated when they shouldn't be. For example, a glove box or trunk lamp may remain illuminated when the lid or door is closed. To check the trunk lamp it will be necessary to get in there with it. Caution: make sure you have a helper, and most importantly, make sure he is your friend.

If the visual inspection fails to identify the drain, pull fuses, one at a time, to find the source. Remember, if the fuse box is in the glove box, the bulb will be illuminated when the door is open. Either record its draw or disconnect the bulb. Once you identify the circuit creating the draw, refer to the service manual or a wiring diagram to determine what devices are on that circuit. Disconnecting these devices one at a time should reveal the problem circuit. If pulling fuses fails to identify the drain, it may be necessary to disconnect relays one at a time. It is simply a process of elimination, isolating circuits to identify the problem circuit. Remember, anything operated by a switch is a likely candidate in causing current drain.

Illustration A reflects the necessary electrical attachments to accurately test for excessive current drain.

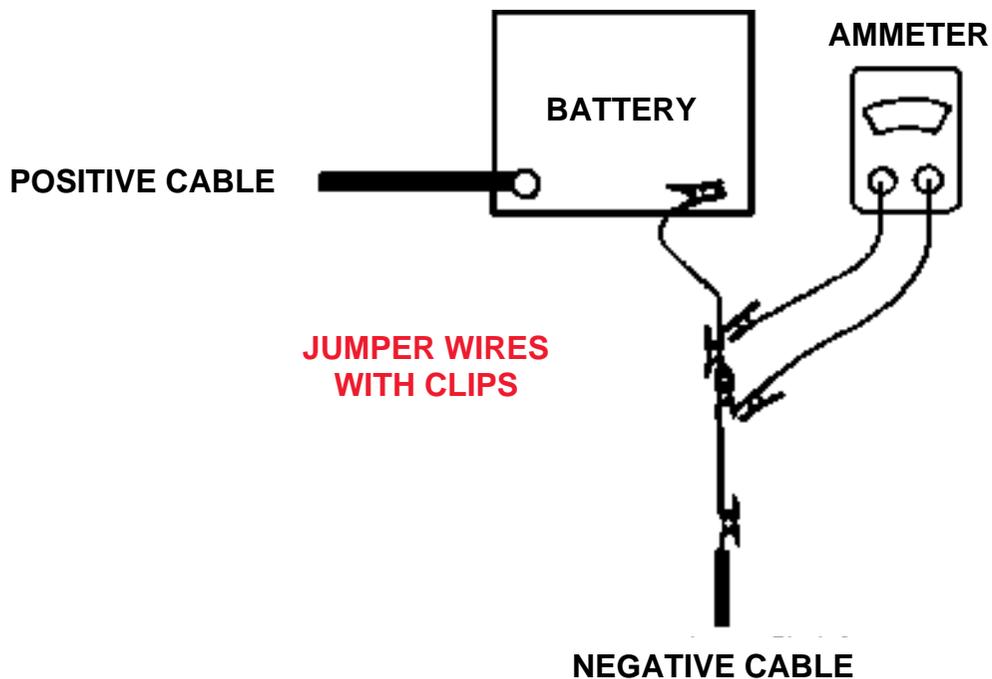


ILLUSTRATION A

1. Make certain the ignition switch is in the Lock position and all electrical accessories are off and doors closed. If equipped with a hood lamp, remove the bulb or disconnect its electrical connector.
2. Fabricate two 12 gauge jumper wires equipped with alligator clips on each end. Install the jumper wires in series with the negative battery post and cable as shown in Illustration A. Next, attach the recommended ammeter test leads in parallel with the jumper wires as illustrated.
3. Rotate the ignition switch to the Run position. Caution: Do not rotate the ignition switch to the Start position as the test leads and ammeter will get very hot, and damage to the vehicle and wiring harness may result.
4. Rotate the ignition switch back to the Lock position. Make certain that electrical continuity between the negative battery post and cable is not interrupted. Allow a one minute wait after placing the switch in the Lock position. The wait allows the capacitors time to charge (failure to do so may result in misdiagnosis).
5. Disconnect the alligator clips as shown in Illustration B. The ammeter is now in series with the battery post and cable. Read the amp draw on the ammeter and follow the recommended test procedure if the drain exceeds the allowable parasitic load.

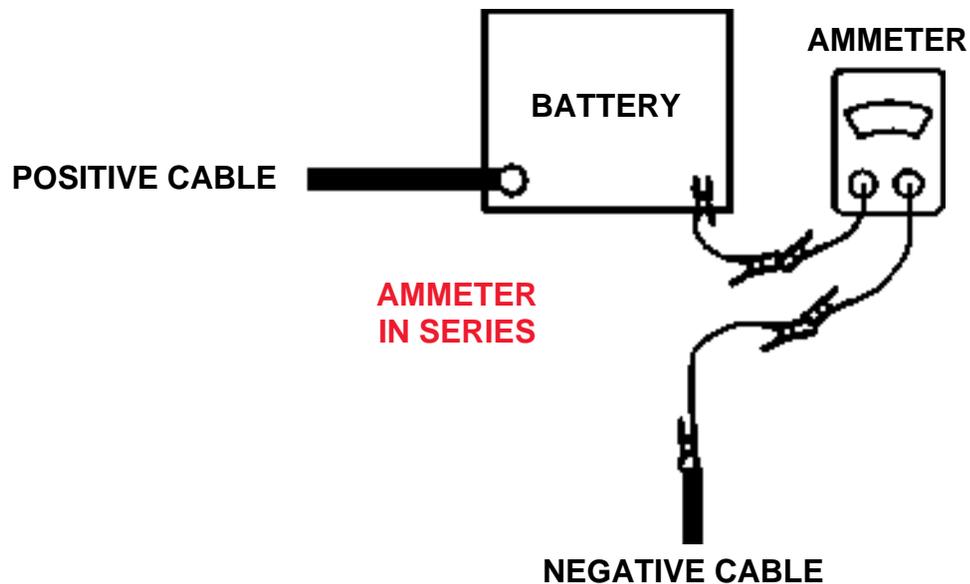


ILLUSTRATION B

ON THE LINE™

CHECKING ELECTRICAL DRAINS

Which Tests Are Valid?

— By Larry Hammer / *Mighty Auto Parts*



No test procedure has experienced as many changes in technique as that required for current drain.

Years ago, we would disconnect a battery cable, make certain all electrical accessories were turned off and the doors closed; then touch the disconnected battery cable connector to the battery post while observing for an arc. No arc — no drain.

Some technicians used voltmeters attached in series with the disconnected battery cable and battery post. This is not a valid test to determine electrical drain. Unfortunately, some still utilize this method and thereby condemn many good parts, in addition to wasting diagnostic time.

DELCO'S POSITION

In 1970, Delco produced a service bulletin which addressed misdiagnosing by using a voltmeter to test for electrical drains. With a 63 ampere-hour battery: (1) use a typical 1000 ohms-per-volt voltmeter (2) read the 20 volt scale on the voltmeter.

If the battery open circuit voltage is 12.6 volts, a reading of 6.3 volts on a voltmeter connected in series indicates current leakage that would require 12 years for the battery to become discharged! Even a reading of 12 volts would require over 200 days for the battery to become discharged!

It's perfectly normal for a voltmeter connected in series to read over 6 volts. In fact, many vehicles will have readings over 12 volts and this reading DOES NOT indicate a defect.

METHODS CHANGE

Later, we progressed to the *test light* method of determining electrical drains. With the ignition switch and all electrical accessories turned off and doors closed, we observed the test lamp attached in series with the battery post and cable. If the test lamp was illuminated, there was definitely an electrical drain. Then it was a matter of pulling fuses or disconnecting circuits to identify the drain.

With the introduction of on-board computers, memory radios, memory seats, and other accessories, current is

required to maintain their memories when the ignition switch is in the off position. Suddenly, our previous test procedure has become obsolete.

However, some technicians are still testing for electrical drains using yesterday's techniques. Red, my technician friend, swears he can detect excessive current drain by the intensity of the test light attached in series with the battery cable and battery post. As far as I know, he's the only person who can. Red has also been known to sniff fuel injection cleaner to clear his sinuses.



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may cause the electrical drain to re-occur. CAUTION: the ignition switch should not be turned to the accessory, run, or start position with the ammeter installed in series with the battery post and battery cable. If you do, your ammeter can turn into a crispy critter.

TESTING FOR ELECTRICAL DRAINS

The desired test instrument is a Digital Ammeter capable of reading as low as one milliamp and up to 20 amps. Meters of a lower amp range can be used by forming a shunt using two jumper wires in parallel across the meter. Reason: the wake-up call necessary to charge the capacitors in a full option state-of-the-art automotive electrical system can require as much as 6 amps for one minute. Many digital meters are fused at 2 amps and therefore have withdrawal symptoms when subjected to this much current. The shunt allows the system to power up the capacitors while protecting the meter from excessive current loads. Once the capacitors are charged, disconnect the shunt and read the ammeter for actual drain.

HOW MUCH IS TOO MUCH

Some tech manuals may include a Battery Testing Section that lists acceptable current drains. Times change ... and so do testing procedures. Ask your Mighty Rep for Tech Tip #63 titled *Parasitic Current Drain* for examples of acceptable parasitic loads and how to accurately test.

Coping with all the changes doesn't have to be a drain. ■

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