

**#PIC4798: Class 2 Platform Battery Drain Diagnosis Purpose - keywords accessory aftermarket generator low operation regulator volt voltage - (Mar 3, 2008)****Subject:** Class 2 Platform Battery Drain Diagnosis Process**Models:** 1996 -2008 Passenger Cars and Light Trucks that use Class 2 Communications

The following diagnosis might be helpful if the vehicle exhibits the symptom(s) described in this PI.

**Condition/Concern:**

Platform Battery Drain Diagnosis Process - Battery is discharged for no apparent reason while vehicle is parked and locked - Intermittent draw and/or possible continuous draw(s) that slowly renders the battery below its serviceable voltage amperage level.

**Please follow this process entirely:**

- Define the conditions which trigger the discharged battery:
  - How long does it take for the battery to discharge? This step will help determine if the draw is large or small. Normally a draw, which takes the battery level down overnight after operating the vehicle the day before, is rather large and is related to a switch, relay or other electric/mechanical device. Small amounts of drain which take several days to take the battery from a good state of charge to below the level required to start the engine can be small single bulbs or modules which are either not going to sleep when they should, or waking up intermittently for some unknown reason.
  - How many times has it happened to the customer? This step will determine if this is a Random occurrence and/or intermittent.
  - Does it always happen in the same location? Is there some outside influence that surrounds the vehicle that needs to be taken into account? This is most unlikely, but worth checking-out.
  - Describe the customer's driving habits. Does the battery get to a state of being fully charged on a regular basis or is this vehicle unable to crank due to a generally low state of charge?
  - Is the vehicle equipped with any non-original equipment including cell phone, remote starter, extra lighting, radio, CD player, LOJAK, etc. or OnStar (either dealer or factory installed)? All of these items can be wired in such a way to either constantly draw amperage, which they shouldn't, or in some way affect the class 2 modules on this vehicle and/or the battery and charging system.
  - Does the customer leave the key in the ignition? Leaving the key in the ignition does not generally cause a problem, but if the customer does not come back to the locked ignition position after shutting the engine off however, many draws will be induced. This draw will not be reduced and/or eliminated; this type of draw is due to the fact that the system is designed to keep certain modules awake with the key in this position.
  - What is the previous history on this car, what parts have been replaced, what repairs have been performed either in an attempt to correct this situation or that might impact it? Are there any other reported problems with the vehicle which may relate to a discharged battery concern - items which were previously reported/corrected and/or currently exist that the customer (car recently bought used) does not recognize as a problem or the used car manager reporting the discharged battery is unaware of? Recent repairs may or may not relate to draw diagnosis: i.e. the IPC was replaced recently.
- Perform a good visual and physical inspection of the battery cables. CHECK TORQUE OF BATTERY CABLE BOLTS. If loose, check for signs of arcing and corrosion etc., grounds and power leads to and from each of these, or BOLT MATERIAL IN BATTERY THREADS, THERMISTOR (if equipped) CONNECTOR FOR PROPER SEATING AND TIGHTNESS. What are the results of a battery/CHARGING SYSTEM test?
  - Perform a generator output test and a terminal drag test on generator terminal L.
  - Fuses related to this concern: check for loose fuses in trunk and engine compartment bussed electrical center by rocking each fuse with one finger, which may help identify the fuse. The only repairs that may be made to the electrical center are replacement of plug-in devices and mounting hardware, as follows: fuses, relays, circuit breakers, electrical center cover, battery stud cover, and other snap-on covers, cover attachment thumb screw, labels for fuse/relay identification, splash shields, and mounting brackets
- What DTCs are currently present or have been recorded on previous visits to the dealer? Correct as per the appropriate service manual.
- Road test vehicle for 30-40 minutes, activate all accessories. Open and close all doors, windows, deck lid, etc. CYCLE LUMBAR AND SEAT SWITCHES along with all other manually operated switches including the trunk release, fuel door release, garage door opener, and valet that have power to them all the time while the car is sitting. Don't forget to look FOR A STUCK SWITCH/RELAY.
- What is the parasitic draw on the vehicle after a 25-minute power down cycle? Using parasitic draw test switch tool J38758 and DVOM J39200, perform a parasitic draw test as per the procedure in the Engine Electrical section Service Information. Record the draw and read the reserve capacity of the battery in the vehicle. Divide the reserve capacity by four (4) and the draw present should not exceed this number. Example: If the battery has a reserve capacity of 100 amperes, the current draw should not exceed 25 mA on the DVOM. See SI for acceptable draw limits for each module the vehicle may be equipped with. Keep in mind the draw created by the OnStar system for the first 48 hours from ignition off.
  - OnStar typical power consumption
    - ANALOG: The system will cycle every 10 minutes and cause a spike to approximately 250 mA for about ten seconds, taper down to 75 mA for another 45 seconds and go to less than one mA for the nine minutes until the next cycle begins. This is normal. The Class 2 data line should not wake up during this sequence. This cycle stops if power is removed from the OnStar system for a short period and will resume once the GPS signal is reacquired.
    - DIGITAL: The system will remain in DIGITAL STANDBY for the full 48 hours after the last ignition cycle. Normally a tech will see a drain that is reading approximately 20 to 70mA with occasional spikes (will vary) around 175mA. IMPORTANT: In digital mode the OnStar module is capable of receiving incoming calls and readings may jump to 250mA or more during the call. The call will normally be only a few seconds in duration.
  - It is vital to monitor the power consumption and not rely on only the MIN/MAX readings on the DVOM. The duration of the OnStar cycle should reflect the above information. A steady reading (no toggle/fluctuation) in digital standby is abnormal.
- If the draw above is determined to be above the appropriate amount for the vehicle involved, are any modules on the class 2 data line staying "active" past the 25-minute time out mentioned above or waking up periodically after this time-out has passed? If one or more module is waking up, how many times and which module(s)? Use the Tech 2 and use the message monitor screen with an external power source to the Tech 2 if performing an amp draw test while using message monitor.

**Recommendation/Instructions:**

Here is a suggested procedure for performing a combination parasitic draw test while monitoring the class 2 devices on the vehicle:

- Remove terminal 16 from data link connector (DLC).
- Install tool #J38758 on battery.
- Connect Fluke 87 to J38758 as described in the Engine Electrical section of the appropriate Service Manual and set to appropriate amp scale.
- Connect Tech 2 to DLC
- Connect 110-volt power supply to DLC end of Tech 2 cable.
- Turn Tech 2 on
  - Main, enter
  - Diagnostics enter.
  - Year
  - Vehicle type
  - Diagnostic circuit check
  - Class 2 message monitor - remember: only modules which are currently communicating on the Class 2 data line will show up on the message monitor screen. If the ignition is in the accessory position as an example, the PCM and ABS controller will not be listed. If a module, which the vehicle is known to be equipped with, does not show up on message monitor when in the run position, this indicates a problem that needs correction prior to proceeding.
- Allow the vehicle to sit with all doors closed and without activating any switches etc. until the class 2 system has had enough time to power down, less than 25 minutes, or use the sleep mode to put all the modules to sleep. Once the sleep mode is enabled, the first module to "wake up" will be listed first on the message monitor screen with others listed in order of "wake up". The time from being put to sleep until the first "wake up" sequence will also be displayed. If a combination of three or four modules has come active, putting all of the modules back to sleep and pulling the fuse to one module at a time will help to narrow down which module may be waking up inadvertently. Remember that module "wake up" can be caused by several factors. They include, but are not limited to:
  - input changing states - door switch going open and closed (hi/lo)
  - power or ground coming and going to module
  - module internal function incorrect
  - Or in the case of the power master, amperage draws in excess of low power requirements or another module which has these or other related concerns. These all can be checked with the Fluke set to 1 millisecond record speed on min/max setting.
- Open the gate on J38758, and let vehicle sit for another ten (10) minutes and/or use sleep mode.
- Review the amperage reading.
- As the amperage draw tapers down below 10 amps, close the J38758 and switch Fluke 87 to millamp scale and record min/max on 100-millisecond scale. Open the J38758 again when done. This step will allow the Fluke meter to record any spikes and keep the meter working during the entire sequence. IF MIN/MAX IS NOT SELECTED, THE METER WILL TIME OUT AND SHUT OFF.
- After the vehicle has been tested for a minimum of 8 hours, check the number of counts as per message monitor for each control module, i.e. each time a unit goes from inactive, to active and inactive again. The module(s) with the highest number of counts may indicate a suspect area. Modules may be waking up on their own, (which is most unlikely) or activated by a switch input, power fluctuation, poor ground or input from other modules which are being activated.
- Once it has been determined that the draw is either a component - relay, switch etc., which is stuck or in some way reduces/contributes to the draw, determine which circuits are specifically involved. Touching and/or removing fuses, relays, and connectors to suspect components after reviewing the current wiring diagram until the draw is reduced to acceptable levels will lead to the correct circuit. When exiting the message monitor screen and then re-entering the message monitor screen, the Tech 2 will also wake up modules. DON'T BE FOOLED. Wait for the module(s) to again go to sleep or use the sleep mode function.
- Back-to-basics:
  - Checking ground credibility requires a voltage drop test under load
  - ALWAYS TEST FROM THE NEGATIVE SIDE OF THE CIRCUIT - A voltage drop test is performed at various points along the circuit from the ground side toward the positive side of the circuit until the point of high resistance is located.
  - ALWAYS MAKE CERTAIN THAT THE CIRCUIT LOAD IS "ON"
  - ALWAYS USE A HIGH IMPEDANCE METER LIKE A FLUKE 87
  - THE HIGHER THE VOLTAGE READING, THE HIGHER THE RESISTANCE IN THAT CIRCUIT
  - WHEN TESTING, TRY TO ACHIEVE A READING AS CLOSE TO ZERO AS POSSIBLE (USUALLY LESS THAN 25 MILLIVOLTS)
  - ALWAYS START WITH A FULLY CHARGED BATTERY!

Please follow this diagnostic or repair process thoroughly and complete each step. If the condition exhibited is resolved without completing every step, the remaining steps do not need to be performed.

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