

BatteryMole[®] Monitor

QUICK INSTALLATION

(Version 1.12)

- Plug the BatteryMole[®] Monitor into the 12V Receptacle (cigarette lighter).
- Ignore any alarms for now.
- After driving your car and after letting it set overnight, if there is ever an alarm please read the Alarm Troubleshooting Aids section of the User Manual. You have a problem.

CAUTION: *This unit is designed to work in vehicles that use a negative ground on the 12-volt battery and therefore will NOT work in many American cars built before the mid-1950's or many British cars built before the late 1960's.*

BatteryMole® Monitor

Automobile Battery Monitor System

The BatteryMole® Monitor is a useful tool for monitoring the state of your car's battery and charging system. Installation is done without tools by simply plugging the unit into your 12V Power Receptacle (cigarette lighter). When a problem occurs, the unit will beep and an alarm message will be shown on the two-line display.

Displays the following information:

- Charge State (SoC) of the Battery
- Engine Start Voltage ^[1]
- Engine Start Time
- Battery Voltage
- Alternator Voltage

Detects the following alarm conditions

- Low Battery Charge
- Weak Engine Start Voltage ^[1]
- Slow Engine Start Time
- Alternator Overcharging
- Alternator Undercharging
- Low Battery Voltage

When a problem associated with the battery is detected, the BatteryMole® Monitor lamp will flash, the unit will beep and an alarm message will be displayed.

1. Some vehicles turn off power to the 12V receptacle while the engine is being started. In these vehicles it is not possible for the starting voltage to be observed. However, all the other monitoring functions work correctly in these vehicles.

CAUTION	4
OTHER VEHICLE TYPES.....	4
INSTALLATION.....	4
MESSAGES	5
ALARMS	6
FACTORY RESET	7
ALARM TROUBLESHOOTING AIDS.....	8
LOW CHARGE	9
LOW VOLTAGE.....	10
SLOW START	10
WEAK START	11
UNDER CHARGING	11
OVER CHARGING.....	12
INSTALLATION TROUBLESHOOTING AIDS.....	13
GENERAL INFORMATION.....	14
LIMITED WARRANTY	15
LEGAL DISCLAIMER.....	15
FREQUENTLY ASKED QUESTIONS	16

Caution

This unit is designed to work in vehicles that use a negative ground on the 12-volt battery and therefore will NOT work in many American cars built before the mid-1950's or many British cars built before the late 1960's.

Other Vehicle Types

BatteryMole[®] Monitor is not necessarily restricted to automobiles. It is designed to work in any 12V receptacle that is powered by a lead-acid battery. Not all of its monitoring capabilities will, however, necessarily be relevant in other types of vehicles. For example, when installed in a forklift or golf cart, only the charge state and voltage level of the battery will be relevant.

If you are using BatteryMole[®] Monitor in something other than an automobile we'd like to hear about it support@4peaks-tech.com.

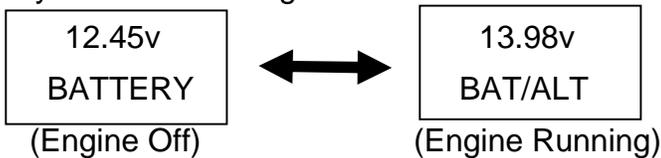
Installation

Plug the unit into the 12V Power Receptacle (cigarette lighter). Some cars turn power off to the 12V receptacle when the ignition switch is in the OFF position. You may have to turn on the ignition switch in order to verify that the unit is successfully installed.

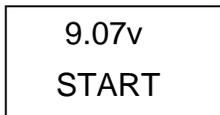
Messages

The display button on the BatteryMole[®] Monitor unit selects the information that appears on the two-line display. Each time the button is depressed, new information appears. The following can be displayed.

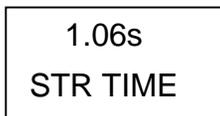
Battery/Alternator Voltage



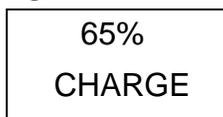
Engine Start Voltage ^[2]



Engine Start Time ^[2]



Charge State of the Battery



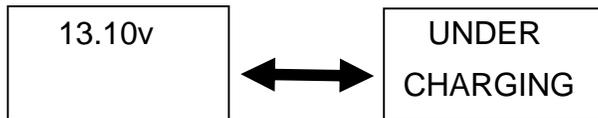
2. The Engine Starting Voltage and the Engine Start Time are only sampled when meaningful measurements can be performed (typically after the car has set overnight). These readings are no longer displayed after the engine has been restarted (if the engine is restarted in less than a few seconds, it is possible that the old start information may not get reset). These readings do, however, always get saved internally by the BatteryMole[®] Monitor and are used in the evaluation of the battery's health.

Alarms

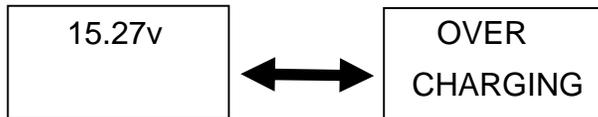
The following alarms can appear on the display. Each time the display button is hit, another alarm message (if any) will appear. The alarm previously displayed is automatically erased.

All alarm messages alternate between the English language description of the problem and the condition that caused the alarm.

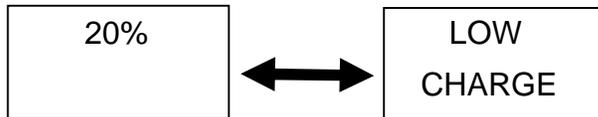
Alternator Undercharging



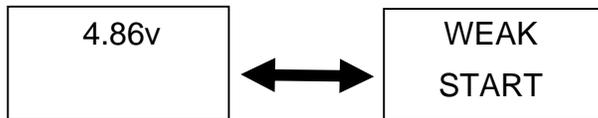
Alternator Overcharging



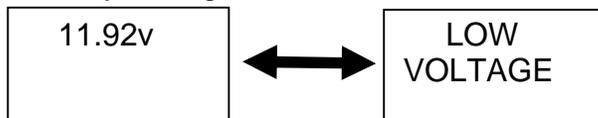
Low Battery Charge



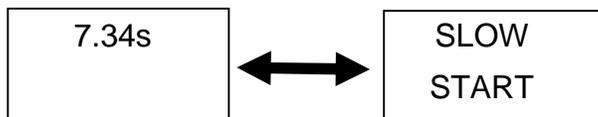
Weak Start Voltage



Low Battery Voltage



Slow Start Time



Factory Reset

The BatteryMole[®] Monitor unit is reset by holding down the display button for approximately 7 seconds. While holding down the display button the unit will beep and flash the following message.

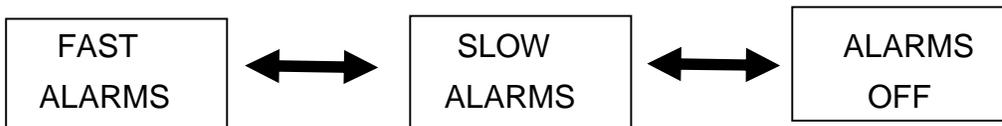
Hold to RESET

Continue to hold the display button down until the unit stops beeping. At that time the following sequence of messages will be displayed. These messages are not necessarily important unless the unit is defective. We will ask you about these messages if you report a problem to support@4peaks-tech.com.

VERSION 4.27	EEPROM 000	12.40v A/D	84 ⁰ F 29 ⁰ C
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If the unit is working properly the Factory Test OK message will then be displayed. All active alarms will be reset and the factory default settings restored.^[3] If, instead, an error message should appear at this time please contact 4 Peaks Technology for assistance support@4peaks-tech.com.

A couple seconds after "Factory Test OK" is displayed, one of the following Alarm Threshold Messages will appear.



Alarm Threshold Messages

3. A Factory Reset does NOT reset the alarm threshold. Alarm levels can only be changed during the brief time that one of the Alarm Threshold Messages appears on the display.

Fast Alarms: This alarm level is the most sensitive. This setting is typically tailored for newer cars that have sophisticated charging systems that dynamically monitor the battery's temperature. Older cars, when set to this alarm level, may trigger false alarms.

Slow Alarms: This alarm level may be required for older cars. This setting might also be necessary for cars in climates with extreme daily temperature swings.

No Alarms: All alarms are turned off. All battery-monitoring functions continue to work normally. No alarm messages are generated.

When either the Fast Alarm, Slow Alarm or No Alarm message is displayed (after the Factory Test has executed), it is possible to change the alarm threshold by depressing the display button. Each time this button is hit, a new Alarm Threshold Message is displayed. After approximately 4 seconds of display button inactivity, the BatteryMole[®] Monitor unit goes active and begins monitoring battery functions. The last Alarm Threshold Message displayed specifies the alarm sensitivity of the system.

Alarm Troubleshooting Aids

CAUTION: Automobile batteries are extremely dangerous. An explosion can occur if hydrogen gas has been vented and a spark near the battery should occur. Please be especially careful if there is a bulge in the battery case. Excessive internal pressure may be causing the bulge and an explosion could be imminent. Call AAA or seek other professional help and get away from this battery. If you doubt the importance of battery safety check out the following web site www.geradio.com/battery_safety.htm. You will not go near another battery without safety glasses and trepidation.

Finally, since many of the following troubleshooting aids require test equipment, experience using this test equipment and a shop manual, it is recommended that you seek professional help for most alarms.

There are a multitude of “things” that can cause alarms. The following information is not all-inclusive and is subject to updates. Please check our web site for the latest version of this manual at www.4peaks-tech.com. We would also appreciate any feedback you might have on how to improve this manual support@4peaks-tech.com.

Low Charge

The battery is under charged. If this problem isn't corrected, you risk being stranded.

- Unless some accessory was left turned on when the engine was not running (such as your headlights or stereo) or there is a loose or corroded battery cable or the car typically sets idle for days, your battery should be recharged and load tested. Most auto parts stores will test your battery for free while it's still in the vehicle. *(Note: If your battery has filler caps, be sure to first add distilled water to any low cells).*
- If an accessory was left turned on, this problem will likely correct itself if the vehicle can be started and then driven. If this alarm reappears after the vehicle has been driven for an extended period of time and allowed to set overnight, there is cause for concern. The battery should be recharged and load tested.
- If you didn't leave an accessory on, inspect for loose or corroded battery cables. This is a very frequent cause of battery related problems. If you need to replace the cables please be sure to remove the negative cable first (even if only the positive cable is to be replaced) and reinstall it last. If you fail to do this and if you accidentally short the positive terminal with your removal tool, sparks will fly. And if your battery has vented hydrogen gas, serious injury can result.
- Short driving trips or infrequent vehicle use, especially if you own a luxury car with a heavy auxiliary power drain, can cause this problem. Recharge and load test your battery.
- The charging system may be at fault. If you have an older car the BatteryMole[®] Monitor should read at least 13.5V on a very hot day and somewhere above 14.8V if its freezing outside with the engine idling. This is, however, no substitute for having a trained technician properly evaluate your charging system, especially if you have a newer luxury car.

If your battery has been fully recharged and successfully load tested and if there is no problem with the charging system and if this alarm reappears, it is possible that there is an electrical short in your vehicle or there is an electrical device malfunctioning that is causing an excessive drain on the battery. This test involves removing the ground cable from the battery and measuring the current drain on the battery with all accessories turned off. This test, although simple, should probably be done by a professional because this person will know the difference between an "excessive" and a "parasitic" drain and if there is an

excessive drain this will probably be a very difficult problem to find.

Low Voltage

If this problem occurs while the engine is running, the alternator's drive belt may be slipping or it may have come off. Otherwise if the engine is not running and there are a bunch of accessories turned on (head lights, A/C fan, sound system, etc.) this does not necessarily mean there is a battery problem. Turn off all accessories and wait a minute or two to see if this alarm goes away. If the alarm persists do the following.

- Check for a broke, loose or worn (glazed) alternator drive belt.
- Check for loose or corroded battery cables.
- Recharge and load test the battery. (*Note: if your battery has filler caps, be sure to first add distilled water to any low cells.*)
- Consult the shop manual for your vehicle and perform a Charging System Check.
- If your battery has been fully recharged and successfully load tested and if this alarm reappears without a bunch of accessories turned on, it is possible that there is an electrical short somewhere in your vehicle or there is an electrical device malfunctioning that is causing an excessive drain on the battery. This test involves removing the ground cable from the battery and measuring the current drain on the battery with all accessories turned off. This test, although simple, should probably be done by a professional because this person will know the difference between an “excessive” and a “parasitic” drain and if there is an excessive drain, this may be a very difficult problem to isolate.

Slow Start

The time to start the engine as compared to previous starts, at approximately the same temperature, was excessive. A faulty starter, dirty injectors, old spark plugs, a dirty fuel filter, a weak fuel pump, a seasonal change made to the blend of the gas or a nearly empty gas tank can all affect the amount of time it takes the engine to start. Do not, however, ignore this alarm if it is more than a very infrequent event. This may be your only indication that a battery failure is imminent.

- Check for loose or corroded battery cables.
- Recharge and load test the battery. *(Note: if your battery has filler caps, be sure to first add distilled water to any low cells).*

Weak Start

The voltage drop of the battery when the engine was started was excessive as compared to previous starts at the approximate same temperature.

- Check for loose or corroded battery cables.
- Recharge and load test the battery. *(Note: if your battery has filler caps, be sure to first add distilled water to any low cells).*

Under Charging

On rare occasion this alarm can occur on some vehicles (in particular GM trucks and vans) after the engine has been shut off for an extended period of time (typically an hour or more). It is safe to ignore this alarm if the engine was not running. Simply hit the display button to reset it.

Otherwise, this alarm should not be ignored. It occurs because the vehicle's charging system is weak and this will in turn result in the battery not getting sufficiently charged. If this alarm persists, battery life will be shortened.

- Check for a loose or worn (glazed) alternator drive belt.
- Check for loose wiring connectors on the alternator.
- Check for loose or corroded battery cables.
- Check for loose alternator bolts.
- A battery that has just been removed from a battery charger may also cause a false "Under Charge" alarm after the engine is turned off. This false alarm condition should go away the next time the car is driven.
- With the engine running, check for abnormal alternator noise.
- Consult the shop manual for your vehicle and perform a Charging System Check.

Note: If these steps have been taken and no problem was found, it is possible that the charging system is working as the manufacturer intended. This may be the situation if your car is an older vehicle or if you live in a climate with wide temperature fluctuations. This may also be the situation if your car is a relatively new luxury car that combines a computer controlled charging system with a sophisticated brake system that recovers energy when the brakes are applied and stores this energy in the battery. If any of these situations apply please follow the procedure specified in the Factory Reset section and change your alarm level setting to Slow Alarms. If this alarm should persist after changing to Slow Alarms please contact support@4peaks-tech.com. We would like to know your vehicle type, where you live and if a qualified technician has checked your charging system.

Over Charging

The battery is being charged at a persistently high voltage that can cause electrolyte in the battery to be lost. This can be a serious problem for sealed batteries. If your battery has filler caps, be sure to add distilled water to any low cells.

- Consult the shop manual for your vehicle and perform a Charging System Check.

Note: If this step was performed and no problem was found, it is possible that the charging system is working as the manufacturer intended. This does not, however, mean that there isn't a problem. You might have a mismatch between battery type and alternator. If your battery has filler caps and you are frequently adding water to the battery, this may indeed be the case. This can occur on cars that normally come from the factory with Maintenance Free (sealed) batteries. These batteries are normally charged at higher voltages. If you now have a battery with filler caps and are constantly adding water to it, you could have this problem. The cheapest solution is to just keep adding water and to follow the procedure specified in the Factory Reset section and change your alarm level setting to Slow Alarms. The next time your battery needs to be replaced, purchase a "Maintenance Free" battery. If you think you are having this type of problem we would like to hear from you support@4peaks-tech.com. We would like to know your vehicle type, battery type, where you live and if a qualified technician has checked your charging system.

Installation Troubleshooting Aids

Please do not attempt to disassemble the BatteryMole[®] Monitor. There are no batteries or replacement parts inside this unit. You'll void your warranty if you do this.

The BatteryMole[®] Monitor unit is dead.

- Make sure your ignition key is turned on. Power to many 12V receptacles is turned off when the ignition key is off.
- Cigarette Lighter / 12V Power Receptacles commonly fail. Try BatteryMole[®] Monitor in a different car. If your receptacle is bad you can have it replaced by your local Car Audio/Stereo shop.

The START voltage is not being displayed

- Your car is the type of vehicle that switches off power to the 12V receptacle when the engine is started. It should be noted that sampling the start voltage is only one method by which the BatteryMole[®] Monitor checks your battery's health.

General Information

If your car battery has been replaced or if the BatteryMole[®] Monitor unit was previously installed in a different vehicle, it is recommended that the unit be manually reset. A reset is performed by holding down the display button for approximately 7 seconds (refer to the Factory Reset section). By resetting the unit, the start engine history is erased. This will prevent false Weak Start or Slow Start alarms from occurring after a new or different battery is monitored.

By performing a Factory Reset when the engine is not running, the Charge State of the battery will be calculated immediately after the unit has been reset. This calculation will not necessarily be accurate but it shows that the BatteryMole[®] Monitor is working correctly and provides a quick glance at the approximate state of the battery.^[4] When the engine is subsequently started, BatteryMole[®] Monitor will also capture the Start Time and Start Voltage.

Except immediately after a Factory Reset the Start Voltage and Start Times are only displayed when meaningful battery health measurements can be taken. This information is automatically reset the next time the car is started (assuming the engine was left off for a minute or two before it was restarted). How and when start samples are taken is a trade secret. We also have several related patents pending.

An alarm message currently being displayed is automatically cleared when the display button is depressed. Some alarms, however, such as Low Voltage, Under Charging or Over Charging will reappear in minutes if the error condition should persist.

Ignore the Low Charge and Over Charge alarms while your battery is being recharged. The BatteryMole[®] Monitor unit won't necessarily like some of the things that a battery charger will be doing to your battery.

4. It must be emphasized that the Charge State of the battery will not necessarily be accurate immediately after a Factory Reset. This is especially true if the ignition switch is in the 'accessory' position and things like the stereo system or the climate control fan are running. You could even get a false Low Voltage alarm at this time.

Limited Warranty

This product will be repaired or replaced for a period of 6 months after the purchase date under normal use. Before returning the unit we ask that you contact our service department at support@4peaks-tech.com and describe the problem you are having. We might be able to resolve the issue based upon your description. If not we will provide a return address (we are a new company and this return address is probably going to change). We ask that you send your unit with proof of purchase using the US Post Office's Priority Mail Small Flat Rate Box 5 3/8" x 8 5/8" x 1 5/8" (currently \$4.95). If you do this and if our unit is defective you will be reimbursed this shipping fee when we replace or repair your defective unit.

If the product is out of warranty we would still like to hear from you. We took a great deal of time and effort to design this product to work accurately and reliably for many years. It was designed and is manufactured in the United States and we take great pride in this fact. We value all of our customers and will make every effort to do the right thing.

Legal Disclaimer

There are battery failures that the BatteryMole[®] Monitor cannot predict. For example, mechanical shock caused by hitting a pothole in the road that, in turn, causes a structural failure inside the battery surely cannot and will not be predicted.

Frequently Asked Questions

Q. The start voltage is never displayed.

A. The power to many 12V receptacles is purposely turned off when the ignition switch is moved to the Start position. It is therefore not possible to sample the battery's voltage in these cars when the engine is started.

Q. It doesn't always display the starting voltage.

A. The starting voltage (and the starting times) are only sampled when meaningful measurements can be taken. This typically occurs after the car has set overnight. The next time the car is started this old start information is purposely erased from the display.

Q: Can this product drain the starter battery overnight?

A: The short answer is "no". Many 12V receptacles turn off power to the receptacle when the ignition key is switched off. In these cars it is not possible for anything plugged into a 12V receptacle to draw power from the battery. In those cars that never turn off the receptacle's power, the BatteryMole[®] Monitor turns itself off after a period of engine inactivity. The amount of power consumed before shutting itself off is trivial and may be even less than the power consumed by the car's alarm system which never shuts off at night. After shutting itself off, the power consumed by the BatteryMole[®] Monitor is approximately nothing.

Q: I went to start my truck in the morning and an under charge alarm was displayed. How could this happen if the vehicle wasn't being driven?

A: On occasion we have seen this happen on GM trucks and vans. It certainly could happen on other vehicles. It occurs when the charging system is on the high end of the safe range and there is little parasitic drain on the battery after the engine is turned off. It is always safe to ignore the under-charge alarm when it occurs when the engine is not running. Just hit the display button to reset it. If, on the other hand, you should ever get an over-charge alarm on this vehicle it would be well advised to get the charging system checked.