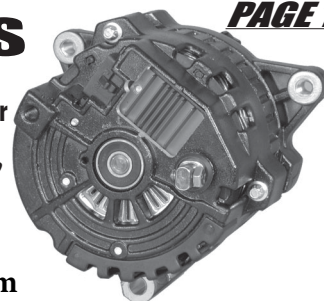




DELCO ALTERNATORS

The XSvolt alternators have a state of the art voltage control system that offers a combination of features and options never before available



PLEASE READ ALL INSTRUCTIONS BEFORE INSTALLING YOUR NEW ALTERNATOR.

Phone: (630) 957-4019

GENERAL INSTRUCTIONS

Email: tech@powermasterperformance.com

***THIS IS A "ONE WIRE" ALTERNATOR, SO THE BATTERY CHARGE WIRE IS THE ONLY CONNECTION REQUIRED FOR STANDARD ALTERNATOR OPERATION. XSvolt UNITS COME FACTORY SET AT 14.9V FOR STANDARD USE.**

Original vehicle wiring- GM vehicles that have the same style plug as the XSvolt alternator, can be plugged directly into the alternator. Powermaster has adapter plugs to convert most other GM connectors to the XSvolt type.

HIGHER VOLTAGE CANNOT COMPENSATE FOR TOO SMALL AN ALTERNATOR- The voltage level of the XSvolt system can only be maintained if the alternator is operating at or below its amperage capability. If the vehicle's amperage load is greater than the alternator's capability, then the supplemental amperage will have to be supplied by the battery, which will cause voltage to fall. Once this situation has occurred, increasing the alternator's voltage set point will not remedy the low voltage.

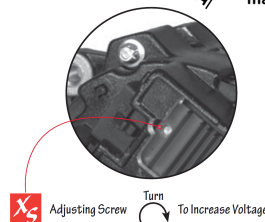
EXCESSIVE VOLTAGE CAN DAMAGE ELECTRICAL COMPONENTS- Increasing the voltage level beyond typical levels can increase certain electrical component performance, but excessively high voltage can be damaging. Refer to the component owner's manual or contact the manufacturer to determine the maximum voltage for safe operation of all aftermarket electrical components. **For all original equipment components, voltage should not be allowed to exceed 15.2 volts. Powermaster is not responsible for damage resulting from voltage levels exceeding component manufacturer's recommendations.**

OPTIONAL FEATURES [The following options are available, but their activation is not required]

Adjustable voltage set point- This feature allows the end user to adjust the voltage level that the alternator sees as its ultimate goal. This is accomplished by turning the small white potentiometer located in the **Heat sink** on the rear of the alternator. Make adjustments with a small Philips or flat screwdriver, taking care not to rotate the potentiometer beyond its physical limitations. The approximate adjustable range is 13.5V through 18.5V and increases with **clockwise rotation**.

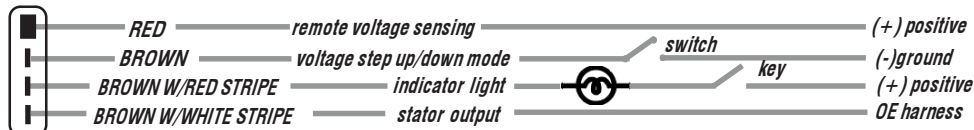


To adjust, first, **TURN OFF** all nonessential vehicle accessories. Next, confirm the battery is in a charged state by using a hand-held digital voltmeter to test voltage at the battery terminals (12.4V+ if 12 volt system/16.5V+ if 16 volt system). **Start the vehicle** and adjust system voltage (measured at the battery) to the desired level. After the adjustment is set, bring the engine to a fast idle while monitoring the voltage, if voltage increases, readjust to desired voltage level while maintaining a fast idle. (see page 2 for additional instructions and precautions)



WARNING: MAKE ADJUSTMENTS WITH ALL NONESSENTIAL VEHICLE ACCESSORIES OFF. ADJUSTING VOLTAGE WITH AMPLIFIERS, LIGHTS, OR OTHER HIGH AMPERAGE ACCESSORIES ON CAN RESULT IN DANGEROUSLY HIGH VOLTAGE WHEN ACCESSORIES ARE THEN SWITCHED OFF.

NOTE: Activating secondary optional features requires XSvolt plug/harness P/N 127. Remove rubber cover on rear of alternator before inserting



REMOTE VOLTAGE SENSING- This feature allows the alternator to "see" the voltage at a remote point instead of just at the alternator, resulting in better compensation for voltage drops. Activating this feature will override the voltage step up/down mode and the adjustable voltage feature, setting it at 14.5V.

To activate this feature connect the red wire on the XSvolt plug/harness to any **positive(+)** point where voltage sensing is desired, typically at the battery. When extending the sense wire use 14 AWG or larger wire.

VOLTAGE STEP UP/DOWN MODE- This feature can be used to remotely step the voltage set point up or down 1.25V from the previously adjusted setting.

To use as a step up mode: Normally ground the brown wire on the XSvolt plug/harness and use a switch to remove the ground when a 1.25V step up is desired.

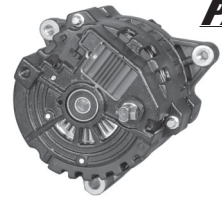
To use as a step down mode: Leave the brown wire normally open. Use a switch to apply ground to the brown wire when a 1.25V step down is desired. (see page 2 for additional instructions and applications)

INDICATOR LIGHT- This is an output for a NO CHARGE indicator light. When this feature is utilized, a light will be illuminated when the key is in the run position and the alternator is not charging. The light will not illuminate when the engine is running and the alternator is charging.

To activate this feature, connect the brown wire w/red stipe on the XSvolt plug/harness to one side of a 250mA bulb (a typical dash light) and connect the other side to a switched **positive (+)** source that is on when the ignition key is in the run position.

STATOR OUTPUT- On the Delco style units, this output can be used to drive certain OE tachometers (often found on diesel engines) or to activate certain OE chokes (often found on early model Ford vehicles).

INSTRUCTIONS



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APPLICATIONS

CIRCLE TRACK RACING APPLICATIONS -- The XSvolt alternator can be setup to create a *Power Saving Mode*. This mode allows the alternator's normal charging to be temporarily reduced to reclaim as much as 50% of the alternator's horsepower requirements. Suggested times for use would include: when qualifying, in straight-aways, and the sprint for the checkered flag at the end of the race. The mode can be triggered with a full throttle activated momentary switch, a dash mounted toggle, or by any other innovative means. To do this, simply ground the brown wire from the XSvolt harness through the inline ON/OFF switch. With the switch in the OFF position (not grounded), adjust the voltage (as directed on page 1) to the preferred battery charge voltage. When the switch is in the ON position (grounded), the voltage will drop 1.25V from its previously set level.

DRAG RACING APPLICATIONS -- The XSvolt alternator can be setup to offer a *High Voltage Quick Recharge Mode*. This mode allows the alternator's normal charge rate to be temporarily boosted to prioritize charging when horsepower is in abundance while in the pits, during staging, and on the return slip. The mode can be triggered with a full throttle activated momentary switch, a dash mounted toggle, or by any other innovative means. To do this simply ground the brown wire from the XSvolt harness through the inline ON/OFF switch. With the switch in the ON position (grounded), adjust the voltage (as directed on page 1) to optimal voltage desired during the pass. *Keep in mind that higher voltage levels maximize your electronics' performance, while lower voltage settings minimize horsepower requirements from the engine.* When the switch is in the OFF position (not grounded), the voltage will increase 1.25V from its previously set level. Make certain that the highest setting is within safe limits for the battery and all electronics.

NOTE: Activating secondary optional features requires XSvolt plug/harness P/N 127



HIGH AMP APPLICATIONS-- The XSvolt alternator can be configured to optimize daily driving voltage, as well as to maximize performance voltage for high amp situations.

Option one: Ground the brown wire from the XSvolt harness through an inline ON/OFF switch mounted on the dash. With the switch in the ON position (grounded), adjust the voltage (as directed on page 1) to the preferred *daily driving* level. Next, move the switch to the OFF position (not grounded) and test the voltage at the battery. The resulting voltage should be approximately 1.25V higher than previously tested. Make certain that the highest setting is within safe limits.

NOTE: Activating secondary optional features requires XSvolt plug/harness P/N 127



Option two: Connect the red sense wire from the XSvolt harness to the positive battery post through an inline, dash-mounted ON/OFF switch. Use 14 AWG or larger wire to extend the sense wire. With the switch in the OFF position (no voltage applied) set the voltage to the preferred *performance voltage level*. Make certain that the highest setting is within safe limits. When the switch is in the ON position (voltage applied), the voltage level will be set at 14.5V (*daily driving mode*). When the switch is in the OFF position (no voltage applied), the voltage is set at the preferred *performance level*.

NOTE: Activating secondary optional features requires XSvolt plug/harness P/N 127



Option three: Use "option one" in combination with "option two" to create three switchable voltage levels. Keep in mind that when the "option two" switch is in the ON position, the switch in "option one" will not affect the voltage level. After all adjustments are complete, make certain that the highest setting (both switches OFF) is within safe limits.

NOTE: Activating secondary optional features requires XSvolt plug/harness P/N 127



* The above voltage settings will only affect voltage if the alternator is at or below its amperage capabilities. If the amperage requirements become greater than the alternator's capabilities, system voltage will fall. The XSvolt alternator will automatically maximize its output voltage to compensate, overriding the current voltage set point, until system voltage has once again risen to the preset voltage level.

* *The XSvolt alternator will turn itself off when the engine stops. Regardless of which features are activated through the XSvolt plug/harness, there will be no residual draw on the battery after the engine is off.*

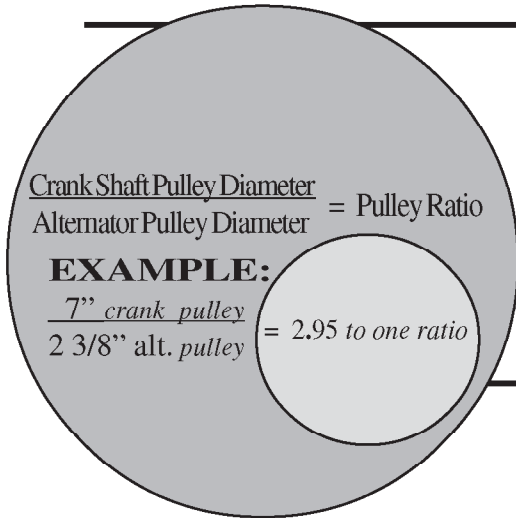
Different battery types prefer different charge rates -- Battery life and performance can be extended if the alternator is adjusted to provide the optimal battery charge voltage measured at the battery. Check with your battery's manufacturer for their recommendations. Battery manufacturers can also supply the maximum safe charge voltages for their batteries, allowing voltage levels to be temporarily boosted to improve electronic components' performance.



WARNING



This alternator should not be allowed to exceed 18000 RPMs at any time. Alternator components are not designed to withstand the increased stress resulting from excessive RPMs. Powermaster recommends that you calculate your pulley ratio and multiply it times your highest expected engine RPM to determine if your alternator will operate within the acceptable range.



To calculate a vehicle's pulley ratio, the engine's crank pulley diameter should be divided by the alternator's pulley diameter. This ratio should then be multiplied times the highest expected engine RPMs. The result will be that vehicle's maximum alternator RPM.

$$(\text{Pulley Ratio}) \times (\text{Max. Engine RPM}) = \text{Max. Alternator RPM}$$

$$2.95 \times 6000 \text{ max. rpm} = 17700 \text{ max. alternator rpm}$$

If your situation allows for greater than 18000 alternator RPMs, Powermaster recommends increasing the alternator pulley diameter or decreasing the crank pulley diameter to compensate. Powermaster has various pulleys available to help. If pulley ratio compensation is not an option, installing a rev limiter on the engine is recommended.

Excessive RPMs can cause the alternator fan to flex and contact the drive belt. This could cause property damage and/or personal injury. In addition to RPMs, there are other factors that will substantially increase the likelihood of alternator fan-to-belt contact.

- ALTERNATOR BRACKET ALIGNMENT AND STABILITY:**
Alternator brackets can be misaligned in such a way that the clearance between the alternator fan and belt is reduced. Loose or nonrigid brackets can also increase the likelihood of contact.
- WORN OR LOOSE BELTS:**
Belts that allow for side-to-side movement or deflection will decrease the effective gap between the fan and belt and increase the likelihood of contact.
- IMPROPER BELTS:**
Powermaster supplied V-type pulleys are designed to accommodate up to a 10mm or 3/8" belt. Larger belts will not seat into the pulley groove properly and will increase the likelihood of belt-to-fan contact. If the application requires a belt of greater than 10mm or 3/8" width, Powermaster recommends the original equipment pulley be used instead of the supplied pulley.

NOTE: Powermaster is not responsible for vehicle damage or any other damage resulting from improper use of this product.



1833 Downs Drive West Chicago, IL 60185
 Tech Phone: (630) 849-7754 Sales Phone: (630) 957-4019
 Tech E-mail: tech@powermasterperformance.com
 Sales E-mail: sales@powermasterperformance.com

INSTRUCTION SHEET

GM CS Series Performance Alternators

17802, 17861, 37802, 37861, 48206, 48208, 48229

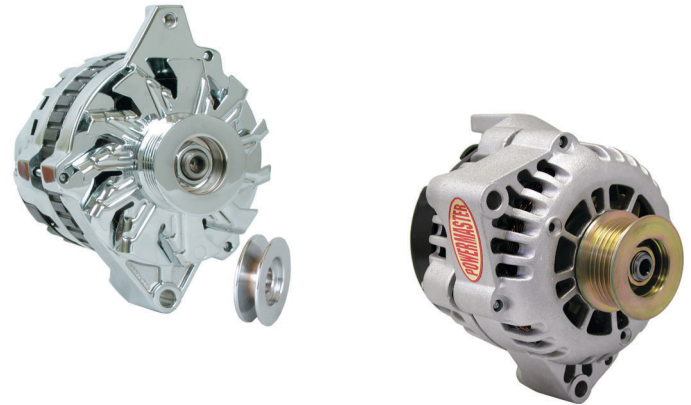
We want to help! If you have any comments or difficulty with this product, please contact technical support at



1833 Downs Drive
West Chicago, IL 60185

Tech/Sales Phone: (630) 957-4019

e-mail: tech@powermasterperformance.com



PLEASE KEEP IN MIND...

- ALWAYS wear eye protection when working around batteries.
- ALWAYS disconnect battery ground terminal and cable assembly before replacing electrical components.
- NEVER disconnect a battery cable or alternator cable and wires when engine is running. Transient voltages (spikes) are produced when this occurs and some of these voltages exceed 200 volts. This can cause alternator voltage regulator or engine computer failure.
- AVOID short circuits. When working with live circuits, never jumper between terminals or from terminals to ground, nor try to trouble shoot by "sparking" terminals. Always use a quality voltmeter to check the operation of live circuits.
- CHECK the battery. Alternators and batteries work together. It is important that the battery be in good condition and fully charged when replacing the alternator. Do use an alternator to charge a dead battery.

INSTALLATION

These instructions are provided as supplementary information to the factory service manual instructions for alternator replacement.

DISCONNECT THE BATTERY.

REMOVE THE OLD ALTERNATOR. See the factory service manual for more details. Remove the belt noting its routing and then remove the alternator. Be sure to label all wires before removing to assure proper reinstallation and location. Compare the new alternator to the old alternator.

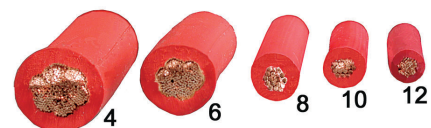
The "clocking" or the location of the back housing of the alternator when compared to the front housing should be the same. If not, refer to the clocking instructions on the reverse side of this form.

INSTALL THE NEW ALTERNATOR.

- ◆ If the belt system on the vehicle is not compatible with the Powermaster alternator, change pulleys per the instructions on the reverse side of this form. For optimum performance use the pulley that is installed on the Powermaster. In many cases the OE pulley can be reused on the Powermaster alternator if necessary.
- ◆ Mount the alternator and check for interference with the brackets or other engine components. Tighten all the bolts.
- ◆ Check for proper belt alignment. Proper alignment is critical for serpentine belts. In cases where the supplied alternator pulley has more grooves than necessary, seat the belt as close as possible to the alternator.
- ◆ Install the belt per the factory service manual instructions.
- ◆ Reconnect all wires and check labeling for correct location. If the Powermaster alternator is of a higher amperage than the alternator that came OE on the vehicle then Powermaster recommends upgrading the battery output cable from the alternator. Your local speed shop has optional charge wires for this purpose.

CONNECT THE BATTERY.

AMPS	Recommended Charging Cable Gauge Size				
	Up to 4'	4' - 7'	7' - 10'	10' - 13'	13' - 16'
125-150	6	6	4	2	2
175-200	4	4	2	2	0



SYSTEM CHECK

- ◆ Apply a moderate load to the charging system (i.e., high beam headlights and A/C for example) and bring the engine to 1,500rpm. Using a digital voltmeter measure the DC voltage from the a bare metal point on the case of the alternator to the negative battery terminal. Readings higher than 0.10VDC indicate a poor ground connection. Check the ground path including any paint or anodizing on the brackets, the engine ground strap, and the ground cable from the frame to the battery. (See figure 1).
- ◆ With battery fully charged and engine running at 1,500rpm, measure the voltage at battery positive post (+) and the ground post (-). Voltage should be 13.8~14.5VDC. Readings above 15.5VDC indicate a defective alternator and readings below 12.7VDC indicate that the alternator is not functioning or cannot supply the current amperage needs of the vehicle at this engine speed.

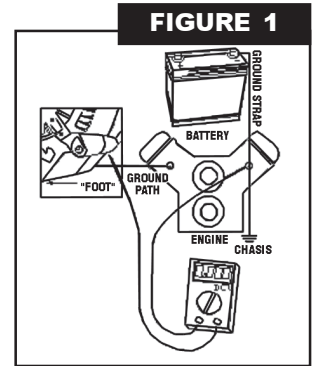
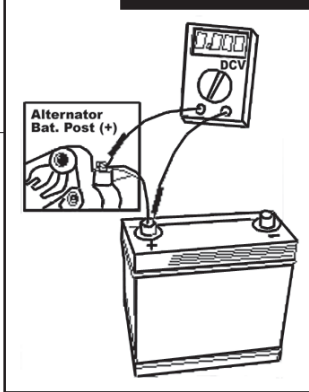


FIGURE 2



- ◆ Using the voltmeter, measure the voltage drop between the battery positive post (+) and the alternator output post (See figure 2). Voltage should be less than 0.40VDC. If voltage is higher than 0.40VDC, check for poor connections between the alternator and the battery. Possible causes are undersized battery cables, loose or improperly crimped terminals, and corroded connections.

GENERAL CLOCKING INSTRUCTIONS

Some vehicle applications may require the rear housing of the alternator to be “re-locked” or turned relative to the front housing. Powermaster ships all alternators clocked to fit most applications, however, it may be necessary for the installer to re-clock the unit to accommodate rear brackets or to allow the factory harness to reach.

Recommended Re-clocking instructions:

1. Remove the pulley using an impact wrench (rotate the nut in a counter-clockwise direction to remove). Remove the nut, lock washer, pulley, fan, and the shaft spacer. Stand the alternator up on the pulley shaft with the output post of the alternator toward you.
2. Remove the four bolts that hold the two housings together.
3. Using a rubber mallet, tap the front housing downward while keeping the unit resting on its pulley shaft. The steel stator ring between the housings will stay with the rear housing. The shaft and rotor assembly should also stay with the rear housing. *Note: there is a second shaft spacer between the front housing and the rotor assembly. Make certain that this spacer remains in place. DO NOT allow the pulley shaft to come out of the rear housing as this may release the brushes.*
4. Turn the front housing to the required position in relation to the rear housing.
5. Reinstall the housing bolts and tighten evenly. Do not over tighten.
6. Reinstall the spacer, fan, pulley, lock washer, and nut in that order.
7. Tighten nut with impact wrench until lock washer is completely closed and nut is tight.

Need to change a pulley?

To remove the alternator pulley, use an air impact wrench to loosen the nut with one hand, while holding the alternator pulley with the other. It is recommended that protective gloves and eyewear be used. If an air impact wrench is not available, a 5/16" hex bit socket and ratchet can be used to hold the alternator shaft, while a typical 15/16" boxed-end wrench can be used to loosen the nut. The pulley nut uses standard, right-hand threads. So to remove, rotate in a counter-clockwise direction.

Install the V-belt pulley, lock washer, and nut by hand.

Torque the pulley nut to 70 ft. lbs. and be certain the lock washer is completely closed. Do not over tighten.

Why is my voltage low when I'm cruising around at a show or sitting at a traffic light?

All alternators have an output curve that increases with RPM. In other words, your alternator cannot provide as many amps at idle as it can at higher speeds. If your car demands more amperage than the alternator can supply at idle, the remaining amps must come from the battery thus a decrease in voltage results. Any after market pulleys that slow the alternator relative to the engine [i.e. power pulleys] can greatly magnify this problem.

Why does my voltage test good at the alternator but low at the battery and fuse box?

Any resistance in the electrical path will decrease voltage. This includes all positive *and* negative conductors and connections between the alternator and the second test point. All connections must be secure and free of corrosion. All ground points must be free of paint and rust. Charging wires must be of adequate size for the amperage capabilities of your alternator. Improving any weak points in the electrical paths should bring voltage readings to within 0.5 volts of each other.