



Heavy Duty Starting & Charging Specialists

# THE REPOSITORY OF ALTERNATOR KNOWLEDGE

As part of our commitment to provide service and expertise, we've developed this eBook to give our customers a single resource for a wide range of alternator related questions. If you want to know whether a rebuilt alternator is better than a repaired alternator for your use, read on. If you want to extend the life of your alternator, read on.

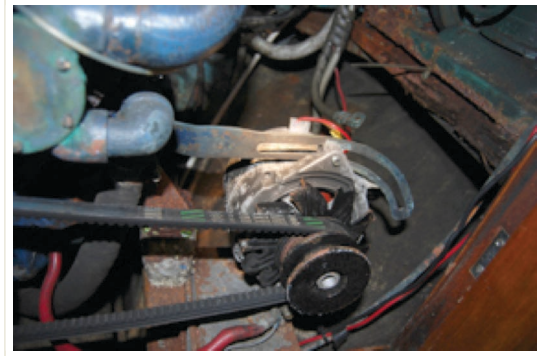
We hope you find this eBook useful.

## Remanufactured versus Rebuilt versus Repaired Alternators

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An alternator produces electricity that your industrial vehicle's battery stores. Since the alternator can only supply electric current when it is spinning, the battery is required to start the engine.

If the alternator fails, often the vehicle will start, but will run only until the stored energy in the battery is depleted as the ignition, fuel pump and other components depend on a source of electrical current.



## Signs an Alternator May be Failing

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Sudden alternator problems may be easy to diagnose. Other times, the signs of a failing alternator are more subtle:

The engine turns over slowly or not at all.

The vehicle's headlamps are dim and do not brighten when you rev the engine.

The charging meter is below 12V or above 14.5V or a charging system warning light is lit.

An engine belt is squealing or you smell burning rubber.

Rattling or whining sounds from within the engine compartment that change with engine speed.

If the vehicle shows any of these signs, take it to a battery vendor and ask for an electrical check. Your problem may be a worn or defective belt or a battery that is at the end of its life. If it is the alternator that is defective, then you must repair or replace it.



### Repaired

Repairing an alternator means that whatever parts are malfunctioning are replaced. A skilled repairperson might also replace parts that are near failure. This option can be the least expensive for the vehicle owner depending on the cost of the parts that need replacement. Only replacing a part or two in an alternator that has already failed may be no more than a temporary fix.

## Rebuilt

Rebuilding an alternator is a more involved process. The alternator is dismantled and inspected. Internal electrical and electronic components are tested. Parts that are known to have a relatively short life may be replaced without testing. Although a rebuilt alternator sounds comparable to a remanufactured or a new alternator in terms of reliability, everything depends on the skill and standards of the individual technician who performs the work.

## Remanufactured

Remanufacturers follow strict guidelines and procedures. They replace the voltage regulator, diodes, brushes and any other part that has failed or is likely to fail. Their testing equipment is state-of-the-art. They restore an alternator to original equipment manufacturer standards of operation. A Factory Authorized Remanufacturer is best in class among remanufacturing facilities and offers the longest guarantee for the product. They even incorporate design improvements made since the alternator was originally manufactured.

## Can You Tell the Difference?

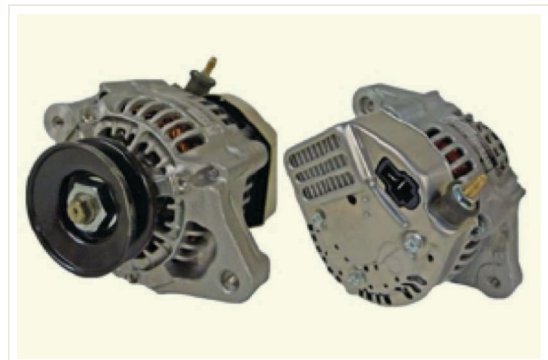
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The quality difference between a rebuilt and remanufactured alternator can be vast while the price difference may be small. The most important factor for buyers to consider is the reputation of the facility performing the work. A longer warranty is a good indication that the facility has confidence in its product. A trusted mechanic can provide guidance as well, since he or she often has firsthand knowledge of the failure rate of alternators from different facilities.

## Factors that Affect the Lifetime of an Alternator

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Our vehicles work hard for us, oftentimes under less than ideal conditions. Though the engine is mostly protected from the harsh elements, parts like the alternator are exposed. Without a working alternator, your vehicle will only run as long as the battery has a charge, which is not long under normal working conditions and electrical demands.



## Your Alternator's Number One Enemy

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The major environmental factor affecting the life of your alternator is heat. Heat is the bane of most electrical equipment as it increases electrical resistance, which means parts or devices must work harder to produce the same output. In addition, excess heat puts strain on electrical component packages, mechanical parts and lubrication.

An alternator itself produces a lot of heat, especially when fully loaded. It absorbs heat from the engine too. As an alternator warms up, it typically loses 10 % efficiency by the time it reaches normal operating temperature. The additional work of the alternator places strain on the drive belt and engine as well. Over time, this strain can reduce the life of belts or bearings.

## Proper Alternator Sizing

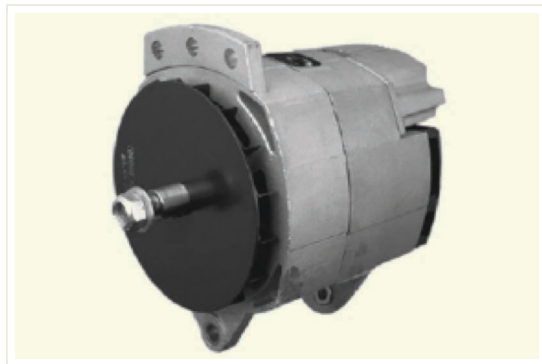
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For cost reasons, all manufacturers, industrial and personal, ship their vehicles with the minimum size alternator that supports the stock electrical system. However, over time as the alternator leeches some of its working capacity, the entire system can suffer.

Furthermore, if the vehicle's full load prevents the alternator from maintaining a full charge on the battery, then battery life may suffer and a weak battery means the alternator must work even harder. The electrical system begins to fall into a deadly spiral.

To test if your alternator is underpowered, use a voltmeter on the battery terminals to see what its output is at full electrical load at engine idle. If the voltage at the battery drops below 12 volts with everything turned on, a larger alternator is recommended.

Fortunately, a properly sized alternator will supply all your vehicle's electronic needs without voltage drops, which means both the alternator and your vehicle's equipment can expect a longer life.



## Correct Spin Ratio

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A less common cause of alternator inefficiency and shorter life span is a mismatch between the size of the drive pulley and the alternator pulley. Most alternators like a ratio of 3:1, which means the alternator spins three times as fast as the engine.

Alternators do not work efficiently at idle until they reach 2,400 RPM and suffer damage if their full RPM exceeds 18,000. At a 3:1 pulley ratio, those speeds correspond to 800 and 6,000 engine RPM, respectively, which is a normal range for most commercial vehicles.

To check the ratio, simply divide the diameter of the drive pulley by the diameter of the alternator pulley. Usually an incorrect ratio is corrected by changing the alternator pulley size.

## Keeping Your Alternator Happy

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To ensure a vehicle's alternator has a long and happy life, ensure it stays clean and free of debris, the battery is in good condition and the alternator's output is sufficient for the full electrical load it must support. If your vehicle's electrical equipment shows signs of voltage drop, have the system checked soon and strongly consider installing a larger, new or remanufactured alternator.

## What Are the Types of Services That Can Be Done to an Alternator to Prolong Its Life?

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Alternators are often written off as "wear items" that, like belts, hoses, and tires, will simply wear out over time. While that's true to a certain extent, it's also true that preventative maintenance can effectively extend the operational lifespan of an [alternator](#). The specific maintenance operations will vary from one alternator to another, but mitigating the effects of heat, vibration, and external contaminants should always be at the top of any list.

## Why Do Alternators Fail?

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Alternators fail for a variety of reasons, but most failures can be traced back to three main factors: heat, vibration, and external contaminants. Some components can also be damaged by other external factors, like an over-tightened belt or chronically discharged battery, and other components simply wear out over time.

## Dealing With Heat, Vibration, and External Contaminants

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The most important part of any alternator preventative maintenance schedule is a thorough visual inspection. As mentioned above, heat is one of the leading causes of alternator failure and it's absolutely vital to check out your alternator's cooling system on a regular basis. If the unit is air-cooled, then this process just involves checking the vents for obstructions and ensuring the fan (if it has an external fan) is in good condition. However, some heavy-duty alternators use liquid or oil cooling. If your alternator is oil-cooled, it is critical to ensure that the oil is maintained through regular manufacturer recommended oil-change intervals. Ensure oil lines don't have and bends or kinks and ensure that any vent or drain lines are clear.



Since excessive vibration can also lead to a premature failure, it's also important to check an alternator's mounting bushings when performing preventative maintenance. If the bushings wear out, and they aren't replaced, excessive vibration can lead to the premature failure of internal components. Loose bushings can also cause other problems if the alternator is grounded through its mounting hardware. Ensure the mounting hardware is secure and has not vibrated free.

The last thing to check for during a visual inspection is the presence of external contaminants like dirt and dust. Dirty electrical connections can put the same sort of strain on an alternator as a discharged battery, which can lead to premature failure, and other contaminants like coolant and oil may damage internal components if they get inside a unit.

## Other External Factors

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Some external factors, like an over-tightened drive belt, can also cause an alternator to fail prematurely. In the same way that a loose belt can prevent an alternator from charging properly, an overly tight belt can overload and damage the alternator bearing, which is why it's important to check belt tensions on a regular basis.

An alternator may also fail prematurely if it is constantly overworked due to poor electrical connections or battery issues. This problem can be dealt with by load testing the battery on a regular basis in addition to checking and cleaning the battery terminals, cable ends, and the electrical connections on the alternator itself.

## Replacing Worn Out Components

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In addition to mitigating the effects of external factors like heat, vibration, and contaminants, you can also prolong the life on an alternator by replacing certain components before they wear out. For instance, some manufacturers recommend that you check the regulator and brushes every 12 to 24 months. If the brushes are out of spec, this provides an opportunity to replace them before they actually fail.

Although replacing components like brushes before they fail won't prolong the life of an alternator indefinitely, it can help prevent sudden failures and keep your vehicle on the road longer.

[Contact us today and we'll be happy to answer any questions you can't find the answer to here.](#)



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