



WARRANTY APPROVAL

Visual Inspection of
Starters & Alternators



STARTERS

Is it Genuine Delco Remy?

37MT™, 41MT™ & 42MT™



Older Delco Remy stamp



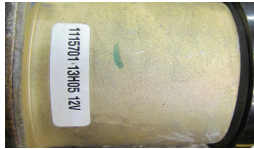
Current stamping



Current stamping



Current ink stamping

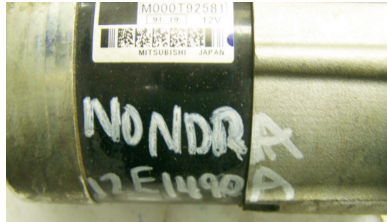


Current reman label



Older reman label

38MT™ & 39MT™



Non-Genuine Delco Remy starters

The 39MT starter is extremely popular with millions on the road running today.

Please familiarize yourself with genuine Delco Remy starters as opposed to "knock offs."



Genuine Delco Remy label

STARTERS

Missing Parts

THE COMPLETE UNIT MUST BE RETURNED WITH NO MISSING PARTS



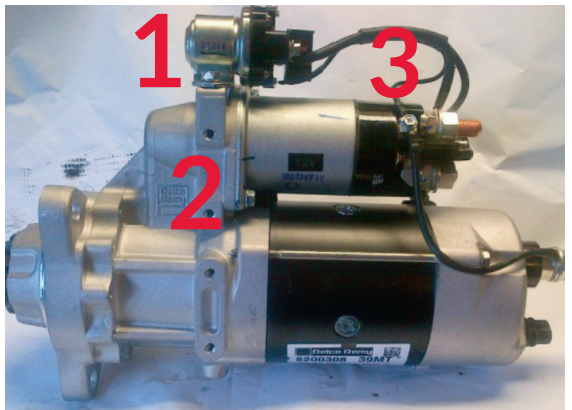
Missing solenoid



Missing IMS switch

If the unit is sold with an IMS switch, it must be returned with the IMS switch. If a unit is returned without the switch, warranty will be denied.

Operating the vehicle without the IMS switch will result in click, no-crank occurrences and possible damage to the starter or ring gear.



The switch will be located on one of three mounting locations just forward of the solenoid. Notice the wires that come off of the switch.

STARTERS

Starter Abuse



The above solenoid has been hit with a tool multiple times. The operator apparently had starting problems (hit the key and nothing happens or hit the key and only heard a click) so the solenoid was hit to get it to start.

A no-start could be one of a number of problems or a combination of problems.

POSSIBLE NO-START ISSUES:

- Low batteries: the starter needs a good battery to move the drive all the way into the ring gear.
- Battery cable voltage drop: bad connections, corrosion or under sized cables act just like a low battery.
- A mechanical problem such as a damaged ring gear and/or starter drive preventing the drive to properly mesh with the ring gear.
- Burnt solenoid contacts from cranking on low batteries.

STARTERS

Drive Inspection

PRESSURE SIDE OF TOOTH

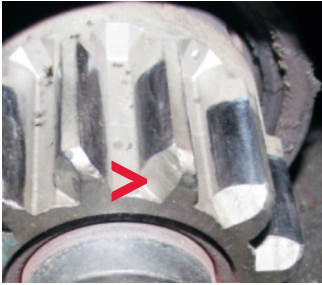
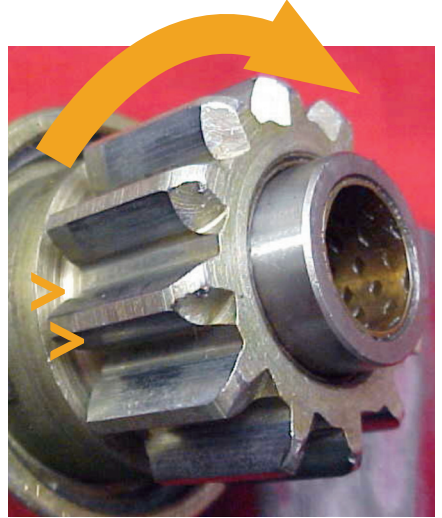
The starter always turns in the same direction. Expect to see good wear on this side of the tooth.

NON-PRESSURE SIDE OF TOOTH

This side of the tooth will show wear but it should not be heavy.



Normal wear



OVERRUN DAMAGE

Notice both sides of the teeth are highly polished. This occurs when the drive stays running with the ring gear for an extended period of time.

NOTE:

Anytime damage on the drive is observed, the ring gear must also be checked for damage.

POSSIBLE OVERRUN DAMAGE CAUSES:

- Sticking tumblers in key switch.
- The magnetic switch continues to provide power to the starter after the key is released. This switch is normally found on the truck firewall or inside a power distribution box.
- Drive not releasing from ring gear freely. Check the entire circumference of the ring gear to insure there are no damaged teeth.

STARTERS

Tooth Damage

MILLING

If milling is observed on the starter drive it is almost certain that similar damage may occur to the truck ring gear. Inspect the entire circumference of the ring gear for damage. Placing a new starter on a truck with a damaged ring gear will result in no-starts and possibly another damaged starter.



All teeth show damage from being run into a running engine.

POSSIBLE CAUSES:

- Driver error: attempting to start an engine that is already running.
- Intermittent issue with truck magnetic switch closing while engine is running.
- Truck ECM software malfunction causing a signal to be sent to start the engine when it is already running.

RAPID RE-ENGAGEMENT

One or several teeth may show damage or chipping. This occurs when the voltage to the solenoid drops so low that the magnetic field strength can no longer keep the return spring collapsed. The spring pulls the drive out of the ring gear but since the driver is keeping the key in the start position, the starter runs the drive back out and hits the ring gear that is still rocking from the last start attempt.



NOTE:

Anytime damage on the drive is observed, the ring gear must also be checked for damage.

BE SURE TO CHECK:

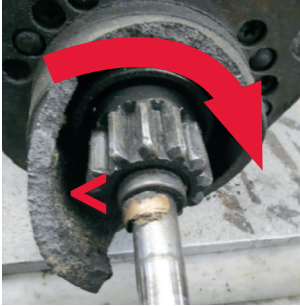
- Battery voltage: Should be at least 12.3 v and pass a load test.
- Voltage drop test of the starter main cables should be no more than .5 volts at 500 amps of current flow.

POSSIBLE ISSUES:

- A hard starting engine that depletes the battery during cranking may be caused by low fuel filter.
- The vehicle operation results in low battery during the course of the day.
- Possible clutch switch problem.

STARTERS

Other Types of Damage



ROCK BACK

Rock back damage occurs when the driver is cranking the engine over (but engine is not yet started) and then releases the key. The engine will seek the natural piston rest position and will turn the flywheel backwards while the ring gear teeth are still in mesh with the starter teeth. This violent action turns the starter drive and armature and the force may break the drive housing, shatter the drive, or twist the armature shaft and splines.

Primarily, this is the result of driver error. On occasion, it could also be the result of a clutch switch problem where the driver lifts their foot up slightly off of the clutch pedal and the clutch switch cuts power to the starter in the middle of a crank.



CONTAMINATION

Heavy rust build up in the nose cone area prevents the drive from sliding down the shaft freely. This will result in no-starts, intermittent no-starts and possible damage to the starter solenoid.

A heavy build up of a combination of grease and clutch dust can cause similar problems especially in cold weather. Avoid over greasing bearing and or shaft grease points.



BE SURE TO CHECK:

- Source of contamination entry.

POSSIBLE CAUSES:

- Bell housing clutch inspection plate missing.
- Heavy pressure washing in the area of the bell housing and starter resulting in water entry.

NOTE:

Anytime damage on the drive is observed, the ring gear must also be checked for damage.

STARTERS

Other Types of Damage

THREAD DAMAGE

All terminals on the starter can suffer thread damage. Stripped, cross-threaded or flared threads can occur from improper installation and removal of nuts and hardware.



LOOSE NUT

When the nut is not tightened to the proper torque, evidence of corrosion or arcing (burns) will be present on contact surfaces that should be clean. This will result in no-starts, slow cranking and intermittent starts.



Good terminal threads

“S” TERMINAL

The “S” terminal is where a wire from the vehicle is connected to energize the starter.

Over-tightening of this terminal can cause it to break off, break the solenoid cap or result in a stripped terminal. Failure to tighten the nut to the specified torque can result in arcing and heat damage and will result in intermittent starts and/or no-starts.

NOTE:

Anytime damage on the drive is observed, the ring gear must also be checked for damage.



Good terminal with factory installed back up nut in place

STARTERS

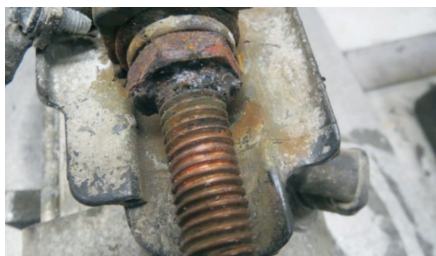
Other Types of Damage

TERMINAL DAMAGE

All terminals should be inspected for damage occurring from leaving them too loose during installation or breaking them off during removal.

In addition, damage may occur from cross-threading.

Final installation should include a visual inspection to make sure no other cables or brackets come in contact with starter.



NOTE:

All products are shipped with installation instructions showing proper torque specs for the terminals.

STARTERS

Other Types of Damage



Improperly installed motor strap



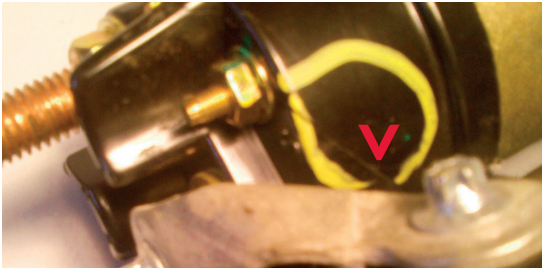
Properly installed motor strap

MOTOR STRAP

The motor strap is factory installed to carry the high battery current to the armature of the starter. The only time this needs to be removed is if the solenoid needs to be changed.

SOLENOID CAP FRACTURES

The solenoid cap can be broken during installation, removal or improper handling. Some are obvious and some are small as in the picture below where a small crack occurred during over tightening of the “S” terminal.



NOTE:

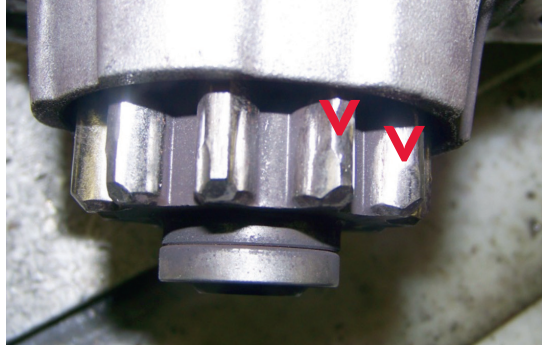
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STARTERS

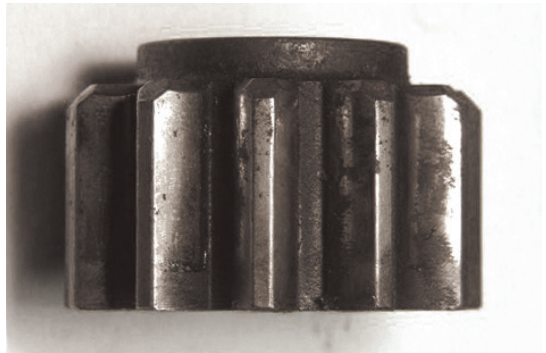
Other Types of Damage

WRONG APPLICATION OR FAILURE TO USE SPACER WHEN REQUIRED

Very shallow marks on the non-pressure side of the pinion teeth 4-6 mm indicates the wrong starter application or the required spacer that should have been used when mounting the starter was not used. This condition will cause a very early failure.

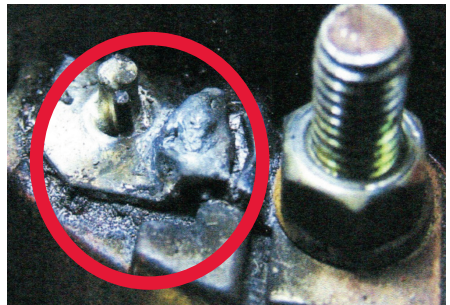


Normal wear marks showing over $\frac{3}{4}$ of the drive surface being used.



SOLDER RE-FLOW

Excessive heat has caused solder to melt and re-flow.



Good solder joint

STARTERS

Other Types of Damage

WIRES DAMAGED BY HEAT

This occurs when the drive fails to make it all the way into the ring gear and the operator continues to apply the key power.



Sometimes these two wires will show heat damage "Puckering"

POSSIBLE CAUSES:

- Ring gear damage preventing smooth movement all the way into gear.
- Low batteries and/or excessive cable voltage drop preventing enough power to move drive all the way into ring gear.
- Possible attempt to start an already running engine.

STARTERS

Other Types of Damage

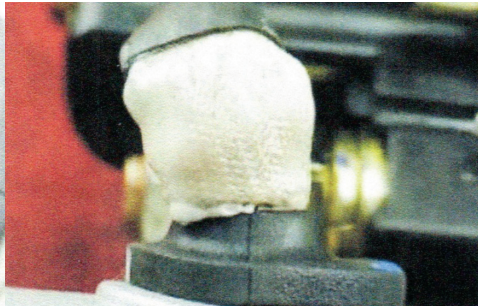
OVER HEATING OF MOTOR STRAP

Damage to the motor strap is the result of cranking for an extended period of time. The starter should never be cranked for more than 30 seconds and a two minute rest should be allowed between crank attempts. Damage to this strap can also be caused by the wrong application resulting in insufficient clearance.

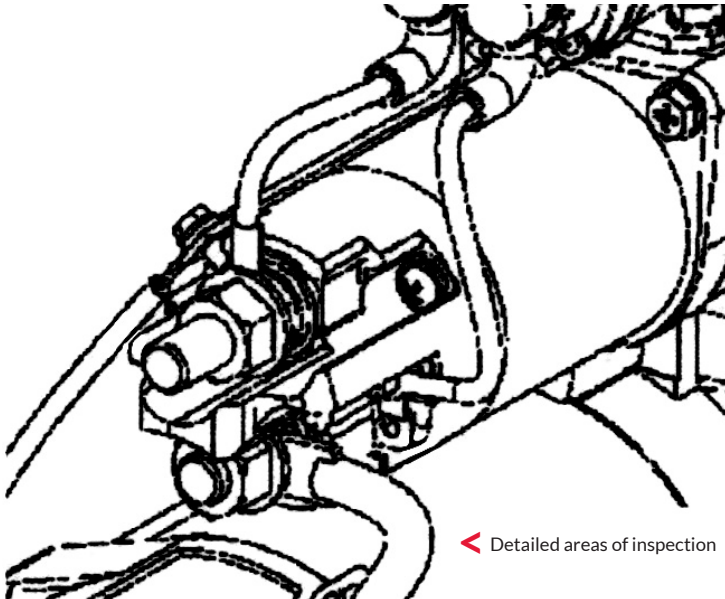
Never use the engine to prime fuel filters.



Strap damaged from heat



Good strap



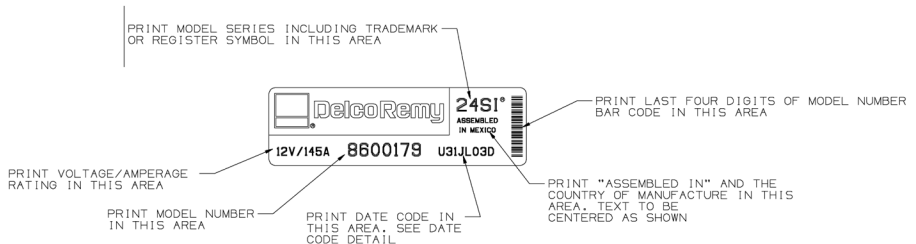
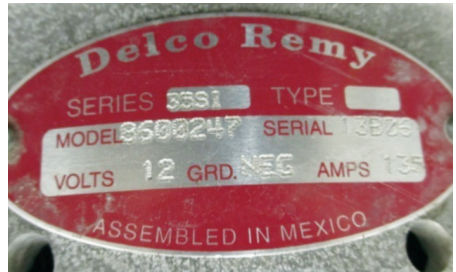
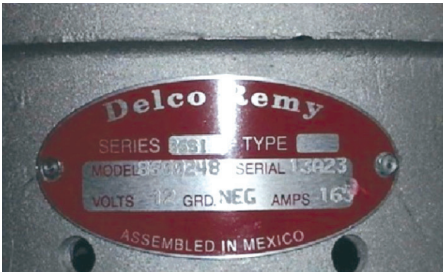
ALTERNATORS

Is it Genuine Delco Remy?

NON-GENUINE DELCO REMY ALTERNATORS



GENUINE DELCO REMY ALTERNATORS



ALTERNATOR

Types of Damage



SHAFT DAMAGE

Many shafts are damaged from improper pulley removal. Some units cannot be tested in this condition.



THREAD, TERMINAL & CASE DAMAGE

Thread, terminal and case damage includes bent, cross-threaded and arcing marks (burns).

Mounting ear completely broken off

ALTERNATORS

Types of Damage

CONTAMINATION

Contamination can appear in the form of water, oil and dirt.

It is good and proper maintenance to blow cooling fins clean with compressed air.



DISASSEMBLED UNITS

Be suspicious if units are supplied disassembled.

ALTERNATOR

Types of Damage

WORN MOUNTING HOLES

Worn mounting holes are due to loose mounting hardware. Checking hardware tightness should be part of regular maintenance.



ALTERNATORS

Types of Damage

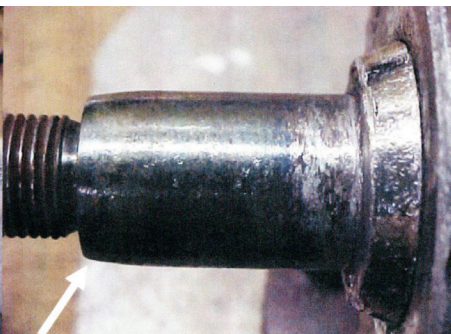
LOOSE PULLEY DAMAGE

Improper pulley installation torque causes the pulley to spin on the shaft.

The examples to the right are from the 24SI™ and 28SI™ models. These units do not use an external fan. The fans are contained inside the unit.

It is important when replacing an external fan type alternator with an internal fan unit that the fan is not transferred from the old unit to the new alternator.

In addition, the pulley must be installed while the unit is in the horizontal position (on it's side), not upright.



Examples of loose pulley damage on external fan type alternators



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Technical Assistance call 800-372-0222

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