Starters

Starter Doesn't Turn:

My Batteries are Good but the starter doesn't turn. Sometimes it helps to hit the starter with a hammer while trying to start the truck.If there is a bad or dirty connection or a hung up internal part the hammer might just help.

Making certain that the truck is not in gear, you can jump power to the small terminal on the side of the starter. This completely bypasses the starting circuit, ignition switch, and neutral switch. If doing this causes the starter to go, you have a wiring / switch problem. If doing this causes the solenoid
to click (fairly loud) but the motor does not start, you have a motor problem (or a wiring problem between the solenoid and the starter). If nothing happens, you have a solenoid problem, or a local wiring problem related to the solenoid. This testing can be done without removing the starter, but
the final diagnosis will still likely require removal.

Note that there are mechanical reasons your started might go bad. The biggest one is broken teeth on the flywheel or the starter gear. Most starter problems stem from weak batteries and or bad electrical connections. Both of these conditions will lower the voltage going to the starter which will shorten it's life.

If you pull the starter and check the contact disc inside the solenoid, you might find you just have some corrosion keeping it from working. This is very common and it's worth checking. If this is the case a cleaning could make this unit last a bit longer. In my case it bought me close to a year
before I had to replace the starter.

The contact disc in the solenoid of 12V. HUMMER and 24V HUMVEE starter is susceptible to pitting from arcing over time. I would not be surprised if there were a few unscrupulous starter repair/rebuild shops out there that will take your starter and simply flip the contact disc over to the clean/unpitted side, reassemble and charge.

For whatever the reason(s), if you're not spinning a cold 6.2L or 6.5L diesel in a HUMMER at 100 or more RPM's it's not going to start.

Go to this site, which lists the various symptoms for starter motor failure. I am sorry that it is in the VW auto world but the engineering still applies.

http://www.hallvw.clara.net/starter.htm

http://www.misterfixit.com/starttst.htm

Could be loose or broken **starter mounting bolts**. I've even seen a few (front) mounting bolts that snapped off, but the bolt shaft and head remained in place giving the appearance all was OK. Best way to check for this is back each out a 1/2 turn then bring them back up to proper torque.

It's could be the **starter solenoid or armature**, assuming no other electrical issues. In cold weather it will get worse. My starter acted in a similar manner for months. I replaced my batteries with factory spec DEKA's to no avail. When the starter begins to fail, it will turn slower and slower over time. New starters are around 750.00 and they weigh 49 lbs. Install requires the under carriage protection to be removed. AMG offers rebuilds for somewhere around 450.00+core. I opted for a new unit, I had the old one rebuilt and found that the armature was shot. After I installed a brand new starter, I was amazed at how fast the engine was turning over.

I would also check your batteries and **cables** for tightness and corrosion. I'd especially take note of the cable leading from the battery to the starter. One time my cable lead going to the starter was loose and I had similar problems to yours.

Eventually I replaced both **batteries** when I discovered that one of them was bad and would not accept a charge. Now my vehicle spins up nice and smooth.

It could be your **neutral safety switch**. It makes sure that you can only start your truck in park or neutral. I had the same deteriating hard starting problem you described. I tried everything from new batteries to checking the wires. Sometimes it would start right up , other times I would turn the key and get nothing. Sometimes you can put the shifter in neutral, turn the key and wiggle the shifter around. With a little luck the truck will start. You may need to either adjust or replace the switch. In a jam you can bypass it but that would be unwise and dangerous.

Hot Cable - Bad Ground

Some earlier trucks ground the starter on the starter bracket. If the cables are getting hot and the starter isn't cranking right it could be corrosion between the bracket and the block causing electrical resistance. Either clean the starter bracket where it contacts the block or ground the starter directly on the engine.

Starter Support Bracket design

Metric; M10-1.5; Class 10.9; special flange-head design; rolled, not cut threads (for improved tensile strength); special non-standard length (to obtain maximum thread engagement while preventing bolt from bottoming out before design clamp load is achieved); larger than normal bolt body diameter; knurling over the entire surface that interfaces with starter motor housing (provides a no-slop fit helping reduce twisting/side loading on bolts when starter first engages; pre-applied "Dri-Loc" thread locking compound (helps maintain applied torque).

How to Clean the starter solenoid.

by Peter Hipson

1. Remove starter. (Disconnect the battery cables (all of them is my recommendation) first. I often pry off the RTV on the battery starter main cable and remove the cable there rather than pull the cable. I used to always pull the cable but I've gotten lazy, and RTV is cheaper than spending a lot of time on the cable.

2. With starter out:

a. Remove big cap plug (looks like a nut or bolt) on the nose end of the starter in line with the solenoid.
b. Remove the battery strap (only from the solenoid, bend it to get it out of the way)
c. Remove the starter strap (from both solenoid and starter, it is too short to take off otherwise)
d. Remove the four nuts on the end where the terminals are. Discard the O-rings.
e. Pull out slightly the end cap and remove the screw holding the wire to the terminal on the inside of the cap piece. Do NOT stress these wires!
f. Complete removal of the end cap. If it doesn't come off, check why don't just yank harder. <g>
g. Carefully burnish the two main terminals on the end cap, to shiny copper. Clean and degrease. Any oil or grease will contaminate the contacts and lead to premature failure.
h. There is a small metal disk inside the solenoid housing. This must also be either cleaned or turned over to the other (fresh) side.
i. Stick an allen wrench into the shaft of the solenoid where that big nut was. There is a nut inside this end, do *NOT* remove or loosen or tighten this nut! If it is moved, it is necessary to readjust the solenoid, a procedure that is a PITA!
j. WHile holding the allen wrench, at the other end loosen and remove the nut holding the round disk to the shaft.
k. The nut will come off, along with a washer, the disk, a spring, and another washer.
l. If the reverse side of the disk is 'new' or unused, turn the disk over and reassemble. If this process was done once before then both sides may be equally 'bad'.
m. If you wish instead of turning over the disk, you can clean it up carefully. The original disk is plated, however I have not noticed any issues with damage to that plating. I clean with a small (wire) brush in my Dremel tool.
n. Reassemble the disk/shaft assembly. If the locknut doesn't go on tightly (don't tighten it down too much, but is must have some drag to keep it on) replace the lock nut. This locknut is not a nylock nut, and should be replaced with the same type. A nylock nut (the locknuts with the small nylon bushing) will fail due to heat, don't use them here! Order of assembly: inner washer, spring, disk, outer washer, nut.
o. Remove the allen wrench used to hold the shaft in the previous steps. Replace the cap plug removed earlier. There is a sealing (fiber) washer on the plug which should be in good shape, if not replace it.
p. The end plate gasket should be in good condition. If not replace it.
q. Partially assemble the end plate to the solenoid, and re-attach the wire to the terminal

inside. If you forget this step your solenoid will fail within a few starts, so it is vital that you reconnect it! (it will seem to work, but the windings will burn up due to excessive current)
r. Press the end plate fully on the solenoid.
s. With new o-rings install the four nuts.

3. Replace the starter in the truck. This step is very important, if you forget it, it will be hard to start the engine. Trust me.

Is Your Starter Waterproof?

You do not test it by water submersion!

There is an assembly line type "air pressure decay test" performed by the starter manufacturer to assure watertightness. I've witnessed it being performed many times at the starter manufacturer's facility.

Clean dry air is slowly fed inside the starter assembly until it stabilizes at a set pressure; the air supply is then cut-off and over a specified time period the internal pressure must remain within a certain range for the starter to pass the watertightness test. Without having that written test procedure in front of me, I'd hate to just guess at the test pressures/times.

How They Test Starters

- 1. With starter removed.
  2. Using a resistor pile, adjust so that there is 9.5 volts on the starter when running, no load.
  3. Check shaft RPMs: should be at least 5000 RPM.
  4. Check current draw, it should not exceed 65 amps no-load.

  If it draws too much, you know its the starter.

Shimming Your Starter

The small diameter starter gear engages the large ring gear on the flywheel / Flexplate. These 2 gears have to mesh properly. If they are too tight the gears won't seperate after the engine starts causing that screaming sound. If they/re too loose they won't mesh and will skip teeth and grind.

1 pc. AMG p/n 12338789-1 Shim-thin (.040 in.) - starter motor mounting
1 pc. AMG p/n 12338789-2 Shim-thick(.089 in.) - starter motor mounting

Also, it is possible (but not likely) to have a starter that has no shims. The correct

procedure to determine shims involves measuring clearance between the pinion gear and the ring gear, and setting the clearance to the correct value. The process to do this can be difficult, but there are some tricks to getting it done painlessly. (Remove the starter solenoid allowing the pinion gear to move freely in and out).

Basically to set clearance (bolts should be torqued as specified prior to measuring):

Begin with one .089 thick shim and using a .020 dia. wire to gage the gap between the peak of a
starter pinion gear tooth and the root between mating teeth on the ring gear, then shim as required ..OR.. just begin with one .040 shim and adjust according to "sound"

OR:

Engage the starter's pinion gear with the ring gear. Insert a wire gauge to check for proper backlash between the ring gear and starter pinion. There should be a 0.020" to 0.025" clearance measured from the flank of the starter pinion to the flank of the ring gear tooth. Check clearance at least three places on the ring gear. If the clearance is too small, add one shim at a time between the starter and engine block to bring it into specifications. In some cases, no shims are necessary.