

## What Causes Broken Starter Nose Cones?

Cracked or broken starter drive end housings result from a variety of vehicle or installation related issues. Causes include:

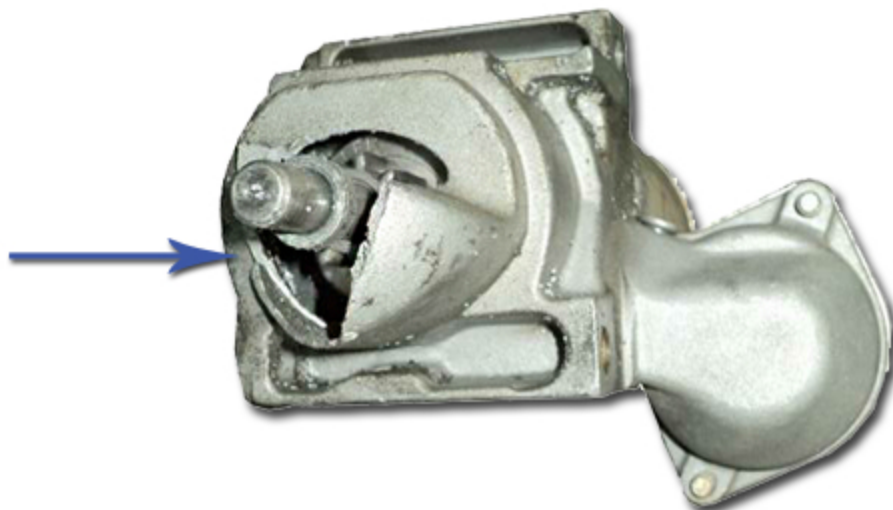
1) Improper flywheel clearance (tight mesh). Improper mounting alignment may occur on certain “pad mount” starters due to lack of installing a spacer shim, or on “flange mount” starters due to not seating the starter completely flush to the bellhousing. Even .015” variance (typical shim thickness) can affect proper mesh.

2) Engine kickback or backfire. Besides generic timing problems, causes include a faulty Crankshaft Position Sensor (1996-2000 General Motors C/K, G, P, and S/T Series) and electrical system noise interference prompting the ignition module to fire the spark plugs prematurely (Hyster forklifts with 3.0L GM engine).

3) Starter activation with engine already running. Instances of operator error on older vehicles is one reason why turning the ignition key on most late model vehicles simply sends a “crank request” to the Powertrain Control Module. In milliseconds, the PCM then decides if it’s safe to activate the starter.

4) Excessive engine resistance. Dirty or improper weight motor oil may cause excessive mechanical resistance to cranking, as can brand new “crate” motors with (initially) tight piston rings.

Missing starter support brackets, loose starter mounting bolts, and harmonic engine vibrations cause most other damaged starter housings. The likelihood of pre-existing flaws in starter nose castings remains very rare.



## STARTER WILL NOT CRANK WHEN HOT (HEAT SOAK)

If your starter easily cranks a cold engine, but “drags” or cranks very slowly when hot, there may be a “heat soak” problem. Before you condemn the starter as bad, you should perform a system diagnosis of the battery, cables and starter.

Assuming that the diagnosis results are within acceptable ranges and the starter cranks fine when cold, it is quite possibly a “heat soak” condition. What exactly is starter “Heat Soak”? Without getting into the physics of thermal conduction or Newton’s law of convective cooling, it is simply a matter of the starter absorbing and retaining heat from under-hood sources such as the exhaust manifold. This absorbed heat adds resistance to the electrical conductors inside the starter. The additional resistance results in the starter requiring more amperage than it normally does when cool. Once under-hood heat warms the battery, cables, and starter, a “tipping point” is reached concerning the overall amount of resistance a starter can accept (and still function properly).

The TOTAL effect of all this unwanted resistance is a dramatically reduced current flow, which in turn means the starter is limited in current, and therefore either turns very slowly or not at all. The starter solenoid is equally vulnerable to this condition, and thus may not activate the starter at all. Another overlooked contributor to “heat soak” is corroded battery cables. At some point, cleaning the battery terminals and connectors may no longer help if the corrosion has already spread throughout the length of the cables. The cable’s outer insulation “hides” the corrosion.

Heat soak can usually be solved by installing a heat shield on the starter; this will reflect the heat away from starter. In fact, many vehicles are originally equipped from the factory with a heat shield. Unfortunately, they are often discarded when the starter is replaced. You can likely find a used heat shield at a salvage yard, or source a new one from your local parts store. Other fixes can involve upgrading the battery cables with a heavier gauge cable or installing a higher capacity battery. Anything that will keep the starter cooler or allow more amperage to the starter should help considerably.



# IMPORTANT NOTICE

This application was originally supplied with a transferable harness attached to the starter. This harness must be transferred to the replacement starter.

## Harness Removal:

1. Remove solenoid battery post nut and wire from post.
2. Remove harness bolt located on the front of the starter.

## Harness Installation:

1. Installation is the reverse order of removal.

