

New Gear and 3RD Member Break-In

Do we really need to break-in a new gear set? I have heard many people say "When I bought my new vehicle no one ever told me to break-in the ring & pinion." Whenever we are blessed enough to afford a new vehicle, we take it easy on the engine for the first few hundred miles. While we are pampering the engine (probably for the last time ever), the ring & pinion set goes along for the ride and gets a chance to break in before we hammer the throttle.

In most stock vehicles with stock tires there is seldom a risk of a burned gear set. For those of us who chose to modify our vehicles, there are many situations that can contribute to burned gear syndrome. High Performance engines, towing, tall tires, and high numeric gear ratios (3.5 & up) can all generate a lot of heat and cause the gear oil to break down. The greatest damage to a new gear set results when it has been run for ten minutes or more during the first 500 miles and the oil is very hot. Any heavy use or overloading while the oil is extremely hot will cause it to break down and allow irreversible damage to the ring & pinion and other internal components.

In order to make them run cooler and quieter, new gears are lapped at the factory. However, they are not lapped under the same pressures that driving creates. The loads generated while driving, force any microscopic high spots on the gear teeth back into the surface of the metal. This is called "work hardening". Work hardening is similar to forging in the way that it compresses the metal molecules into a very compact and hard formation. This can only be accomplished if the metal surfaces are lubricated and the gear temperature stays cool enough that the molecular structure does not change. If the temperature of the metal gets hot enough to change the molecular structure, it will soften the surface instead of hardening it. This may seem like a balancing act but it all happens easily & passively as long as the oil keeps the gear cool while it is breaking in. I've had great success with Penrite 140[®] any extreme pressure EP140 mineral based oil will perform best. This oil will continue to lubricate at temperatures where many other oils break down.

Even with the correct oil, this procedure for breaking in a new gear set or 3rd member must be followed: After driving the first 15 to 20 miles it is best to stop and let the differential cool before proceeding. Keep the vehicle at speeds below 60 mph for the first 100 miles. I also recommend putting at least 500 miles on the new gear set before heavy use. During the first 45 miles of towing it helps to go about 15 miles at a time before stopping to let the differential cool for 15 minutes before continuing. This is necessary because not all of the gear tooth is making contact until it is heavily loaded. When towing or under heavy use, the teeth flex to contact completely, and cause the previously unloaded portion of the teeth to touch and work harden. All of this may seem like paranoia, but it is very easy to damage the ring & pinion by overloading before the teeth are broken in. If you take it easy on a new ring & pinion and keep it full of high quality oil, it should last a lot longer.

With regards to limited slip additives, I have found that using too much additive can lead to premature gear wear. Use just enough to keep the limited slip from chattering but not more than 4 oz for every 2 qts of oil. It is a good idea to change the gear oil after the first 500 miles in order to remove any metal particles or phosphorus coating that has come from the new gear set. This is cheap insurance and a good time to discover any problems before they grow to disastrous proportions.

With regards to spools and locking 3rd members due to the added strain on the ring & pinion when both wheels are locked will shorten the life of the ring & pinion. Spools & locking units should only be used for racing and off road purposes; as they will be prone to noise, due to this added load.

Note: These 3rd members are to be used with:

- Street/Strip | TorqueWorms (LSD) and Spools: **Synthetic SAE 140 Gear Oil**
- Strip & OffRoad | Spools and Lockers: **Synthetic SAE 250 Racing Gear Oil**

NO split grades eg. 85/140 (These are not recommended), failure to use the correct oil can result in gear damage, noise and may void your warranty.

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