

MANUAL TRANSMISSION EXPLANATIONS

Bearings /Gear = Copper/Chrome/Iron/Lead/Tin

Ball or needle bearings in manual transmissions can be made up of **Iron** and **Chrome**. Elevated levels of **Iron** plus **Chrome** point toward early detection of bearing wear. Bearing failures may cause a growling noise, difficult shifting, and can lead to more costly gear/shaft failures. Have your transmission specialist do further diagnostics to determine if or what services are suggested.

Bearings (Bushings) = Copper+Tin or Lead+Iron

Some Manual transmissions may have bushings made of **Lead** and **Iron** or made of bronze. **Lead plus Iron** or **Copper plus Tin** indicate that one or more of these bushings may be showing some wear. Bushing failures may lead to more costly gear/shaft failures. Have your transmission specialist do further diagnostics to determine if or what services are suggested.

Gear = Iron Only

There are several gears in a manual transmission. When there is **Iron only** one or more of the gears is showing signs of wear. When an elevated level of **Iron only** is found, have your transmission specialist do further diagnostics to determine if or what services are suggested.

Dirt/Seal Material = Silicon

Silicon can come from dirt getting into your transmission from vent areas or worn seals. Abrasive dirt, **Silicon**, with low levels of **Aluminum**, can cause serious damage if it is not removed with a transmission service. **Silicon**, *by itself*, can also come from recently replaced seals and gaskets.

OIL CONDITION

Oil Condition = Oxidation/Nitration

Oxidation occurs when air is mixed with hot gear oil in your transmission. **Oxidation** breaks down your oil's ability to lubricate the gears and bearings in your transmission. High **Nitration** (*Acid build-up*) is corrosive to transmission parts. High **Oxidation** and **Nitration** are signs of going too long between fluid changes or over heating the transmission. Worn out gear oils can cause hard shifting and growling noises, and can lead to early transmission failure.

Water Contamination = Water in oil

Low levels of **Water** can come from condensation caused by short drives or a vehicle sitting for a long periods of time. Servicing your transmission gear oil and doing further diagnostics are suggested to locate the source of the contamination. Abnormal levels of water would have to come in from an outside source such as being in a flood.

Transmission Gear Oil = Wear or Contamination

The useful life of the oil has reached its end because of the presence of wear metals or contamination. This may be caused by incoming dirt, water, overheating, or going too long between transmission services. *On new (under 30,000 miles) or recently rebuilt transmissions, it is normal for break-in material to be found. Check with your servicing dealer for service suggestions.*