

The New Process 249 Transfer Case

By Mike Weinberg
Rockland Standard Gear Inc.

The continuing advance of technology that has given us so many new units to work on, also has produced more advanced 4WD transfer cases. Arriving on the scene is the NP249 transfer case which will be found in some Jeep models for 1993. Produced by the New Venture Gear Co., a joint venture between the Accustar subsidiary of Chrysler Corp. and General Motors, the model 249 is a further refinement of transfer case technology. The NP249 is a full time transfer case with three shifter positions; 4WD high range, neutral, and 4WD low range. High range is direct drive (1-1 ratio), while low offers a 2.72 gear reduction for off-road use. The 249 comes equipped with a gerotor-type pump for pressurized lubrication of the internal parts. This makes it possible to tow the vehicle with driveshafts in place. The 249 is chain driven, and is equipped with a planetary inter-axle differential and a viscous coupling. The viscous coupling differs from the 229 model in that it can lock up completely to transfer torque through the differential to the axle that has traction. We will discuss the differences between these two couplings later on. The differential allows the vehicle to be driven on hard surfaces in 4WD.

This is a beefy transfer case capable of handling 615 foot pounds of input torque. Dry weight of the unit is 95 lbs. The proper lube fill according to Chrysler Corp's Jeep division is 2.5 pints of Dexron II ATF.

As more models in the marketplace come equipped with all-wheel drive and new transfer case

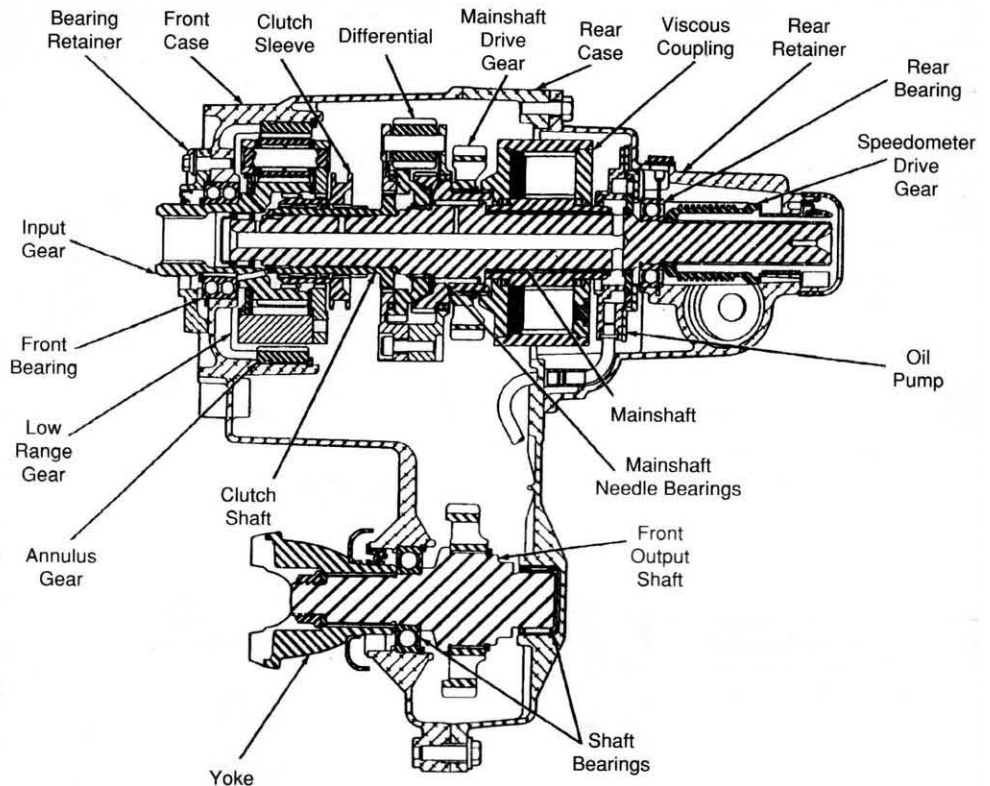


Figure 1 NP249 Transfer Case

systems, we will be called upon to work on more viscous couplings (VC for short). Understanding how the VC works will help us in diagnosing and repairing the units. In its simplest form, a Viscous Coupling uses a fluid to transmit torque between several operating parts. This is done by having a drum with metal plates, much like clutch discs, alternately splined to the outside of the drum and to a cylinder contained in the drum. The outer splined plates have holes in them, and the inner splined plates have slots machined in them, in a sunburst fashion. The fluid used to fill the container is a special silicone polymer fluid, the most common of which is polydimethylsiloxane. Yeah, say that three times fast! At a given speed of rotation, the shear forces of the fluid flowing between the plates causes them to rotate together. Coupled to a differential, torque can be transmitted to the front and rear axles smoothly, according to demand.

Up To Standards

We all are familiar with the NP129, 219 and 229 models that used the VC. The 229 was produced in sufficient numbers for most shops to have worked on them. The main problem associated with the 229 was not in the transfer case design, but rather AMC's use of vacuum controls. With external plumbing and vacuum motors on the transfer case and, in some cases, the front axle, many failures occurred due to corrosion, damage, and poor engine condition. Once the vacuum system became inoperative, or began leaking, VC failure was not far away.

In the NP249 we have new advances in VC technology. New Process Gear has been on the leading edge in coupling research and development. The VC found in the 249 is called a "humping" type. I know, I know, I can't say it with a straight face either. This phenomenon called humping enables the plates in the coupling to move into full contact with each other, vastly increasing the amount of torque the unit can handle. Without going into the really complex engineering, the

VC is partially filled with silicone fluid. As certain temperatures and rotation speeds are reached, the fluid expands and compresses the air in the drum until it is completely dissolved in the fluid. When the right conditions of temperature and rotation occur, the plates move together (hump) and increased torque transmission is possible. When the speed and temperature drop, the plates move away from each other, allowing torque differentiation through slippage.

Viscous couplings are NOT rebuildable. Do not take one apart unless you want it for a conversation piece. The fluid fill within the unit is a precise percentage of volume of the drum and very sophisticated equipment is needed for proper fill. The plates inside appear to be simple steel discs, but a tremendous amount of research went into their design. They are precision ground and finished and any bends, nicks or distortion will kill the efficiency of the unit. The development and engineering that went into the 249 is impressive.

I would like to extend my thanks to the people at New Venture Gear and New Process Gear for making this information available to the transmission repair industry. ■



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