

6/2/1D- Gearing For Towing Performance

The idea here is to get that weight in motion and keep it in motion despite atrocious aerodynamics, steep grades, headwinds and other outside forces. The transmission aids in torque multiplication by providing gearing “steps” to get the load moving. The axle ratio helps with this but must also be chosen to put the engine into an efficient rpm range at cruising speed in top gear. This speed is often limited by state speed limits, usually 55-65 mph for towing vehicles. There are many factors in choosing an axle ratio for towing.

Frequency of Towing: If your tow rig spends a high percentage of its time as a commuter vehicle, you may have to compromise more on a

ratio or limit the amount you tow according to the ratio you currently have. Follow your vehicle manufacturer’s towing limit recommendation.

Engine Torque vs Load: A bigger engine with more torque can work harder and doesn’t need the torque multiplication of lower gears quite as much. It’s all relative, of course. It’s really torque vs load. Regardless of engine torque, a lighter load can be towed with taller gears.

Transmission Type: The variances here run from overdrive vs non-overdrive, close ratio vs wide ratio and automatic vs manual. Overdrive vs non-overdrive is explained in more detail farther on. Wide ratio transmissions are those truck boxes with a very deep first gear. In these cases, there is a wide ratio gap between the “granny” first and second. Second is used as first for normal driving, but may not be low enough to get the job done with a full load. In this case, you have to rev way up in first, do a quick shift and lug the engine down in second. Close ratio truck trannies have a taller first gear that is closer to second and are often preferred for towing (assuming the first gear ratio is low enough). Some of the more modern heavy-duty manual five and six speeds feature deep first gears and an overdrive top gear, but fairly even spacing of the other ratios.

Finally, automatics versus manuals is an ages-old debate that we won’t continue here. As it relates to gearing, the automatic offers a great deal more flexibility at low speeds. You can get away with slightly taller gearing in terms of low speed work because of the automatic’s “variable speed” first gear, more correctly known as the torque converter. Combined with the mechanical first gear ratio (as high as about 2.4:1 and as low as about 3:1), it has the effect of a fairly deep first gear. Most torque converters have around a 2:1 ratio just off idle, so the converter gives the effect of a 4.5:1 to 6:1 first gear (depending on the mechanical ratio).