

## Thick or thin gears? High speed, low speed, fast and slow?

### High Pinion or low pinion?

### Understanding the jargon, what does all of this mean?

These terms are fairly common but without some history, they may not make sense.

High speed and fast will have the same meaning. Low speed and slow will have the same meaning. These terms reference the speed of the vehicle. Before transmission overdrive units were common, your gear ratio would really affect the overall speed of the vehicle.

High Speed or Fast means a high gear ratio but lower numerically. I.E., a 2.73 gear is considered a high speed or fast gear. Sometimes a high ratio gear is also called a taller gear. A 4.88 gear set is considered a low or slow gear (but higher numerically).

Many vehicles (but not all) use differentials of different dimensions based on the gear ratio used. This is called a carrier break. A common Dana 44 has a carrier break of 3.73 down and 3.92 up. This means that 2.73-3.73 gears would use the fast or high speed carrier. In this case an RD117. A slow or low speed carrier would fit 3.92-5.38 gearing. It all sounds so simple. Sorry, that's not the case.

Users have always wanted to change gear ratios. Sometimes this is for speed, other times it might be to compensate for larger tires. As an example, the GM 14B full float axle has always used a 4.10 and down case as the lowest ratio from the factory was a 4.10 gear. The aftermarket saw a demand for lower gears and, since the 4.10 case was the only unit available, they made a gear that would fit the 4.10 case. We built our RD114 Air Locker to fit the gears for the 4.10 case. Around 2002, GM offered a 4.56 gear in some trucks. This used a 4.56 up case. In this case, if a customer wants to install an Air Locker with a truck with this gear set, the customer will need to buy aftermarket 'thick' gears.

What is a 'thick' gear?

Lower gears will use a smaller pinion gear. A 5.38 gear set will generally have 43 ring gear teeth and the pinion gear will have 8 teeth-  $43 \div 8 = 5.375$  and a 2.73 gear set will usually have 49 ring gear teeth and 18 pinion gear teeth-  $49 \div 18 = 2.722$ . The smaller 8 tooth pinion gear moves the ring gear teeth farther from the differential ring gear flange. This extra distance is accomplished by making the back of the ring gear thicker.

Common applications of 'thick' gears are Jeep JK rear D44, Jeep TJ Rubicon front and rear, high pinion (HP) D60, GM 14B full floater and Toyota Tacoma/4Runner front axles.

All Jeep JK D44 rears will use a 3.73 and down carrier

HP D60 should always check with gear supplier before purchase.

Toyota Tacoma and 4 Runner front should also check with gear supplier.

GM 14B full float rear will always require an aftermarket gearset if lower than 4.10

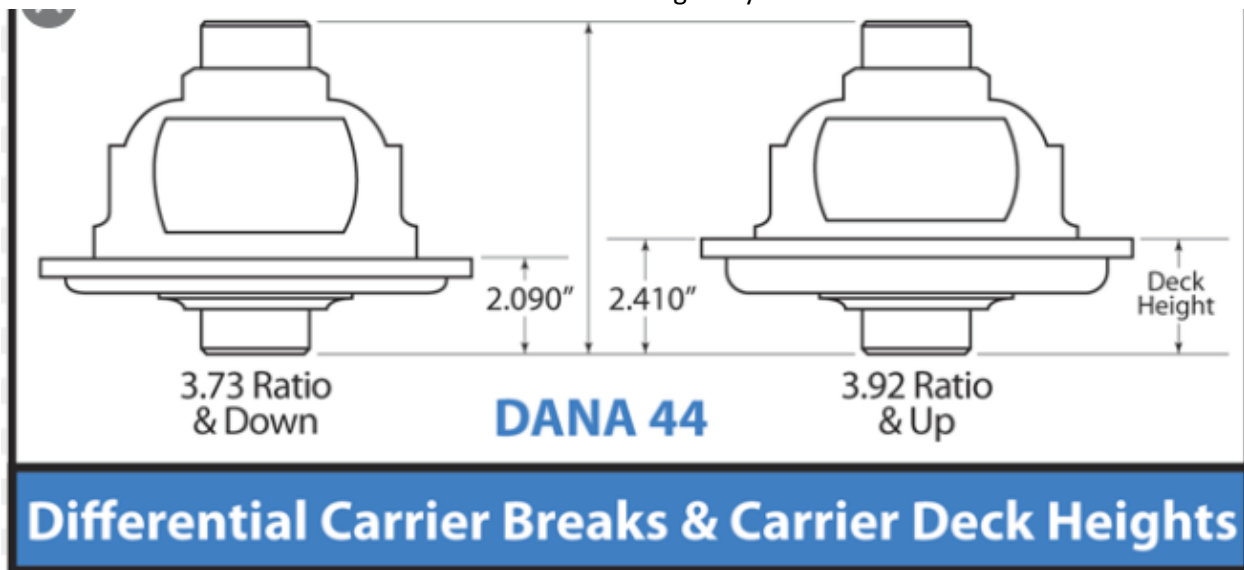
Calling a gear a 'thin' gear is usually incorrect. It would be a standard gear. There is an actual 'thin' gear. The Jeep JL front axle M186 (Dana 30) uses a 'thin' gear. The factory gear ratio is 3.45 and it fits on a 3.73 and up case instead of the expected 3.54 and down case. Every Jeep JL equipped with an m186 front axle will fit our RD100 (if 27 spline axle shafts are retained).

The terms High Pinion and Low Pinion refer to the physical placement of the pinion in the differential housing. High pinion means the pinion is located above the axle centerline. Low pinion means the pinion is below the axle centerline. A high pinion gear was designed to fit in a front axle and has a reverse rotation gear cut. If a standard cut gear was installed in the high pinion location the front axle would push backwards while the back pushed forward. The reverse cut gear also loads the gear properly in front end applications.

There are 2 main sides of a ring gear, the drive side and the coast side. In a front application with a reverse rotation gear design the drive shaft rotation loads the drive side of the gear. If this same high pinion design was installed in the rear of a vehicle the driveshaft would be driving the coast side of the gear. There is an approximate 20% loss of strength using a HP gear in the rear of a vehicle. Conversely, using a standard cut gearset up front will provide the same 20% loss of strength.

You'll see below an illustration that shows common flange heights.

This is NOT relevant to our Air Lockers as the seal housings may add to the shown dimensions.



This most relevant information to determine the flange height on an Air locker is shown as the 'C' dimension shown below.

