



and the boat up. A special benefit of 4WD is that it has a “low range” — a lower gear range that increases the torque delivered to the wheels for more power to pull a heavy boat up a steep, wet ramp.

Tow ratings for 4WD systems are usually lower than they are for 2WDs, because they add weight to the vehicle, and the extra weight detracts from the GCWR.

All-wheel drive (AWD) systems also make all four wheels turn at the same time, but through a different system than 4WD — usually a computer-controlled viscous coupling. This is a tremendous safety advantage for all kinds of

driving, especially on wet or slick surfaces. With all wheels driving, the vehicle is also more stable and controlled on winding, curving roads. However, AWD also adds weight to the vehicle and can reduce the trailer tow rating.

On the plus side, modern AWD systems go into action in a matter of milliseconds with computer control. It continues to adjust for wheel spin at any or all wheels just as quickly. It’s an excellent feature on slick launch ramps.

Understanding exactly what your tow vehicle is equipped with and how much weight it can actually tow is the key to being happy with your tow vehicle choice.

Towing Equipment

How To Equip Your Vehicle for Towing

Most vehicles require additional equipment for towing. The equipment package often includes various cooling systems, heavy-duty suspension components, the appropriate axle (ring and pinion) gear ratio and usually a more powerful engine. However, some towing packages do not include a hitch or wiring, so you’ll need to get that on your own. The purpose of this extra equipment is to increase the longevity of your tow vehicle and improve its trailering performance.

A tow vehicle’s greatest enemy is heat. It affects everything that moves. Controlling that heat usually isn’t a problem during normal driving, as long as the vehicle is used within its prescribed limits. But, when you make it work hard, such as when towing, heat will build up more rapidly. Your major concerns must be keeping engine coolant, engine oil and transmission oil temperatures at proper levels.

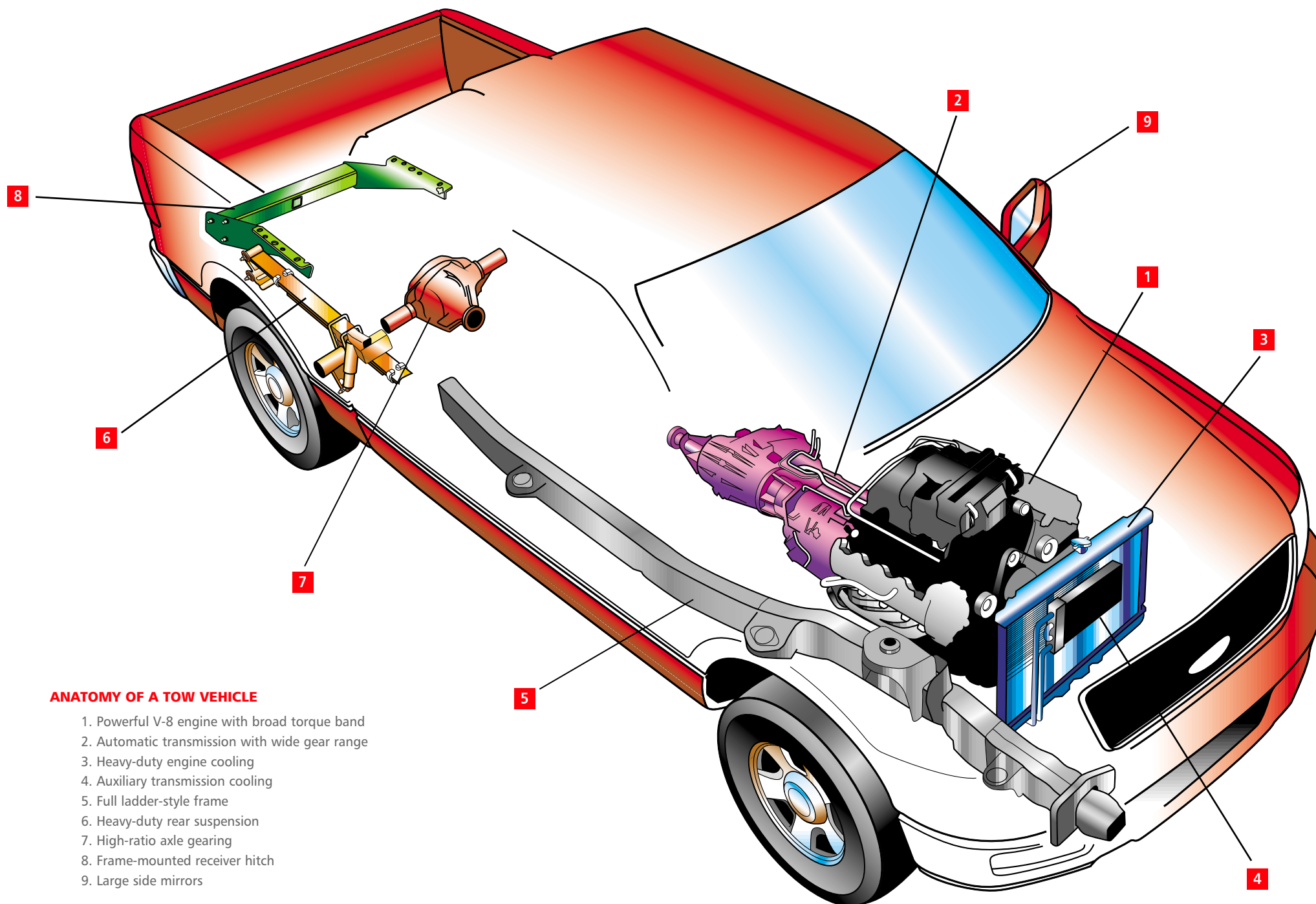
ENGINE COOLING

All engine radiators work on the same principle. As liquid coolant circulates from the engine block and through the radiator, heat is dissipated from the radiator to the surrounding air. Consequently, the greater the cooling surface area and/or the more air that passes over that surface, the faster the heat is drawn from the coolant.

The harder an engine works, the more heat it generates. That’s why manufacturers offer optional heavy-duty cooling systems and/or include them in towing packages. A heavy-duty cooling system generally has a radiator with one or more additional cores for greater cooling capacity. A core is a layer of cooling fins and tubes through which the hot water passes.

Included in many heavy-duty cooling systems is a more powerful fan that increases airflow





through the radiator. Quite often, a heavy-duty fan is thermostatically controlled, so it operates only when coolant temperature becomes too high.

ENGINE OIL COOLER

Engine oil can also reach unusually high temperatures when towing, especially in engines that have smaller oil capacities. Many auto manufacturers require the use of oil coolers for towing. Oil coolers are routed from the engine oil filter to an auxiliary radiator. Adding an aftermarket deep-sump oil pan will increase oil capacity, which can also help cooling.

By keeping oil temperature down, you lower overall engine temperature. This is especially important when towing in the mountains or in high-heat desert conditions.

TRANSMISSION COOLER

The most overlooked cooling device is the automatic transmission fluid cooler. The premature failure of an automatic transmission is almost always due to overheating, and this usually occurs when towing.

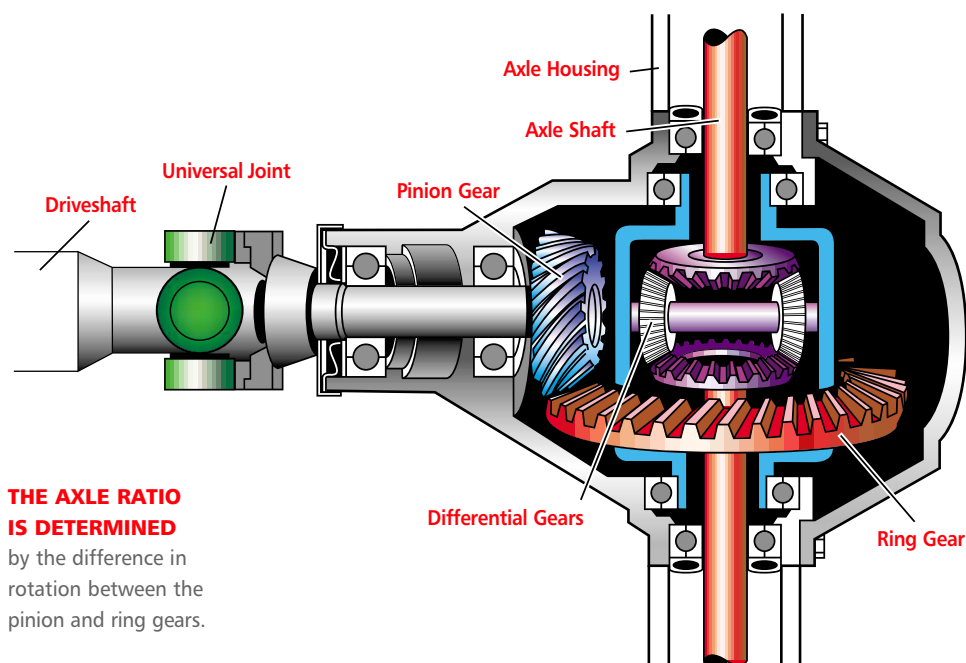
Automatic transmissions generate heat whenever the vehicle is moving. The harder the powertrain works, the more heat is generated inside the transmission. Without some way of cooling the transmission fluid, heat will continue to build.

Normal automatic transmission fluid (ATF) temperatures are 170 degrees F. Once those temperatures exceed 200 degrees, the ATF begins to break down rapidly as heat increases.

Many of today's vehicles already have transmission coolers built into the radiator. But these are for normal use only. For towing, most manufacturers recommend auxiliary coolers. An auxiliary cooler has a separate radiator that is normally mounted in front of the coolant radiator. Deep sump pans, like those used for engine oil, are also available for transmissions and add more fluid volume, which can help control temperatures in the transmission.

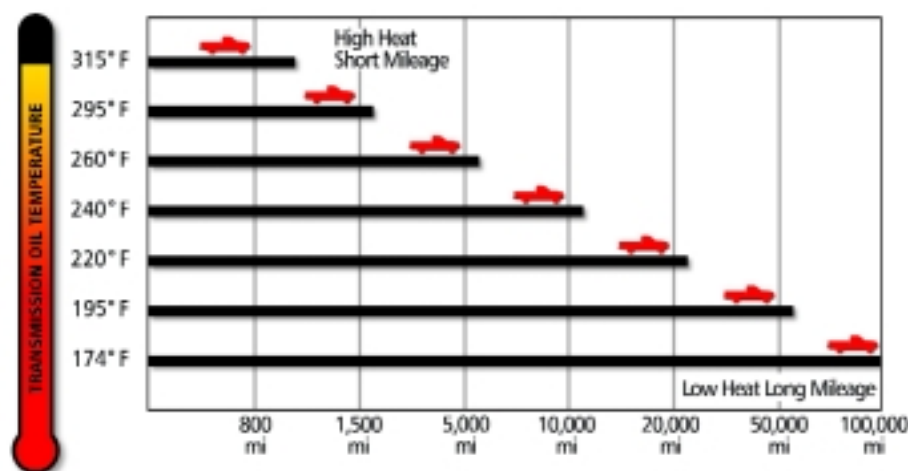
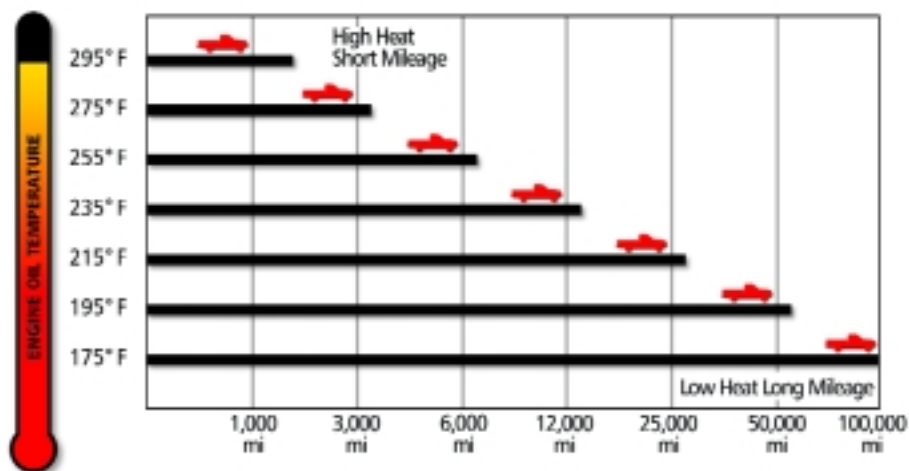
AXLE RATIO

The proper axle (ring and pinion) gear ratio keeps the engine operating at a sufficient speed to best use its available power. Up to a point, an engine turning higher rpm when towing will run cooler,



THE AXLE RATIO IS DETERMINED

by the difference in rotation between the pinion and ring gears.



TEMPERATURE REGULATION IS one of the most important strategies for extending powertrain component life in your tow vehicle.

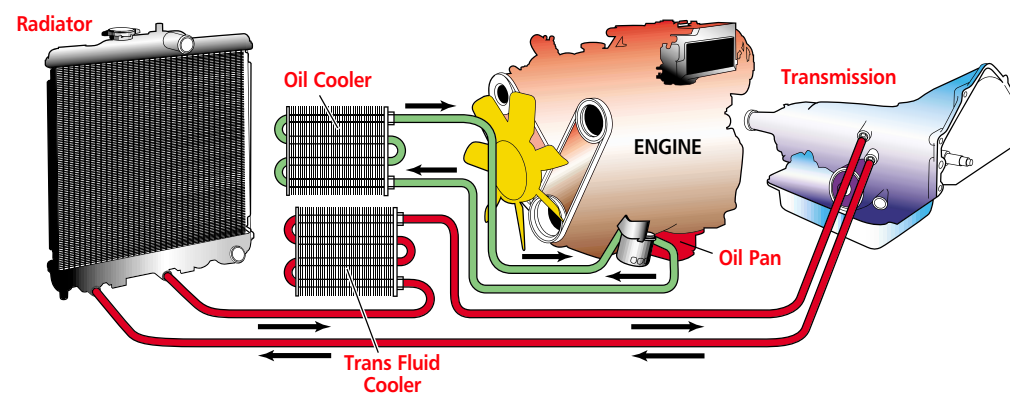
give better performance and better fuel economy than an engine that is laboring (running too slow). Axle ratio also affects acceleration and tow ratings.

For light, non-towing loads, the vehicle can use an axle ratio that has low numbers, such as a 2:1 ratio. When subjected to heavy loads, high numbers are preferred, such as 4:1. The axle ratio is determined by two gears in the differential: pinion and ring gears.

The pinion gear transfers power from the transmission to the larger ring gear, which is located in the differential and drives the axles. A ratio of 2:1 indicates that the smaller pinion gear must rotate two times for each revolution of the ring gear. A ratio of 4:1 means the pinion turns four times to each ring-gear revolution.

Each axle ratio has its own advantages and disadvantages. A low axle ratio can offer better

AUXILIARY OIL AND TRANSMISSION fluid coolers are key elements in reducing high operating temperatures in tow vehicles.



fuel economy, quieter operation, higher top speeds and longer engine life. A high axle ratio (4.10:1, for example) can increase pulling power and give better acceleration. When towing, however, if an axle ratio is too low, the engine cannot operate at optimum rpm while maintaining speed, accelerating or climbing hills; thus it overheats. Generally, good axle ratios for towing are between 3.50:1 and 4.10:1.

On new vehicles sitting on the dealer's lot, the axle ratio will be listed on the window sticker. If you don't know your present vehicle's axle ratio, there are several ways to find out what it is. Some manufacturers stamp it into the differential or transaxle housing, or on a metal tag attached to the differential cover. More commonly, it is in code and part of the Vehicle Identification Number (VIN) or some other identification number, such



AFTERMARKET OIL AND TRANSMISSION fluid coolers are available in different sizes for a variety of tow-vehicle applications.



AIR SPRINGS (bags) are one way to improve a tow vehicle's rear suspension. They are easy to install and can be adjusted for different loads.

as on a sticker or card pasted inside the glove compartment or doorjamb. It's best to check with a dealer as to where you can locate and how to decode a number that refers to the axle ratio.

SUSPENSIONS

A vehicle's suspension not only helps the driver maintain control and provide for passenger comfort, but it can affect the trailering performance. Too soft a ride when towing can make the vehicle's rear end sag, bounce and even sway. This is why factory supplied towing packages include heavier-duty suspensions.

Usually, springs with higher spring rates (stiffer), heavy-duty shocks and larger diameter anti-sway bars are included in these factory towing packages. Often, though, even factory towing packages may need to be supplemented with additional equipment such as aftermarket air spring (bag) systems, performance shock absorbers and

anti-sway bars — particularly if your towed load is large and heavy.

ADDITIONAL MAINTENANCE

Towing places extra stress on any tow vehicle. You need to pay closer attention to routine maintenance than normal. Manufacturers have a separate maintenance recommendation for heavy-duty use, such as towing, which is outlined in the owner's manual.

Most importantly, you need to change engine and transmission oils and filters more frequently, and lubricate components and check cooling systems at shorter intervals than you would on a vehicle used strictly for passenger duty.

If you have the appropriate equipment on your tow vehicle, and are prudent when it comes to an accelerated maintenance schedule, it should offer you many happy, carefree trailering miles.

Leveling, Loading and Driving

How to Set Up and Drive with a Trailer Behind Your Tow Vehicle



A trailer tows best when level, so do your level best to get it that way when attached to your tow vehicle by adjusting the hitch ball height. This can be done using a dropped or raised drawbar, or with an adjustable hitch.

Weight distribution can affect trailer handling, too. Make sure the trailer is properly loaded — front to rear, and side to side. Because most of a boat's weight is over the axles, it will generally be properly balanced when empty. Due to the engine, however, a small boat is often heavier at the rear. In this case, gear is usually packed in the forward section to offset the heavy weight at the stern. If the loaded boat is not properly balanced on the trailer, the bow stop and axles can be moved fore or aft to alter tongue weight.

For camping trailers, it is usually recommended to add cargo to the front to increase tongue weight. Bicycle racks and other gear storage appliances can lead to trailer sway if not mounted properly, especially with lightweight trailers that are more susceptible to changes in weight distribution. With bike racks or storage boxes mounted at the rear, the tongue weight of the trailer is lightened. Again, be aware of the total weight you are adding to the trailer.

SWAY CONTROL

Camping trailers — and some large boat trailers — often use sway controls. These usually mount to the drawbar near the hitchball and reach to a point on the trailer tongue. A damping device (such as a shock absorber or friction pad) is used to control side-to-side movement and help keep sway in check.

Passing trucks, gusting crosswinds, steep downhill grades, and excessive speed can cause sway. Slow down before approaching downhill sections and areas of gusty wind. To reduce the tendency of a trailer to sway, keep tongue weight between 10 to 15 percent of the total towed weight for camping trailers; boat trailer tongue weights of 5 to 8 percent are recommended. Keep the tow vehicle's tires and trailer tires inflated to the maximum cold pressure stamped on