

2005 GUIDE TO **TOWING**

A Supplement to
TrailerLife

America's Number
One RV Magazine



OFFICIAL TRAILER TOW RATINGS

■ **SELECTING A TOW VEHICLE**

■ **HOW TO HITCH UP**

■ **TOW-PACKAGE ESSENTIALS**

■ **RULES OF THE ROAD**

■ **WEIGHTS AND BALANCE**

■ **BRAKE CONTROLLERS**

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The Right Stuff

Towing has never been more exciting. Detroit's light-truck builders continue to leapfrog each other, with this year's top prize going to Ford for the highest tow rating, 19,200 pounds. But the stable of strong tow vehicles is no longer exclusive to the venerable "Big Three;" Nissan offers tow ratings up to 9,500 pounds for its still-fresh Titan trucks, and Toyotas can be outfitted to handle trailers up to 7,200 pounds. And that's only the tip of the iceberg.

With a slew of vehicles capable of towing decent-size trailers, it's only fitting that the 2005 Guide To Towing be offered as an independent reference pamphlet. And it's packed with more information than ever published in a single towing guide.

This year's guide is more than just a listing of all the vehicles designed to tow more than 3,000 pounds — it's a tool that lets you pinpoint how many pounds a particular model vehicle can actually tow. "How To Choose a Tow Vehicle," on page 7, provides the necessary information prospective owners need when matching their trailer to a new tow vehicle. The key is knowing how to work the numbers as they relate to gross combination weight rating (GCWR). Consideration must also be made to axle ratio, transmission type and whether the vehicle has two- or four-wheel drive. It's all explained here.

Armed with precise information, including the proper components of a well-equipped tow package ("Towing-Package Essentials," page 16), you'll be ready to order the right vehicle, the necessary hitch hardware ("The Connection," page 25) and the best brake control ("Controlling Trailer Brakes," page 31). With this year's guide at your side, you'll be in control when searching for a tow vehicle that best fits your RV needs — and you'll avoid making a costly mistake.

Finally, the guide gives you pointers needed for safe driving techniques ("On the Road," page 35) and what you should expect transitioning from a passenger car to the wonderful world of trailer travel, and some important "Rules of the Road" (page 36). Happy towing! **TG**

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Ford Motor Company, (800) 392-3673, ford.com.
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PUBLISHER BILL ESTES

ASSOCIATE PUBLISHER BOB LIVINGSTON

EDITORIAL DIRECTOR BARBARA LEONARD

ART DIRECTOR MIRANTE ALMAZAN

TECHNICAL EDITOR GREGORY R. WHALE

MANAGING EDITOR KRISTOPHER BUNKER

ASSOCIATE EDITOR MILLIE EVANS

EDITORIAL/BUSINESS OFFICE

2575 VISTA DEL MAR, VENTURA, CA 93001

■ TEL (805) 667-4100 ■ FAX (805) 667-4484

ADVERTISING

Ventura, California

VP/SALES BOB SHERRY

NATIONAL ADVERTISING SALES JULIE LILLIS

BUSINESS MANAGER DENELLE STERNBURG

P.O. Box 8510, VENTURA, CA 93002

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NATIONAL SALES DIRECTOR TERRY THOMPSON

1818 WESTLAKE AVENUE N, #420 SEATTLE, WA 98109

TEL (206) 283-9545 ■ FAX (206) 283-9571

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How To Choose a Tow Vehicle

Taking the ratings seriously is essential to making good vehicle and option choices

TEXT BY A.E. FRANCIS

With so many choices available in tow vehicles, picking the correct one would seem to be a simple task based on budget, brand loyalty and towing capacity. However, there are many more variables to consider, and going through the effort to better understand them and account for them now will lead to a more pleasant ownership and trailering experience later.

How To Choose *a Tow Vehicle*

Know the Lingo

The tow-ratings guide in this section lists only maximum towing and gross combined weight ratings (GCWR) for trucks with specific equipment (largest engine and numerically highest axle ratio), but for many vehicles the maximum tow rating is optimistic. What follows is a layman's explanation of the terms you need to know, which, when combined with readings from a public scale and your calculator, will help you determine the correct towing rating for the truck you plan to buy.

Gross combination weight rating (GCWR):

The total allowable weight of the truck, the trailer, the cargo in each, fluids and occupants.

Gross vehicle weight rating (GVWR):

The total allowable weight for the truck, including fluids, options, occupants, hitch, cargo, and any trailer tongue weight. The trailer's GVWR, sometimes referred to as gross trailer weight rating (GTWR) is the total allowable weight of the trailer, fluids, occupants, options and cargo.

Gross axle weight rating (GAWR): The total allowable weight on any given individual axle. Note that this includes the weight of the tires, wheels, brakes and axle itself.

Maximum tow rating: The manufacturer's weight limit for towed loads. For conventional trailers this normally includes a tongue-weight limit as well; for fifth-wheels the pin weight is applied to the truck's GVWR and rear-axle GAWR.

The GVWR and GAWR for all motor vehicles are listed on the data plate, typically affixed to the driver's door frame, fuel door, glove box, end of the dashboard or other easy-to-get-to location. Brochures and window stickers may be inaccurate. All trailers should have a weight sticker, normally found in an interior cabinet that lists the trailer's unloaded vehicle weight (UVW), GVWR, weight added by freshwater and LP-gas and the resulting payload capability.

In many cases, optional equipment — including AC generators and the fuel they run on — sneaks on after weighing and may not be reflected on the sticker and don't forget the motor-fuel tanks that some SURVs offer for campground refueling of motorcycles and ATVs.

The GVWR figures are neither guidelines nor estimates; they are limits and there are numerous valid reasons the manufacturer arrived at the figures given. If you think these figures are "close-enough" or have a fudge factor percentage built in, think again. Your safety, and your warranty coverage, may be at risk.

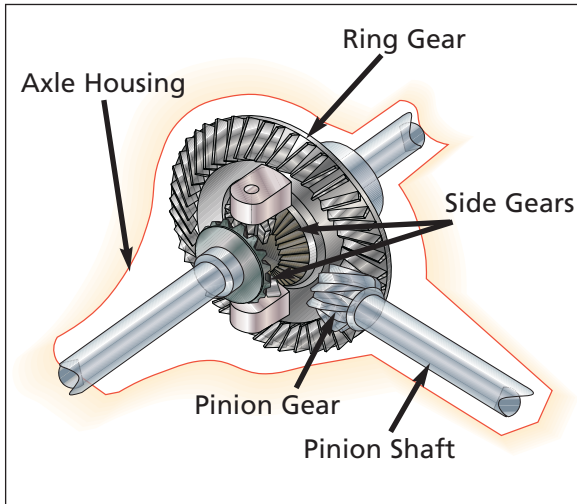
There is one sure way to find out what your trailer weighs, and that is to fill it with everything you normally travel with, right down to the soap and soda, and weigh it at a public truck scale. Without forming a long queue, get the tongue weight, axle weight and total. Assuming that

the axle weight is below the GAWR, the total is below the GVWR and the tongue weight is below the maximum given for your tow vehicle, you can then move on to tow-vehicle selection.

For a new trailer, consult the weight sticker in the unit of your choice on a dealer's lot and refer to the UVW and cargo carrying capacity (CCC). Estimate how much cargo you will add, being mindful of the GVWR, and use that number while selecting a tow vehicle.

To a lesser extent, truck weight is variable as well. Brochures and tow guides frequently list how much a truck weighs, but this number generally applies to the most basic model in that configuration, without any options. In some cases, distinctions are made by engine, transmission, drive system (2WD or





Selecting the proper axle ratio is important to performance and fuel economy. The ratio indicates the proportion between the pinion-shaft and ring-gear revolutions.

some cargo, it weighs 7,500 pounds. That is split to 4,000 pounds on the front axle, and 3,500 pounds on the rear axle.

The first thing you should have noticed is that the maximum tow rating can not apply with the truck fully loaded, because GCWR (23,000) minus GVWR (9,900) leaves 13,100 pounds ... about two tons less than quoted towing ability. After adding options and people to the ex-

ample truck, and subtracting that value (7,500) from GCWR (23,000), the effective working tow rating of the truck becomes 15,500 pounds, about 1,500 pounds less than the truck's quoted maximum towing rating.

ample truck, and subtracting that value (7,500) from GCWR (23,000), the effective working tow rating of the truck becomes 15,500 pounds, about 1,500 pounds less than the truck's quoted maximum towing rating.

However, you have yet to check all the numbers and verify that a 15,500-pound trailer will work. If that trailer is a fifth-wheel and has 20 percent of its weight on the pin, that adds 3,100 pounds to the back of the truck. This would make the truck overweight — its 7,500-pound ready-to-roll weight plus the 3,100 pounds on the pin equals 10,600 pounds — 700 pounds over the truck's GVWR, and just 224 pounds shy of the rear-axle limit of 6,824 pounds.

For Example

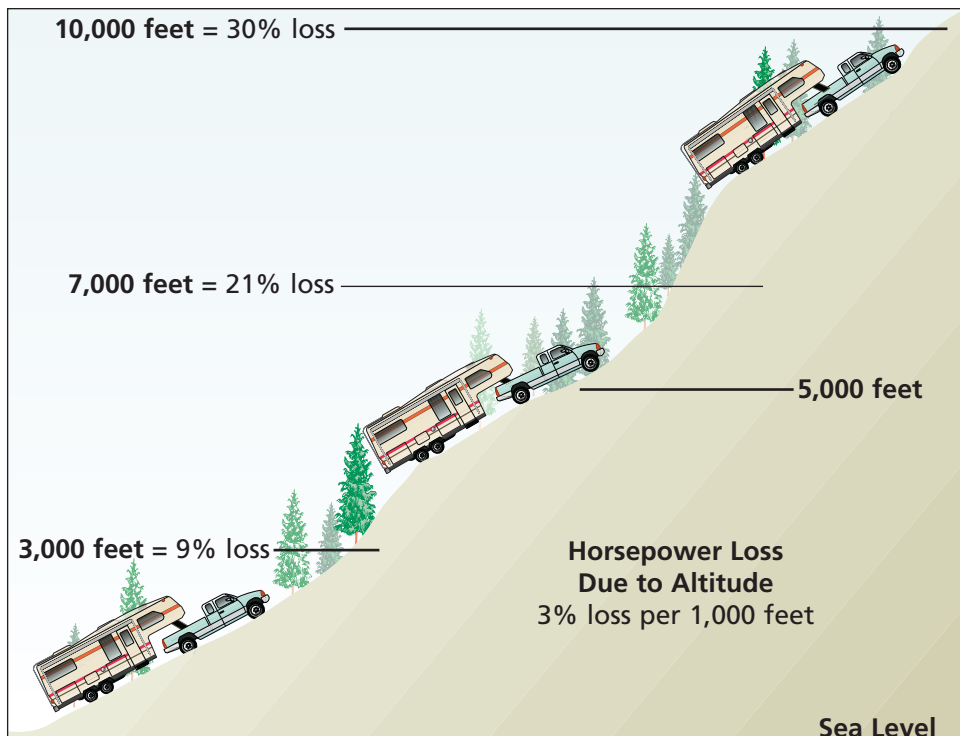
SUVs cannot always escape either. The vehicle's loaded weight must be subtracted from the GCWR to determine the realistic towing rating.

Plus & Minus

Consider a fictional one-ton longbed, diesel, extended cab, 2WD, single-rear wheel pickup set up for towing. We'll arbitrarily assign it a GVWR of 9,900 pounds, a front GAWR of 5,000 pounds, a rear GAWR of 6,824 pounds, a GCWR of 23,000 pounds and a quoted maximum tow rating of 17,000 pounds.

As is often the case in single-rear wheel trucks, the rear axle's GAWR on this truck is derived from each tire's maximum load of 3,412 pounds. Pickups such as this normally start at more than 6,000 pounds, and with a diesel, automatic and nice trim, figure that with a full tank of fuel and hitch, this unit weighs 7,000 pounds. If we add two "standard-size" people (154 pounds each), a few tools and

How To Choose *a Tow Vehicle*



Atmospheric pressure drops as altitude increases, reducing performance of naturally aspirated engines.

Transmission: For the majority of vehicles, an automatic transmission offers the higher tow ratings when they vary by transmission. On heavy-duty models the difference may be 1,000 pounds or less, and on lighter-duty vehicles a manual might rate a 2,000-pound lower tow rating. Exceptions include high-output engines that are available only with manual gearboxes, those vehicles where the manual weighs more than the automatic and transmissions in vehicles designed for high performance and not towing.

Axle Ratio: Lower gearing (the numerically higher ratios, e.g. 4.10:1, 4.56:1, as opposed to 3.55:1, 3.73:1), typically produces the highest tow ratings because of greater torque multiplication. There is wide variance in the axle ratio's effect on tow rating, with some diesel-powered rigs varying only a few hundred pounds. On others, changing from a 3.73:1 to a 4.30:1 sometimes increases the tow rating by 3,500 pounds. In the past, some ratings have increased by a factor greater than three (from 2,000 to 7,100 pounds) simply by using a different axle ratio.

Lower gearing will also make your vehicle accelerate quicker up to 50-55 MPH. In general, a one-step drop in axle ratio (4.10:1 to 3.73:1) on an HD pickup will drop tow rating and GCWR by a ton.

Lower gearing does have an adverse effect on fuel economy, but it's usually not proportional to the gain in towing ability. Under the best circumstances, the difference between the highest and lowest gear ratios offered (say, 3.42:1 and 4.10:1) results in a 1.5-MPG decrease in non-towing, steady state-highway cruising. In most conditions that change is less than 1 MPG, and if you tow a relatively heavy trailer a lot, there's no question that the lowest gearing is best.

Drive System: Vehicles that drive only two wheels, be they front or rear, generally have higher tow ratings (all other things being equal). Even though modern 4WD and AWD systems are quite efficient, a small amount of parasitic loss uses up energy. More importantly, 4WD systems add weight, easily up to 400 pounds on some heavy-duty pickups,

and that weight frequently comes off the tow rating. Unless the GCWR and GVWR are higher, a 4WD version will probably tow a few hundred pounds less than its 2WD counterpart.

Tow Package: If you can order a tow package, do so. Not only is it usually required to get the top tow rating, the contents rarely can be duplicated



for the original cost, and it will add to resale value. Frequently you can see the hitch or tow plug, but there are often changes to the wiring system (including up-rated wire and fuses), alternator, battery, cooling system, power steering and lubricants.

Bed Length/Style: If there's a difference, a long-bed truck may rate slightly lower in tow capacity — 150-250 pounds — because the longer bed adds weight. On other cases there is no change because the longer wheelbase is beneficial. Note that the more "styled" beds marketed under a variety of names typically are heavier than conventional slab-sided beds, and that cab-and-chassis figures do not reflect any bed unless otherwise noted. A steel bed for a medium-duty cab-and-chassis could quickly eat up a ton of its GCWR.

Single or Dual Rear Wheel: Where available, this difference is listed in the guide. Most people assume that a dually pickup will have a higher tow rating than a single-rear wheel unit, but this is not correct. In many cases the GCWR is limited by factors other than the number of rear wheels and does not change, and in those cases the weight of the wider axle, bigger brakes and two more tires and

wheels is subtracted from the GCWR. The dually no doubt provides a more stable towing platform for the heavier trailers, although not always with the highest towing rating.

Tires: Wheel sizes continue to grow commensurate with their popularity, with some tow vehicles offering 20-inch-diameter wheels as factory options. However, using a larger wheel and lower-profile tire means a smaller air cushion and lower sidewall, to the extent that tow ratings generally drop whenever the wheel size increases. Be sure to read the packaging fine print carefully.

Hitches & Equipment

Before purchasing any truck or SUV as a tow vehicle, ensure that the hardware required is available for your vehicle. You may find that the new-kid-on-the-block is a very capable tow vehicle, but no one makes a fifth-wheel for it. Also beware of hitch-ball and receiver rat-

ings, as some trucks are rated for heavier loads than any easily found hardware can handle, and therefore may require special-order parts.

This is a relatively condensed guide compared with what is available from motor companies and their dealers, and acquiring towing guides is essential to making an intelligent tow-vehicle selection. It's necessary to read the fine print in the guide, because in many cases the maximum rating may apply only to one particular version and be for a fifth-wheel trailer; many larger pickups may have their actual tow rating limited by the hitch and hardware. Note that manufacturers provide tow ratings based variously on a fully loaded vehicle, one with two or four passengers or a vehicle with just a driver on board — the primary reasons we've included GCWR when available — and in some cases tow ratings include frontal area of the trailer as a consideration.

Only Acura and Honda differentiate trailer limits by aerodynamic drag — our guide lists the travel-trailer value. Also, remember that the powertrains used in top-rated trucks may not be available in each of the 50 states or Canada. **TG**

2005 Tow

Please refer to page 9 for instructions on how to use the following tow ratings.

LIST OF ABBREVIATIONS

4WD = Four-Wheel Drive
 AWD = All-Wheel Drive
 CV = Cargo Van
 DRW = Dual Rear Wheel
 Ext Cab = Extended Cab

HD = Heavy-Duty
 LD = Light-Duty
 PV = Passenger Van
 Reg Cab = Regular Cab
 SC = Supercharged

SRW = Single Rear Wheel
 TC= Turbocharged/intercooled
 TD = Turbo Diesel
 () = Fifth-Wheel rating
 NA = Not Available/ ND = No Data

MODEL	ENGINE	TOW CAP (Lb) 2WD/ 4WD or AWD	GCWR (Lb) 2WD/ 4WD or AWD	MODEL	ENGINE	TOW CAP (Lb) 2WD/ 4WD or AWD	GCWR (Lb) 2WD/ 4WD or AWD
ACURA							
MDX	3.5L V-6	NA/3,500	NA/EST 10,000		5.9L I-6 TD	13,400/13,100	20,000
				3500 Reg Cab DRW	5.7L V-8	10,950/10,450	17,000
					5.9L I-6 TD	16,250/15,850	23,000
				3500 Quad Cab SRW	5.9L I-6 TD	16,350/15,950	23,000
				3500 Quad Cab DRW	5.7L V-8	10,550/10,100	17,000
					5.9L I-6 TD	15,900/15,500	23,000
BMW				SUV			
X3 2.5i	2.5L I-4	NA/3,500	NA/EST 7,700	Durango	3.7L V-6	3,750/NA	8,600/NA
X3 3.0i	3.0L I-6	NA/3,500	NA/EST 7,725		4.7L V-8	7,400/7,200	12,500
X5 3.0i	3.0L I-6	NA/6,000	NA/EST 10,850		5.7L V-8	8,950/8,650	14,000
X5 4.4i	4.4L V-8	NA/6,000	NA/EST 11,000	Grand Cherokee	3.7L V-6	3,500	EST 7,500
X5 4.8is	4.6L V-8	NA/6,000	NA/EST 11,170		4.7L V-8	6,500	EST 11,000
DAIMLERCHRYSLER					5.7L V-8	NA/7,200	NA/EST 11,500
(Chrysler, Dodge, Jeep, Mercedes-Benz)				Liberty	2.4L I-4	2,000	6,750/7,000
PICKUP					2.8L I-4 TD	NA/5,000	NA/10,150
Dakota					3.7L V-6	5,000	9,850/10,000
Club Cab	3.7L V-6	4,850/4,700	9,500/9,300	G-Class	5.0L V-8, 5.4L V-8 SC	NA/7,000	NA/EST 13,500
	4.7L V-8	7,150/6,950	11,700	GST	3.7L V-6	3,500	NA/8,000
Quad Cab	3.7L V-6	4,750/4,600	9,500/9,300	ML350	3.7L V-6	NA/6,200	NA/EST 12,000
	4.7L V-8	7,000/6,850	11,700	ML500	5.0L V-8	NA/6,200	NA/EST 12,000
Ram				Pacifica	3.5L V-6	3,500	EST 8,500
1500 Reg Cab	3.7L V-6	3,800/NA	8,500/NA		3.8L V-6	3,500/NA	EST 8,000/NA
	4.7L V-8	7,750/7,400	12,500	Wrangler	2.5L I-4	NA/1,000	EST 5,500
	5.7L V-8	9,250/8,850	14,000		4.0L I-6	NA/2,000	EST 6,500
1500 Quad Cab	3.7L V-6	3,550/NA	8,500/NA	Wrangler Unlimited	4.0L I-6	NA/3,500	EST 7,000
	4.7L V-8	7,400/7,150	12,500	VAN			
	5.7L V-8	8,900/8,600	14,000	Caravan LWB	3.3L V-6	3,800/NA	EST 7,500
2500 Reg Cab	5.7L V-8	11,450/11,000	17,000		3.8L V-6	3,800/3,500	EST 7,500
	5.9L I-6 TD	13,600/13,200	20,000				
2500 Quad Cab	5.7L V-8	11,200/10,800	17,000				

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Town & Country LWB	3.3L V-6, 3.8L V-6	3,800	EST 7,500
Sprinter 2500	2.7L I-5	5,000/NA	13,550/NA
Sprinter 3500	2.7L I-5	5,000/NA	14,990/NA

FORD/LINCOLN/MERCURY CAB & CHASSIS

F-350 Reg Cab SRW	5.4L V-8	11,500/11,100	18,000
	6.8L V-10	12,500 (14,500/14,000)	21,000
	6.0L V-8 TD	12,500 (15,900/15,500)	23,000
F-350 Reg Cab DRW	5.4L V-8	11,700/11,300	18,500
	6.8L V-10	15,000 (16,200/15,700)	23,000
	6.0L V-8 TD	15,000 (16,200/15,700)	23,500
F-350 SuperCab SRW	5.4L V-8	11,100/10,700	18,000
	6.8L V-10	12,500 (14,100/13,600)	21,000
	6.0L V-8 TD	12,500 (15,600/15,100)	23,000
F-350 SuperCab DRW	6.8L V-10	15,000 (15,800/15,300)	23,000
	6.0L V-8 TD	15,000 (15,800/15,300)	23,500
F-350 Crew Cab SRW	5.4L V-8	10,900/10,500	18,000
	6.8L V-10	12,500 (13,900/13,400)	21,000
	6.0L V-8 TD	12,500 (15,400/14,900)	23,000
F-350 Crew Cab DRW	6.8L V-10	15,000 (15,600/15,100)	23,000
	6.0L V-8 TD	15,000 (15,600/15,100)	23,500
F-450 Reg Cab	6.8L V-10	16,000 (18,400/18,100)	26,000
	6.0L V-8 TD	16,000 (21,900/21,600)	30,000
F-450 SuperCab	6.8L V-10	16,000 (18,000/17,700)	26,000
	6.0L V-8 TD	16,000 (21,500/21,200)	30,000
F-450 Crew Cab	6.8L V-10	16,000 (17,800/17,500)	26,000
	6.0L V-8 TD	16,000 (21,300/21,000)	30,000
F-550 Reg Cab	6.8L V-10	16,000 (18,400/18,100)	26,000
	6.0L V-8 TD	16,000 (24,800/24,500)	33,000
F-550 SuperCab	6.8L V-10	16,000 (18,000/17,700)	26,000
	6.0L V-8 TD	16,000 (24,500/24,200)	33,000
F-550 Crew Cab	6.8L V-10	16,000 (17,800/17,500)	26,000
	6.0L V-8 TD	16,000 (24,300/23,900)	33,000

(Ford cab & chassis ratings listed for shortest wheelbase models)

PICKUP

Explorer Sport Trac	4.0L V-6	5,300/5,080	EST 9,100
F-150 Reg Cab	4.2L V-6	5,600/NA	10,500
	4.6L V-8	7,100/6,800	12,200
	5.4L V-8	9,900/9,500	15,300
F-150 SuperCab	4.6L V-8	6,900/6,600	12,200
	5.4L V-8	9,500/9,300	15,300
F-150 SuperCrew	4.6L V-8	6,800/6,500	12,200

	5.4L V-8	9,500/9,200	15,000
F-250/350 SRW Reg Cab	5.4L V-8	12,000/11,600	18,000
	6.8L V-10 (a)	12,500 (17,000/16,500)	23,000
	6.0L V-8 TD	12,500 (16,500/15,900)	23,000
F-350 Reg Cab DRW	5.4L V-8	12,300/11,800	18,500
	6.8L V-10	15,000 (16,700/16,200)	23,000
	6.0L V-8 TD	15,000 (19,200/18,700) (b)	26,000
F-250/350 SuperCab SRW	5.4L V-8	11,700/11,200	18,000
	6.8L V-10 (a)	12,500 (16,600/16,200)	23,000
	6.0L V-8 TD	12,500 (16,100/15,600)	23,000
F-350 SuperCab DRW	5.4L V-8	11,900/11,400	18,500
	6.8L V-10	15,000 (16,300/15,900)	23,000
	6.0L V-8 TD	15,000 (18,800/18,400) (b)	26,000
F-250/350 Crew Cab SRW	5.4L V-8	11,500/11,100	18,000
	6.8L V-10 (a)	12,500 (16,400/15,900)	23,000
	6.0L V-8 TD	12,500 (15,900/15,400)	23,000
F-350 Crew Cab DRW	6.8L V-10	15,000 (16,100/15,600)	23,000
	6.0L V-8 TD	15,000 (18,700/18,300) (b)	26,000
Ranger	2.3L I-4	2,260/NA	5,500/NA
	3.0L V-6	2,640/2,340	6,000
	4.0L V-6	5,980/5,660	9,500
Ranger SuperCab	3.0L V-6	2,460/NA	6,000/NA
	4.0L V-6	5,860/5,580	9,500

(a) Deduct 500 pounds for F-250.

(b) Must have TowBoss package for fifth-wheel towing. Deduct 2,500 pounds from fifth-wheel tow ratings and GCWR without TowBoss package.

SUV

Aviator	4.6L V-8	5,000/7,100	10,000/12,300
Escape	3.0L V-6	3,500	7,080/7,240
Excursion	5.4L V-8	7,600/7,200	14,500
	6.0L V-8 TD, 6.8L V-10	11,000	20,000
Expedition	5.4L V-8	8,900/8,600	14,500
Explorer	4.0L V-6	5,760/5,380	10,240/10,000
	4.6L V-8	7,140/7,000	11,600
Mountaineer	4.0L V-6	5,660/5,280	10,240/10,000
	4.6L V-8	7,040/6,900	11,600
Navigator	5.4L V-8	8,600/8,300	11,900/12,200

VAN

E-150 PV	4.6L V-8	6,100/NA	11,500/NA
	5.4L V-8	6,500/NA	12,000/NA
E-150 CV	4.6L V-8	6,500/NA	11,500/NA
	5.4L V-8	6,900/NA	12,000/NA

2005 Towing Guide

E-250 CV	4.6L V-8	5,600/NA	11,000/NA
	5.4L V-8	7,500/NA	13,000/NA
E-350 CV	5.4L V-8	7,300/NA	13,000/NA
	5.4L V-8	6,900/NA	13,000/NA
E-350 PV/CV	6.8L V-10	10,000/NA	17,700/NA
	6.0L V-8 TD	10,000/NA	20,000/NA

GENERAL MOTORS

(Buick, Cadillac, Chevrolet, GMC, Hummer, Pontiac, Saab, Saturn)

CAB & CHASSIS

2500HD/3500 (a)	6.0L V-8	ND	16,000
	6.6L V-8 TD, 8.1L V-8	ND	22,000 (b)
C4500 (a)	6.6L V-8 TD, 8.1L V-8	ND	24,000/26,000
C5500 (a)	6.6L V-8 TD, 8.1L V-8	ND	26,000

(a) Tow ratings determined by added body and GCWR

(b) 23,500 LB on diesel DRW models

PICKUP

Avalanche 1500	5.3L V-8	8,200/7,900	14,000
Avalanche 2500	6.0L V-8	12,000/11,900	14,000
	8.1L V-8	10,400	19,000

Canyon/Colorado

Reg Cab	2.8L I-4	3,500/3,100	7,000
	3.5L I-5	4,000	9,000
Ext Cab	2.8L I-4	3,200/2,900	7,000
	3.5L I-5	4,000	9,000
Crew Cab	2.8L I-4	3,100/2,900	7,000
	3.5L I-5	4,000	9,000
Denali/Silverado SS	6.0L V-8	NA/8,100	NA/14,000
Escalade EXT	6.0L V-8	NA/7,300	NA/14,000

Sierra/Silverado

1500 Reg Cab	4.3L V-6	5,100	10,000
	4.8L V-8	8,000	13,000
1500 Ext Cab	4.3L V-6	3,700	10,000
	4.8L V-8	4,100	13,000
	PHT 5.3L V-8	7,000	EST 14,000
	5.3L V-8	7,500	14,000
	6.0L V-8	7,600	16,000
1500 Crew Cab	5.3L V-8	7,500	14,000
1500HD Crew Cab	6.0L V-8	10,200	16,000
2500HD Ext Cab	6.0L V-8	10,600	16,000
	8.1L V-8	12,000 (16,200)	22,000
	6.6L TD V-8	12,000 (16,000)	22,000
2500HD Crew Cab	6.0L V-8	8,000	16,000
	8.1L V-8	12,000	22,000
	6.6L TD V-8	12,000	22,000

3500 Ext Cab	6.0L V-8	9,800 (10,000)	16,000
	8.1L V-8	12,000 (15,600)	22,000
	6.6L TD V-8	12,000 (16,700)	23,500
3500 Crew Cab	6.0L V-8	9,600	16,000
	8.1L V-8	12,000	22,000
	6.6L TD V-8	12,000	23,500
Silverado SS/Denali	6.0L V-8	NA/8,100	NA/13,000

SUV

9-7x	4.2L I-6	EST 6,300/6,100	EST 11,000
	5.3L V-8	EST 7,000/6,500	EST 11,500
Aztek	3.4L V-6	3,500	EST 8,000
Blazer 2-door	4.3L V-6	5,700/5,400	9,500
Envoy XUV, XL, TrailBlazer EXT	4.2L I-6	6,000/5,800	11,000
Envoy XUV	5.3L V-8	6,500/6,400	12,500
Envoy XL, Denali	5.3L V-8	7,100/6,700	12,500
Envoy/TrailBlazer	4.2L I-6	6,300/6,100	11,000
	5.3L V-8	7,000/6,500	11,500
Equinox	3.4L V-6	3,500	7,600
Escalade	5.3L V-8	7,400/NA	13,000/NA
	6.0L V-8	NA/8,100	NA/14,000
Escalade ESV	6.0L V-8	NA/7,700	NA/14,000
H1 4-door Open Top	6.5L V-8 TD	7,867	15,300
H1 Station Wagon	6.5L V-8 TD	7,409	15,300
H2	6.0L V-8	6,700	14,000
Rainier	4.2L I-6	6,200/6,000	11,000
	5.3L V-8	6,700/6,500	11,500
Rendezvous	All	3,500	EST 8,000
SRX	3.6L V-6	EST 3,000	6,853
	4.6L V-8	4,250	9,353

Suburban/ Yukon XL 1500	5.3L V-8	8,400/8,100	14,000
Suburban/ Yukon XL 2500	6.0L V-8	9,700/9,400(a)	16,000
	8.1L V-8	12,000	19,000
Tahoe/Yukon	5.3L V-8	7,700/7,800	14,000
Yukon Denali	6.0L V-8	8,200	14,000
Yukon Denali XL	6.0L V-8	8,000	16,000
VUE	3.5L V-6	2,500	EST 7,500

(a) With QuadraSteer.

VAN

Astro/Safari CV	4.3L V-6	5,700/5,500	8,500
Astro/Safari PV	4.3L V-6	5,400/5,100	8,500
G1500 CV	4.3L V-6	4,400/NA	10,000/NA
	5.3L V-8	6,100/NA	12,000/NA
G1500 PV	5.3L V-8	6,000/NA	12,000/NA
G2500 CV	6.0L V-8	8,600/NA	14,000/NA
G2500 PV	6.0L V-8	8,000/NA	14,000/NA
G3500 CV	6.0L V-8	10,000/NA	16,000/NA

G3500 PV	6.0L V-8	10,000/NA	16,000/NA
Montana/Venture	3.4L V-6	3,500	EST 8,000
Montana SV6/Relay/ Terraza	3.5L V-6	3,500	8,500

HONDA

Odyssey	3.5L V-6	3,500	EST 10,000
Pilot	3.5L V-6	3,500	EST 10,000

HYUNDAI

Santa Fe	2.4L I-4	1,700/NA	6,000/NA
	2.7L V-6	3,200/2,700	7,700/7,400
	3.5L V-6	3,300/2,800	7,800/7,500
Tucson	2.0L I-4	2,000	5,930/6,130
	2.7L V-6	2,000	6,650/6,830

INFINITI

FX35	3.5L V-6	3,500	8,000
FX45	4.5L V-8	NA/3,500	8,100
QX56	5.6L V-8	9,000/8,900	14,599

ISUZU

Ascender	4.2L I-6	5,500/5,300	EST 11,000
	5.3L V-8	6,800/6,300	EST 11,500
Axiom	3.5L V-6	4,500	EST 8,000
Rodeo	3.2L V-6	4,500	EST 8,000

KIA

Sedona	3.5L V-6	3,500/3,500	9,000/9,000
Sorento	3.5L V-6	3,500	EST 9,000
Sportage	2.0L I-4	2,000	5,930/6,130

LAND ROVER

LR3	4.4L V-8	NA/5,500	EST 11,500
Freelander	2.5L V-6	NA/2,500	EST 6,800
Range Rover	4.4L V-8	NA/5,500	EST 11,300

LEXUS

GX 470	4.7L V-8	NA/6,500	NA/12,000
LX 470	4.7L V-8	NA/5,000	NA/10,900
RX 330	3.3L V-6	3,500	8,475

MAZDA

B2300	2.3L I-4	2,260/NA	5,500/NA
B3000	3.0L V-6	2,640/2,300	6,000
B3000 Cab Plus 4	3.0L V-6	2,460/NA	6,000/NA
B4000	4.0L V-6	5,980/5,660	9,500
B4000 Cab Plus 4	4.0L V-6	5,860/5,580	9,500
Tribute	3.0L V-6	3,500	EST 7,080/7,240

MITSUBISHI

Montero	3.8L V-6	NA/5,000	NA/EST 11,000
Endeavor	3.8L V-6	3,500	EST 8,800

NISSAN

Armada	5.6L V-8	9,100	14,799
Frontier	2.5L I-4	EST 3,500	EST 8,000
	4.0L V-6	6,000	EST 11,500
Murano	3.5L V-6	3,500	EST 8,000
Pathfinder	4.0L V-6	6,000	EST 11,500
Quest	3.5L V-6	3,500	EST 8,000
Titan Crew Cab	5.6L V-8	9,400	14,600
Titan King Cab	5.6L V-8	9,500	EST 14,600
Xterra	4.0L V-6	5,500	EST 11,500

PORSCHE

Cayenne S/Turbo	All	NA/7,716	NA/EST 14,000
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SUBARU

Outback H6	3.0L H-6	3,000	EST 6,850
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SUZUKI

Vitara	2.5L V-6	2,000	EST 6,000
Grand Vitara	2.5L V-6	2,000	EST 6,000
XL-7	2.7L V-6	3,000	EST 7,000

TOYOTA

4Runner	4.0L V-6	5,000	EST 11,000
	4.7L V-8	7,300/7,000	EST 12,000
Land Cruiser	4.7L V-8	NA/6,500	NA/12,400
Sequoia	4.7L V-8	6,500/6,200	12,000
Sienna	3.3L V-6	3,500	EST 8,200
Tacoma Reg Cab	2.7L I-4	3,500	7,500
	4.0L V-6	6,500	8,000
Tacoma Access/ Double Cabs	2.7L I-4	3,500	7,500/8,000
	4.0L V-6	6,500	11,100
Tundra Reg Cab	4.0L V-6	5,000	EST 10,000
	4.7L V-8	NA/7,200	EST 11,800
Tundra Access Cab	4.0L V-6	4,800	EST 10,000
	4.7L V-8	7,100/6,900	EST 11,800
Tundra Double Cab	4.7L V-8	6,800/6,500	11,800

VOLKSWAGEN

Eurovan	2.8L V-6	NA/4,400	NA/ EST 14,000
Touareg	4.2L V-8, 5.0L V-10 TDI	NA/7,716	NA/ EST 14,700

VOLVO

XC70	All	3,300	EST 7,300
XC90	All	5,000	EST 10,000

Towing-Package

A tow-vehicle buyer is presented with a dizzying array of options when choosing a new tow vehicle, but there's one option that should be crystal clear and a must-have: the towing package.

There are several good reasons for choosing factory-installed towing hardware. You have full warranty coverage on the equipment. It was designed by the best engineering minds at a major auto manufacturer, and that's reassuring when the hardware is tying your tow rig and trailer safely together. You'll probably save money over the cost of aftermarket hardware. And perhaps best of all, use of the factory options means being ready for the road is a turnkey operation that calls for few or no trips to specialty shops after leaving the dealership.

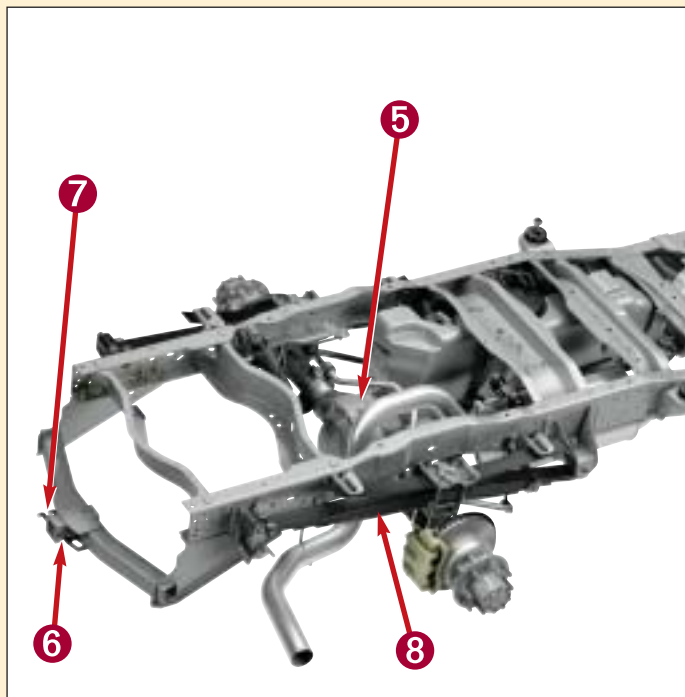
In many cases, you don't have a choice. If the vehicle is to be rated for its highest towing capacity, the towing-package option is mandatory to give the rig its optimum performance potential. For less strenuous duty, the towing package is optional.

Check dealer literature to determine the content of the towing-package option. Some of the items you may encounter include:

Towing axle ratio: Most packages include a lower (numerically higher) axle ratio; for example, a 3:73:1 or 4:10:1 instead of the 3:55:1 that comes with the stock vehicle. A lower ratio results in greater torque multiplication

at the rear wheels, which means more power for towing. It also means the engine turns somewhat faster for a given road speed, but that's the tradeoff for improved towing performance.

Hitch receiver: If the rig already has a receiver, all you need to select is the proper ball mount and the associated hardware, such as a load-distributing hitch. The receiver will be properly matched to the tow vehicle's trailer tow rating so you needn't worry about any hitch overloading situations – as long as you pay attention to the numbers. You'll also avoid interference problems with the exhaust pipe(s), the fuel tank and the spare tire.



Essentials

Wiring package: The wiring package at its simplest is a group of color-coded pigtailed near the back bumper that's ready for installation of the trailer-plug receptacle. It can also be as complete as a plug or two installed out back, a pigtail for brake-control installation under the dash and full integration with the tow rig's electric system.

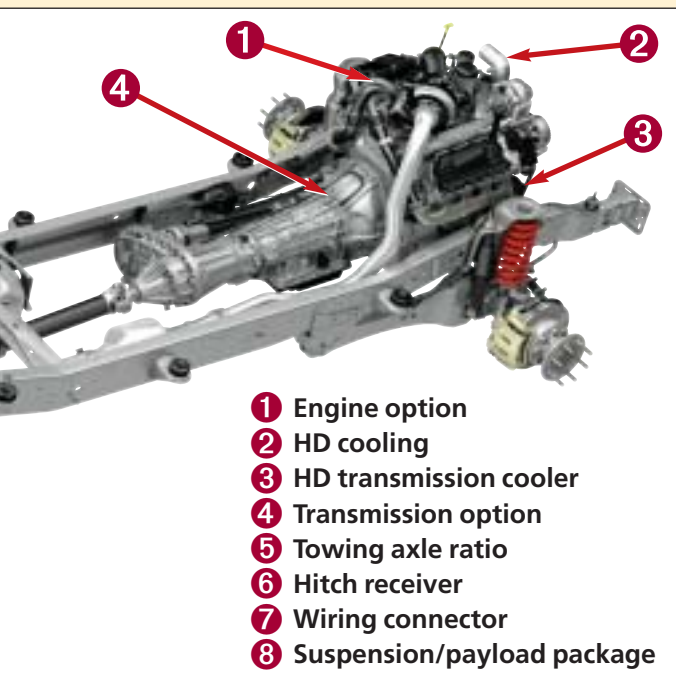
Alternator: It takes extra charging current to keep a trailer's battery(ies) charged in addition to handling the electrical power needs of the tow vehicle. The battery itself may also be larger.

Heavy-duty suspension: The trailer and its hitch weight add load on the tow-

vehicle suspension, so the normal reaction among dealership sales staff and buyers alike is to order the optional HD suspension, particularly when fifth-wheel towing is involved. In fact, when the trailer is a conventional ball-type trailer, it's often best not to order a heavy spring option if there is a choice (if the towing package does not include HD suspension) for trucks rated 8,600 pounds and above because stiff ride and the tendency of the rear springs to do some or most of the work of the load-distributing hitch can be the result. A stiff ride is a very common complaint among owners of $\frac{3}{4}$ -ton and one-ton pickups not towing fifth-wheels.

A case can be made for not ordering

HD suspension even for fifth-wheel towing – except in very high pin-weight situations – opting instead to install auxiliary springs or air bags after delivery to support the pin weight (if necessary), which allows a more civilized ride on standard rear springs while not towing. It's necessary to compare the standard and optional rear-axle-weight ratings (GAWR) relative to the anticipated trailer pin weight. It's easy to upgrade rear suspensions after a truck is built, but nearly impossible to soften the ride of an oversprung truck without replacing the suspension. SUVs have enough of their body weight on the rear axle so that it's not an issue.





Extendible mirrors require less space than conventional towing mirrors when retracted, and offer a clear view of the trailer when they're in position while towing.

Brake control: Ford's 2005 model Super Duty is the only tow rig that offers a factory-installed brake controller. This new unit works amazingly well, and should be at the top of a must-have list. Otherwise, towing packages usually include a trailer-wiring harness with a circuit for an aftermarket brake-control unit – a very worthwhile component of the package.

Stability control: The Big Tow package on Nissan's Titan is the only one that includes electronic stability control. Some GM vehicles offer QuadraSteer or electronic stability control, but these are not part of the towing option.

Mirrors: Both the Ford Super Duty TowCommand package and the Nissan Titan Big Tow package include dual-element extendible mirrors; in many cases the primary mirror element is electrically adjusted and heated.

Extra cooling: The largest possible radiator, a larger transmission-oil cooler and often a power-steering-fluid cooler are essential parts of the usual HD cooling component of a towing package, and no tow vehicle should be ordered without them. These components not only help the tow rig avoid overheating any vital functional parts, they also lead to longer trouble-free component service life. – *Jeff Johnston*

WHAT'S IN A TOWING PACKAGE?

Trailer packages vary by model, but here are some components that may be part of it:

Hitch receiver
4 and/or 7-pin connector
Larger alternator
Larger battery
Larger radiator
Additional electric fan(s)
Transmission-fluid cooler
Engine-oil cooler

Rear antisway bar
Extendible mirrors
Vehicle Dynamic Control
Integrated brake controller
Brake controller pre-wire
Synthetic lubricants
Lower axle ratio
Re-valved shock absorbers



**Ford F-Series
Super Duty**

WHAT'S NEW

TOWING 2005

Ford raises the F-350 ratings' bar to 19,200 pounds and adds built-in brake control

TEXT BY DUNCAN O'NEAL



**Nissan
Frontier**



C550 Topkick

As trailer manufacturers continue to add more features, slideouts and weight, the maximum tow ratings for pickups continue to climb, with Ford's Super Duty emerging as the new leader. Super Duty pickups carry a peak rating of 15,000 pounds for a conventional trailer and an unprecedented (for an F-350 light-duty truck) 19,200 pounds for fifth-wheels; gross combination weight rating (GCWR) has been raised to 26,000 pounds.

The key to the ratings boost is Ford's new TowBoss option, which adds a 4.30 limited-slip rear axle to the truck equipped with a 6.0-liter diesel engine, Torq-Shift automatic transmission and the TowCommand

System. The TowBoss package is only available on F-350 dual-rear-wheel trucks, standard cab, SuperCab or Crew Cab models in two or four-wheel-drive.

The largest F-550 rating reaches almost 25,000 pounds, making it capable of pulling every production trailer built.

Additional noteworthy news for Super Dutys includes a factory-optional fully integrated electronic brake controller, upgraded brakes and a new coil/link front suspension system for 4WD models. Three-valve-per-cylinder heads give the gas engines better power — now up to 300 HP on the 5.4-liter V-8 and 362 HP (and 457 LB-FT of torque) on the 6.8-liter V-10.



**Nissan
Pathfinder**



**Dodge
Dakota**

Regardless of engine, a six-speed manual is the standard gearbox, with the five-speed TorqShift automatic an option. Front styling, wheels and tires and interior cosmetics round out the major upgrades. (See the November 2004 issue of *Trailer Life* for more details.)

Although the Super Duty is literally and figuratively the biggest towing news of the year, there are a few fully redesigned vehicles on the horizon. Alphabetically by manufacturer, here's a brief outline of notable changes.

The DaimlerChrysler umbrella is highlighted by a new Grand Cherokee, replete with independent front suspension, rack-and-pinion steering, a five-link solid

rear axle, an automatic transmission and electronic limited-slip differentials. Standard power is a 210-HP 3.7-liter V-6, with options of the 4.7-liter V-8 and Hemi 5.7-liter V-8 — 330 HP in this installation. In 4WD, only the V-8 uses a two-speed transfer case. The Grand Cherokee is rated to tow up to 7,200 pounds.

Although it might be hard to find in 45 states, the Liberty diesel will sell in limited quantities. Equipped with a 2.8-liter twin-cam four-cylinder common-rail Italian turbodiesel, this Liberty delivers 160 HP and more torque than a 4.7-liter V-8 (295 LB-FT) at just 1,800 RPM; EPA estimates are 21/27 MPG.

Other DaimlerChrysler news includes the new for



2005 Dakota (December 2004 *Trailer Life*) — up to 7,150 pounds towing with the 4.7-liter V-8, but no 5.7-liter option — the stalwart 5.9-liter is no longer made.

Those RVers that avoid civilization will appreciate the Dodge Power Wagon that's good for SUVs and serious outback trailers; the Wrangler Unlimited that is much longer than standard and features up to 3,500 pounds tow rating — including the Rubicon; and a supercharged G55 from Mercedes with 469 hp and 516 lb-ft of torque to pull 7,000 pounds very quickly.

Although the Ford Excursion was modeled on the Super Duty, only the frontal cosmetics change on the lone big SUV with a diesel option. The F-150

introduced last year adds a 4.2-liter V-6 to engine choices on 2WD models (maximum 5,600 pounds tow rating) and the new three-valve 5.4-liter is the only engine offered in the Expedition. Ford's new Escape hybrid is getting a lot of attention, but it doesn't rate highly as a tow vehicle and will likely be in short supply.

General Motors has aimed at refinements for most full-size pickups and utilities, notably including an uprated Duramax/Allison combo (310 hp and 605 lb-ft of torque), electrical architecture upgrades and enhancement of electric-cooling fan systems for more mileage and less noise. The Hummer H2 gets an SUT pickup version that tows just like the wagon, and



Dodge Power Wagon



Toyota Tacoma

wider availability of touch-screen navigation, Stabili-Trak and QuadraSteer on many GM trucks and utilities. Medium-duty Top Kick and Kodiak trucks are now available with a factory 4WD option.

The mid-size Buick Rainier's 300-HP 5.3-liter V-8 is now optional on all versions and a new series of minivans joins the GM fleet. The Buick Terraza, Saturn Relay and Montana SV6 all rate a maximum of 3,500 pounds and come with a 200-HP 3.5-liter V-6 and front or all-wheel drive. Expect standard rear-seat DVD entertainment and options like remote start, PhatNoise entertainment with a removable 40-gig hard drive, a 120-volt AC outlet and hands-free OnStar.

Among the import-badge brigade, Hyundai's Tucson adds another SUV to the compact class, with a sister vehicle from Kia returning the Sportage nameplate, both suited for lightweight tent trailers. Isuzu's Rodeo will offer its gasoline-direct-injection 3.2-liter V-6 (250 HP) that is standard in the Axiom; tow rating stays at 4,500 pounds.

Land Rover has replaced the Discovery with the LR3, an all-new luxury utility powered by a 300-HP 4.4-liter version of Jaguar's AJ V-8 and a six-speed automatic, and that is equipped with the latest in chassis electronics. Its tow rating mirrors the Range Rover at 5,500 pounds. Saab shares further in GM's corpo-



Saturn Relay



Hyundai Tucson

rate empire with its version of the TrailBlazer/Envoy/Rainier/Ascender called the 9-7x.

On the heels of last year's Titan and Armada, Nissan remodels the entire smaller lineup with an all-new Pathfinder, Xterra and Frontier pickup. The Pathfinder uses independent rear suspension to include a standard third-row — much like a smaller scale version of the Armada, the most powerful 4.0-liter V-6 in any SUV — and a top tow of 6,000 pounds. The Frontier and Xterra share the engine upgrade, with the former using a 2.5-liter I-4 as standard; expect ratings between 3,500 and 6,000 pounds.

With six-cylinder power now, Subaru's Outback

H-6 is rated up to 3,000 pounds, making it a viable competitor with compact SUVs, especially if your recreation takes you to the snow.

Toyota has added some horsepower, torque and a five-speed automatic to the Tundra V-8 and Sequoia, and introduced an all-new Tacoma (November 2004 issue of *Trailer Life*) that can be equipped to pull 6,500 pounds with the V-6 engine and either a five-speed automatic or six-speed manual transmission.

Finally, Volvo is planning on making a V-8 engine available in the XC90, but its tow rating is not likely to change. **TG**

The Connection



Buying a new travel trailer or fifth-wheel is fraught with choices. Negotiating a price, arranging financing, settling on a fair trade-in value for your old rig, choosing insurance, floorplans, décor schemes and optional equipment — the list goes on and on.

However, one of the most important choices may be an afterthought — namely, selecting the proper trailer hitch.

Fortunately, selecting the right hitch isn't difficult — nor is its installation, after locating a competent hitch shop. Maintaining proper adjustment of the hitch on an ongoing basis is the challenge, and it has a large bearing on safety and enjoyment of trailer towing.

Trailers are available in two distinctly different designs — one that is coupled to the rear of the

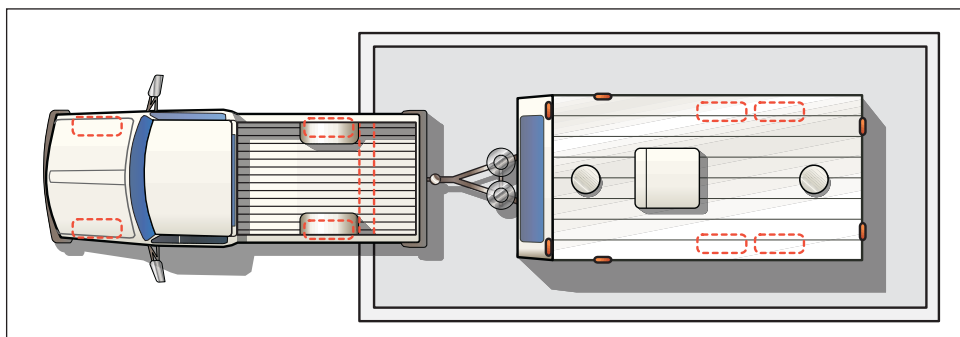
tow vehicle by a conventional hitch ball, and another that utilizes a fifth-wheel hitch mounted in the center of the truck bed. The hitching methods are as different as the trailers, and require specific knowledge by the installer and by the trailer owner.

Choosing the right hitch and adjusting it correctly are the keys to enjoyable towing

TEXT BY JOEL DONALDSON

Hitch Basics — Conventional

All hitches are rated by their respective manufacturers to safely handle up to a specific gross vehicle weight rating (GVWR), which is the weight of the trailer with full water and LP-gas cylinders and with all supplies aboard. Several weight classes exist for hitches designed for towing conventional travel trailers:



To determine tongue weight, first get a reading on axle weight (above), then unhitch the trailer for a total weight reading and then subtract the two.

Weight Carrying

Class I	200-LB TW, 2,000-LB GVWR
Class II	350-LB TW, 3,500-LB GVWR
Class III	500-LB TW, 5,000-LB GVWR
Class IV	750-LB TW, 7,500-LB GVWR
Class V	1,200-LB TW, 12,000-LB GVWR

Weight Distributing

Class IV	1,200-LB TW, 12,000-LB GVWR
Class V	1,400-LB TW, 14,000-LB GVWR

TW=TONGUE WEIGHT

Weight-carrying hitches are intended for lighter trailers because the entire trailer tongue weight is carried on the ball and transferred to the rear axle of the tow vehicle, whereas load-distributing hitches are designed to distribute the trailer's tongue load to all axles of the tow vehicle and trailer, making larger, heavier trailers and considerably higher tongue weights towable without destabilizing the tow vehicle.

A trailer with ideal weight distribution will have a minimum tongue weight of about 10 percent of the gross weight, and the maximum can range upward to 15 percent providing it does not violate the rating of the hitch.

Except for the lightest folding trailers, hitches rated Class II and higher are used for recreational towing, and they utilize a receiver bolted to the tow vehicle's frame. The hitch receiver, which may have hitch box dimensions of 1¼-inches square, 2-inches square or 2½-inches square, with larger boxes designed for higher load ratings, accepts a slide-in ball mount (or draw bar) which is secured with a pin.

Besides serving as the trailer/receiver attachment

point, the ball mount also is used in varying heights (known as "drop") to couple the trailer in a level attitude (frame parallel to the road surface), which is desirable for best stability and trailer-brake performance. Some ball mounts are fixed, while others are adjustable.

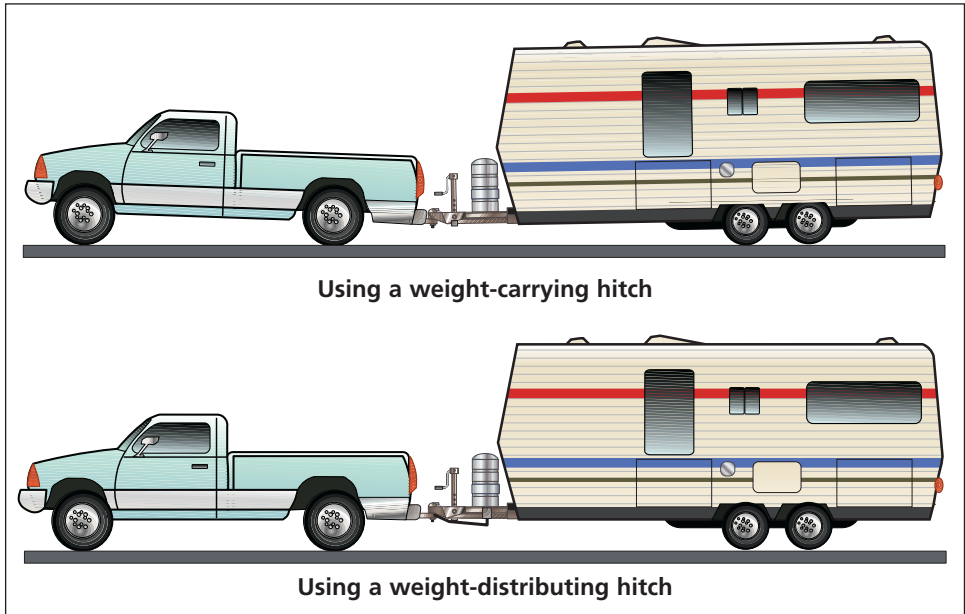
Ball mounts used for weight-carrying hitches are quite different from those used for load distributing. Need for weight-distributing hitches varies with tow-vehicle type and trailer weight. A trailer with 350 pounds of hitch weight may present no challenge for a stiffly sprung, long-wheelbase ¾-ton pickup, while it may destabilize a softly sprung compact SUV. In general, a load-distributing hitch will improve stability in most situations because tongue weight resting on a hitch ball (when a weight-carrying hitch is used) loads the rear axle excessively by placing all of the tongue weight on that axle in addition to weight that is transferred from the front axle to the rear in a see-saw action.

Since many receivers are usable in either weight-carrying or weight-distributing configurations, the manufacturer may list both ratings for the same receiver.

Weight-distributing hitches should be used in many weight situations of Class II, and in most situations of Class III and above. Unlike their weight-carrying counterparts, these hitches use a much heavier ball mount (adjustable in height), plus a pair of springs that provide the leverage needed to distribute weight fore and aft.

Adjustment: The Critical Element

After having a load-distributing hitch of proper weight rating installed, owners may take the rest for granted, which can be a very significant error



A weight-distributing hitch distributes weight to all axles of the tow vehicle and the trailer.

because an improperly adjusted load-distributing hitch can contribute to trailer sway, which is a very undesirable handling trait.

The keys to happy towing are proper ball height and proper load (tension) on spring bars. When they are correct, the tow vehicle, as well as the trailer, are at proper ride height, which in most cases is level. (One exception will be described later.) Proper hitch adjustment helps prevent rear-axle overloading and improves braking and steering response.

Evaluating the proper adjustment of a load-distributing hitch is relatively simple: The tow vehicle should maintain the same attitude before hitching that it does after hitching, measured at reference points at the front and rear bumpers. If it's level before hitching, it should be level afterward, although slightly lower due to the addition of tongue weight. Level attitude means adequate load is placed on spring bars to distribute portions of the tongue weight equally to the front and rear axles. If the rear of the vehicle sags after hitching, spring-bar loading is not adequate.

The exception to level attitude: If the tow vehicle is a stiffly sprung pickup and the rear of the truck is higher than the front, that attitude should

be maintained after hitching. Such trucks often will carry heavy tongue loads without the need for weight-distributing hitches — and without sagging. Judging from the appearance, it's correct; but most of the tongue weight is being carried by the rear axle, in addition to weight transferred to the rear from the front in the aforementioned see-saw action, which can create instability.

If the trailer is not level after spring bars have been adjusted to create the proper tow-vehicle attitude, ball height should be corrected.

Trailer sway can be a problem if trailer balance or hitch adjustment are not correct because the trailer has steering leverage on the tow vehicle by virtue of being connected to the tow vehicle three or four feet behind the rear axle. With correct hitching, trailer balance may be a problem if the tongue weight is less than 10 percent of gross weight. It should be more than 10 percent for best stability.

Even with a well-balanced trailer and a properly adjusted hitch, use of a sway-control device is highly recommended. Often called sway bars (not to be confused with anti-roll bars fitted to axles of tow vehicles), sway-control devices are designed to damp rotation of the coupler on the hitch ball. They improve



Ford Super Duty Receiver

the handling characteristics of the trailer/tow vehicle combination whether the hitch method is weight-carrying or weight-distributing.

Sway-control devices are available in two different configurations, the most popular of which is one that employs a steel bar, attached to the ball mount, that is encased in a rail or tube attached to the trailer A-frame. Inside the rail or tube is friction material that is clamped against the steel bar (adjustable). Any pivoting of the trailer coupler on the bar causes the bar to slide within the rail, creating drag and damping sway. On larger trailers, it's often possible to use a pair of friction-type units for additional sway control.

One popular hitch (the Equal-i-zer) includes a friction feature in the hitch design (tips of spring bars create friction on trailer-frame brackets).

Cam-type sway units work by modifying the operation of the spring bars on a weight-distributing hitch. As the trailer turns, a cam increases the tension on one of the bars, creating a force that tends to pull the trailer back into a straight line. The harder the trailer turns, the stronger this self-centering force becomes. Since this scheme relies on spring-bar tension, it's generally most effective on trailers with relatively high hitch weights (e.g., trailers requiring considerable spring-bar tension).



Hensley Arrow Hitch

The ultimate in sway control is afforded by both the Hensley Arrow and Pulliam Enterprises' PullRite hitch.

The Hensley unit prevents sway through use of trapezoidal hitch linkages that make the tow vehicle and trailer act as a single unit with no pivoting of the coupler on the ball unless the tow vehicle turns. Thus, during highway travel the tow vehicle and trailer are connected as non-articulated vehicles, and function as a single unit. Even so, there is no restriction on the tow vehicle's capability for turns.

The PullRite, in effect, moves the hitch pivot point to a location immediately aft of the tow vehicle's rear axle, which dramatically reduces the leverage the trailer can exert on the tow vehicle.



Draw-Tite W-D Hitch



Equal-i-zer Hitch

Fifth-Wheel Hitch Basics

Fifth-wheel towing is quite a different story. The trailer's kingpin serves as the pivot point for the fifth-wheel hitch, which is centered slightly ahead of the truck's rear axle. The trailer's kingpin slides into a hitch head, where it's secured between latching jaws. This head is attached to a support base, which transfers the towing forces to the truck frame.

The design prevents the trailer from having any steering effect on the tow vehicle, and is what gives fifth-wheel trailers such good road manners. Wind gusts and road irregularities have little or no effect on tow-vehicle stability.

Most hitches are secured to the bed with a pair of mounting rails, or other designs that leave the truck bed flat after the hitch is removed. Removal is accomplished quickly by removing pins. On some models, the hitch head and support base can be removed separately, greatly reducing the amount of weight that must be hefted at one time.

Many fifth-wheel heads are mounted so they allow fore-and-aft flexing to occur between the trailer and tow vehicle. However, having one pivot only permits significant motion in the fore/aft direction, while restricting side-to-side twisting. For this motion to occur, the pin box must lean to one side on the hitch head.



Other hitches have heads that pivot in multiple directions, allowing the pin box to move in any direction with respect to the pickup, while still maintaining a tight mechanical connection. This also makes it easier to hitch or unhitch the trailer on uneven ground.

Another strategy for improving trailer-truck flexibility involves the use of air springs. Typically, the hitch is suspended on multiple bladder-type air bags, which support most of the trailer's kingpin weight. Aside from providing considerable articulation, these springs are also capable of smoothing out much of the road shocks and vibration that would otherwise be transmitted from the trailer to the tow vehicle. Adjustments to the system can be accomplished by varying the amount of air pressure in the bags.

Shortbed pickups are now more popular than ever, particularly among extended-cab models. However, a short bed often causes complications in using the truck for towing a fifth-wheel because the proper hitch-mounting location is far enough forward to cause trailer-to-cab collisions during sharp turns. Installing an extended pin box provides a workable solution with smaller trailers with modest pin weights. Owners should check with the pin-box manufacturer before adding any extension.

For larger units, one solution is a conventional hitch that can be manually unlocked and moved aft on a special set of rails before making tight turns. Other hitches perform this motion automatically, returning to the forward towing position after the turn is completed. Rearward travel can be as much as 22 inches for some models, which is generally adequate for accommodating 102-inch wide trailers. Turns as

tight as 90 degrees are possible in some cases.

Maximum weight ratings for fifth-wheel hitches range up to 25,500 pounds gross weight, with as much as 25 percent of it on the hitch (most fivers have 20 percent hitch weight or less), and it's best to choose a unit that not only will handle the trailer it will be used to tow but any possibility of a larger trailer, although a higher-rated hitch will cost more and will be slightly heavier.

In either case — fifth-wheel or conventional towing — use of a properly rated hitch, adjusted correctly, will ensure a pleasurable towing experience. **TG**

Sources

B & W Truck Beds Inc., (800) 248-6564, turnoverball.com.

Draw-Tite Hitches, (800) 453-5615, drawtite-hitches.com.

Equal-i-zer Hitch, (800) 478-5578, equalizerhitch.com.

Hensley Manufacturing, Inc., (800) 410-6580, hensleymfg.com.

MOR/ryde International, (574) 293-1581, morryde.com.

Pulliam Enterprises, (800) 443-2307, pullrite.com.

RBW Industries Inc., (800) 451-7821, rbwindustries.com.

Reese Division, Cequent Towing Products, (800) 326-1090, reeseproducts.com.

Trailair, (800) 998-4238, trailair.com.

Trailer Saver Air Ride Hitches, (270) 779-9182, trailersaver.com.

Controlling Trailer Brakes



**Ford Trailer-Brake
Controller**

Electric brake systems have been employed for several decades on most trailers that have any significant weight. Each trailer with electric brakes, in turn, requires that the tow vehicle be fitted with a brake controller.

For a number of years, brake-controller choices have been extensive — all aftermarket and all electronic — but Ford has changed the game for 2005 with the first trailer-brake control system included as an integral part of the vehicle's design. During initial *Trailer Life* testing

Ford raises the bar with a new system, while aftermarket designs grow more sophisticated

TEXT BY CHUCK HAMMOCK

(November 2004), the brake control created seamless trailer-braking performance — the truck and trailer behaved as a single unit under all types of braking conditions. The trailer-brake controller is part of the new TowCommand System.

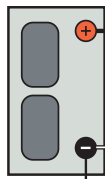
Until the advent of anti-lock brake systems (ABS), most brake controllers were tapped directly into the hydraulic lines of the tow vehicle's on-board hydraulic braking system. They were often described as hydraulic/electric brake controllers, as

Controlling *Trailer Brakes*

General Wiring Diagram For an Aftermarket Controller

Stoplight switch - connect to cold side
(voltage only when pedal is pushed)

20A or 30A auto-reset
circuit breaker



Battery

Chassis
ground

Aux

Battery (+) Black
Stoplight Red
Ground (-) White

Brake Blue

Brake
controller

Trailer
connector

they converted hydraulic pressure in the tow vehicle's brake system to an electric signal used to activate the trailer's brakes directly proportional to hydraulic pressure in the vehicle's braking system.

The most significant factor in elimination of this system was the advent of ABS, and vehicle manufacturers' cautions against tapping into the hydraulic system. The controllers displaced a small amount of brake fluid, and with ABS systems, brake-cylinder volume was more limited, so manufacturers warned not to add controllers that displaced more than 0.02 cubic inches. The tap-in could not occur downstream of the ABS mechanism, so the pressure was on to use alternate systems.

Electronics were the answer, and many different types of aftermarket brake controllers were developed, none tied in with the tow vehicle's hydraulic system. Even in the old days of hydraulic/electric controllers, all were sold in the aftermarket, and Ford is the first to offer a trailer-brake actuation system at the factory.

Ford's New System

Ford's integrated controller electronically tracks hydraulic pressure inside the vehicle's master cylinder and uses it and vehicle speed to modulate the amount of current produced for trailer brakes. Thus, the system accurately follows tow-vehicle braking — more at high speeds than low — even to the point of utilizing ABS. If the tow-vehicle wheels are slipping, ABS goes into action for the tow vehicle as well as the trailer. The Ford system doesn't give the trailer the same functions and characteristics of true ABS, but when the truck's ABS is activated, the trailer-brake application is reduced to avoid wheel lockup — just as with true ABS. A dash monitor indicates the level of trailer braking, and a manual override is provided so trailer brakes can be applied independently of tow-vehicle brakes.

The system cannot be retrofitted to earlier Ford models, and aftermarket controllers still must be used for other vehicles, so the demand for aftermarket controllers is quite large. Accordingly, it's helpful



to understand what's out there and how to make a good choice.

In essence, all electronic brake controllers fall into two general categories: timer-based brake controllers and proportional brake controllers. All brake controllers generate an output signal to a trailer-brake system when you first touch the tow vehicle's brake pedal or activate the brake controller's manual control, if so equipped. What happens next varies greatly, depending on whether you're using a timer-based or proportional brake controller.

While most manufacturers will identify their proportional brake controllers as such, you usually won't see the words "timer-based" in the literature for a nonproportional brake controller. Instead, marketers will sometimes advertise timer-based controllers as having the advantage of requiring no leveling, but even that idea is confusing. Several proportional brake controllers do not require leveling. Timer-based controllers are also touted as being microprocessor-operated, but all brake controllers contain a processor

of some kind. Even the most sophisticated timer-based microprocessor doesn't determine how hard you are braking, only how long you've been braking. A good rule of thumb is that if it doesn't say the word "proportional" somewhere in the literature, it's probably a timer-based brake controller.

Timer-Based vs. Proportional Brake Controllers

A timer-based brake controller has a timer that generates an output signal for your RV's brakes that increases with the amount of time you keep your foot on the brake pedal. It doesn't know whether you're braking gently on a gradual downhill grade, or if you're in a panic stop. The rate of increase in output (the slope of the voltage ramp) has no bearing on pedal effort but can usually be adjusted for braking aggressiveness.

A proportional controller generates an output that is, as the name suggests, directly proportional to your braking needs. Most proportional brake controllers

Controlling *Trailer Brakes*

measure the tow vehicle's rate of deceleration by means of a pendulum. The quicker you slow, the further the pendulum is displaced from its at-rest position. This creates an electric signal to your trailer's brakes that is proportional to your deceleration rate.

Tekonsha and its sister companies use a series of LEDs and photoelectric detectors in their proportional controllers to determine the position of the displaced pendulum and therefore determine the deceleration rate. Hayes-Lemmerz uses the Hall effect, a well-known physics principal involving moving magnets, to determine the pendulum's position.

All pendulum controllers are subject to some inaccuracies, as the pendulum can tilt slightly forward or backward on steep grades. Most such controllers employ a damping device to stabilize the sensor against vibrations, and the damper also helps reduce the effect of the fore-or-aft-tilt problem.

The pendulum's position is adjusted through the level-control knob. This allows the pendulum to be oriented to a true vertical resting position to compensate for the angle of the brake-controller body — the "leveling" referred to in some timer-based controller advertising. The level adjustment also allows the driver to pitch the pendulum slightly forward or aft of its normal resting position to set up the trailer so its braking is aggressive or delayed.

Most drivers prefer some braking effect from the trailer's brakes on the initial touch of the brake pedal, and adjust the brake controller accordingly to provide this so-called threshold voltage. This adjustment produces some output, typically 2 volts, without the initial time period having passed or deceleration having occurred in the two electric brake-controller types. This time period, or deceleration event, is normally needed to activate the timer-based controller or the proportional pendulum-based controller, respectively.

Choices, Choices, Choices

With at least 25 different models of brake controllers on the market, many RVers may find the selection of the right controller difficult without some form of guidance. While budgetary considerations may force a user into one category of controller, this is a critical system where pinching pennies may not be advisable.

When faced with the need for a panic stop, most drivers want a controller that will respond in proportion to their braking need at that moment. Keep in mind that a timer-based controller can't respond in this manner, as its output is fixed for a certain timed duration.

Wiring Considerations

Critical to every successful brake-controller installation is the proper tow-vehicle wiring. While you should carefully follow the manufacturer's recommendations, there are certain common elements to almost every controller.

Among priorities is a reliable power source, which may include a vehicle manufacturer's built-in circuitry for an aftermarket brake controller. The main power line should be at least a 10 AWG wire from a circuit breaker at the fuse box, or the battery, to the brake controller's power-input connection. The circuit should continue from the controller, without any splices, and terminate at the seven-pin connector found at the rear of your tow vehicle. Most manufacturers advise against grounding the controller to the vehicle's firewall, but recommend routing a 10 (or larger) AWG separate ground wire directly back to the battery; the controller may not function properly if the ground connection is not made directly to the battery terminal.

The other wiring connection is made to the brakelight circuit, downstream of the brakelight switch mounted to the brake pedal, so the controller senses when you've activated the brakes.

Among more recent developments, accelerometers are being used to measure braking force. Tekonsha has embraced this technology in its Prodigy brake controller, and U.S. Gear uses it in the company's system intended for vehicles towed behind motorhomes (dinghy vehicles).

Today's RVer has many choices in brake controllers from many reputable manufacturers. It's important to be careful in choosing the controller that is right for your needs, and capable of handling the weight and number of axles on your trailer.

Be sure to follow your selected manufacturer's written instructions about every aspect of the brake controller's installation, operation, adjustment and maintenance. **TG**



On the Road

Towing a trailer is not difficult, but it clearly is a step up in complexity from driving a solo vehicle, requiring new awareness of combined vehicle length, trailer width, braking distance, turning characteristics and several other factors that must be considered for safe, enjoyable towing.

Most of us drive our light

Practice and good defensive driving skills are keys to safe and enjoyable towing

TEXT BY BRAD CLAYTON

trucks or passenger cars daily, and graduate to our RVs only occasionally. Thus, it's always necessary to make a mental transition and keep in mind the size and handling characteristics of the larger rig.

Allowing solo-vehicle habits to take over may result in a tendency to make turns too

continued on page 38

Rules of the Road

State or Province	Size Limits					Equipment Required						Riding Permitted				
	Height	Width	Trailer Length	Motorhome Length	2-vehicle Combined Length	Single Towing Allowed	Safety Chain	Breakaway Switch	Fire Extinguisher in RV	Flares or Reflective Signs	Weight of Trailer Requiring Brakes (Unladen)	Wipers On/Lights On	In Fifth-wheel Trailer	In Pickup Camper	In Travel Trailer	Overnight Parking Permitted in State Rest Areas
Alabama	13'W	8'W	40'	45'	65'	+	+	1	1		3,000 lb	+	-	-	-	P
Alaska	14'	8'W	40'	45'	75'	+	+	2			5,000 lb		-	-	-	+
Arizona	13'W	8' ^{10B}	40'	45'	65'	2A		2			3,000 lb ¹¹		+	-	-	2
Arkansas	13'W	8'W	43'W	45'	65'	+	+	2			3,000 lb	+	-	-	-	+
California	14'	8'W	40'	45' ²⁰	65'	+	+	+	+		1,500 lb ¹¹		20, 25	25		+
Colorado	13'	8'W	NS	45'	75' ²²	22, 23	+	+			3,000 lb ¹²		+	-	-	P
Connecticut	13'W	8'W	NS	45'	60' ^{13, 15}		+	+	+		3,000 lb ¹¹	+	-	-	-	P
Delaware	13'W	8'W	40'	45'	60'		+	+	+		4,000 lb		-	-	-	P
District of Columbia	13'W	8' ^{20B}	NS	40'	55'	+	+	+			3,000 lb ¹¹		-	-	-	
Florida	13'W	8'W ¹⁶	40'	45'	65'		+	+	+		3,000 lb ¹¹	+	-	-	-	P
Georgia	13'W	8'W	NS	NS	60'		+	+	+		1,500 lb	26		-	-	
Hawaii	14'	8'	40'	45'	65'		+	2			3,000 lb ¹¹			-	25	
Idaho	14'	8'W	48'	45'	75'	40		-			1,500 lb		-	-	-	P
Illinois	13'W	8'W	45'	45'	60'	10, 43	+	2			3,000 lb ¹¹	+	-	-	-	
Indiana	13'W	8'W	40'	45'	60'	41	+	+	+		3,000 lb ¹¹		+	-	-	+
Iowa	13'W	8'W	NS	45'	65'	41	+	+	+		3,000 lb		-	-	-	+
Kansas	14'	8'W	NS	45'	65'	41	20	-	26		- 34		23	23	23	P
Kentucky	13'W	8'W	NS	45'	65'	41	+	-	+		3,000 lb ⁹	+	-	-	-	
Louisiana	13'W	8' ¹⁸	40'	45'	70'	42	+	2			3,000 lb		-	-	-	P
Maine	13'W	8'W	48'	45'	65'		+				3,000 lb	+	-	-	-	P
Maryland	13'W	8'W	40'	40'	55'		+	2	+		3,000 lb ¹¹	+	-	-	-	P
Massachusetts	13'W	8'W	40'	45'	60'						10,000 lb		-	-	-	2
Michigan	13'W	8'W	45'	45'	65'	18	+	+			3,000 lb		+	-	-	P
Minnesota	13'W	8'W	45'	45'	60'	18	+	2			3,000 lb ¹¹	+	-	-	-	P
Mississippi	13'W	8'W	40'	45'	53'		+	+	+		2,000 lb ¹⁷		-	-	-	
Missouri	14' ²⁷	8'W ²⁷	NS	45'	65' ²⁷	27, 41	20				NS		+	-	-	+
Montana	14'	8'W ²⁵	NS	55'	75'	42	+	-	+		3,000 lb		+	-	-	P
Nebraska	14'W	8'W	40'	45'	65'	41	+	2			3,000 lb		+	-	-	
Nevada	14'	8'W	NS	45'	70'	42	+	2			1,500 lb		-	-	-	21
New Hampshire	13'W	8' ¹⁸	48'	45'	NS		+				3,000 lb		-	-	-	
New Jersey	13'W	8' ¹⁸	40'	40'	50'				+		3,000 lb	+	+	-	-	P
New Mexico	14'	8'W	40'	45'	65'		+	+	+		3,000 lb ¹³		-	-	-	P
New York	13'W	8'W ²³	48'	45'	65'		+				1,000 lb ⁹	+	-	-	-	P
North Carolina	13'W	8'W	35'	45'	60'		+				1,000 lb	+	-	-	-	P

Note: While every attempt has been made to verify this information, TrailerLife cannot guarantee its accuracy, and assumes no responsibility for errors or omissions. Changes may have been made since the data was compiled. Call state and provincial tourism offices for additional details.

• Indicates "yes," item is permitted or required.

NS indicates not specified.

Ⓟ indicates "as posted." Information is based on latest available data; laws may have changed since press time.

⁶ Required if weight of trailer exceeds 40% of tow-vehicle weight.

⁷ Required on trailers over 6,000 lb.

⁸ Required if gross weight is over 2,500 lb.

⁹ Required on trailers over 1,000 lb unladen, or 3,000 lb laden.

¹⁰ Riding in 883-wheel with audible or visual device with tow vehicle and safety glass.

¹¹ 24-hour limit.

¹² Required if trailer exceeds 50% of tow-vehicle weight. BC: laden.

¹³ Trailer limited to 48' in a 60' combination.

¹⁴ Eight-hour limit; 3 hours in SD.

¹⁵ Only if required by CSA at time of manufacture.

¹⁶ 8 1/2 ft on certain federal road systems.

¹⁷ Gross weight requiring brakes.

¹⁸ Must have free access to drive compartment.

¹⁹ Maximum combined length 60 ft on selected highways. Special permit in CT and WI.

¹ On designated rural interstates; some exceptions.

² Required on trailers over 3,000 lb.

³ Prohibited where posted.

⁴ Required on trailers over 3,000 lb or if gross weight of trailer exceeds empty weight of tow vehicle.

⁵ Required on trucks over 3,700 lb (8,140 lb).

tightly, run over curbs, hit stationary objects such as overhanging tree limbs or to follow too closely.

The Highway Ahead

The first towing precautions are those that precede towing — matching the tow vehicle and trailer correctly, adhering to weight limits and making sure hitch selection and adjustment are correct, as described in this guide. And it's important to refresh defensive driving skills. From there, the fun begins.

The combined length of tow vehicle and trailer, as well as the combined weight, must be at the top of your mind right from the start. Maintaining extended following distances is one of the most important towing-related driving habits that initially is difficult to maintain because we tend to fall into our typical driving habits.

Even though trailer brakes may be quite functional, braking distances almost always are extended. It's also important to be mindful of making lane changes carefully and slowly, and to allow extended distances for passing. Good, solidly mounted extendible mirrors with large reflective areas, adjusted properly, are essential.

Fast traffic seems more tolerant of slow 18-wheelers than of slow RVs, which makes courtesy an important safety factor for RV owners because an irate driver trying to pass can be a serious safety threat; courtesy is not only the consideration of others, it's a safety issue. Frequent monitoring of rearview mirrors is necessary; when a vehicle is tailgating and trying to pass, we should help by driving slightly to the right to give the other driver a better view of the road ahead, even if a passing opportunity does not exist at the time. We should use turnouts whenever possible and avoid following another vehicle so closely that a vehicle overtaking from the rear cannot return to the proper lane.

Braking and Brake Fade

While RV brakes are adequate for most situations, care is necessary to avoid overheating, which can lead to brake fade. If brake fade occurs, it will likely be on steep downgrades. If this happens, friction will raise the temperature of brake pads and linings to extremely high levels, resulting in temporary loss of braking.

The cure is prevention — downshifting to a gear

range that is low enough to retard speed sufficiently that brakes need not be used more than occasionally. Thus, enough braking performance is reserved to make an emergency stop, if it becomes necessary.

When braking on a grade is necessary, apply the brakes intermittently, with moderate pressure, and release the pedal to allow the brakes to cool.

Action of electric trailer brakes should be apparent to the driver and sufficient to handle the trailer's weight. The controller should be adjusted so maximum braking action does not cause trailer-wheel lock-up. Improper controller adjustment is a major cause of inadequate braking, so it's wise to study the manufacturer's instructions. Travel-trailer instability should not occur in a well-balanced, well-hitched combination, but if it does, independent actuation of trailer brakes usually will bring the trailer back into line.

Tracking & Backing

All trailers require more space for turns, and travel trailers follow the tow-vehicle track more closely than do fifth-wheels, which track farther to the inside of a turn. There is need for continual awareness that becomes second-nature after a modest amount of on-the-road experience.

Fifth-wheel trailers are different to back than conventional trailers, and require more practice for someone accustomed to backing a conventional trailer. A well-used technique involves placing one's hand at the bottom of the steering wheel and moving it in the same direction the trailer is intended to go. It's more effective with travel trailers than with fifth-wheels, which require more turning of the steering wheel. Hand-held two-way radios can allow an assistant to more effectively relay backing instructions to the driver.

Before each trip, the essentials should be taken care of: Tires should be checked to assure that inflation pressures match those molded on tire sidewalls (cold), or that are appropriate for your load (consult load/inflation tables), and vehicle fluids should be inspected. Make sure trailer-wheel lug nuts are tightened to factory specifications.

Trailerling is a great way to explore the new horizons and great camping destinations that are available to owners of recreational trailers, and proper attention paid to defensive driving will pay off in safe travel. **TG**

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