Safe

Towing

What do all these initials (GVWR, GCWR, TW, GTW, CW, RGAWR, etc.) mean? Are they important to me? How do I know I have a **safe** towing set-up? How do I prevent sway and what should I do if my rig starts to sway? What tow vehicle should I purchase to handle the trailer I want? What size trailer can I tow with my current vehicle? How do I check my rig to be sure it is safe?

THE RATINGS

The 'G' stands for gross or the total. When the initials end with 'R' it stands for rating. No 'R' means you are looking at the real number. 'V' is the vehicle that can be the Tow Vehicle (TV) or the Trailer. We are going to use 'T' to represent the trailer. So:

1. **GVW** is the gross tow vehicle weight, which means **everything** in the tow vehicle including you and any passengers.

2. **GTW** means the gross trailer weight, which means **everything** in the trailer including fluids, propane, etc.

Once we have determined the gross weight of our tow vehicles and the gross weight of the trailer we can add them together and determine the gross combined weight of our rig, GCW. We compare this number to the maximum allowed by the tow vehicle manufacturer, **GCWR**. This weight includes everything in the rig including you and your passengers.

Some manufacturers provide a maximum **Trailer tow capacity rating** by subtracting the TV gross rating from the combined rating and stating: "This is the heaviest trailer this vehicle can tow". This number should never be exceeded; however, it is usually much higher than the real capacity of your TV.

Sometimes there are ratings for the rear axle, 'A' (**GAWR**) and the front axle. If you have this rating enter it into the Calculation Chart, so it can be compared to the actual weight on the axle.

What usually determines these 'R' ratings is the weakest component. For example, the spindle, bearings, tires, springs, suspension, shocks, etc. could determine the front axle rating. Each Manufacturer could have a different component that has the lowest weight rating.

There is a lot of misinformation that floats around some of which can be dangerous.

1. The weight ratings provided by the Vehicle Manufacturer are purposely lowered because of liability concerns.

Let us examine this from a logical point of view. A Manufacturer wants to sell as many cars as possible. Why would he take a TV that can be rated at 10,000 lbs. and **reduce** the advertised rating to 8000 lbs. This is not going to improve sales and makes no logical sense.

2. The correct tire pressure for your tow vehicle, motor home or trailer, should be the number imprinted on the side of the tire.

The number on the sidewall of the tire has the word maximum next to it. Every tire company provides a chart, which lists the proper tire pressure as a function of the weight it has to carry. This clearly says that the proper pressure is based upon the weight it has to support and the number on the tire is indeed just the maximum that should not be exceeded. I will not mention the number of times I have had to argue with Service Managers or technicians over this.

3. The tongue weight is the number provided by the trailer manufacturer in his specification list and nothing else counts.

This one can be quite dangerous if you believe the above. Why do you think most of the articles on hitches have elaborate directions on how to measure the real tongue weight? For stability and safe towing, it should be between 10% to 15% (closer to the high end for minimum sway) of the gross trailer weight (GTW). Part of this weight is transferred to the front axle with the load distribution hitch in order to have a stable rig and minimize sway. You can do a reasonable calculation to determine what your tongue weight will be. **Tongue weight means everything that is on the ball i.e.:**

The Trailer Manufacturers stated loaded tongue weight + the hitch weight

+ all the stuff in your tow vehicle that is located behind the rear axle = Tongue Weight

Be sure the manufacturers tongue weight is not just the empty trailer but includes the filled propane tanks and any other trailer equipment that will add to the weight on the ball.

This calculation is usually the one that causes the most problems in getting the proper size hitch and setting it correctly.

I remember when a member contacted me and asked why when he had been towing for several years with virtually no sway and a very stable rig, this year he had all kinds of scary problems. I remembered he had contacted me to determine the best set-up for adding a generator so he could boondock with air conditioning. It turns out he had added a 3000 watt, 145 lb. generator and rearranged his truck so that the new four drawer toolbox was also at the tail gate. His Tongue Weight had significantly increased and his hitch bars could no longer transfer enough weight.

Determining the actual weight of the Tow Vehicle and the actual weight of the trailer will give us the total rig weight, which is the gross combined weight (GCW). This includes you and all of the passengers for a total weight that has to be less than the **GCWR** rating of your TV.

In order to determine what size trailer we can safely tow we need to determine.

1. The actual tow vehicle gross weight
2. The actual trailer gross weight
3. The actual Tongue Weight (total weight on the ball).

We can then compare these weights to the TV ratings provided by the manufacturer and see if the trailer we want to buy can be safely towed with our existing vehicle. Alternatively, now we know what tow capability is needed in order to purchase a safe TV.

In order to buy the proper hitch we also need to determine or measure the real tongue weight so we can distribute the weight to the front of the TV and have a stable rig. Not exactly rocket science. You do not have to weigh everything but

100 pounds is a reasonable resolution level.

WHAT IF I EXCEED THE RATINGS?

A car's **gross vehicle weight rating** (**GVWR**), also referred to as the truck towing capacity or vehicle towing capacity, is serious business. A towing capacity rating is based on the maximum **gross vehicle weight** (**GVW**) (the weight of the fully loaded vehicle or trailer, including cargo and passengers) the vehicle is designed to carry. Exceeding it cannot only damage your vehicle, but it also puts your life and the lives of others in jeopardy.

Understanding (and heeding) your truck's towing capacity -- specifically its GCWR, which adds the gross trailer weight to the tow vehicle gross weight -- is one of the most important things you need to do before heading to the great outdoors.

Towing is no small feat and often requires a special beast to get the job done properly. Among other things, tow vehicles need stronger frames, suspension systems, engines and axles to handle larger loads. Transmissions need special cooling systems. Brakes have to handle the emergency stopping you will be required to make on every camping trip. Mountains on hot summer days will stress everything in the tow vehicle.

Just because your pickup might be able to manage the extra, weight of the boat for a quick trip does not mean it is OK to do. Driving to Florida in the winter will

minimize the stress but would you want to have to worry about the whether or not you will be over stressing your rig.

Vehicles are designed to handle only a certain amount of force, and the way they are constructed reflects that. That is why commercial trucks that regularly haul tons of cargo across the country have significantly bigger wheels, more powerful engines, stronger braking and suspension systems than do passenger cars.

When you ask your truck to pull more than it was meant to -- exceeding its towing capacity-- a number of things can start to happen: the brakes begin to fade, the added weight contributes to tire failure, and the extra work required of your engine causes it to overheat, which, in turn, overloads the drivetrain and shortens the life of your transmission.

Although you may not see the effects of exceeding towing capacity at first, the gradual wear and tear will lead to eventual failure. The best-case scenario is repeated trips to the repair shop; the worst is a major wreck.

Of course, if you insist on pulling an overweight load, you may not even live to see the effects of this wear and tear. That is because the extra weight pulling on the back of your vehicle significantly hampers your braking ability and steering control. When the back of your truck is loaded down, the front tires come up, causing them to lose some traction with the road. Without those front tires firmly on the ground, you will definitely see a negative impact on your stability and handling. Your brakes, which were designed to stop a limited amount of weight, will either take much longer to slow the vehicle down in an emergency or they simply will not work at all. You may actually boil your transmission fluid and reduce its ability to function properly.

The answer I shudder to hear **"I been doing this for 25 years and never had a problem"**. This from the camper towing his 25 foot Airstream with a Volkswagen.

I towed my first trailer (25-foot Holiday Rambler) with a Suburban SUV that had the special tow package with heavy duty everything including an extra transmission cooler. On two separate trips, my brakes faded coming down mountains. After a couple of years, I burned out my transmission. A year and a half later, on another other trip, I burned out my second transmission. I finally found out what the white smoke coming out of the TV was (transmission fluid). This also explained the little oil spots on the front of my trailer I had to clean off

on occasion. I never understood all of these GV's and GC's etc. so I just ignored them and eventually paid the price (thank goodness, it was only money).

CALCULATIONS WITH EXISTING TV

So how do we determine if we are meeting the ratings?

Travel Trailer Weight Calculator:

http://changingears.com/rv-sec-calc-trailer-weight-t.shtml

Changing Gears has put together an excellent Weight Calculator just for the purpose of helping us out and making this an easy exercise. Further, it will

allow us to vary the placement of stuff so we can better balance loads to improve stability and performance.

So let us get started and assume we have a Ford F150 that we purchased in 2013. Every manufacturer provides extensive ratings information in their manuals and/or sales literature. This has been conveniently gathered for you by Changing Gears in the menu on the left side, 'Truck Ratings' or:

Tow Vehicle Ratings:

http://changingears.com/rv-sec-tow-vehicles-ratings.shtml

The Ford Towing Guide listing goes back to 1999. So select 2013 and down load it. These guides include all classes of towing from just a ball mount to weight distribution hitch ratings.

Download the info for your TV and check the towing guide table of contents, which indicates that the ratings we want are on pages 15-21. The GCWR for our V8 regular cab and 3.31 axle ratio is 12,900 lbs. and the maximum loaded trailer weight is 7,900 lbs. From page 9, we get a GVWR of 8200 lbs., which allows a maximum cargo weight of 2687 lbs. with our V8 engine.

There are also ratings for trailer towing packages, SUV ratings, Van/Wagon and passenger cars. Page 26 illustrates a truck safety compliance certification label which gives the GVWR, and the GAWR (axle rating) for both the front and rear axles. These provide checks to make sure the axle ratings are not exceeded especially with load leveling hitches.

Therefore, here are our TV rating numbers:

GVWR = 8,200

GCWR = 12,900

Maximum TV Cargo = 2687

Maximum loaded trailer weight =

7900

Maximum Tongue Load (Hitch Receiver) = 1130

Base Curb Weight Rating = 5513 (GVWR – Max

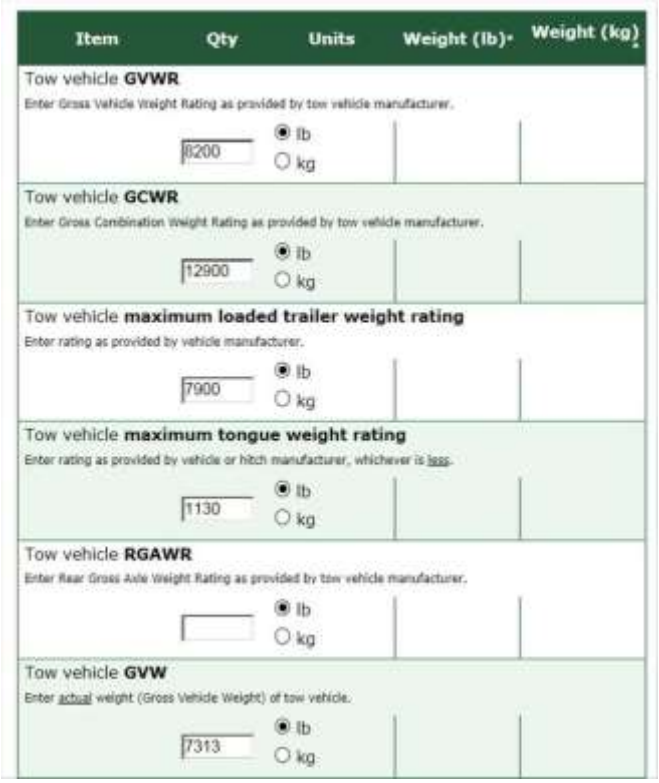
Cargo) Now we can calculate the actual tow vehicle

GVW: **GVW = Curb Weight + Cargo + Passengers**

Let us assume we have 1500 lbs. of cargo including fuel, hitch, tools, stuff, generator, etc. and there are two passengers averaging 150 pounds. The GVW would be:

GVW = 5513 + 1500 + 300 = 7313 lbs.

This provides a reasonable margin when compared to the GVWR. Enter the numbers as shown in Figure (1) Weight Calculator. We leave the trailer numbers blank because we are trying to determine the size unit that can be safely towed.



Item	Qty	Units	Weight (lb)*	Weight (kg)
Tow vehicle **GVWR** Enter Gross Vehicle Weight Rating as provided by tow vehicle manufacturer.	8200	◉ lb ○ kg		
Tow vehicle **GCWR** Enter Gross Combination Weight Rating as provided by tow vehicle manufacturer.	12900	◉ lb ○ kg		
Tow vehicle **maximum loaded trailer weight rating** Enter rating as provided by vehicle manufacturer.	7900	◉ lb ○ kg		
Tow vehicle **maximum tongue weight rating** Enter rating as provided by vehicle or hitch manufacturer, whichever is less.	1130	◉ lb ○ kg		
Tow vehicle **RGAWR** Enter Rear Gross Axle Weight Rating as provided by tow vehicle manufacturer.		◉ lb ○ kg		
Tow vehicle **GVW** Enter actual weight (Gross Vehicle Weight) of tow vehicle.	7313	◉ lb ○ kg		

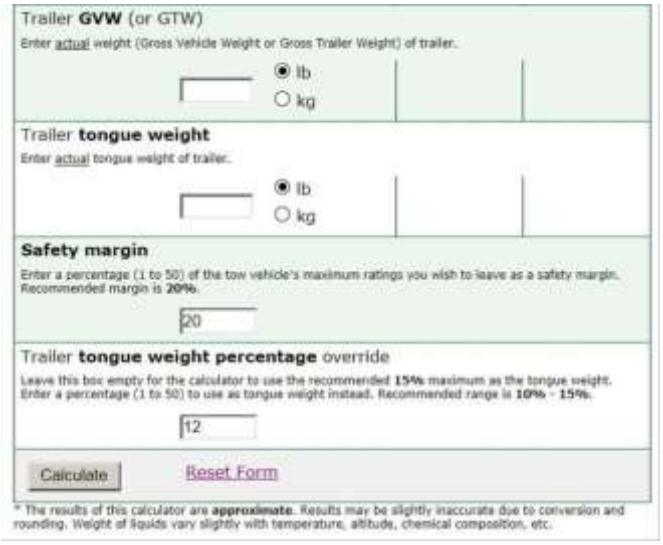


Figure (1) Weight Calculator TV

Next select 'Calculate' and Figure (2) Calculation Results will give you the maximum trailer weight and tongue weight. We selected a safety margin of 20%.

Figure (2) Calculation Results F-150

Now let us pick out a used 2010 trailer that interests us. Figure (3) illustrates an

Airstream 2010 specification summary sheet. Our calculated GTWR with the 20% safety factor is 4470 lbs. Simply checking the unit base weight, (UBW) (dry unit with no fluids and no payload) limits us to less than 19 feet. Since we wanted at least a 25-foot trailer, our basic F150 Truck is not going to work. In fact, the more years we spend with our RV's the larger they seem to grow.

If you are going to purchase a new tow vehicle, it is a good idea to plan for growth in the size and weight of your future trailer. Once the RV camping bug captures you, the trailers seem to grow over the years.

CALCULATIONS WITH A NEW TRAILER

Now let us select a new 2015 trailer and determine what we need for a TV. For a Classic 30 which is just over 31 feet in length:

Gross Trailer Weight Rating = 10,000

Unit Base Weight = 7365 (w/Propane tanks, and no options, water & cargo)

Fresh water 54 gal, Black water 39 gal, Gray water 37 gal

Hitch Weight = 773 (w/Propane tanks, and no options, water & cargo)

AIRSTREAM 2010 Summary Sheet

MODEL	GVWR	UBW	NCC	Tongue Weight W/Propane	Fresh/wtr tank	Water #	Fuel	Fuel #	Height W/AC	Gray	Black	LP
Sport												
16 Sport	3,500	2897	603	446	20	217			8' 11"	24	18	20 # (2)
17 Sport	3,500	30,043	457	300	20	217			8' 11"	24	18	20 # (2)
22 FB Sport	4,500	3,594	906	393	20	217			8' 11"	24	18	20 # (2)
Flying Cloud												
19 Flying Cloud	4,500	3,792	708	550	23	242			9'5"	21	18	30# (2)
20 Flying Cloud	5,000	4,211	789	631	23	242			9'5"	21	18	30# (2)
23 Flying Cloud Corner Double	6,000	4,708	1,292	779	30	300			9'5"	21	18	30# (2)
23 FB"B" Flying Cloud	6,000	4,746	1,254	467	39	378			9'5"	30	18	30# (2)
25 FB "B" and Twin Flying Cloud	7,300	5,443	1,857	837	39	378			9'7"	37	39	30# (2)
27 FB queen J and Twin	7,600	5,808	1792	791	39	378			9'7"	37	39	30# (2)
28 Flying Cloud	7,300	5,919	1,381	976	39	378			9'7"	37	35	30# (2)
30 Flying Cloud--Optional Recliners	8,800	6,322	2,478	880	54	504			9'7"	38	38	30# (2)
International Signature Series												
16 International	4,300	3,261	1,039	459	23	242			9' 4"	21		20# (2)
19 International	4,500	3,763	737	550	23	242			9'5"	21	18	30# (2)
19 Victorinox	4,500	3,800	700	583	23	242			9'5"	21	18	30# (2)
23 D International	6,000	4,701	1,299	720	30	300			9'5"	21	18	30# (2)
25 FB Intl Queen (B)Ocean Breeze	7,300	5,552	1,748	833	39	378			9'7"	37	39	30# (2)
27 FB Intl Queen (J)Ocean Breeze	7,600	5,764	1,836	770	39	378			9'7"	37	39	30# (2)
28' International	7,300	5,853	1,447	950	39	378			9'7"	37	35	30# (2)
International Ocean Breeze												
16 Intl Serenity	4,300	3,261	1039	459	23	242			9' 4"	21		20# (2)
19' Intl Serenity	4,500	3,763	737	550	23	242			9'5"	21	18	30# (2)
23' D Intl Serenity	6,000	4,701	1,299	720	30	300			9'5"	21	18	30# (2)
25 FB Intl Queen (B)Serenity	7,300	5,552	1,748	833	39	378			9'7"	37	39	30# (2)
27 FB Intl Queen (J)Serenity	7,600	5,764	1,836	770	39	378			9'7"	37	39	30# (2)
28 Intl Serenity	7,300	5,853	1,447	950	39	378			9'7"	37	35	30# (2)
Classic												
27 FB queen J and Twin	9,000	6,592	2,408	792	54	504			9'7.5"	37	39	30# (2)
30 Classic queen J and Twin	10,000	7,285	7,215	773	54	504			9'7.5"	37	39	30# (2)
31 Dinette "W"	10,000	7,174	2,826	805	54	504			9'7.5"	37	39	30# (2)
Pan America												
34 Pan America	11,500	7,288	4,212	1260	54	504			9' 7.5"	37	39	30# (2)
3500 Interstate												
Interstate Rear Sofa	11,030	8,056	2,974	5000/500	26	266	26.4	176	9'7"	27	16	14 GAL
Interstate Twin	11,030	7,976	3,054	5000/500	26	266	26.4	176	9'7"	27	16	14 Gal

TRAILER UBW (UNIT BASE WEIGHT) is the dry weight of the base unit with bedroom group and w/o options or fluids

MOTOR HOME UBW (UNIT BASE WEIGHT) is dry weight of base unit with full fuel tank and w/o options or fluids.

N CC (NET CARRYING CAPACITY) is GVWR - UBW

Water Weight is: 8.33 Lbs per gallon of water and includes water capacity of water heater

Fuel weight is: 5.75 lbs. per gallon Gasoline / 6.67 lbs. per gallon Diesel fuel / 4.50 lbs per gallon LP

R-factor: approximately 8.0 on both the trailers and motor homes.

All trailers use 5/8" tongue and groove plywood With WPB type glue

Tank heating: The 20 and 23 Flying Cloud use heating pads. All others use direct heat from the furnace.

Exterior metal thickness: Trailer sidewalls/End shell are .040 and roofs are .032 White metal

STEPS

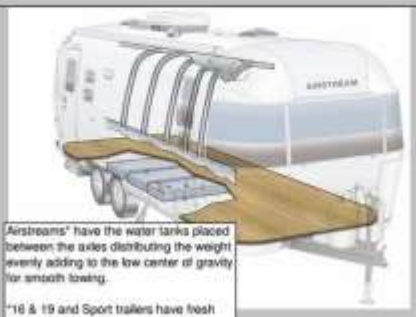
Flying Cloud
Single step 19
Double Step -20,23,23FB,25FB,27FB,28 & 30

International
Single Step 16,19
Double Step 23D,25FB,27FB, & 28

Pan America
Traditional Aluminum Airstream Double Step

Classic Limited
Traditional Airstream aluminum double step

Windows
Sport: Hehr windows- Optional Airstream Panoramic Windows
Flying Cloud Airstream Manufactured Windows
Classic Limited: Airstream manufactured windows
International: Airstream manufactured windows
White Roof: This will help keep the trailer 10 degrees cooler during the summer months.



Airstreams* have the water tanks placed between the axles distributing the weight evenly adding to the low center of gravity for smooth towing.

*16 & 19 and Sport trailers have fresh water tanks installed above the floor.

Figure (3) Airstream 2010 Trailer Specifications

The first step is to estimate the gross trailer weight, GTW:

GTW = base unit weight + options + hitch + fluids + kitchen + food + clothes + stuff

Fluids Weight: Fuel weight (gas 6.2 lbs/gal, diesel 7.0 lbs/gal)

Fresh water (8.35 lbs/gal)

Propane (4.22 lbs/gal)

The weight of a Hensley or Pro Pride hitch is around 195 lbs. Eaz-lift and Reese, with sway control, are around 100 lbs. Yes! The hitch counts particularly with the tongue weight since it becomes part of the load distribution weight.

GTW = 7365 + 500 + 100 + 500 + 100 + 75 + 75 + 100 = 8815

Assuming 500 lbs. of options, a 100 lb. hitch, a full water tank and partial black water, 100 lbs. of kitchen appliances, 75 lbs. of food, 75 lbs. of clothes and 100 lbs. of miscellaneous stuff. Since our GTWR is 12,500 lbs., we are well within this rating.

Tongue Weight = Trailer with Propane + hitch + weight behind rear axle of TV

Tongue weight = 773 + 100 + 150 = 1023 lbs.

This is about 12 % of the GTW and should provide a stable towing environment. With a 20% margin our TV has to be able to handle about 10500 lbs. of GTW. Staying with a Ford Truck, we will need an F250, which can handle a 12,300 lbs. GTWR trailer, and a GCWR of 19000 lbs. The GVWR is 10000 lbs.

GVW = Curb Weight + Cargo +

Passengers GVW =

7057 + 1500 +300 = 8857

Let us plug these ratings into our Calculator:

Figure (4) illustrates the data entry form that results from starting with a 2015 trailer and using a 2013 Ford F-250 TV. Ratings were not available for the axles; however these usually are on the TV Specification sticker. Figure (5) provides the results using a 12% safety margin. Since this calculation is for a 2015, 31 foot trailer this margin is more should be quite adequate.

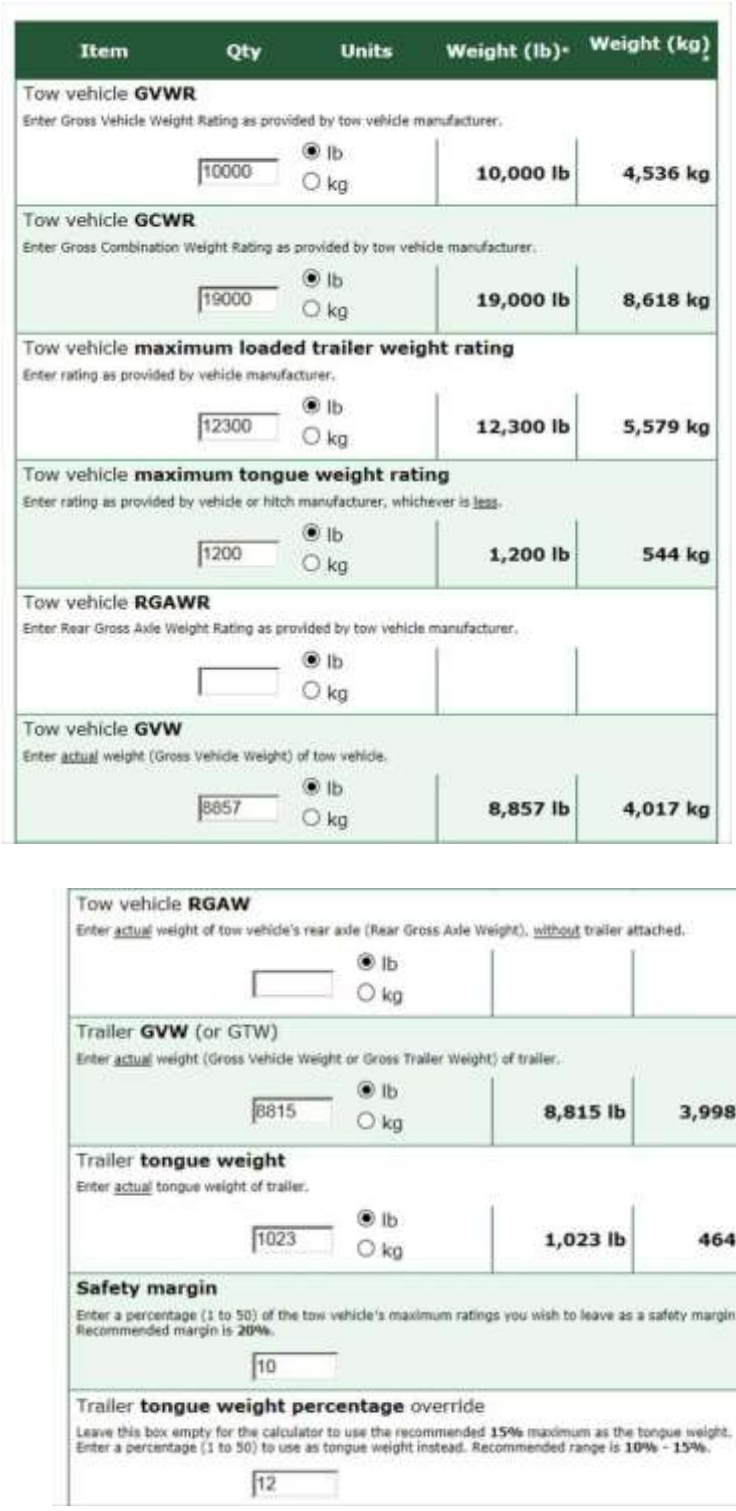


Figure (4) Data Entry Using F250/Classic 31

Calculation Results	Weight (lb) *	Weight (kg) *
Maximum Trailer Weight This is the maximum trailer weight based on the most restrictive tow vehicle ratings provided (**GVWR - GVW remainder for tongue weight at 12% of trailer weight**).	**9,525 lb**	**4,320 kg**
Maximum Trailer Weight with Margin This is the maximum trailer weight based on the most restrictive tow vehicle ratings provided, reduced by a safety margin of **10%**.	**8,572 lb**	**3,888 kg**
Maximum Tongue Weight This is the recommended maximum tongue weight, based on **12%** of the calculated Maximum Trailer Weight.	**1,143 lb**	**518 kg**
Maximum Tongue Weight with Margin This is the recommended maximum tongue weight, based on **12%** of the calculated Maximum Trailer Weight with Margin.	**1,029 lb**	**467 kg**

Calculate Reset Form

* The results of this calculator are **approximate**. Results may be slightly inaccurate due to conversion and rounding. Weight of liquids vary slightly with temperature, altitude, chemical composition, etc.

Figure (5) Calculation Results F-250/Classic 31

Now we can configure our load distribution hitch. We need a class IV hitch with at least a 1200 lb. capability.

Weight distribution systems use spring bars to help combat the problems that often occur with standard hitch systems. Adding spring bars to your towing setup applies leverage to either side of your system, which transfers the load that is pushing down on the rear of your vehicle to all of the axles on both your tow vehicle and your trailer. This even distribution of weight results in a smooth, level ride, as well as the ability to tow at the maximum capacity of your hitch.

Spring bars are responsible for transferring the load that pushes down on the rear of your vehicle when you are towing to the axles on both your tow vehicle and trailer. By applying leverage to your towing setup, these bars are responsible for distributing the weight in a complete weight-distribution setup. Typically, there are two types of spring bars - round and trunnion. Some manufacturers have specialized spring bars for their hitch.

If you do not use a load distribution hitch, your rig may look like the before in Figure (6). For a stable rig with minimum sway, both the TV and trailer must be level. Your hitch must be sized properly and adjusted correctly to distribute the tongue weight.

Figure (6) Leveling the Rig

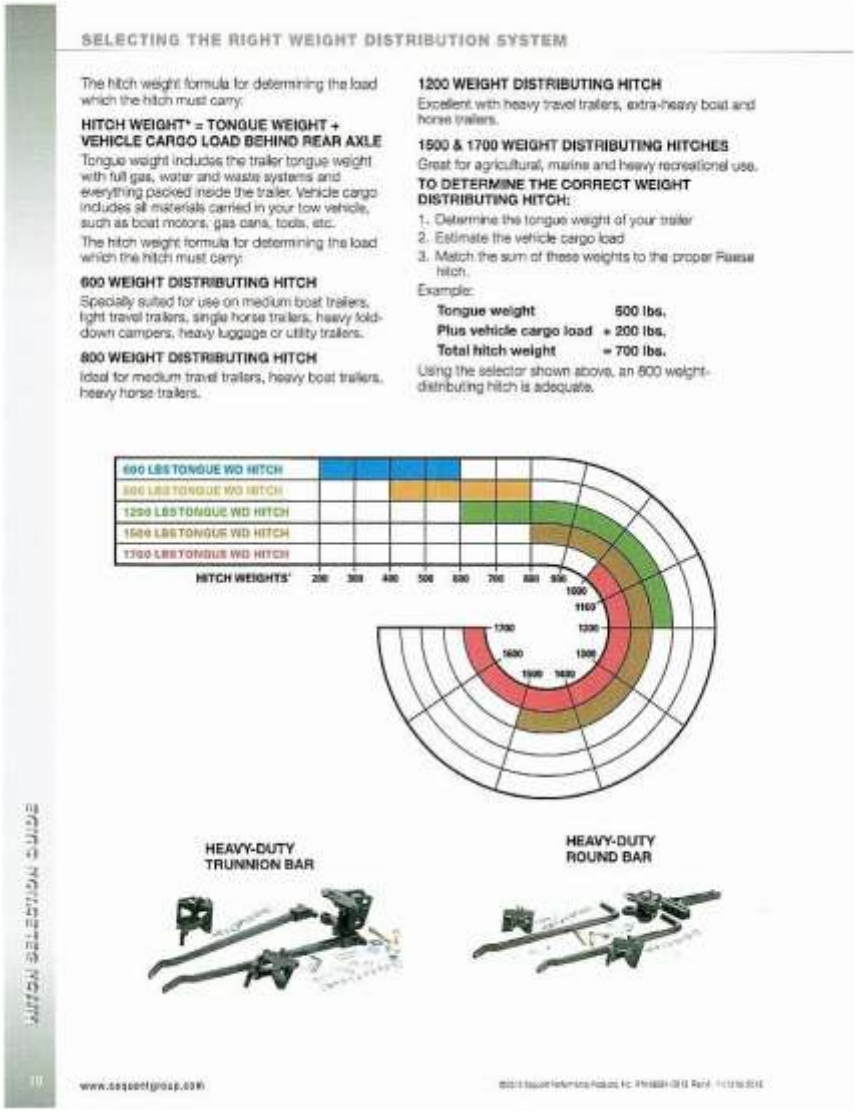


Figure (7) Reese Hitch Bars

Once you do a few rigs with the Changing Gear Weight Calculator, you can use it to adjust your cargo locations in the trailer and/or TV. If you need more tongue weight (minimum10%) move heavy stuff behind your rear axle. If the weight is too high, move the generator or toolbox in front of the rear axle.

To assist in determining the actual GVW and/or GTS you can use:
http://changingears.com/rv-sec-calc-adjust-gvw.shtml

This is an Adjust GVW or GTW Calculator and it allows you to change the TV or trailer configuration. In this calculator, you can vary all of the fluid levels, change the number of people or their weight, change cargo and adjust tongue weight. This is also handy when you actually weigh the trailer or TV and you have to adjust fluid levels to your typical traveling levels. You can use positive or negative weights.

After you do a few calculations and try several different rated TV's you will be able to help your new Unit member to buy the right tow vehicle and hitch so he can have a safe and stable rig.

The definitive weight determination for your rig is to have it weighed. The RV Safety organization provides this service for a nominal cost ($60). Here is there web site and schedule for 2015.

http://www.rvsafety.com/weighing/weighing-schedule

They will put a scale under each tire, measure tongue weight and provide axle weights to compare with your GAWR ratings. They will check the tires for maximum load and proper air pressure.

http://rvsafety.com/images/pdf/TowForm.pdf

This is well worth doing and has resulted in many campers finding out why they have towing problems with their rigs.

Many years ago, I owned a Classic Motor Home with which I towed a Range Rover. Besides rear dual tire axles, Classic had a tag axle that I thought provided the extra weight capability to easily tow the Rover. I did not feel comfortable when I had my towed on the Motor Home. One year in Florida, I had the entire rig weighed. It turned out that I was 800 lbs. over the rear axle GAWR without the Rover. The tag axle had about 15 lbs. on the curbside tire and about 75 lbs. on the driver side tire. Needless to say, I gave up towing any car, particularly in the mountains.

My recommendation is to use the above Calculator's to decide what you need for a TV or to decide what your current vehicle can handle before you buy your trailer.

The weight rating of all Airstream Products from 1954 thru 2013 is available in Reference (3). It lists the dry weight (do not forget the Propane), hitch weight and GTWR.

When the opportunity presents itself get the rig weighed. I have used several of the Truck weigh stations when they are not busy. With the motor home, I weighed the RV and front and rear axles. With a trailer, you can do the TV and trailer separately as well as the tongue weight.

CONTROLLING SWAY

This is one of the best articles I have seen on how to prevent and handle sway problems.

Causes of poor tow-vehicle/travel-trailer handling may seem elusive, but remedies can be simple.

By Bill Estes

Were it not for the tendency of many travel trailers to sway at least occasionally, the fifth-wheel trailer may not have grown so popular. Certainly, fifth wheels have strong attributes. Travel trailers do, too, but the fifth wheel does not, indeed, cannot sway.

The travel trailer's Achilles' heel is the way it's hitched to the tow vehicle - at a point often four or five feet behind the axle. Thus, the trailer has the necessary leverage to move the tow vehicle's rear to one side or the other, which has the effect of steering the tow vehicle. This steering effect can go into oscillations, which are fondly known as fishtailing - another name for sway.

By contrast, the fifth-wheel hitch pin is centered over the axle, unable to move laterally, which makes the fifth wheel trailer virtually immune to this motion.

While many tow vehicle/travel trailer combinations handle quite well, and their owners greatly enjoy their travels, sway may occur in a substantial number of others, creating uneasiness, white-knuckle experiences or even accidents. The trauma is unnecessary because sway can be tightly controlled in most cases. Many owners of swaying travel trailers figure sway is the "nature of the beast" and just live with the reduced enjoyment of that it produces. But, travel trailers can and should handle well. The causes of sway often are not analyzed

correctly, if at all.

The step-by-step procedure described here can be the key to safe, enjoyable towing.

Weight and Balance

Sway is a fishtailing motion of the trailer, caused by external forces that set the trailer's mass into lateral motion with the trailer's wheels serving as the axis or pivot point. The motion is a sideways seesaw. All conventionally hitched travel trailers will sway slightly in response to crosswinds or the bow wave of an 18-wheeler overtaking from the rear. The good ones will need little correction by the driver and will quickly re-stabilize. Only poorly set-up trailers will continue to sway after the force that caused the instability has ceased. In fact, in poorly balanced trailers, the sway motion may increase until control is lost. Unfortunately, most evaluations of sway problems focus on the hitch or the tow vehicle, but the trailer's weight distribution often is the primary cause.

Following are points on how to tell a well-behaved travel trailer from a poor one, and how to correct a problem in a trailer that you may already own.

Trailer Checkup

A trailer's inherent stability is part of its design, based on the amount of weight in front of the axles vs. the amount of weight behind. The difference between these two weight masses is the amount of weight on the trailers hitch, which is called the hitch weight or tongue weight.

Trailers with insufficient hitch weight have two deficiencies: The percentage of weight (mass) behind the axle(s) is too high, so when set in motion it acts as a pendulum; and the distance between the hitch ball and the trailer axles is insufficient.

Simply stated, trailers with a high proportion of hitch weight to gross weight usually have more of their length ahead of the axles, and they handle better. The generally accepted industry standard is that hitch weight should be approximately 10 percent of gross weight. In fact, that is a bare minimum, and some trailers with 10 percent hitch weight do not handle well. Hitch weights of 12 percent or higher (up to the weight limits of the hitch and vehicle beings used) assure proper handling.

In marginal situations, the owner's ability to handle an unstable trailer will

depend on the inherent stability of the tow vehicle, which is yet another variable. A truck

or van with a long wheelbase, a relatively short rear overhang and stiff springs often will at least partially make up for a trailer's lack of inherent stability, whereas if the trailer is towed by a softly sprung vehicle with a long overhang, the trailer's shortcomings will be more obvious.

How a Trailer Should Handle

Many campers become accustomed to being uncomfortable or even frightened by trailer sway when they encounter strong crosswinds, trucks overtaking from the rear, or mountainous roads. They think it is normal - the way all trailer's handle. Not so! Properly designed, well-matched tow vehicles and trailers have positive control and good road manners and are fun to drive.

Strong crosswinds may tend to push the tow vehicle/trailer combination laterally, and it may end up wandering out of the traffic lane a bit if the driver isn't paying close attention. But, steering should be predictable, and the driver should be able to use corrective steering measures without fear of sway. Likewise, it should be possible to drive a mountain road aggressively while being able to keep the tow vehicle in the proper position on curves.

Speeding 18-wheelers present hazards to conventionally hitched trailers that don't handle well, particularly while descending mountain grades. A tow vehicle/trailer rig is most susceptible to destabilizing forces while descending a grade at highway speeds, and such conditions are the true test of inherent stability. It's natural for the bow wave (air pressure) of a speeding 18-wheeler to have an effect on a tow vehicle and trailer - an effect that requires steering correction. But, the effect should not be destabilization that makes the tow vehicle feel like steering control is minimal and therefore unpredictable.

However, it is always necessary to monitor one's rearview mirror and anticipate the effects on an 18-wheeler overtaking from the rear. Drivers of marginally stable vehicles who are caught napping usually are the drivers who have control problems.

The four important keys to good road manners while towing a travel trailer are:

1. Proper trailer-weight distribution;

2. Proper hitch adjustment;

3. Use of effective sway-control equipment;
4. Anticipation of adverse driving conditions.

Weight Evaluation

If you notice significant trailer sway during normal driving and an occasional uncomfortable situation, your rig is not set up properly, and that should be corrected. The first step in evaluating a trailer for correction of stability is a trip to the scales.

Commercial scales are accessible in most communities at rental yards, moving and storage firms, and grain elevators. Gross weight and hitch weight should be recorded with the trailer loaded for travel. Gross weight is recorded with the trailer unhitched on the scale.

Hitch weight is determined by recording two trailer weights. For the first, weigh the trailer, unhitched, on the scale. For the second, position the tongue jack off the scale (trailer unhitched and tongue height same as when towing) to weigh only the trailer wheels. Subtract the two figures for hitch weight. Weighing the trailer wheels with the trailer hitched and spring bars in use will give a false hitch weight reading.

If hitch-weight percentage is down around 10 percent or less, it can cause unstable trailer behavior. If hitch weight is 10 to 12 percent, towing stability still could be a problem if the tow vehicle is marginally stable. If hitch weight is 12 to 15 percent, the trailer should handle well and should not be a contributor to any instability problem.

IT is important that hitch weight not exceed the rating of the equipment. Ratings of conventional hitches typically range between 800 and 1000 pounds, although they are available up to 2000 pounds. Ratings are stamped on hitch components.

Let us examine a couple of examples of trailers that have very different weight distribution:

Example 1
Total trailer weight 5400 pounds

Hitch weight 650 pounds
Hitch weight percentage: 650 / 5400 = 12%

In this example, hitch weight is a good margin of total weight. This trailer should handle well.

Example 2
Total trailer weight 6200 pounds
Hitch weight 560 pounds
Hitch weight percentage: 560 / 6200 = 9%

This example involves a trailer that clearly has insufficient hitch weight, and it undoubtedly is prone to sway. The only solution is to move weight forward. This may be accomplished by moving some supplies or a rear-mounted spare tire.

The worst place for a tire, or anything else that's relatively heavy, is on the back of a travel trailer that has marginal hitch weight. Carry it in the tow vehicle unless it can be mounted on the trailer's A-frame (in front). Another possibility is the battery; if carried in the rear, it should be relocated forward to the trailer A-frame.

The freshwater tank should not be located behind the trailer axles. This does occur, however, whenever designers don't pay proper attention to roadworthiness. If a rear water tank can be replaced by one of a different shape that will fit under a sofa in the forward section of the trailer, for example, the positive effect on stability will be dramatic. Ideally, the water tank should be located over the axles, so it's varying content does not affect hitch weight significantly. Of course, it's wise to empty holding tanks before traveling, to minimize weight in the rear.

A trailer with insufficient hitch weight can be towed successfully by combining a very stable tow vehicle with very conservative driving habits, but such a rig can get out of control in an emergency.

Proper Hitch Adjustment

Another important factor in tow vehicle/trailer stability is proper adjustment of a conventional load-distributing hitch. Proper adjustment means that the trailer is level and that the tow vehicle was level before hitching, it should remain at that angle after hitching.

The concept of a properly operating load-distributing hitch is that it should distribute hitch weight to all axles of the tow vehicle and the trailer. Here is how to make it happen:

1. Measure the tow vehicle at reference points on the front and rear bumpers with the vehicle loaded for travel, but prior to hitching.

2. Hitch the trailer and adjust spring-bar tension, so weight appears to have been added to the front as well as the rear of the tow vehicle.

3. Measure front and rear reference points again. If, for example, the rear of the vehicle has dropped one inch and the front has only dropped a quarter inch, add more tension to the spring bars, which will raise the rear and lower the front. Continue adjustment until the measurements are approximately the same. If a discrepancy is unavoidable, the rear of the vehicle should drop slightly more than the front.

If the spring bars cannot be adjusted tightly enough to achieve similar or identical vehicle-height reduction, stiffer spring bars may be needed. The spring bars should be rated for at least the amount of hitch weight of the trailer, plus about 200 pounds if the tow vehicle is softly sprung.

If, after proper adjustment of tow-vehicle attitude is achieved, the trailer is not level; the ball mount should be raised or lowered. Bolt-together ball mounts permit ball-height adjustment. If the ball mount is welded to the shank, replace it with a ball mount that can be adjusted. (Such mounts are available at hitch shops.)

Importance of Sway Control

Assuming hitch weight of a poorly balanced trailer is raised to at least 12 percent (but not more than the rating of the hitch) by redistribution of supplies or equipment, use of an effective sway control is another important element in the towing stability formula. Two types of sway controls that are available, the friction-type controls from Reese and Eaz-Lift, and the Reese Duo Cam. Both types are effective, but the Reese Duo Cam depends on adequate hitch weight for its effectiveness. Thus, it is most suitable to trailers with high hitch weights.

A sway control should be utilized, no matter how good trailer stability appears to be. The sway control dampens or slows the pivoting motion of the trailer coupler on the ball, and is very valuable during emergency maneuvers to

prevent driver steering overreaction, not to mention its role in helping the tow vehicle and trailer feel like they are in concert with each other.

To properly adjust a friction-bar sway control for maximum effectiveness, tighten the control until you notice that the tow vehicle doesn't quite straighten out after

completing a sharp turn at slow speeds. Loosen the control slightly, so the vehicle will track straight after the turn. If your sway control cannot be tightened enough to cause the tow vehicle to "dog-track" after a slow-speed turn, the unit probably needs service (cleaning, light sanding of friction surfaces). If that still does not created the desired effect, add a second sway-control unit on the opposite side.

The PullRite Hitch

So far, we have focused on conventional hitches, in the interest of helping you retain equipment that may already be in place. However, the most effective sway control actually is a very unconventional hitch called the PullRite. The unique feature of this hitch is that it relocates the tow vehicle/trailer pivot point from its usual location behind the bumper to a point immediately behind the rear axle. The trailer no longer pivots on the hitch ball, so it's necessary to visualize the trailer A- frame having been, in effect, extended about five feet underneath the tow vehicle to the pivot point.

With the trailer, in effect, lengthened and tracking much like a fifth-wheel trailer, a certain amount of maneuverability is sacrificed. The PullRite also functions as a load-distributing (equalizing) hitch.

The PullRite can dramatically improve towing stability. Even an inherently unstable trailer can be cured of its bad road manners. The principle is similar to that of fifth-wheel hitching, although the applications differ widely. The fifth-wheel hitch pin normally is positioned a couple of inches ahead of the rear-axle centerline, topside in the bed of the truck, while the PullRite pivot point is underneath the vehicle, a few inches to the rear of the axle housing.

PullRite hitches are available in two models, one rated for 10,000 pounds maximum trailer weight and 1000 pounds maximum hitch weight, and another rated at 20,000 pounds maximum trailer weight and 2000 pounds maximum hitch weight. The PullRite is available for full-size trucks, vans and sport-utility vehicles.

Evaluating the Tow Vehicle

Tow vehicles come in all shapes and sizes and with varying inherent stability for trailer towing. Their manufacturers rate them for specific trailer-weight limits, which should not be exceeded.

Factors that affect stability include wheelbase length, rear overhang, steering characteristics and center of gravity. The most significant factor is the proportion between wheelbase and rear overhang. A longer wheelbase makes a vehicle respond more slowly to steering input. A short rear overhang gives the trailer less mechanical advantage over the tow vehicle.

Typically, short-wheelbase sport-utility vehicles, such as the Ford Broncos, Dodge Ram chargers and pre-1992 GM Blazers/Jimmy's are not as stable as SUV's. It is possible to tow successfully with sport-utility vehicles, but they are less forgiving of poor trailer balance and/or improper hitching and sway control.

If sway tends to be a problem even though the trailer has a good proportion of hitch weight vs. gross weight and hitching is proper, it may be necessary to raise the trailer's hitch-weight proportion still higher. The sway-control device being utilized should be very effective.

For the tow vehicle itself, use tire with stiffer sidewalls and follow the vehicle manufacturer's recommended pressure. Use effective shock absorbers, which tend to keep the vehicle in better control on uneven road surfaces. A friction-type sway control adjusted to a stiff setting is especially important for comfortable towing with short-wheelbase vehicles.

Corrective Driving Techniques

When stability is in question under exceptionally bad driving conditions, despite good trailer balance and proper equipment, the driver must compensate. In any marginal driving situation, reduce speed, which will slow the reaction of your vehicles to external forces, while also giving you more time to react.

If sway occurs, the single most valuable technique for counteracting it is independent actuation of trailer brakes, even though it requires removing one hand from the steering wheel for a moment.

The location of the brake controller is a critical safety consideration. If it is positioned far under the dash and is hard to reach, relocate it to a better position accessible to the hand you can most comfortably remove from the steering

wheel, typically the left hand.

With a properly balanced rig, you probably won't need to use the manual brake-control lever. But being capable of using it as a natural defensive maneuver is your insurance policy against loss of control in an emergency situation.

If severe sway occurs, don't step on the tow vehicle's brake pedal unless you're in danger of hitting something. Just lift your foot from the accelerator pedal, and apply trailer brakes sharply via the hand control. During adverse driving conditions, such as severe crosswinds, reduce speed and anticipate terrain that can produce sharp windblasts. Be prepared to use trailer brakes if necessary.

The driver who is vigilant about monitoring driving conditions and the scene in his rearview mirror typically will have better capability to use defensive techniques than the driver who is caught napping by a sudden change in driving conditions.

By following the recommendations outlined here, tow vehicle and trailer road manners can be greatly improved, providing safe, enjoyable travel.

MEASURING TONGUE WEIGHT

In order to select the correct components to safely tow your trailer, you need to know its tongue weight. This is the weight that the fully loaded trailer exerts downward on the hitch ball of the tow vehicle. If you do not know the tongue weight of your trailer, there are several different ways you can determine it.

1. Tongue weight scale
2. Bathroom scale
3. Commercial scale

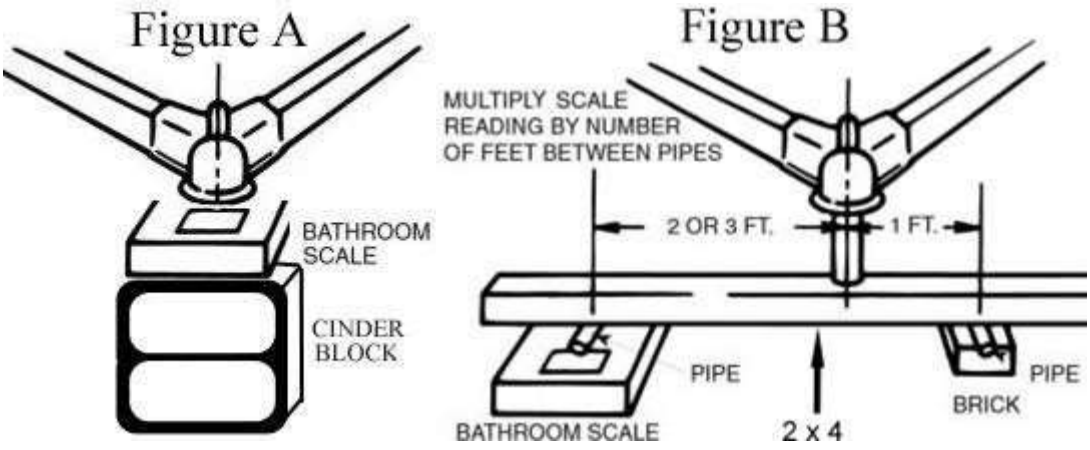
Remember, if you intend to use a weight distribution system, you will want to keep in mind the weight of the contents that you will carry in your vehicle behind the rear axle. You need to know this because the spring bars, which provide the support in a weight distribution system, are available in different sizes. And any weight that is located behind your rear axle affects the performance of the spring bars. You will need to include this weight so you can select spring bars of the proper size for your vehicle and trailer.

Tongue Weight Scale

A tongue weight scale quickly, easily and accurately allows you to get the weight of the trailer tongue. This scale can weigh a trailer tongue with a weight of up to 2,000 lbs. Since tongue weight is typically 10% to 15% of the weight of the trailer, this scale can handle a gross trailer weight of up to 20,000 lbs.

These images show the tongue weight scale in use. Be sure that the trailer is level and parked on level ground when you weigh it.

Bathroom Scale



You can use a bathroom scale and a box to measure tongue weight of smaller trailers. Place the coupler of the loaded trailer on the scale at normal towing height (Figure A). For heavier tongue weights, use the second method (Figure B). Be sure to perform these measurements on a level surface and with a leveled trailer.

To use the method in Figure B, follow these guidelines:

- Always place the trailer tongue 1 foot from the pipe on the support brick
- Multiply the reading on the scale by the total distance between the 2 support pipes
- Use a brick that is the same thickness as the scale so that the 2 x 4 is level when you weigh your trailer

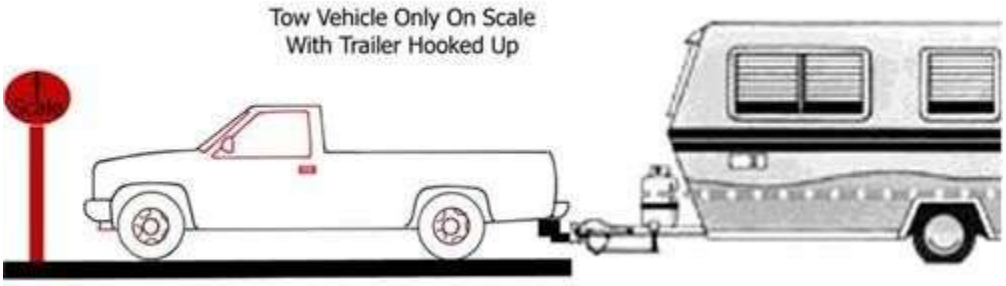
For example, if the distance between the trailer tongue and the pipe on the scale is 2 feet and the distance between the trailer tongue and the pipe on the support brick is 1 foot, then you would multiply the reading on the scale by 3 to get the tongue weight. If the distance between the trailer tongue and the pipe on the scale is 3 feet and the distance between the trailer tongue and the pipe on the support brick is 1 foot, then you would multiply the reading on the scale by 4 to get the tongue weight.

Commercial Scale

Another way to determine your trailer's tongue weight (and get your vehicle and trailer weights) is to take the trailer with your tow vehicle to a scale at a truck stop,

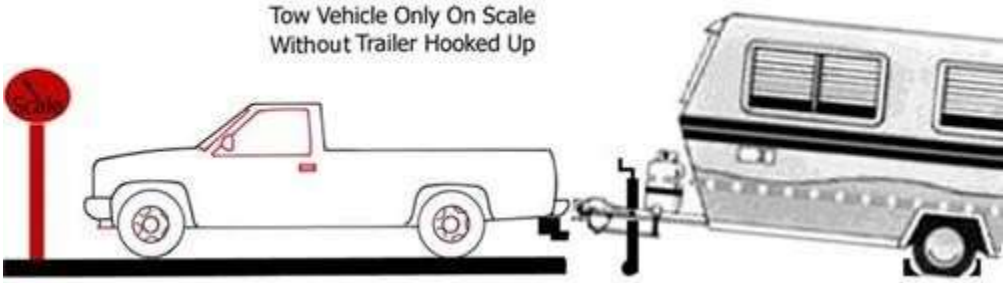
quarry or material supply center. For a small fee, you can weigh your tow vehicle and trailer there.

A. Determine Weight of Vehicle with Tongue Weight



Your vehicle and trailer must be fully loaded and fueled just as they will be when you are leaving for a trip. First, drive on to the scale with all 4 wheels of the truck and record the weight of the truck with the trailer attached.

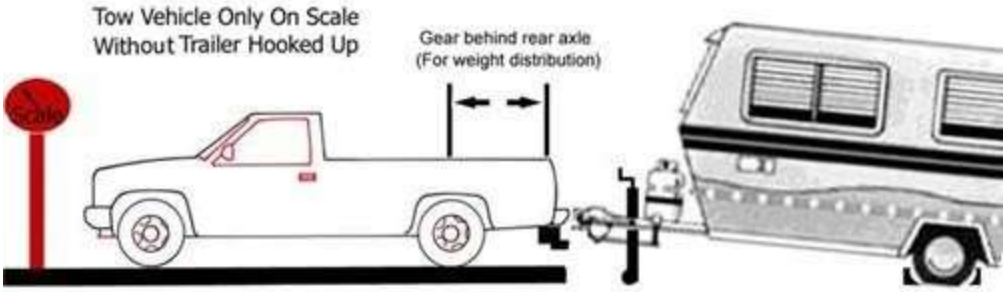
B. Determine Weight of Vehicle without Tongue Weight



Next, unhook the trailer and jack up the trailer tongue so there is no weight on the hitch ball. Make sure that the trailer jack is not on the scale. Record the weight of only the truck on the scale. This is your gross vehicle weight (GVW). Now, subtract the GVW from the weight of the truck with the trailer attached. This will give you the tongue weight of your trailer.

A - B = Tongue Weight

Determine Tongue Weight for Weight Distribution System



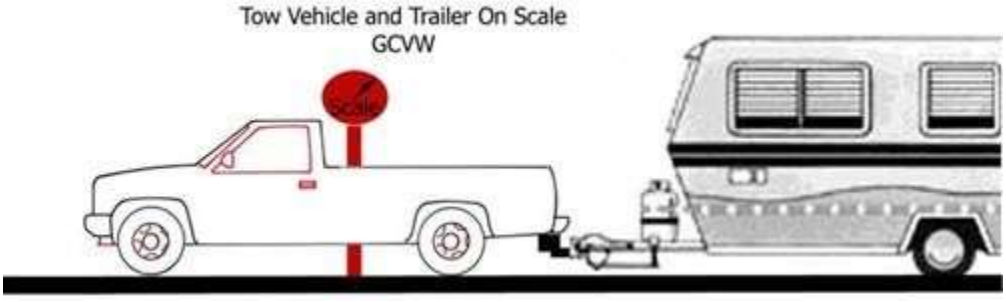
If you want to use a weight distribution system, remember to include the weight of any gear you might load behind the rear axle of the tow vehicle. You should add the weight of this gear to your tongue weight to select a weight distribution system of the proper size. To get the weight of the gear behind the rear axle, weigh your vehicle with this gear and without. Then subtract the weight without the gear from the weight with the gear. This difference is the weight of your gear. In the formula below, C represents the weight of your gear. A represents the weight of your tow vehicle including the tongue weight. B represents the weight of your tow vehicle without the tongue weight.

A good time to get this weight is when you are determining your tongue weight as described in step B, above. You can get the weight of your gear while you are weighing your tow vehicle.

Weight of Vehicle with Gear Behind Rear Axle - Weight of Vehicle without Gear Behind Rear Axle = C (Weight of Your Gear)

A - B + C = Tongue Weight for Weight Distribution System

Determine Additional Weights



Weight of Your Trailer

While you are at the scale you can also make sure that your towing setup is within the rated capacity of your tow vehicle. To do this, you need to get the weight of your trailer. To weigh your trailer, pull it with your tow vehicle onto the scale so you can weigh them together. This weight is your Gross Combined Vehicle Weight (GCVW). You can get the weight of your trailer (Gross Trailer Weight - GTW) by subtracting the weight of your tow vehicle alone (GVW (Step B, above)) from the weight of your tow vehicle and trailer combined (GCVW). Then check your owner's manual or with your dealer to determine if the weight of your trailer is within the towing capacity of your tow vehicle.

GCVW - GVW = GTW

Eaz-Lift Spring Corporation, P.O. Box 489, Sun Valley, California 91353-0489, (800) 636-9412; PullRite/Pulliam Enterprises Incorporated, 13790 E. Jefferson Boulevard, Mishawaka, Indiana 46545, (800) 443-2307; Reese Products, P.O. Box 1706, Elkhart, Indiana 46515, (800) 326-

1090. As printed in *Trailer Life*, February 1994.

Hitches that virtually eliminate sway are the Hensley and the ProPride 3P. These work but they range in price from $2500 to over $3000.

http://blog.hensleymfg.com/free-report-how-to-tow-safely?gclid=CJ_5-p_x38QCFdgVgQod70kAeg

http://www.propridehitch.com/products/ProPride-3P-Trailer-Sway-Control-Hitch-.html?gclid=CMf-2rbx38QCFS9o7AodQ04Ayw

ADJUSTING THE HITCH

The exact procedure is different for each type of hitch; however, the measurement techniques are the same. Figure (8) describes the adjustment steps and measurements required.

ADJUSTING AN EQUALIZER HITCH

Begin by getting the trailer level

- Park the trailer on a flat firm surface and disconnect it from the tow vehicle
- Adjust the trailer so that the distance from the bottom of the frame to the ground is the same in the front and back of the trailer.
- Measure the distance from the top inside of the hitch connector (on the trailer) to the ground. Record that measurement.
- Set the height to the top of the hitch ball (on the tow vehicle) ½ to 1 inch higher than that measurement – depending on the spring capacity of the tow vehicle – to allow for settling when the trailer is hooked up.

On a flat firm surface, hook up the trailer to the tow vehicle and drive forward so that the trailer and tow vehicle are in a straight line.

- Disconnect the trailer and raise it from the hitch ball without moving the trailer or tow vehicle.
- Measure the distance from a defined front and rear point on the tow vehicle to the ground (I use a straight line through the center of the front and rear wheels to a spot on the fender well). Record these measurements.
- Re-connect the trailer to the tow vehicle and repeat the above measurements (and record them).
- Use the chains on the equalizer bars to adjust the measurements so that both the front and rear of the tow vehicle DROP the same amount.
- If a whole chain link allows too much difference you can get a smaller amount by adjusting the tilt of the hitch head.

Re-check the trailer level when the final adjustment has been made – make any necessary corrections.

Figure (8) Adjusting The Hitch

WEIGHT DISTRIBUTION HITCHES

The material in this section is from:

http://www.etrailer.com/faq-weightdistribution.aspx#Styles

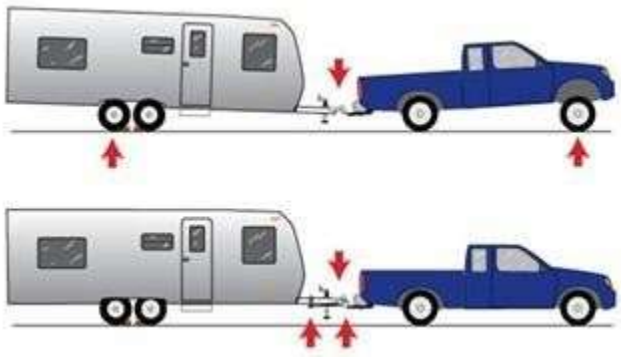
This is the web site for etrailer.com.

What Is Weight Distribution?

Weight Carrying

When you are towing a trailer with a standard rear-mounted hitch, your trailer's tongue weight is transferred to the rear axle of your tow vehicle. As a result, the back end of the vehicle may be forced lower and the front end raised. If this happens, your vehicle's rear axle will bear the weight of not only the trailer, but much of your tow vehicle's weight as well. Less weight on the front axle of your vehicle can cause diminished performance in terms of steering, traction and stopping power. It can also increase trailer sway. Your view of the road may be limited due to the awkward angle.

Weight Distributing



Weight-distribution systems use spring bars to help combat the problems that often occur with standard hitch systems. Adding spring bars to your towing setup applies leverage to either side of your system, which transfers the load that is pushing down on the rear of your vehicle to all of the axles on both your tow vehicle and your trailer. This even distribution of weight results in a smooth, level ride, as well as the ability to tow at the maximum capacity of your hitch.

What Are the Components of a Weight-Distribution System?

In addition to the Class III, IV or V trailer hitch on your vehicle, a weight-distribution system is made up of the ball mount, spring bars and trailer-frame-mounted brackets. The ball mount is composed of two pieces: the shank (which slides into the trailer hitch) and the ball platform (or weight-distribution head). The hitch ball is typically sold separately.

1. Trailer Hitch

The trailer hitch attaches to the frame of your vehicle and provides the 2" x 2" (or 2-1/2" x 2-1/2") receiver opening that the weight-distribution shank slides into.

Trailer hitches are classified based on weight-carrying capabilities. A trailer hitch must be categorized as Class III, IV or V to be used with a weight-distribution system. Not all Class III hitches are designed to be used with weight-distribution systems, though. Always check the weight-rating label that is on the trailer hitch. This sticker lists two capacities: weight carrying and weight distributing. If nothing is listed for weight distributing, then a weight-distribution system cannot be used.

2. Weight-Distribution Shank

The weight-distribution shank is the piece that slides into your trailer hitch and provides an attachment point for the weight-distribution head assembly. Shanks are available in many different lengths, drops and rises to fit multiple applications.
This is to ensure that your trailer is level with your tow vehicle when it is hooked up. For more information on determining the necessary rise or drop for your setup, see Choosing the Correct Ball Mount.

Standard shanks - those included with weight-distribution systems - typically have a maximum rise of about 6" and a maximum drop of approximately 2". Consult the description of the product you are considering to get the maximum rise and drop specific to that part.

Note: Weight-distribution systems are available both with and without the shank. If you need a shank with a rise or drop that is greater than the standard measurements, purchase a system that does not include a shank and then choose the shank that you need separately.

3. Weight-Distribution Head Assembly

The weight-distribution head assembly attaches to the channel or bolt holes along the shank and provides mounting points for the hitch ball and the spring bars.

Hitch Ball Platform

In addition to providing a place to mount the hitch ball that is used for trailer hookup, many weight-distribution heads have built-in platforms for mounting bar- style friction sway controls. A bar-style sway control mounts to a smaller ball on the side of the weight-distribution head. Some heads only have ball holes for a right-side attachment. Others, like the one pictured, have dual platforms so that you can mount a sway control on either side (or both sides) of your trailer.

Spring Bar Attachment

Different heads are made to accept different types of spring bars - mostly round or trunnion. The round-style bars slide up into the head and are held in place with clips. The trunnion-style bars slide into the head from the side or the back.

Head Adjustment

To achieve proper positioning for your weight-distribution system, you may have to adjust the tilt of the head assembly. There are a few ways to do this, depending on the system you choose.

The traditional washer-style adjustment method lets you adjust the tilt by sliding washers onto a spacer rivet and then inserting the rivet into the head assembly. To increase the angle, add a washer. To reduce the angle, remove a washer. Accessing the pin and washers can be a bit tedious, but this typically has to be done at initial setup only or if you switch trailers.

Serrated washers make adjusting the tilt of the weight-distribution head a snap. An improvement over the standard pin-and-washer - or traditional washer-style - method, this method lets you fine-tune leverage without having to access a rivet inside the head. The serrated-washer system lets you easily loosen, adjust and tighten a single washer and nut on either side of the head for simple, secure

positioning. This type of system is most often found on Reese trunnion-style weight-distribution hitches.

The easy-to-use, block-style washer system features a uniquely shaped washer that can be rotated and positioned between blocks on the weight-distribution head.
Each side of the hexagonal washer is numbered to provide reference points should you need to adjust your system if you switch it between different tow vehicles.
There is no need to use a difficult-to-access pin to obtain your desired tilt. This system is common on Reese round-bar-style weight-distribution hitches.

4. Spring Bars

Spring bars are responsible for transferring the load that pushes down on the rear of your vehicle when you are towing to the axles on both your tow vehicle and trailer. By applying leverage to your towing setup, these bars are responsible for distributing the weight in a complete weight-distribution setup. Typically, there are
two types of spring bars - round and trunnion. Some manufacturers have specialized spring bars.

Round Spring Bars

Round bars slide up into the weight-distribution head and are held in place with clips.

Trunnion Spring Bars

Trunnion bars insert into the head from the side or back. There is no real difference in the effectiveness of one type of bar versus the other. That being said, if ground clearance is an issue, you may be better off choosing a trunnion-bar system simply because these bars slide into the weight-distribution head instead of inserting into it from the bottom, thus maintaining a more streamline system.

The material it is made of and the forging process can affect a spring bar's flexibility and therefore its effectiveness. The more a spring bar flexes, the more the weight-distribution system will be working. When spring bars do not flex enough, the system can essentially turn off.

Most spring bars are made of traditional spring steel, which is able to flex and still "spring" back to its original shape. Some manufacturers, however, have made improvements to the standard spring bar.

- Many Reese weight-distribution spring bars are made of hot rolled steel that is tapered. This allows for superior flexibility.
- Equal-i-zer spring bars are crafted from chromoly steel. This chromium molybdenum alloy has a high tensile strength that ensures durability while also maintaining great flexibility.

5. Lift Brackets

Lift brackets mount to the frame of your trailer and are used to hold the spring bars of your weight-distribution system in place. The design and, to an extent, function of lift brackets can very among different weight-distribution systems.

Snap-Up Brackets

Standard weight-distribution systems use chains to connect the spring bars to your trailer. The chains are attached to lift brackets that install on the trailer's frame. The number of chain links between each spring bar and lift bracket is integral in achieving proper tension in the bars - and therefore weight distribution for your load. Traditionally, lift brackets have a snap-up design.

Method for setting up a system with snap-up lift brackets:

1. Hook your trailer up to your tow vehicle.
2. Choose reference points on your tow vehicle's front and rear wheel wells. Measure from these points down to the ground.
3. Use a jack to raise the trailer tongue and the rear of your vehicle.
4. Hook the chain onto the lift bracket on one side of your trailer.
5. Snap up the lift bracket using the lift handle. This may take a good amount of leverage and effort.
6. Secure the bracket in place with a pin and clip.
7. Repeat steps 4 - 6 for the other side.
8. Lower the jack and re-measure the distance from the reference points on your vehicle's wheel wells to the ground. The measurement for the front should be nearly equal to that in rear, with no more than 1/2" difference.

- If the front of your vehicle is lower than the rear, increase the number of chain links between the spring bars and the lift brackets until the height is about even. If there are no more links available for adjustment, angle the weight-distribution head assembly up to correct the height difference.
- If the rear of your vehicle is lower than the front, reduce the number of chain links between the spring bars and the lift brackets until the height is about even.

Blue Ox Rotating Latch Brackets

Blue Ox SwayPro weight-distribution systems include rotating latch brackets instead of snap-up brackets. These brackets are supremely easy to use. Simply insert the chain into the bracket and use the included handle to rotate the bracket until the chain is taut. The bracket will lock in place automatically when the lock pin engages.

The SwayPro rotating latch brackets are designed not only to be easier to use, but also to help prevent trailer sway. Each bracket hangs farther down from the trailer frame than a traditional lift bracket, minimizing the distance between the brackets and the spring bars. As a result, less chain hangs down from the brackets, which limits the movement of the spring bars so that they can exert more force on your trailer to effectively keep it from shifting side to side.

Friction Sway Control Brackets

Some premium weight-distribution systems, like Reese SC, have specially designed sway-control brackets in place of traditional snap-up brackets. These systems do not use chains to hold the spring bars in place. Instead the bars rest directly on the brackets. Each sway-control bracket is designed to inhibit sway both by holding the spring bar firmly in place and by ensuring that friction occurs any time, the bar moves along the surface of the bracket. This is referred to as dependent friction sway control.

What Is Sway Control?

A sway-control device is recommended for most standard weight-distribution systems. Trailer sway can be caused by crosswinds, poor trailer loading (load being too far back), or inadequate spring bar tension in the weight-distribution system. The use of a weight-distributing hitch by itself may help limit trailer sway by evenly distributing the weight of the load, but it will do little to improve sway caused by crosswinds. Trailer sway can be controlled with 2 basic types of systems
- those that reduce sway once it has begun and those that work to prevent sway altogether.

Reduce Sway

There are 2 styles of sway control systems that are designed to reduce trailer sway once it has already begun. Both of these styles rely on the friction that occurs when your trailer shifts to force your trailer back in line and prevent further sway from occurring.

Independent Friction Sway Control

An independent friction-style (or bar-style) sway control bolts onto your trailer frame at one end and hooks up to a small hitch ball that mounts to the system head at the other end. By attaching to both the weight-distribution system and the trailer frame, the sway-control unit can supply tension to help keep the trailer in line. An interior bar telescopes in and out as your trailer moves. As soon as your trailer begins to move out of line, the friction pads inside the unit make contact with one another and create resistance to help reduce any further side-to-side movement.

Installation:

1. Bolt the sway-control plate to the frame of your trailer.
2. Mount the included ball to the side platform on your weight-distribution head (or to the sway-control tab on your ball mount).
3. Attach the sway-control device to the balls (on the ball mount and on the sway-control plate).
4. Adjust the tension with the integrated knob. Note: Overtightening or under tightening the sliding mechanism affects the amount of friction and can, therefore, render the system ineffective.

Quick Tips:

- It is recommended that you remove the friction-style sway control before backing up to ease reversing and prevent damage to your system.
- When towing in slippery conditions - such as on wet, icy, or snow-covered roads or on loose gravel - turn the on/off handle of the sway-control unit counterclockwise until all tension is removed from unit.

Failure to do so could prevent the tow vehicle and trailer from turning properly.

- One friction-style sway control can be used for trailers with up to 6,000-lb GTW. If your trailer's GTW is between 6,000 lbs. and 10,000 lbs., you will need two sway-control units, one on either side of the trailer. You will also want to use two units if your trailer is 26' or longer.

Dependent Sway Control

Dependent sway controls are built into weight-distribution systems. These systems combat trailer sway as soon as it begins by creating enough resistance to essentially force your trailer to remain in line. Typically, they rely on the downward force of the spring bars to apply frictional resistance to the brackets on both sides of the trailer frame. In order for the trailer to move side to side (sway) it must apply enough force to overcome this resistance and make the brackets slide beneath the spring bars, which would prove very difficult in a normal towing situation.

Depending on the exact style of your system, there may be additional points of friction as well. This style is usually easier to hook up than standard systems that rely on lift chains, and over tightening or under tightening the sway control device is not an issue. Dependent systems are also able to be used with trailers that have surge (or hydraulic) brakes, unlike independent controls and certain sway control systems that work to prevent sway.

Prevent Sway

Certain sway control systems are designed to constantly keep your trailer in line to prevent sway. These systems are sometimes referred to as active sway control systems.

Active Sway Control

Active sway control is built into the weight-distribution system, but it doesn't use friction to stop trailer sway. Active systems, like Reese's Strait-Line system, proactively and aggressively stop sway before it begins by forcing the tow vehicle and trailer to continuously ride in a straight line.

The Strait-Line system uses unique sliding devices called "cams" to suspend the spring bars. One end of a cam bolts onto the trailer's frame, and the other end attaches to the lift bracket via the lift chain. The rounded, hooked ends of the spring bars then sit in these cams. The controlled placement of the spring **bars** keeps your system secure while still allowing enough movement for free, easy interaction between your trailer and your tow vehicle.

Functioning of Dual Cams

Automatically self-adjust and self-center in variety of situations

Straight-line movement - cams lock in position to hold trailer steady despite crosswinds

Cornering - cams automatically unlock and slide to allow full-radius turns

Sudden swerving - cams seek a straight-line angle to help stabilize trailer

Another type of active sway control can be found in the Blue Ox SwayPro weight- distribution system. This system features unique rotating brackets that are designed to take up far more slack in the lift chains than is possible with traditional weight- distribution systems. This creates a situation where the spring bars are pulled so taut that they are able to exert enough force on your trailer to effectively keep it from shifting side to side.

Quick Tips

- Active systems do not need to be disengaged for you to drive your rig in reverse
- The Reese Strait-Line system is not compatible with surge or hydraulic trailer brakes
- Many basic weight-distribution systems from Reese can be upgraded to dual-cam systems

. Spring bars must have curved ends to fit into cams

- Blue Ox SwayPro systems can be purchased with either clamp-on or bolt-on brackets and can be chosen based on whether you have a standard ball coupler or an underslung coupler on your trailer

What Types of Weight-Distribution Systems Are Available?

Weight-distribution systems are available in many styles that differ based on features such as the spring bars, the head assembly and the sway control. The following table offers a quick comparison of the weight-distribution hitches available from etrailer.com.

	Sway Control Type	Surge Brake Compatible	Head Adjustment Method	Lift Bracket Type
Standard Systems	**None**	**Yes**	**Depends on Model and Manufacturer**	**Snap-Up**
Standard Systems w/ Independent Sway Control	**Bar Style**	**No**	**Traditional Washer Style**	**Snap-Up**
Blue Ox SwayPro	**Tension**	**Yes**	**No Adjustment Necessary**	**Rotating Latch**
Reese SC	**2-Point Friction**	**Yes**	**Serrated Washer**	**Platform Brackets w/ Brake Pad Lining**
Reese Strait-Line	**Dual Cam**	**No**	**Serrated Washer or Block-Style Washer**	**Cams**

Standard Weight-Distribution System

These systems offer standard weight distribution and basic sway control. An independent, bar-style sway control is included to combat trailer sway. This type of system is typically the most cost-effective option for someone who has a problem with trailer sway.

Sway Control

- Single, bar-style friction sway control
- Independent system relies on friction produced by brake-pad-like material rubbing together inside of add-on unit
- Many Reese systems have bends integrated into the ends of the spring bars - upgrade to dual cam sway control

Trailer Brake Compatibility

- Electric brakes only
- Not compatible with surge or hydraulic

brakes Head Adjustment Method

- Typically, traditional washer

style Lift Brackets

- Traditional snap-up

design Spring Bars

- Typically, round bars
- Construction depends on manufacturer

Standard Weight-Distribution System with Independent Friction Sway Control

These systems offer standard weight distribution and basic sway control. An independent, bar-style sway control is included to combat trailer sway. This type of system is typically the most cost-effective option for someone who has a

problem with trailer sway.

Sway Control

- Single, bar-style friction sway control
- Independent system relies on friction produced by brake-pad-like material rubbing together inside of add-on unit
- Many Reese systems have bends integrated into the ends of the spring bars - upgrade to dual cam sway control

Trailer Brake Compatibility

- Electric brakes only
- Not compatible with surge or hydraulic

brakes Head Adjustment Method

- Typically, traditional washer

style Lift Brackets

- Traditional snap-up design

Spring Bars

- Typically, round bars
- Construction depends on manufacturer

Note: Bar-style sway controls must be manually deactivated to back up with your trailer.

Blue Ox SwayPro Weight-Distribution System with Active Sway Control

The SwayPro offers four points of built-in sway control. Within the head assembly the trunnions are designed to hold the spring bars securely in position, placing just enough tension on them to cause them to constantly force your trailer to remain in line. At the other end of this weight-distribution system, the rotating brackets ensure that the lift chains are pulled as taut as possible. This limits the movement of the spring bars so that they can exert more force on your trailer to effectively keep it from shifting side-to-side.

Perhaps the most attractive asset of the SwayPro is the rotating latch brackets. All you have to do to attach the spring bars to the trailer frame is insert the lift chain into the bracket slot and rotate the bracket with the included wrench until the lock pin engages.

Sway Control

- Active tension sway control
- Wrap-around design of lift brackets keep chains secure and taut
- Trunnion bars are held tightly in place to limit movement of system

Trailer Brake Compatibility

- Electric brakes
- Surge or hydraulic

brakes Head Adjustment

Method

- No adjustment

needed Lift Brackets

- Rotating latch

brackets Spring Bars

- Trunnion bars only
- Steel construction

Reese SC Weight-Distribution System with Dependent Friction Sway Control

The integrated sway control on the Reese SC system reduces trailer sway caused by winds, winding roads and sudden maneuvers. As soon as your trailer begins to move out of line, the friction material that lines the bottoms of the brackets installed on the trailer frame creates just enough resistance with the shifting spring bars to prevent any further side-to-side movement.

Sway Control

- Dependent, 2-point friction sway control

Trailer Brake Compatibility

- Electric brakes
- Surge or hydraulic

brakes Head Adjustment

Method

- Serrated

washer Lift Brackets

- Platform-style brackets are lined with brake-pad-like friction

material Spring Bars

- Trunnion bars only
- Hot rolled steel construction
- Tapered for excellent flex

The unique platform-style brackets make installation a snap. The included lift handle lets you hook up the spring bars with limited use of your trailer jack.

Reese Strait-Line Weight-Distribution System with Dual-Cam, Active Sway Control

This high-performance weight-distributing hitch offers spring bars with excellent flex, ensuring the load is always evenly distributed, even on rough terrain. The dual cam system keeps the trailer in a straight line behind the tow vehicle.

Sway Control

- Active sway control with dual-cam

design Trailer Brake Compatibility

- Electric brakes only

- Not compatible with surge or hydraulic

brakes Head Adjustment Method

- Serrated or block-style

washers Lift Brackets

- Cam-style

brackets Spring Bars

- Round and trunnion bars available
- Hot rolled steel construction
- Tapered for excellent flex

Reese's dual-cam sway-control system stops trailer sway before it begins. This is different from traditional friction-style controls, which help to correct sway only after it has already begun. This specially designed system uses unique sliding devices called "cams" to suspend the spring bars of your weight-distribution system. One end of each cam bolts onto your trailer's frame, and the other end attaches to the lift bracket via the lift chain. The hooked ends of the spring bars then sit in the cams. The controlled placement of the spring bars keeps your system secure while still allowing enough movement for free, easy interaction between your trailer and your tow vehicle.

During basic, straight-line towing, the cams lock in place and hold the trailer steady by applying constant, consistent pressure to both sides of the trailer frame. This keeps the trailer from swaying in crosswinds. When you go into a turn, the cams unlock and slide to allow a controlled, full-radius maneuver. If you swerve suddenly, the cams will give to accommodate the movement while still working to obtain a straight angle, thereby maintaining control of the trailer

What Types of Accessories Are Available for Weight-Distribution Systems

The majority of weight-distribution accessories are geared towards adapting a certain system for use with your particular towing setup. Differently sized shanks, for example, are available to precisely match the hitch height required for your application. The following are the most commonly sought after parts for weight- distribution systems.

Pole-Tongue Adapter

Designed for use on a trailer that does not have an A-frame tongue, a pole-tongue adapter clamps around the straight (or pole) tongue of your trailer and provides attachment points for the lift brackets of your weight-distribution system.

Lift Bracket Upgrades

Lift brackets are an integral part of any weight-distribution system. As discussed earlier, these brackets are what hold the spring bars of your system to the frame

of your trailer. Replacement brackets are available for most systems.

You can typically choose between clamp-on or bolt-on brackets. Clamp-on brackets install easily with no drilling required. Bolt-on brackets attach to the side of your trailer frame, allowing plenty of room for toolboxes, propane tanks, winches, batteries or anything else that you want to mount to the top of the frame.

Blue Ox offers clamp-on and bolt-on varieties of their rotating latch brackets.

Reese carries clamp-on and bolt-on chain hangers, which serve the same function as snap-up brackets but take up less space on your trailer frame.

Hitch Balls

The hitch ball is usually not included with a weight-distribution system and

must, therefore, be purchased separately. This is because the ball diameter - typically 2" or 2-5/16" - is dependent on your trailer capacity and coupler size. The ball shank diameter required for most weight-distribution systems is 1-1/4".

PROPER TIRE PRESSURE

Tire manufactorers provide weight charts by tire size and type as a function of weight carrying capability. In order to maximize tire life, you should insure that the entire tread is in contact with the road surface and the tire is not overloaded. In order to do this you have to weigh each tire on the TV and Trailer. This should be done with the rig fully loaded and the hitch correctly adjusted. The number on the side of each tire is the maximum allowed pressure above which the tire is unsafe.

This is particularly important on hot days and at high speeds. For many trailers it turns out that the loads are such that the running air pressure is quite close to the maximum allowed. The tires on a particular axle must be at the same pressure. So both of them should be raised to the higher measured weight. If you check the recommended pressure versus weight for Goodyear and Michelen tires; for the same size tire they both have the same recommend pressure.

The Inflation Loading

Proper Tire Inflation

Correct tire inflation is a key component in tire care. The recommended maximum inflation pressures for your tires are indicated on the certification label or in your owner's manual. Since RVs can be loaded with many different configurations, the load on each tire will vary. For this reason, actual air pressure required should be determined based on the load on each individual tire. Inflation pressure should be adjusted to handle the tire carrying the heaviest load, and all tires on the axle should be adjusted to this standard.

Each manufacturer provides load and inflation tables specific to their products to help you determine the correct tire inflation pressure for your vehicle's loading.

Underinflation brings a higher risk of susceptibility to damage due to road hazards, reduces casing durability, and causes a loss in fuel economy, plus uneven or irregular tire wear. Severe or prolonged underinflation brings about an increased risk of tread separation.

IMPORTANT: It's a common practice for RV owners to lower tire pressure in their search for a smoother ride. This is not only dangerous, it's relatively ineffective, as the difference in ride quality is not significant. When minimum inflation pressure requirements are not met, tire durability and optimum operating conditions are compromised. Tire inflation pressure should always meet at least the minimum guidelines for vehicle weight.

Tire Inflation Guidelines

Check your tires' air pressures at least once a month, before each trip and each morning you drive during a trip. Tire pressure should be checked cold, or before you have driven that day, as tire pressure ratings have been designed with typical running heat/pressure build-up in mind. Remember to check the air pressures of the inside tires in dual fitments and make sure the valves and caps are free of dirt and moisture.

- It may be necessary to inflate your tires at a truck stop or truck service center in order to achieve adequate air pressure for your coach's needs

- Only permanent air seal metal valve caps should be used
- Be safe - if a tire has been run 20% underinflated, it must be dismounted and inspected by a trained professional. It should not be aired up withou a fullinspection or without using a safety cage. Use a calibrated gauge. If your tire is rated for higher inflation pressures, a special gauge will be required designed for larger tires.
- Maintain mated duals at equal inflation pressures
- Don't bleed air from warm tires to reduce pressure buildup
- Don't inflate tires to cold PSI rating beyond rim specifications
- Don't run one dual at low inflation pressure or flat

Tire Loading

Tire pressure is what enables your RV tire to support loads. Overloading your tires can have serious consequences for passengers and your RV. Too much weight can cause stress on your RV's suspension system, brake failure, shock absorber damage, handling and steering problems, irregular tire wear and possible tire failure. Excessive loads or underinflation can lead to an excessive amount of heat and tire failure. If you discover that your tire cannot handle the load, lighten the weight of the load or install tires with a higher carrying capacity. Remember to consult your owner's manual, a Goodyear retailer, or the RV manufacturer for information concerning selection and installation of new tires.

Tire pressure should never be reduced below the vehicle manufacturer's recommended levels to support load conditions in order to improve the ride quality of a vehicle. The difference in ride quality is not significant. When minimum inflation pressure requirements are not met, tire durability and optimum operation can be affected.

Inflation Pressure for Uneven Vehicle Weight Distribution:

- Select a tire with load carrying capacity designed to handle the maximum load point
- For each axle determine the correct inflation pressure needed for that size tire to handle the maximum load
- Inflate all tires on that axle to this same inflation pressure

Tire Load Pressure Tables

Goodyear Tires

LOAD/INFLATION INFORMATION FOR RV ST METRIC TIRES

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI) HIGHWAY STEER AND ALL POSITION TREAD DESIGNS USED IN NORMAL HIGHWAY SERVICE*

Tire Size	Max Speed Rating (MPH)	Inflation Pressure - PSI										
		15	20	25	30	35	40	45	50	55	60	65
ST175/80R13	65	670	795	905	1000	**1100(B)**	1190	1270	**1360(C)**			
ST185/80R13	65	740	870	990	1100	**1200(B)**	1300	1400	**1480(C)**			
ST205/75R14	65	860	1030	1170	1300	**1430(B)**	1530	1640	**1760(C)**			
ST215/75R14	65	953	1110	1270	1410	**1520(B)**	1660	1790	**1870(C)**			
ST205/75R15	65	905	1070	1220	1360	**1480(B)**	1610	1720	**1820(C)**			
ST225/75R15	65	1060	1260	1430	1600	1760	1880	2020	**2150(C)**	2270	2380	**2540(D)**
ST235/80R16	65			1720	1920	2090	2270	2430	2600	2730	2870	**3000(D)**

LOAD/INFLATION INFORMATION FOR RV TIRES

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI) HIGHWAY STEER AND ALL POSITION TREAD DESIGNS USED IN NORMAL HIGHWAY SERVICE*

Tire Size	Single (S) Dual (D)	Inflation Pressure - PSI															
		35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110
LT215/75R15	S	1345	1475	1600	**1765(C)**	1845	1960	**2095(D)**									
	D	1225	1340	1455	**1610(C)**	1680	1785	**1930(D)**									
LT235/75R15	S	1530	1680	1825	**1895(C)**	2100	2230	**2335(D)**									
	D	1390	1530	1660	**1820(C)**	1910	2030	**2150(D)**									
LT225/75R16	S	1500	1650	1790	**1940(C)**	2060	2190	**2335(D)**	2440	2560	**2680(E)**						
	D	1365	1500	1630	**1765(C)**	1875	1995	**2150(D)**	2200	2330	**2470(E)**						
LT245/75R16	S	1700	1865	2030	**2205(C)**	2335	2480	**2623(D)**	2765	2900	**3042(E)**						
	D	1545	1695	1845	**2006(C)**	2125	2255	**2381(D)**	2515	2640	**2778(E)**						
LT215/85R16	S	1495	1640	1785	**1940(C)**	2050	2180	**2335(D)**	2430	2550	**2680(E)**						
	D	1360	1490	1625	**1765(C)**	1865	1985	**2150(D)**	2210	2320	**2470(E)**						
LT235/85R16	S	1700	1870	2030	2205	2335	2485	**2623(D)**	2765	2905	**3042(E)**	3170	3300	3415	3550	3675	**3750(G)**
	D	1545	1700	1845	2006	2125	2260	**2381(D)**	2515	2645	**2778(E)**	2885	3005	3085	3230	3345	**3415(G)**
7.50R16LT	S	1620	1770	1930	**2040(C)**	2190	2310	**2470(D)**	2560	2670	**2755(E)**						
	D	1430	1565	1690	**1820(C)**	1930	2040	**2150(D)**	2245	2345	**2470(E)**						
8.75R16.5	S						2240	2405	2470	2570	**2680(E)**						
	D						1970	2095	2175	2260	**2405(E)**						

**Industry standards for load & inflation are in the process of being revised. These tables are current as of 01/01/05. For the most current information, please visit the RV Tire section of Goodyear's Web site at www.goodyear.com/rv.*

LOAD/INFLATION INFORMATION FOR RV TIRES

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI) TRAILER DESIGNS USED IN NORMAL HIGHWAY SERVICE*

Tire Size	Max Speed Rating (MPH)	Single (S) Dual (D)	Inflation Pressure - PSI											
			70	75	80	85	90	95	100	105	110	115	120	125
215/17.5	75	S					3695	3860	4020	4180	4340	4495	4650	**4806(H)**
		D					3490	3645	3800	3950	4100	4245	4395	**4540(H)**

LOAD/INFLATION INFORMATION FOR RV TIRES

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI) HIGHWAY STEER AND ALL-POSITION TREAD DESIGNS USED IN NORMAL HIGHWAY SERVICE*

Tire Size	Max Speed Rating (MPH)	Single (S) Dual (D)	Inflation Pressure - PSI											
			65	70	75	80	85	90	95	100	105	110	115	120
8R19.5	75	S	2410	2540	2680	2835	2955	3075	3195	3305	3415	**3525(F)**		
		D	2350	2460	2610	2755	2865	2975	3085	3195	3305	**3415(F)**		
225/70R19.5	75	S		2895	3040	3195	3315	3450	**3640(F)**	3715	3845	**3970(G)**		
		D		2720	2860	3000	3115	3245	**3415(F)**	3490	3615	**3750(G)**		
245/70R19.5	75	S		3640	3740	3890	**4080(F)**	4190	4335	**4540(G)**				
		D		3415	3515	3655	**3970(F)**	4115	4265	**4410(G)**				
†245/70R19.5	75	S				3640	3740	3890	**4080(F)**	4190	4335	**4540(G)**		
		D				3415	3515	3655	**3970(F)**	4115	4265	**4410(G)**		
265/70R19.5	75	S				3970	4180	4355	4540	4685	4850	5070	5170	**5355(G)**
		D				3750	3930	4095	4300	4405	4560	4805	4860	**5070(G)**

†*Tires produced after 2/28/06.*

Tire Size	Max Speed Rating (MPH)	Single (S) Dual (D)	Inflation Pressure - PSI										
			70	75	80	85	90	95	100	105	110	115	120
9R22.5	75	S	3370	3560	3730	3890	4080	4235	4390	**4540(F)**			
		D	3270	3410	3550	3690	3860	4005	4150	**4300(F)**			
10R22.5	65	S	4080	4280	4480	4675	4850	5025	**5205(F)**	5360	5515	**5675(G)**	
		D	3860	4045	4230	4410	4585	4760	**4940(F)**	5075	5210	**5355(G)**	
11R22.5	75	S	4530	4770	4990	5220	5510	5730	5950	**6175(G)**	6320	6465	**6610(H)**
		D	4380	4580	4760	4950	5205	5415	5625	**5840(G)**	5895	5950	**6005(H)**
12R22.5	75	S	4940	5200	5450	5690	6005	6205	6405	6610	6870	7130	**7390(H)**
		D	4780	4990	5190	5390	5675	5785	5895	6005	6265	6525	**6780(H)**
245/75R22.5	75	S	3470	3645	3860	3980	4140	4300	4455	4610	**4675(G)**		
		D	3260	3425	3640	3740	3890	4080	4190	4335	**4410(G)**		

LOAD/INFLATION INFORMATION FOR RV TIRES

TIRE LOAD LIMITS (LBS) AT VARIOUS COLD INFLATION PRESSURES (PSI) HIGHWAY STEER AND ALL-POSITION TREAD DESIGNS USED IN NORMAL HIGHWAY SERVICE*

Tire Size	Max Speed Rating (MPH)	Single (S) Dual (D)	Inflation Pressure - PSI											
			70	75	80	85	90	95	100	105	110	115	120	125
255/70R22.5	75	S			4190	4370	4550	4675	4895	5065	5205	5400	**5510(H)**	
		D			3970	4110	4275	4410	4455	4610	4675	4915	**5070(H)**	
265/75R22.5	75	S	3875	4070	4255	4440	4620	4800	4975	5150	**5205(G)**			
		D	3870	4040	4205	4370	4525	4685	**4805(G)**					
275/70R22.5	75	S				5170	5400	5630	5850	6070	6290	6510	6730	**6940(H)**
		D				4770	4980	5180	5390	5590	5800	6000	6200	**6395(H)**
275/70R22.5 (G159)	75	S				4885	5080	5305	5530	5750	5965	6185	6400	**6610(H)**
		D				4535	4750	4960	5165	5370	5575	5775	5975	**6175(H)**
275/80R22.5	75	S					5500	5745	5985	6225	6460	6700	6930	**7160(H)**
		D					5080	5305	5530	5750	5965	6185	6400	**6610(H)**

Tire Size	Max Speed Rating (MPH)	Single (S) Dual (D)	Inflation Pressure - PSI											
			75	80	85	90	95	100	105	110	115	120	125	130
295/75R22.5	75	S	4725	4940	5155	5370	5510	5780	5980	**6175(G)**	6370	**6610(H)**		
		D	4690	4885	5070	5260	5440	**5675(G)**	5800	**6005(H)**				
295/80R22.5	75	S		5480	5750	6020	6285	6550	6810	7070	7320	7580	**7830(H)**	
		D		4855	5100	5335	5570	5805	6035	6265	6490	6720	**6940(H)**	
315/80R22.5	75	S			6415	6670	6940	7190	7440	7610	7920	8270	8680	**9090(L)**
		D			5840	6070	6395	6540	6770	6940	7210	7610	7940	**8270(L)**
11R24.5	75	S		5310	5550	5840	6095	6350	**6610(G)**	6790	6970	**7160(H)**		
		D		5070	5260	5510	5675	5840	**6005(G)**	6205	6405	**6610(H)**		

*Industry standards for load & inflation are in the process of being revised. These tables are current as of 01/01/05. For the most current information, please visit the RV Tire section of Goodyear's Web site at www.goodyear.com/rv.

TRAILER HOOKUP

You have three hookup cables:

(1) Electric wire cable for coach battery charging, running lights, turn signals, brakes and backup light.

(2) Chains for safety.

(3) Emergency trailer brakeaway switch.

In the event of the ball beaking loose or any failure of the TV trailer hitch the safety chains prevent the A-frame from hitting the ground first and the trailer flipping over on top of the TV. They are designed to be crossed once, Figure (9) so they can act as a platform in the event of a hitch assembly failure.

If the chains break then we want the trailer brakes to go on, indepent of the TV which is the purpose of the Brakeaway switch. When the cable is extended this switch closes and the

trailer battery energises its brakes. The TV attachment must be strong enough so that the cable will be properly extended. Just attaching this cable to the license plate is not sufficient. You should install a ring bolt assembly through some part of the TV body that the switch cable can be clipped to.

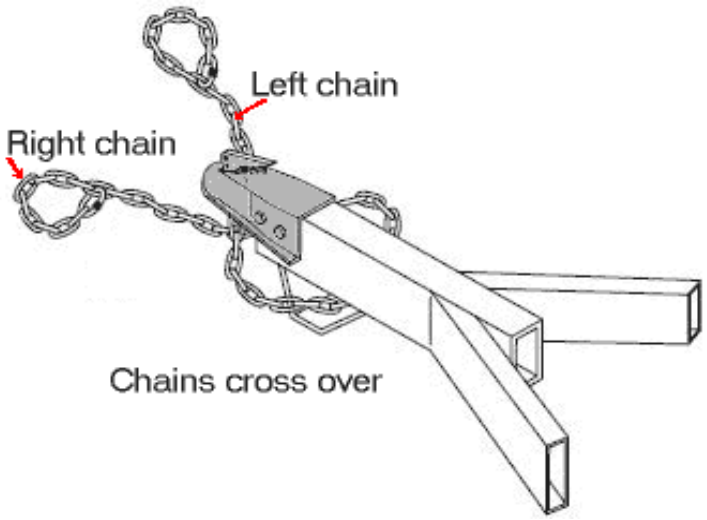


Figure (9) Safety Chains

TOW VEHICLE LENGTH

From Reference (8)

Why is length such an important factor? Well, it is not really the length of the trailer that is as important as is the size (or wheelbase) of the tow vehicle trying to pull it. The main focus of this is to minimize trailer sway, which in many cases is caused by the wind from either Mother Nature or large vehicles passing you by.

Basically, the longer the wheelbase the better! Think of it as leverage. The longer the trailer, the more leverage it can have on the tow vehicle. The longer the wheelbase of the tow vehicle, the more it can resist the leverage being applied from the trailer. You don't need a crew cab long bed truck to pull a pop-up that could easily be towed by a small SUV. However, you don't want to pull a 30' trailer behind that small SUV. You want something longer. But don't get carried away, either. Let's see how it works.

You will need 2 measurements, the wheelbase of your tow vehicle, and the total length of the trailer you are pulling (or intend to pull). That length is from the coupler to the back bumper.

Guideline
(This guideline was first used by the RV Consumers Group rv.org)

For the first 110" of wheelbase, this allows you 20' of trailer.

For each additional 4" of wheelbase, this gets you 1' more of

trailer. Wheelbase / Trailer length
110" = 20'
114" = 21'
118" = 22'
and so on
If you look at some of the physics and geometry inherent to travel trailers, you might see why length is an important factor to consider. Ever try to carry a full sheet of plywood (or something similar in size) by yourself, on a windy day? It can be difficult to maintain control. But, how about carrying a couple of 2 by 4's on that same windy day? Not so hard! That is because the 2 by 4's do not have the same surface area to catch the wind as the sheet of plywood does. So, in a way, that travel trailer is just like a sheet of plywood for catching the wind.

The next thing to look at is how far the coupler is from the trailer tires. The greater the distance, the lesser the impact it will have on the tow vehicle and the less sway it could create. You will see travel trailers of the same overall length with the axles in different locations. This is probably due to the floor plan or layout of the trailer in order to balance the overall trailer, as well as to provide enough, but not too much, tongue weight.

Finally, the ball, or hitch location. How far is it from the tow vehicle's rear axle? The farther away it is (known as rear overhang), the more leverage the trailer can apply to the tow vehicle and create the possibility for more sway. A Jeep or a Hummer would make great tow vehicles because they have very little rear overhang compared to most pickup trucks and SUV's. Another example of this would be in comparing a 2003 Chevy

Tahoe to a 2003 Chevy Suburban. The wheelbases of the two are different, but their wheelbase to rear overhang ratios are almost identical. Therefore, both vehicles should be able to handle the same trailer with similar results as far as length is concerned.

If you end up breaking the length guideline by a few feet (3'-4'), you might be okay as long as you have a good sway control hitch or anti-sway bar.

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