Towing Safety

Auburn University Risk Management and Safety
971 Camp Auburn Road
Auburn, AL 36849
Phone: 334-844-4870
Fax: 334-844-4197
www.auburn.edu/administration/rms

Towing

- Towing a trailer, automobile or boat can be extremely dangerous.
  - **Towing requires skill beyond operating a normal vehicle.**
- All drivers must be trained and have practiced in a safe location before driving on main roads.
- On average, **more than one person a day dies** in the United States from towing-related accidents –many of which occur because of driver inexperience.

Alabama Laws

- All drivers should read “Alabama Code Title 32, Chapter 9 – Trucks, Trailers and Semi-Trailers.”

  http://law.justia.com/codes/alabama/2006/22786/138258.html

- Specifications for hookups differ from state to state. Check to make sure you are within code before embarking on a long trip.

Alabama Laws

- Maximum trailer length – **40 feet**
- Maximum trailer width – **8 feet**
- Maximum trailer height – **13 feet 6 inches**
- Weight requiring trailer brakes – **3,000 pounds or more**

- Follow the manufacturers' towing specifications for the tow vehicle, trailer, and all of the tow package components.
  - NEVER exceed the recommended maximum towing capacity of the tow vehicle or the trailer. **Too much trailer weight or an improperly loaded trailer can easily cause an accident.**

Three things you need in order to tow

Tow Vehicle

Tow Trailer

Tow Package

Tow Vehicle

- Must be a proper match for the trailer and load to be towed.
  - Even though a vehicle may have the ability to pull a loaded trailer on a level surface, it may not have the power to haul the trailer up steep inclines.

Tow Vehicle

- Know your vehicle's tow rating – size, maximum loaded weight, and maximum trailer weight the tow vehicle can handle.
  - The tow vehicle owner's manual will contain these specifications.
  - **In general, the trailer you are carrying should <u>never</u> outweigh the tow vehicle you are driving.**

Tow Vehicle

- 12 and 15 passenger vans should **never** tow a trailer.

Tow Trailers

- There are many types of trailers, but in general, they fall into four categories:
  1. Flatbed or “Open Trailers”
  2. Boat Trailers
  3. Enclosed Trailers
  4. Recreational Vehicle Trailers (includes travel trailers, fifth-wheel trailers, and folding camping trailers.

Tow Trailers

- Federal law requires trailers to have working:
  - taillights
  - brake lights
  - side marker lights
  - turn signals
  - side and rear reflectors

It is very important that you check all lights before you leave and frequently throughout the trip.

Tow Package Components

- Three crucial components in most tow packages:

1) Hitch – device that attaches directly to a tow vehicle providing the connection between the tow vehicle and the trailer.

2) Hitch Ball or Tow ball – ball shaped attachment to a hitch where the trailer coupler is attached.

3) Coupler – used to secure the trailer to the towing vehicle.
   - Envelopes and secures to the tow vehicle hitch ball.
   - **The hitch ball and coupler must be the same size!**

Tow Package Components – Hitch

- There are different types of hitches, used for different purposes. The most common include:
  - Fixed Tongue Hitch
  - Pintle Hitch
  - Fifth Wheel Hitch (heavier loads)
  - Gooseneck Hitch (heavier loads)
  - Receiver Style Hitch (includes front mouth and customized hitches)

Receiver Style Hitches are the most commonly used trailer hitches.

Fix Tongue Hitch

- A trailer hitch with a basic ball platform (tongue) that cannot be removed.
  - Everything is permanently installed in place and remains that way even when you are unhitched.
  - Have decreased in use in recent years.

Pintle Hitch

- A common heavy duty hitch which uses a pintle hook ('jaw' part of the hitch which attaches to a tow vehicle) to pull the lunette eye (round metal ring that attaches to the pintle hook on the trailer.)
  - Pintle hitches are commonly used on military, construction, industrial, and agricultural equipment.

Fifth Wheel Hitch

- Trailer hitch that mounts in the bed of a truck and a pin on the trailer.
- Fifth wheel hitches are “Class 5” hitches – meaning, they are used to haul very heavy equipment such as horse trailers and large RVs.

Gooseneck Hitch

- Another “Class 5” hitch that mounts a ball in the bed of a truck to engage a coupler on a trailer.

Receiver Style Hitch

- Any hitch with a receptacle (typically 1-1/4 inches or 2 inches) which accommodates inserts such as drawbars or ball mounts (removable platforms that slide into a hitch receiver and fasten with a pin and clip.)

Front Mount Hitch

- A type of receiver-style hitch that mounts to the frame of the tow vehicle, and is available for several trucks, full-sized vans, and SUV's.
  - Front mount hitches are commonly used for boat launching.

Custom Hitches

- A type of receiver hitch designed for a particular year, make, and model of a vehicle.
  - It is important to check the vehicle's specifications on custom hitches (weight/towing capacity, etc.)

Tow Package Components – Tow Ball

- Come in a variety of sizes including 1 7/8-inch, 2-inch, 2 5/16-inch and 3-inch.
- Typically, the lighter the trailer – the smaller the hitch ball.
- While the diameter of hitch balls are usually standard, shank diameters and the hitch ball weight ratings will differ.
  - **The rating of the hitch ball is just as important as the hitch ratings!**

Tow Package Components – Coupler

- Some couplers have a “handwheel” that can be turned to tighten or loosen the coupler to the hitch ball.

- There are also “latch style” couplers, utilizing a lock and key to hold the coupler/hitch ball together.

Tow Package Components – Safety Chains

- Make sure any kind of hitch you use has provisions for the connection of safety chains – chains to keep the trailer connected to the tow vehicle should the coupler or hitch ball detach from the tow vehicle. **Safety chains must be secured every time you tow.**

Tow Package Components – Safety Chains

- Should cross under the trailer tongue to help prevent the tongue from dropping to the road if the trailer were to separate from the tow vehicle.
  - Should have some slack to permit sharp turns, but not drag the road.
- **Do not wrap the safety chains around the hitch ball.** Fasten them to a solid area of the framework or to the area of the auto hitch designed for that purpose.

Tow Package Components – Optional Equipment

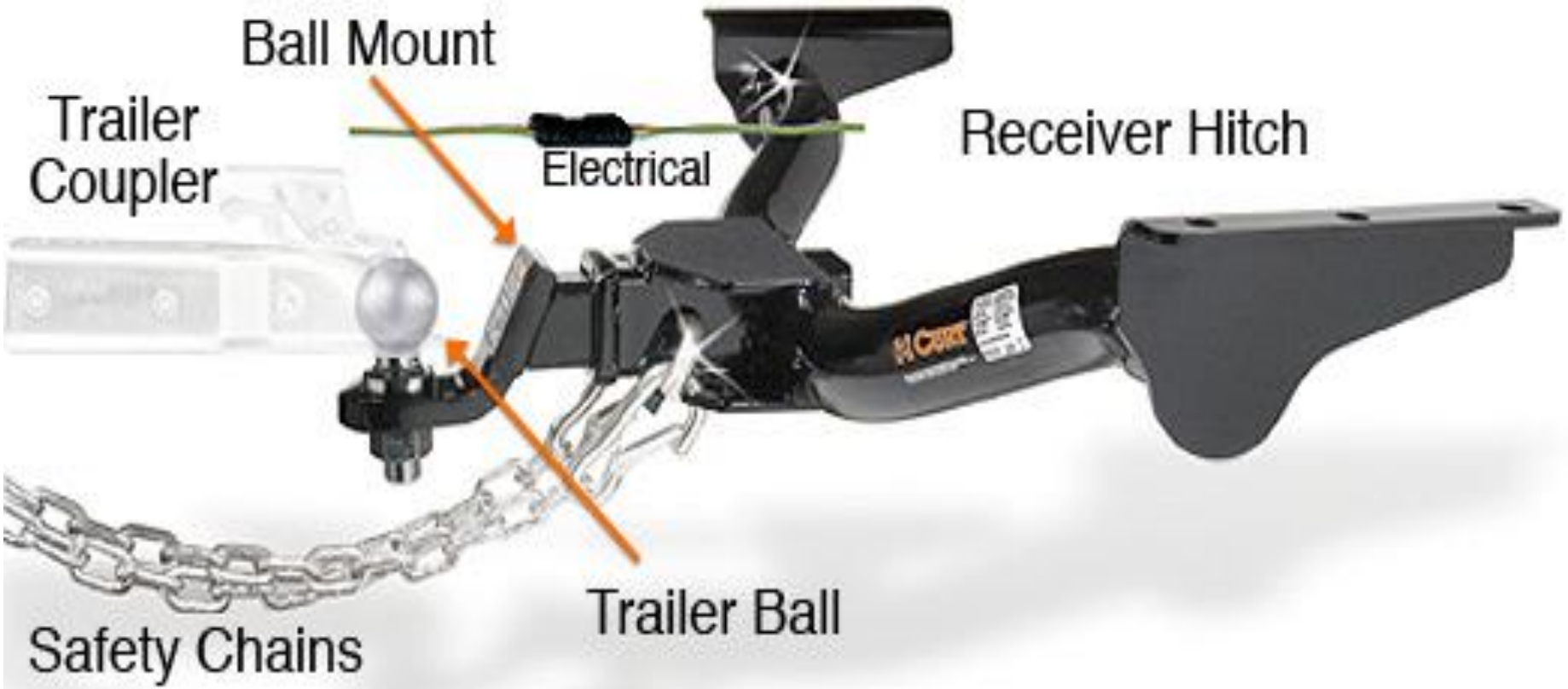
- Receiver Hitch Adapter – an item that fits into the receiver tube of a hitch and converts it from a 1 1/4" receiver to a 2" receiver, or vice versa.

- Receiver Hitch Extender – an item that fits into the receiver tube of a hitch used to extend the length.
  - Using a hitch extender may reduce the overall capacity to the rating of the extender being used.

Tow Package Components – Optional Equipment

- Winch: device used to load or unload cargo to and from a trailer.
  - The winch mounts onto the trailer hitch.
  - Is commonly utilized in boat towing.

Diagram

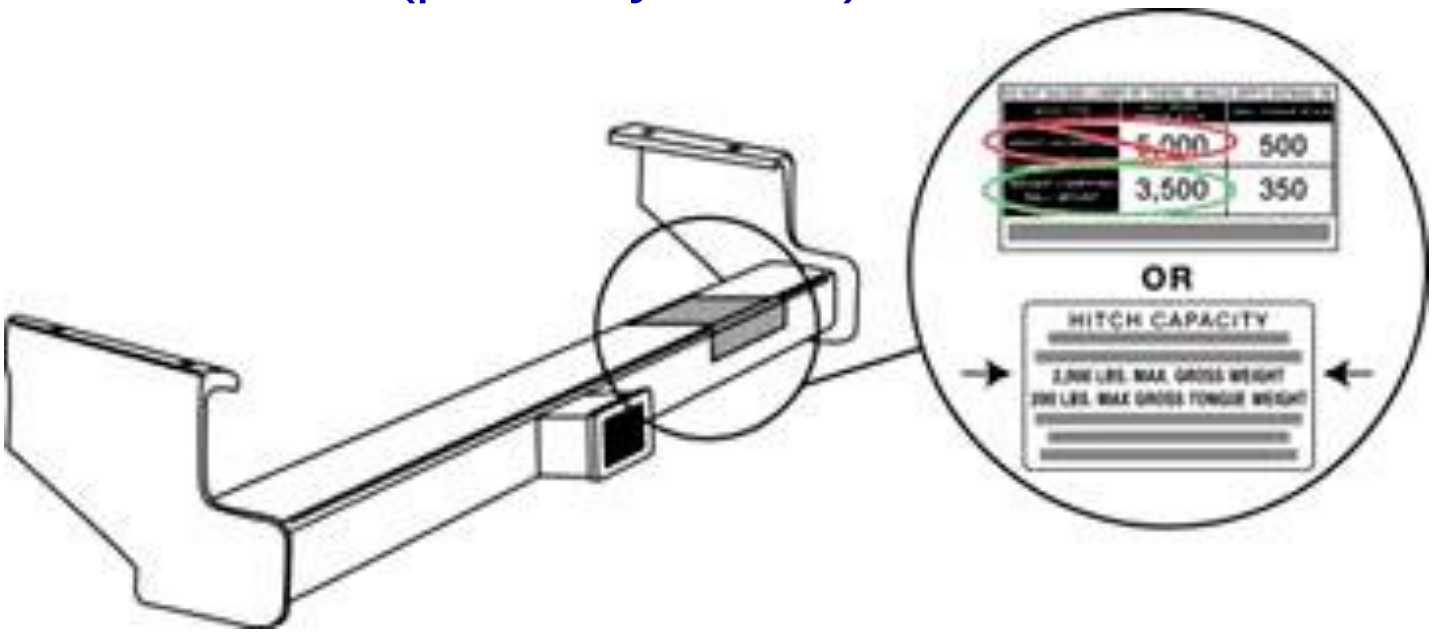

Ball Mount
Trailer Coupler
Electrical
Receiver Hitch
Trailer Ball
Safety Chains

Hitch Rating

- The amount of weight a hitch is able to carry is called the **hitch rating** and is determined by the **Gross Trailer Weight** (GTW – The total weight of the trailer fully loaded in its actual towing condition.)
  - Class I: 2,000 pounds GTW (light loads.)
  - Class II: 3,500 pounds GTW (light loads.)
  - Class III: 5,000 pounds GTW (heavier loads – campers, boats, etc.)
  - Class IV: 7,500 pounds GTW (heavier loads – campers, boats, etc.)
  - Class V: 10,000 + pounds GTW (very heavy loads.)

Hitch Rating

- It is **very important** you know the rating of hitch you will need for the type of trailer you will be carrying.
  - For example, to tow a boat, you will need **at least a class III hitch** (probably more.)



Hitch Ball and Drawbar Ratings

- The ratings of the hitch ball and drawbar are just as important as the hitch rating. **The weight of the load should never exceed the hitch ball or drawbar rating!**

- You can find the hitch ball rating at the top of the ball or around the base.

- The rating of the drawbar is usually on a label on the mounting plate or along the shaft that goes into the receiver.

Hitch System Rating

- A hitch system is only as strong as its lowest-rated component.

- Compare the maximum tow weight ratings of your **hitch**, **ball mount,** and **hitch ball.** Your hitch system rating is the lowest weight rating among these components.

Hitch System Rating

Example: if you are towing with a Class III Hitch, a ball mount rated for 5,000 pounds, and a hitch ball rated for only 2,000 pounds – then your system is only rated as Class I (can only tow under 2,000 pounds.)

Make sure to examine all of these components before you hit the road. Weight and towing capacity are crucial to your safety!

Hitch System Rating

How to determine your system's rating

http://www.youtube.com/watch?v=TYqtfe_MpUM

Weight

- **Gross Vehicle Weight Rating (GVWR)** – amount the tow vehicle will weigh when fully loaded (without attached trailer.)
- **Weight the vehicle *is able* to tow** – will vary based on the type of vehicle, type of transmission (automatic or manual), and whether it is equipped with four-wheel drive.
- **Gross Combination Weight Rating (GCWR)** – permissible combined weight of the tow vehicle, trailer, passengers, equipment, fuel, etc. that the vehicle can handle.

Gross Axle Weight Rating(GAWR)

- The maximum weight the tow vehicle's axles can carry.
  - The gross axle weight rating should be listed on the tow vehicle's certification label.
  - Never exceed the gross axle weight when towing. Doing so can cause damage to the vehicle and problems on the road.

“Dry” Weight

- Some manufacturers provide a “dry” or empty weight for trailers. To select the proper tow vehicle and hitching system, you must know how much the trailer will weigh when it’s fully loaded.
  - The best way to know the actual weight of the trailer is to weigh on a public scale.

Tongue Weight

- Trailer tongue is the part of the trailer that extends forward from the trailer box and includes the coupler.

- Tongue Weight – amount of the trailer's weight that presses down on the trailer hitch.

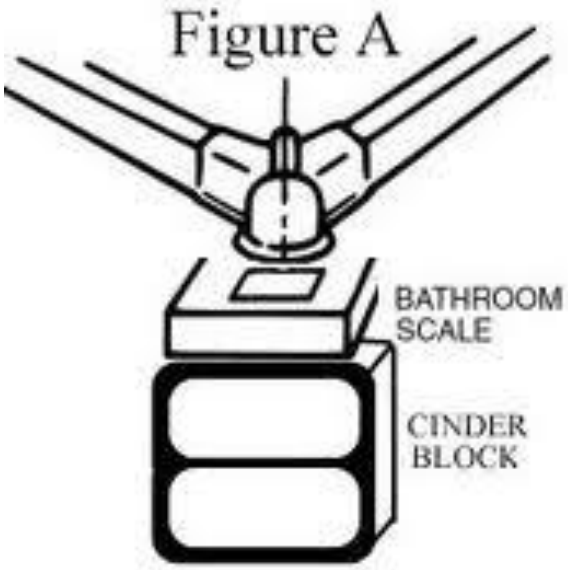
Tongue Weight

Generally, tongue weight should never be more than 10% of the gross trailer weight (total weight of the trailer fully loaded.)

- Too *little* tongue weight can cause the trailer to sway.
- Too *much* tongue weight can cause the front of the towing vehicle to rise, making the tow vehicle less responsive to steering and causing the hitch to drag.

Determining Tongue Weight

- Tongue Weight up to 300 pounds can be measured on a household scale:
  - Rest the trailer coupler on the scale and place the scale on a box (or other hard surface) so that the coupler is at its normal towing height. The trailer must be fully loaded and level.

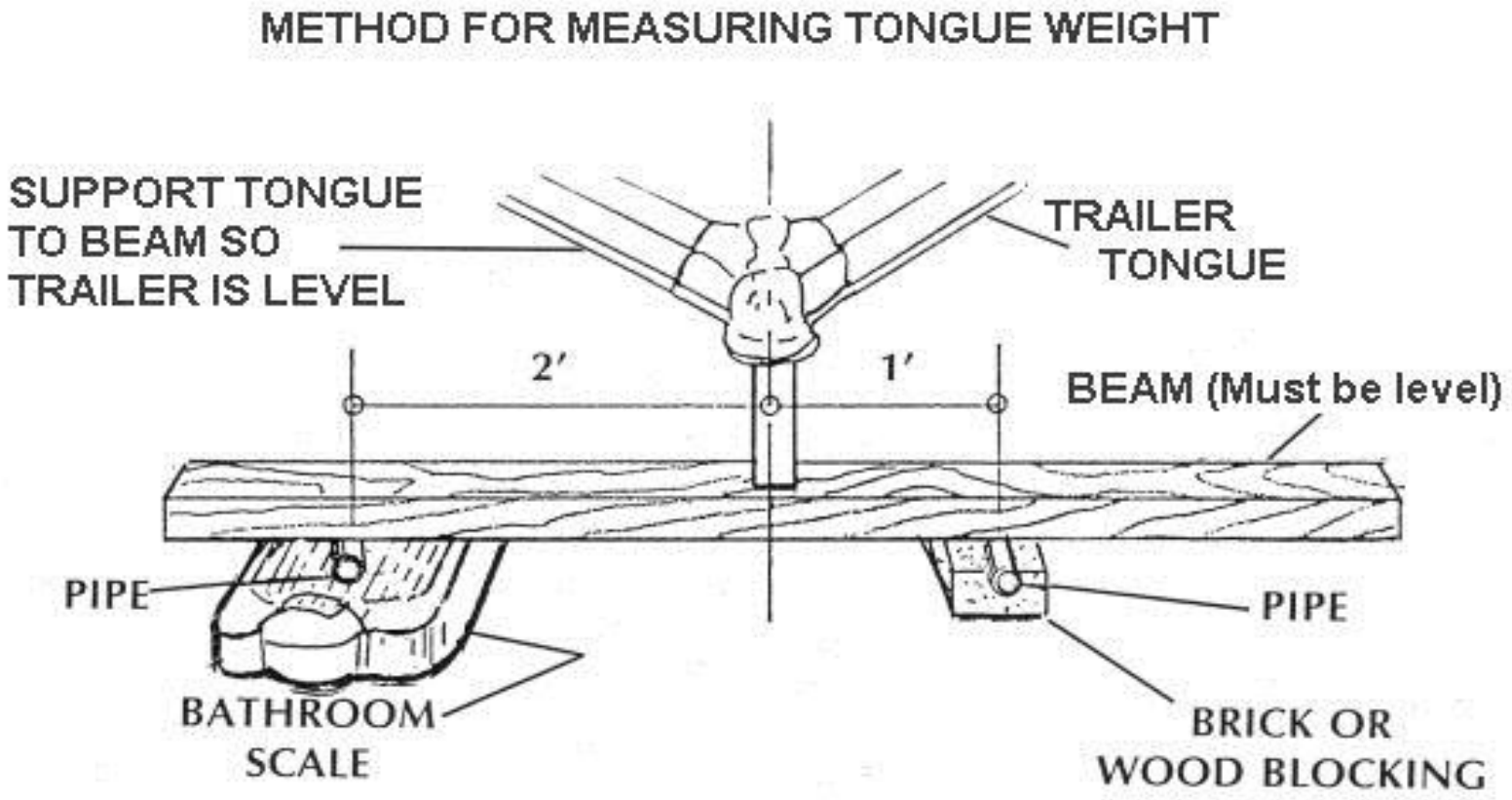


Determining Tongue Weight

- For heavier tongue weights, place a household scale and a brick that's as thick as the scale three feet apart.
  - Set a length of pipe on each and rest a beam across the pipes.
  - Re-zero the scale to correct for the weight of the beam and pipe.
  - Securely block the trailer wheels. Rest the trailer jack on the beam **one** foot from the brick and **two** feet from the scale.

To obtain the Tongue Weight, multiply the scale reading by **three**.

Determining Tongue Weight



FORMULA:
TONGUE WEIGHT = 3 X WEIGHT REGISTERED ON THE SCALE

Determining Tongue Weight

- For even heavier tongue weights, place the scale and brick **four** feet apart, rest the jack on the beam **three** feet from the scale and multiply the scale reading by **four**.

Selecting the Correct Trailer based on Weight

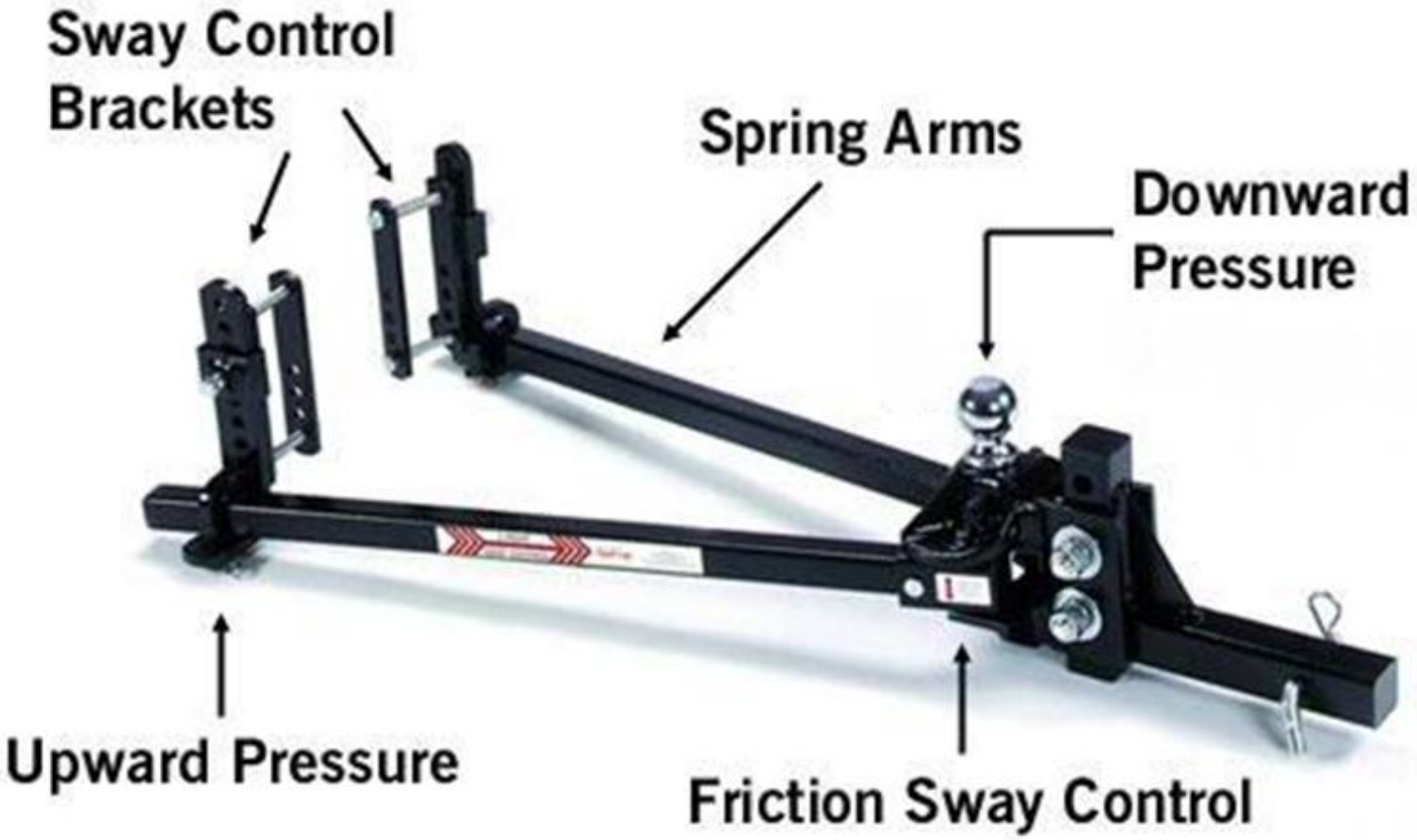
How to Select and Hook up a Trailer

http://www.uhaul.com/Articles/Tips/79/How-to-select-and-hook-up-a-trailer

Weight Distributing Hitch System

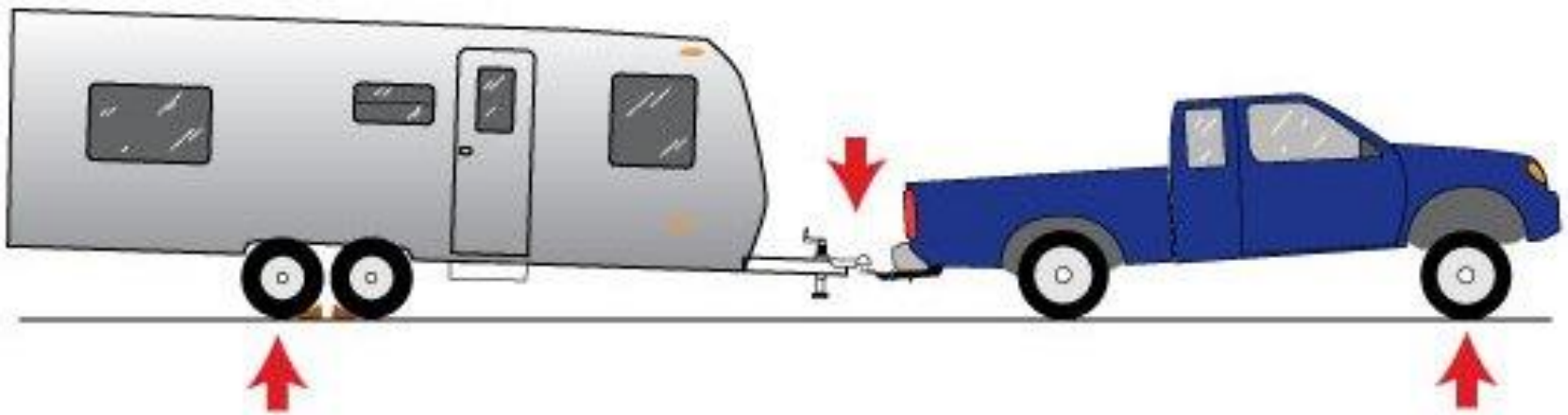
- Also known as an “equalizer.”
- Utilize “spring bars” with a receiver-style hitch.
- Although the Weight-Distributing system is not required, it is strongly recommended to help evenly distribute the load you are carrying.
  - Without a weight distributing system, heavy tongue weight can lift the tow vehicle's front wheels and weigh down the vehicle's rear end.
  - With a weight distributing system, your entire towing rig will ride level and be more stable on the road.

Weight Distributing Hitch System

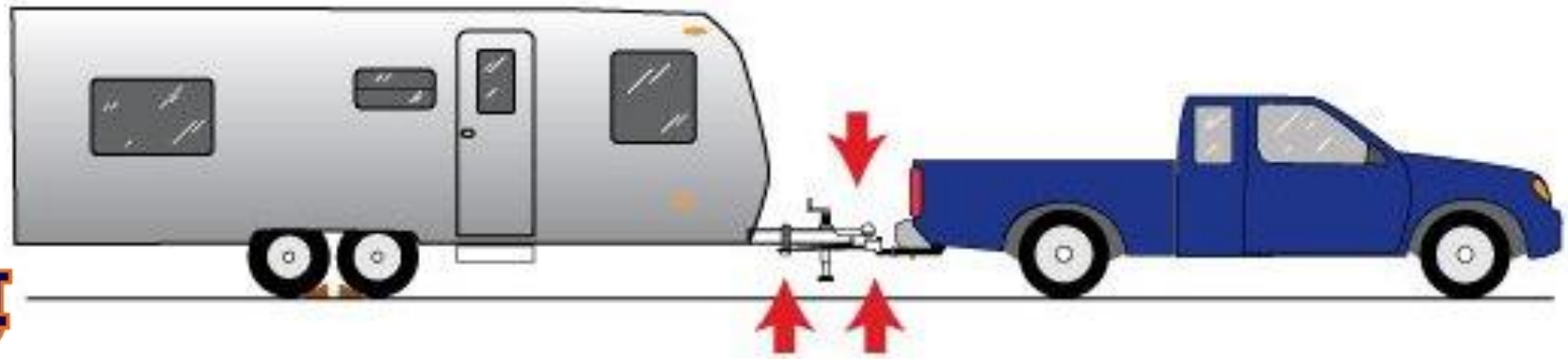


Weight Distributing Hitch System

Without Any Weight Distribution

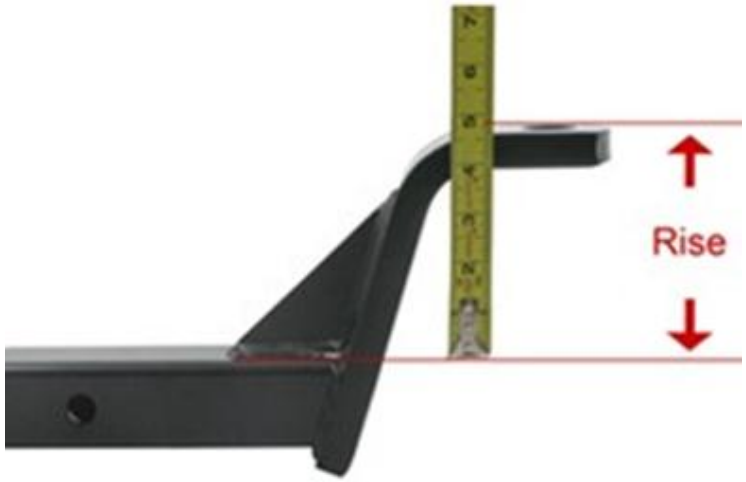


With the Equal-i-zer Hitch



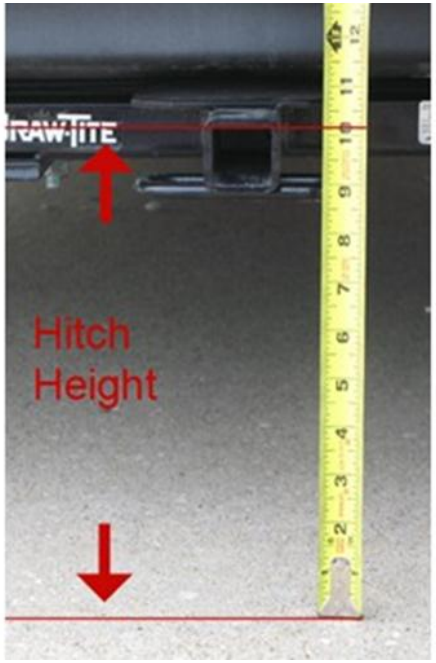
Determining Rise/Drop

- You may notice that your trailer and tow vehicle are not level with one another. To get the trailer and tow vehicle at the same height, it might be necessary to use a “rise” or “drop” ball mount.



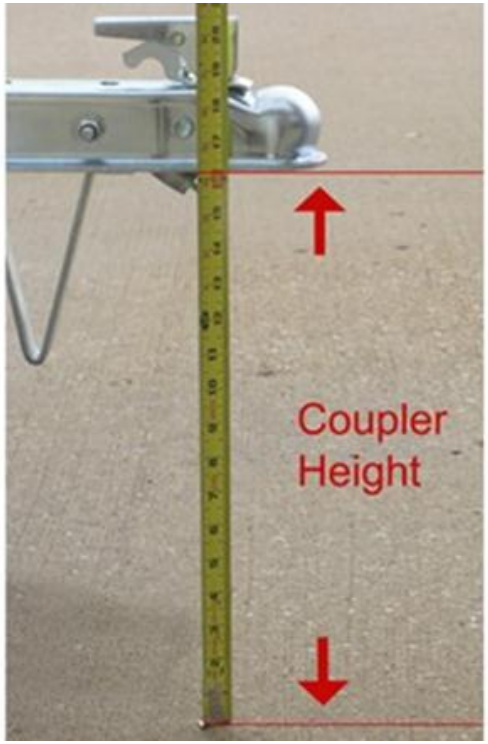
Determining Rise/Drop

- Measure the hitch height from the ground to the top of the receiver opening on the trailer hitch.
  - While the vehicle is parked on level ground, measure from the ground to the very top of the **receiver area**. *Remember: the hitch is attached to the tow vehicle.*



Determining Rise/Drop

- Measure the coupler height from the ground to the bottom of the trailer's coupler, ensuring that the trailer is level and on level ground. *Remember: the coupler is attached to the trailer.*



Determining Rise/Drop

- Calculate the difference:
  - Calculate the difference between the hitch height and the coupler height.
  - If the hitch height is GREATER than the coupler height, the difference is the *drop*, and you will use a drop ball mount.
  - If the coupler height is greater, the difference is the *rise*, and you will use a rise ball mount.

Determining Rise/Drop

- Example: The hitch height (from the ground) is **25 inches** and the coupler height (from the ground) is **17 inches**. Do you need a *rise* or *drop* ball mount? What size?

- Since the hitch height is greater than the coupler height (25-17=8) a ball mount with a drop of **8 inches is required.**

Braking Systems

- Selecting brakes will depend on the tow vehicle and the type and fully loaded weight of the trailer.
  - Trailers having a loaded weight of more than 1,500 pounds may require a separate braking system and a breakaway switch (a switch that automatically sets the trailer brakes in case of accidental trailer breakaway.)

Braking Systems

- Two basic types of brake systems designed to activate the brakes on the trailer:
  - **Electronically controlled brakes –** provides automatic or manual control for trailer brakes. These require the tow vehicle to be equipped with a controlling device and additional wiring for electrical power. There is usually a control box within reach of the driver and can be manually or automatically applied.
  - **Surge brakes –** independent hydraulic brakes which are activated by a master cylinder at the junction of the hitch and trailer tongue. These type of brakes are not controlled by the hydraulic fluid in the brake system of the tow vehicle.

Follow the manufacturer's guidelines for selecting which type of brakes to use on your system.

Wiring Systems

- To provide power to all the lights of your trailer, a four way (or more) connector should be hooked into the tow vehicle's electrical system.
- You must ensure that the signals on the electrical connector of the *tow vehicle* match the electrical connector of the *trailer.*
  - It may be necessary to purchase a taillight converter. This converter will combine all wires so they can be connected to the trailer lighting system.
  - If you typically tow more than one type of trailer, you may also need to purchase an adapter to accommodate differences in the wiring systems.

Prior to the Trip

- Inspect tires and wheel bearings before each use.
  - Bearings should be properly lubricated.
- If the trailer has brakes, inspect them daily and make sure all connections are intact. Trailer tires should be inflated based on towing specifications of the manufacturer (located on the tire sidewall.)
- All trailer tires should be the same type, size and construction.

Prior to the Trip

- Make sure the wheel lug nuts/bolts on the tow vehicle and trailer are tightened to the correct torque.
- Be sure the hitch, coupler, draw bar, and other equipment that connect the trailer and the tow vehicle are properly secured and adjusted.
- Check side and rear view mirrors to make sure you have good visibility. It may be necessary to add extended side view mirrors.

Prior to the Trip

- Remember: check the owner's manual of the vehicle for the recommended gross vehicle towing weight and other towing specifications.

- Vehicles must not carry or tow loads beyond their rated capacity. Doing so can be very dangerous – **Never tow more than your vehicle can handle**!

Loading Safety

- Load and unload on level surfaces. **Always make sure the brakes are locked before loading.**
- Do not allow passengers to ride on the trailer.

Loading Safety

- Keep decks free from dirt, oil, and other debris. Steel decks can be slippery when wet and extra caution is needed when loading and unloading.

- Tilting trailer beds should be securely locked in position before moving.

Loading Safety

- Be sure to load trailers properly. Loads must be distributed evenly over the axles.
  - It is recommended that approximately **60 percent** of the load be put toward the **front** of the trailer.
  - Load the towing vehicle so that it can be handled safely on any road or highway.
  - Adjust your driving techniques and **slow down** to accommodate hauling heavy loads.

Loading Safety

- Use tie downs or chain binders with sufficient load strength to secure loads to the trailer.
  - Avoid using bindings that are worn, frayed or badly rusted.
  - Check bindings regularly while traveling to ensure no bindings have loosened or that the load has shifted.
  - Consider using a tarp to cover the load (if appropriate), especially if you are carrying small, loose items.

Loading Safety

- Place heavier items at the bottom of the trailer, and lighter items near the top to avoid a top heavy load. A top heavy load makes it easer for the vehicle and trailer to turn over.

- Avoid making the load taller than the tow vehicle itself. Be mindful of aerodynamic issues created, as well as clearance requirements of power lines, tree limbs, or bridges along your route.

Loading Safety

- How to load and haul the trailer safely.

- http://www.youtube.com/watch?v=UZ8DRC_fWSg

Towing Safety

- ALWAYS wear your seatbelt, and make sure passengers do the same!

- Avoid distractions such as loud music, talking to friends, eating, or any other activities that will take attention away from driving.
  - NEVER talk/text on your cell phone while driving!
  - Do not drive if you feel tired or unwell. If you need a break– find a safe location and pull over.

Towing Safety

- It is strongly recommended you use a **maximum towing speed of 45 mph.** Keep your speed low and increase following distance to compensate for the extra stopping distance required due to added weight.
- Slow down and be extra cautious when traveling over bumpy roads, railroad crossings, and ditches.

Towing Safety

- It's a good idea to check the brakes while driving at a low speed to ensure they will stop the vehicle and trailer easily and comfortably.
- Reduce speed when travelling downhill, but avoid "riding" the brakes.

Towing Safety

- Maintain a safe following distance (at least **four** seconds) from the vehicle in front of you.

- Avoid sudden stops and rapid acceleration. Sudden deceleration or acceleration can cause trailer skidding, sliding, or jackknifing.

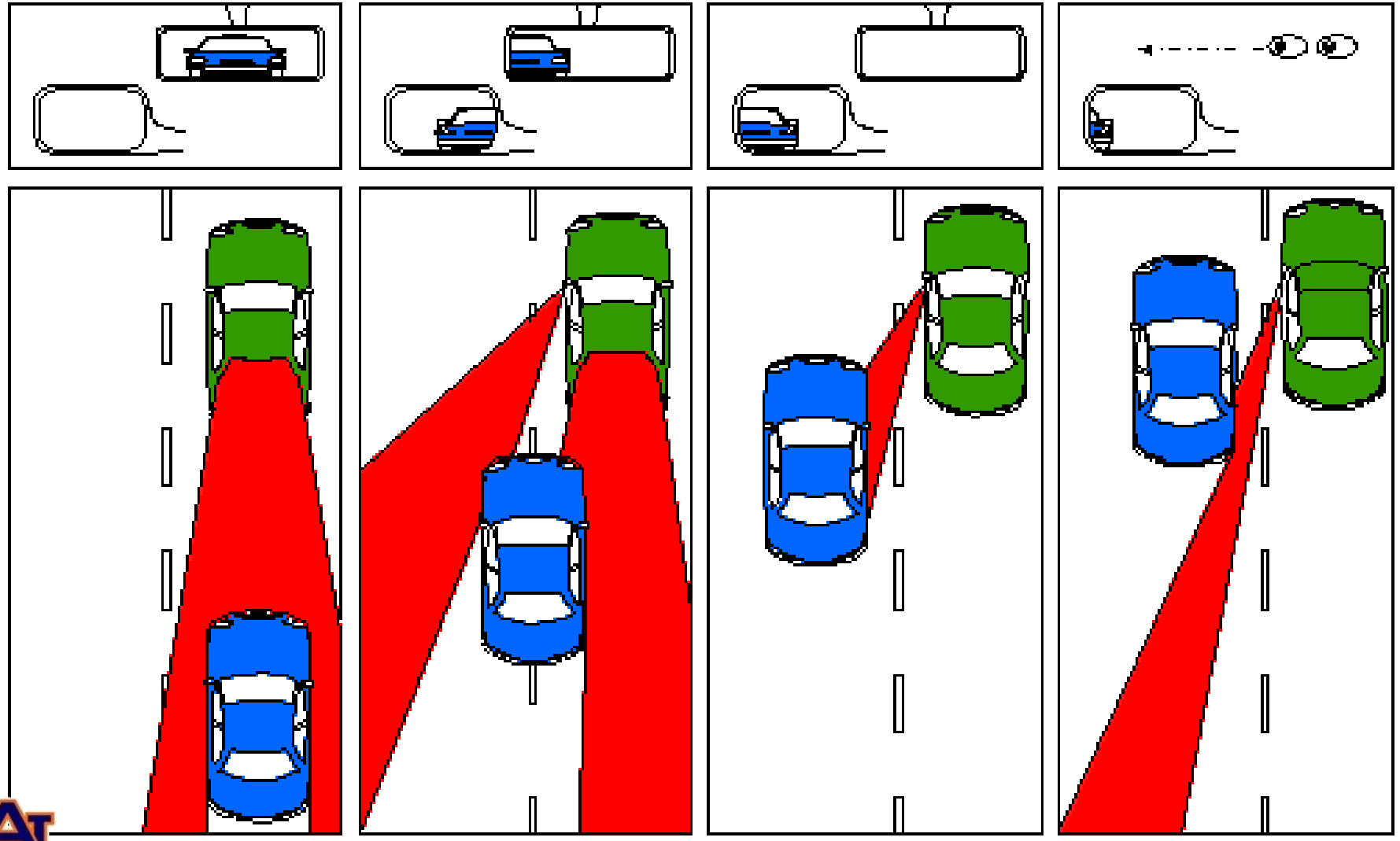
Towing Safety

- When changing lanes or moving in front of another vehicle, consider the added length of the trailer. Be sure there is sufficient distance between you and any other vehicles before acting.
  - ALWAYS use turn signals well in advance before changing lanes. It is very important that people around you know exactly what to expect!

Towing Safety

- Use your mirrors frequently to check traffic conditions beside and behind you.
  - Check “blind spots” to make sure the area is clear before passing or changing lanes. Sometimes there are vehicles around you that cannot be seen in mirrors!

Towing Safety: Blind Spots



Towing Safety

- Be mindful of adverse weather conditions, traffic conditions, road work or other circumstances that could affect the safety of your trip. Decrease your speed when the road is bumpy or rough.

- If you begin “swaying” or “whipping,” do not brake or make sudden movements. Simply let your foot off the gas, and firmly hold the steering wheel in the straight position.

Towing Safety

- Trailers cut corners more sharply than a towing vehicle, making it necessary to make wider turns at curves and corners.
- The trailer's wheels are closer to the inside of the curb than the wheels of the tow vehicle, making them more likely to hit or ride up over curbs.
- When this occurs, a previously secure load can become disturbed, requiring you to recheck the load and bindings.

Steering

- Sharp steering wheel corrections will cause the trailer to jackknife and may cause damage to the rear of the tow vehicle or the front of the trailer.
  - Use slight movements of the steering wheel to adjust direction. Exaggerated movements will cause greater movement of the trailer.

Backing Up

- If possible, avoid having to back the trailer up. **The trailer will go in the opposite direction of the tow vehicle**.
  - Having another person assist with backing up by standing to the rear and side and providing instruction is very helpful.
  - Turn the vehicle's wheels to the **right** to make the trailer go right. Turn the wheels to the **left** to make the trailer go left.
  - If you have difficulty, pull forward, realign the tow vehicle and trailer and start again.

Parking

- When uncoupling a trailer, place blocks at the front and rear of the trailer tires to keep the trailer from rolling away when the coupling is released.
- While unloading, the remaining equipment may become unbalanced, causing the tongue to suddenly rotate upward. Before uncoupling, place jack stands under the rear of the trailer to prevent injury.
- Avoid parking on grades.

Towing an Automobile

- There are different ways of towing an automobile. The safest (and simplest) is using a flatbed trailer.
  - Drive your car up the rear ramps to the trailer, park it, and be sure to properly secure the vehicle to the trailer.
    - Use tie downs or chain bindings rated for the weight you are carrying to secure the vehicle to the trailer.

Towing an Automobile

- How to load a vehicle onto an auto trailer.

http://www.uhaul.com/Articles/Tips/30/How-to-load-your-vehicle-onto-a-U-Haul-car-hauler

Towing an Automobile

- Two-wheel car towing involves towing a car with its two front wheels off the ground. A tow dolly (a short, two wheeled trailer with ramps and slots your front tires drive up and settle into) attaches to the tow vehicle's trailer hitch.

Towing an Automobile

- Towing with a tow dolly can be complicated.
  - If your vehicle is front wheel drive, the process is relatively simple.
- If your car has rear-wheel or all-wheel drive, two wheel towing is more difficult, because the wheels are connected to the drive shaft of the vehicle.
  - In order to tow a rear/all wheel drive vehicle with a tow dolly (two wheel tower), you will have to remove the drive shaft – which is a complicated process and better left to a mechanic.

NEVER back the vehicle onto the trailer – this will cause an imbalanced weight distribution and cause sway on the road.

Towing an Automobile

- Flat Tow – Also known as “four wheels down towing.”
  - Method where all four wheels of the towed car are touching the ground.
- Utilizes a tow bar (hitch system that connects the towing vehicle to the vehicle being towed, allowing for swiveling between the two vehicles so that they can move independently in turns and over bumps.)
- Not all vehicles can be flat towed. As with using a tow dolly, you may have to disconnect the drive shaft to flat tow properly. Check the vehicle’s owner’s manual to see if this is an option for your vehicle.

Towing an Automobile: Flat Tow

Boat Towing

- When towing a boat remember:
  - The boat should be balanced from side to side. If the vessel has side mounted fuel or water tanks and only one side is filled, it may be off balance and maneuver poorly.
    - Make sure there isn't any trapped rain or other water stowing away on the boat.
  - The boat should be firmly secured with at least two ratchet type straps.
  - Use the correct hitching system – one that is rated for the task, and be sure your vehicle can handle the weight of the boat!

Boat Towing “How-to” Videos

- How to Launch a Boat into the Water

http://www.youtube.com/watch?v=IOM4aTiH2Pc&feature=fvwrel

- Retrieving the Boat from the Water

http://www.youtube.com/watch?v=7WaH87ZYBLs&feature=relmfu

Remember

- Fully-loaded, un-braked trailers cannot exceed the dry weight (empty weight) of the tow vehicle.
- Loaded braked trailers may safely exceed the empty weight of the tow vehicle *in some cases*, but be sure to follow the recommendations of the vehicle and trailer manufacturers.
- Make sure **all** of your hitch system components have ratings that **exceed** the weight of the loaded trailer and that the hitch ball is compatible with the coupler.

Remember

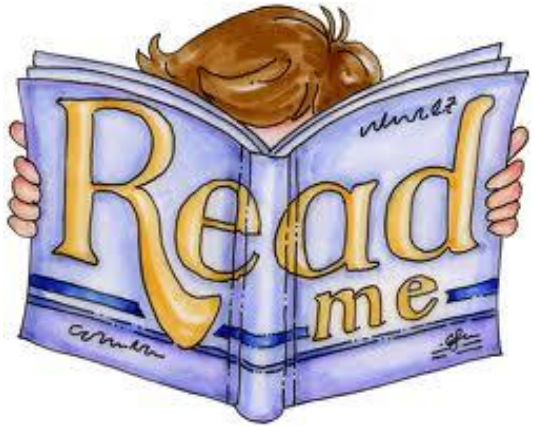
- Always complete the hook up procedure from beginning to end.
- When tightening the coupler onto your hitch, tighten it down well, and shake the trailer and towing system. You will probably notice that the coupler has loosened, so tighten the clamp down again.
  - Make sure the hitch ball is the same size as the coupler.

Remember

- Connect safety chains by crisscrossing them and looping them through the loops on your hitch. Then cross them again and secure the hooks to the chains.
  - Be sure that the safety chains have enough slack to turn, but don't drag the ground.

Remember

- It is very important you read the trailer manufacturers' towing guide and the vehicle owner's manual.
- These are valuable resources that will teach you the specifications of your equipment and how to hook your system up properly.



Remember

If you hear a strange noise or feel that something is wrong at anytime throughout your journey, **pull over**!

- It is <u>always</u> better to be safe than sorry.

Questions or Concerns?

Contact: Auburn University Risk Management and Safety
971 Camp Auburn Road
Auburn, AL 36849-0001
Phone: 334-844-4870
Fax: 334-844-4197
www.auburn.edu/administration/rms