

11 BOAT TRAILERING

INTRODUCTION

Most recreational boats are small enough to be trailerable, and although many are never trailered and are left in the water for the boating season, a large percentage is towed by owners to various boating locales. Accidents occur for various reasons but primarily because of improper loading, inadequate trailer maintenance, and driver error. Almost all of these accidents can be prevented by exercising proper care in selecting and maintaining the trailering equipment and by adjusting driving habits to allow for the extra weight of the trailer and its load behind the tow vehicle.

TRAILERING EQUIPMENT

THE BOAT TRAILER

Capacity

First and foremost, a boat trailer must be of sufficient capacity to carry the boat and all the supplies and equipment that are typically loaded into the boat. This means the capacity must be enough to allow for all that extra camping gear and other stuff you put in the boat.

If the trailer was purchased with the boat, there is a good chance the trailer is sized adequately for the unloaded boat but will not be up to the task when all the aforementioned supplies and hardware are loaded into the boat. If that's the case, then you must either be careful not to overload the boat or acquire a new adequately sized trailer. *Do not drive with an overloaded trailer!*

The total weight of the trailer with loaded boat is the **gross trailer weight (GTW)**.

Single and Tandem Axle

Boat trailers usually come with one or two (tandem) axles, although three axles are found on some trailers for larger boats. Generally, tandem axle trailers tend to track better and are less prone to fishtailing. The extra wheels also provide a safety factor in the event of a blowout. The downside of tandem axle trailers is that they are harder to turn, which makes them difficult to maneuver by hand.



FIGURE 11-2: Weighing the Boat and Trailer

ing for the rated GVWR to be at least 15 percent more than the full load (GTW).

Load Distribution

The *tongue weight* (TW) is the downward force exerted by the fully loaded trailer on the hitch ball by the trailer coupler. In addition to the total load being less than the GTW, the load must also be properly distributed between the trailer wheels and trailer hitch. Ideally, the TW will be 5 to 10 percent of the GTW. If the TW is too little, the trailer will have a tendency to sway easily. If the TW is too heavy, too much stress is placed on the truck hitch and suspension.

If the boat and trailer are relatively heavy, the 5 percent figure will be fine. If the boat and trailer are of intermediate weight (say, 1500 to 3000 pounds [700 kg to 1400 kg]), then the 10 percent ratio will be more appropriate. A very light rig might have 15 percent or more of the weight at the tongue.

Determining TW Using the Public Truck Scale

The TW is most safely and easily determined at the truck scale by carrying out the following procedure:

Determine the GTW of the trailer and boat by using the procedure described earlier.

- Hook the trailer back to the towing vehicle and tow the trailer forward until only the trailer wheels are on the scale. Take down this weight. We'll call this the total axle weight.
- Subtract the total axle weight from the GTW to get the TW.

Note: This procedure won't work with a weight-distributing hitch. In this case, the trailer must be unhooked from the vehicle before weighing for the total axle weight. Alternatively, the TW can be directly determined on the scale with a vertical pipe from the inside of the coupler down to the scale.

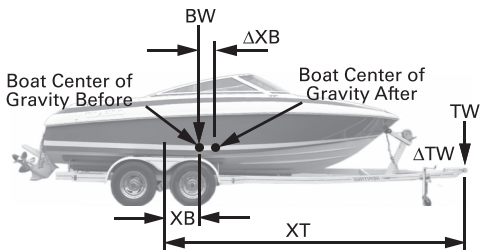


FIGURE 11-3: Dimensions Used to Calculate Amount to Shift Boat on Trailer

$$\Delta XB \times BW = \Delta TW \times XT$$

$$\Delta XB = \frac{\Delta TW \times XT}{BW}$$

Where: ΔXB = Distance to shift boat

ΔTW = Desired tongue weight change

XT = Distance from center of axles to coupler

BW = Boat weight

EQUATION 11-1: Calculate Amount to Shift Boat on Trailer to Achieve Desired Tongue Weight

Gross trailer weight = $GTW = 4500 \text{ lb} = 2041 \text{ kg}$

Tongue weight = $TW = 200 \text{ lbs} = 91 \text{ kg}$ (4.4% of GTW)

This TW is too low. For this example, assume we want to get our TW to 7.5 percent of GTW or 338 lb (153 kg):

Desired change in tongue weight = $\Delta TW = 338 - 200 = 138 \text{ lb}$ (62.6 kg)

$\Delta XB = (\Delta TW \times XT) / BW = (138 \text{ lb} \times 208 \text{ in}) / 3800 \text{ lb} = 7.6 \text{ in.}$

$\Delta XB = (\Delta TW \times XT) / BW = (62.6 \text{ kg} \times 528 \text{ cm}) / 1724 \text{ kg} = 19.2 \text{ cm}$

Calculate Distance to Shift Axles

Sometimes it will be more desirable to alter the TW by moving the wheels backward or forward. The following diagram and formula can be used to get an approximate distance to shift the wheels.

Note that in this case we must use the weight of the **boat plus the frame weight (BFW)** excluding the axles and wheels

Note that in table 11-1, the maximum TW is always 10 percent of the GTW.

Class	Capacity	
	Gross Trailer Weight (lbs)	Tongue Weight (lbs)
I	2000	200
II	3500	350
III	5000	500
IV	7500-12000	750-1200
Note: This table is only a guide. The weight and capacity are specific to each hitch.		

TABLE 11-1: Trailer Hitch Classes

Hitch Safety Chains

Safety chains from the trailer to the tow vehicle are required by law to keep the trailer from running away in the event of a hitch failure. An illustration showing how safety chains must be attached is shown later in the hooking up topic.

The chain used must have a strength rating, equal to or greater than the allowable GTW as specified in table 11-1.

THE TOW VEHICLE

The tow vehicle must be up to the task of towing the completely loaded boat and trailer. Determining this is a fairly straightforward process; you simply get the owner's manual out of the glove box of your truck and look up the tow rating for the vehicle.

If the maximum GTW specified in the manual is greater than that of your boat and trailer, then you're okay. If it's less, then you need to show this book page to your significant other to prove that you really do need to get a new truck, since it's obviously impractical to downsize to a smaller boat.

In general, a truck is needed to tow most boats, since most modern cars are of unibody construction and essentially lack a frame to which a good hitch needs to be attached. In addition, front-wheel drive presents a problem in that additional weight behind the rear axle takes weight off the front driving wheels which lessens traction. This can be problematic on a slippery boat ramp.

If the truck is towing a boat/trailer load, that is near the truck's towing capacity, it may be necessary to outfit the truck with such things as a heavy duty suspension and

Attach fenders to the side of the boat that will be against the launching dock (if there is one). Make sure the outboard or sterndrive is fully raised. If there is an outboard or sterndrive support installed for transport, remove it now. The ignition key should be inserted and ready to start the engine. It's better to find out you forgot your key now than once you're in the water. If you have an inboard gasoline engine, start the exhaust blower running now so you don't have to wait five minutes after you launch to start the engine.

Use the launch checklist provided at the end of this chapter to help you remember all these steps.

Launching the Boat

When everything is ready, proceed to the launch ramp. Have one person on the ramp to one side to help guide the driver.

Back down only as far as necessary. A trailer with slide type bunks usually needs to go far enough for the boat to float off the trailer. A trailer with rollers can stop when the water is deep enough to allow the boat to roll off safely. The winch should remain connected until the boat is nearly afloat since the boat can slide off the trailer as you are backing down the ramp, especially if you need to shift into forward to go back up the ramp. Boats sliding off on the ramp are a more common occurrence than one might think.

If the driver needs to leave the tow vehicle, the vehicle should be placed in park, the emergency brake pulled full on, and the engine shut off. Most boaters don't bother with a wheel chock, but this is a good idea and it only takes about five seconds to place it. Ensure that someone has control of both docklines.

Lower the engine or sterndrive, start the engine, and immediately check to see if cooling water is pumping. Move the boat promptly from the ramp area to make room for the next person.

Haul-Out

Retrieving the Boat

Essentially, retrieving the boat is the opposite of launching it.

Let everyone off the boat except the boat operator if the boat is to be driven onto the trailer. Once the boat is aligned with the trailer it can be winched up to the vertical winch post roller. Often when the trailer and boat are pulled up the ramp, the boat slides back a few inches, even though the winch was tightened as much as possible. To prevent this, a chain or

Some trailers do not have the white ground wire connected, instead relying on the trailer hitch to provide a ground return to the tow vehicle. This provides a poor connection and is often the cause of intermittent problems with the lights. If you have one of these, connect a white wire from the (white) pin to the trailer frame to ensure a good ground.

Warnings

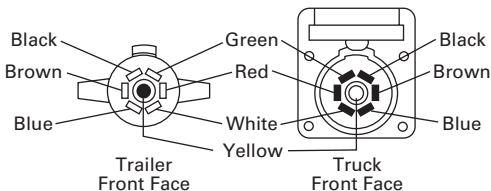
Incorrect wiring on some types of tow vehicles can cause severe (and very expensive) damage to the vehicle's electrical system. For this reason, the installation of wiring and receptacles on the tow vehicle should be left to experienced professionals.

The wiring color indexes shown here are for trailers not for the tow vehicle. The installation of wiring and receptacles on the tow vehicle should be left to experienced professionals since incorrect wiring can damage your car.

The color coding shown is standard, but there are trailers out there that are not wired this way so be careful.

Seven-Way Trailer Wiring

The colors shown are for the trailer, not the truck or car. Note that the color index used for trailers with seven-way connectors differs from the colors used for other connectors.



White	Common Ground	Green	Tail lights and license
Red	Left turn and stop	Blue	Electric brake
Brown	Right turn and stop	Black	Battery charge
		Yellow	Auxiliary

FIGURE 11-8: Seven-Way Trailer Connector Wiring and Color Index for Seven-Way Trailer Connectors

State / Province	Trailer Brakes Required Over		Maximum Trailer Dimensions						Safety Chains
			Width		Height		Length		
	lbs	kg	ft	m	ft	m	ft	m	
United States									
New Hampshire	30/20		4	8.5 2.6	13.5 4.11	48 14.6		Yes	
New Jersey	ALL			8.0 2.4	13.5 4.11	40 12.2		Yes	
New Mexico	3000	1361		8.5 2.6	14.0 4.27	40 12.2		Yes	
New York	3000	1361		8.0 2.4 1	13.5 4.11	ns		Yes	
North Carolina	1000	454		8.5 2.6	13.5 4.11	ns		Yes	
North Dakota	All			8.5 2.6	14.0 4.27	53 16.2		Yes	
Ohio	2000	907		8.5 2.6	13.5 4.11	40 12.2		Yes	
Oklahoma	3000	1361		8.5 2.6	13.5 4.11	40 12.2		Yes	
Oregon	note		5	8.5 2.6	14.0 4.27	45 13.7		Yes	
Pennsylvania	3000	1361		8.5 2.6	13.5 4.11	ns		Yes	
Rhode Island	4000	1814		8.5 2.6	13.5 4.11	ns		ns	
South Carolina	3000	1361		8.5 2.6	13.5 4.11	48 14.6		Yes	
South Dakota	3000	1361		8.5 2.6	14.0 4.27	ns		Yes	
Tennessee	3000	1361		8.5 2.6	13.5 4.11	40 12.2		Yes	
Texas	4500	2041		8.5 2.6	14.0 4.27	ns		Yes	
Utah	40/20		3	8.5 2.6	14.0 4.27	40 12.2		Yes	
Vermont	3000	1361		8.5 2.6	13.5 4.11	53 16.2		Yes	
Virginia	3000	1361		8.5 2.6	13.5 4.11	ns		ns	
Washington	3000	1361		8.5 2.6	14.0 4.27	ns		Yes	
West Virginia	3000	1361		8.0 2.4 1	13.5 4.11	40 12.2		ns	
Wisconsin	3000	1361		8.5 2.6	13.5 4.11	45 13.7		Yes	
Wyoming	40/20		3	8.5 2.6	14.0 4.27	ns		ns	
Canada									
Alberta	2982	909		8.5 2.6	12.6 3.85	41 12.5		-	
British Columbia	4593	1400		8.5 2.6	13.6 4.15	41 12.5		Yes	
Manitoba	2986	910		8.5 2.6	13.6 4.15	41 12.5		Yes	
New Brunswick	4921	1500		8.5 2.6	13.6 4.15	41 12.5		-	
Newfoundland	14763	4500		8.5 2.6	13.6 4.15	41 12.5		Yes	
Nova Scotia	5905	1800		8.5 2.6	13.6 4.15	41 12.5		Yes	
Nunavik		ns		8.5 2.6	13.8 4.20	-		-	
Northwest Territories	4462	1360		8.5 2.6	13.8 4.20	-		-	
Ontario	4462	1360		8.5 2.6	13.6 4.15	41 12.5		Yes	
Prince Edward Island	4921	1500		8.5 2.6	13.6 4.15	41 12.5		Yes	
Quebec	4265	1300		8.5 2.6	13.6 4.15	48 14.7		Yes	
Saskatchewan	4462	1360		8.5 2.6	13.6 4.15	41 12.5		Yes	
Yukon	2986	910		8.5 2.6	14.8 4.50	41 12.5		-	
(1) 8.5 ft (2.6 m) on designated roads									
(2) New trailers over 1500 lbs (460 kg) must have brakes									
(3) Brakes must stop in less than 40 ft from 20 mph									
(4) Brakes must stop in less than 30 ft from 20 mph									
(5) Brakes must stop in less than statute specified distance									
(6) Some roads have a 13.5 height limit									

TABLE 11-2: State and Provincial Rules for Trailers

TRAILERING SUPPLIES AND TOOLS	
Spare trailer tire	<input type="checkbox"/>
Trailer lug wrench	<input type="checkbox"/>
Trailer jack	<input type="checkbox"/>
Wheel chocks	<input type="checkbox"/>
Road flares	<input type="checkbox"/>
Emergency reflectors (triangles)	<input type="checkbox"/>
Spare signal bulbs	<input type="checkbox"/>
Jack stands	<input type="checkbox"/>
Extension mirrors	<input type="checkbox"/>
Extra chain for locking trailer	<input type="checkbox"/>
Locks for motors, trailer, etc	<input type="checkbox"/>

EN ROUTE CHECKLIST	
On The Road	
30 minutes into trip, stop and do a quick visual of everything on the departure checklist. Most importantly, check hitch, bearing temperature, and tires	<input type="checkbox"/>
Every 2 hours, stop and do a quick visual of everything on the departure checklist. Most importantly check hitch, bearing temperature, and tires	<input type="checkbox"/>
Hotel Parking Lots Overnight	
Install boat cover	<input type="checkbox"/>
Install hitch lock	<input type="checkbox"/>
Lock trailer to vehicle frame or tree	<input type="checkbox"/>
Lock at least one wheel to frame	<input type="checkbox"/>
Remove license plate	<input type="checkbox"/>
Remove propellers	<input type="checkbox"/>
Do some of the checks from the departure checklist so you don't have to do them in the morning	<input type="checkbox"/>
Leaving Next Morning	
Repeat the relevant items from the trip departure checklist	<input type="checkbox"/>
As always—Complete trailer/boat walk around and inspect	<input type="checkbox"/>

BOAT LAUNCH	
Pre Launch (away from ramp)	
Checklist in Rules & Regs—All safety equipment aboard	<input type="checkbox"/>
Gasoline inboards and sterndrives—turn exhaust blower on	<input type="checkbox"/>
Disconnect trailer lights	<input type="checkbox"/>
Remove transom or gunnel tie downs	<input type="checkbox"/>
Remove bow-eye turnbuckle or chain	<input type="checkbox"/>
Leave winch connected to bow-eye	<input type="checkbox"/>
Install drain plug	<input type="checkbox"/>
Attach line to bow and stern for controlling boat	<input type="checkbox"/>
Fasten fenders if there is a launch dock	<input type="checkbox"/>
Check that outboard or sterndrive is in raised position	<input type="checkbox"/>
Remove outboard or sterndrive supports	<input type="checkbox"/>
Outboard—hook up gas tank and prime fuel line	<input type="checkbox"/>