OPERATION MANUAL

MULTIQUIP®

MODELS
WT5C2 AND WT5HP2
SERIES
WATER TRAILERS
(HONDA GX120/GX160 GASOLINE ENGINES)
(QP2HLF/QP205SHLF CENTRIFUGAL PUMPS)

Revision #1 (10/27/26)

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www.multiquip.com



THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

PN: 59830


WARNING
CANCER &
REPRODUCTIVE HARM
www.P65Warnings.ca.gov
P/N 38707

WT5C2/WT5HP2 Series Water Trailers

Proposition 65 Warning 2
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DISCLAIMER:

Product features, descriptions, and specifications are based on published information at the time of publication and are subject to change at any time without notice. Multiquip Inc. and its affiliates reserve the right to change specifications, features, design, and descriptions of products at any time without notice.

DO NOT operate or service the equipment before reading the entire manual. Safety precautions should be followed at all times when operating this equipment. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.



SAFETY MESSAGES

The four safety messages shown below will inform you about potential hazards that could injure you or others. The safety messages specifically address the level of exposure to the operator and are preceded by one of four words: **DANGER, WARNING, CAUTION** or **NOTICE.**

SAFETY SYMBOLS

DANGER

Indicates a hazardous situation which, if not avoided, **WILL** result in **DEATH** or **SERIOUS INJURY**.

WARNING

Indicates a hazardous situation which, if not avoided, **COULD** result in **DEATH** or **SERIOUS INJURY**.

CAUTION

Indicates a hazardous situation which, if not avoided, **COULD** result in **MINOR** or **MODERATE INJURY**.

NOTICE

Addresses practices not related to personal injury.

Potential hazards associated with the operation of this equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
	Respiratory hazards
	Accidental starting hazards
	Eye and hearing hazards
	Pressure hazards

GENERAL SAFETY

⚠ CAUTION

- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.



- Avoid wearing jewelry or loose-fitting clothes that may snag on the controls or moving parts, as this can cause serious injury.
- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when on medication.



- **NEVER** operate this equipment under the influence of drugs or alcohol.



- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.
- No one other than the operator is to be in the working area when the equipment is in operation.
- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.

NOTICE

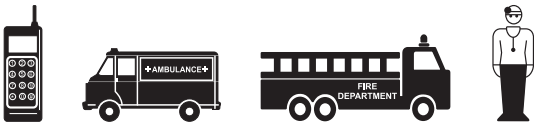
- This equipment should only be operated by trained and qualified personnel 18 years of age or older.
- Whenever necessary, replace nameplate, operation, and safety decals when they become difficult to read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.
- **NEVER** use accessories or attachments that are not recommended by Multiquip for this equipment. Damage to the equipment and/or injury to the user may result.
- **ALWAYS** know the location of the nearest **fire extinguisher**.



- **ALWAYS** know the location of the nearest **first aid kit**.



- **ALWAYS** know the location of the nearest phone or **keep a phone on the job site**. Also, know the phone numbers of the nearest **ambulance, doctor,** and **fire department**. This information will be invaluable in the case of an emergency.



PUMP SAFETY

⚠ DANGER



- **NEVER** operate the equipment in an explosive atmosphere or near combustible materials. An explosion or fire could result, causing **severe bodily harm or even death**.

⚠ WARNING



- Accidental starting can cause severe injury or death. **ALWAYS** place the ON/OFF switch in the OFF position.



- **DO NOT** place hands or fingers inside the pump when the pump is running.
- **NEVER** disconnect any **emergency or safety devices**. These devices are intended for operator safety. Disconnection of these devices can cause severe injury, bodily harm or even death. Disconnection of any of these devices will void all warranties.

⚠ CAUTION

- Be careful of discharge whipping under pressure.

NOTICE

- **NEVER** leave an open pump chamber unattended.
- **ALWAYS** keep the machine in proper running condition.
- **DO NOT** attempt to thaw out a frozen pump by using a torch or other source of flame. Application of heat in this manner may heat the oil in the seal cavity above the critical point, causing pump damage.
- **DO NOT** pump water greater than 140°F.
- **DO NOT** pump liquids containing acid or alkali.
- **DO NOT** fill with or pump heavy debris-laden water.
- Fix damage to machine and replace any broken parts immediately.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children and unauthorized personnel.
- **NEVER** lubricate components or attempt service on a running machine.
- **ALWAYS** allow the machine a proper amount of time to cool before servicing.
- Keep the machine in proper running condition.

ENGINE SAFETY

⚠ WARNING

- **DO NOT** place hands or fingers inside the engine compartment while the engine is running.
- **NEVER** operate the engine with heat shields or guards removed.



- **DO NOT** remove the engine oil drain plug while the engine is hot. Hot oil will gush out of the oil tank and severely scald any persons in the general area of the pump.

⚠ CAUTION



- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing equipment.

NOTICE

- **NEVER** run the engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service the air filter frequently to prevent engine malfunction.



- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or equipment can result if operating in speed ranges above the maximum allowable.

FUEL SAFETY

⚠ DANGER

- **DO NOT** start the engine near spilled fuel or combustible fluids. Fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **DO NOT** fill the fuel tank while the engine is running or hot.

- **DO NOT** overfill the fuel tank, as spilled fuel can ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **DO NOT** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine.



TOWING SAFETY

⚠ CAUTION

- Check with your local county or state safety towing regulations, in addition to meeting ***Department of Transportation (DOT) safety towing regulations,*** before towing your water trailer.



- In order to reduce the possibility of an accident while transporting the water trailer on public roads, **ALWAYS** make sure the trailer and the towing vehicle are mechanically sound and in good operating condition.
- **ALWAYS** shut down the engine before transporting.
- Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer's gross vehicle weight rating (GVWR).
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both towing vehicle and trailer. ***Trailer tires should be inflated to 50 psi cold.*** Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with a **safety chain**.
- **ALWAYS** properly attach the trailer's safety chains to the towing vehicle.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake, and trailer lights are connected and working properly.
- DOT requirements include the following:
  - Connect and test electric brake operation.
  - Secure portable power cables in cable tray with tie wraps.
- The maximum speed for highway towing is **55 MPH** unless posted otherwise. Recommended off-road towing is not to exceed **15 MPH** or less depending on type of terrain.
- Avoid sudden stops and starts. This can cause skidding or jack-knifing. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns to prevent rolling.
- For hydraulic brake models, **ALWAYS** ensure that backing up is done in a slow, straight, and steady manner to safeguard the brakes from locking up.
- Trailer should be adjusted to a level position at all times when towing.
- Raise and lock the trailer wheel stand in up position when towing.
- Place **chock blocks** underneath wheels to prevent **rolling** while parked.
- Place **support blocks** underneath the trailer's bumper to prevent **tipping** while parked.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.

ENVIRONMENTAL SAFETY/DECOMMISSIONING

NOTICE

Decommissioning is a controlled process used to safely retire a piece of equipment that is no longer serviceable. If the equipment poses an unacceptable and unrepairable safety risk due to wear or damage, or is no longer cost effective to maintain (beyond life-cycle reliability) and is to be decommissioned (demolished and dismantled), be sure to follow the rules below.

- **DO NOT** pour waste or oil directly onto the ground, down a drain, or into any water source.
- Contact your country's Department of Public Works or a recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this equipment.



- When the life cycle of this equipment is over, remove the battery, if any, and bring to an appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the water trailer frame and all other metal parts be sent to a recycling center.

  Metal recycling involves the collection of metal from discarded products and its transformation into raw materials to use in manufacturing a new product.

  Recyclers and manufacturers alike promote the process of recycling metal. Using a metal recycling center promotes energy cost savings.

EMISSIONS INFORMATION

NOTICE

The gasoline engine used in this equipment has been designed to reduce harmful levels of carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NOx) contained in gasoline exhaust emissions.

This engine has been certified to meet US EPA evaporative emissions requirements in the installed configuration.

Attempts to modify or make adjustments to the engine emission system by unauthorized personnel without proper training could damage the equipment or create an unsafe condition.

Additionally, modifying the fuel system may adversely affect evaporative emissions, resulting in fines or other penalties.

Emission Control Label

The emission control label is an integral part of the emission system and is strictly regulated.

The label must remain with the engine for its entire life.

If a replacement emission label is needed, please contact your authorized Honda Engine Distributor.

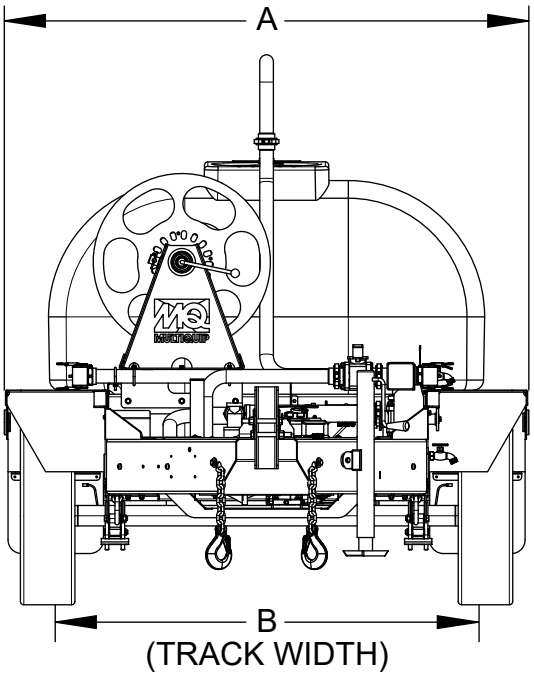
Table 1. Water Trailer Specifications			
Water Trailer	**Model**	**WT5C2 • WTE5C2 • WT5CHR2 • WTE5CHR2**	**WT5HP2 • WTE5HP2**
	Dimensions (L × H × W)	138 in. (3,505 mm) × 81 in. (2,057 mm) × 77 in. (1,956 mm)	
	Weight (Water Tank Empty)	2,000 lb. (907 kg)	
	Weight (Water Tank Full)	6,600 lb. (2,994 kg)	
Water Tank	Type	Industrial	
	Style	Rotomolded — seamless	
	Fill Port	12 in. vented port	
	Material	Polyethylene — 3/8 in. wall	
	Fill Rate at Full Throttle	3.5 min./fill	5.3 min./fill
	Capacity	550 gal. (2,081 liters)	
Pump	Model	QP2HLF	QP205SHLF
	Type	2 in. (51 mm) centrifugal	2 in. (51 mm) high-pressure centrifugal
	Maximum Flow	158 gpm (600 lpm)	106 gpm (400 lpm)
	Maximum Head	115 ft. (35 m)	246 ft. (75 meters)
	Maximum Pressure	50 psi	100 psi
	Dry Net Weight	53 lb. (24 kg)	60 lb. (27 kg)
Trailer and Frame	Material	Formed steel channel frame and hose bin	
	Number of Axles	2	
	Axle Capacity Rating	3,500 lb. (1,587 kg) each	
	Tires	ST205/75R14	
	Brakes (WT5C2/WT5CHR2/WT5HP2)	Hydraulic surge brakes	
	Brakes (WTE5C2/WTE5CHR2/WTE5HP2)	Electric-actuated drum brakes	
	Coupler	2" ball hitch, 2-5/16" ball hitch, 2-5/16" bulldog ball hitch, or 3" pintle eye	
	Tongue Weight	750 lb. (340 kg)	
	Jack	2,000 lb. (907 kg)	

Water Operations	Delivery Methods	• Pressurized 1.5 in./2.0 in. left and 2.0 in. right
		• Three standard garden hose adapters:
		  • Adapter #1 pressurized (upper)
		  • Adapter #2 drain only (lower)
		  • Adapter #3 spray bar drain
		• Two pressurized rear spray nozzles
		• 1 in. × 50 ft. mounted hose reel*	

	Fill Methods	• Municipal fire hydrant — QD • 1.5 in. and 2.0 in. QD cam and groove adapters • One standard garden hose adapter	

*Models WT5HP2, WTE5HP2, WT5CHR2 and WTE5CHR2 only. Not included with models WT5C2 and WTE5C2.

Table 2. Engine Specifications		
Water Trailer Model	**WT5C2 • WTE5C2 • WT5CHR2 • WTE5CHR2**	**WT5HP2 • WTE5HP2**
Engine Model	Honda GX120UT3PX2	Honda GX160U1TX2NH1
Type	Air-cooled, 4-stroke, single-cylinder, OHV, horizontal-shaft, gasoline engine	
Bore × Stroke	2.36 in. × 1.65 in. (60 mm × 42 mm)	2.7 × 1.8 in. (69 × 46 mm)
Displacement	7.2 cu. in. (118 cc)	9.9 cu. in. (163 cc)
Maximum Output	3.5 hp @ 3,600 rpm	5.5 hp @ 3,600 rpm
Fuel Tank Capacity	0.66 US gallons (2.0 liters)	0.82 US gallons (3.1 liters)
Fuel Type	Unleaded gasoline	
Lube Oil Capacity	0.63 qt. (0.6 liters)	0.61 qt. (0.6 liters)
Oil Type	4-Stroke API, SF or SG SAE 10W-30 general use	
Speed Control Method	Centrifugal flyweight type	
Cooling System	Forced air	
Starting Method	Recoil start	
Spark Plug Type	BPR6ES NGK	
Spark Plug Gap	0.028–0.031 in. (0.7–0.8 mm)	
Dimensions (L × W × H)	12.0 × 13.6 × 12.9 in. (306 × 346 × 329 mm)	12.0 × 14.4 × 13.2 in. (305 × 366 × 335 mm)
Dry Net Weight	28.6 lb. (13 kg)	33.0 lb. (15 kg)



NOTICE

WT5HP2 model shown.

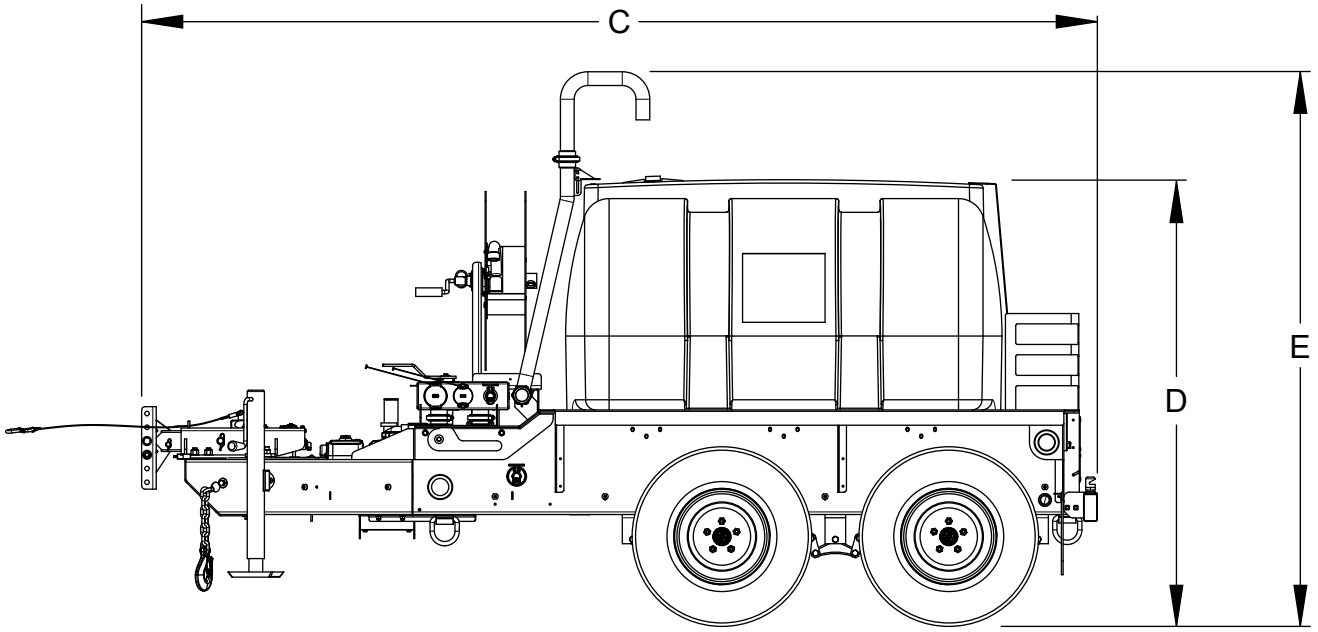


Figure 1. Dimensions

Table 3. Dimensions									
Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)
A	77 (1,956)	B	62 (1,575)	C*	138 (3,505)	D	65 (1,651)	E	81 (2,057)

* For total length add approximately 3.5 in. (90 mm) for coupler length.

APPLICATION

The WT5C2/WT5HP2 Series is an industrial, 550-gallon water trailer. Each water trailer is equipped with a centrifugal pump, flexible suction/discharge manifold system with simple valve controls, and a rugged, polyethylene water tank.

Typical applications for Multiquip's water trailers include: dust control, emergency firefighting response, construction, agricultural irrigation support and equipment washdown.

WATER TANK

The water tank capacity is approximately 550 gallons (2,081 liters). The tank is made of durable, 3/8-inch walled polyethylene.

The water tank can be quickly filled via a 2-inch diameter steel pipe with 2-inch Quick Disconnect coupler or vented 12-inch diameter port. In addition, the water tank has a rear spray bar that operates under pressurized or gravity feed settings.

Additional features also include three standard garden hose valves (fill/discharge and tank drain).

NOTICE

Water tank is not rated for chemicals or potable water.

MANIFOLD SYSTEM

- 1.5-inch cam and groove Quick Disconnect (QD)
- 2-inch cam and groove QD left and right sides
- 2-inch cam and groove QD water tank fill
- 1-inch × 50-foot hose on mounted hose reel (WT5CHR2, WTE5CHR2, WT5HP2, and WTE5HP2 models only)
- 3-position manifold control lever, Off-Suction-Discharge
- 2-position spray bar control lever, On-Off
- Three 3/4-inch garden hose bibs

PUMP

Models WT5C2, WT5CHR2, WTE5C2 and WTE5CHR2 are equipped with a Multiquip QP2HLF centrifugal pump, which is capable of pumping at a rate of approximately 158 gallons per minute (gpm) or 600 liters per minute (lpm).

Models WT5HP2 and WTE5HP2 are equipped with a Multiquip QP205SHLF centrifugal pump, which is capable of pumping at a rate of approximately 106 gallons per minute (gpm) or 400 liters per minute (lpm) at a maximum pressure of 100 psi (690 kPa).

These centrifugal pumps should only be used for clear-water applications (agricultural, industrial, residential), as they have a limited solid-handling capability of only 10% by volume.

NOTICE

The pump must be primed before the engine is started. To prime the pump, remove the pump fill cap and fill the pump casing with water, then reinstall the fill cap.

Elevation

Higher elevations will affect the performance of the pump. Due to less atmospheric pressure at higher altitudes, pumps **DO NOT** have the priming ability that they have at sea level. This is due to the "thinner air" or lack of oxygen at higher altitudes.

ENGINE

The QP2HLF centrifugal pump (equipped on the WT5C2 Series models) is powered by a 3.5-horsepower, air-cooled, 4-stroke, single-cylinder, Honda GX120 gasoline engine.

The QP205SHLF centrifugal pump (equipped on the WT5HP2 Series models) is powered by a 5.5-horsepower, air-cooled, 4-stroke, single-cylinder, Honda GX160 gasoline engine.

Both engines utilize a Low Oil Alert shutdown feature. In the event of low oil or no oil, the engine will automatically shut down and cannot be restarted until the oil level is brought up to a safe operating level.

TRAILER AND FRAME

The double-axle trailer can be configured with various hitch options. Customers can choose between a hydraulic-surge or electric brake system.

For convenience, a formed-steel hose bin has been provided for the storage of hoses and accessories.

HOSE REEL ASSEMBLY (SELECT MODELS ONLY)

Models WT5HP2, WTE5HP2, WT5CHR2 and WTE5CHR2 are equipped with a standard industrial hose reel assembly. The hose reel holds a 1-inch × 50-foot, construction-grade, reinforced hose and a fire fog nozzle which is rated at 200 psi. The hose reel can be utilized anytime the water trailer's main manifold is in the discharge position.

OPTIONAL ACCESSORIES

- Suction hose — NPT thread
- Suction hose — Quick Disconnect coupler
- Discharge hose — NPT thread
- Discharge hose — Quick Disconnect coupler
- Discharge hose — Fire hydrant
- Aluminum couplers — Quick Disconnect
- Fire hose nozzle

Contact your nearest Multiquip dealer for any hoses or accessories that you may need.

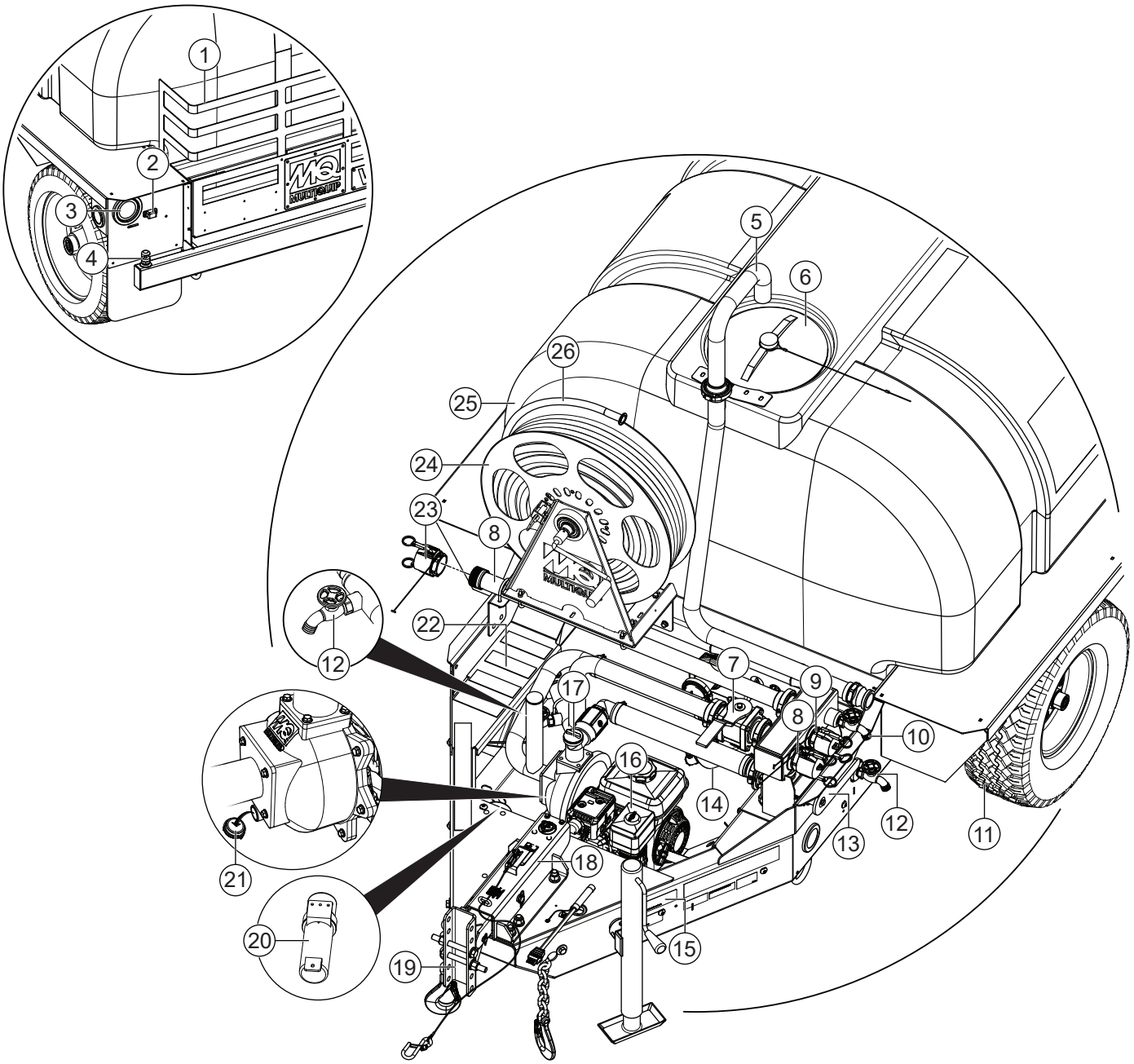


Figure 2. Water Trailer Components

1. **Storage Bin** — Place hoses and accessories here.
2. **License Light** — Illuminates the license plate. Make sure this light is operational whenever towing of the water trailer is required.
3. **Brake Lights** — Before towing the water trailer, make sure these lights are operational and are working correctly. **DO NOT** tow the water trailer if these lights are inoperative.
4. **Spray Nozzles (2)** — Located at the rear of the water trailer, these two water spray nozzles can operate at multiple pressure settings.
5. **Water Tank Fill Pipe** — 2-inch diameter steel pipe. An interface hose will be required to connect the 2-inch QD coupler end of this pipe to a fire hydrant.
6. **Water Tank Cap** — Remove this cap to fill the water tank through the 12-inch diameter fill port when using a fire hydrant type fill method.

7. **Spray Bar Control Handle** — 2-position handle, allows the spray bar to be turned either ON or OFF.
8. **2.0" Cam and Groove Male QD Ports (2)** — These left- and right-side ports can be used for either suction or discharge depending on the placement of the manifold control handle.
9. **1.5" Cam and Groove Male QD Port** — Left-side port can be used for either suction or discharge depending on the placement of the manifold control handle.
10. **Garden Hose Valve** — When other options for filling the water tank are unavailable, a garden hose can be connected to this valve to fill the water tank. A rigid-walled garden hose or suction-type garden hose is reommended for this purpose. Can also be used as a discharge port depending on the position of the manifold control lever. See Table 5.
11. **Tires (4)** — This water trailer uses ST205/75R 15-inch tires. Replace only with recommended type tires. Never tow the water trailer with damaged or worn tires.
12. **Garden Hose Drain Valve (2)** — Open these valves to drain water from the water tank.
13. **Manifold Control Handle** — 3-position handle: OFF, Discharge, or Suction.
14. **Inline Partial Strainer Valve** — This inline filter contains a suction-side strainer that can capture large debris that may be ingested while drawing water from natural water sources. It is not intended to allow for the suction of heavy debris-laden water. Equipped on models WT5HP2 and WTE5HP2 only.
15. **VIN Tag/Serial Number** — This is the location of the vehicle identification number (VIN) tag. The last six numbers of the VIN represent the unit's serial number.
16. **Engine/Pump Assembly** — There are two engine/pump assembly configurations:

    Models WT5C2, WT5CHR2, WTE5C2 and WTE5CHR2 are equipped with a 3.5-horsepower Honda GX120 gasoline engine connected to a Multiquip QP2HLF centrifugal water pump.

    Models WT5HP2 and WTE5HP2 are equipped with a 5.5-horsepower Honda GX160 gasoline engine connected to a Multiquip QP205SHLF high-pressure centrifugal water pump.
17. **Pump Fill Cap** — Prior to operation, the pump casing must be filled with water. Remove the fill cap to add water to the pump. After the initial prime, a sufficient amount of water will be retained in the casing so that the operator will not need to re-prime later.
18. **Brake Actuator** — Applies and regulates the trailer's brake pressure in response to braking actions by the tow vehicle. The breakaway cable must be rigged to the tow vehicle with appropriate slack so that the brake system will be activated in the event of a breakaway (the coupler connection comes loose). Hydraulic surge or electric-actuated brakes are available (hydraulic model shown in diagram). Refer to ***Trailer Brakes*** in the ***Trailer Maintenance*** section for more information.
19. **Adjustable Channel Coupler Adapter** — Attachment point for various types of tow couplers. Refer to ***Adjustable Channel*** in the ***Trailer Maintenance*** section and ***Coupler Types*** in the ***Trailer Safety Guidelines*** section for more information.
20. **Document Box** — Provides storage for manuals and other water trailer documentation.
21. **Pump Drain Plug** — Remove this plug to drain water from the pump.
22. **Tank Fill Port Access Step** — Non-slip surface provides user access to the water tank fill port. Hold onto the horizontal and/or vertical water pipes when using this step.
23. **Dust Cap (3)** — Prevent dirt and debris from entering the manifold system when hoses are not connected.
24. **Hose Reel** — Used for extending, retracting and storing the water hose. Equipped on models WT5CHR2, WTE5CHR2, WT5HP2, and WTE5HP2 only.
25. **Water Tank** — Capacity is approximately 550 gallons (2,081 liters). Fill only with clean water with no debris.

> ***NOTICE***
>
> Water tank is not rated for chemicals or potable water.

26. **Water Hose** — 1" × 50', construction-grade, reinforced hose and fire fog nozzle rated at 200 psi. Equipped on models WT5CHR2, WTE5CHR2, WT5HP2, and WTE5HP2 only.

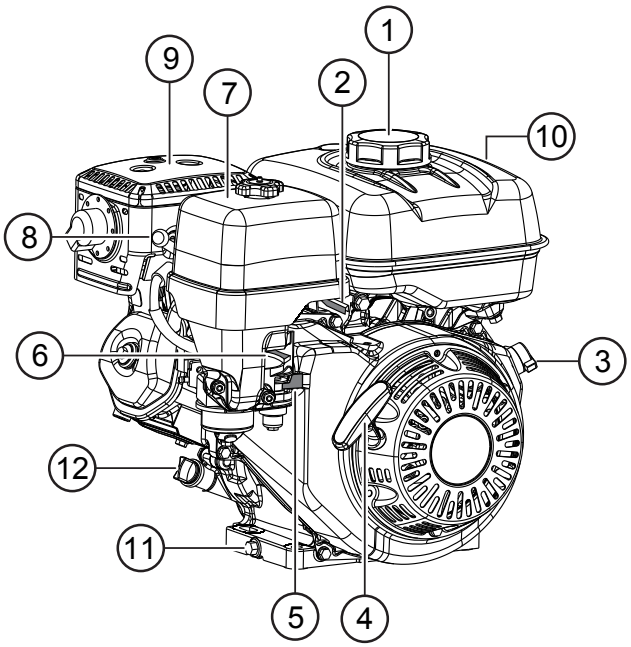


Figure 3. Engine Components

INITIAL SERVICING

The engine (Figure 3) must be checked for proper lubrication and filled with fuel prior to operation. Refer to the engine manufacturer's manual for instructions and details on operation and servicing.

1. **Fuel Filler Cap** — Remove this cap to add unleaded gasoline to the fuel tank. Make sure the cap is tightened securely. **DO NOT** overfill.

DANGER

Adding fuel to the tank should be done only when the engine is stopped and has had an opportunity to cool down. In the event of a fuel spill, **DO NOT** attempt to start the engine until the fuel residue has been completely wiped up, and the area surrounding the engine is dry.

2. **Throttle Lever** — Use to adjust engine speed. Lever advanced forward—**SLOW**, lever back toward operator—**FAST**.
3. **Engine ON/OFF Switch** — **ON** position permits engine starting, **OFF** position stops engine operation.
4. **Recoil Starter (Pull Rope)** — Manual starting method. Pull the starter grip until resistance is felt, then pull briskly and smoothly to start the engine.
5. **Fuel Valve Lever** — **OPEN** to let fuel flow, **CLOSE** to stop the flow of fuel.
6. **Choke Lever** — Used in the starting of a cold engine, or in cold weather conditions. The choke enriches the fuel mixture.
7. **Air Cleaner** — Prevents dirt and other debris from entering the fuel system. Remove the wing nut on top of the air filter canister to gain access to the filter element.

NOTICE

Operating the engine without an air filter, with a damaged air filter, or with a filter in need of replacement will allow dirt to enter the engine, causing rapid engine wear.

8. **Spark Plug** — Provides spark to the ignition system. Set the spark plug gap to 0.6–0.7 mm (0.028–0.031 inch). Clean the spark plug once a week.
9. **Muffler** — Reduces noise and emissions.

WARNING

Engine components can generate extreme heat. To prevent burns, **DO NOT** touch these areas while the engine is running or immediately after operating. **NEVER** operate the engine with the muffler removed.

10. **Fuel Tank** — Holds unleaded gasoline. For additional information refer to the engine owner's manual.

BEFORE STARTING

1. Read all safety instructions at the beginning of the manual.
2. Clean the unit, removing dirt and dust — particularly the engine cooling air inlet, carburetor and air filter.
3. Check the air filter for dirt and dust. If the air filter is dirty, replace with a new air filter as required.
4. Check the carburetor for external dirt and dust. Clean with dry compressed air.
5. Check fastening nuts and bolts for tightness.

ENGINE OIL CHECK

1. To check the engine oil level, place the unit on secure, level ground with the engine stopped.
2. Remove the **engine oil dipstick** (Figure 4) from the oil filler hole and wipe it clean.

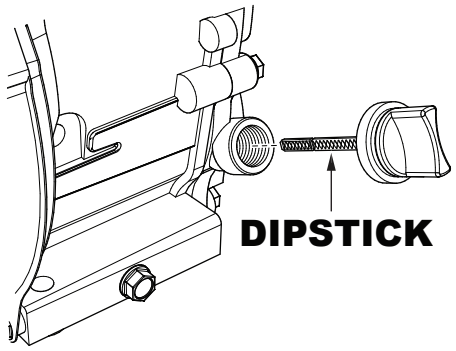


Figure 4. Engine Oil Dipstick

3. Insert and remove the dipstick without screwing it into the filler neck. Check the oil level shown on the dipstick.
4. If the oil level is low (Figure 5), fill to the edge of the oil filler hole with the recommended oil type (Table 4). For engine oil capacity, refer to Table 2.

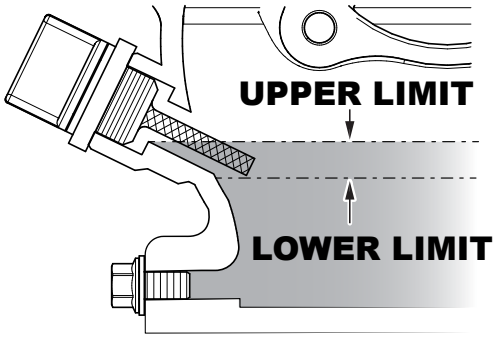
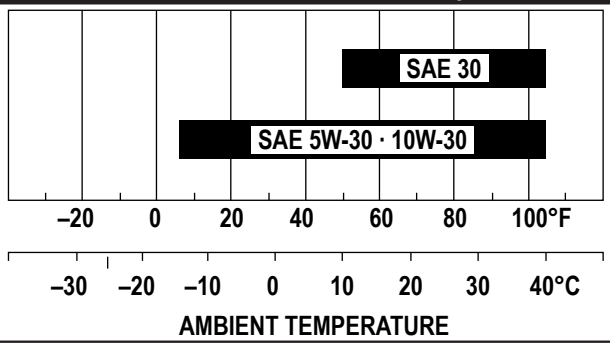


Figure 5. Engine Oil Level

Table 4. Recommended Oil Viscosity Grades



NOTICE

SAE 10W-30 is recommended for general use. Other viscosities shown in the chart may be used when the average temperature in your area is within the indicated range.

FUEL CHECK

DANGER

Motor fuels are highly flammable and can be dangerous if mishandled. **DO NOT** smoke while refueling. **DO NOT** attempt to refuel if the engine is hot or running.

1. Remove the **fuel cap** (Figure 6) located on top of the fuel tank.

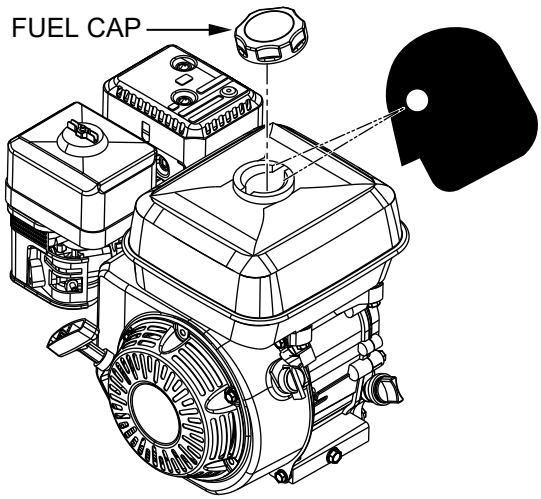


Figure 6. Fuel Level Inspection

2. Visually inspect to see if the fuel level is low. If fuel is low, replenish with unleaded fuel.
3. When refueling, be sure to use a strainer for filtration. **DO NOT** top off fuel. Wipe up any spilled fuel immediately.

INSPECTING AND CLEANING THE INLINE FILTER SYSTEM (HIGH-PRESSURE MODELS ONLY)

Models WT5HP2 and WTE5HP2 utilize a high-pressure centrifugal pump which contains a fully closed impeller system. Pump performance can be negatively affected if the fully enclosed impeller system becomes clogged due to an accumulation of dirt, sand, and general debris.

NOTICE

Failure to regularly check and clean out the inline mesh filter (models WT5HP2 and WTE5HP2 only) can result in loss of performance of the high-pressure pump and damage to the impeller system.

When drawing water from sources that may include a degree of sediment, debris, and sandy particles, it is necessary to regularly check and clean out the **inline filter** (models WT5HP2 and WTE5HP2 only), which is located adjacent to the pump casing. See Figure 7.

1. Loosen the **strainer ring** (Figure 7**A**) and separate the parts to extract the stainless steel **mesh filter screen** (Figure 7**C**) for inspection and cleaning.
2. After inspecting the screen and cleaning it if necessary, reinstall all components and make sure that the strainer ring and **gasket** (Figure 7**B**) are securely tightened onto the **strainer body** (Figure 7**D**).

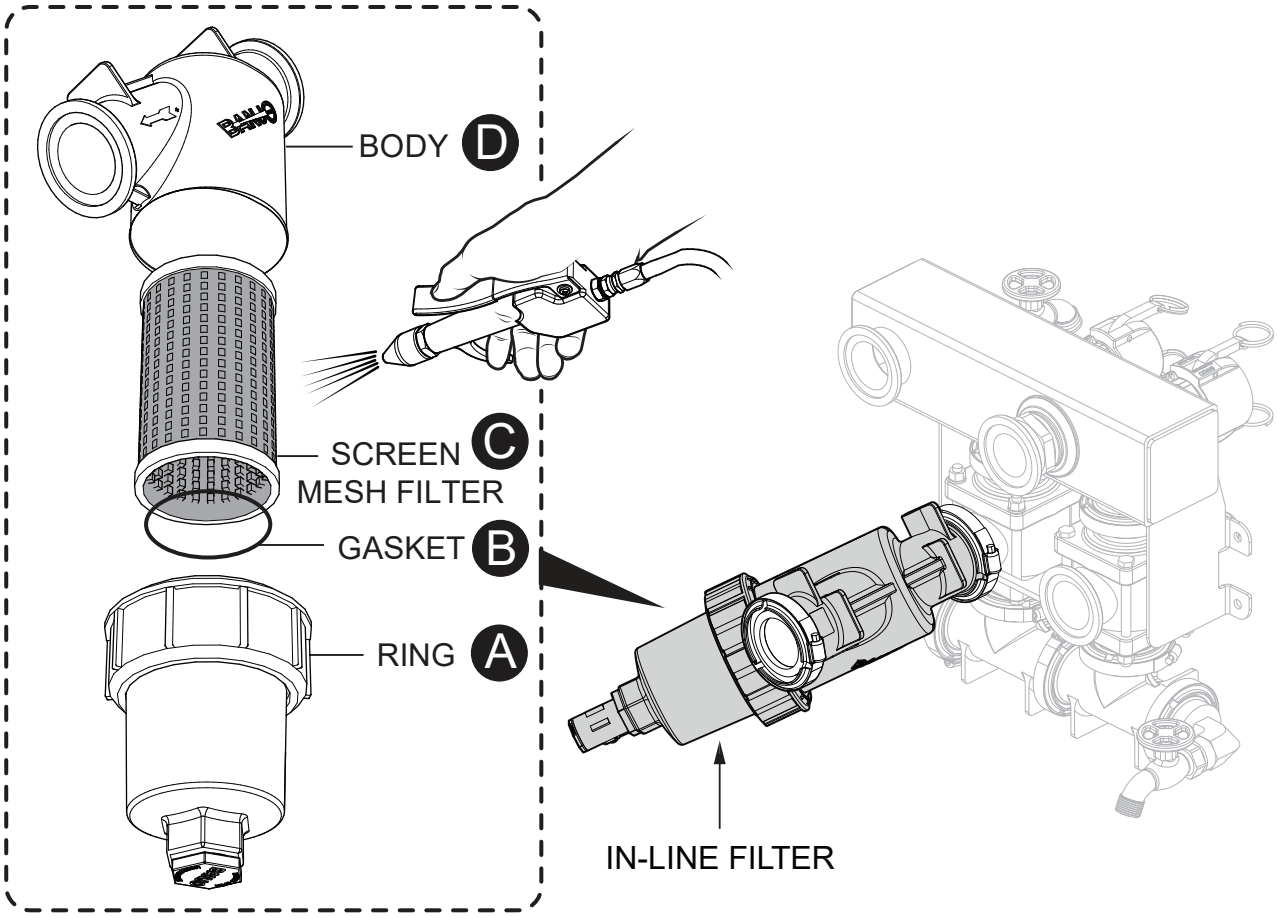


Figure 7. Inline Water Filter Inspection And Cleaning (High-Pressure Models Only)

STARTING THE ENGINE

NOTICE

The pump must be primed before the engine is started. To prime the pump, remove the pump fill cap and fill the pump casing with water, then reinstall the fill cap.

1. Place the **manifold control handle** in the **OFF** (vertical) position. See Figure 8.

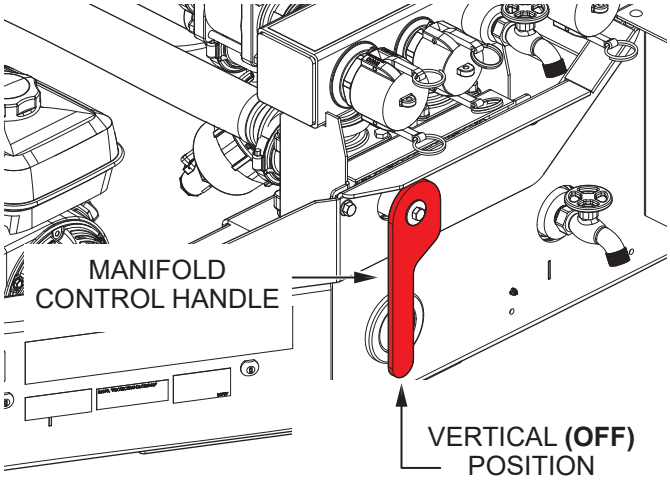


Figure 8. Manifold Control Handle (OFF)

2. Place the **engine fuel valve lever** (Figure 9) in the **ON** position.

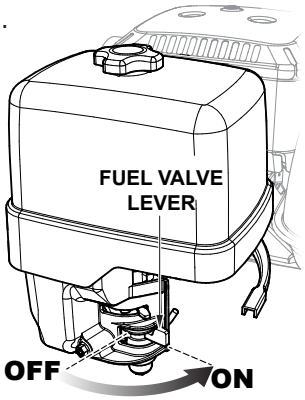


Figure 9. Engine Fuel Valve Lever (ON)

3. Move the **engine throttle lever** (Figure 10) away from the slow position, about 1/3 of the way toward the fast position.

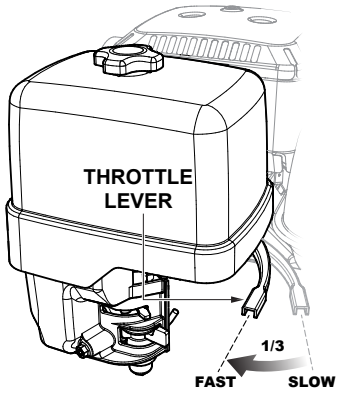


Figure 10. Engine Throttle Lever (1/3 Start Position)

4. If starting a cold engine, place the **engine choke lever** in the **CLOSED** position (Figure 11).

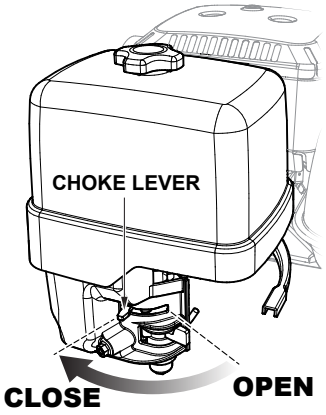


Figure 11. Engine Choke Lever (Closed)

5. If starting a warm engine, or if the ambient temperature is warm, place the **engine choke lever** in the **OPEN** position (Figure 12).

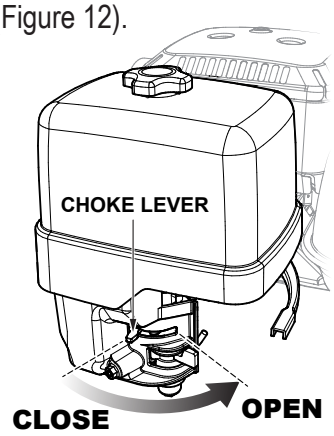


Figure 12. Engine Choke Lever (Open)

6. Place the **engine ON/OFF switch** (Figure 13) in the **ON** position.

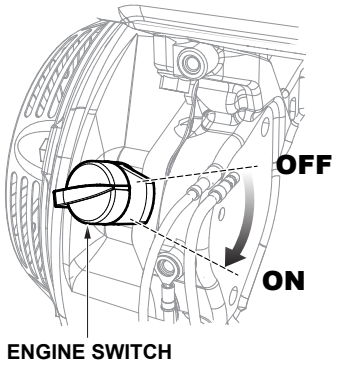


Figure 13. Engine ON/OFF Switch (ON)

7. Slowly pull the **starter grip** (Figure 14) until resistance is felt, then pull briskly and smoothly to start the engine. Gently return the starter grip to its original position.

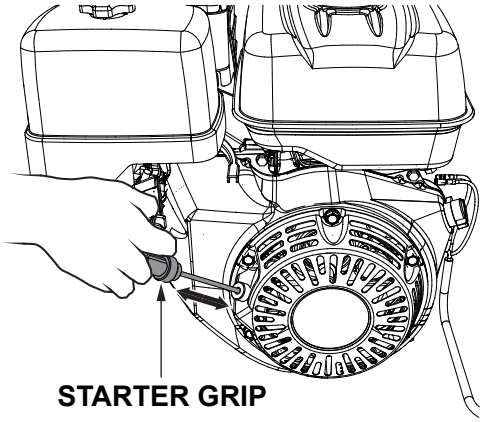


Figure 14. Starter Grip

8. If the engine has not started, repeat steps 1 through 7. If the engine has started and the choke lever was moved to the **CLOSED** position to start the engine, gradually move the choke lever to the **OPEN** position (Figure 12) as the engine warms up.

9. Before the water trailer is placed into operation, run the engine for several minutes.

10. Check for fuel leaks and noises that would be associated with a loose component. Check for leaks between the pump and the engine. If water is leaking between the pump and the engine housing, the seal inside the pump may be worn or damaged. Continued operation of the pump is not recommended. Further usage of the pump under these conditions may cause severe water damage to the engine.

11. To begin pumping, place the **engine throttle lever** (Figure 15) in the **RUN** position.

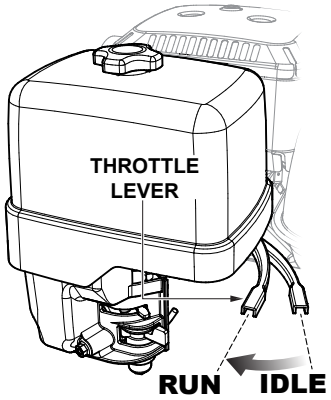


Figure 15. Engine Throttle Lever (Run)

12. To activate pumping, set the manifold and spray bar control handles as shown in Figure 19 and Table 5.

STOPPING THE ENGINE

Normal Shutdown

1. Place the **engine throttle lever** in the **IDLE** position (Figure 16) and run the engine for three minutes at low speed.

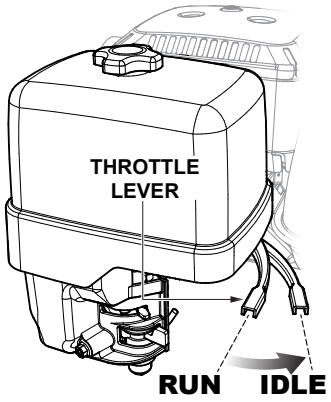


Figure 16. Engine Throttle Lever (Idle)

2. After the engine cools, place the **engine ON/OFF switch** in the **OFF** position (Figure 17).

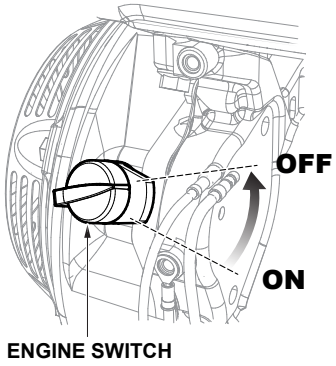


Figure 17. Engine ON/OFF Switch (OFF)

3. Place the **engine fuel valve lever** (Figure 18) in the **OFF** position.

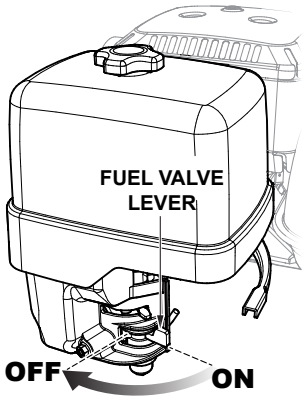


Figure 18. Engine Fuel Valve Lever (OFF)

Emergency Shutdown

Quickly move the **engine throttle lever** to the **IDLE** position (Figure 16), then place the **engine ON/OFF switch** in the **OFF** position (Figure 17).

CONTROL HANDLES

Refer to Figure 19 and Table 5 for the various operating positions of the **manifold and spray bar control handles**.

> ***NOTICE***
>
> **The pump must be primed before the engine is started.** To prime the pump, remove the pump fill cap and fill the pump casing with water, then reinstall the fill cap.

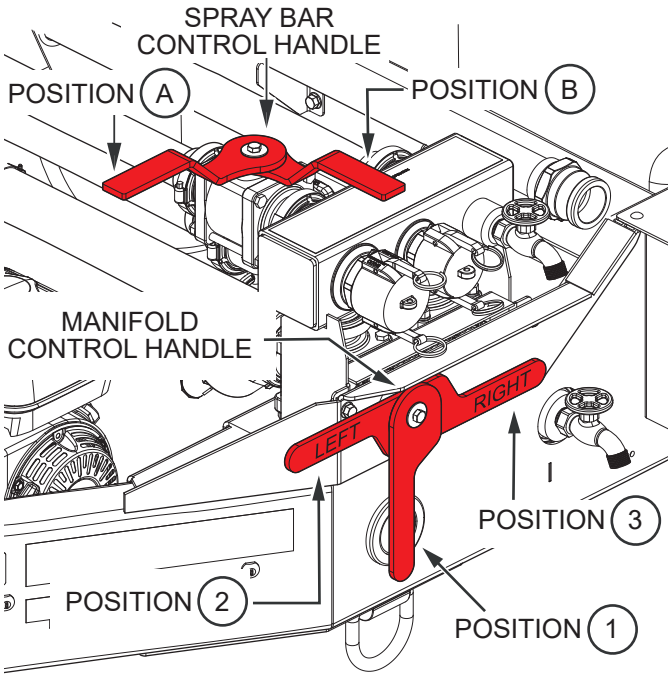


Figure 19. Pump Control Handle Positions

Table 5. Pump Control Handle Operation

Operation	Manifold Control Handle	Manifold Couplers	Spray Bar Control Handle	Rear Spray
Engine Start/Parked	Position 1 (Vertical)	OFF	Position A (Forward)	OFF
Suction	Position 2 (Horizontal/Left)	ON	Position A (Forward)	OFF
Discharge	Position 3 (Horizontal/Right)	ON	Position A (Forward)	OFF
Discharge/Spray	Position 3 (Horizontal/Right)	ON	Position B (Right)	ON
Spray Only Dust Caps Attached To All 3 Ports	Position 3 (Horizontal/Right)	ON	Position B (Right)	ON

IMPORTANT!

There is an operating mode (Figure 20) that can be harmful to your water pump. **NEVER** operate the water trailer with the **spray bar control handle in the right position (rear spray ON)**, the **manifold control handle in the horizontal/left position (suction)**, and the **engine running**.

With no hoses attached, this mode of operation causes the pump to draw in air, creating unnecessary back pressure. **NEVER** operate the water trailer in this mode.

The recommended operating modes of the water trailer are shown in Table 5.

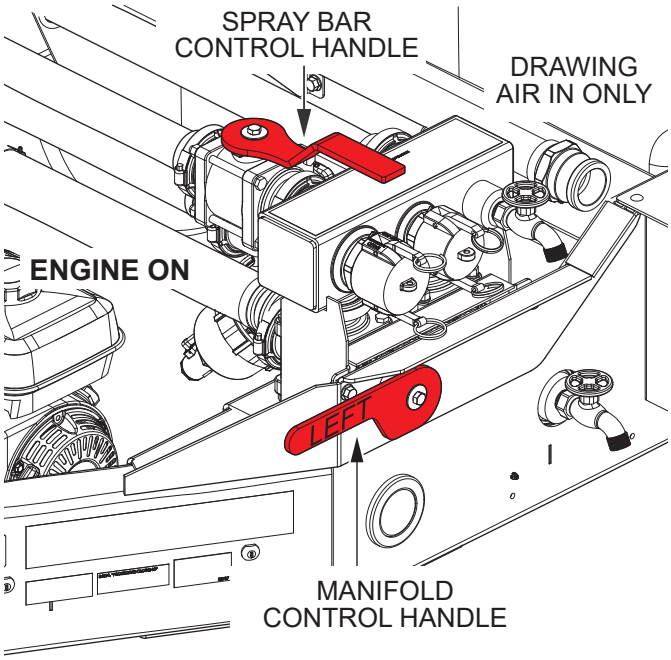


Figure 20. DO NOT USE Mode (Engine ON)

NOTICE

NEVER operate the water trailer with the spray bar and manifold control handles as shown in Figure 20.

With the engine running, this mode of operation causes the pump to draw in air, creating unnecessary back pressure.

NOTICE

The pump must be primed before the engine is started. To prime the pump, remove the pump fill cap and fill the pump casing with water, then reinstall the fill cap.

FILLING THE WATER TANK (FIRE HYDRANT)

Refer to Figure 21.

1. Remove the **water tank cap**.
2. Attach a hydrant adapter to the fire hydrant if necessary.
3. Connect the **fire hydrant discharge hose** between the 2-inch steel water tank pipe QD port and the fire hydrant.
4. Make sure there are no bends or sharp kinks in the hose between the fire hydrant and water tank fill port.
5. Slowly open the hydrant valve. The water tank should begin to fill.
6. Fill the water tank to the desired level, then close the fire hydrant valve.
7. Remove the fire hydrant discharge hose and allow the hose to drain. Remove the hydrant adapter.

NOTICE

DO NOT attempt to connect the fire hydrant discharge hose to the suction side of the pump as a water source to fill the tank. The high-pressure discharge of the fire hydrant will damage the pump casing.

NOTICE

The pump must be primed before the engine is started. To prime the pump, remove the pump fill cap and fill the pump casing with water, then reinstall the fill cap.

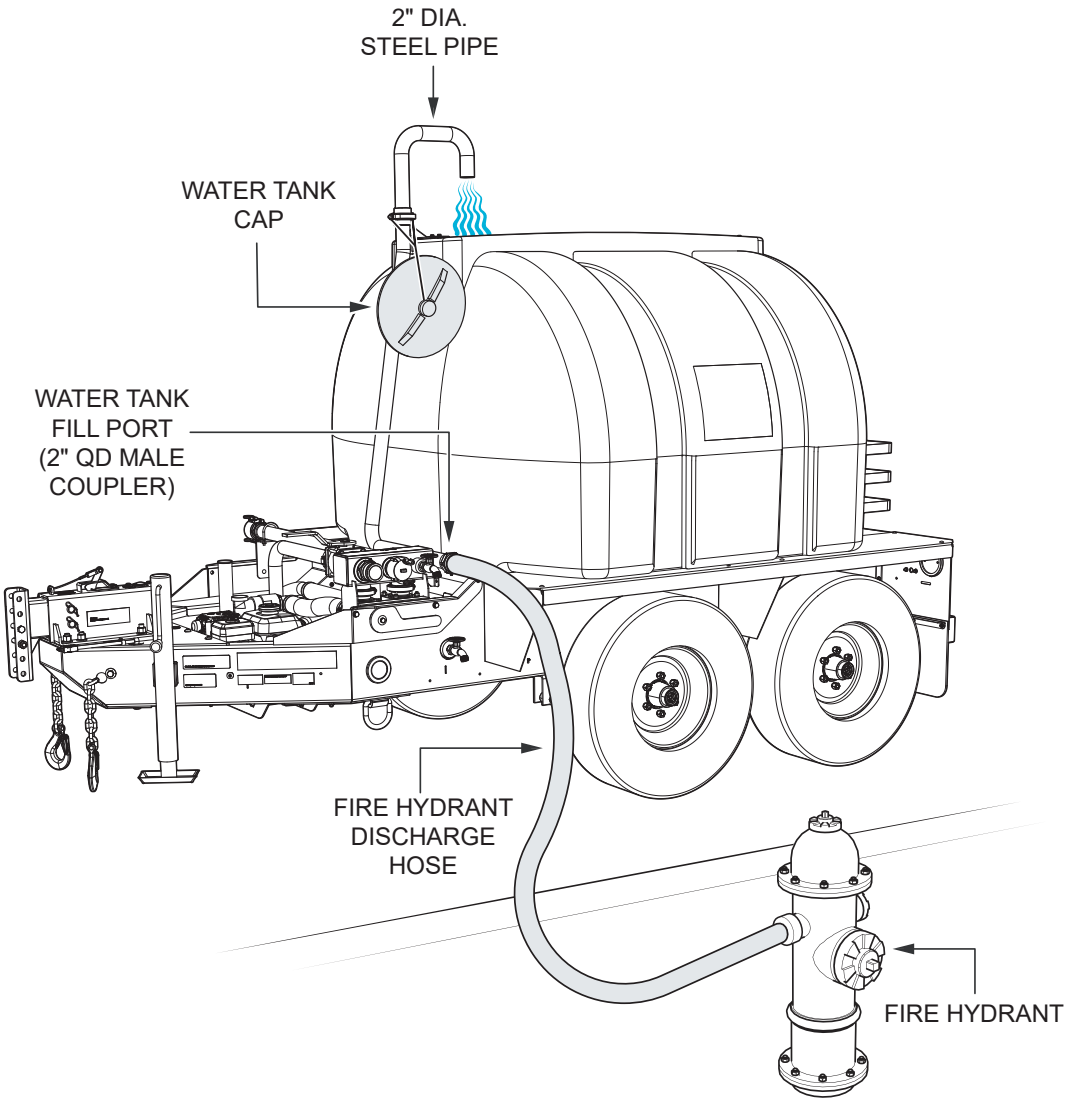


Figure 21. Filling The Water Tank (Fire Hydrant Connection)

FILLING THE WATER TANK (WATER SOURCE)

1.5-Inch Or 2.0-Inch Cam And Groove Male Quick-Disconnect Port

The following procedure shows how to fill the water tank using a swimming pool, pond, lake, river, etc. as a water source. Refer to Figure 22.

1. Remove the dust cap from the desired **(1.5-inch or 2.0-inch) cam and groove male QD port** on the upper manifold.
2. Connect the **suction hose** between the desired port and the **water source**.
3. Place the spray bar and manifold control handles in the **suction position** as shown in Figure 19 and Table 5.
4. Fill the water tank to the desired level.
5. To stop the flow of water, place the manifold control handle in the **OFF** (vertical) position.
6. Remove the suction hose.
7. Install the dust cap back onto the male QD port.

Garden Hose

1. Connect a **garden hose** between the **garden hose valve** and the **water source**.
2. Open the garden hose valve.
3. Place the spray bar and manifold control handles in the **suction position** as shown in Figure 19 and Table 5.
4. Fill the water tank to the desired level.
5. To stop the flow of water, place the manifold control handle in the **OFF** (vertical) position.
6. Close the garden hose valve.
7. Remove the garden hose.

NOTICE

DO NOT pump heavy debris-laden water. Ensure the suction hose is tethered in a manner that will keep the suction end off of the bottom of ponds, lakes, rivers, etc.

NOTICE

The pump must be primed before the engine is started. To prime the pump, remove the pump fill cap and fill the pump casing with water, then reinstall the fill cap.

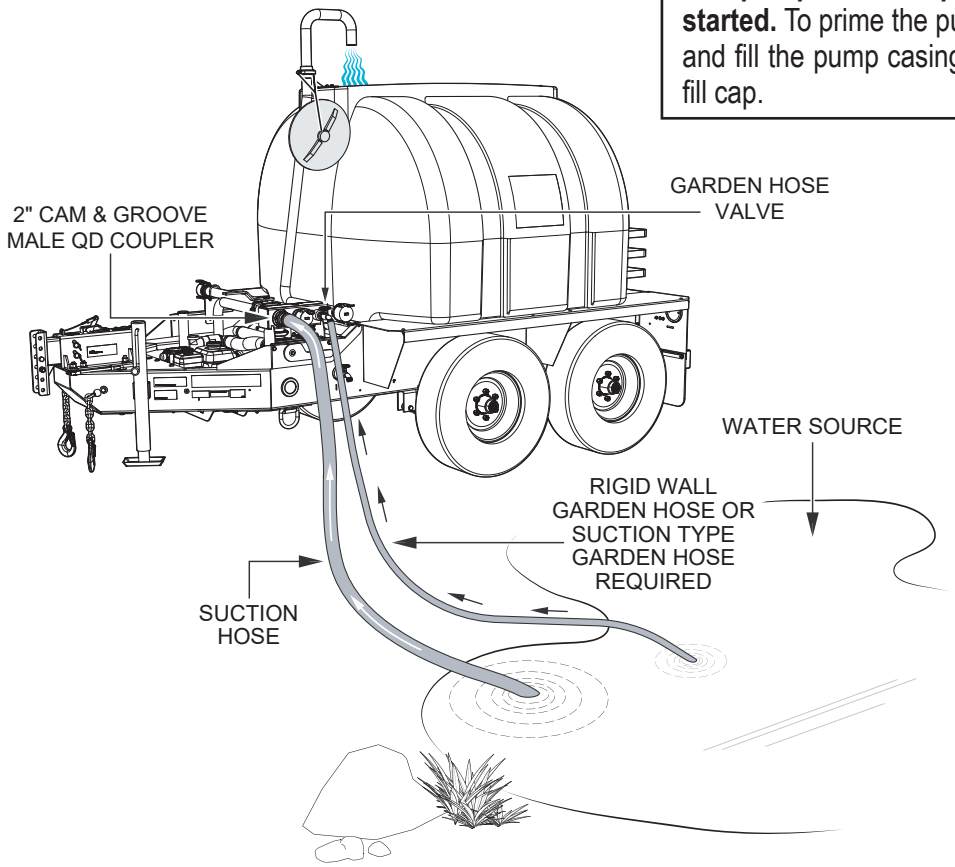


Figure 22. Filling The Water Tank (Water Source)

DISCHARGING WATER

The following processes demonstrate how to discharge water from: the cam and groove ports on the main manifold, the rear spray bar, and the hose bib ports.

> ***NOTICE***
>
> The pump **MUST BE** primed **before** the engine is started. This is accomplished by removing the pump fill cap and filling the pump casing with water, then re-securing the fill cap.

Cam And Groove Ports

1. Remove the dust cap(s) of the port(s) you want to discharge water from.
2. Ensure that all hose bib couplers have been turned to the **OFF** position.
3. Ensure that the **spray bar control handle** is in the **OFF** position (Figure 19, Table 5).
4. Place the **manifold control handle** in the **discharge** position (Figure 19, Table 5).

Rear Spray Bar

1. Ensure all main manifold dust caps are secured on the male couplers.
2. Ensure that all hose bib couplers have been turned to the **OFF** position.
3. Place the **spray bar control handle** in the **ON** position (Figure 19, Table 5).

Hose Bibs

1. Ensure all main manifold dust caps are secured on the male couplers.
2. Ensure that the **spray bar control handle** is in the **OFF** position (Figure 19, Table 5).
3. Place the **hose bib(s)** you want to discharge from in the **ON** position.

> ***NOTICE***
>
> Figure 23 illustrates a typical water discharge application utilizing either the cam and groove ports on the main manifold or the rear spray bar.

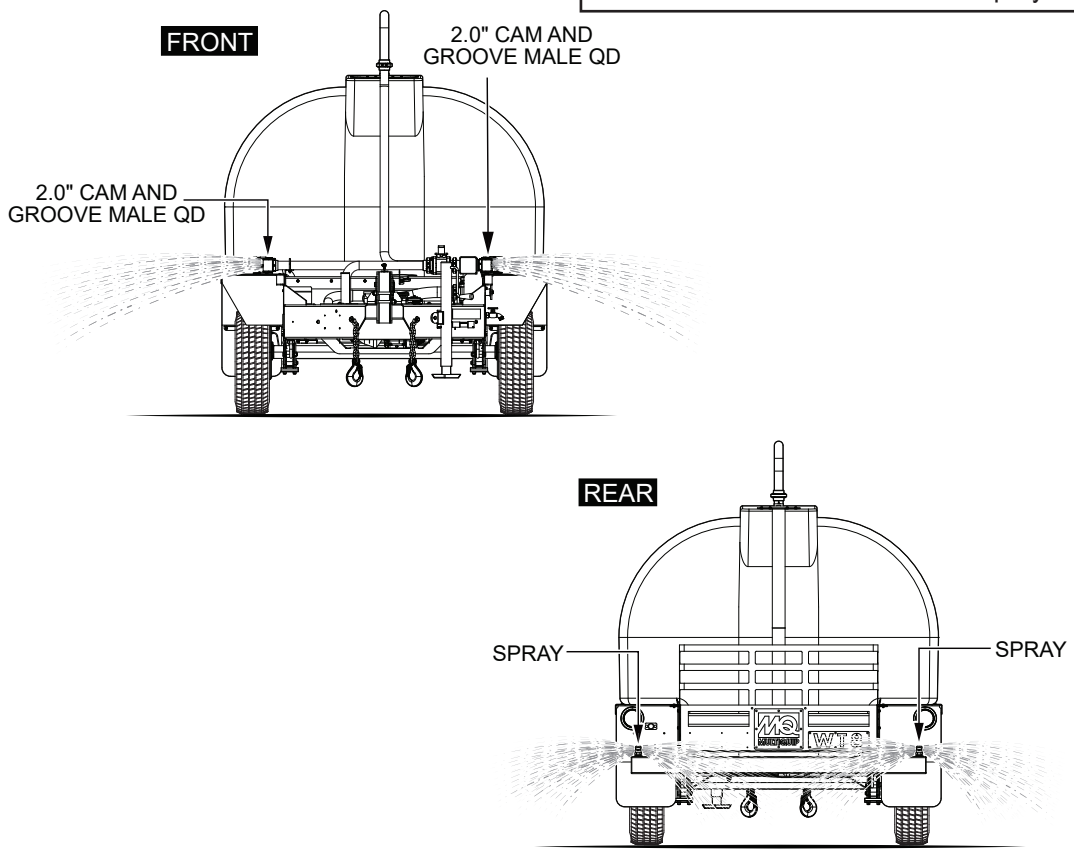


Figure 23. Discharging Water

WINTERIZING PROCEDURE

Perform the following procedure to protect the water trailer from component damage in freezing weather.

1. Make sure the engine is turned **OFF** and the water tank is completely empty. Use the pump to remove any water present in the water tank.
2. Place the unit on a level surface and raise the **trailer tongue** by placing the **tongue jack stand** in the highest position (Figure 24).

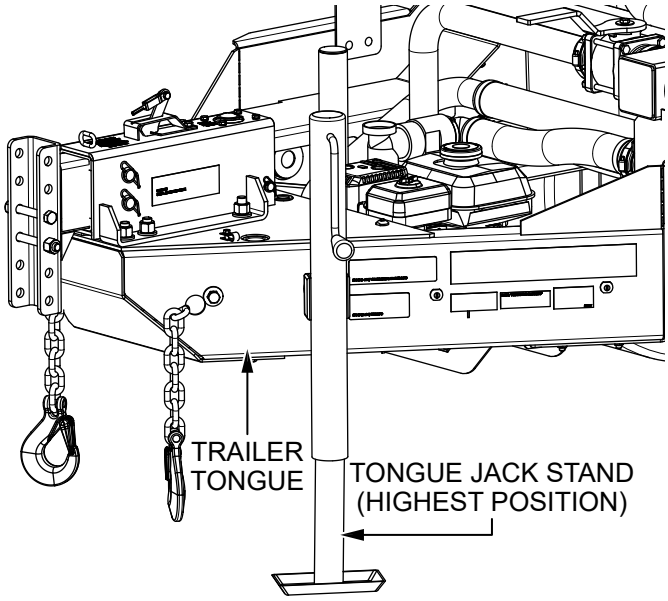


Figure 24. Raise The Trailer Tongue

3. Locate and remove the **pump drain plug** (Figure 25) on the pump end.

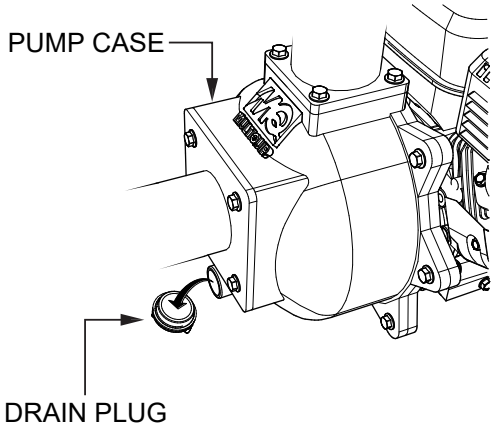


Figure 25. Remove The Drain Plug

4. Place the **manifold control handle** in the **horizontal/right** position (Figure 26).

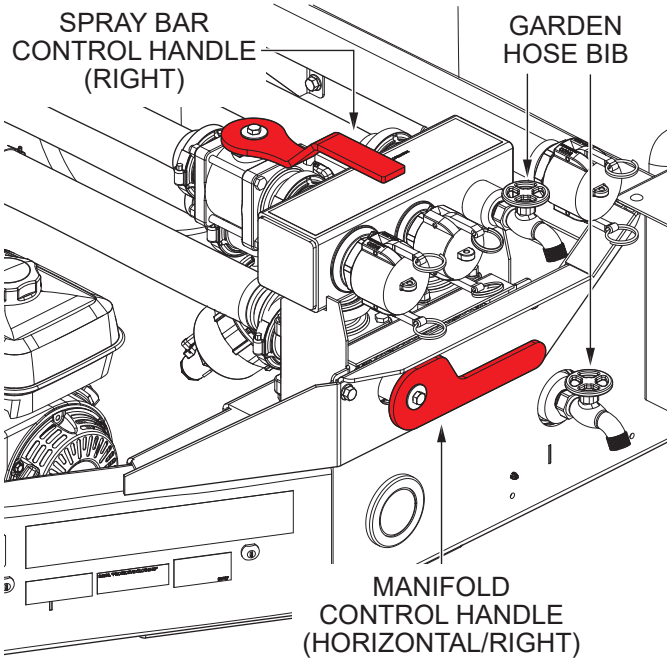


Figure 26. Control Handle Positions And Garden Hose Bib Locations

5. Place the **spray bar control handle** in the **right** position (Figure 26).
6. Locate and open all three **garden hose bibs**. See Figure 26 and Figure 27.

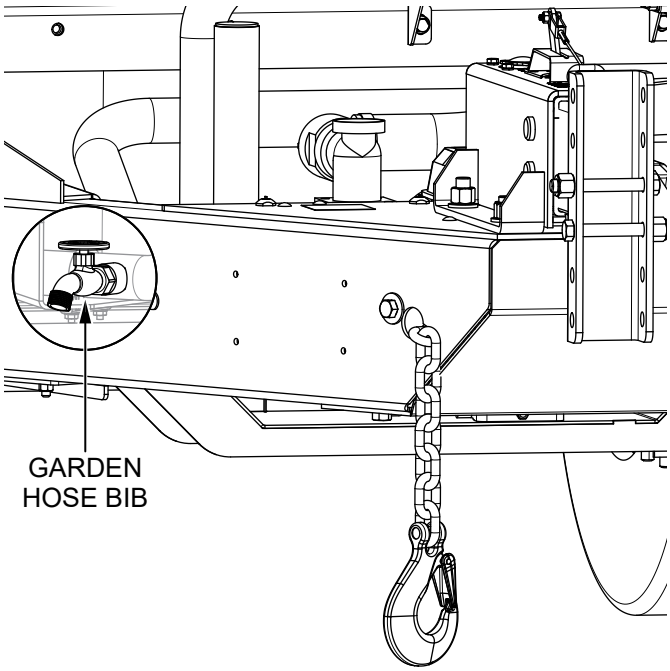


Figure 27. Third Garden Hose Bib Location

7. Once all water appears to have been drained, lower the **trailer tongue** by placing the **tongue jack stand** in the lowest position (Figure 28).

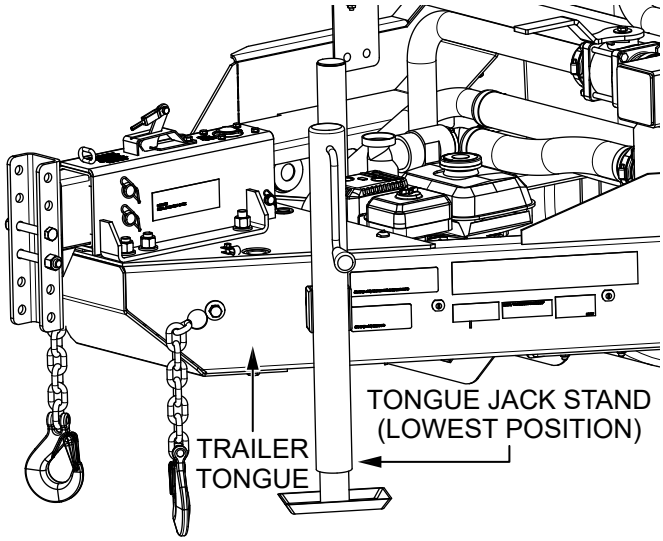


Figure 28. Lower The Trailer Tongue

8. Place the **manifold control handle** in the **horizontal/left** position (Figure 29).

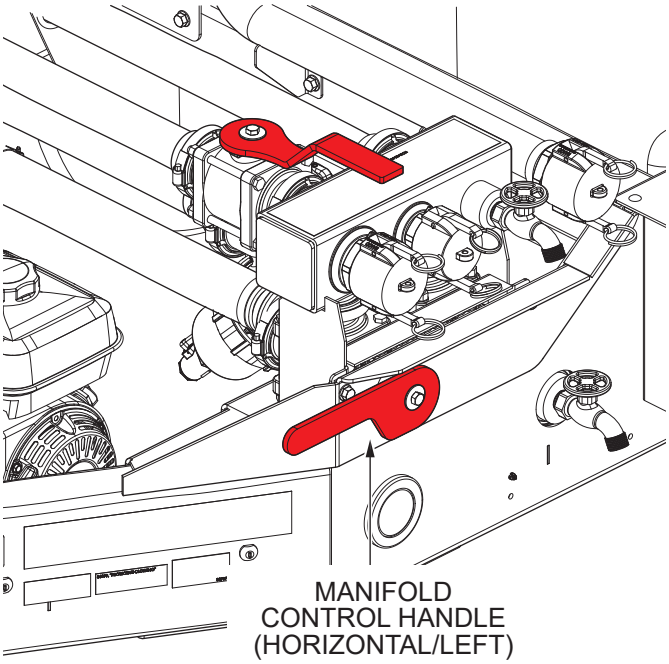


Figure 29. Manifold Control Handle (Horizontal/Left Position)

9. Once fluid has stopped draining, reinstall the **pump drain plug** (Figure 30) on the pump end.

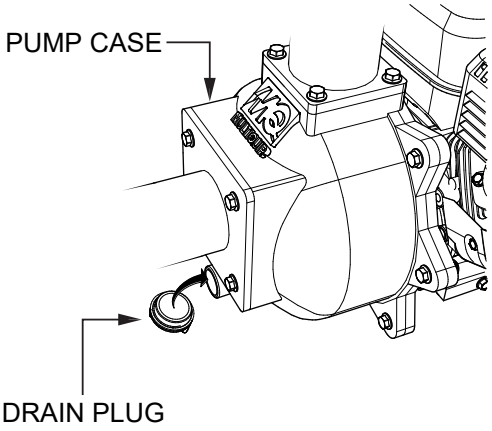


Figure 30. Reinstall The Drain Plug

NOTICE

It is important to cycle the manifold control handle from the **horizonal/right** position back to the **horizontal/left** position to allow all water to drain from the entire manifold valve assembly.

NEVER leave the **manifold control handle** in the **vertical** position.

ALWAYS leave the **spray bar control handle** in the **right** position.

PUMP VACUUM TEST

⚠ CAUTION

DO NOT attempt to start the engine unless the pump has previously been primed with water. Severe pump damage will occur if the pump has not been primed.

To perform the pump vacuum test:

1. Remove the pump fill cap and fill the pump with water.
2. Start the engine as outlined in the ***Operation*** section, and wait for the pump to begin pumping.
3. As shown in Figure 31, place a water hose inside the discharge opening of the pump, and turn on the water. This flow of water into the discharge opening will prevent the pump from running dry.
4. Place the **pump vacuum tester** (P/N 7000030) over the pump suction (inlet) opening with the vacuum gauge facing upwards. It may be necessary to apply a small amount of water around the rubber seal of the vacuum tester to create a good suction fit.
5. Make sure that there are no air leaks between the vacuum tester and the inlet port on the pump. If air leaks are present, reset the vacuum tester.
6. Run the pump for a few minutes while monitoring the vacuum gauge. If the gauge indicates a reading between 25 and 20 inHg (inches of mercury) then it can be assumed that the pump is working correctly.
7. If the vacuum tester gauge indicates a reading below 20 inHg, it can be assumed that the pump is not functioning correctly, and corrective action needs to be taken.

NOTICE

25 inHg (inches of mercury) translates into 25 feet of lift at sea level.

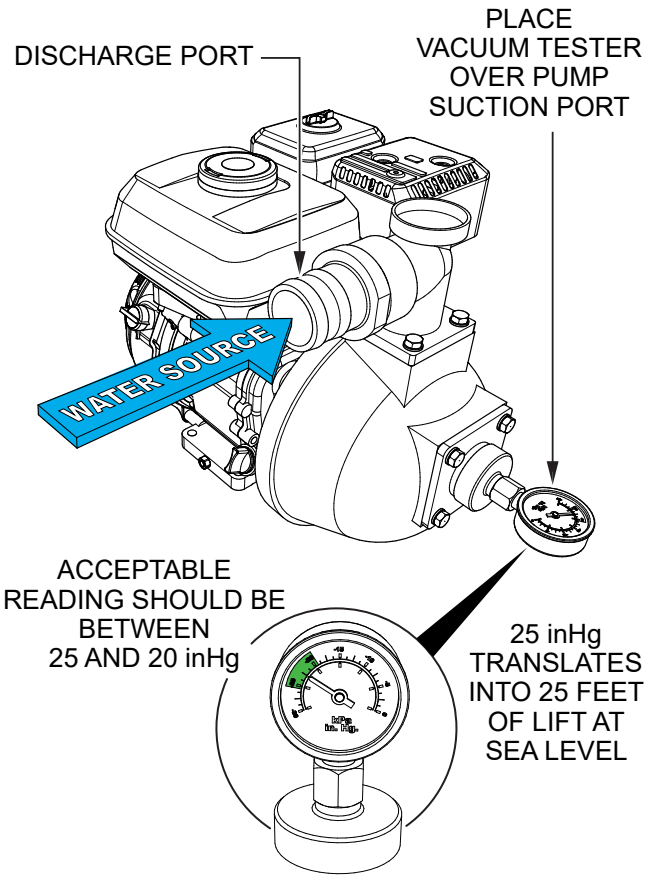


Figure 31. Pump Vacuum Test

NOTICE

A vacuum test may be performed without water flowing through the discharge port. However, it is recommended to have water flowing to prevent the pump from heating up.

Use Table 6 as a general maintenance guideline when servicing your engine. For more detailed engine maintenance information, refer to the engine owner's manual supplied with your engine.

Table 6. Engine Maintenance Schedule

Description (3)	Operation	Before Each Use	First Month Or 20 Hours	Every 3 Months Or 50 Hours	Every 6 Months Or 100 Hours	Every Year Or 300 Hours	Every 2 Years
All Nuts and Bolts	Re-tighten if necessary	X					
Engine Oil	Check	X					
	Change		X		X		
Air Cleaner	Check	X					
	Clean			X (1)			
Sediment Cup	Clean				X		
Spark Plugs	Check/Clean				X		
	Replace					X	
Spark Arrester	Clean				X		
Idle Speed	Check/Adjust					X (2)	
Valve Clearance	Check/Adjust					X (2)	
Fuel Tank and Strainer	Clean					X (2)	
Fuel Lines	Check (Replace if necessary)						X (2)

(1) Service more frequently when used in dusty areas.

(2) These items should be serviced by your service dealer, unless you have the proper tools and are mechanically proficient. Refer to the Honda shop manual for service procedures.

(3) For commercial use, log hours of operation to determine proper maintenance intervals.

Perform scheduled maintenance procedures as defined by Table 6 and below. For more detailed engine maintenance information, refer to the Honda engine owner's manual.

DAILY

- Thoroughly remove dirt and oil from the engine and control area.
- Check the engine oil level.
- Check and clean or replace the air cleaner elements as necessary.
- Check and retighten all fasteners as necessary.

SPARK PLUG

Remove and clean the **spark plug** (Figure 32), then adjust the **spark plug gap** to **0.028–0.031 inch (0.7–0.8 mm)**. This unit has electronic ignition, which requires no adjustments.

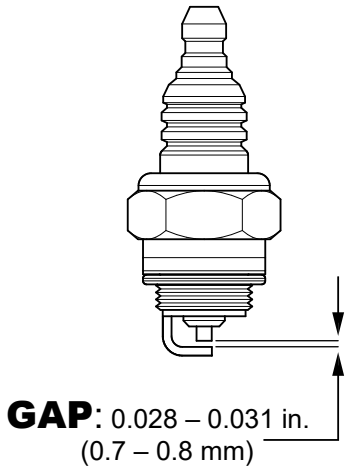


Figure 32. Spark Plug Gap

ENGINE OIL

NOTICE

Drain the engine oil while the oil is **warm**.

1. Remove the **engine oil dipstick**, **oil drain bolt**, and **sealing washer** (Figure 33), and allow the oil to drain into a suitable container.

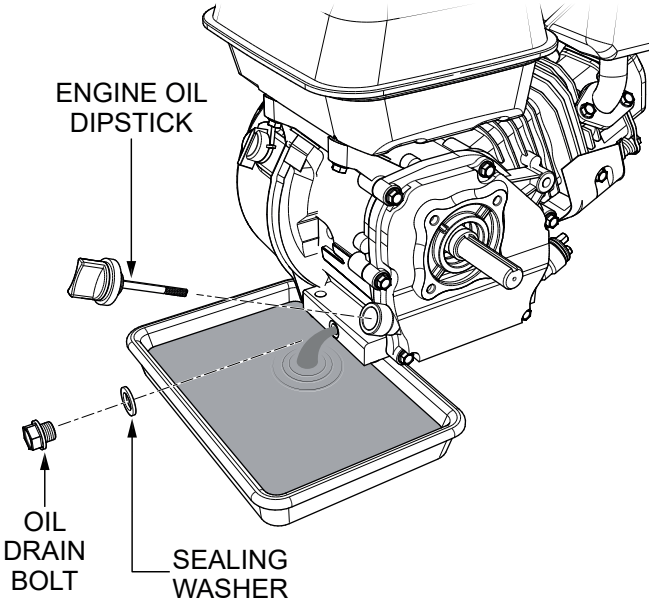


Figure 33. Draining The Engine Oil

NOTICE

Dispose of fluids properly in accordance with local and governmental regulations. **NEVER** pour fluids onto the ground or down drains or sewers.

2. After the oil has fully drained, reinstall the oil drain bolt with a new sealing washer and tighten securely.
3. Fill with the recommended oil type (Table 4) to the upper limit mark on the dipstick (bottom edge of the oil filler hole). **DO NOT** overfill. For engine oil capacity, refer to Table 2.

ENGINE AIR CLEANER

1. Remove the **wing nut** from the **air cleaner cover**, then remove the cover (Figure 34).

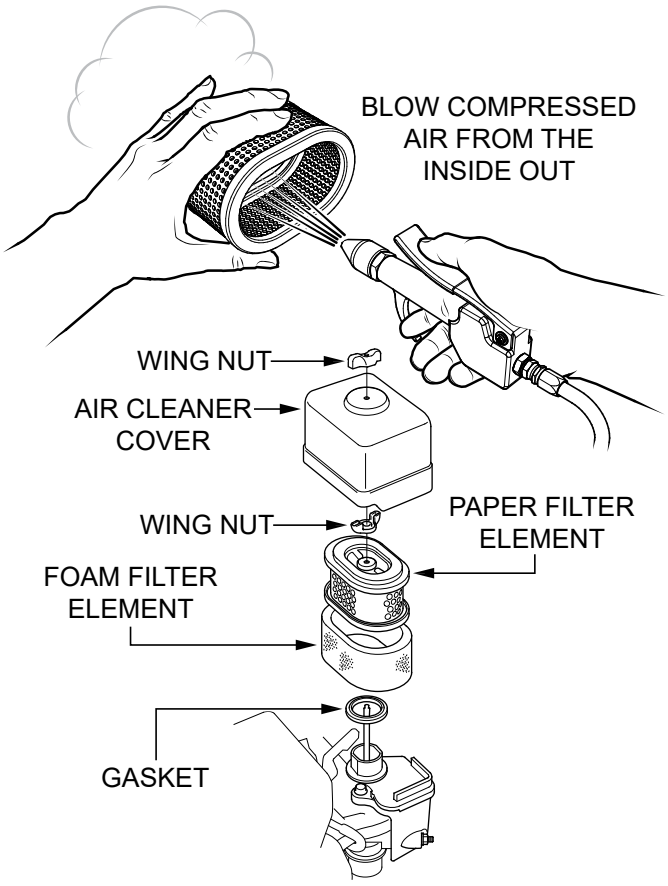


Figure 34. Engine Air Cleaner

2. Remove the **wing nut** from the air filter assembly (**paper filter element** and **foam filter element**), and remove the air filter assembly. See Figure 34.
3. Remove the foam filter element from the paper filter element.
4. Inspect both filter elements, and replace them if they are damaged. Always replace the paper air filter element at the scheduled interval (Table 6).
5. Clean the air filter elements if they are to be reused:
   a. Tap the paper filter element several times on a hard surface to remove dirt, or blow compressed air not exceeding 30 psi (207 kPa, 2.1 kgf/cm²) through the filter element from the inside. **NEVER** brush off dirt. Brushing will force dirt into the fibers. Replace the paper filter element if it is excessively dirty.
   b. Clean the foam filter element in warm, soapy water or a nonflammable solvent. Rinse and allow to dry thoroughly. Dip the element in clean engine oil and completely squeeze (but **DO NOT** twist) out all excess oil from the element before reinstalling. The engine will smoke when started if too much oil is left in the element.

⚠ DANGER

DO NOT use gasoline as a cleaning solvent. **Fire or an explosion** may result.

6. Using a moist rag, wipe dirt from the inside of the air cleaner case and cover. Be careful to prevent dirt from entering the air duct that leads to the carburetor.
7. Place the foam air filter element over the paper element, and reinstall the air filter assembly. Make sure the **gasket** (Figure 34) is in place beneath the air filter assembly. Tighten the air filter wing nut securely.
8. Reinstall the air cleaner cover, and tighten the wing nut securely.

LONG-TERM STORAGE

When storing the unit for longer than 30 days:

- Drain the fuel tank completely.
- Run the engine until the fuel in the carburetor is completely consumed.
- Completely drain used oil from the engine crankcase and fill with fresh, clean oil, then follow the procedure described in the engine manual for engine storage.
- Remove the drain plug from the pump and drain out any water left in the housing.
- Remove the pump cover and clean the inside of the pump housing. Coat the inside of the pump housing with a light film of oil to reduce corrosion. A spray can of oil works well for this application.
- Cover the pump and engine with a plastic covering or equivalent and store in a clean, dry place.
- To protect the water-cooled seals, place one-half pint of lubricating oil (new or used) through the discharge opening on the pump and crank the engine several times. This will prevent excessive corrosion and also keep the mechanical seal lubricated.
- Drain the water tank completely.

The following guidelines are to assist the operator with preventive maintenance of the trailer.

TRAILER BRAKES

Properly functioning brake shoes and drums are essential to ensure safety. The brakes should be inspected after the first 200 miles of operation. This will allow the brake shoes and drums to seat properly. After the first 200-mile interval, inspect the brakes every 3,000 miles. If driving over rough terrain, inspect the brakes more frequently.

HYDRAULIC BRAKES

If your trailer has hydraulic brakes, they function the same way the surge brakes do on your tow vehicle. The hydraulic braking system must be inspected at least as often as the brakes on the tow vehicle, but no less than once per year. This inspection includes an assessment of the condition and proper operation of the wheel cylinders, brake shoes, brake drums, and hubs.

Manually Adjusting The Brakes

Most axles are fitted with a brake mechanism that will adjust the brakes during a hard stop. However, some braking systems are not automatically adjusted by hard stopping. These brakes require manual adjustment. The following steps apply to adjust most manually adjustable brakes.

1. Jack up the trailer and secure it on adequate capacity jack stands.
2. Be sure the wheel and brake drum rotate freely.
3. Remove the adjusting hole cover from the adjusting slot on the bottom of the brake backing plate.
4. With a screwdriver or standard adjusting tool, rotate the starwheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.

   Note: Your trailer may be equipped with drop-spindle axles. See axle manual for your axle type. You will need a modified adjusting tool for adjusting the brakes in these axles. With drop-spindle axles, a modified adjusting tool with about an 80-degree angle should be used.
5. Rotate the starwheel in the opposite direction until the wheel turns freely with a slight drag.
6. Replace the adjusting hole cover.
7. Repeat the above procedure on all brakes.
8. Lower the trailer to the ground.

Check the fluid level in the master cylinder reservoir at least every three months. If you tow your trailer an average of 1,000 miles per month in a hot and dry environment, you must check the brake fluid level once a month. The brake fluid reservoir is located on the tongue of the trailer. **ALWAYS** fill with clean, uncontaminated, DOT 4 brake fluid.

Figure 35 shows the major **hydraulic brake components** that will require inspection and maintenance. Please inspect these components as required in the ***Manually Adjusting the Brakes*** section on this page. See Table 7 for hydraulic brake troubleshooting.

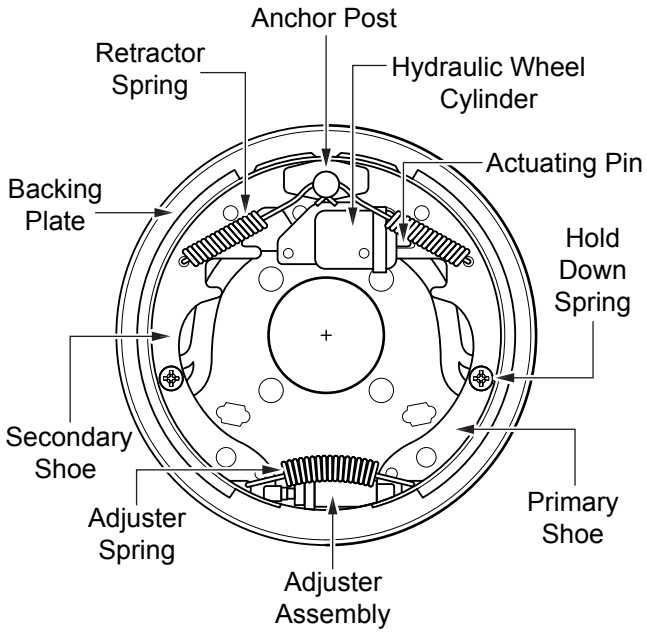


Figure 35. Hydraulic Brake Components

Hydraulic Brake Actuator

The **hydraulic brake actuator** (Figure 36) is the mechanism that activates the trailer's brake system. This actuator changes fluid power into mechanical power. Therefore, the fluid level inside the **hydraulic brake fluid reservoir** must be checked frequently to ensure that the brakes function properly.

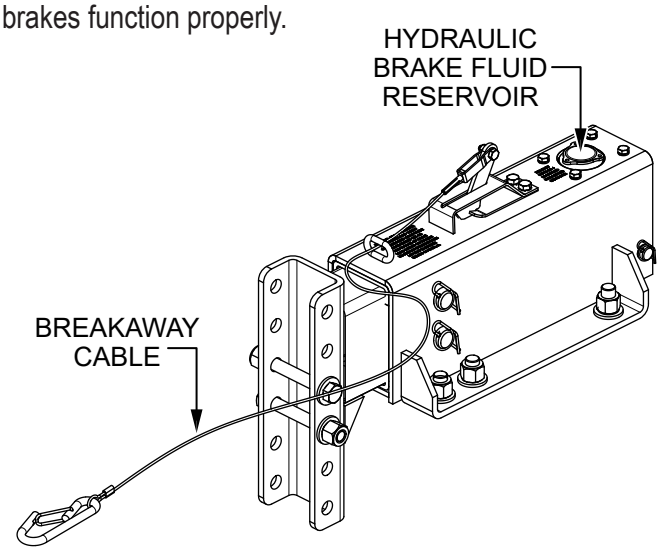


Figure 36. Hydraulic Brake Actuator

⚠ WARNING

Failure to maintain the proper level of hydraulic brake fluid in the actuator may result in loss of braking action which can cause severe property damage, injury or death.

Periodically check the hydraulic brake actuator mounting fasteners for damage or loosening. Inspect the actuator for worn or damaged parts. As you are towing your trailer, be aware of any changes in braking quality. This could be an early warning of brake or actuator malfunction and requires immediate attention. Consult a certified brake specialist to make necessary adjustments or repairs.

Table 7. Hydraulic Brake Troubleshooting

Symptom	Possible Cause	Solution
No Brakes	Brake line broken or kinked?	Repair or replace.
Weak Brakes or Brakes Pull to One Side	Brake lining glazed?	Reburnish or replace.
	Trailer overloaded?	Correct weight.
	Brake drums scored or grooved?	Machine or replace.
	Tire pressure incorrect?	Inflate all tires equally.
	Tires unmatched on the same axle?	Match tires.
Locking Brakes	Brake components loose, bent or broken?	Replace components.
	Brake drums out of round?	Replace.
Noisy Brakes	System not lubricated?	Lubricate.
	Brake components incorrect?	Replace and correct.
Dragging Brakes	Brake lining thickness incorrect or not adjusted correctly?	Install new shoes and linings.
	Not enough brake fluid or incorrect fluid?	Replace rubber parts, fill with DOT 4 fluid.

Servicing The Emergency Lever

If the hydraulic brake actuator's **emergency lever** (Figure 37) is applied, it can be disengaged by using a screwdriver to lift upward on the front of the flat **emergency lever spring** while pulling the lever forward until released. A thorough inspection of the emergency lever, emergency lever spring, and **safety cable** is required. Damaged parts must be replaced as follows:

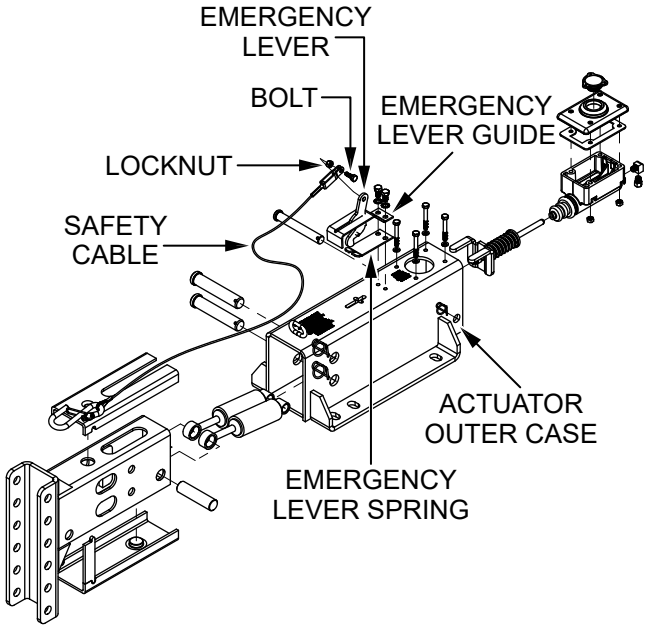


Figure 37. Hydraulic Brake Actuator (Exploded View)

1. Remove the safety cable from the emergency lever, emergency lever guide, and flat emergency lever spring, then pull the lever out of the **actuator outer case** (Figure 37) through the cross-slot in the top of the outer case.
2. Install a new emergency lever through the cross-slot in the top of the outer case. Attach a new emergency lever spring and emergency lever guide.
3. Bolt the safety cable to the emergency lever using the **bolt** and **locknut** (Figure 37). Leave loose to allow the fork to pivot on the lever.
4. Add adequate brake fluid to the master cylinder and bleed the brake system per manufacturer instructions.

ELECTRIC BRAKES

Electrically actuated brakes are similar to hydraulic brakes. The basic difference is that electric brakes are actuated by an electromagnet. Listed below are some of the advantages that electric brakes have over hydraulic brakes:

- Brake system can be manually adjusted to provide the corrected braking capability for varying road and load conditions.
- Brake system can be modified to provide more or less braking force, thus easing the brake load on the towing vehicle.
- Brake system has very little lag time between the time the vehicle's brakes are actuated and the trailer's brakes are actuated.
- Brake system can provide an independent emergency brake system.

Proper synchronization of the tow vehicle's braking to the trailer's braking can only be accomplished by road testing. Brake lockup, grabbiness, or harshness is due to under-adjusted brakes or to lack of synchronization between the tow vehicle and the trailer being towed.

Before any brake synchronization adjustments can be made, the trailer brakes should be burnished in by applying the brakes 20–30 times with approximately a 20 mph decrease in speed (e.g. from 40 mph to 20 mph). Allow ample time for the brakes to cool between applications. This allows the brake shoes to be slightly seated into the brake drum surface.

Figure 38 displays the major **electric brake components** that will require inspection and maintenance. Please inspect these components as required. See Table 8 for electric brake troubleshooting.

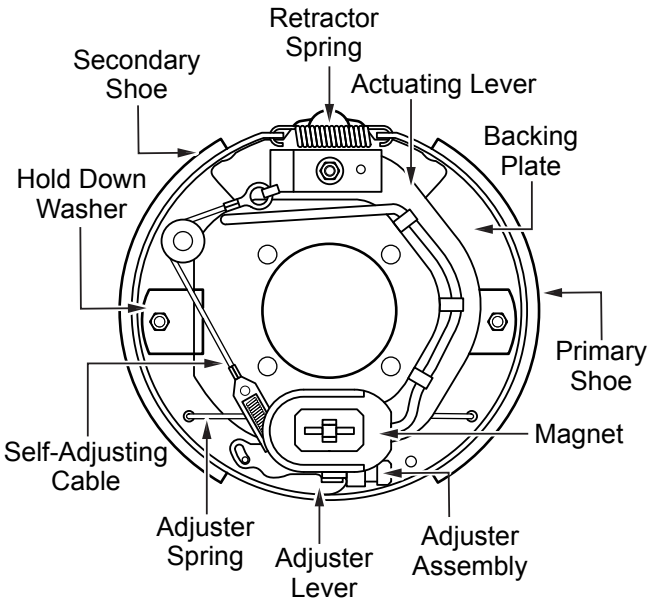


Figure 38. Electrical Brake Components

Electric Brake Actuator

The **electric brake actuator** (Figure 39) is the mechanism that activates the trailer's brake system. The breakaway brake system includes a DC power source, a switch with a pull pin, and a breakaway brake controller. Read and follow the instructions that have been prepared by the breakaway brake controller manufacturer.

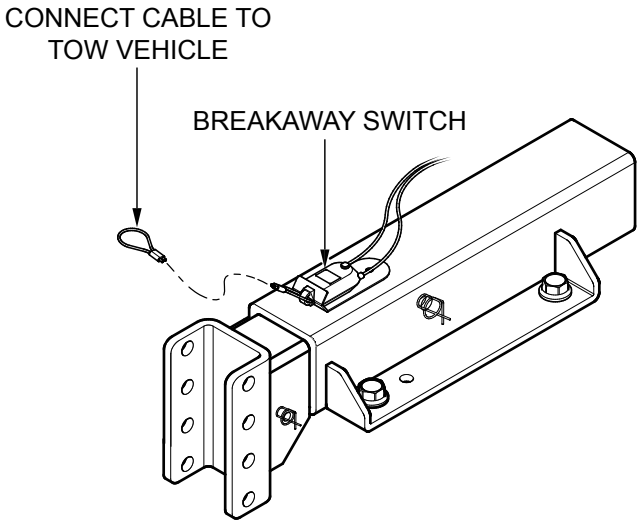


Figure 39. Electric Brake Actuator

Table 8. Electric Brake Troubleshooting		
Symptom	**Possible Cause**	**Solution**
No Brakes or Intermittent Brakes	Any open circuits or broken wires?	Find and correct.
	Any short circuits?	Find and correct.
	Faulty controller?	Test and correct.
	Any loose connections?	Find and repair.
	Ground wire secure?	Find and secure.
Weak Brakes or Brakes Pull to One Side	Grease or oil on magnets or linings?	Clean or replace.
	Connections corroded?	Clean and correct cause of corrosion.
	Brake drums scored or grooved?	Machine or replace.
	Brakes synchronized?	Correct.
Locking Brakes	Brake components loose, bent or broken?	Replace components.
	Brake drums out of round?	Replace.
Noisy Brakes	System lubricated?	Lubricate.
	Brake components correct?	Replace and correct.
Dragging Brakes	Brake lining thickness incorrect or not adjusted correctly?	Install new shoes and linings.
	Enough brake fluid or correct fluid?	Replace rubber parts, fill with DOT 4 fluid.

BREAKAWAY BRAKE

Breakaway Battery

This battery supplies power to operate the trailer brakes if the trailer uncouples from the tow vehicle. Be sure to check, maintain, and replace the battery according to the battery manufacturer's instructions.

Breakaway Switch

This switch causes the breakaway battery to operate the brakes if the trailer uncouples from the tow vehicle. The pull cable for the pull pin is connected to the tow vehicle, and the switch is connected to the trailer.

To check for proper functioning of the switch, battery and brakes, you must pull the pin from the switch and confirm that the brakes apply to each wheel. You can do this by trying to pull the trailer with the tow vehicle after pulling the pin. The trailer brakes may not lock, but you will notice that a greater force is needed to pull the trailer.

⚠ WARNING

If the electric breakaway brakes do not operate when the trailer is uncoupled from the tow vehicle, death or serious injury can occur. Check the emergency breakaway brake system **BEFORE** each tow.

Tow-Vehicle Operated Electric Brakes

Electric brakes that operate in conjunction with the tow vehicle brakes must be synchronized so that braking is properly distributed to the tow vehicle brakes and the trailer brakes. For proper operation and synchronization, read and follow the axle, brake, and brake controller manufacturers' instructions.

To make certain an electrically operated braking system will function properly, you must have your dealer inspect the magnets at least once a year, or every 12,000 miles. See the brake manual for wear and current inspection instructions.

ADJUSTABLE CHANNEL

Your trailer may be equipped with an **adjustable channel** (Figure 40) that allows the coupler to be raised or lowered to a desired height. Periodically check the channel bolts for damage or loosening.

NOTICE

When replacing channel mounting hardware (nuts, bolts, and washers), **NEVER** substitute substandard hardware. Pay close attention to **bolt length** and **grade**. **ALWAYS** use the manufacturer's recommended parts when replacing channel mounting hardware.

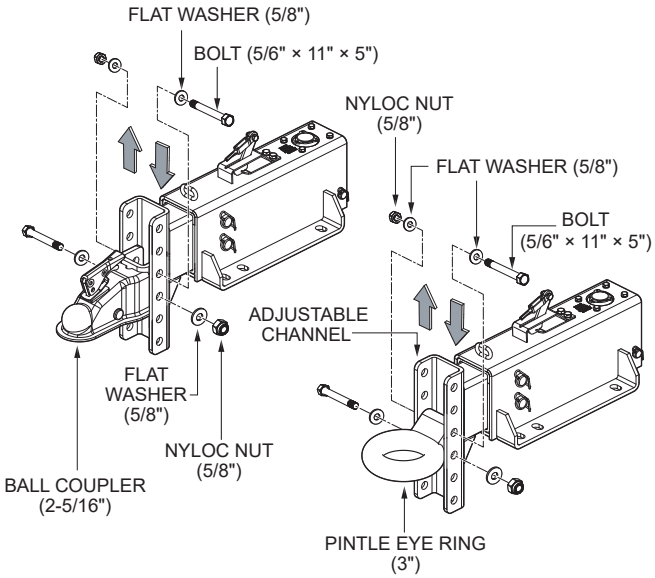


Figure 40. Adjustable Channel Mounting

WHEEL BEARINGS

Wheel bearings (Figure 41) must be inspected and lubricated once a year or every 12,000 miles to ensure safe operation of your trailer.

If the trailer wheel bearings become immersed in water, they must be replaced.

⚠ DANGER

If the trailer wheels are underwater for a long period of time, the wheel bearings may fail. If this is the case, service the wheel bearings immediately.

The possibility exists of the wheels falling off, causing equipment damage and severe bodily harm, even death!

If the trailer has not been used for an extended amount of time, have the bearings inspected and packed more frequently — at least every six months and prior to use.

Follow the steps below to disassemble the wheel hub and service the wheel bearings. See Figure 41.

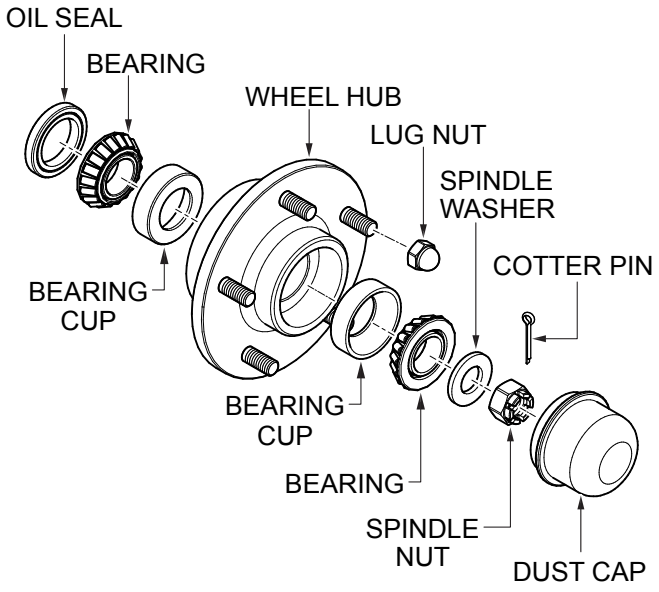


Figure 41. Wheel Hub Components

1. Remove the **dust cap**, **cotter pin**, **spindle nut** and **spindle washer**, then remove the **wheel hub** and inspect the **bearings** for wear and damage.
2. Replace bearings that have flat spots on rollers, broken roller cages, rust, or pitting. Always replace bearings and **bearing cups** in sets. The inner and outer bearings are to be replaced at the same time.
3. Replace **oil seals** that have nicks, tears or wear.
4. Lubricate the bearings with a high-quality, EP-2 automotive wheel bearing grease.

WHEEL HUB ADJUSTMENT

Every time the wheel hub is removed and the bearings are reassembled, follow the steps below to check the wheel bearings for free running and adjust as needed.

1. Turn the hub slowly, by hand, while tightening the spindle nut until you can no longer turn the hub by hand.
2. Loosen the spindle nut just until you are able to turn it (the spindle nut) by hand. **DO NOT** turn the hub while the spindle nut is loose.

3. Install a new cotter pin through the spindle nut and axle.
4. Check the adjustments. Both the hub and the spindle nut should be able to move freely (the spindle nut motion will be limited by the cotter pin).

DANGER

NEVER crawl under the trailer unless it is on firm, level ground and resting on properly placed and secured jack stands.

The possibility exists of the trailer falling, causing equipment damage and severe bodily harm or even death!

DANGER

When performing trailer inspection and maintenance, you must jack up the trailer using jacks and jack stands.

When jacking and using jack stands, place jack stands so as to clear wiring, brake lines, and suspension parts (e.g. springs, torsion bars). Place jacks and jack stands inside of the perimeter strip on the supporting structure to which the axles are attached.

DANGER

Improper weld repair will lead to early failure of the trailer structure and can cause serious injury or death.

DO NOT repair cracked or broken welds unless you have a certified welder perform the repair. Otherwise, have the welds repaired by your dealer.

WARNING

If the trailer is involved in an accident, have it inspected immediately by qualified personnel. In addition, the trailer should be inspected annually for signs of wear or deformations.

LEAF SUSPENSION

The springs and associated components of the **leaf suspension** (Figure 42) should be visually inspected every 6,000 miles for signs of excessive wear, elongation of bolt holes, or loosening of fasteners. Replace all damaged suspension components immediately.

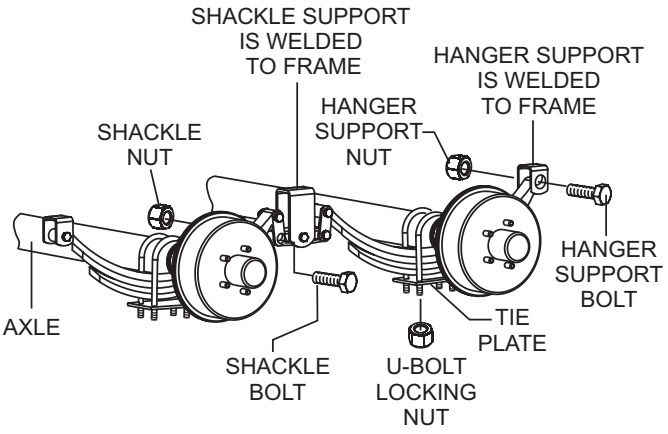


Figure 42. Leaf Suspension Components

DANGER

Worn or broken suspension parts can cause loss of control, damage to equipment, and severe bodily injury, even death!

Check the suspension regularly.

The following guidelines are to assist the operator with the operation and handling of a trailer.

Safety precautions should be followed at all times when operating a trailer. Failure to read, understand and follow the safety guidelines could result in injury to yourself and others. Loss of control of the trailer or tow vehicle can result in death or serious injury.

COMMON CAUSES FOR LOSS OF TRAILER

- Driving too fast for the conditions (maximum speed when towing a trailer is 55 mph).
- Overloading the trailer or loading the trailer unevenly.
- Trailer improperly coupled to the hitch.
- No braking on trailer.
- Not maintaining proper tire pressure.
- Not keeping lug nuts tight.
- Not properly maintaining the trailer structure.
- Ensure machine is towed level to tow vehicle.

TRAILER TOWING GUIDELINES

- Recheck the load tiedowns to make sure the load will not shift during towing.
- Before towing, check coupling, safety chain, safety brake, tires, wheels and lights.
- Check the lug nuts or bolts for tightness.
- Check coupler tightness after towing 50 miles.
- Use your mirrors to verify that you have room to change lanes or pull into traffic.
- Use your turn signals well in advance.
- Allow plenty of stopping space for your trailer and tow vehicle.
- **DO NOT** drive so fast that the trailer begins to sway due to speed.
- Allow plenty of room for passing. A rule of thumb is that the passing distance with a trailer is 4 times the passing distance without the trailer.
- Shift your automatic transmission into a lower gear for city driving.
- **ALWAYS** use lower gears for climbing and descending grades.
- **DO NOT** ride the brakes while descending grades, they may get so hot that they stop working. Then you will potentially have a runaway tow vehicle and trailer.
- To conserve fuel, do not use full throttle to climb a hill. Instead, build speed on the approach.
- Slow down for bumps in the road. Take your foot off the brake when crossing the bump.
- **DO NOT** brake while in a curve unless absolutely necessary. Instead, slow down before you enter the curve and power through the curve. This way, the towing vehicle remains in charge.
- **DO NOT** apply the brakes to correct extreme trailer swaying. Continued pulling of the trailer, and even slight acceleration, will provide a stabilizing force.
- Anticipate the trailer “swaying.” Swaying is the trailer reaction to the air pressure wave caused by passing trucks and buses. Continued pulling of the trailer provides a stabilizing force to correct swaying. **DO NOT** apply the brakes to correct trailer swaying.
- Use lower gear when driving down steep or long grades. Use the engine and transmission as a brake. Do not ride the brakes, as they can overheat and become ineffective.
- Be aware of your trailer height, especially when approaching roofed areas and around trees.
- Make regular stops, about once each hour. Confirm that:
  - Coupler is secure to the hitch and is locked.
  - Electrical connectors are secure.
  - There is appropriate slack in the safety chains.
  - There is appropriate slack in the breakaway switch pullpin cable.
  - Tires are not visibly low on pressure.

DRIVING CONDITIONS

When towing a trailer, you will have decreased acceleration, increased stopping distance, and increased turning radius (which means you must make wider turns to keep from hitting curbs, vehicles, and anything else that is on the inside corner). In addition, you will need a longer distance to pass, due to slower acceleration and increased length.

- Be alert for slippery conditions. You are more likely to be affected by slippery road surfaces when driving a tow vehicle with a trailer, than when driving a tow vehicle without a trailer.
- Check rearview mirrors frequently to observe the trailer and traffic.
- **NEVER** drive faster than what is safe.

WARNING

Driving too fast for severe road conditions can result in loss of control and cause death or serious injury.

Decrease your speed as road, weather, and lighting conditions deteriorate.

Always check for local trailer tow speed limits in your area.

WARNING

Do not transport people on the trailer. The transport of people puts their lives at risk and may be illegal.

COUPLING TO THE TOW VEHICLE

Follow all of the safety precautions and instructions in this manual to ensure safety of persons, equipment, and satisfactory life of the trailer. Always use an adequate tow vehicle and hitch. If the vehicle or hitch is not properly selected and matched to the Gross Vehicle Weight Rating (GVWR) of your trailer, you can cause an accident that could lead to death or serious injury.

If you already have a tow vehicle, know your vehicle tow rating and make certain the trailer's rated capacity is less than or equal to the tow vehicle's rated towing capacity. If you already have (or plan to buy) a trailer, make certain that the tow rating of the tow vehicle is equal to or greater than that of the trailer.

The trailer VIN tag contains critical safety information for the use of your trailer. Again, be sure your hitch and tow vehicle are rated for the Gross Vehicle Weight Rating of your trailer.

WARNING

Proper selection and condition of the coupler and hitch are essential to safely towing your trailer. A loss of coupling may result in death or serious injury.

- Be sure the hitch load rating is equal to or greater than the load rating of the coupler.
- Be sure the hitch size matches the coupler size.
- Observe the hitch for wear, corrosion, and cracks before coupling. Replace worn, corroded or cracked hitch components before coupling the trailer to the tow vehicle.
- Be sure the hitch components are tight before coupling the trailer to the tow vehicle.

WARNING

An improperly coupled trailer can result in death or serious injury.

DO NOT move the trailer until:

- The coupler is secured and locked to the hitch.
- The safety chains are secured to the tow vehicle.
- The trailer jacks are fully retracted.

DO NOT tow the trailer on the road until:

- Tires and wheels are checked.
- The trailer brakes are checked.
- The breakaway switch is connected to the tow vehicle.
- The load is secured to the trailer.
- The trailer lights are connected and checked.

WARNING

Use of a hitch with a load rating less than the load rating of the trailer can result in loss of control and may lead to death or serious injury.

Use of a tow vehicle with a towing capacity less than the load rating of the trailer can result in loss of control, and may lead to death or serious injury.

Be sure your hitch and tow vehicle are rated for the Gross Vehicle Weight Rating of your trailer.

INOPERABLE BRAKES, LIGHTS OR MIRRORS

Be sure that the brakes and all of the lights on your trailer are functioning properly before towing your trailer. Check the trailer tail lights by turning on your tow vehicle headlights. Check the trailer brake lights by having someone step on the tow vehicle brake pedal while you look at the trailer lights. Do the same thing to check the turn signal lights. See Trailer Wiring Diagram section in this manual.

Standard mirrors usually do not provide adequate visibility for viewing traffic to the sides and rear of a towed trailer. You must provide mirrors that allow you to safely observe approaching traffic.

WARNING

Improper electrical connection between the tow vehicle and the trailer will result in inoperable lights and can lead to collision.

Before each tow, check that the tail lights, brake lights, and turn signals work properly.

TRAILER TOWING TIPS

Driving a vehicle with a trailer in tow is vastly different from driving the same vehicle without a trailer in tow. Acceleration, maneuverability, and braking are all diminished with a trailer in tow.

When towing a trailer, it takes longer to get up to speed, more room is needed to turn and pass, and more distance is needed to stop. You will need to spend time adjusting to the different feel and maneuverability of the tow vehicle with a loaded trailer.

Because of the significant differences in all aspects of maneuverability when towing a trailer, the hazards and risks of injury are also much greater than when driving without a trailer. You are responsible for keeping your vehicle and trailer in control, and for all the damage that is caused if you lose control of your vehicle and trailer.

As you did when learning to drive an automobile, find an open area with little or no traffic for your first practice trailering. Of course, before you start towing the trailer, you must follow all of the instructions for inspection, testing, loading, and coupling. Also, before you start towing, adjust the mirrors so you can see the trailer as well as the area to the rear of it.

Drive slowly at first, 5 mph or so, and turn the wheel to get the feel of how the tow vehicle and trailer combination responds. Next, make some right- and left-hand turns. Watch in your side mirrors to see how the trailer follows the tow vehicle. Turning with a trailer attached requires more room.

Stop the rig a few times from speeds no greater than 10 mph. If your trailer is equipped with brakes, try using different combinations of trailer brake and tow vehicle brake. Note the effect that the trailer brakes have when they are the only brakes used. When properly adjusted, the trailer brakes will come on just before the tow vehicle brakes.

It will take practice to learn how to back up a tow vehicle with a trailer attached. Take it slow. Before backing up, get out of the tow vehicle and look behind the trailer to make sure that there are no obstacles.

Some drivers place their hands at the bottom of the steering wheel, and while the tow vehicle is in reverse, “think” of the hands as being on the top of the wheel. When the hands move to the right (counterclockwise, as you would do to turn the tow vehicle to the left when moving forward), the rear of the trailer moves to the right. Conversely, rotating the steering wheel clockwise with your hands at the bottom of the wheel will move the rear of the trailer to the left while backing up.

If you are towing a bumper hitch rig, be careful not to allow the trailer to turn too much because it will hit the rear of the tow vehicle. To straighten the rig, either pull forward or turn the steering wheel in the opposite direction.

⚠ CAUTION

For hydraulic brake models, **ALWAYS** ensure that backing up is done in a slow, straight, and steady manner to safeguard the brakes from locking up.

TRAILER VIN TAG

Figure A below shows a sample of the **Vehicle Identification Number (VIN) Tag** which is typically located on the left front of the trailer. See Figure B for location.

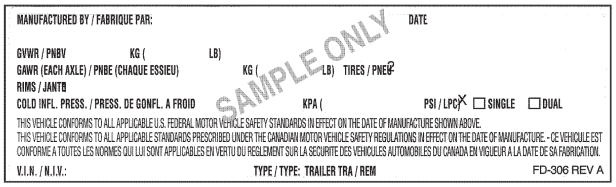


Figure A. Vehicle VIN Tag

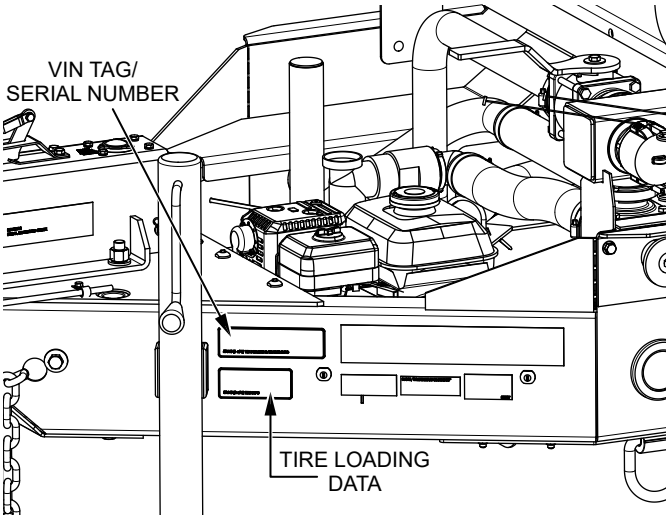


Figure B. Typical VIN Tag Location

The trailer VIN Tag contains the following critical safety information for the use of your trailer.

GAWR: The maximum gross weight that an axle can support. It is the lowest out of the axle, wheel, or tire ratings.

Usually, the tire or wheel rating is lower than the axle rating, and determines GAWR.

GVWR: The maximum allowable gross weight of the trailer and its contents. The gross weight of the trailer includes the weight of the trailer and all of the items within it. GVWR is sometimes referred to as GTWR (Gross Trailer Weight Rating), or MGTW (Maximum Gross Trailer Weight). GVWR, GTWR and MGTW are all the same rating.

The sum total of the GAWR for all trailer axles may be less than the GVWR for the trailer, because some of the trailer load is to be carried by the tow vehicle, rather than by the trailer axle(s). The total weight of the cargo and trailer must not exceed the GVWR, and the load on an axle must not exceed its GAWR.

PSIC: The tire pressure (PSI) as measured when cold.

VIN: The Vehicle Identification Number.

EMPTY WEIGHT: Some information that comes with the trailer (such as the Manufacturer's Statement of Origin) is not a reliable source for "empty" or "net" weight. The shipping documents list average or standard weights and your trailer may be equipped with options.

To determine the "empty" or "net" weight of your trailer, weigh it on an axle scale. To find the weight of the trailer using an axle scale, you must know the axle weights of your tow vehicle without the trailer coupled. Some of the trailer weight will be transferred from the trailer to the tow vehicle axles, and an axle scale weighs all axles, including the tow vehicle axles.

SERIAL NUMBER: The last five (5) numbers of the VIN Number are the Water Trailer Serial Number.

TOW VEHICLE

The towing hitch attached to your tow vehicle must have a capacity equal to or greater than the load rating of the trailer you intend to tow. The hitch capacity must also be matched to the tow vehicle capacity. Your vehicle dealer can provide and install the proper hitch on your tow vehicle.

SUSPENSION SYSTEM

Sway bars, shock absorbers, heavy-duty springs, heavy-duty tires, and other suspension components may be required to sufficiently tow the trailer and pump.

BRAKE CONTROLLER

For trailers equipped with electric brakes, the electric brake controller is part of the tow vehicle and is essential in the operation of the electric brakes on the trailer. The brake controller is not the same as the safety breakaway brake system that may be equipped on the trailer.

SIDE-VIEW MIRRORS

The size of the trailer that is being towed and your state law regulations determine the size of the mirrors. However, some states prohibit extended mirrors on a tow vehicle, except while a trailer is actually being towed. In this situation, detachable extended mirrors are necessary. Check with your dealer or the appropriate state agency for mirror requirements.

HEAVY-DUTY FLASHER

A heavy-duty flasher is an electrical component that may be required when your trailer turn signal lights are attached to the tow vehicle flasher circuit.

ELECTRICAL CONNECTOR

An electrical connector connects the light and brake systems on the trailer to the light and brake controls on the towing vehicle.

EMERGENCY FLARES AND TRIANGLE REFLECTORS

It is wise to carry these warning devices even if you are not towing a trailer. It is particularly important to have these when towing a trailer because the hazard flashers of your towing vehicle will not operate for as long a period of time when the battery is running both the trailer lights and tow vehicle lights.

SAFETY CHAINS

If the coupler connection comes loose, the safety chains can keep the trailer attached to the tow vehicle. With properly rigged safety chains, it is possible to keep the tongue of the trailer from digging into the road pavement, even if the coupler-to-hitch connection comes apart.

TRAILER LIGHTING AND BRAKING CONNECTOR

A trailer lighting and braking connector is a device that connects electrical power from the tow vehicle to the trailer. Electricity is used to turn on brake lights, running lights, and turn signals as required. In addition, if your trailer has a separate braking system, the electrical connector will also supply power to the brakes from the tow vehicle.

BREAKAWAY SYSTEM

If the trailer coupler connection comes loose, the breakaway system can actuate emergency hydraulic brakes depending on the type of actuator on the trailer. The breakaway cable must be rigged to the tow vehicle with appropriate slack that will activate the system if the coupler connection comes loose.

JACKSTAND

A jackstand is a device on the trailer that is used to raise and lower the coupler. The jack is sometimes called the “landing gear” or the “tongue jack.”

COUPLER TYPES

Three types of couplers are available.

- Ball Hitch Coupler, 2" (P/N 29228)
- Ball Hitch Coupler, 2-5/16" (P/N EE43253)
- Pintle Eye Coupler, 3" (P/N 29369)
- Ball Hitch Bulldog, 2-5/16" (P/N EE56638)

BALL HITCH COUPLER

A **ball hitch coupler** (Figure C) connects to a ball that is located on or under the rear bumper of the tow vehicle. This system of coupling a trailer to a tow vehicle is sometimes referred to as “bumper pull.”

A ball hitch trailer may be fitted with a tongue jack that can raise and lower the coupler. The tongue jack is mounted to the A-frame (front or tongue) part of the trailer. By rotating the jack handle clockwise, the jack will extend and raise the tongue of the trailer.

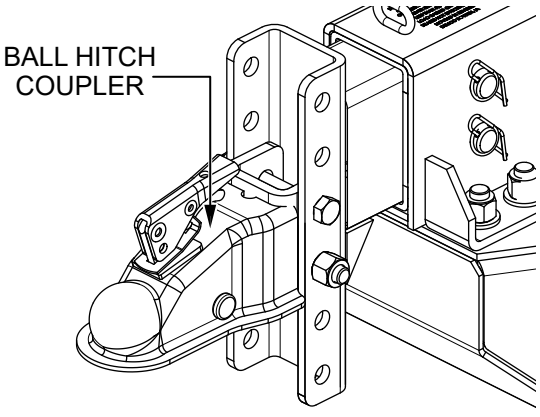


Figure C. Ball Hitch Coupler

Before each tow, coat the ball with a thin layer of automotive bearing grease to reduce wear and ensure proper operation. Check the locking device that secures the coupler to the ball for proper operation.

If you see or feel evidence of wear on the ball or coupler, such as flat spots, deformations, pitting or corrosion, immediately have your dealer inspect them to determine the proper action to prevent possible failure of the ball and coupler system. All bent or broken coupler parts must be replaced before towing the trailer.

The coupler handle lever must be able to rotate freely and automatically snap into the latched position. Oil the pivot points, sliding surfaces, and spring ends with SAE 30W motor oil. Keep the ball socket and latch mechanism clean. Dirt or contamination can prevent proper operation of the latching mechanism.

The load rating of the coupler and the necessary ball size are listed on the trailer tongue. You must provide a hitch and ball for your tow vehicle where the load rating of the hitch and ball is equal to or greater than that of your trailer.

Also, the ball size must be the same as the coupler size. If the hitch ball is too small, too large, is underrated, is loose, or is worn, the trailer can come loose from the tow vehicle and may cause death or serious injury.

The tow vehicle, hitch, and ball must have a rated towing capacity equal to or greater than the trailer Gross Vehicle Weight Rating (GVWR). It is essential that the hitch ball be of the same size as the coupler.

The ball size and load rating (capacity) are marked on the ball. Hitch capacity is marked on the hitch.

⚠ WARNING

Coupler-to-hitch mismatch can result in uncoupling, leading to death or serious injury.

Be sure the LOAD RATING of the hitch ball is equal to or greater than the load rating of the coupler.

Be sure the SIZE of the hitch ball matches the size of the ball coupler.

⚠ WARNING

A worn, cracked or corroded hitch ball can fail while towing and may result in death or serious injury.

Before coupling trailer, inspect the hitch ball for wear, corrosion and cracks.

Replace worn or damaged hitch ball.

⚠ WARNING

A loose hitch-ball nut can result in uncoupling, leading to death or serious injury.

Be sure the hitch ball is tight to the hitch before coupling the trailer.

- Rock the ball to make sure it is tightened to the hitch, and visually check that the hitch-ball nut is solid against the lock washer and hitch frame.
- Wipe the inside and outside of the coupler. Clean and visually inspect it for cracks and deformations. Feel the inside of the coupler for worn spots and pits.
- Be sure the coupler is secured tightly to the tongue of the trailer. All coupler fasteners must be visibly solid against the trailer frame.
- The bottom surface of the coupler must be above the top of the hitch ball. Use the tongue jackstand to support the trailer tongue. Wood or concrete blocks may also be used.

Coupling The Trailer To The Tow Vehicle (Ball Coupler)

- Lubricate the hitch ball and the inside of the coupler with a thin layer of automotive bearing grease.
- Slowly back up the tow vehicle so that the hitch ball is near to or aligned under the coupler.
- Using the jackstand at the front of the trailer (tongue), turn the jackstand crank handle to raise the trailer. If the ball coupler does not line up with the hitch ball, adjust the position of the tow vehicle.
- Open the coupler locking mechanism. Ball couplers have a locking mechanism with an internal moving piece and an outside handle. In the open position, the coupler is able to drop fully onto the hitch ball.

- Lower the trailer (Figure D) until the coupler fully engages the hitch ball.

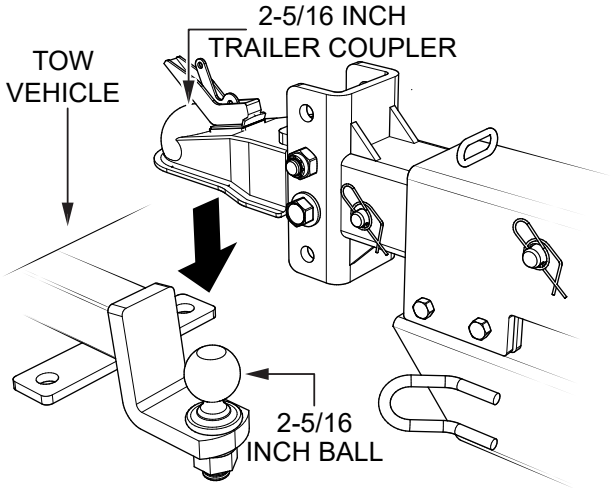


Figure D. Ball Hitch Coupling Mechanism

- Engage the coupler locking mechanism. In the engaged position, the locking mechanism securely holds the coupler to the hitch ball.
- Insert a pin or lock through the hole in the locking mechanism.
- Be sure the coupler is all the way on the hitch ball and the locking mechanism is engaged. A properly engaged locking mechanism will allow the coupler to raise the rear of the tow vehicle. Using the trailer jackstand, verify that you can raise the rear of the tow vehicle by one inch after the coupler is locked to the hitch.
- Lower the trailer so that its entire tongue weight is held by the hitch.
- Raise the jackstand to a height where it will not interfere with the road.

NOTICE

Overloading can damage the tongue jack. **DO NOT** use the tongue jack to raise the tow vehicle more than one inch.

If the coupler cannot be secured to the hitch ball, do not tow the trailer. Call your dealer for assistance. Lower the trailer so that its entire tongue weight is held by the hitch and continue retracting the jack to its fully retracted position.

Attaching Safety Chains

Visually inspect the safety chains and hooks for wear or damage. Replace worn or damaged safety chains and hooks before towing.

Attach the safety chains so that they:

- Cross underneath the coupler. See Figure E.

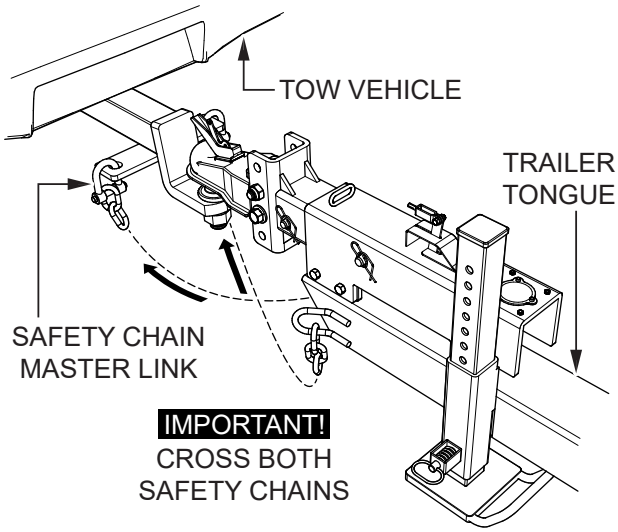


Figure E. Attaching Safety Chain (Ball Hitch)

- Loop around a frame member of the tow vehicle or holes provided in the hitch system. (**DO NOT** attach them to an interchangeable part of the hitch assembly.)
- Have enough slack to permit tight turns, but not be close to the road surface, so if the trailer uncouples, the safety chains can hold the tongue up above the road.

⚠ WARNING

Improper rigging of the safety chains can result in loss of control of the trailer and tow vehicle, leading to death or serious injury, if the trailer uncouples from the tow vehicle.

- Fasten chains to frame of tow vehicle. **DO NOT** fasten chains to any part of the hitch unless the hitch has holes or loops specifically for that purpose.
- Cross chains underneath hitch and coupler with enough slack to permit turning and to hold tongue up, if the trailer comes loose.

Breakaway Brake System

If the coupler or hitch fails, a properly connected and working breakaway brake system (Figure F) will apply the hydraulic brakes on the trailer. The safety chains will keep the tow vehicle attached and as the brakes are applied at the trailer's axles, the trailer/tow vehicle combination will come to a controlled stop.

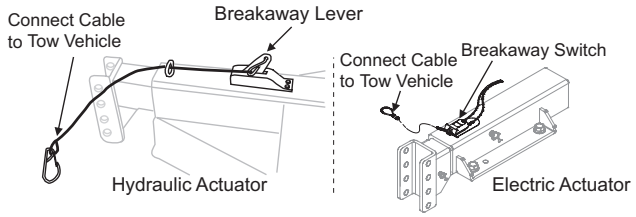


Figure F. Breakaway Brake System

Breakaway Cable Surge Brake System

The breakaway brake system includes a brake cable connected to the tow vehicle on one end and to the emergency brake lever located on the hydraulic actuator on the other end.

⚠ WARNING

- An ineffective breakaway brake system can result in a runaway trailer, leading to death or serious injury, if the coupler or ball hitch fails.
- Connect the breakaway cable to the tow vehicle and NOT to the hitch, ball or support.
- Before towing the trailer, test the function of the breakaway brake system. If the breakaway brake system is not working, **DO NOT** tow the trailer. Have it serviced or repaired.

NOTICE

DO NOT tow the trailer with the breakaway brake system ON because the brakes will overheat which can result in permanent brake failure.

NOTICE

Replace the breakaway brake battery (if equipped) at intervals specified by the manufacturer.

Connecting Trailer Lights

Connect the trailer lights to the tow vehicle's electrical system using the electrical connectors at the front of the trailer (tongue). Refer to the wiring diagram shown in the trailer wiring diagram section of this manual. Before towing the trailer check for the following:

- Running Lights (turn on tow vehicle headlights).
- Brake Lights (step on tow vehicle brake pedal).
- Backup Lights (place tow vehicle gear shift in reverse).
- Turn Signals (activate tow vehicle directional signal lever).

⚠ WARNING

Improper electrical connection between the tow vehicle and the trailer will result in inoperable lights and electric brakes, and can lead to collision.

Before each tow:

- Check that the tail lights, brake lights, and turn signals work.
- Check that the electric brakes work by operating the brake controller inside the tow vehicle.

Uncoupling The Ball Hitch

Follow these steps to uncouple the ball hitch from the tow vehicle:

- To prevent the trailer from rolling, block trailer tires before jacking the trailer up.
- Disconnect the electrical connector.
- Disconnect the breakaway brake switch cable. Promptly replace the pullpin in the switchbox.
- Before extending the jackstand, make certain the ground surface below the jackstand foot will support the tongue load.
- Rotate the jackstand handle (or crank) clockwise. This will slowly extend the jack and transfer the weight of the trailer tongue to the jack.

PINTLE EYE COUPLER

A **pintle eye coupler** (Figure G) connects to a pintle-hook hitch that is located on or under the rear bumper of the tow vehicle. This system of coupling a trailer to a tow vehicle is sometimes referred to as a "lunette eye," "tow ring," or "G.I. hitch."

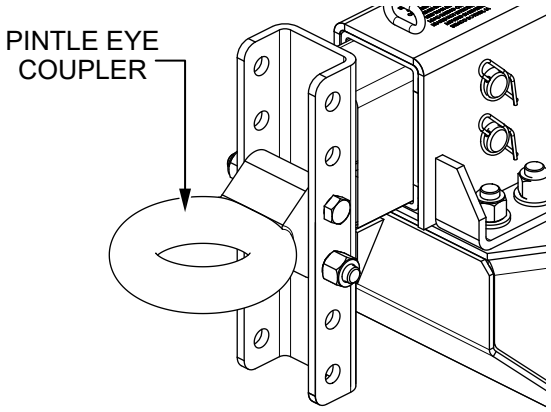


Figure G. Pintle Eye Coupler

A pintle hitch trailer may be fitted with a tongue jackstand that can raise and lower the coupler. The tongue jack is mounted to the A-frame (front or tongue) part of the trailer. By rotating the jack handle clockwise, the jack will extend and raise the tongue of the trailer.

The load rating of the coupler and the necessary pintle hitch size are listed on the trailer tongue. You must provide a pintle hitch and pintle coupler for your tow vehicle, where the load rating of the pintle hitch and pintle coupler is equal to or greater than that of your trailer.

Also, the pintle hitch size must be the same as the pintle coupler size. If the hitch is too small, too large, underrated, loose, or worn, the trailer can come loose from the tow vehicle, and may cause death or serious injury.

Pintle Coupler And Pintle Hook

Before each tow, check the locking device that secures the coupler to the pintle hook assembly.

The pintle hook lever must be able to operate freely and automatically snap into place in the latched position. Lightly oil the pivot points and sliding surfaces with SAE 30W motor oil to prevent rust and to help ensure proper operation of the latching mechanism.

If you see or feel evidence of wear, such as flat spots, deformations, pitting, or corrosion on the pintle hook or coupler, immediately have your dealer inspect them to determine the proper action to prevent possible failure of the hook and coupler system. All bent or broken coupler parts must be replaced before towing the trailer.

The tow vehicle, pintle hitch and pintle coupler must have a rated towing capacity equal to or greater than the Trailer Gross Vehicle Weight Rating (GVWR).

It is essential that the pintle hitch be of the same size as the pintle coupler.

The coupler size and load rating (capacity) are marked on the coupler. Hitch capacity is marked on the hitch.

⚠ WARNING

Coupler-to-hitch mismatch can result in uncoupling, leading to death or serious injury.

Be sure the LOAD RATING of the pintle hitch hook is equal to or greater than the load rating of the pintle eye coupler.

Be sure the SIZE of the pintle hitch hook matches the size of the pintle eye coupler.

⚠ WARNING

A worn, cracked or corroded pintle hitch hook can fail while towing, and may result in death or serious injury.

Before coupling trailer, inspect the pintle hitch hook for wear, corrosion, and cracks.

Replace a worn or damaged pintle hitch hook.

- Rock the pintle eye coupler to make sure it is secured tightly to the hitch.
- Wipe the inside and outside of the pintle coupler. Clean and inspect it visually for cracks and deformations. Feel the inside of the coupler for worn spots and pits.
- Be sure the coupler is secured tightly to the tongue of the trailer. All coupler fasteners must be visibly solid against the trailer frame.
- Raise the bottom surface of the coupler to be above the top of the pintle hitch hook. Use the tongue jackstand to support the trailer tongue. Wood or concrete blocks may also be used.

⚠ WARNING

A defective pintle hitch not properly fastened can result in uncoupling, leading to death or serious injury.

Be sure the pintle hook is securely tightened to the tow vehicle before coupling the trailer.

Coupling Trailer To Tow Vehicle (Pintle Coupler)

- Slowly back up the tow vehicle so that the pintle hitch hook is near to or aligned under the pintle eye ring coupler.
- Using the jackstand at the front of the trailer (tongue), turn the jackstand crank handle to raise the trailer. If the pintle eye coupler does not line up with the pintle hitch hook, adjust the position of the tow vehicle.
- OPEN the pintle hook locking mechanism (Figure H). Place the hook inside the eye coupler. CLOSE the pintle hook mechanism.

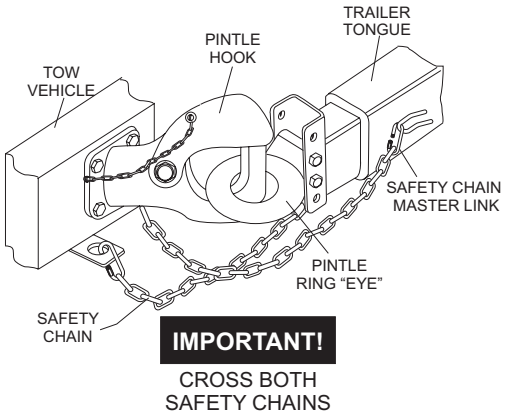


Figure H. Attaching Safety Chain (Pintle Hitch)

- Insert a pin or lock through the hole in the locking mechanism.
- Be sure the pintle hook is inserted completely through the eye ring and the locking mechanism is engaged. A properly engaged locking mechanism will allow the coupler to raise the rear of the tow vehicle. Using the trailer jack, test to see that you can raise the rear of the tow vehicle by one inch after the coupler is locked to the hitch.
- Lower the trailer so that its entire tongue weight is held by the hitch.
- Raise the jackstand to a height where it will not interfere with the road.

TIRE SAFETY

Unsafe Tires, Lug Nuts, Or Wheels

Trailer tires and wheels are more likely to fail than car tires and wheels because they carry a heavier load. Therefore, it is essential to inspect the trailer tires before each tow.

If a tire has a bald spot, bulge, cuts, is showing any cords, or is cracked, replace the tire before towing. If a tire has uneven tread wear, take the trailer to a dealer service center for diagnosis.

Uneven tread wear can be caused by tire imbalance, axle misalignment or incorrect inflation.

Tires with too little tread will not provide adequate tracking on wet roadways and can result in loss of control, leading to death or serious injury.

Improper tire pressure causes an unstable trailer and can result in a tire blowout and loss of control. Therefore, before each tow you must also check the tire pressure. Tire pressure must be checked when tires are cold.

Allow 3 hours cool-down after driving as much as 1 mile at 40 mph before checking tire pressure. Trailer tires will be inflated to higher pressures than passenger vehicle tires.

Since trailer wheels and lug nuts (or bolts) are subjected to greater side loads than automobile wheels, they are more prone to loosen. Before each tow, check to make sure they are tight.

The proper tightness (torque) for lug nuts is listed in the lug nut tightening section of this manual. Use a torque wrench to tighten the lug nuts. If you do not have a torque wrench, use a lug wrench (from your tow vehicle) and tighten the nuts as much as you can. Then have a service garage or trailer dealer tighten the lug nuts to the proper torque.

⚠ WARNING

Metal creep between the wheel rim and lug nuts will cause the rim to loosen and could result in a wheel coming off, leading to death or serious injury.

Tighten lug nuts before each tow.

Lug nuts are also prone to loosen after first being assembled. When driving a new trailer (or after wheels have been remounted), check to make sure they are tight after the first 10, 25, and 50 miles of driving and before each tow thereafter.

Failure to perform this check can result in a wheel parting from the trailer and a crash, leading to death or serious injury.

WARNING

Lug nuts are prone to loosen after initial installation, which can lead to death or serious injury.

Check lug nuts for tightness on a new trailer or when wheel(s) have been remounted after the first 10, 25, and 50 miles of driving.

WARNING

Improper lug nut torque can cause a wheel to part from the trailer, leading to death or serious injury.

Be sure lug nuts are tight before each tow.

WARNING

Improper tire pressure can result in a blowout and loss of control, which can lead to death or serious injury.

Be sure tires are inflated to pressure indicated on side wall before towing trailer.

Determining Load Limit Of Trailer

Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a federal certification/VIN label that is located on the forward half of the left (road) side of the unit. This certification/VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most the axle can weigh.

There is a vehicle placard (Figure I) located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity.

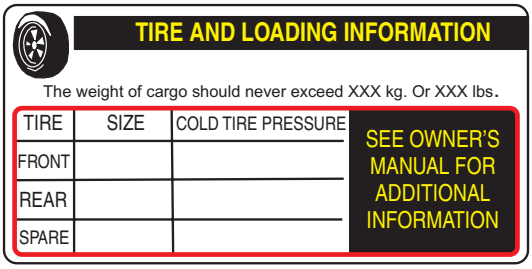


Figure I. Trailer Tire Placard

If additional work items (hoses, tools, clamps, etc.) are going to be added to the trailer, be sure they are distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification/VIN label and/or on the Tire and Loading Information placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

Perform the following steps to determine the load limit of your trailer.

Step 1.

Locate the statement, "The weight of cargo should never exceed XXX kg or XXX lbs.," on your vehicle's Tire and Loading Information placard (Figure I). This value equals the available amount of equipment load capacity.

Step 2.

Determine the weight of the equipment being loaded on the tow vehicle. That weight may not safely exceed the available equipment load capacity. The trailer's Tire Information Placard is attached adjacent to or near the trailer's VIN (Certification) label at the left front of the trailer (See Figure I).

Determining Load Limit Of Tow Vehicle

Step 1.

Locate the statement, "The combined weight of occupants and cargo should never exceed XXX lbs.," on your vehicle's placard.

Step 2.

Determine the combined weight of the driver and passengers who will be riding in your vehicle.

Step 3.

Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.

Step 4.

The resulting figure equals the available amount of cargo and luggage capacity. For example, if the "XXX" amount equals 1,400 pounds and there will be five 150-pound passengers in your vehicle, the amount of available cargo and luggage capacity is 650 pounds. 1,400 – 750 (5 × 150) = 650 pounds.

Step 5.

Determine the combined weight of luggage and cargo being loaded onto the vehicle. That weight may not safely exceed the available cargo and luggage capacity calculated in Step 4.

If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle's manual to determine how this weight transfer reduces the available cargo and luggage capacity of your vehicle.

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards, and inspecting tires for cuts, slashes and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling.
- Help protect you and others from avoidable breakdowns and accidents.
- Improve fuel economy.
- Increase tire life.

Use the information contained in this section to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

TIRE FUNDAMENTALS

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires (Figure J). This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

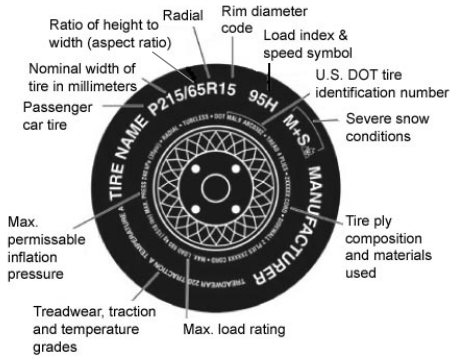


Figure J. Standard Tire Sidewall Information

P: The "P" indicates the tire is for passenger vehicles.

Next number: This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Next number: This two-digit number, known as the aspect ratio, gives the tire's ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

P: The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 40 years.

Next number: This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

Next number: This two- or three-digit number is the tire's load index. It is a measurement of how much weight each tire can support. You may find this information in your owner's manual. If not, contact a local tire dealer. Note: You may not find this information on all tires because it is not required by law.

M+S: The "M+S" or "M/S" indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

Speed Rating: The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed in Table A. Note: You may not find this information on all tires because it is not required by law.

Table A. Speed Rating

Letter Rating	Speed Rating
Q	99 mph
R	106 mph
S	112 mph
T	118 mph
U	124 mph
H	130 mph
V	149 mph
W	168* mph
Y	186* mph

U.S. DOT Tire Identification Number: This begins with the letters "DOT" and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the number 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer's discretion. This information is used to contact consumers if a tire defect requires a recall.

Tire Ply Composition and Materials Used: The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

Maximum Load Rating: This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

Maximum Permissible Inflation Pressure: This number is the greatest amount of air pressure that should ever be put into the tire under normal driving conditions.

Uniform Tire Quality Grading Standards (UTQGS)

Treadwear Number: This number indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter: This letter indicates a tire's ability to stop on wet pavement. A higher-graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA," "A," "B," and "C."

Temperature Letter: This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, underinflation, or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A," "B," or "C."

Refer to Figure K for additional tire information for light trucks.

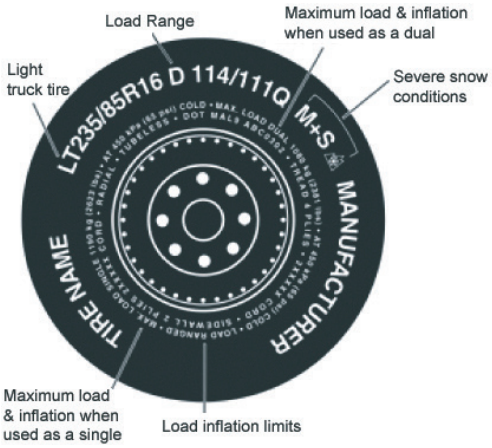


Figure K. UTQGS Tire Information

Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.

LT: The "LT" indicates the tire is for light trucks or trailers.

ST: An "ST" is an indication the tire is for trailer use only.

Max. Load Dual kg (lbs.) at kPa (psi) Cold: This information indicates the maximum load and tire pressure when the tire is used as a dual — that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

Max. Load Single kg (lbs.) at kPa (psi) Cold: This information indicates the maximum load and tire pressure when the tire is used as a single.

Load Range: This information identifies the tire's load-carrying capabilities and its inflation limits.

Tire Safety Tips

- Slow down if you have to go over a pothole or other object in the road.
- **DO NOT** run over curbs or other foreign objects in the roadway, and try not to strike the curb when parking.
- Check tire inflation pressure weekly during use to ensure maximum tire life and tread wear.
- **DO NOT** bleed air from tires when they are hot.
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.
- Remove bits of glass and foreign objects wedged in the tread.
- Make sure your tire valves have valve caps.
- **ALWAYS** check tire pressure on tow vehicle and trailer before towing. Check tire pressure at least once a month.
- **DO NOT** overload tow vehicle. Check the tire information and loading placard for safe allowable tire loading conditions.

Tire Repair

The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

Replacing Worn Or Damaged Tires

Replace the tire before towing the trailer if the tire treads have less than 1/16-inch depth or the telltale bands are visible. Check inflation pressure weekly during use to ensure maximum tire life and tread wear. A bubble, cut or bulge in a side wall can result in a tire blowout. Inspect both side walls of each tire for any bubble, cut or bulge, and replace a damaged tire before towing the trailer.

NOTICE

NEVER use a pneumatic air gun to tighten wheel lug nuts.

Over-tightening lug nuts will result in breaking the studs or permanently deforming the mounting stud holes in the wheels.

Table B below will help pinpoint the causes and solutions of tire wear problems.

Table B. Tire Wear Troubleshooting

Wear Pattern		Cause	Solution
	Center Wear	Over inflation.	Adjust pressure to particular load per tire manufacturer.
	Edge Wear	Under inflation.	Adjust pressure to particular load per tire manufacturer.
	Side Wear	Loss of camber or overloading.	Make sure load does not exceed axle rating. Align wheels.
	Toe Wear	Incorrect toe-in.	Align wheels.
	Cupping	Out of balance.	Check bearing adjustment and balance tires.
	Flat Spots	Wheel lockup and tire skidding.	Avoid sudden stops when possible and adjust brakes.

WARNING



ALWAYS wear safety glasses when removing or installing force-fitted parts. **DO NOT** attempt to repair or modify a wheel. **DO NOT** install an inner-tube to correct a leak through the rim. If the rim is cracked, the air pressure in the inner tube may cause pieces of the rim to explode (break off) with great force and cause serious eye or bodily injury.

Wheel Rims

If the trailer has been struck, or impacted, on or near the wheels, or if the trailer has struck a curb, inspect the rims for damage (i.e. being out of round), and replace any damaged wheel. Inspect the wheels for damage every year, even if no obvious impact has occurred.

Wheels, Bearings And Lug Nuts

A loose, worn or damaged wheel bearing is the most common cause of brakes that grab.

To check wheel bearings, jack the trailer and check wheels for side-to-side looseness. If the wheels are loose, or spin with a wobble, the bearings must be serviced or replaced. Check inflation pressure weekly during use to ensure maximum tire life and tread wear. Most trailer axles are built with sealed bearings that are not serviceable. Sealed bearings must be replaced as complete units.

⚠ WARNING

Lug nuts are prone to loosen after initial installation, which can lead to death or serious injury. Check all wheel lug nuts periodically.

Lug Nut Torque Requirements

It is extremely important to apply and maintain proper wheel mounting torque on the trailer. Be sure to use only the fasteners matched to the cone angle of the wheel. Proper procedure for attachment of the wheels is as follows:

1. Start all wheel lug nuts by hand.
2. Torque all lug nuts in sequence. See Figure L. **DO NOT** torque the wheel lug nuts all the way down. Tighten each lug nut in 3 separate passes as defined by Table C.
3. Check to see if the lug nuts are tight after the first 10, 25, and 50 miles of driving and before each tow thereafter.

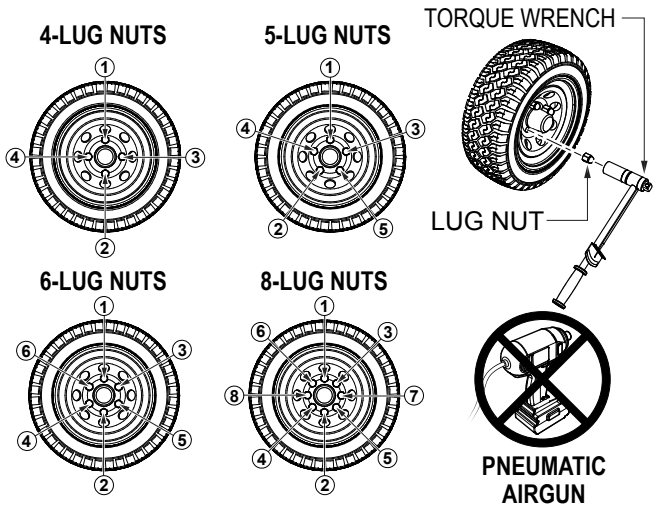


Figure L. Wheel Lug Nuts Tightening Sequence

Table C. Tire Torque Requirements			
Wheel Size	First Pass lbf·ft	Second Pass lbf·ft	Third Pass lbf·ft
12"	20–25	35–40	50–65
13"	20–25	35–40	50–65
14"	20–25	50–60	90–120
15"	20–25	50–60	90–120
16"	20–25	50–60	90–120

Lights And Signals

Before each tow, check the trailer tail lights, stop lights, turn signals, and any clearance lights for proper operation.

Replace any broken or burned-out lamps as necessary. Check the wire harness for cuts, fraying or other damage. If it needs replacing, contact your dealer.

⚠ WARNING

Improperly operating tail lights, stop lights, or turn signals can cause collisions.

Check all lights before each tow.

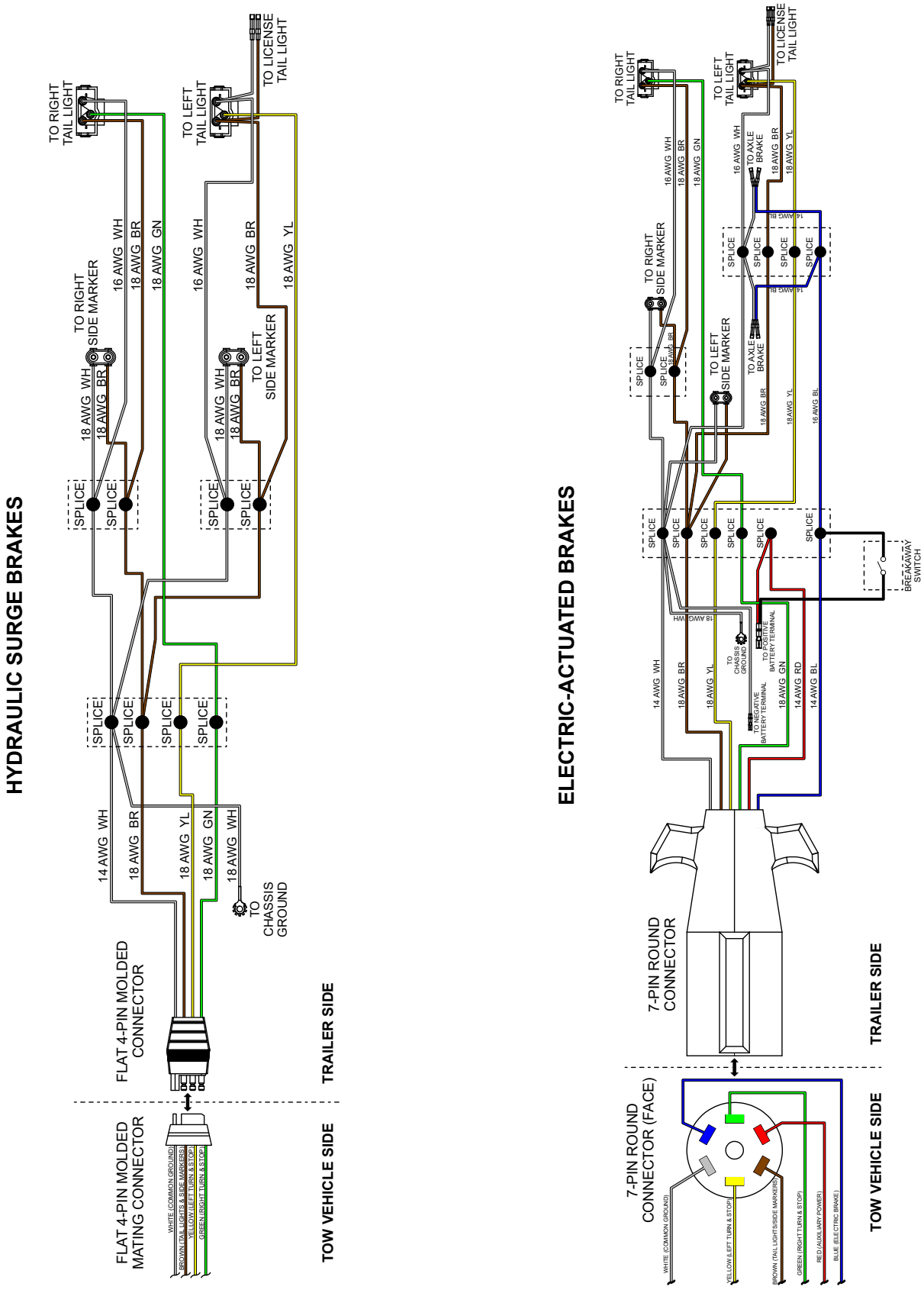


Figure M. Trailer To Tow Vehicle Wiring Diagram

Troubleshooting (Pump)		
Symptom	**Possible Problem**	**Solution**
Pump does not take in water.	Not enough priming water in the housing?	Add water.
	Engine speed too low?	Increase throttle.
	Strainer plugged?	Clean strainer.
	Suction hose damaged?	Replace or repair hose and clamps.
	Air leak at suction port?	Check that fittings are tight and properly sealed.
	Pump is located too high above water line?	Move pump closer to water.
	Debris collecting in pump housing?	Clean pump housing.
	Too much distance between impeller and volute?	Adjust clearance by adding shims or replace impeller. Min. 0.006" – Max. 0.020"
	Water leaking out weep hole between pump and engine?	Check condition of mechanical seal and gaskets between pump end and engine housing.
Pump takes in water, little or no discharge.	Engine speed too low?	Increase throttle speed.
	Suction strainer partially plugged?	Clean strainer.
	Impeller/volute worn?	Adjust clearance by adding shims or replace impeller/volute.
Suction hose leaks at inlet.	Fittings/clamps are not sealed properly?	Tighten, replace or add clamp. (Keep extra seals on pump).
	Hose diameter is too large?	Use smaller diameter hose or replace hose.
Discharge does not stay on coupling.	Pressure too high?	Check pressure, add additional clamp.
	Hose kinked or end blocked?	Check hose.
Impeller does not turn; pump is hard to start.	Impeller jammed or blocked?	Open pump cover and clean dirt and debris from inside housing.
	Impeller and volute binding?	Adjust clearance by removing shim from behind impeller.
	Defective engine?	See engine owner's manual.

Troubleshooting (Engine)		
Symptom	**Possible Problem**	**Solution**
Difficult to start, fuel is available, but no spark at spark plug.	Spark plug bridging?	Check gap, insulation or replace spark plug.
	Carbon deposit on spark plug?	Clean or replace spark plug.
	Short circuit due to deficient spark plug insulation?	Check spark plug insulation, replace if worn.
	Improper spark plug gap?	Set to proper gap.
	Spark plug is red?	Check transistor ignition unit.
	Spark plug is bluish white?	If insufficient compression, repair or replace engine. If injected air leaking, correct leak. If carburetor jets clogged, clean carburetor.
	No spark present at tip of spark plug?	Check if transistor ignition unit is broken, and replace defective unit. Check if voltage cord cracked or broken and replace. Check if spark plug is fouled and replace.
	No oil?	Add oil as required.
	Oil pressure alarm lamp blinks upon starting? (if applicable)	Check automatic shutdown circuit, oil sensor. (if applicable)
Difficult to start, fuel is available, and spark is present at the spark plug.	ON/OFF switch is shorted?	Check switch wiring, replace switch.
	Ignition coil defective?	Replace ignition coil.
	Improper spark gap, points dirty?	Set correct spark gap and clean points.
	Condenser insulation worn or short circuiting?	Replace condenser.
	Spark plug wire broken or short circuiting?	Replace defective spark plug wiring.
Difficult to start, fuel is available, spark is present and compression is normal.	Wrong fuel type?	Flush fuel system, replace with correct type of fuel.
	Water or dust in fuel system?	Flush fuel system.
	Air cleaner dirty?	Clean or replace air cleaner.
	Choke open?	Close choke.
Difficult to start, fuel is available, spark is present and compression is low.	Suction/exhaust valve stuck or protruded?	Reseat valves.
	Piston ring and/or cylinder worn?	Replace piston rings and/or piston.
	Cylinder head and/or spark plug not tightened properly?	Torque cylinder head bolts and spark plug.
	Head gasket and/or spark plug gasket damaged?	Replace head and spark plug gaskets.
No fuel present at carburetor.	No fuel in fuel tank?	Fill with correct type of fuel.
	Fuel cock does not open properly?	Apply lubricant to loosen fuel cock lever, replace if necessary.
	Fuel filter/lines clogged?	Replace fuel filter.
	Fuel tank cap breather hole clogged?	Clean or replace fuel tank cap.
	Air in fuel line?	Bleed fuel line.

OPERATION MANUAL

HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL NUMBER ON-HAND WHEN CALLING

UNITED STATES

Multiquip Inc.

(310) 537- 3700
6141 Katella Avenue Suite 200
Cypress, CA 90630
E-MAIL: mq@multiquip.com
WEBSITE: www.multiquip.com

CANADA

Multiquip

(450) 625-2244
4110 Industriel Boul.
Laval, Quebec, Canada H7L 6V3
E-MAIL: infocanada@multiquip.com

UNITED KINGDOM

Multiquip (UK) Limited Head Office

0161 339 2223
Unit 2, Northpoint Industrial Estate, Globe Lane,
Dukinfield, Cheshire SK16 4UJ
E-MAIL: sales@multiquip.co.uk

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