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STEALTH ENTERPRISES LLC

STEALTH TRAILERS



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OWNER'S MANUAL



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Safety Information

Introduction

This operator's manual is intended for Stealth enclosed trailers. Read this manual before loading or towing your trailer and follow all the safety precautions and instructions. It contains safety information, instructions and warnings for protection against death and serious injuries, including loss of control of the trailer, and the trailer/tow vehicle combination.

Common causes of loss of control of your trailer include:

- Driving too fast for conditions
- Failure to properly couple the trailer to the hitch
- Inadequate tow vehicle or towing hitch
- Absence of braking on trailer
- Failure to maintain proper tire pressure
- Failure to keep lug nuts tight
- Overloading or uneven loading of the trailer
- Failure to properly maintain the trailer structure

This manual is not all-inclusive and may not provide all of the specific details necessary for the proper combination of trailer, tow vehicle and hitch that you have. Therefore, the trailer owner is responsible for reading, understanding and following the instructions of the towing vehicle and trailer hitch manufacturers, as well as the instructions of this manual.

Safety Information

I. Safety Information

- **Warning!**

The following signal word is used to indicate risk:



Hazards or unsafe practices that **COULD** result in severe personal injury or death if the warning is ignored.

- **Driving Too Fast**

The maximum speed that the trailer can be safely towed, under ideal conditions, is 60 miles per hour. Do not exceed the maximum towing speed while towing your Stealth trailer.



Driving too fast for conditions may result in loss of control and cause death or serious injury. Reduce your speed when towing a trailer.

- **Changed Handling With A Trailer**

When towing the trailer, you will have:

1. Slower acceleration
2. Increased stopping distance
3. Increased turning radius (watch the inside corner)
4. Longer distance to pass, due to slower acceleration
5. Increased vehicle length

Also, keep in mind the following information:

- Beware of slippery conditions. A tow-vehicle and trailer combination is more likely to be affected by slippery road surfaces than a tow vehicle without a trailer.
- Anticipate the trailer reaction to the air pressure wave caused by passing trucks and busses. This reaction is called “swaying”.
- Use rear view mirrors frequently to observe both the trailer behavior and traffic patterns.

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- Use a lower gear when going down steep or long grades. Do not ride the brakes, or they may overheat to the point of becoming ineffective. Use the engine and transmission as a brake.
- Keep the height of your trailer in mind, especially when approaching sheltered areas and when around trees.
- **Coupling of Trailer to Tow Vehicle**

A secure coupling, including the correct attachment of the safety chains, is vital. A loss of coupling may result in death or serious injury.



Coupler and hitch selection and condition are critical for safe towing. Uncoupling may result in death or serious injury.

- Make sure the hitch and ball are related for the trailer
- Make sure the hitch [ball size] matches the coupler.
- Check the hitch ball for wear, corrosion and cracks before coupling. Replace worn, corroded or cracked hitch ball before coupling the trailer.
- Make sure the hitch ball nut is tight before coupling the trailer.



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

Do NOT move the trailer until:

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

Do NOT tow the trailer on the road until:

- The trailer brakes are checked
- The breakaway switch is connected to the tow vehicle (if applicable)
- The trailer lights are connected

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- **Usage of Safety Chains and Breakaway Kit**

Safety Chains are provided so that control of the trailer can be maintained, even if the trailer becomes loose from the hitch. To be effective, safety chains must be in good condition and properly rigged.



Incorrect rigging of the safety chains may result in loss of control of the trailer and tow vehicle, leading to serious injury.

Safety Chains must:

- Fasten to the frame of tow vehicle, not to the trailer hitch or ball.
- Cross underneath the hitch and coupler with minimum slack to permit turning and to hold the tongue up, if the trailer comes loose.

Your trailer may be equipped with a breakaway brake system, in addition to having safety chains. This system will apply the brakes on your trailer, if the trailer comes loose from the hitch for any reason. To be effective, the breakaway brake system must be in good condition, and properly rigged.



An ineffective breakaway system can result in a runaway trailer, if the coupler or ball hitch fails, leading to death or serious injury.

- Test the function of the breakaway system before towing the trailer. Do not tow the trailer if the breakaway system is not working. Having it serviced or repaired.
- Connect the breakaway cable to the tow vehicle.
 - NOT to the safety chain.
 - NOT to the hitch, ball or support.

- **Mismatch Between Trailer and Hitch**



Use of an under-rated hitch, ball or tow vehicle may result in loss of control leading to death or serious injury. Make certain that your hitch and tow vehicle are rated for your trailer.

Safety Information

- **Tires and Wheels**

Tire or wheel failure may result in loss of control of the trailer and the towing vehicle. Trailer tires and wheels are more likely to fail than car tires and wheels because they carry a heavier load. Therefore, it is critical that you develop the necessary habit of always inspecting the trailer tires before towing. If tire pressure is too low or too high, the trailer will not be stable. They must be inflated to the proper pressure before getting underway. Trailer tires are designed to be inflated to higher pressure than passenger vehicle tires.



Improper tire pressure causes an unstable trailer. Blow out and loss of control may occur. Death or serious injury may result. Make sure of proper tire pressure before towing a trailer. Inflate tires to pressure indicated on the sidewall.

Tire pressure must be checked "cold". Allow 3 hours of cool down after driving as much as 1 mile at 40 m.p.h. before checking pressure. If the tires have too little tread, they will not provide adequate traction on wet roadways. This may result in loss of control of the towing vehicle and trailer, leading to death or serious injury.

Inspect the trailer tires before each tow. If a tire has a bald spot, bulge, cut, crack, or is showing any cords, immediately replace the tire before towing the trailer. Uneven tread wear may be caused by tire imbalance, axle misalignment or improper inflation. If you observe uneven tread wear, take the trailer to a Stealth dealer service center for diagnosis.

Lug nuts or bolts may shift and settle quickly after assembly. You must check the lug nuts for tightness after the first 10, 25, and 50 miles of driving a new trailer (or remounted wheel), and before each tow thereafter. Trailer wheels and lug nuts are subjected to greater side loads than automobile wheels. This may cause the lug nuts to become loose.

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

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Lug nuts are prone to loosen after assembly. Death or serious injury may result. Check lug nuts for tightness on a new trailer, and after re-mounting a wheel at 10,25, and 50 miles.

Use a torque wrench to obtain the proper tightening of the lug nuts (or bolts). If you do not have a torque wrench, tighten the lug nuts with a lug wrench as much as you can, then have the lug nuts tightened to the proper torque at a service garage or by your Stealth dealer.



Inadequate lug nut torque may cause a wheel to part while towing. Death or serious injury can result. Make sure lug nuts are tight before towing trailer.

- **Weight and Load Distribution**

Proper loading of your trailer is essential for your safety. Tire, wheel, axle or structural failure may be caused by overloading.



An overloaded trailer may result in failure or in loss or control of the trailer, leading to death or serious injury.

Never load a trailer so that the weight on any tire exceeds its rating.

Never exceed the trailer Gross Vehicle Weight Rating (GVWR)

Never exceed an axle Gross Axle Weight Rating (GAWR)

Proper handling of your trailer depends on having the trailer load distributed properly. A proper weight distribution is equal, right to

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left; and proper tongue weight for stable trailer handling. Rules of thumb for proper tongue weight are:

Ball Hitch (or Bumper Hitch) 10-15% of GVW

Gooseneck Hitch 20-25% of GVW

Fifth Wheel Hitch 20-25% of GVW

The trailer is more stable when its center of gravity is low.

- Load heavy items on the floor and over the axles
- Load additional items to maintain even weight distribution and to achieve desired tongue weight.



An improperly distributed load may result in loss of control of the trailer, leading to death or serious injury.

- Proper tongue weight is essential for stable trailer handling
 - Distribute the load front to rear to provide proper tongue weight
 - Distribute the load evenly, right and left to avoid tire overload
 - Keeping the center of gravity low and centered is essential to minimize the risk of tipping over
- **Shifting Cargo**

You are responsible for securing your cargo in such a way that it does not shift within the trailer during the tow. The "ride" inside a trailer can be very bumpy and rough.



A shifting load may result in failure, or loss of control of the trailer, and can lead to death or serious injury. You must tie down all loads with properly sized fasteners, rope, straps, etc. to prevent the load from shifting while trailer is in motion. If the catch on the door latch has a hole for a lynch pin, be sure to securely fasten the lynch

Safety Information

pin to the door.



Always secure the door latch after closing. Place a linch-pin in the catch. If the door opens, your cargo may be ejected onto the road.

Your Stealth trailer is not capable of safely transporting flammable, explosive, poisonous or other dangerous materials.

- **Brakes, Lights, and Mirrors**

The brakes (if equipped) and lights on your trailer are controlled via a connection to the tow vehicle, usually a multi-pin electrical connector. Trailer brake operation is critical for slowing the trailer. Lights are necessary for drivers behind you to see you at night, and be alerted to your intended moves. Make sure that the brakes and all of the lights on your trailer are functioning properly before towing your trailer.



Failure to connect the tow vehicle lighting and braking to the trailer will result in inoperable lights and brakes, and may lead to collision.

Check that all the trailer lights and brakes work before each tow.

Standard mirrors usually do not provide adequate visibility for viewing traffic to the sides and rear of a trailer under tow. You are responsible for providing mirrors that permit you to safely maneuver in traffic.



Safety Information Safety Information

- Determining Correct Load Limit

Steps for Determining Correct Load Limit (10K GVWR or less)

1. Locate the statement, "The weight of cargo should never exceed XXXkg or XXXlbs.," on your vehicle's placard. This figure equals

the available amount of cargo and luggage load capacity this placard is attached to vin tag.

2. Determine the combined weight of passengers, luggage and cargo being loaded in the tow vehicle and the trailer. That weight may not safely exceed the available cargo and luggage load capacity.

3. The resulting figure equals the available amount of cargo and luggage capacity available. For example, if the "XXX" amount equals 1400 lbs. and there will be five 150 lb. passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. $(1400 - 750(5 \times 150) = 650 \text{ lbs.})$

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

5. 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.

Steps for Determining Correct Load Limit (10K GVWR or more):

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.

2. Locate the GVWR(Gross Vehicle Weight Rating) of the trailer on your trailer's VIN Certification label.

3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and may not be safely exceeded.



Safety Information

- Reporting Safety Defects

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Stealth Enterprises, LLC.

If NHTSA receives similar complaints, it may open an investigation and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Stealth Enterprises, LLC.

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153); go to <http://www.safercar.gov>; or Write to: NHTSA, US Department of Transportation, 1200 New Jersey SE, Washington, DC 20590. You can also obtain other information about motor vehicle safety from <http://www.safercar.gov>.

II. Preparing to Tow

Introduction

This chapter provides instructions for the operation and care of Stealth Trailer's enclosed trailers. These instructions must be followed to ensure safety of persons, and satisfactory life of the trailer. Safety precautions protect against injury or property damage, and must be followed at all times.

This section of the manual is organized into subsections containing information pertaining to the correct methods of preparing to tow your Stealth enclosed trailer. Reading this information is a prerequisite to towing your trailer and must be fully comprehended before use.

- **Providing an Adequate Tow Vehicle and Hitch**

You are responsible for providing a vehicle and hitch that have a towing capacity that is sufficient for your trailer. Vehicle and hitch manufacturers are the appropriate source of competent advice. If the vehicle or hitch is not properly selected and matched, you can cause an accident that may result in loss of life.



Use of an under-rated hitch or tow vehicle may result in loss of control leading to death or serious injury. Make certain your hitch and tow vehicle are rated for your trailer.

- **Trailer Information**

Your Stealth enclosed trailer has an identification and information tag. The VIN tag is located on the tongue near the trailer on the right side as you face the trailer. The trailer VIN tag contains essential information for the safe use and identification of your Stealth enclosed trailer.



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EMPTY WEIGHT: The documents that accompany the trailer, such as the Manufacturer's Certificate Origin, are not a reliable source for "empty" or "net" weight of your Stealth trailer, you must weigh it on an axle scale. Axle scaling requires knowing the axle weights of your tow vehicle, without the trailer coupled

GAWR: This is the maximum gross weight that each axle can support. It is the lowest of axle, wheel or tire rating.

GVWR: This is the maximum allowable gross weight of your Stealth enclosed 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. The total weight of the cargo and trailer must not exceed the lesser of the total GAWR or GVWR.

VIN: This is the Vehicle Identification Number.

- **Tow Vehicle**

If you are purchasing a new vehicle to tow your Stealth trailer, consult the vehicle dealer for advice on how to equip the towing vehicle. The following information and equipment must be discussed with the vehicle dealer.

Automatic Transmission Oil Cooler:

A towing vehicle automatic transmission is handling more power when a trailer is being towed. Inadequate cooling will shorten transmission life, and may result in sudden transmission failure. Check with the tow vehicle dealer.

Brake Controller:

This device is part of the tow vehicle and is necessary to operate the electric brakes on your trailer (if applicable). Stealth Trailer provides

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electric brakes on some trailers. The brake controller here is not the same as the safety breakaway brake controller that may be provided on some trailers.

Cooling System:

The engine on the tow vehicle is working harder when you are towing your trailer. Depending on the size of the trailer being towed, it may be necessary to have an engine oil cooler. Inadequate cooling may result in sudden engine failure. Check with the tow vehicle dealer.

Electrical connector:

This component is used to connect the lighting and brake facilities on the trailer to the light and brake controls on the towing vehicle.

Emergency Flares and Emergency Triangle Reflectors:

It is suggested to carry these warning devices if you are towing a trailer. The hazard lights of your towing vehicle will not operate for as long a period of time because the battery is running the trailer lights as well as the towing vehicle lights.

Fire Extinguisher:

It is wise to carry a fire extinguisher in the tow vehicle.

Heavy Duty Flasher:

This electrical component may be required when your trailer turn signal lamps are attached to the tow vehicle flasher circuit.

Overall Carrying and Towing Capacity of Vehicle:

Vehicle Manufacturers will provide you with the maximum capacities of their various models.

Suspension System:

Sway bars, shock absorbers, heavy duty springs, heavy duty tires and other suspension components must be selected to accommodate the size and weight of the trailer that is going to be towed.

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Side View Mirrors:

The size of the mirrors that are required depends on the size of the trailer that is being towed and your state law requirements. In addition, you must consider the fact that some states prohibit having extended mirrors on a towing vehicle, except while trailer is actually being towed. In these cases, detachable extended mirrors are required. You must check with your dealer or the appropriate state agency for mirror requirements.

• Coupling the Trailer

A reliable coupling (or fastening) of the trailer to the tow vehicle is essential to safety. A loss of coupling may result in death or serious

injury. Therefore, you must understand and follow all of the instructions for coupling.

Improperly coupled trailers may result in death or serious injury.

Do not move the trailer until:

- the coupler is secured and locked, if applicable
- the safety chains are secured to tow vehicle
- the trailer jacks are fully retracted

Do not tow the trailer on the road until:

- the trailer brakes are checked
- the breakaway switch is connected to the tow vehicle
- the trailer lights are connected

The following parts are involved in making a secure coupling between the trailer and the tow vehicle:

Coupler*: A device on the tongue of the trailer, that makes the connection to the hitch on the tow vehicle.

*Note Coupler Size: All 2,000 lb. GVWR trailers use a 1 7/8" coupler. All 2,990 lb. GVWR trailers use a 2" Coupler. All 7,000lb - 14,000 lb. GVWR trailers use a 2 5/16" Coupler.

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Hitch: A device on the tow vehicle, to which the coupler of the trailer is attached. The hitch also supports the weight of the trailer tongue.

Safety Chains: They keep the trailer attached to the tow vehicle in case the coupler connection comes loose. In order to be effective safety chains must be properly rigged to pull the trailer in case the coupler comes loose from the hitch. With proper rigging, it is possible to keep the tongue of the trailer from digging into the pavement, even if the coupler to hitch connection comes apart.

Trailer Lighting Connector: A device that connects electrical power from the tow vehicle to the trailer. This connector operates the brakes, brake lights, running lights, and turn signals as required.

Breakaway Switch: A device that activates emergency electrical brakes on the trailer in case the coupler connection comes loose. In order to be effective, the breakaway switch must be rigged to the tow vehicle with the correct amount of slack. This will allow switch activation if the coupler connection comes loose.

Jack: A device on the trailer that is used to raise and lower the tongue (front) of the trailer. Sometimes called the "landing gear".

>>>Ball Hitch Coupler

Couple the trailer to the tow vehicle:

- Using the trailer jack, lower the trailer until the coupler fully engages the hitch ball. If the coupler does not line up with the hitch ball, adjust the position of the tow vehicle.
- Engage the coupler locking mechanism. In the engaged position, the locking mechanism holds the coupler securely to the hitch ball. Make sure that the coupler completely covers the hitch ball and the locking mechanism is engaged. A properly engaged locking mechanism will permit the coupler to raise the rear of the tow vehicle.



Incorrect rigging of the safety chains may result in loss of control of the trailer and tow vehicle, leading to death or

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serious injury, if the trailer becomes uncoupled from the tow vehicle.

Fasten safety chains to the frame of the tow vehicle, leading to death or serious injury, if the trailer becomes uncoupled from the tow vehicle.

Cross underneath hitch and coupler with minimum slack to permit turning and to hold the tongue up, if the trailer comes loose.

- **Loading the Trailer**

An improperly loaded trailer is dangerous on the road. Many accidents and deaths are caused by improper trailer loading. Safely loading a trailer is an activity that requires attention to many factors

- Overall load weight
- Load weight distribution
- Securing the load properly

To determine that you have loaded the trailer within its rating, you must consider the distribution of weight, as well as the total weight of the trailer and its contents.

The total weight of the trailer and its contents must never exceed the lesser of the GVWR, or the sum total of the GAWR's as stated on the trailer's VIN tag.

Usually, the wheel and tire ratings determine the "GAWR", and the GVWR determines the maximum weight of the trailer and its contents.



An overloaded trailer can result in failure or in loss of control of the trailer, leading to death or serious injury.

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- Never load a trailer so that the weight on any tire exceeds its rating
- Never exceed the trailer Gross Vehicle Weight Rating (GVWR)
- Never exceed an axle Gross Axle Weight Rating (GAWR)

It is also essential to distribute the load so that the tongue has enough weight to provide predictable handling, and so that no single tire is overloaded. Rules of thumb for proper tongue weight are:

- Ball (or bumper) Hitch 10-15% of GVW
- Gooseneck Hitch 20-25% of GVW
- Fifth Wheel 20-25% of GVW

GVW is the total weight of the trailer and all cargo. The cargo should be distributed so that the trailer center of gravity is as low as possible. Heavy items should be loaded on the floor and over the axles. Additional items should be loaded evenly, right to left, to achieve uniform tire loading and the total load should be distributed front to rear to obtain proper tongue weight.

>>>Checking Tongue Weight

Tongue weight can be measured on a fully loaded trailer by several methods. In each method, the trailer must be level, as it will be when being towed.



An improperly distributed load may result in loss of control of the trailer, and may lead to death or serious injury

- Proper tongue weight is essential for stable trailer handling
- Distribute the load front to rear to provide proper tongue weight
- Distribute the load evenly, right and left, to avoid tire overload

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- Keeping the center of gravity low and centered is essential to minimize the risk of tip-over.

You are responsible for securing your cargo in such a way that it does

not shift while the trailer is being towed. The "ride" inside a trailer tends to be bumpy and rough.

A shifting load may result in failure or loss of control of the trailer, leading to death or serious injury.

You must tie down all loads with properly sized fasteners, ropes, straps, etc. to prevent the load from shifting while towing.

>>>Loading Cargo

Before loading cargo into your enclosed trailer, inspect the trailer for any internal or external damage.

All trailers must be coupled to the tow vehicle before loading. This is critical for the bumper pull trailer. The tongue of a bumper pull trailer may rise during loading, before the cargo is properly distributed.

The enclosed cargo trailer is not to be used to transport people, animals, containers of hazardous substances, or containers of flammable substances. Fuel used by an off-road vehicle, a car, or a motorcycle comes in a gasoline tank that is designed to contain fuel while that vehicle is being driven. These "containers" of fuel may be carried inside your enclosed cargo trailer.



Never transport people, or animals inside your Stealth enclosed trailer, even if it has living quarters. Besides putting their lives at risk, the transport of people in trailers is illegal.

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Your Stealth enclosed trailer is not capable of safely transporting flammable, explosive, poisonous or other dangerous materials.

Loading the Enclosed trailer

Some enclosed trailers are equipped with a drop ramp door. The weight of the drop ramp door is partially held by a spring and cable counterbalance assembly.

If the spring and cable is out of adjustment or worn out, it will not provide the expected assistance for slow and careful lowering and raising of ramp



A spring and cable counterbalance may inflict serious injury if it breaks, or if it is incorrectly adjusted.

Inspect the cable and cable ends each time the door is operated. Do not attempt to service the counterbalance. Take the trailer to your Stealth trailer dealer for service.

To load your trailer:

1. Carefully lower the drop ramp to the ground .
2. Load the cargo up the drop ramp and into the trailer.
3. Secure the cargo to the trailer using appropriate straps, chains and tensioning devices.
4. Close the drop ramp door and secure the trailer door catch, so that the catch and the door cannot open while the trailer is being towed.



Always secure the door latch after closing. Place a linch pin in the catch. If the door opens, your cargo may be ejected onto the road.

Preparing to Tow

Some trailers are equipped with ventilation openings. These openings are provided to exhaust potentially deadly fumes. Open the vent(s) while loading the trailer. However, do not tow the trailer with the vents open, as this may cause damage to the vent.



Accumulation of hazardous fumes may cause death or serious injury. Do not block access to ventilation ports.

- **Checking the Trailer Before and During Each Tow**

Pre-Tow Checklist:

Coupler secured and locked

Safety chains properly rigged to tow vehicle, not to hitch or ball

Safety breakaway switch cable fastened to tow vehicle, not to safety chain

Tires: Check pressure while tires are "cold;

Inspect tread and wear patterns (no cuts, bulges, cracks or cords)

Wheels: Inspect for cracks, dents and bends

Lug nuts tight

Test of lights: tail, stop and turn

Cargo appropriately restrained (doors are latched and secured)

Fire extinguisher

Flares and reflectors

Regular Stops Checklist:

After each 50 miles, or one hour of towing, stop and check the following items:

Coupler is secure

Safety chains are fastened and have not been dragging

Tires not visibly low on pressure

Cargo is secure

Cargo door is latched and securely fastened

Preparing to Tow

- **Breaking in a New Trailer**

The wheel and brake system on your trailer require special attention early in their lives. Wheel lugs may shift and settle quickly after assembly, and must be checked after the first 10, 25, and 50 miles of driving. Failure to perform this check may result in a wheel parting from the trailer, and a crash leading to death or serious injury.



Lug nuts are prone to loosen after assembly, Death or serious injury may result.

Check lug nuts before and during use.

Check lug nuts for tightness on a new trailer, and after re-mounting a wheel at 10, 25, and 50 miles.

- **Uncoupling the Trailer**

>>>Ball Hitch/Tongue Jack Uncoupling

Follow these steps to uncouple your ball hitch trailer from the tow vehicle.

- Before jacking the trailer up, block the trailer tires to prevent the trailer from rolling.
- Disconnect the electrical connector (if applicable)

- Disconnect the breakaway brake switch cable
- Disconnect the safety chains from the tow vehicle
- Unlock the coupler
- Rotate the jack handle (or crank) clockwise. This will slowly extend the jack and transfer the weight of the trailer tongue to the jack
- Continue to extend the jack(s), making sure that the ground is providing stable and level support for the trailer.



Trailer Towing Guide

III. Trailer Towing Guide

- **Important Advice for Towing Your Trailer**

As with driving a car, towing a trailer is a learning experience. The hazards, however, are greater than when driving a vehicle without a trailer. You are responsible for keeping your vehicle and the trailer under control, and for all of the damage that is caused if control is lost.

Driving a vehicle with a trailer is vastly different from driving that same vehicle without a trailer in tow. Acceleration, maneuverability and braking are all diminished. It takes longer to get up to speed and more room is needed to turn and pass. More distance is also required to stop when towing a trailer.

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 that you are able to see the trailer as well as the area to the rear of it. Then as you did when learning to drive and automobile, find an open area with little or no traffic for your first practice tow. Drive slow at first, 5 m.p.h. or less, and turn the wheel to get the feel for how the tow vehicle and trailer combination responds. Next, make some right and left hand turns. Watch in your rear view mirror to see how the trailer follows the tow vehicle.

Stop the vehicle a few times from speeds no greater than 10 m.p.h. If your trailer is equipped with brakes, try using different combinations of trailer/electric 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 breaks will engage just before the tow vehicle brakes.



Trailer Towing Guide

- **Safe Trailer Towing Guidelines:**
 - Before towing, check coupling, safety chains, safety brake, tires, and lights
 - Check the lug bolts for tightness
 - Check the coupler tightness after towing 50 miles
 - Adjust the brake controller to engage the trailer brakes before the tow vehicle brakes (if applicable). (Your Stealth dealer can assist you by making this adjustment)
 - 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
 - Never drive faster than 60 m.p.h.
 - Allow plenty of room for passing (a rule of thumb is that the passing distance with a trailer is 4 times the passing distance required without a trailer)
 - Shift your automatic transmission to a lower gear for city driving
 - Use lower gears for climbing and descending grades
 - Do not ride the brakes while descending grades, they may overheat and stop working
 - To conserve fuel, don't use full throttle to climb a hill. Instead, build speed on the approach
 - Slow down for bumps in the road. Be 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 slight even acceleration, will provide a stabilizing force.
 - Make regular stops, about once each hour. Confirm that the coupling is in order and locked, electrical connectors made, and breakaway switch pull (if applicable) pin cable has an appropriate amount of



slack. Also make certain that the tires are not visibly low on pressure, and that your cargo is secure and in good condition.



Scheduled Inspection and Maintenance

IV. Scheduled Inspection and Maintenance

Introduction

This manual provides instructions for the operation and care of Stealth trailers. The instructions in this manual must be followed to ensure safety of persons, and satisfactory life of the trailer. Safety precautions protect against injury or property damage, and must be followed at all times.

Essential to the longevity of the trailer is the proper attention to the scheduled inspection and maintenance. This section is divided into the various sections providing maintenance and schedules for your new Stealth enclosed trailer.

Scheduled Inspection and Maintenance

- **Inspection & Service Instructions**

- >>>Axle, Bolts, & Frame Suspension**

- Various inspection and maintenance activities require that the trailer be jacked up.



- Worn or broken suspension parts may cause loss of control resulting in death or serious injury. Have the trailer professionally inspected annually and after any impact

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



- Never crawl under your trailer unless it is on level ground and resting on properly placed and secured jack stands.

- **Brakes/Electric**

- An emergency electric breakaway system acts only if the trailer comes loose from the hitch, and the breakaway pin is pulled.

- >>>Breakaway Battery**

- The breakaway battery automatically engages the trailer brakes if the trailer uncouples from the tow vehicle. It is critical to check, maintain and replace this battery, as directed by the manufacturer.

- >>>Breakaway Switch**

- This switch causes the breakaway battery to operate the electric 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 operation of the switch, battery and brakes, you must pull the pin from the switch and verify that the brakes apply to each wheel.

Scheduled Inspection and Maintenance

>>>Magnets

To make sure that the electrically operated braking system will function properly you must have your Stealth trailer dealer inspect the magnets at least once a year, or each 12,000 miles.

- **Trailer Connection to Tow Vehicle**

>>>Coupler and Ball

The coupler on the trailer connects to the ball attached to the hitch on the towing vehicle. The coupler, ball, and hitch transmit the towing forces between the tow vehicle and the trailer. To reduce wear and ensure proper operation, coat the ball with a thin layer of automotive bearing grease before each use of the trailer. Check the locking device on the coupler and make sure that it operates properly.

If you see or can feel evidence of wear, such as flat spots, deformations, pitting or corrosion, on the ball or coupler, have them examined immediately by your Stealth dealer in order to take proper action in preventing possible failure of the ball and coupler system. Have all bent or broken coupler parts 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 pocket and latch mechanism clean. Dirt or contamination may prevent proper operation of the latching mechanism.

Replace ball only with one having a load rating adequate for towing the trailer, that is, having a load rating that matches or exceeds the GVWR of the trailer.

- **Tires**

Before each tow, check to make sure the tire pressure is at the value indicated on the sidewall. Tire pressure must be checked while the tire is cold. Do not check the tire pressure immediately after towing the trailer. If the trailer has been towed as much as one mile, allow at least three hours for the tires to cool. If the tire treads have less than 1/16" depth or the telltale bands show, replace the tire before towing the trailer.

Scheduled Inspection and Maintenance

Inspect both sidewalls of each tire for bubbles, cuts or bulges. Such conditions may lead to a tire blowout. Replace the damaged tire before towing the trailer.



Check tires before use. Worn, damaged or under-inflated tires may result in loss of control of the vehicle, death serious injury or property damage.

- **Wheels**

- >>>Unsealed Bearings (Hubs)**

- If your trailer has unsealed axle bearings, they must be inspected and lubricated once a year or every 12,000 miles to insure safe and reliable operation of your trailer.

- If a trailer wheel bearing is immersed in water it must be replaced. Trailers that are subjected to extended periods of non-use should have bearings inspected and packed more frequently, at least every six months and prior to use.

To disassemble and service the unsealed wheel bearings, follow these steps:

- Removing the grease cap, cotter pin, and spindle washer. Next, remove the hub and drum to inspect the bearings for wear and damage.
- If the bearings exhibit flat spots on rollers, broken roller cages, rust, or pitting, they must be replaced. Always replace bearings and cups in groups. The inner and outer bearings are to be replaced at the same time.
- Check seals for nicks, tears or wear. Replace damaged or worn seals.
- Lubricate the bearings with a high quality EP-2 automotive wheel bearing grease.

After reassembling the bearings, follow the steps below for proper adjustment. The wheel bearings must be checked for free running and be adjusted every time the wheel hub is removed. Adjustment of the wheel bearings is done by the following steps:

Scheduled Inspection and Maintenance

- Turn the hub slowly, by hand, while tightening the spindle nut. Tighten the spindle nut until you can no longer turn the hub by hand.
- Loose 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.
- Put a new cotter pin through the spindle nut and axle.
- 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.

>>>Lug Bolts or Nuts



Tighten the lug nuts (bolts) before each tow. Metal creep between the wheel rim and lug nuts (bolts) will cause the rim to loosen. Death or serious injury may occur if the wheel comes off.

Lug nuts are most likely to loosen right after a wheel is mounted to a hub. You must check the lug nuts for tightness at short intervals after mounting a wheel.



Lug nuts are prone to loosen after assembly. If lug nuts are not properly maintained death or serious injury may result.

Check lug nuts for tightness on a new trailer, and after re-mounting a wheel at 10, 25, and 50 miles.

To prevent the wheels from coming loose, the lug nuts (bolts) must be tightened to the proper torque for the axle size on your trailer.

You must use a torque wrench to obtain the proper tightening of the fasteners. If you do not have a torque wrench, use a lug wrench and then have the lug nuts (bolts) tightened to the proper torque at a service garage or by your Stealth Trailer Dealer. Over-tightening will result in breaking the studs.



Scheduled Inspection and Maintenance

Lug Nut Torque-Steel Wheels

<i>Axle Rating (lbs)</i>	<i>Stud Size (in.)</i>	<i>Torque (ft.-lbs)</i>
3,500 to 7,000	1/2"	80 - 95
8,000	9/16"	120 - 140
9,000	5/8"	175 - 225
10,000	5/8" flanged	275 - 325
12,000	3/4" flanged	375 - 425

>>>Wheel Rims

If the trailer has been struck/impacted, on or near the wheels, or if the trailer has struck a curb, the rims must be inspected for damage, such as being out of round. Replace a damaged wheel. Inspect the wheels for damage every year, even if no obvious impact has occurred.

- **Trailer Wheel Safety Guide**

Wheel Mounting and Application for Utility and Enclosed Trailers

Instruction Guidelines

Assembly of the wheel onto the hub is a critical, safety -related process. The proper method of assembly and the consistency of the torque applied to wheel fasteners are important factors in ensuring reliability of the fastening system and retention of the wheel to the trailer. Torque is the measure of the amount of tightening applied to a fastener (nut or bolt) and is expressed as length force. For example, a force of 90 lbs. applied at the end of a wrench 1 ft. long will yield 90 lbs.-ft. torque. Torque wrenches are the best way to assure the proper amount of torque is being applied to a fastener. The trailer manufacturer/distributor/dealer and end user must consistently follow proper torquing technique in order to ensure the hub and wheel are properly seated and use caution to prevent anything from interfering with the flat, full designed mating contact of wheel mounting surface and hub. Excess paint, oil and grease must be removed from the fastener contact surfaces (the mounting surfaces, studs, and lugs) or not applied at all. Adherence to all instructions, warnings and procedures set out below will minimize the likelihood of fastener torque-loss and wheel separation.

Scheduled Inspection and Maintenance

Instruction Cautions

1. Surfaces of contact on a wheel (the nut seat and mounting surface) the axle (flat hub surface and threaded studs) must be free of paint, oil, grease, contamination and physical damage. Smooth, clean surfaces provide uniform clamping pressure and best retain torque.
2. Lug nut geometry and cone angle of wheel (usually 60 or 90 degrees) must match.
3. Stud length must be sufficient that after mounting the wheel to the hub, the lug nut is engaged to a depth at least equivalent to the diameter of the stud. For example, a lug nut threaded on a 1/2 inch diameter stud should thread on for a depth of at least a 1/2 inch.



Wheel nuts or bolts must be tightened and maintained at the proper torque levels to prevent loose wheels, broken studs, and possible dangerous separation of wheels from your axle, which can lead to an accident, personal injury or death.

Torque Procedures

1. Start all bolts or nuts by hand to prevent cross threading.
2. Tighten bolts or nuts in the sequence shown below for Wheel Torque Requirements. (See Figure 1.)
3. The tightening of the fasteners should be done in stages. Following the recommended sequence, tighten fasteners per Wheel Torque Requirements shown below.
4. Wheel nuts/bolts should be torqued before first road use and after each wheel removal.

Important! Check and re-torque after the first 10 miles, 25 miles and again at 50 miles. Check periodically thereafter.

Scheduled Inspection and Maintenance

Wheel Size	Wheel Torque Requirements		
	Torque Sequence		
	1st Stage	2nd Stage	3rd Stage
12"	20-25	35-40	50-75
13"	20-25	35-40	50-75
14"	20-25	50-60	90-120
15"	20-25	50-60	90-120
16"	20-25	50-60	90-120
16.5"x6.75"	20-25	50-60	90-120
16.5"x9.75"	55-60	120-125	175-225
14" Demount	Tighten Sequentially to		85-95
17.5" Hub Pilot Clamp Ring & Cone Nuts	50-60	100-120	190-210
17.5" Hub Pilot	50-60	90-200	275-325
5/8" Flange Nuts	50-60		

Figure 1

Torque Requirement DO's:

- DO remove all oil and grease from threaded fasteners (studs and lugs).
- DO mask or shield (cover) all fastener contact surfaces (mounting surfaces and studs) before painting axles, whether for improved cosmetics or for corrosion protection.
- DO only use an impact wrench with torque stick as a tool initially to lightly secure the wheel, applying a criss-cross or star pattern. (See Figure 1)
- DO use a calibrated torque wrench to complete the torque fastening process applying the same criss-cross or star pattern.
- DO re-torque periodically during the trailer's initial towing and thereafter in accordance with the component supplier's recommendations.
- DO maintain records of the maintenance and torque checks performed by transporters, noting any loss of torque or any corrective measures taken.

Scheduled Inspection and Maintenance

Torque Requirement DON'Ts:

- DON'T deviate from the component manufacturers recommendations regarding compatible components without a competent engineering review.
- DON'T substitute any component for the component the suppliers have specified without a competent engineering review.
- DON'T deviate from the component's suppliers fastener torque specifications, where provided, without a component engineering review.
- DON'T use adhesive products to maintain fastener retention
- DON'T use lubricants or oils on threaded fasteners (studs or lugs) to make applying the torque easier unless assembly specifications require it.
- DON'T apply any additional paint on fastener contact surfaces (mounting surfaces/hub faces or stud)



Do not attempt to repair or modify a damaged wheel. Even minor modifications can cause a dangerous failure of the wheel and result in personal injury or death.



Vin Tag and Manufacturing Certification of Origin

V. Vin Tag & Manufacturing Certification of Origin

The Vehicle Identification Number (VIN) tag must be in a visible location on the trailer.

The serialized VIN tag number matches the number on the trailer Manufacturer's Certificate of Origin. The bill of sale with this certificate of origin will be all that you need to obtain license plates and registration in most states. VIN tags should be attached to the trailer before you receive your trailer tag. The VIN tag also has other required information that will provide you with needed payload capacity, GVWR, and other tire and wheel ratings.

For more information on VIN tags or the certificate of origin contact:

**Stealth Enterprises, LLC at
(574) 848-5900**

or write to:

**Stealth Enterprises, LLC
907 S. Division St.
Bristol, IN 46507**



Tire Care, Safety and Warranty Information

VI. Tire Care, Safety and Warranty Information

Important Safety Information

Any tire, no matter how well constructed, may fail due to improper maintenance or service factors, creating a risk of property damage and serious or fatal injury.

For your safety, comply with the following:

- Check air pressure monthly, when tires are "cold". Use an accurate tire pressure gauge. Do not reduce pressure when tires are hot. Proper inflation is essential. Under-inflation produces flexing of sidewalls and builds up heat to the point that premature tire failure may occur. Over-inflation can cause the tire to be more susceptible to impact damage.
- Never overload your tires. The maximum load capacity and inflation pressures are molded onto the sidewall of your tire. Overloading builds up excessive heat and can lead to early tire failure.
- Avoid damaging objects (chuckholes, glass, rocks, curbs, ect.) which may cause internal tire damage. Continued use of tire that has suffered internal damage, which may not be visible externally, can lead to dangerous failure. Diagnosis of the internal damage will require dismounting the tire and examination by trained tire personnel.
- Property damage and serious or fatal injury can also result from the following causes:
 - (1) Improper tire mounting and inflation procedures may cause the tire beads to break with explosive force during installation of the tire on the rim. Tire and rim must match in size. Rim parts must match by manufacturer's design. Clean rim. Lubricate rim and beads. Do not exceed the maximum recommended pressure to seat the beads.

ONLY SPECIALLY TRAINED PERSONS SHOULD MOUNT TIRES

- (2) Use of worn out tires (less than 1/8" remaining tread depth) increases the probability of tire failure.
- (3) Excessive speed creates heat buildup in a tire, leading to possible tire failure.



ATTENTION! IMPORTANT TIRE WARRANTY INFORMATION

Tire Safety Information as required by 49 CFR 575.6 refer to Tire Warranty, Registration, and Safety Information booklet as provided below:

1. Tire Safety Information

This portion of the User's Manual contains tire safety information as required by 49 CFR 575.6.

Section 2.1 contains "Steps for Determining Correct Load Limit - Trailer".

Section 2.2 contains "Steps for Determining Correct Load Limit – Tow Vehicle".

Section 2.3 contains a Glossary of Tire Terminology, including "cold inflation pressure", "maximum inflation pressure", "recommended inflation pressure", and other non-technical terms.

Section 2.4 contains information from the NHTSA brochure entitled "Tire Safety – Everything Rides On It".

This brochure This brochure, as well as the preceding subsections, describes the following items;

- Tire labeling, including a description and explanation of each marking on the tires, and information about the DOT Tire Identification Number (TIN).
- Recommended tire inflation pressure, including a description and explanation of:
 - A. Cold inflation pressure.
 - B. Vehicle Placard and location on the vehicle.
 - C. Adverse safety consequences of under inflation (including tire failure).
 - D. Measuring and adjusting air pressure for proper inflation.
- Tire Care, including maintenance and safety practices.
- Vehicle load limits, including a description and explanation of the following items:
 - A. Locating and understanding the load limit information, total load capacity, and cargo capacity.
 - B. Calculating total and cargo capacities with varying seating configurations including quantitative examples showing / illustrating how the vehicles cargo and luggage capacity decreases as combined number and size of occupants' increases. This item is also discussed in Section 3.
 - C. Determining compatibility of tire and vehicle load capabilities.
 - D. Adverse safety consequences of overloading on handling and stopping on tires.



1.1. Steps for Determining Correct Load Limit – 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 weight the fully loaded trailer can weigh. It will also provide the Gross Axle Weight Rating (GAWR). This is the most a particular axle can weigh. If there are multiple axles, the GAWR of each axle will be provided.

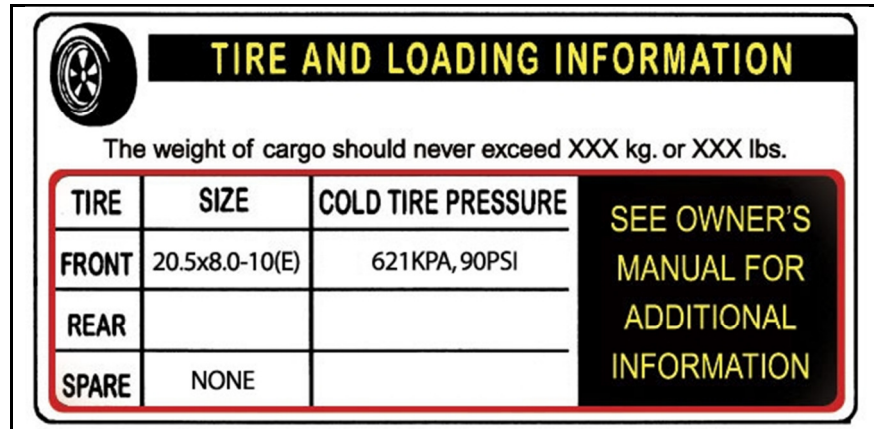
If your trailer has a GVWR of 10,000 pounds or less, there is a vehicle placard located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity. Cargo can be added to the trailer, up to the maximum weight specified on the placard. The combined weight of the cargo is provided as a single number. In any case, remember: the total weight of a fully loaded trailer can not exceed the stated GVWR.

For trailers with living quarters installed, the weight of water and propane also need to be considered. The weight of fully filled propane containers is considered part of the weight of the trailer before it is loaded with cargo, and is not considered part of the disposable cargo load. Water however, is a disposable cargo weight and is treated as such. If there is a fresh water storage tank of 100 gallons, this tank when filled would weigh about 800 pounds. If more cargo is being transported, water can be off-loaded to keep the total amount of cargo added to the vehicle within the limits of the GVWR so as not to overload the vehicle. Understanding this flexibility will allow you, the owner, to make choices that fit your travel needs.

When loading your cargo, be sure it is 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. The best way to know the actual weight of the vehicle is to weigh it at a public scale. Talk to your dealer to discuss the weighing methods needed to capture the various weights related to the trailer. This would include the weight empty or unloaded, weights per axle, wheel, hitch or king-pin, and total weight.

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 Placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

1.1.1. Trailers 10,000 Pounds GVWR or Less



Tire and Loading Information Placard – Figure 1-1

1. Locate the statement, “The weight of cargo should never exceed XXX kg or XXX lbs.,” on your vehicle’s placard. See figure 1-1.
2. This figure equals the available amount of cargo and luggage load capacity.
3. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage load capacity.

The trailer’s placard refers to the Tire Information Placard attached adjacent to or near the trailer’s VIN (Certification) label at the left front of the trailer.

1.1.2. Trailers Over 10,000 Pounds GVWR (Note: These trailers are not required to have a tire information placard on the vehicle)

1. Determine the empty weight of your trailer by weighing the trailer using a public scale or other means. This step does not have to be repeated.
2. Locate the GVWR (Gross Vehicle Weight Rating) of the trailer on your trailer’s VIN (Certification) label.
3. Subtract the empty weight of your trailer from the GVWR stated on the VIN label. That weight is the maximum available cargo capacity of the trailer and may not be safely exceeded.

1.2. Steps for Determining Correct Load Limit – Tow Vehicle

1. Locate the statement, “The combined weight of occupants and cargo should never exceed XXX lbs.,” on your vehicle’s placard.
2. Determine the combined weight of the driver and passengers who will be riding in your vehicle.
3. Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.
4. The resulting figure equals the available amount of cargo and luggage capacity. For example, if the “XXX” amount equals 1400 lbs. and there will be five 150 lb.



passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. (1400-750 (5 x 150) = 650 lbs.).

5. Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage capacity calculated in Step # 4.
6. 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.

1.3. Glossary Of Tire Terminology

Accessory weight

The combined weight (in excess of those standard items which may be replaced) of automatic transmission, power steering, power brakes, power windows, power seats, radio and heater, to the extent that these items are available as factory-installed equipment (whether installed or not).

Bead

The part of the tire that is made of steel wires, wrapped or reinforced by ply cords and that is shaped to fit the rim.

Bead separation

This is the breakdown of the bond between components in the bead.

Bias ply tire

A pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Carcass

The tire structure, except tread and sidewall rubber which, when inflated, bears the load.

Chunking

The breaking away of pieces of the tread or sidewall.

Cold inflation pressure

The pressure in the tire before you drive.

Cord

The strands forming the plies in the tire.

Cord separation

The parting of cords from adjacent rubber compounds.

Cracking

Any parting within the tread, sidewall, or inner liner of the tire extending to cord material.

CT

A pneumatic tire with an inverted flange tire and rim system in which the rim is designed with rim flanges pointed radially inward and the tire is designed to fit on the



underside of the rim in a manner that encloses the rim flanges inside the air cavity of the tire.

Curb weight

The weight of a motor vehicle with standard equipment including the maximum capacity of fuel, oil, and coolant, and, if so equipped, air conditioning and additional weight optional engine.

Extra load tire

A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Groove

The space between two adjacent tread ribs.

Gross Axle Weight Rating

The maximum weight that any axle can support, as published on the Certification / VIN label on the front left side of the trailer. Actual weight determined by weighing each axle on a public scale, with the trailer attached to the towing vehicle.

Gross Vehicle Weight Rating

The maximum weight of the fully loaded trailer, as published on the Certification / VIN label. Actual weight determined by weighing trailer on a public scale, without being attached to the towing vehicle.

Hitch Weight

The downward force exerted on the hitch ball by the trailer coupler.

Innerliner

The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner separation

The parting of the innerliner from cord material in the carcass.

Intended outboard sidewall

The sidewall that contains a white-wall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire or the outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle.

Light truck (LT) tire

A tire designated by its manufacturer as primarily intended for use on lightweight trucks or multipurpose passenger vehicles.

Load rating

The maximum load that a tire is rated to carry for a given inflation pressure.

Maximum load rating

The load rating for a tire at the maximum permissible inflation pressure for that tire.



Maximum permissible inflation pressure

The maximum cold inflation pressure to which a tire may be inflated.

Maximum loaded vehicle weight

The sum of curb weight, accessory weight, vehicle capacity weight, and production options weight.

Measuring rim

The rim on which a tire is fitted for physical dimension requirements.

Pin Weight

The downward force applied to the 5th wheel or gooseneck ball, by the trailer kingpin or gooseneck coupler.

Non-pneumatic rim

A mechanical device which, when a non-pneumatic tire assembly incorporates a wheel, supports the tire, and attaches, either integrally or separably, to the wheel center member and upon which the tire is attached.

Non-pneumatic spare tire assembly

A non-pneumatic tire assembly intended for temporary use in place of one of the pneumatic tires and rims that are fitted to a passenger car in compliance with the requirements of this standard.

Non-pneumatic tire

A mechanical device which transmits, either directly or through a wheel or wheel center member, the vertical load and tractive forces from the roadway to the vehicle, generates the tractive forces that provide the directional control of the vehicle and does not rely on the containment of any gas or fluid for providing those functions.

Non-pneumatic tire assembly

A non-pneumatic tire, alone or in combination with a wheel or wheel center member, which can be mounted on a vehicle.

Normal occupant weight

This means 68 kilograms (150 lbs.) times the number of occupants specified in the second column of Table I of 49 CFR 571.110.

Occupant distribution

The distribution of occupants in a vehicle as specified in the third column of Table I of 49 CFR 571.110.

Open splice

Any parting at any junction of tread, sidewall, or innerliner that extends to cord material.

Outer diameter

The overall diameter of an inflated new tire.

**Overall width**

The linear distance between the exteriors of the sidewalls of an inflated tire, including elevations due to labeling, decorations, or protective bands or ribs.

Ply

A layer of rubber-coated parallel cords.

Ply separation

A parting of rubber compound between adjacent plies.

Pneumatic tire

A mechanical device made of rubber, chemicals, fabric and steel or other materials, that, when mounted on an automotive wheel, provides the traction and contains the gas or fluid that sustains the load.

Production options weight

The combined weight of those installed regular production options weighing over 2.3 kilograms (5 lbs.) in excess of those standard items which they replace, not previously considered in curb weight or accessory weight, including heavy duty brakes, ride levelers, roof rack, heavy duty battery, and special trim.

Radial ply tire

A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 degrees to the centerline of the tread.

Recommended inflation pressure

This is the inflation pressure provided by the vehicle manufacturer on the Tire Information label and on the Certification / VIN tag.

Reinforced tire

A tire designed to operate at higher loads and at higher inflation pressures than the corresponding standard tire.

Rim

A metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

Rim diameter

This means the nominal diameter of the bead seat.

Rim size designation

This means the rim diameter and width.

Rim type designation

This means the industry of manufacturer's designation for a rim by style or code.

Rim width

This means the nominal distance between rim flanges.



Section width

The linear distance between the exteriors of the sidewalls of an inflated tire, excluding elevations due to labeling, decoration, or protective bands.

Sidewall

That portion of a tire between the tread and bead.

Sidewall separation

The parting of the rubber compound from the cord material in the sidewall.

Special Trailer (ST) tire

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

Test rim

The rim on which a tire is fitted for testing, and may be any rim listed as appropriate for use with that tire.

Tread

That portion of a tire that comes into contact with the road.

Tread rib

A tread section running circumferentially around a tire.

Tread separation

Pulling away of the tread from the tire carcass.

Treadwear indicators (TWI)

The projections within the principal grooves designed to give a visual indication of the degrees of wear of the tread.

Vehicle capacity weight

The rated cargo and luggage load plus 68 kilograms (150 lbs.) times the vehicle's designated seating capacity.

Vehicle maximum load on the tire

The load on an individual tire that is determined by distributing to each axle its share of the maximum loaded vehicle weight and dividing by two.

Vehicle normal load on the tire

The load on an individual tire that is determined by distributing to each axle its share of the curb weight, accessory weight, and normal occupant weight (distributed in accordance with Table I of CRF 49 571.110) and dividing by 2.

Weather side

The surface area of the rim not covered by the inflated tire.

Wheel center member

In the case of a non-pneumatic tire assembly incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic rim and provides the connection between the non-pneumatic rim and the vehicle; or, in the



case of a non-pneumatic tire assembly not incorporating a wheel, a mechanical device which attaches, either integrally or separably, to the non-pneumatic tire and provides the connection between tire and the vehicle.

Wheel-holding fixture

The fixture used to hold the wheel and tire assembly securely during testing.

1.4. Tire Safety - Everything Rides On It

The National Traffic Safety Administration (NHTSA) has published a brochure (DOT HS 809 361) that discusses all aspects of Tire Safety, as required by CFR 575.6. This brochure is reproduced in part below. It can be obtained and downloaded from NHTSA, free of charge, from the following web site:

http://www.nhtsa.dot.gov/cars/rules/TireSafety/ridesonit/tires_index.html

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 the life of your tires.

This booklet presents a comprehensive overview of tire safety, including information on the following topics:

- Basic tire maintenance
- Uniform Tire Quality Grading System
- Fundamental characteristics of tires
- Tire safety tips.

Use this information 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.

1.5. Safety First—Basic Tire Maintenance

Properly maintained tires improve the steering, stopping, traction, and load-carrying capability of your vehicle. Underinflated tires and overloaded vehicles are a major cause of tire failure. Therefore, as mentioned above, to avoid flat tires and other types of tire failure, you should maintain proper tire pressure, observe tire and vehicle load limits, avoid road hazards, and regularly inspect your tires.



1.5.1. Finding Your Vehicle's Recommended Tire Pressure and Load Limits

Tire information placards and vehicle certification labels contain information on tires and load limits. These labels indicate the vehicle manufacturer's information including:

- Recommended tire size
- Recommended tire inflation pressure
- Vehicle capacity weight (VCW—the maximum occupant and cargo weight a vehicle is designed to carry)
- Front and rear gross axle weight ratings (GAWR—the maximum weight the axle systems are designed to carry).

Both placards and certification labels are permanently attached to the trailer near the left front.

1.5.2. Understanding Tire Pressure and Load Limits

Tire inflation pressure is the level of air in the tire that provides it with load-carrying capacity and affects the overall performance of the vehicle. The tire inflation pressure is a number that indicates the amount of air pressure—measured in pounds per square inch (psi)—a tire requires to be properly inflated. (You will also find this number on the vehicle information placard expressed in kilopascals (kpa), which is the metric measure used internationally.)

Manufacturers of passenger vehicles and light trucks determine this number based on the vehicle's design load limit, that is, the greatest amount of weight a vehicle can safely carry and the vehicle's tire size. The proper tire pressure for your vehicle is referred to as the "recommended cold inflation pressure." (As you will read below, it is difficult to obtain the recommended tire pressure if your tires are not cold.) Because tires are designed to be used on more than one type of vehicle, tire manufacturers list the "maximum permissible inflation pressure" on the tire sidewall. This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

1.5.3. Checking Tire Pressure

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole or other object or if you strike the curb when parking.
- With radial tires, it is usually not possible to determine underinflation by visual inspection.

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets.



The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has not been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

1.5.4. Steps for Maintaining Proper Tire Pressure

- Step 1: Locate the recommended tire pressure on the vehicle's tire information placard, certification label, or in the owner's manual.
- Step 2: Record the tire pressure of all tires.
- Step 3: If the tire pressure is too high in any of the tires, slowly release air by gently pressing on the tire valve stem with the edge of your tire gauge until you get to the correct pressure.
- Step 4: If the tire pressure is too low, note the difference between the measured tire pressure and the correct tire pressure. These "missing" pounds of pressure are what you will need to add.
- Step 5: At a service station, add the missing pounds of air pressure to each tire that is underinflated.
- Step 6: Check all the tires to make sure they have the same air pressure (except in cases in which the front and rear tires are supposed to have different amounts of pressure).

If you have been driving your vehicle and think that a tire is underinflated, fill it to the recommended cold inflation pressure indicated on your vehicle's tire information placard or certification label. While your tire may still be slightly underinflated due to the extra pounds of pressure in the warm tire, it is safer to drive with air pressure that is slightly lower than the vehicle manufacturer's recommended cold inflation pressure than to drive with a significantly underinflated tire. Since this is a temporary fix, don't forget to recheck and adjust the tire's pressure when you can obtain a cold reading.

1.5.5. Tire Size

To maintain tire safety, purchase new tires that are the same size as the vehicle's original tires or another size recommended by the manufacturer. Look at the tire information placard, the owner's manual, or the sidewall of the tire you are replacing to find this information. If you have any doubt about the correct size to choose, consult with the tire dealer.

1.5.6. Tire Tread

The tire tread provides the gripping action and traction that prevent your vehicle from slipping or sliding, especially when the road is wet or icy. In general, tires are not safe and should be replaced when the tread is worn down to 1/16 of an inch. Tires have built-in treadwear indicators that let you know when it is time to replace your tires. These indicators are raised sections spaced intermittently in the bottom of the tread grooves. When they appear "even" with the outside of the tread, it is time to replace your tires. Another method for checking tread depth is to place a penny in the tread

with Lincoln's head upside down and facing you. If you can see the top of Lincoln's head, you are ready for new tires.

1.5.7. Tire Balance and Wheel Alignment

To avoid vibration or shaking of the vehicle when a tire rotates, the tire must be properly balanced. This balance is achieved by positioning weights on the wheel to counterbalance heavy spots on the wheel-and-tire assembly. A wheel alignment adjusts the angles of the wheels so that they are positioned correctly relative to the vehicle's frame. This adjustment maximizes the life of your tires. These adjustments require special equipment and should be performed by a qualified technician.

1.5.8. Tire Repair

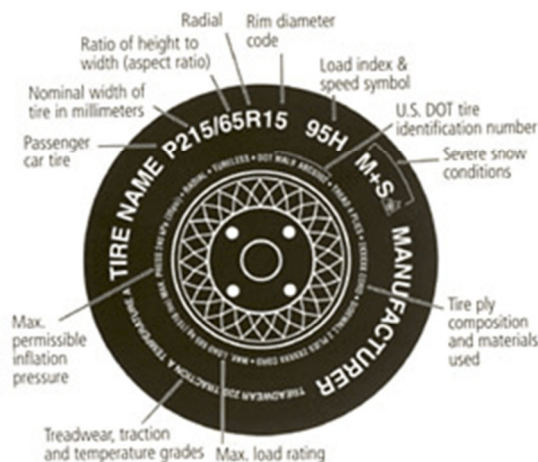
The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim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

1.5.9. Tire Fundamentals

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires. 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.

1.5.9.1. Information on Passenger Vehicle Tires

Please refer to the diagram below.





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.

R

The "R" stands for radial. Radial ply construction of tires has been the industry standard for the past 20 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 below. Note: You may not find this information on all tires because it is not required by law.

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

* For tires with a maximum speed capability over 149 mph, tire manufacturers sometimes use the letters ZR. For those with a maximum speed capability over 186 mph, tire manufacturers always use the letters ZR.



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 numbers 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 in the tire under normal driving conditions.

1.5.9.2. UTQGS Information

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

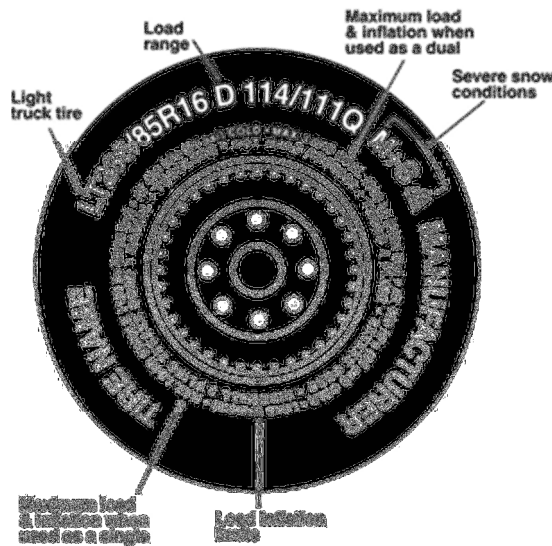
This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

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".

1.5.9.3. Additional Information on Light Truck Tires

Please refer to the following diagram.



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.

1.6. Tire Safety Tips

Preventing Tire Damage

- 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.



Tire Safety Checklist

- Check tire pressure regularly (at least once a month), including the spare.
- 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.
- Check tire pressure before going on a long trip.
- Do not overload your vehicle. Check the Tire Information and Loading Placard or User's Manual for the maximum recommended load for the vehicle.