

Proof of Training

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Towing Trailers with Company Vehicles (Rental Trailers and the Dump Trailer)

<u>Purpose</u>

The purpose of this program is to establish a policy for towing trailers with company vehicles. Only company vehicles are allowed to tow trailers. With respect to the Dump Trailer Unger Construction has 4 vehicles that can tow it; the Heavy 1-ton, the Lite 1-ton and either of the F250's. No other company vehicle is approved to tow the Dump Trailer. Unger Construction employee's personal vehicles can be used as a tow vehicle when approved in writing by an owner of Unger Construction.

<u>Scope</u>

This policy will apply to all authorized drivers of company vehicles, the Dump Trailer, all rental trailers, as well as trailers owned by subcontractors or clients that are towed by Unger Construction employees.

<u>Objective</u>

Inform employees that are authorized to drive company vehicles of the proper methods to select, connect and tow a trailer. Due to the potential for catastrophic injuries and/or significant property damage when towing a trailer, the procedures and protocol outlined in this policy must be followed to the letter. This policy applies to all trailer towing operations regardless of the trailers load (empty or full).

Responsibilities

Management (Board of Directors and Project Managers)

Management is responsible for ensuring that the materials (e.g., tools, equipment, personal protective equipment) and other resources (i.e., worker training materials) required to fully implement and maintain this program are readily available where and when they are required. Additionally, management will monitor the effectiveness of the program, provide technical assistance as needed and review the program bi-annually.

Program Manager

Dave Simpson is responsible for the development, documentation, training and administration of the program. This position carries the responsibility of ensuring this program is adhered to and that proper reporting is executed.

Supervisors

Worker selection is an important factor when considering which of our approved drivers should be assigned the task of towing a trailer. Within our pool of authorized drivers there will be a wide variety of



trailer towing experience ranging from expert level to novice. The size of the trailer and the load to be towed should be considered before making an assignment. Larger and heavier trailers require a more skilled driver. The Dump Trailer is large (14' x 7') it is heavy and it can haul loads up to 9,900 pounds. Only authorized drivers with considerable experience towing trailers should be assigned to the Dump Trailer.

Authorized Drivers

Only authorized drivers (name listed on the approved driver list) are allowed to operate company vehicles. The tow vehicle is more than a mode of transportation. It is a company asset, a marketing tool, and a representation of our company image. Authorized drivers have responsibilities including but not limited to: strict compliance with motor vehicle laws, being courteous at all times to other drivers and pedestrians and driving with utmost regard for the care and cost efficient use of the vehicle.

Authorized drivers must be mentally and physically able to drive safely. Do not operate the vehicle if you are fatigued or stressed to the point of distraction. Do not operate the tow vehicle while under the influence of alcohol, illegal drugs, recreational drugs, or medications that could impair your reflexes or judgment. All passengers must wear seatbelts. Make proper allowances for adverse weather and traffic conditions. Operate the tow vehicle in a manner consistent with reasonable practices that would avoid abuse, theft, neglect, or disrespect to other drivers. Tool boxes must be locked and any equipment within the vehicle reasonably secured.

Tow vehicles should not be operated with any defect that would inhibit safe operation; the tow vehicle must be in safe mechanical condition. Any defect that may render the vehicle un-roadworthy must be reported to your supervisor or Dave Simpson as soon as it is detected. Should any warning light appear, address it immediately; do not procrastinate.

Authorized drivers are required to follow the procedures outlined in this policy. Authorized drivers are responsible for knowing the hazards and the control measures established in the policy. Authorized drivers are responsible for stopping unsafe acts and correcting unsafe conditions on the spot as soon as they are discovered. Any deviations from this program must be immediately brought to the attention of your supervisor. Authorized drivers that choose to conduct themselves in a manner that is inconsistent with these expectations will be held accountable for those decisions and may incur disciplinary actions up to and including termination.

Cellular phones

Cell phone distracted driving has become a serious public health threat. Driver distraction (cell phones) has joined alcohol and speeding as leading factors in fatal and serious injury crashes. Driver distraction is typically broken into three areas: Visual – eyes on the road, Mechanical – hands on the wheel, Cognitive – mind on driving. When using a cell phone all three of these forms of distraction apply. Many people tend to focus on visual and mechanical distractions with respect to cell phones, which is why the hands free devices were mandated. With cell phones, cognitive distraction lasts much longer than the other two. When you are talking on the phone be proactive; slow down and increase the safe distance between your vehicle and others. The dangers involved with texting or reading emails while driving are well known. To text or read emails pull off the roadway and park in a safe place, once finished you can return to the roadway. In our line of work, you may need to repeat this process many times per day.



<u>Accidents</u>

If your tow vehicle is involved in an accident you must notify your supervisor or Dave Simpson immediately and follow the procedures established and required by our insurance carrier. If the accident is determined to be preventable, you will be required to reimburse the company the sum of the deductible currently \$500.00. After an at fault accident or traffic citation you will be required to complete a recognized Driver Training Course (i.e." Traffic School") within 60 days, at your own expense. Completion of a driver's training course / traffic school is required to reinstate your driving privilege.

Definitions

Ball Mount: A removable steel component that fits into the receiver. The hitch ball is attached to the ball mount.

Bumper hitch: Is attached to the tow vehicles bumper

Coupler: The ball socket at the front of the trailer that receives the hitch ball.

GCWR: Gross Combined Weight Rating is the maximum combined weight of the tow vehicle (loaded) and the trailer (loaded).

GTW: Gross Trailer Weight is the maximum weight as specified by the manufacturer.

GVWR: Gross Vehicle Weight Rating is the maximum weight as specified by the manufacturer. The gross vehicle weight rating includes the vehicles curb weight plus the weight of any cargo.

Pitch: Front to back or back to front movement.

Receiver: The platform attached to the tow vehicle that the ball mount inserts into.

Receiver Hitch: Is attached to the tow vehicles frame.

Roll: Movement that causes the trailer to tip over.

Sway: Uncontrolled side to side movement also known as yaw.

Tongue Weight: the downward pressure placed on the ball by the coupler, tongue weight is adjustable. *Trailer Tongue*: the very front of the trailer.

Zerk Joint: Fittings to apply grease.

Attention on the Task

Towing requires undivided driver attention. If you are not paying careful attention you could find yourself driving at the same speed as you would without the trailer. Towing a trailer will have a dramatic affect when responding to sudden changes. Your driving habits must adapt to the new weight, length, handling and stopping characteristics. Failure to do so could result in serious injury, property damage and business interruptions.

Use the 5-second rule when driving on the freeway. Pick out a landmark ahead of the vehicle you are following. When that vehicle reaches the landmark start counting 1-second, 2-second, 3- second etcetera until you reach 5 seconds. If the vehicle you are driving reaches the landmark before you reach 5 seconds you are following too close. If something unforeseen were to happen and you need to take evasive maneuvers you are going to need more time to react than you are used to.

A photo of the warning, caution, danger and notice sticker for the dump trailer is located on the next page. It is difficult to read the small print in the photo. Before using the trailer review the actual sticker.





Keys for the Dump Trailer

There are four keys for the dump trailer, two lock boxes and two security devices. The keys to the trailer are kept in a real estate lock box that is attached to the front of the trailer on the driver's side of the trailer. The combination is 0910. The keys are for the lock boxes (standard keys) are not keyed the same therefore you will need to read the number on the lock to find the correct key. The security devices (puzzle keys) are not keyed the same.



The trailer has two lock boxes, both located at the front of the trailer. The lock box near the trailer tongue is known as the hydraulic control box. It houses the hydraulics/battery, the remote control for the dump bed, the tire pressure gauge and the spare breakaway switch assembly. It is important that



no metal parts are stored in the hydraulics/battery compartment. Metal parts could move around during transit and create electrical issues. The spare breakaway switch assembly is stored in a plastic container inside this compartment. The other is known as the storage box. It houses the trailer hitch/ball, security devices (Denver Boot, hitch ball lock), tools to change the tongue height and flat tire, the flat tire jack, wheel chocks, and several bungee cords.

When the trailer is connected to the tow vehicle the security devices do not need to be installed. With that said, anytime the trailer is separated from the tow vehicle the security devices shall be installed, as well as the wheel chocks.

Capacity and Design

Company vehicles are of various designs and capacity limitations for example, ½ ton, ¾ ton and 1 ton trucks. All company vehicles will be operated in a manner that is consistent with the capacity and design limitations and in complete compliance with manufactures recommendations. The following information is listed for the model year 2007, and is to be used for reference only. To find the specific information for your vehicle refer to your owner's manual or the internet.

<u>F150</u>	<u>F250</u>	<u>F350</u>
Curb weight = 4,747 lbs.	Curb weight = 5,683 lbs.	Curb weight = 6,954 lbs.
GVWR = 6,650 lbs.	GVWR = 9,400 lbs.	GVWR = 12,600 lbs.
GCWR = 10,500 lbs.	GCWR = 19,500 lbs.	GCWR = 23,500 lbs.
Max trailer weight = 5,100 lbs.	Max trailer weight = 13,300 lbs.	Max trailer weight = 15,000 lbs.

The Dump Trailer

Curb weight = 4,220 lbs. Max cargo = 5,770 lbs. GTW = 9,990 lbs.

Depending upon the particular trailer you need to haul, you need to determine the weight limits of the tow vehicle and the trailer. This information can be found in the owner's manual or on the internet.

All towing components have a maximum weight capacity. This value is usually displayed on each piece of equipment. All of your components should be rated at a higher capacity than the heaviest trailer you will tow. Some parts have more than one capacity. For example, hitches are usually rated for maximum weight capacity and maximum tongue weight capacity. The maximum weight value represents the heaviest trailer the hitch can pull, and the maximum tongue weight represents the maximum weight that the hitch can handle pushing down on it. The weight capacity of each component - the tow vehicle, the trailer hitch, ball mount, ball, and safety chains - must be greater than the weight of the loaded trailer.

Trailers and hitch assembly are separated into classes. These classes are determined by the carrying capacity of the trailer and the tongue weight of the trailer, see the trailer classification listing on page 6. Hitch balls come in three sizes: $1^{7}/_{8}$ inch, 2 inch and $2^{5}/_{16}$ inch. The larger the ball the more weight it can carry. The hitch ball must be properly sized to the coupler, they must match exactly. Generally speaking bumper mounted hitches are limited to Class 1 and 2. Receivers include a removable draw-bar that you



can use to install different sized hitches. Generally speaking receivers can accommodate Class 1-5. Note this does not mean that your tow vehicle can accommodate this class of trailer. The tow vehicles limitation is stated by the manufacturer and must be strictly adhered to.

Trailer Classifications

Class 1:	2,000 pounds GTW	200 pounds tongue weight
Class 2:	3,500 pounds GTW	350 pounds tongue weight
Class 3:	5,000 pounds GTW	500 pounds tongue weight
Class 4:	7,500 pounds GTW	750 pounds tongue weight
Class 5:	10,000 pounds GTW	1,000 pounds tongue weight

The Dump Trailer is a Class 5 Trailer. The trailer ratings for each axle, the tires and the maximum trailer capacity are provided in the photo below. It is difficult to read the small print in the photo. Before using the trailer review the actual sticker.

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Discussion

There are five distinct elements involved when towing a trailer. The driver, the tow vehicle, the connecting mechanism between the tow vehicle and the trailer, the trailer and the trailer's load. The most important element is the driver. The driver determines if the system is operated safely. Driver error is the primary cause of trailering accidents. Usually this is due to speeding, driving too fast for conditions, and/or following too closely.

Stopping distance while towing a trailer is nearly twice that of an unloaded vehicle. The following is an example of stopping distances when towing a trailer when reaction time and stopping distances are combined. 50 MPH = 198 feet or approximately 14 car lengths. 70 MPH = 348 feet or approximately 23 car lengths. The increased stopping distance when towing a trailer is why the State of California has a maximum speed limit of 55 MPH.

When towing a trailer you will have decreased acceleration (merging/passing) increased stopping distance and increased turning radius. Which means you must take wider turns to keep from hitting objects on the inside corner of the turn. You will need longer distances to pass and far more time to stop. Additionally, the trailer will change the handling characteristics of your towing vehicle.

Get to know the trailer you are towing and the handling differences when towing. Practice basic maneuvers in an empty parking lot before taking it out on the road. Practice until you are familiar with the added length and turning radius. Simple maneuvers like changing lanes, merging, parking, stopping



for gas, accelerating and braking will require adjustments. Practice using your side mirrors. Play it safe and be cautious.

Trailers that weigh too much for the tow vehicle can cause stability and control issues. For these reasons the maximum towing capacity of the tow vehicle should not be exceeded. You can locate this information in the vehicles owner's manual, inside the driver's door frame or on the internet. Make certain that your hitch and tow vehicle are rated for the GVWR of the trailer.

The most common cause for loss of control of a trailer are:

- Improper sizing of the trailer for the tow vehicle
- Excessive speed. When towing trailers with company vehicles the maximum speed limit is 55 MPH regardless of it is loaded or empty. Trailer speed limits are no joke. Trailer speeds over 55MPH significantly increase the likelihood that the trailer will sway. Tires may overheat.
- The trailer is overloaded or has improper weight distribution (sway)
- Improper coupling of the trailer to the hitch via improper ball size, tongue not seated, and latch not secured.
- Improper tire pressure, causing a blowout.
- Improper braking

Driving

Before hooking the trailer to tow vehicle, walk around each to ensure that they are both fit for the road. This will take less than 10 minutes and can eliminate the vast majority of trailer problems that occur on the highway. Make sure the tires are inflated correctly (look in the owner's manual for tow-vehicle tire pressures) or on the tire sidewalls and that the tires are in good shape.

Towing in a safe manner requires knowing a couple of numbers and reading the tow vehicle's owner's manual. For instance, you need to make sure the trailer weight doesn't exceed the vehicle's maximum tongue weight or maximum weight-carrying capacity.

The addition of a trailer adds weight and length to the tow vehicle. With additional weight, your rig will accelerate slower and take longer to stop. You should allow for extra time when switching lanes, stopping, and passing other vehicles when you're towing a trailer. The extra length that a trailer adds can also cause problems on turns. Because the trailer does not follow the exact path of the vehicle on turns, you must swing out wider when traveling around bends and corners. Look in the mirror on the side of the vehicle you are turning towards to ensure proper clearance.

When you are pulling a trailer, remember that as you go around curves and corners the trailer's wheels will not track the same as the tow vehicles -- they will track tighter. So if you are making a curve to the left, and the tow vehicle's left wheels are just right of the center line, the trailer's left wheel (or wheels) will be on or past the line, putting the trailer in the path of oncoming traffic. Make wider turns to compensate for the tracking difference.

Trailer sway can also lead to a loss of vehicle control. When starting out with a new load on a trailer, gradually increase your speed in intervals until highway speed is reached. If the trailer does begin to sway, try adjusting the cargo accordingly. The trailer should handle well if the weight and hitch



adjustments are correct. If you detect sway in your trailer, stop to check if the load has shifted. A slight increase in the tongue weight may help. Loading weight directly over the axle will help distribute the weight accordingly.

When encountering sway take your foot off the gas, steer as little as possible (use trim like steering) to stay on the road. Attempting to steer out of the sway will likely make the sway worse. Applying the tow vehicles brakes could make the sway worse. Application of the trailer's own brakes via the trailer brake controller will tend to straighten out the tow vehicle and the trailer. The drag of the trailer brakes will tend to pull the trailer back onto the centerline of the truck and trailer.

Swaying trailers are almost always the result of insufficient tongue weight. If there is zero tongue weight, the trailer's center of gravity, will be between the contact surfaces with the road, in essence the trailer tires making it very unstable. Adding tongue weight, by moving cargo in the trailer forward, pulls the center of gravity forward stabilizing the trailer. The more tongue weight, the farther forward the center of gravity goes, creating more stability, right up until you add too much tongue weight for the tow vehicle's rear suspension to handle.

When driving down steep grades use lower gears in the tow vehicle. Engage tow-mode if your truck has that feature. Use the tow vehicles engine and transmission as a brake. Brakes will overheat if you keep your foot on the brake pedal when going downhill. They can overheat and become ineffective.

Backing a trailer can be frustrating for inexperienced drivers. The most important thing to remember is that the trailer will go in the opposite direction of the tow vehicle. Turn the vehicle's wheels to the right to make the trailer go left, and vice versa. Some drivers like to place their hand at the bottom of the steering wheel. The trailer will go in the same direction your hand moves (moving your hand to the right will cause the trailer to go right, and vice versa).

It is helpful to have another person help you back the trailer. Any time a trailer is in tow, slow down. This is especially important when backing one up: The slower you back up a trailer, the easier it is to control. Generally speaking the idling speed should be plenty fast enough. Sharp steering wheel corrections will cause the trailer to jackknife and may cause damage to the rear of the tow vehicle or the front of the trailer. Avoid jackknifing. If, at any point, the angle of the truck to the trailer becomes smaller than a right angle, pull forward enough to straighten out and give it another go. Don't try to force it.

<u>Tires</u>

Inflate the tires to the trailer manufacturer's maximum recommended cold pressure. Heat is the tires' enemy, and a properly inflated tire will run cooler. Be even more careful of the small tires on light-duty trailers—the tiny outside diameter means they spin faster. Be sure the trailer tires are inflated to the pressure indicated on their sidewall before towing. Check the spare tire pressure too. Improperly inflated tires can lead to wheel bearings overheating and seizing.

Tires with too little tread will not provide adequate frictional forces and could lead to loss of control. If a tire has uneven tread wear take the trailer to a service center for diagnostics. Uneven wear can be caused by tire imbalance, axle misalignment or incorrect inflation. Tires are not safe and should be replaced when the tread is worn down to 1/16" remaining.





A tire pressure gauge, see photo below, is stored in the hydraulic control box. The maximum tire pressure for the dump trailer is 80 PSI.



Trailer Hitch Balls

Trailer ball hitches come is three sizes. 1-7/8", 2" and 2-5/16". The size of the required ball is stamped into the body of the trailer coupler and the ball itself has its size stamped into the top. Make sure hitch, drawbar, and trailer ball are the proper ones for the trailer you're about to tow--and that all are tight. The Dump Trailer requires a 2-5/16" Ball. The assembly shown in the photo below is for the dump trailer. It is kept in the trailers storage box.





Trailer Jack

The trailer jack for the dump trailer is a heavy duty (12,000 lbs.) telescoping three piece jack. The exterior main frame leg does not move. The interior leg is adjusted by the hand crank and has 12 inches of travel. The inner most leg is adjustable via king pin for coarse height adjustments. The drop leg travel is 13.5 inches with 5 holes spaced 3-3/8" apart. See photo on page 11.

Because this is a heavy duty jack it has a gear ratio that makes subtle adjustments; it will require numerous cranks to make visible progress. This comes into play once the tongue has been secured on the hitch ball. Drop the trailer onto the hitch ball, then lock the trailer coupler lever and place a locking pin or other bolt through the lever to keep it from accidentally popping open while you're driving.

To achieve proper ground clearance you need to crank for several minutes. Note the inner most leg is spring loaded to automatically withdraw into the up most position when the king pin is pulled. This is a serious pinch point; ensure fingers and hands are well clear when the king pin is pulled. You can step on the bottom plate to hold it in position while you pull the king pin. Gently lifting your foot up will prevent the plate from slamming into the retracted position. Use your foot to push the plate down to lower the spring loaded section.

Once the jack has reached the proper height for ground clearance rotate the jack handle such that it can be stowed in the transit position clamp.





As soon as the pin is pulled the spring will retract the bottom section. You might want to place your foot on the bottom plate to control the speed in which it retracts.





Jack handle storage hook







Setting the Hitch Height

It's important that the loaded trailer be level to the ground when it's attached to the vehicle, each tow vehicle will have a different hitch height. If the trailer tongue is too high or too low it will adversely affect how the trailer tows. Step back and observe the tow vehicle and trailer from the side: The trailer should sit parallel with the ground (or ever so slightly tongue low) and in line with the chassis of the tow vehicle.

Find the height of the trailer's tongue when the trailer is level. Set up the trailer on flat pavement. Run the tongue jack up and down until it is level. Adjust the tongue height until the trailer sits level when connected to the tow vehicle. The dump trailer has 6 height adjustment position. The tongue height adjustment bolts and nuts are 15/16". The tools to adjust the tongue height are in the storage box. Don't use pipe wrenches, slip jaw pliers or adjustable wrenches as these tools can round the corners of the nuts and bolts.



Coupling the Trailer

Proper selection and condition of the coupler and the hitch are essential. 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. Be sure the hitch components are tight with no signs of corrosion or cracks. A ball hitch mounted to a bumper is generally speaking for light to medium loads.

Use the trailer jack to raise the trailer and align it with the ball. Make sure that the hitch lock is unlocked (fully open) before lowering the trailer onto the ball and securing the tongue. Once the tongue of the trailer is on the ball, you can lock it in place by placing a bolt or padlock through the ball lock mechanism to prevent it from accidentally opening.

To test the coupling you can use the trailer jack to try and raise the tongue off of the ball. If you are able to do this, the ball and tongue sizes do not match, or the ball is not locked properly. In this case, replace the ball with the correct size, or lock it properly and try again.





<u>Chain It Up</u>

Chains serve as the hitch of last resort: If the tongue ever loses its grip on the ball, the chains will keep the trailer from vaulting the guardrail into oncoming traffic or something equally inconvenient. Always connect the trailer's safety chains securely to the trailer hitch or tow vehicle by crossing them underneath the coupler. Connect the safety chains to the hooks near the vehicle hitch or the vehicle frame. Make sure the chains cannot wiggle or bounce free. The safety chains should only be long enough to allow for tight turns. Make sure to leave enough slack in the chains so you can corner without impeding the movement of the trailer. Do not let the safety chains drag on the ground. Chains should be fastened to the tow vehicles frame if the hitch assemble does not have holes or loops specifically designed for that function.





Emergency Breakaway Switches

Emergency breakaway switches are required for any trailer having a gross weight of 1,500 pounds or more. They are designed to activate trailer brakes if the tow vehicle becomes separated from the trailer. One end of the breakaway switch is attached to an electrical switch on the trailer frame and the other end is looped around a stationary component on the tow vehicle. The emergency breakaway cable must be connected to the tow vehicle not to any part of the hitch. Do not attach to safety chains, hitch ball or removable ball mount. Do not feed the cable through chains or in any way that might prevent it from being pulled in an emergency. If the two become separated, the cable pulls a pin inside the breakaway switch and applies full power from the trailer battery to the trailer brakes.

Trailers with hydraulic brakes or electric brakes will have an emergency breakaway cable.



We have a spare breakaway switch assembly stored in the hydraulic control box. The switch can be found inside the plastic container as shown in the following picture. This is particularly handy if a road hazard engages the breakaway cable, displacing the plunger causing the trailer brakes to activate. If this happens, pull safely off the road so you can insert the breakaway cable plunger from the spare unit. This should reset the emergency brakes and get you back on the road.





Trailer Lights

Trailers in California are required to have reflectors, tail lights, brake lights and license plate lights. Turn signal lights are also required if the tow vehicle's lights are hidden. Trailers over 80 inches wide must have clearance lights. Attach the lights with the wiring harness. The dump trailer has a universal 7 pin connector.

Check that all of the lights are working. You can do this without making four trips up to the cab and toggling on all the turn signals and brake lights in succession. Turn on the parking lamps and the hazard flashers. Walk to the back of the trailer. If the parking lamps and flashers are on, you've got turn signals and brake lights, because they're the same filaments as the hazards.

Trouble shooting trailer or tow vehicle wiring - 7 pin connector



Electrical Circuits

Before operating the dump bed function disconnect the 7 pin connector from the tow vehicle.

Trailers that have their own internal battery, such as the dump trailer, can backflow (current reversing direction) into the tow vehicle's electrical circuit, occasionally blowing fuses or tripping circuit breakers for the auxiliary circuit of the tow vehicle. This will leave the trailer without brake lights, turn indicators or reverse lights since the tow vehicle provides power for these functions, not the trailer battery.



Trailer Brakes

In California, brakes are required on any trailer having a gross weight of 1500 lbs. or more. Trailer brakes can either be surge brakes or electric brakes. Surge brakes are activated by a sliding mechanism attached to the receiver/ball connection. As the tow vehicle slows, the forward motion of the trailer compresses the mechanism which in turn applies the trailer brakes.

Trailer brakes are designed to work in conjunction with the brakes of the tow vehicle. When they are synchronized both braking systems contribute to slowing. When synchronized the tongue of the trailer will not dive or rise sharply.

Trailers that have electric brakes are activated by a controller in the tow vehicle. The controller automatically coordinates the tow vehicle and trailer braking so the two systems work together when the brake pedal is applied. The controller can also be helpful in stabilizing a trailer that sways because of bad road conditions. Manually applying the trailer brakes by using the hand lever on the controller will stabilize a trailer reducing sway. Tow vehicle brake controllers come in various styles and functions. Look at the vehicle owner's manual or on the internet to get the specific information. (See synchronizing the brake controller system below)

Trailers with electric brakes rely on a trailer mounted battery to operate the trailer brakes. A low or dead battery may cause brake failure. Never attempt to tow the trailer with a dead battery. **The battery should be charged before each trip.**

Brakes can either be adjusted manually, with a tool once the wheel is removed or self-adjusting meaning they will adjust without removing the wheel assembly. To adjust self-adjusting brakes hard brake when traveling in reverse. Keep the speed below 5 MPH and press firmly on the tow vehicles brakes. It may be necessary to repeat this maneuver 2-3 times for the self-adjusting mechanism to align properly.

Synchronizing the Brake Controller System (Electric Trailer Brakes)

This process is to take place in a parking lot or somewhere were the traffic is light. Adjust the tow vehicle brake controller gain to 5. Travel at no more than 15 MPH. Take your foot off the brake, gently squeeze brake controller slide. You should feel the trailer brakes grab. If the brakes don't activate, adjust the gain up and repeat the process until they do. If the trailer brakes don't activate with the gain set at maximum, don't use the trailer; put it out of service. If the wheels lock up (skid), turn the gain down and repeat the process.

When towing heavy trailer loads you will need to set the gain and retest the brakes when the trailer is loaded. It is not uncommon for the settings to be different when the trailer is loaded versus empty.

Dump Trailer Electrical

Dump trailers have an internal battery that is mounted to the trailer. The battery will be able to make between 5-7 dumps on a single charge. This may seem like a small number however, you need to take into consideration the load forces required to lift 5,000 pounds. This places a tremendous demand on the battery. The worst possible situation would be to have the trailer battery die with the dump be



partially raised while you were at the dump site. Another negative factor of a dead battery with a raised dump bed is the failure of the hydraulic system as the dump bed lowers without the aid of the electrical hydraulic pump. When this happens, the hydraulic fluid will flow out of the pressure relief valve and spill into the hydraulic control box. The moral of the story is to **make certain the dump trailer battery is fully charged before you depart.**

Contrary to popular belief a dead trailer battery cannot be charged up from the 12VDC circuit from the tow vehicle. This circuit only provides a maintenance charge which will keep the battery at its current level. The tow vehicles alternator is not sized to push the amperage needed to charge up a trailer mounted battery. The driving charge from an alternator is typically 1.5 amps. As a rule of thumb calculation it would take 93 hours of driving for the tow vehicle alternator to fully charge a dead battery.

The dump trailer has an internal battery charger that requires AC power. The AC powered battery charger for the Dump Trailer is mounted in the hydraulic control box. Charging the battery requires the use of a heavy duty extension cord, using an ordinary extension cord could cause a fire. This onboard battery charger has an output rating of 8 amps. The reserve capacity rating for the trailer battery is 140 amps. As a rule of thumb calculation it will take 17 hours of AC powered battery charging to fully charge a dead battery.



The Dump Trailer's AC powered battery charger is a DLH Model D1208T. It is a 3-step automatic charger.

- 1) Constant-Current Charge. For when the battery voltage is lower than the set point, it will charge the battery to maximum current. (Quick Charge)
- 2) Constant-Voltage Charge. For when the battery is almost fully charged, the charger will limit the current automatically.
- 3) Float Charge. When the battery voltage reaches 13.5 VDC it will automatically switch to float charging 0.1-0.3 amps.

At the end of the shift plug the Dump Trailer into an AC circuit so the battery can charge overnight. To check the status of the battery unplug the AC charger and unplug the 7 pin connector. Push the button on the charger. The battery condition will be displayed as either Poor (red), Fair (orange) or Good (blue). Note when the 7 pin connector is plugged into the tow vehicle and the tow vehicle is running the green light should be illuminated.

The Dump Trailer has a solar panel cell mounted on the lid of the hydraulic control box. The solar panel does not charge the trailer battery. The solar panel is a 5-watt solar pulse charger which prevents sulfate buildup on lead acid batteries that sit for extended time periods. Therefore it extends the life of the battery but it does not charge the battery. The amperage output of the solar panel is only 0.41 amps.



Tongue Weight

Tongue weight is the downforce the trailer applies to the back of the tow vehicle. That force should never be more than 15 percent of the loaded trailer's weight. Tongue weight should be 10-15 percent of the trailer's total weight. Not having enough weight on the trailer tongue can cause sway. To keep your trailer from swaying, place heavier cargo forward, in front of the trailer's axle. Also center the cargo left-to-right and use tie-downs to keep the load from sliding.

It is critical to have a portion of the trailer load carried by the tow vehicle. The trailer tongue must exert downward force on the hitch. This is necessary for two reasons:

1) The proper amount of tongue weight allows the tow vehicle to maintain control (steering and braking).

2) Improper tongue weight – too little weight on the tongue can cause the trailer to sway at speed. Too much weight towards the rear of the trailer can push up on the hitch and can cause tow vehicle braking issues. Too much tongue weight can cause the front wheels of the tow vehicle to be lightly loaded causing loss of steering and braking.

Trailer Loading

The total weight of the load you put in the trailer, plus the empty weight of the trailer itself must not exceed the Gross Trailer Weight rating (GTW). In addition, you must distribute the load in the trailer such that the load on any axle does not exceed the gross axle weight rating (GAWR) Generally speaking the trailer will have a placard on the front driver's side that calls out the tire and trailer loading. The way you load a trailer can determine how easily you can tow it. While loading, keep in mind that the tongue weight should be 10% to 15% of the overall trailer weight. Weight balance of the trailer affects tongue weight, axle loading and tire loading. The majority of the weight in the trailer should be distributed over the axles. The trailer and the tow vehicle should be level. Shift the cargo back and forth until you get the correct weight distribution. If the tongue weight is too heavy or too much weight is placed on the front axle (too little weight on the rear axle) the trailer will not steer, brake or handle well. For a single axle trailer 60% of the payload capacity should be placed over the axle and slightly forward of the axle.

Distribute the load side-to-side and front-to-back to provide proper tongue weight and distribute the load evenly. Distribute the load right-to-left to avoid overloading individual tires. Keep the center of gravity low. Improperly distributed loads can cause the trailer to pitch (front to back movement), sway (side to side movement), or roll (tip over).

The dump trailer has dual function doors on the rear of the trailer: barn door and spreader gate. The barn door function is also known as swing gate, half of the bed opening is covered by each of the right and left doors. When the barn doors are open, the trailer can be loaded with the internally stored ramps. The ramps are located at the rear of the trailer below the gate locking mechanism. They are well camouflaged behind the small door panels. See the photos on the next page. The spreader gate is a function where the bottom of the full bed opening pivots up away from the dump bed to act as a regulator for flowable material coming out of the trailer.







Secure your load

Trailers ride rough and bumpy cargo can shift. Don't trust anything to stay put in or on a trailer once you're under way. Use ratchet tie downs or bungees to keep cargo in place. Depending on the load you're hauling, you might need to use a tarp to secure loose objects. Light debris that could become airborne while traveling in the trailer should be placed in bags. As the driver you are personally responsible for anything that flies out and causes damage. Re-inspect the trailer every time you stop for fuel, food or relief. Secure the load and ensure the doors and gates are fully closed and latched (kingpins). The load in the trailer is subject to longitudinal forces (front-to-back) and lateral forces (side-to-side) while under tow. You must secure the load accordingly.











Pre-tow checklist - Don't move the trailer until you have checked the following

- Tire tread/sidewalls in good condition and the lug nuts are snug.
- Tire pressure for the tow vehicle and the trailer match the values on the VIN/Certification.
- The coupler is secured and locked to the hitch.
- Hitch ball coupler secured and locked.
- The trailer jack is fully retracted. (Adequate ground clearance).
- Safety chains: crossed, attached properly to the tow vehicle, proper slack for turning, not dragging.
- All lights are connected and function checked; Brake, Running and Turn Indicators.
- Emergency Breakaway cable fastened to tow vehicle not safety chains.
- Tongue weight proper, load properly distributed front-to-back, left-to-right.
- The load of the trailer is secured and covered.
- Doors, gates latched and secured.
- The tow mirrors have been adjusted such that the driver can see the back of the trailer and the traffic following the trailer.

On the Road

- Test the trailer brakes.
- Every time you stop—inspect the trailer.
- Stop and inspect the trailer if you hear anything unusual or if the handling characteristics of the trailer have changed.



Dumping the Trailer

Dump trailers need to be on firm and level ground (left-to-right, front-to-back) before raising them to the dump position. As the body raises the center of gravity shifts, wheels can sink and trailers can tip over.

Open the rear doors, making sure they are securely hooked to the sides of the trailer using the door hold back chains.

Ensure you have proper overhead clearance to power lines, canopies and tree branches before raising the dump bed. Electrocution can occur even without direct contact with power lines. Ensure the power lines are more than 15 feet away from the dump bed when it is in the fully raised position.

Unplug the 7 pin connector before you activate the dump feature on the trailer. The surge from the trailer battery into the tow vehicle can back feed the tow vehicles accessory circuit and blow the fuse or trip the circuit breaker.



Open the latch on the control box and remove the control module. Stand well clear of the dump bed. Push and hold the up button until the bed reaches approximately the halfway point of its dumping angle. With the dump controller in your hand walk to the rear of the trailer so you can determine if the load is transferring properly and if you have enough space for the remainder of the load. Never leave the control module when operating the dump bed. Stay at the controls until the dump bed is in the down position.



Unplug the 7 pin connector from the tow vehicle before activating the dump controller.

If there is not enough remaining space to safely off load the trailer, lower the dump bed by depressing the down button until the dump bed is in the down and traveling position. Pull the trailer forward and repeat the previous step. **Never drive with the dump bed raised.** The dump bed must be down before moving the trailer.

If there is enough space to safely unload the balance of the trailer raise the dump bed to the ¾ full open position. Repeat the process until the dump bed is raised fully.

If the load doesn't leave the dump bed when fully raised lower the bed. Once the bed is level manually free the load. **Never attempt to free the load from a raised dump bed.** Serious injury could occur.

Do not drive forward and stop quickly to "shock" the load out of the dump bed. Do not use the hydraulic controls to "jerk" the load out of the bed (toggling the up and down functions on the controller). The proper procedure to dislodge a stuck load is to lower the dump bed and dislodge the material by hand.

Hydraulics

Do not alter or substitute hydraulic components on the dump trailer. The hoist system is designed with each component being compatible with the safe and reliable operation of the hoist system. Under no circumstances should you alter the hydraulic pressure or flow rate to the hoist system. The hoist system should be repaired /maintained by a qualified hydraulic technician.

Never assist the hoist with a jack, crane/forklift, or heavy equipment.



Unloading Flowable Material (Rock, Sand, Mulch)

Flowable material will assume an even weight distribution within the trailer after a few minutes of driving. To unload flowable material from the dump bed the tow vehicle and trailer must be on a firm and level surface (front-to-back, left-to-right). Attempting to unload on soft or uneven surfaces may cause the trailer to overturn, causing death, serious injury and/or significant property damage.

When spreading flowable material the travel path for the trailer and the tow vehicle must be firm and level. Set the metering chains to the desired number of links to control the opening distance of the spreader gate. Ensure both sides are set to equal chain link lengths. Unlatch the spreader gate. Check the travel path to ensure the path is level (no crowning, shoulder or pot holes in the path of travel. Ensure the overhead clearance is free and clear of powerlines, canopies, tree branches.

Standing in a safe location operate the dump controller slightly. Materials can exert significant pressure against the spreader gate. This can cause the spreader gate to swing out with force. When unlatching the spreader gate stand clear and away from the potential swing path.

To adjust the dump rate raise the dump bed, typically in ¼ range increments (1/4, ½, ¾, full). You will need to raise the bed after a portion of the load has been spread to place the remaining material at the rear of the dump body. Do not shock or jerk the trailer to free up the load. Never try to manually free the load with the bed raised.

When the load is empty, or when the desired amount of material has been placed, lower the bed, stow the controller, close and latch the rear gates and reconnect the 7 pin connector.





Parking The Trailer - When Disconnected From The Tow Vehicle

The dump trailer is an expensive piece of equipment. You need to protect it when it is not in use. When parking secure the trailer with wheel chocks that are positioned to prevent the trailer from moving. Install the Nemesis Full Stop (Denver Boot) anti-theft device and the hitch ball locking device. See photos below.













Rain Storage

Don't leave the dump bed elevated. Adjust the front jack high enough to allow rain water to exit the trailer.

Changing a Flat Tire

As soon as you realize you have a flat tire take your foot off of the throttle to gradually slow down, do not hard brake or turn suddenly. Look for a safe, level area where the road is straight and oncoming traffic has an unobstructed view. Never attempt to change your tire on a turn or narrow shoulder near oncoming traffic. Slowly drive until you find a safer spot. Replacing a damaged tire and rim is far better than having an accident due to an inattentive oncoming driver.

- Find a level and safe place and pull as far from traffic as is safe. Avoid soft surfaces that could compress under the weight of the jack.
- Turn on your hazard lights and place reflectors to warn oncoming traffic.
- Remove the jack ramp, lug wrench and socket from the storage box.
- Unlock the spare tire security lock and remove the spare tire. The wheel lugs on the dump trailer are 13/16".
- While the flat tire is resting in contact with the pavement loosen but do not remove the lugs. Lugs nuts are really tight; you might need to use your body weight (place your foot on the lug wrench) to snap them loose.
- Place the jack ramp near the good tire. Note: don't have anyone stand near the jack ramp when you drive onto the jack ramp as it could slip out with substantial force and cause an injury.
- Slowly, very slowly drive up on the jack ramp taking care not to overshoot the jack ramps top surface.
- Apply the tow vehicles parking brake.
- The flat tire should be elevated enough to change the tire. Unscrew and remove the lugs. Remove the flat tire.
- Install the spare tire, tightening the lugs slightly more than finger tight.
- Release the parking brake and slowly drive down the jack ramp.
- With the tire resting in contact with the ground tighten the lugs on the new tire using an alternating star pattern, don't tighten lugs next to each other.
- Place the jack ramp, lug wrench, and socket back in the storage box.
- Place the flat tire into the bed of the tow vehicle.
- Schedule repair of the flat tire.

Review the photos on the next few pages.













Servicing The Dump Trailer

Annual maintenance shall be performed around July 4th.

When servicing and lubricating the trailers pivot points don't over pressurized the couplings. Stop as soon as grease is shown.

- Grease the trailer jacks top gears once per year.
- Grease the trailer bearings once per year.
- Grease the Zerk joints once per year.

The body prop that is supplied as part of the trailer is to be used only when the trailer is empty. The purpose of the body prop is to block out the hydraulic system to hold it in the raised position while performing maintenance on the hoist or the trailer itself.

Do not perform maintenance under a raised dump bed without the bed being empty, the body prop installed, the remote controller being locked out and the battery being disconnected.

Trailer tires should be rotated every 5,000 miles.

Once per year test the emergency trailer braking system by pulling the plunger. Disconnect the 7 pin connector from the tow vehicle. Testing the emergency trailer braking system with the wiring harness connected may result in damage to the trailer brake system. Always disconnect the wiring harness before testing or dumping. Pull the emergency trailer brake plunger. Attempt to tow the trailer a few feet while an observer watches the trailer wheels. All four wheel have brakes so the observer should see both wheels on each side grab. Repeat and have the observer move to the other side of the vehicle to ensure both are functioning properly. If brakes do not engage properly troubleshoot the power supply, wiring connections, brake adjustment and function and switch box. Repair or replace as required for proper operation.

Trouble shooting trailer or tow vehicle wiring - 7 pin connector

