

# Introduction

This manual is designed to provide information for you to understand, use, and maintain and service your trailer running gear system. Your axles are manufactured by Dexter Axle. The Dexter product line, the most complete in the industry, is the result of over 30 years of experience in the design, testing and manufacture of trailer axles. The Dexter running gear system consists of spindles, hubs, drums, brakes, and wheels which are engineered to provide you the finest towing and stopping performance currently available in the industry today.

Two Dexter philosophies are at work to provide you the best product available and have enabled us to maintain our position of leadership. First we operate on the theory that "there is always a better way" for a product to operate, to be manufactured, and/or to be serviced. We are constantly striving to find that better way.

Secondly, we maintain wall-to-wall production control so that all the major components of your running gear system are manufactured in **Dexter** facilities under our strict quality control standards. These manufactured components include the axle beam, hubs, drums, spindles, brakes, magnets, rims, wheels and most of the steel stampings used in the attachment of your axle to your trailer. Dexter has the most complete, state-of-the-art manufacturing facilities which enables us to provide you, the trailer owner, with the finest product possible.

***For all your running gear needs...***

***Look first to Dexter!***

**Now visit us at our web site!  
[www.dexteraxle.com](http://www.dexteraxle.com)**



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## **Important Safety Notice**

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all running gear as well as the personal safety of the individual doing the work. This manual provides general directions for performing service and repair work with tested, effective techniques. Following these guidelines will help assure reliability.

There are numerous variations in procedures, techniques, tools, parts for servicing axles, as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this manual must first establish that they neither compromise their personal safety nor the vehicle integrity by their choice of methods, tools, or parts.

Refer to your vehicle manufacturers owner's manual for additional procedures, techniques, and warnings prior to performing any maintenance or repairs.



**THIS SYMBOL WARNS OF POSSIBLE  
PERSONAL INJURY.**

## **Set-up and Adjustment**

For proper performance, all new axles should have the following checked at the specified intervals:

- *Wheel Nut Torque:* at 10, 25, and 50 miles (page 45)
- *Brake Adjustment:* at 200 and 3000 miles (page 31)
- *Tire pressure:* to manufacturers requirements (page 46)
- *Brake synchronization* - set brake controller per controller manufacturer's directions (page 10)

## Electric Brakes -Features

Electrically actuated brakes have several advantages over other brake actuation systems.

1. They can be manually adjusted to provide the correct braking capability for varying road and load conditions.
2. They can be modulated to provide more or less braking force, thus easing the brake load on the towing vehicle.
3. They have very little lag time from the moment the tow vehicle's brakes are actuated until the trailer brakes are actuated.
4. In an emergency situation, they can provide some braking independent of the tow vehicle.

## Operation

The electric brakes on your trailer are similar to the drum brakes on your automobile. The basic difference is that your automotive brakes are actuated by hydraulic pressure while your electric trailer brakes are actuated by an electromagnet. With all of the brake components connected into the system, the brake will operate as follows: (see electric brake assembly illustration on page 10)

When the electrical current is fed into the system by the controller, it flows through the electromagnets in the brakes. The high capacity electromagnets are energized and are attracted to the rotating armature surface of the drums which moves the actuating levers in the direction that the drums are turning.

The resulting force causes the actuating cam block at the shoe end of the lever to push the primary shoe out against the inside surface of the brake drum. The force generated by the primary shoe acting through the adjuster link then moves the secondary shoe out into contact with the brake drum.

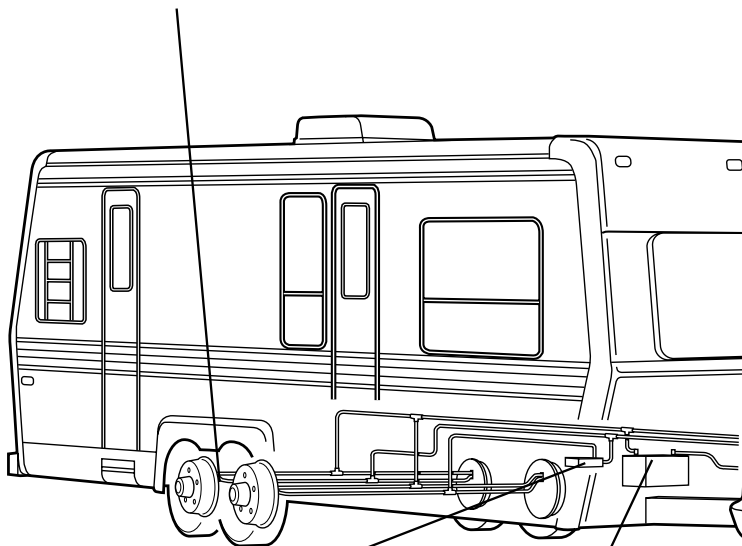
Increasing the current flow to the electromagnet causes the magnet to grip the armature surface of the brake drum more firmly. This results in increasing the pressure against the shoes and brake drums until the desired stop is accomplished.





**Dexter Electric Brakes**

Wired in parallel



**Front Axle Resistor**

(Optional)

Helps eliminate front wheel lockup and front axle bounce if problem occurs with tandem axle trailers.

**Breakaway Battery**

Provides power to actuate trailer brakes in the event of trailer breakaway.

**Controller**

Controls the set point at which the trailer brakes are energized during braking.

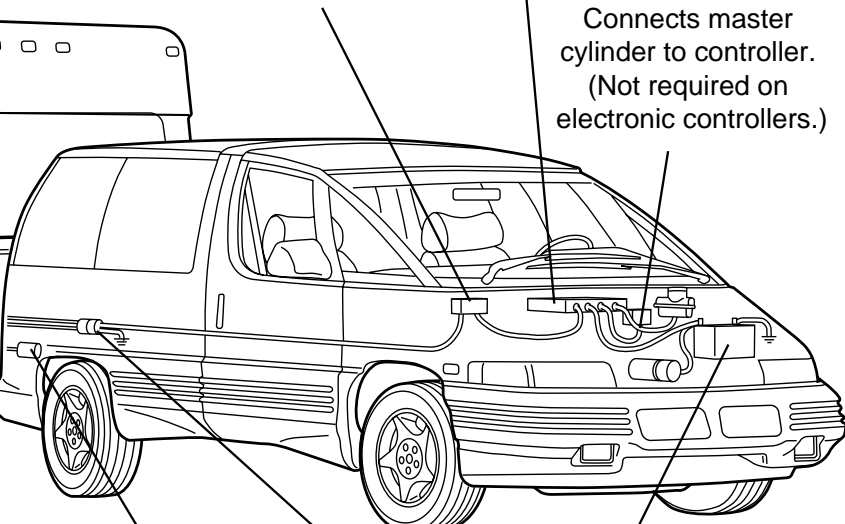
(Optional)

**System Resistor**

Permits adjustment of trailer braking power for varying driving or load conditions.

**Hydraulic Line**

Connects master cylinder to controller. (Not required on electronic controllers.)



**Battery**

Connect controller directly.

**Breakaway Switch**

Switches battery power to brakes if breakaway occurs.

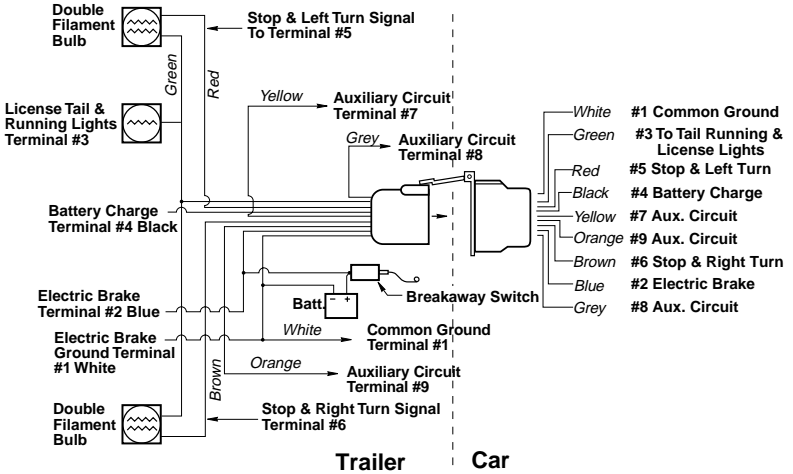
**Connector**

Used to connect and disconnect trailer and tow vehicle. (Always ground trailer brakes through connector.)

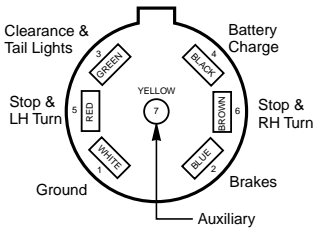




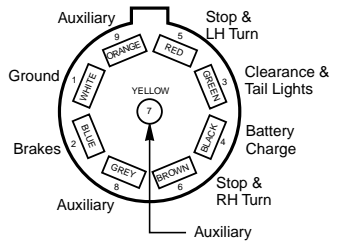
## Typical Connector Wiring



7-Circuit Receptacle



9-Circuit Receptacle



View Looking into Tow Vehicle Receptacle

## ***Parking Brake Option*** *(not available on all sizes)*

Dexter electric brakes with parking brake option, are mechanically operated by cable means. The cable attachment occurs outside of the brake backing plate. Cable force applied to the parking lever creates a torque through the pivot pin and cam assembly. Torque transferred to the parking cam results in a spreading force between the primary and secondary shoes. The shoes in turn, move towards the drum until contact is made. Friction generated between the drum and lining contact surface results in parking brake capability.

## ***Trailer Wire Size Chart***

Number of Brakes	Hitch-to-Axle Distance in Feet	Recommended Minimum Hookup Wire Size (Copper)
2		12 AWG
4	Under 30	12 AWG
4	30-50	10 AWG
6	Under 30	10 AWG
6	30-50	8 AWG

## ***How To Use Your Electric Brakes Properly***

Your trailer brakes are designed to work in synchronization with your tow vehicle brakes. Never use your tow vehicle or trailer brakes alone to stop the combined load.

Your trailer and tow vehicle will seldom have the correct amperage flow to the brake magnets to give you comfortable, safe braking unless you make proper brake system adjustments. Changing trailer load and driving conditions as well as uneven alternator and battery output can mean unstable current flow to your brake magnets. It is therefore imperative that you maintain and adjust your brakes as set forth in this manual, use a properly modulated brake controller, and perform the synchronization procedure noted below.

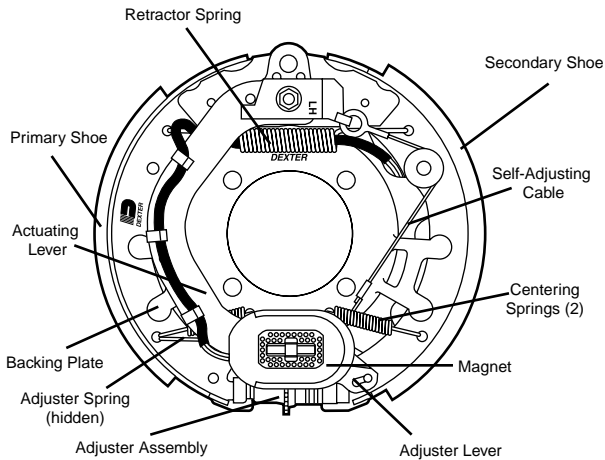




In addition to the synchronization adjustment detailed below, electric brake controllers provide a modulation function that varies the current to the electric brakes with the pressure on the brake pedal or amount of deceleration of the tow vehicle. It is important that your brake controller provide approximately 2 volts to the braking system when the brake pedal is first depressed and gradually increases the voltage to 12 volts as brake pedal pressure is increased. If the controller “jumps” immediately to a high voltage output, even during a gradual stop, then the electric brakes will always be fully energized and will result in harsh brakes and potential wheel lockup.

Proper synchronization of tow vehicle to trailer braking can only be accomplished by road testing. Brake lockup, grabbiness, or harshness is quite often due to the lack of synchronization between the tow vehicle and the trailer being towed, too high of a threshold voltage (over 2 volts), or under adjusted brakes.

Before any synchronization adjustments are made, your trailer brakes should be burnished-in by applying the brakes 20-30 times with approximately a 20 m.p.h. decrease in speed, e.g. 40 m.p.h. to 20 m.p.h. Allow ample time for brakes to cool between application. This allows the brake shoes and magnets to slightly “wear-in” to the drum surfaces.



*Electric brake assembly*

## To Synchronize

To insure safe brake performance and synchronization, *read the brake controller manufacturer's instructions completely before attempting any synchronization procedure.*



### CAUTION:

*Before making road tests, make sure the area is clear of vehicular and pedestrian traffic.*

Make several hard stops from 20 m.p.h. on a dry paved road free of sand and gravel. If the trailer brakes lock and slide, decrease the gain setting on the controller. If they do not slide, slightly increase the gain setting. Adjust the controller just to the point of impending brake lockup and wheel skid.

**Note:** *Minimum vehicle stopping distances are achieved when wheels approach lock up. Brake lock up should be avoided as it results in poor vehicle stability and control. Depending on load, brake type, wheels and tires, not all trailer brakes are capable of wheel lockup.*

If the controller is applying the trailer brakes before the tow vehicle brakes, then the controller level adjustment should be adjusted so the trailer brakes come on in synchronization with the tow vehicle brakes. For proper braking performance, it is recommended that the controller be adjusted to allow the trailer brakes to come on just slightly ahead of the tow vehicle brakes. When proper synchronization is achieved there will be no sensation of the trailer “jerking” or “pushing” the tow vehicle during braking.



### CAUTION:

*Do not adjust this control outside the parameters outlined by the brake controller manufacturer's instructions.*

## Controllers

Start by making sure the trailer brakes are properly adjusted. (see page 12 & 27) Some controllers have a gain control to vary the amount of current to the brakes, and a level control which sets the controller's inertia sensor to sense deceleration. The





level adjustment also can be used to vary when the trailer braking is felt. The gain or output control adjustment usually controls the maximum amount of amperage available to the brakes. This can be adjusted for varying trailer loads. The chart below details adjustments available for different brake controllers.

<b>Controller*</b>	<b>Adjustment to control brake timing</b>	<b>Adjustment for brake force</b>
Tekonsha 9030,9035, 9040,9045,9055	Level	Gain
Kelsey 81741A	Level	Gain
Draw-Tite 5100	Sync	Output

\*See manufacturers instructions

## General Maintenance

### ***Brake Adjustment***

Brakes should be adjusted (1) after the first 200 miles of operation when the brake shoes and drums have “seated,” (2) at 3000 mile intervals, (3) or as use and performance requires. The brakes should be adjusted in the following manner:

1. Jack up trailer and secure on adequate capacity jack stands. Follow trailer manufacturers recommendations for lifting and supporting the unit. Check that the wheel and drum rotate freely.



#### **CAUTION:**

*Do not lift or support trailer on any part of the axle or the suspension system.*

2. Remove the adjusting hole cover from the adjusting slot on the bottom of the brake backing plate.
3. With a screwdriver or standard adjusting tool, rotate the starwheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.

**Note:** *With drop spindle axles, a modified adjusting tool with about an 80 degree angle should be used.*

4. Then rotate the starwheel in the opposite direction until the wheel turns freely with a slight lining drag.
5. Replace the adjusting hole cover and lower the wheel to the ground.
6. Repeat the above procedure on all brakes.



**CAUTION:**

*Never crawl under your trailer unless it is resting on properly placed jack stands*

Follow the trailer manufacturers recommendations for lifting and supporting the unit. Do not lift or place supports on any part of the suspension system.

## ***Brake Cleaning and Inspection***

Your trailer brakes must be inspected and serviced at yearly intervals or more often as use and performance requires. Magnets and shoes must be changed when they become worn or scored thereby preventing adequate vehicle braking.

Clean the backing plate, magnet arm, magnet, and brake shoes. Make certain that all the parts removed are replaced in the same brake and drum assembly. Inspect the magnet arm for any loose or worn parts. Check shoe return springs, hold down springs, and adjuster springs for stretch or deformation and replace if required.



**CAUTION:**

***ASBESTOS DUST HAZARD!***

*Since some brake shoe friction materials contain asbestos, certain precautions need to be taken when servicing brakes:*

1. Avoid creating or breathing dust.
2. Avoid machining, filing or grinding the brake linings.
3. Do not use compressed air or dry brushing for cleaning. (Dust can be removed with a damp brush.)





## Brake Lubrication

Before reassembling, apply a light film of Lubriplate or similar grease, or anti-seize compound on the brake anchor pin, the actuating arm bushing and pin, and the areas on the backing plate that are in contact with the brake shoes and magnet lever arm. Apply a light film of grease on the actuating block mounted on the actuating arm.

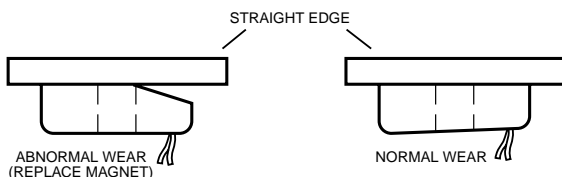


### CAUTION:

*Do not get grease or oil on the brake linings, drums or magnets.*

## Magnets

Your electric brakes are equipped with high quality electromagnets that are designed to provide the proper input force and friction characteristics. Your magnets should be inspected and replaced if worn unevenly or abnormally. As indicated below a straightedge should be used to check wear.



Even if wear is normal as indicated by your straightedge, the magnets should be replaced if any part of the magnet coil has become visible through the friction material facing of the magnet. It is also recommended that the drum armature surface be re-faced when replacing magnets. (See Brake Drum Inspection on page 32.) Magnets should also be replaced in pairs - both sides of an axle. Use only genuine Dexter replacement parts when replacing your magnets. Noted on the next page are the magnet replacement kits which will include the necessary specific instruction for replacement.

Brake Size	Magnet Kit No. (one magnet per kit)	Wire Color
7 x 1 <sup>1</sup> / <sub>4</sub>	K71-057-00 Since 4/90	White
7 x 1 <sup>1</sup> / <sub>4</sub>	K71-056-00 Prior to 4/90	Yellow
10 x 1 <sup>1</sup> / <sub>2</sub>	K71-057-00 Prior to 9/88	White *
10 x 1 <sup>1</sup> / <sub>2</sub>	K71-177-00 Since 9/88	Yellow
10 x 2 <sup>1</sup> / <sub>4</sub>	K71-104-00	Green
12 x 2	K71-105-00	White
12 x 2	K71-125-00 (7K)	Black
12 <sup>1</sup> / <sub>4</sub> x 2 <sup>1</sup> / <sub>2</sub>	K71-441-00	Red
12 <sup>1</sup> / <sub>4</sub> x 3 <sup>3</sup> / <sub>8</sub>	K71-375-00 oval magnet	White

\* Slight actuating arm magnet tab modification required.

## Shoes and Linings

A simple visual inspection of your brake linings will tell if they are usable. Replacement is necessary if the lining is worn (to within 1/16" or less), contaminated with grease or oil, or abnormally scored or gouged. Hairline heat cracks are normal in bonded linings and should not be a cause for concern. It is important to replace both shoes on each brake and both brakes of the same axle. This is necessary to retain the "balance" of your brakes. Contained in the chart on the next page are the Dexter replacement shoe and lining kits which will contain the specific instructions necessary for proper replacement.





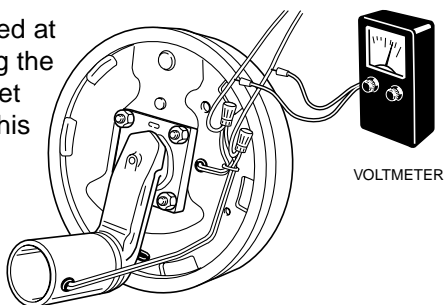
Brake Size	Shoe and Lining Replacement (1 Brake)	
	<i>Electric</i>	<i>Hydraulic</i>
7 x 1 <sup>1</sup> / <sub>4</sub>	K71-045-00	N/A
7 x 1 <sup>3</sup> / <sub>4</sub>	N/A	K71-466-00
10 x 2 <sup>1</sup> / <sub>4</sub>	K71-047-00	K71-267-00
Free Backing		K71-393-00
Corrosion Resistant		K71-423-00
12 x 2 (5.2K)	K71-048-00	K71-268-00
12 x 2 (6K)		K71-269-00 <sub>LH</sub> K71-270-00 <sub>RH</sub>
Free Backing		K71-394-00 <sub>LH</sub> K71-395-00 <sub>RH</sub>
Free Backing, Corrosion Resistant		K71-427-00 <sub>LH</sub> K71-428-00 <sub>RH</sub>
12 x 2 (7K)	K71-127-00	
12 <sup>1</sup> / <sub>4</sub> x 2 <sup>1</sup> / <sub>2</sub>	K71-410-00	N/A
12 <sup>1</sup> / <sub>4</sub> x 3 <sup>3</sup> / <sub>8</sub>	K71-049-00 <sub>LH</sub> K71-050-00 <sub>RH</sub>	K71-165-00 <sub>LH</sub> K71-166-00 <sub>RH</sub>

## Troubleshooting

Most electric brake malfunctions that cannot be corrected by either brake adjustments or synchronization adjustments can generally be traced to electrical system failure. Mechanical causes are ordinarily obvious, i.e. bent or broken parts, worn out linings or magnets, seized lever arms or shoes, scored drums, loose parts, etc. Voltmeter and ammeter are essential tools for proper troubleshooting of electric brakes.

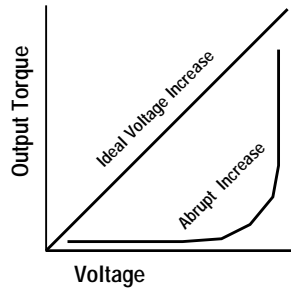
### *How to Measure Voltage*

System voltage is measured at the magnets by connecting the voltmeter to the two magnet lead wires at any brake. This may be accomplished by using a pin probe inserted through the insulation of the wires dropping down from the chassis or by



cutting the wires. The engine of the towing vehicle should be running when checking the voltage so that a low battery will not affect the readings.

Voltage in the system should begin at 0 volts and, as the controller bar is slowly actuated, should gradually increase to about 12 volts. This is referred to as modulation. No modulation means that when the controller begins to apply voltage to the brakes it applies an immediate high voltage, which causes the brakes to apply instantaneous maximum power.

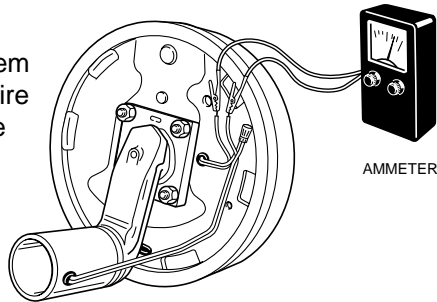


The threshold voltage of a controller is the voltage applied to the brakes when the controller first turns on. The lower the threshold voltage the smoother the brakes will operate. Too high of a threshold voltage (in excess of 2 volts as quite often found in heavy duty controllers) can cause grabby, harsh brakes.

## How to Measure Amperage

System amperage is the amperage being drawn by all brakes on the trailer. The engine of the towing vehicle should be running when checking amperage.

One place to measure system amperage is at the BLUE wire of the controller which is the output to the brakes. The BLUE wire must be disconnected and the ammeter put in series into the line. System amperage draw should be as noted in the following table. Make sure your ammeter has sufficient capacity and note polarity to prevent damaging your ammeter.



If a resistor is used in the brake system, it must be set at zero or bypassed completely to obtain the maximum amperage reading.





Individual amperage draw can be measured by inserting the ammeter in the line at the magnet you want to check. Disconnect one of the magnet lead wire connectors and attach the ammeter between the two wires. Make sure that the wires are properly reconnected and sealed after testing is completed.

**By far, the most common electrical problem is low or no voltage and amperage at the brakes.** Common causes of this condition are:

1. Poor electrical connections
2. Open circuits
3. Insufficient wire size
4. Broken wires
5. Blown fuses (Fusing of brakes is not recommended.)
6. Improperly functioning controllers or resistors

Another common electrical problem is shorted or partially shorted circuits (indicated by abnormally high system amperage). These are occasionally the most difficult to find. Possible causes are:

1. Shorted magnet coils
2. Defective controllers
3. Bare wires contacting a grounded object

Finding the system short is a matter of isolation. If the high amperage reading drops to zero by unplugging the trailer, then the short is in the trailer. If the amperage reading remains high with all the brake magnets disconnected, the short is in the trailer wiring.

All electrical troubleshooting procedures should start at the controller. Most complaints regarding brake harshness or malfunction are traceable to improperly adjusted or non-functioning controllers. See your controller manufacturer's data for proper adjustment and testing procedures. If the voltage and amperage is not satisfactory, proceed on to the connector and then to the individual magnets to isolate the problem source. 12 volts output at the controller should equate to 10.5 volts minimum at each magnet. Nominal system amperage at 12 volts with magnets at

normal operating temperatures, i.e. not cold, system resistor at zero and controller at maximum gain should be as detailed in the following chart:

### ***Magnet Amperes Chart***

<b>Brake Size</b>	<b>Amps/ Magnet</b>	<b>Two Brakes</b>	<b>Four Brakes</b>	<b>Six Brakes</b>
7 x 1 <sup>1</sup> / <sub>4</sub>	2.5	5.0	10.0	15.0
10 x 1 <sup>1</sup> / <sub>4</sub>	3.0	6.0	12.0	18.0
10 x 2 <sup>1</sup> / <sub>4</sub>	3.0	6.0	12.0	18.0
12 x 2	3.0	6.0	12.0	18.0
12 <sup>1</sup> / <sub>4</sub> x 2 <sup>1</sup> / <sub>4</sub>	3.0	6.0	12.0	18.0
12 <sup>1</sup> / <sub>4</sub> x 3 <sup>3</sup> / <sub>8</sub>	3.0	6.0	12.0	18.0





# Troubleshooting

SYMPTOM	CAUSES	REMEDIES
No Brakes	Open Circuits	Find & Correct
	Severe Underadjustment	Adjust Brakes
	Faulty Controller	Test & Correct
	Short Circuits	Find & Correct
Weak Brakes	Grease or Oil on Magnets or Linings	Clean or Replace
	Corroded Connections	Clean & Correct Cause of Corrosion
	Worn Linings or Magnets	Replace
	Scored or Grooved Brake Drums	Machine or Replace
	Improper Synchronization	Correct
	Underadjustment	Adjust Brakes
	Glazed Linings	Reburnish or Replace
	Overloaded Trailer	Correct
Locking Brakes	Underadjustment	Adjust
	Improper Synchronization	Correct
	Faulty Controller	Test & Correct
	Loose, Bent or Broken Brake Components	Replace Components
	Out-of-Round Brake Drums	Machine or Replace
	Insufficient Wheel Load	Adjust System Resistor and Synchronize
Intermittent Brakes	Faulty Controller	Test & Correct
	Broken Wires	Repair or Replace
	Loose Connections	Find & Repair
	Faulty Ground	Find & Repair

# Troubleshooting

SYMPTOM	CAUSES	REMEDIES
Brakes Pull to One Side	Wrong magnet lead wire color	Correct
	Incorrect Adjustment	Adjust
	Grease or Oil on Linings or Magnets	Clean or Replace
	Broken Wires	Find & Repair
	Bad Connections	Find & Repair
Harsh Brakes	Underadjustment	Adjust
	Improper Synchronization	Correct
	Improper Controller	Change
	Faulty Controller	Test & Correct
Noisy Brake	Underadjustment	Adjust
	Lack of Lubrication	Lubricate
	Broken Brake Components	Replace Component
	Incorrect Brake Components	Correct
Surging Brakes	Grease or Oil on Linings or Magnet	Clean or Replace
	Out-of-Round or Cracked Brake Drums	Machine or Replace
	Faulty Controller	Test & Correct
Dragging Brakes	Overadjustment	Readjust
	Out-of-Round Brake Drums	Machine or Replace
	Incorrect Brake Components	Replace
	Loose, Bent or Broken Brake Components	Replace
	Faulty Breakaway Switch	Repair or Replace
	Loose Wheel Bearing Adjustment	Adjust
	Bent Spindle	Replace Axle





## Hydraulic Brakes

The hydraulic brakes on your trailer are much like those on your car. The hydraulic fluid from a master cylinder is used to actuate the wheel cylinder which, in turn, applies force against the brake shoes and drum. The main differences between automotive hydraulic brakes and hydraulic trailer brakes are the actuation systems which transfer the braking signal from the tow vehicle to the brakes. Descriptions of the most popular hydraulic actuation systems are as follows:

### Vacuum / Hydraulic

The basic actuation system consists of a vacuum booster, synchronizing valve, check valve and a plumbing kit which includes all lines and fittings. A vacuum supply from the engine manifold is routed to the front of the booster and the top chamber of the synchronizing valve through flexible hoses. The rear of the booster and the lower chamber of the synchronizing valve are connected by a separate line. The vacuum from the engine must pass through a normally closed check valve. The check valve keeps gas vapor out of the system and insures that the highest vacuum available will be kept in the system. With the engine running and with no brake pedal pressure, a vacuum exists throughout the system. The synchronizing valve is connected to the master cylinder hydraulic supply. When the brake pedal is applied, the hydraulic pressure in the synchronizing valve forces a poppet to open which allows atmospheric air to enter the bottom chamber of the valve. Since this part of the valve is connected to the rear of the vacuum booster, the vacuum on this side of the booster chamber is lost. The vacuum on the front side of the booster chamber is maintained and this atmospheric / vacuum pressure differential causes a piston to move in the booster's slave cylinder. This piston applies the hydraulic pressure to the brakes through the connecting hydraulic line. When the pedal is released, the poppet in the synchronizing valve is closed, and by internal passages, the air in the rear of the booster chamber is removed. This restores a vacuum which is equal to the vacuum in the front part of the booster chamber. The pressure balance allows the slave cylinder piston to be pulled back to its original position and the hydraulic pressure to the brakes is released.

## Air / Hydraulic

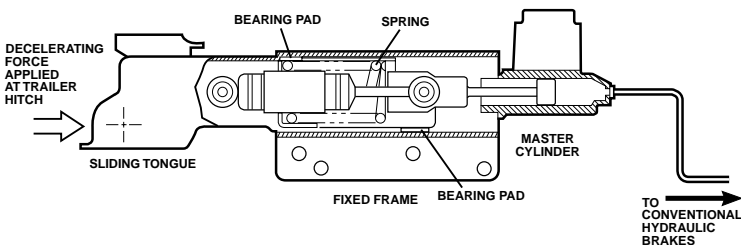
Air / hydraulic braking systems are commonly used when the tow vehicle has a diesel engine which does not develop manifold vacuum. The air / hydraulic tow vehicle has an air compressor mounted on the engine to supply compressed air for the braking system and other needs required by the tow vehicle trailer combination. This air is routed to a booster chamber attached to the trailer master cylinder. The air pressure multiplies hydraulic output pressure which then sends fluid to the wheel cylinders. The air over hydraulic systems are often controlled by a series of control valves and servos to insure proper braking under all conditions.

## Electric / Hydraulic

Electric over hydraulic systems consist of an actuator and battery mounted on the trailer that contains an electric powered hydraulic pump or an electric powered ball screw that strokes a master cylinder. A standard electric brake controller is used in the tow vehicle to control the actuator by sending a proportional signal to the actuator. After receiving the signal, the actuator generates a proportional hydraulic pressure in the trailer brakes.

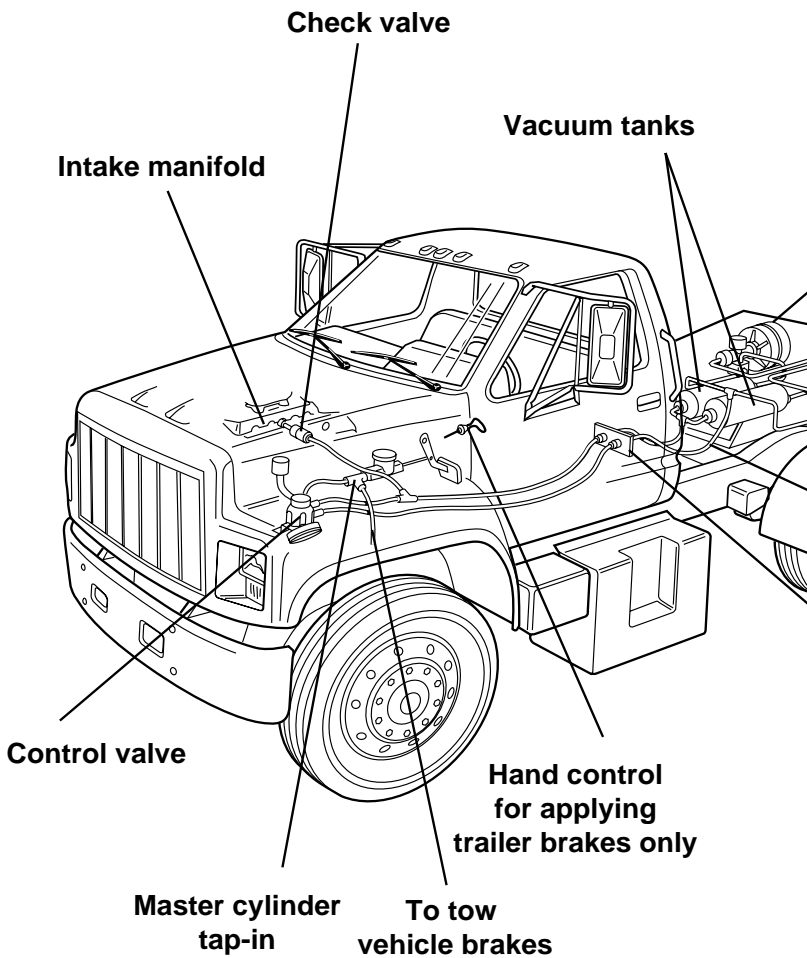
## Surge Braking System

The surge braking system uses a specially designed trailer hitch coupler which has a hydraulic cylinder built in. When the tow vehicle applies its brakes, the tow vehicle decelerates causing the trailer to apply a pushing force against the hitch. This force actuates the surge hitch hydraulic cylinder, transferring high pressure brake fluid to the wheel cylinder. The trailer brakes are now applied.

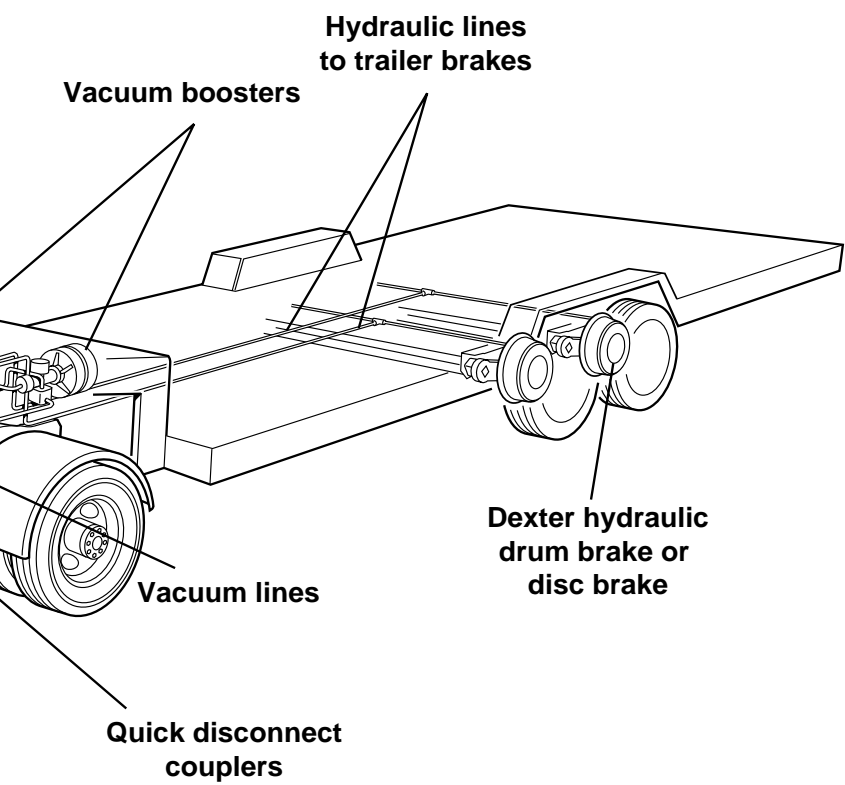




# Braking Systems - Hydraulic



*Vacuum / Hydraulic braking system*



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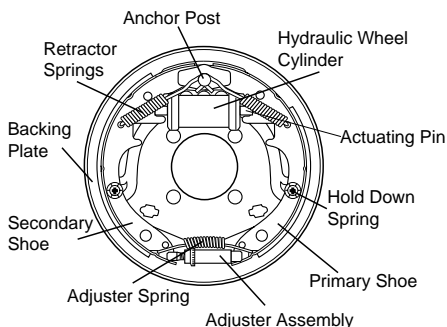
## Hydraulic Brake Operation

### *Duo-Servo*

The duo-servo brake uses a dual piston wheel cylinder to apply the brakes. This type of brake is typically used in a vacuum/hydraulic, electric/hydraulic or air/hydraulic system. A description of operation of this brake is as follows:

When the brakes are applied, the double-acting wheel cylinder moves the primary and secondary shoes towards the drum. The frictional force between the brake drum and lining attempts to turn the primary shoe into the secondary

shoe. The secondary shoe is forced onto the anchor pin and from this point, the secondary and primary shoes attempt to 'wrap around'. In essence, the brake has utilized frictional force to help the applying force on both shoes.

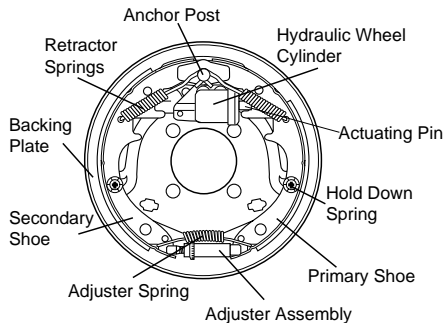


If the brakes are applied while the vehicle is backing, the shoes rotate in the direction of the drum rotation. This causes the secondary shoe to leave the anchor and causes the primary shoe to move against the anchor. Action of the brake is therefore the same in reverse as forward.

### *Uni-servo*

This type of hydraulic brake utilizes a single acting cylinder. Upon actuation, the primary shoe is pressed against the brake drum, which causes the shoe to move in the direction of rotation. This movement in turn actuates the secondary shoe through the adjuster link assembly. Another variation is called a "free backing" brake which is commonly used on trailers with a surge hitch system. When backing with a surge brake hitch, the brakes are applied through the surge mechanism, and if there is more brake force on the trailer than the tow vehicle can override,

no backing is possible. The free backing brake was developed to allow backing in this application. This brake has a primary shoe on a pivot which allows normal application in the forward direction, but allows the primary shoe to rotate away from the drum surface when backing.



## Self-Adjusting Mechanism for 12<sup>1</sup>/<sub>4</sub>" Brakes

### Electric Brakes

Design prior to 10/96 only adjusts the brake shoes outward during a reverse stop. The mechanism consisted of an adjuster screw, an adjuster lever, pivot pin, an adjuster return spring (blue or white), a cable, and a cable anchor (also known as shoe guide plate). On one end, the adjuster lever pivots on the pivot pin that is pressed into the shoe web. The other end of the adjusting lever engages the teeth of the star wheel. A cable guide is staked into the secondary shoe web. When a reverse stop is made and there is need for shoe adjustment, the secondary shoe moves away from the anchor post pulling on the cable. Since the cable is anchored on the top end and hooked on the lever on the other end, the lever is pulled upward turning the star wheel and thus increasing the diameter of the shoes. When the brake is released and the secondary shoe returns to the anchor post, the adjuster return spring returns the lever and cable to their starting position.

Forward self adjust brakes released after 10/96 adjusts the brakes on both forward and reverse stops. The reverse stop adjustment is the same as the previous design. Forward brake adjustment occurs when the modified shoe guide plate (cable anchor) rotates when engaged by the pin that is staked in the rotating magnet lever arm. A modification to the anchor post prevents the shoe guide plate from being clamped tight as in the previous design. The rotating shoe guide plate (cable anchor) pulls the cable that lifts the adjuster lever to turn the adjuster star





wheel. After the brake shoes obtain proper adjustment, there is insufficient movement of the magnet lever arm to cause enough rotation of the shoe guide to pull the cable to engage the next tooth on the adjuster star wheel. When the linings have worn sufficiently, the increased rotation of the lever arm and shoe guide plate will cause the adjuster lever to engage the next tooth on the adjuster and adjust the brake continuing to maintain a superior level of adjustment.

### **Hydraulic Brakes**

Previous design prior 3/97 adjusts only on reverse stops. The mechanism functions identical to the electric brake design described earlier. The only difference is the hydraulic brake adjuster cable is anchored directly on the brake anchor post and there is not a shoe guide plate.

Forward self adjust brakes released after 3/97 adjusts the brakes on both forward and reverse stops. Components include a new adjuster, adjuster lever arm, adjuster return springs, cable, cable anchor bracket, and an extension spring. The new cable anchor bracket fits over the anchor post and has a slotted hole. The extension spring attaches the cable anchor bracket to the primary brake shoe. The brake adjuster cable is routed from the cable anchor bracket, over the cable pulley, to the adjuster lever. The forward stop adjustment is accomplished when the primary shoe lifts sufficiently far off the anchor post. The extension spring connecting the primary shoe to the slotted cable anchor bracket pulls the bracket and the cable causing the adjuster lever to rotate the adjuster screw star wheel. This will continue on each brake apply until the shoe clearance is sufficiently small so that the primary shoe movement is insufficient to pull the cable to engage the next tooth on the adjuster star wheel.

### ***Hydraulic Parking Brake Option***

The parking feature on Dexter hydraulic brakes are cable operated. Cable attachment occurs inside of the brake backing plate. On Dexter 10" and 12" brakes, the parking cable mounts to the brake backing plate. The cable end is attached to the internal parking brake lever. On Dexter 12<sup>1</sup>/<sub>4</sub>" brakes, the parking cable mounts to a support plate which is attached to the inboard side of

# Troubleshooting

SYMPTOM	CAUSES	REMEDIES
No Brakes	Broken or Kinked Brake Line	Repair or Replace
	Severe Underadjustment	Adjust Brakes
	Malfunctioning Actuation System	Troubleshoot System
Weak Brakes	Brake Adjustment Not Correct	Manual-Adjust Brakes Automatic-Make Several Reverse Stops
	Excessively Worn Brake Linings	Replace Shoe and Lining
	Incorrect Lining	Install Correct Shoe and Lining
	Grease or Fluid Soaked Lining	Repair Grease Seal or Wheel Cylinder. Install New Shoe and Lining.
	Frozen Master Cylinder or Wheel Cylinder Pistons	Recondition or Replace All Cylinders, Brake Fluid
	Glazed Lining	Reburnish or Replace
	Excessive Drum Wear	Replace
	Trapped Air in Lines	Bleed System
	Overloaded Trailer	Correct
	Malfunctioning Actuating System	Troubleshoot System
Harsh Brakes	Brake Adjustment Not Correct	Manual-Adjust Brakes Automatic-Make Several Reverse Stops
	Grease or Fluid on Linings	Replace Shoes and Linings
Surging Brakes	Grease or Oil on Linings	Clean or Replace
	Out of Round Drums or Cracked Drums	Machine or Replace





# Troubleshooting

SYMPTOM	CAUSES	REMEDIES
Noisy Brakes	Underadjustment	Adjust
	Lack of Lubrication	Lubricate
	Broken Brake Components	Replace Components
	Incorrect Brake Components	Correct
Locking Brakes	Loose, Bent or Broken Brake Components	Replace Components
	Underadjustment	Adjust
	Out-of-Round Drums	Machine or Replace
Pulls to One Side	Incorrect Tire Pressure	Inflate Evenly on Both Sides to Req. Pressures
	Unmatched Tires on Same Axle	Match Tires on Axle
	Restricted Brake Lines or Hoses	Repair or Replace
	Malfunctioning Cylinder Assembly	Check for Stuck or Sluggish Pistons
	Defective or Damaged Shoe and Lining	Install New Shoe and Lining-Complete Axle
	One Side Out-of-Adjustment	Adjust
Dragging	Improper Fluid	Replace Rubber Parts Fill with DOT4 Fluid
	Blocked Master Cylinder	Open with Compressed Air or Replace Cylinder
	Parking Brake Cable Frozen	Free Cable and Lubricate
	Improper Lining Thickness or Location	Install New Shoes and Linings

the brake mounting flange. The cable end is routed through the dust shield and the brake spider to attach to the internal parking brake lever.

The internal parking brake lever of 10" and 12" Dexter brakes, which is mounted to the secondary shoe, transfers applied cable force through a parking strut which is attached to the primary shoe. This transferred load generates a spreading force between the primary and secondary shoes. The shoes in turn, move towards the drum until contact is made. Friction generated between the drum and lining contact surface results in parking brake capability.

The internal parking brake lever of Dexter 12<sup>1</sup>/<sub>4</sub>" brakes transfers the applied cable force through a cam mechanism. The cam mechanism generates a spreading force between the primary and secondary shoes. The shoes in turn, move towards the drum until contact is made. Friction generated between the drum and lining contact surface results in parking brake capability.

*Note: The parking brake option is **not** available on some torflex axles.*

## Maintenance

A properly installed vacuum / hydraulic, electric / hydraulic or air / hydraulic system should not require any special attention with the exception of routine maintenance such as shoe and lining replacement. If problems occur, the entire tow vehicle / trailer braking system should be traced by a qualified mechanic using a methodical approach to determine the exact source of the problem. Typical problems in a hydraulic braking system are:

- Air or Vacuum leaks
- Hydraulic system leaks
- Air in brake lines
- Water or other impurity in brake fluid
- Rusted or corroded master or wheel cylinders.
- Weak trailer battery on electric / hydraulic

Most of the brake components are very similar to those used in electric brakes, and maintenance is comparable for the hub and drum, shoes and linings, and bearings. Specific maintenance





activities are as follows:

### *Brake Adjustment*

As mentioned in the electric brake section, adjustment of your brakes is critical to proper brake performance. Adjustment intervals are after the first 200 miles, and every 3000 miles thereafter.

### *Wheel Cylinders*

Inspect for leaks and smooth operation. Clean with brake cleaner and flush with fresh brake fluid. Hone or replace as necessary.

### *Brake Lines*

Check for cracks, kinks, or blockage. Flush with fresh brake fluid. Bleed system to remove all air. Replace as necessary.

### *Shoes and Linings*

Inspect visually. Replace if the lining is worn (to within  $\frac{1}{16}$ " or less), contaminated with grease or brake fluid, or abnormally scored or gouged.

### *Hardware*

Check all hardware. Check shoe return spring, hold down springs, and adjuster springs for stretch or wear. Replace as required. Service kits are available.

### *Drums*

Check drums for scoring, cracking, or uneven wear. Turn drum smooth only if under maximum diameter. Replace as necessary.

## **Hubs / Drums / Bearings**

*(For Nev-R-Lube drums and bearings see page 39)*

### **Hub Removal**

Whenever the hub equipment on your axle must be removed for inspection or maintenance the following procedure should be utilized.

1. Elevate and support the trailer unit per manufacturers' instructions.

2. Remove the wheel.
3. Remove the grease cap by carefully prying progressively around the flange of the cap. If the hub is an oil lube type, then the cap can be removed by unscrewing it counterclockwise while holding the hub stationary.
4. Remove the cotter pin from the spindle nut or, in the case of E-Z Lube versions, bend the locking tang to the free position.
5. Unscrew the spindle nut (counterclockwise) and remove the spindle washer.
6. Remove the hub from the spindle, being careful not to allow the outer bearing cone to fall out. The inner bearing cone will be retained by the seal.
7. On 7200# and 8000# a hub puller should be used to assist drum removal.

## ***Brake Drum Inspection***

There are two areas of the brake drum that are subject to wear and require periodic inspection. These two areas are the drum surface where the brake shoes make contact during stopping and the armature surface where the magnet contacts (only in electric brakes.)

The drum surface should be inspected for excessive wear or heavy scoring. If worn more than .020" oversized, or the drum has worn out of round by more than .015", then the drum surface should be turned. If scoring or other wear is greater than .090" on the diameter, the drum must be replaced. When turning the drum surface, the maximum rebore diameter is as follows:

- 7" Brake Drum-7.090"
- 10" Brake Drum-10.090"
- 12" Brake Drum-12.090"
- 12<sup>1</sup>/<sub>4</sub>" Brake Drum-12.340"

The machined inner surface of the brake drum that contacts the brake magnet is called the armature surface. If the armature surface is scored or worn unevenly, it should be refaced to a 120 micro inch finish by removing not more than .030" of material. To insure proper contact between the armature face and the magnet face, the magnets should be replaced whenever the armature





surface is refaced and the armature surface should be refaced whenever the magnets are replaced.

**Note:** *It is important to protect the wheel bearing bores from metallic chips and contamination which result from drum turning or armature refacing operations. Make certain that the wheel bearing cavities are clean and free of contamination before reinstalling bearing and seals. The presence of these contaminants will cause premature wheel bearing failure.*

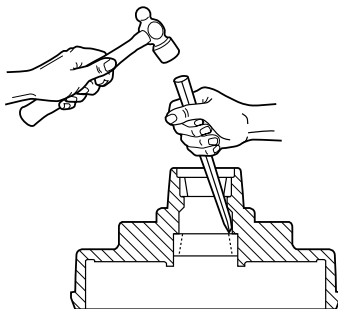
## Bearing Inspection

Wash all grease and oil from the bearing cone using a suitable solvent. Dry the bearing with a clean, lint-free cloth and inspect each roller completely. If any pitting, spalling, or corrosion is present, then the bearing must be replaced. The bearing cup inside the hub must be inspected.

**IMPORTANT:** *Bearings must always be replaced in sets of a cone and a cup.*

When replacing the bearing cup proceed as follows:

1. Place the hub on a flat work surface with the cup to be replaced on the bottom side.
2. Using a brass drift punch, carefully tap around the small diameter end of the cup to drive out.
3. After cleaning the hub bore area, replace the cup by tapping in with the brass drift punch. *Be sure the cup is seated all the way up against the retaining shoulder in the hub.*



Replace only with bearings as specified in the accompanying Bearing Replacement Chart.



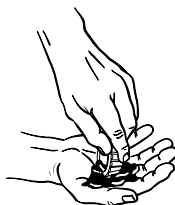
### CAUTION:

*Be sure to wear safety glasses when removing or installing force fitted parts. Failure to comply may result in serious eye injury.*

## Bearing Lubrication

Along with bearing adjustment, proper lubrication is essential to the current function and reliability of your trailer axle. Bearings should be lubricated every 12 months or 12,000 miles. The method to repack bearing cones is as follows:

1. Place a quantity of grease into the palm of your hand.
2. Press a section of the widest end of the bearing into the outer edge of the grease pile closest to the thumb forcing grease into the interior of the bearing.
3. Repeat this while rotating the bearing from roller to roller.
4. Continue this process until you have the entire bearing completely filled with grease.
5. Before reinstalling, apply a light coat of grease on the bearing cup.



## Bearing Replacement Chart

Brake Size	Hub Size	Bearings	Dexter Part # Cup & Cone	Industry Part # Cup/Cone
7 x 1 <sup>1</sup> / <sub>4</sub>	4 or 5 Bolt	Inner	31-31-4	L44610 / L44649
		Outer	31-31-4	L44610 / L44649
10 x 1 <sup>1</sup> / <sub>2</sub>	4 or 5 Bolt	Inner	31-32-3	LM67010 / LM67048
		Outer	31-31-4	L44610 / L44649
10 x 2 <sup>1</sup> / <sub>4</sub>	4 or 5 Bolt	Inner	31-33-3	L68111 / L68149
		Outer	31-31-4	L44610 / L44649
12 x 2	4 or 6 Bolt	Inner	31-30-3	25520 / 25580
		Outer	31-32-3	LM67010 / LM67048
12 x 2	5 Bolt Demount	Inner	31-30-3	25520 / 25580
		Outer	31-29-3	15245 / 15123
12 x 2	8 Bolt	Inner	31-30-3	25520 / 25580
		Outer	31-17-3	14276 / 14125A
12 x 2 *	6 Bolt	Inner	31-30-3	25520 / 25580
		Outer	31-29-3	15245 / 15123
12 <sup>1</sup> / <sub>4</sub> x 2 <sup>1</sup> / <sub>2</sub>	8 Bolt	Inner	31-30-3	25520 / 25580
		Outer	31-28-3	02420 / 02475
12 <sup>1</sup> / <sub>4</sub> x 3 <sup>3</sup> / <sub>8</sub>	8 Bolt	Inner	31-30-3	25520 / 25580
		Outer	31-28-3	02420 / 02475

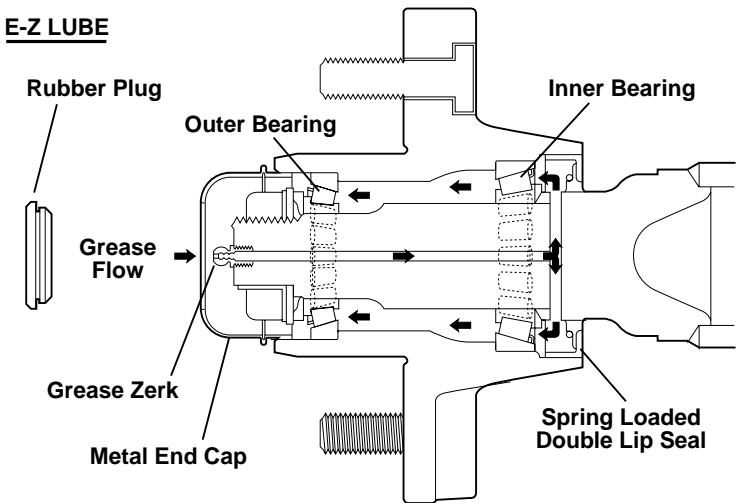
\*Special Application





## E-Z Lube

If your axle is equipped with the Dexter E-Z Lube feature, the bearings can be periodically lubricated without removing the hubs from the axle. This feature consists of axle spindles that have been specially drilled and fitted with a grease zerk in their ends. When grease is pumped into the zerk, it is channeled to the inner bearing and then flows back to the outer bearing and eventually back out the grease cap hole.



The procedure is as follows:

1. Remove the rubber plug from the end of the grease cap.
2. Place a standard grease gun onto the grease zerk located in the end of the spindle. Make sure the grease gun nozzle is fully engaged on the fitting.
3. Pump grease into the zerk. The old, displaced grease will begin to flow back out the cap around the grease gun nozzle.
4. When the new, clean grease is observed, remove the grease gun, wipe off any excess, and replace the rubber plug in the cap.
5. Rotate hub or drum while adding grease.

**Note:** The E-Z Lube feature is designed to allow immersion. Axles not equipped with E-Z Lube are not designed for immersion and bearings should be repacked after each immersion. If hubs are removed from an axle with the E-Z Lube feature, it is imperative that the seals be replaced **BEFORE** bearing lubrication. Otherwise, the chance of grease getting on brake linings is greatly increased.

If your axles are equipped with oil lubricated hubs, then your lubrication procedure is to periodically fill the hub with a high quality hypoid gear oil to the level indicated on the clear plastic oil cap. The oil can be filled from either the oil fill hole, if present, in the hub or through the rubber plug hole in the cap itself.

## **Recommended Wheel Bearing Lubrication Specifications**

### **Grease:**

Thickener Type ..... Lithium Complex  
 Dropping Point ..... 230°C (446°F) minimum  
 Consistency ..... NLGI No. 2  
 Additives ..... EP, Corrosion & Oxidation Inhibitors  
 Base Oil ..... Solvent Refined Petroleum Oil  
 Base Oil Viscosity ..... @40°C (104°F) 150cSt(695 SUS) Min.  
 Viscosity Index ..... 80 Minimum  
 Pour Point ..... -10°C (14°F) Minimum

### **Approved Sources:**

Mobil Oil ..... Mobilgrease HP  
 Exxon/Standard ..... Ronex MP  
 Kendall Refining Co. .... Kendall L-427  
 Ashland Oil Co. .... Valvoline Val-plex EP Grease  
 Pennzoil Prod. Co. .... Premium Wheel Bearing Grease 707L

### **Oil:**

SAE 90 Hypoid Gear (Hypoid Rear Axle Oil)  
*Use only with hubs equipped with oil option.*

### **Approved Sources:**

Union Oil Co. .... Union MP, Gearlube - LS  
 Exxon Co. USA ..... Gear Oil GX 80W-90  
 Mobil Oil Corp. .... Mobilube SHC 75W-90  
 Pennzoil Prod. Co. .... Multipurpose Gear Lubricant 4092,  
 ..... Multipurpose Gear Lubricant 4096



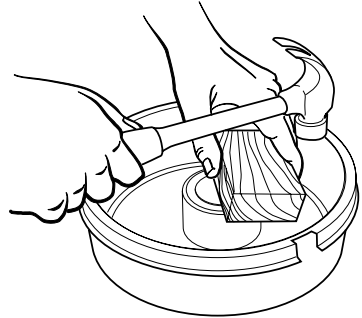


**Note:** The convenient lubrication provisions of the E-Z Lube and the oil lubrication must not replace periodic inspection of the bearings.

## Seal Inspection and Replacement

Whenever the hub is removed, inspect the seal to assure that it is not nicked or torn and is still capable of properly sealing the bearing cavity. If there is any question of condition, replace the seal. Use only the seals specified in the Seal Replacement Chart. To replace the seal:

1. Pry the seal out of the hub with a screwdriver. Never drive the seal out with the inner bearing as you may damage the bearing.
2. Apply a PERMATEX sealant to the outside of the new seal.



**Note:** Permatex sealant should not be used on rubber encased seals, i.e. 10-10 and 10-63.

3. Tap the new seal into place using a clean wood block.

## Seal Replacement Reference

Brake Size	Hub	Seal Part No.		
		Std.	E-Z Lube	Oil
7 x 1 <sup>1</sup> / <sub>4</sub>	4 or 5 Bolt	10-9	10-60	NA
10 x 1 <sup>1</sup> / <sub>2</sub>	4 or 5 Bolt	10-42	NA	NA
10 x 2 <sup>1</sup> / <sub>4</sub>	4 or 5 Bolt	10-4	10-19	NA
12 x 2	4 Bolt	10-1	10-10	NA
12 x 2 <sup>+</sup>	5 Bolt Demount; 6 or 8 Bolt	10-1	10-10	10-10
12 x 2 <sup>*</sup>	5 Bolt Demount; 6 or 8 Bolt	10-54	10-36	10-63
12 <sup>1</sup> / <sub>4</sub> x 2 <sup>1</sup> / <sub>2</sub>	8 Bolt	10-63	10-63	10-63
12 <sup>1</sup> / <sub>4</sub> x 3 <sup>3</sup> / <sub>8</sub>	8 Bolt	10-63	10-63	10-63

\*2.25 diameter seal journal after 10/97

\*2.12 seal journal prior to 10/97

## **Bearing Adjustment and Hub Replacement**

If the hub has been removed or bearing adjustment is required, the following adjustment procedure must be followed:

1. After placing the hub, bearings, washers, and spindle nut back on the axle spindle in reverse order as detailed in the previous section on hub removal, rotate the hub assembly slowly while tightening the spindle nut to approximately 50 lbs.-ft. (12" wrench or pliers with full hand force.)
2. Then loosen the spindle nut to remove the torque. *Do not rotate the hub.*
3. Finger tighten the spindle nut until just snug.
4. Back the spindle nut out slightly until the first castellation lines up with the cotter key hole and insert the cotter pin (or locking tang in the case of E-Z Lube.)
5. Bend over the cotter pin legs to secure the nut (or locking tang in the case of E-Z Lube)
6. Nut should be free to move with only restraint being the cotter pin (or locking tang.)

## **Nev-R-Lube Drums/Bearings**

### ***Drum Removal***

Whenever the hub equipment on your axle must be removed for inspection or maintenance the following procedure should be utilized.

1. Elevate and support the trailer unit per manufacturer's instructions.
2. Remove the wheel.
3. Remove the grease cap from the hub by carefully prying progressively around the flange.
4. Remove snap ring on the end of the spindle. Remove "torque instruction" washer.
5. Unscrew the spindle nut (counterclockwise) and remove the spindle washer.
6. Remove the hub from the spindle, the Nev-R-Lube bearing package will remain with the hub as a one piece unit when disassembling. Note: Do not remove cartridge bearing from the hub bore as this will damage the bearing unit, unless replacing with a new bearing pack.





## **Bearing Inspection**

### **Important:**

1. Elevate and support the trailer unit per manufacturers' instructions.
2. Check for excessive wheel end clearance by pulling the tire assembly towards you and by pushing the assembly away from you. Slight end play is acceptable.
3. Rotate tire slowly forwards and backwards. The wheel assembly should turn freely and smoothly.
4. Excessive wheel end play, restriction to rotation, noise, or "bumpy" rotation should be remedied by replacing the bearing unit.
5. Bearing units should be inspected every year or 12,000 miles whichever comes first.

**Note:** *A slight amount of grease weeping from the seal area is normal. Excessive leakage may indicate abnormal bearing operation.*

## **Bearing Replacement and Drum Installation**

1. Once the drum and bearing assembly is removed from the axle, remove "internal" snap ring from the bearing bore that retains bearing.
2. Using an arbor press and mandrel, press the bearing out of the drum. Bearing will exit on the wheel side of the drum.
3. When replacing a Nev-R-Lube bearing pack, the bore in the hub should be cleaned and inspected for visual damage (replace as necessary).
4. Installing the new bearing should be conducted using an arbor press and a "hollow" or "stepped" mandrel to press only on the outer housing of the bearing assembly (failure to follow procedure will damage bearing and/or seals during installation). Press bearing until it seats against the back-up shoulder machined into the hub.
5. Install "internal" snap ring into hub.
6. Clean and inspect spindle shaft. Apply never-seize lubricant to the spindle shaft prior to assembling drum.
7. Install drum assembly onto spindle (*DO NOT FORCE*).
8. Install steel washer onto spindle end.

9. Start self-locking nut onto spindle thread by hand. Complete installation using a 1½" or 1 7/16" socket and torque wrench. Nut should be torqued to 145-155 lb.-ft. (This torque will set the internal bearing adjustment, no other adjustments are to be made.)
10. Install "torque instruction" washer onto end of spindle.
11. Install "external" snap ring onto end of spindle to retain washer.
12. Inspect assembly for excessive end play, noise, and rotation restriction prior to mounting final wheel end hardware.

## Suspension

### Types

The suspension systems incorporated into Dexter axles are designed to provide the trailer owner three basic functions:

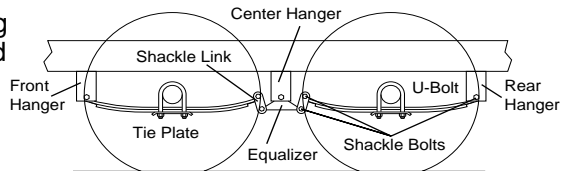
1. Attach the axle to the trailer
2. Dampen the effects of road shock
3. Provide stability to the trailer

All Dexter suspension systems are available in single and multiple axle configurations. These suspension systems are:

### Double Eye Leaf Springs

Double eye springs have eyes formed in each end of the spring and are attached to the trailer as follows:

1. The front spring eye is attached directly to the front hanger with a bolt and nut.
2. The rear spring eye is attached to a pair of shackle links which are

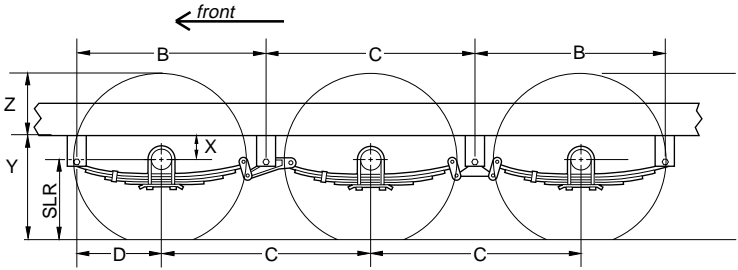


*Underslung Shown*



attached to either a rear hanger (in the case of single axle installation), or an equalizer (in the case of a tandem axle installation.)

3. For triple installation, the middle axle is towed by equalizer eye attachment.



The articulation of this suspension occurs when the spring becomes loaded and consequently lengthens. The double pivot action of the shackle links accommodates this articulation and allows the system to move freely.

In multiple axle installations the action is the same but with the additional movement of the equalizer assembly which serves to transfer instantaneous loads from one axle to another in an effort to “equalize” the load between the axles.

### Grease Lubricated Suspension Bushings

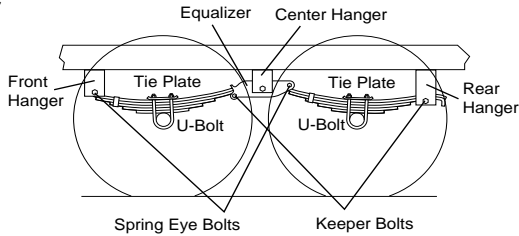
In the optional heavy duty attaching parts kits, the suspension bolts and equalizers have grease zerks which provide a lubrication path to the bronze bushing located in the spring eyes and equalizer. These parts should be periodically lubricated and inspected for signs of excessive wear, cracking, or hole elongation. If excessive wear, cracking or hole elongation exists, all links and worn parts should be immediately replaced.

### Slipper Leaf Springs

Slipper springs have an eye formed in one end only with the other end formed into a reverse curve. The attachment of these springs is as follows:

1. The front eye is attached directly into the front hanger with a bolt and nut.
2. The rear end of the spring is captured in the rear hanger or equalizer with a "keeper bolt" that prevents the spring from coming out when the trailer is jacked up for service.

The articulation of this suspension occurs when the rear end of each slipper spring slides against the wear surfaces provided in the rear hangers or equalizers. This suspension is also available in single and multiple axle configurations.



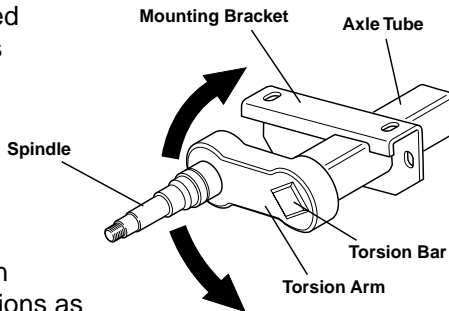
Overlung Shown

*Note: Failure to do proper and periodic maintenance of these important structural parts may result in severe and catastrophic injury or damage to property.*

## Torflex Suspension

The TORFLEX suspension system is a torsion arm type suspension which is completely self contained within the axle tube. It attaches directly to the trailer frame using brackets which are an integral part of the axle assembly. The TORFLEX axle provides improved suspension characteristics relative to leaf spring axles through the unique arrangement of a steel torsion bar surrounded by four natural rubber cords encased in the main structural member of the axle beam.

The wheel/hub spindle is attached to a lever, called the torsion arm, which is fastened to the rubber encased bar. As load is applied, the bar rotates causing a rolling/compressive resistance in the rubber cords. This action provides the same functions as





conventional sprung axles with several operating advantages including independent suspension.

## ***Inspection and Replacement***

All the components of your suspension system should be visually inspected at least every 6,000 miles for signs of excess wear, elongation of bolt holes, and loosening of fasteners. Whenever loose or replaced, the fasteners in your suspension system should be torqued as detailed in the charts below.

## ***Suspension Fastener Torque Values***

Item	Torque (lbs.-ft.)	
	Min	Max
3/8" U-Bolt	30	35
7/16" U-Bolt	45	60
1/2" U-Bolt	45	60

### **Non shoulder type**

Shackle Bolt	Snug fit only. Parts must rotate freely. Locking nuts or cotter pins are provided to retain nut-bolt assembly.	
Spring Eye Bolt		
Equalizer Bolt		

Shoulder Type	30	50
Shackle Bolt		

Worn spring eye bushings, sagging springs, or broken springs should be replaced using the following method.

1. Support the trailer with the wheels just off the ground. *Follow the trailer manufacturer's recommendations for lifting and supporting the unit. Do not lift or place supports on any part of the suspension system.*
2. After the unit is properly supported place a suitable block under the axle tube near the end to be repaired. This block is to support the weight of the axle only so that suspension COMPONENTS can be removed.
3. Disassemble the U-bolts, nuts, and tie plates.
4. Remove the spring eye bolts and remove the spring and place on a suitable work surface.

5. If the spring eye bushings are to be replaced, drive out the old bushing using a suitable drift punch.



## CAUTION:

*Be sure to wear safety glasses when removing or installing force fitted parts. Failure to comply may result in serious injury.*

6. Drive the new bushing into the spring eye using a piloted drift punch or a close fitting bolt inserted through the bushing.
7. Reinstall repaired or replaced components in reverse order.

**Note:** *For multiple axle units, the weight of each axle must be supported as outlined in Step 2 before disassembly of any component of the suspension system.*

If the equalizer or equalizer bushings must be replaced, follow the instructions above for lifting and supporting the trailer unit and then proceed as follows:

1. With both axles blocked up, remove the spring eye bolt, shackle bolt, and equalizer bolt from the equalizer to be repaired or replaced.
2. Take the equalizer to suitable work surface and remove the worn bushings using a suitable drift punch.
3. Drive the new bushings into place using a piloted drift punch or a close fitting bolt through the bushing.



## CAUTION:

*Be sure to wear safety glasses when removing or installing force fitted parts. Failure to comply may result in serious injury.*

4. Reassemble in reverse order.

All of the pivot points on your suspension system have been fitted with anti friction bearing materials which do not require routine lubrication. However, when otherwise servicing the unit, these pivot points may be lubricated if you so desire.

Except for periodic inspection of the fasteners used to attach the TORFLEX axle to the vehicle frame, no other suspension maintenance is required on TORFLEX axles. They are, of course, subject to the maintenance and inspection procedures regarding





brakes, hubs, bearings, seals, wheels, and tires as outlined in this manual.



**WARNING:**

**DO NOT WELD ON THE TORFLEX BEAM.** It has rubber cords inside and the heat generated by welding could damage the cord.

## Wheels

### **Wheel Selection**

Wheels are a very important and critical component of your running gear system. When specifying or replacing your trailer wheels it is important that the wheels, tires, and axle are properly matched. The following characteristics are extremely important and should be thoroughly checked when replacement wheels are considered.

1. *Bolt Circle.* Many bolt circle dimensions are available and some vary by so little that it might be possible to attach an improper wheel that does not match the axle hub. Be sure to match your wheel to the axle hub.
2. *Capacity.* Make sure that the wheels have enough load carrying capacity and pressure rating to match the maximum load of the tire and trailer.
3. *Offset.* This refers to the relationship of the center line of the tire to the hub face of the axle. Care should be taken to match any replacement wheel with the same offset wheel as originally equipped. Failure to match offset can result in reducing the load carrying capacity of your axle.
4. *Rim Contour.*



**DANGER:**

**Use only the approved rim contours as shown in the Tire and Rim Yearbook or the tire manufacturers catalog. The use of other rim contours is dangerous. Failure to use the proper rim contour can result in explosive separation of the tire and wheel and could cause a serious accident.**



## WARNING:

**Do not attempt to repair or modify a wheel. Even minor modifications can have a great effect. Do not install a tube to correct a leak through the rim. If the rim is cracked, the air pressure in the tube may cause the pieces of the rim to explode with great force and can cause serious injury or death.**

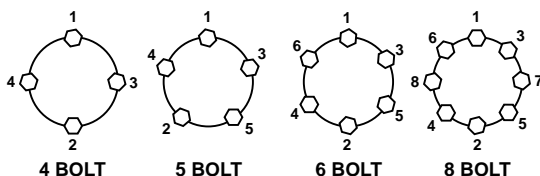
## Torque Requirements

It is extremely important to apply and maintain proper wheel mounting torque on your trailer axle. Torque is a measure of the amount of tightening applied to a fastener (nut or bolt) and is expressed as length times force. For example, a force of 90 pounds applied at the end of wrench one foot long will yield 90 lbs.-ft. of torque. Torque wrenches are the best method to assure the proper amount of torque is being applied to a fastener.

**Note:** *Wheel nut or bolts must be applied and maintained at the proper torque levels to prevent loose wheels, broken studs, and possible dangerous separation of wheels from your axle.*

Be sure to use only the fasteners matched to the cone angle of your wheel (usually 60° or 90°.) The proper procedure for attaching your wheels is as follows:

1. Start all bolts or nuts by hand to prevent cross threading.
2. Tighten bolts or nuts in the following sequence.
3. The tightening of the fasteners should be done in stages.



Following the recommended sequence, tighten fasteners per wheel torque chart below.

4. Wheel nuts/bolts should be torqued before first road use and after each wheel removal. Check and re torque after





the first 10 miles, 25 miles, and again at 50 miles. Check periodically thereafter.

## Wheel Torque Requirements

Wheel Size	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

## Tires

Before mounting tires onto wheels make certain that the rim size and contour is approved for the tire as shown in the Tire and Rim Association Yearbook or the tire manufacturers catalog. Also make sure the tire will carry the rated load. If the load is not equal on all tires due to trailer weight distribution, use the tire rated for the heaviest wheel position.

**Note:** *The capacity rating molded into the sidewall of the tire is not always the proper rating for the tire if used in a trailer application. Use the following guideline:*







1. LT and ST tires. Use the capacity rating molded into the tire.
2. Passenger Car Tires. Use the capacity rating molded into the tire sidewall **divided by 1.10**.

Use tire mounting procedures as outlined by the Rubber Manufacturers Association or the tire manufacturers.

Tire inflation pressure is the most important factor in tire life. Inflation pressure should be as recommended by the manufacturer for the load. Pressure should be checked cold before operation. Do not bleed air from tires when they are hot. Check inflation pressure weekly during use to insure the maximum tire life and tread wear. The following tire wear diagnostic chart will help you pinpoint the causes and solutions of tire wear problems.

**Note:** Tire wear should be checked frequently because once a wear pattern becomes firmly established in a tire it is difficult to stop, even if the underlying cause is corrected.

### **Tire Wear Diagnostic Chart**

Wear Pattern		Cause	Action
	<b>Center Wear</b>	Over Inflation	Adjust pressure to particular load per tire catalog
	<b>Edge Wear</b>	Under Inflation	Adjust pressure to particular load per tire catalog
	<b>Side Wear</b>	Loss of camber or overloading	Make sure load doesn't exceed axle rating. Align at alignment shop.
	<b>Toe Wear</b>	Incorrect toe-in	Align at alignment shop.
	<b>Cupping</b>	Out-of-balance	Check bearing adjustment and balance tires.
	<b>Flat Spots</b>	Wheel lockup & tire skidding	Avoid sudden stops when possible and adjust brakes.

## **Operation**

### **Storage Preparation**

If your trailer is to be stored for an extended period of time or over the winter, it is important that the trailer be prepared properly.

1. Remove the emergency breakaway battery and store inside, out of the weather. Charge the battery at least every 90 days.
2. Jack up the trailer and place jack stands under the trailer frame so that the weight will be off the tires. Follow trailer manufacturers guidelines to lift and support the unit. Never jack up or place jack stands on the axle tube or on the equalizers.





3. Lubricate mechanical moving parts such as the hitch, and suspension parts, that are exposed to the weather.
4. Boat trailer axles are subject to repeated immersion. Before storing, remove brake drums; clean, dry and re-lubricate moving brake components; inspect bearings - clean and re-lubricate.

**Note:** *On oil lubricated hubs the upper part of the roller bearings are not immersed in oil and are subject to potential corrosion. For maximum bearing life it is recommended that you revolve your wheels periodically (every 2-3 weeks) during periods of prolonged storage.*

## **After Prolonged Storage - Inspection Procedures**

Before removing trailer from jack stands:

1. Remove all wheels and hubs or brake drums. Note which spindle and brake that the drum was removed from so that it can be reinstalled in the same location.
2. Inspect suspension for wear.
3. Check tightness of hanger bolt, shackle bolt, and U-bolt nuts per recommended torque values.
4. Check brake linings, brake drums and armature faces for excessive wear or scoring.
5. Check brake magnets with an ohmmeter. The magnets should check 3.2 ohms. If shorted or worn excessively, replace.
6. Lubricate all brake moving parts using a high temperature brake lubricant. (LUBRIPLATE or Equivalent).



### **CAUTION:**

*Do not get grease or oil on brake linings or magnet face.*

7. Remove any rust from braking surface and armature surface of drums with fine emery paper or crocus cloth. Protect bearings from contamination while so doing.
8. Inspect oil or grease seals for wear or nicks. Replace if necessary.
9. Lubricate hub bearings. Refer to procedure in manual.

10. Reinstall hubs and adjust bearings per instructions in manual.
11. Mount and tighten wheels per instructions in manual.

## ***Trip Preparation Checklist***

There are a number of simple rules to follow in caring for your trailer axle assembly that can add to its life - and in the case of some of these rules, you may be protecting your own life as well. Using the following checklist before starting a trip with your trailer is highly recommended. Some of these items should be checked 2-3 weeks prior to planned trip to allow sufficient time to perform maintenance.

1. Check your maintenance schedule and be sure you are up-to-date.
2. Check hitch. Is it showing wear? Is it properly lubricated?
3. Fasten safety chains and breakaway switch actuating chain securely. Make certain the breakaway battery is fully charged.
4. Inspect towing hookup for secure attachment.
5. Load your trailer so that approximately 10% of the trailers total weight is on the hitch. For light trailers this should be increased to 15%.
6. *Do Not Overload.* Stay within your gross vehicle rated capacity. (Consult your trailers identification plate.)
7. Inflate tires according to manufacturers specifications; inspect tires for cuts, excessive wear, etc.
8. Check wheel mounting nuts/bolts with a torque wrench. Torque, in proper sequence, to the levels specified in this manual.
9. Make certain brakes are synchronized and functioning properly.
10. Check tightness of hanger bolt, shackle bolt, and U-bolts nuts per torque values specified in manual.
11. Check operation of all lights.
12. Check that your trailer is towing in a level position and adjust hitch height if required.





# Dexter Axle Limited Warranty

## WHAT PRODUCTS ARE COVERED

Dexter Axle's spring suspension type axles ("Spring Suspension Axles") and Torflex Axle Suspensions ("Torflex Axles").

LIMITED WARRANTY FOR SPRING SUSPENSION AXLES Dexter Axle warrants to the original purchaser that the Spring Suspension Axles will be free from defects in material and workmanship for a period of one (1) year from the date of purchase by the original purchaser.

## LIMITED WARRANTY FOR TORFLEX AXLES

Dexter Axle warrants to the original purchaser that the Torflex Axles, exclusive of hubs, drums, brakes, bearings and seals, will be free from defects in material and workmanship for a period of five (5) years from the date of purchase by the original purchaser.

Dexter Axle warrants to the original purchaser that the hubs, drums, brakes, bearings and seals that are part of the Torflex Axles will be free from defects in material and workmanship for a period of one (1) year from the date of purchase by the original purchaser.

## LIMITED WARRANTY FOR NEV-R-LUBE™ BEARINGS

Dexter Axle warrants to the original purchaser that these bearings will be free from defects in material and workmanship for a period of five (5) years OR 100,000 miles from the date of purchase by the original purchaser.

## EXCLUSIVE REMEDY

Dexter Axle will, at its option, repair or replace (without installation) the affected components of any defective Spring Suspension Axle or Torflex Axle, repair or replace (without installation) the entire defective Spring Suspension Axle or Torflex Axle, or refund the then-current list price of the Spring Suspension Axle or Torflex Axle. In all cases, a reasonable time period must be allowed for warranty repairs to be completed.

## WHAT YOU MUST DO

In order to make a claim under these warranties:

1. You must be the original purchaser of the vehicle in which the Spring Suspension Axles or Torflex Axles were originally installed.
2. You must promptly notify us within the warranty period of any defect and provide us with any substantiation that we may

reasonably request.

3. The Spring Suspension Axles and Torflex Axles must have been installed and maintained in accordance with good industry practice and any specific Dexter Axle's recommendations, including those specified in Dexter Axle's publication "Operation, Maintenance Service Manual."

## EXCLUSIONS

These warranties do not extend to or do not cover defects caused by:

1. The connecting of brake wiring to the trailer wiring or trailing wiring to the towing vehicle wiring.
2. The attachment of the running gear to the frame.
3. Hub imbalance, or any damage caused thereby.
4. Parts not supplied by Dexter Axle.
5. Any damage whatever caused by or related to any alteration of the axle.
6. Use of a Spring Suspension Axle or Torflex Axle on a unit other than the unit to which it was originally mounted.
7. Normal wear and tear.
8. Alignment.
9. Improper installation.
10. Damage (not resulting from defects in material or workmanship) while in the possession or the original purchaser.
11. Unreasonable use (including failure to provide reasonable and necessary maintenance as specified in Dexter Axle's publication "Operation, Maintenance Service Manual" including required maintenance after "Prolonged Storage".)
12. Improper wheel nut torque.
13. Welding supplemental brackets/members onto the existing Torflex Suspension beam.

## LIMITATIONS

1. **In all cases, Dexter Axle reserves the right to fully satisfy its obligations under the Limited Warranties by refunding the then-current list price of the defective Spring Suspension Axle or Torflex Axle (or, if the axle has been discontinued, of the most nearly comparable current product).**
2. Dexter Axle reserves the right to furnish a substitute or replacement component or product in the event a Spring Suspension Axle or Torflex Axle or any component of these axles is discontinued or is otherwise unavailable.





3. These warranties are non-transferable.

GENERAL

**THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXCEPT THAT OF TITLE, WHETHER WRITTEN, ORAL OR IMPLIED, IN FACT OR IN LAW (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE).**

These warranties give you specific legal rights, and you may also have other rights which vary from state to state.

**THE DURATION OF ANY IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THE EXPRESS WARRANTIES HEREIN. DEXTER AXLE HEREBY EXCLUDES INCIDENTAL AND CONSEQUENTIAL DAMAGES, INCLUDING LOSS OF TIME, INCONVENIENCE, LOSS OF USE, TOWING FEES, TELEPHONE CALLS OR COST OF MEALS, FOR ANY BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, APPLICABLE TO THE SPRING SUSPENSION AXLES AND THE TORFLEX AXLES.**

Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you.

The remedies of the original purchaser set forth herein are exclusive and the liability of Dexter Axle with respect to the Spring Suspension Axles and Torflex Axles, whether in contract, tort, warranty, strict liability or other legal theory shall not exceed the then-current average list price charged by Dexter Axle to its customer for the affected Spring Suspension Axle or Torflex Axle at the time that the claim is made.

Inquiries regarding these warranties should be sent to:  
Dexter Axle P.O. Box 250 Elkhart, Indiana 46515



