



Hydraulic Brakes

The hydraulic brakes on your trailer are much like those on your automobile or light truck. The hydraulic fluid from a master cylinder or actuation system is used to actuate the wheel cylinder, which in turn applies force against the brake shoes and drum. The main difference between automotive hydraulic brakes and hydraulic trailer brakes is the trailers' actuation system. These systems respond to the braking signal from the tow vehicle and supply the required brake fluid volume and pressure to the trailer brakes.

CAUTION

The maximum operating pressure for Dexter 12 $\frac{1}{4}$ " hydraulic brakes is 1,000 PSI.



Hydraulic Drum Brake Operation

Duo-Servo

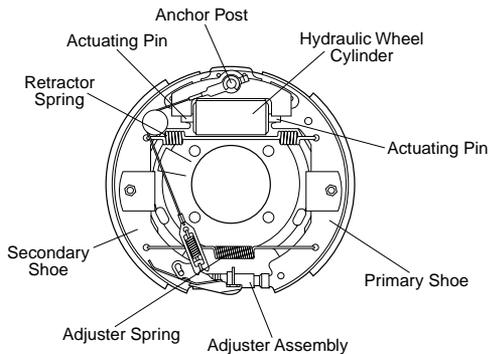
The duo-servo brake uses a dual piston wheel cylinder to apply the brakes. This type of brake is typically used in an electric/hydraulic, vacuum/hydraulic, or air/hydraulic system. A description of operation of this brake is as follows:

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.



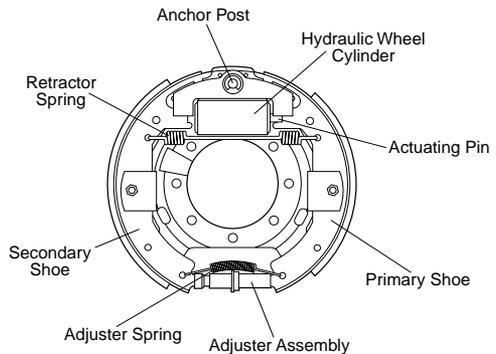
If the brakes are applied while the vehicle is backing, the shoes rotate in the direction of the drum rotation. This causes the secondary shoe to leave the anchor and causes the primary shoe to move against the anchor. Action of the brake is the same in reverse as forward.





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. Braking in reverse is significantly less effective than in the forward direction. Uni-servo brakes are normally used with surge type actuators.



Self Adjusting Mechanism for 12¼" Hydraulic Brakes

Forward self-adjust hydraulic brakes were introduced in March, 1997. This feature adjusts the brakes on both forward and reverse stops. Brake adjustment occurs only when lining wear results in enough gap between the shoes and the drum surface. This added clearance will allow the adjuster mechanism to rotate the screw assembly at the bottom of the brake. That action expands the distance between the shoes and thus closes the gap to the drum surface.

Hydraulic Parking Brake Option

The parking feature on Dexter hydraulic brakes is cable operated. The cable end is attached to the internal parking brake lever to actuate the brake. On Dexter 12¼" brakes manufactured before February 2002, the parking cable body mounts to a support plate which is attached to 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. For 12¼" brakes produced after February 2002, a short cable is installed directly into the backing plate to provide a convenient means for the trailer manufacturer to attach an appropriate operating system.

The internal parking brake lever of Dexter 12¼" 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 move toward the drum until contact is made. Friction generated between the drum and lining contact surface results in parking brake capability.

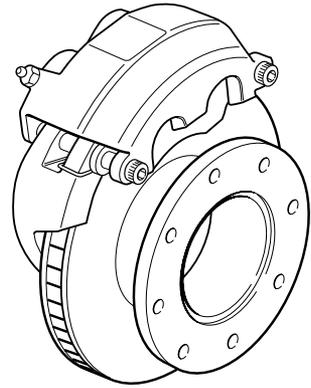




Hydraulic Disc Brakes

Dexter Axle manufactures two types of disc brakes, the floating caliper and the fixed caliper brake. With both styles, the disc brake uses friction pads astride a ventilated rotor which is attached to the wheel hub. When the brake is actuated, the pads are pressed against the sides of the rotor causing drag to slow the rotating disc. This action converts the kinetic energy (motion) into heat. The heat is dissipated rapidly by the ventilated disc.

The floating caliper brake uses piston(s) situated on one side of the brake rotor. Hydraulic fluid pressure pushes against the piston(s) to apply the inboard brake pad. As the inboard pad exerts force against the rotating rotor surface, the caliper moves laterally towards the trailer frame and in turn applies an equivalent force to the outboard brake pad against the rotor surface. As the lining material wears, the caliper will automatically maintain the proper lining to rotor clearance. The floating caliper design is used on Dexter 10,000 and 12,000 lb. axle models.



Disc brake effectiveness is the same going either in a forward or reverse direction. All Dexter disc brakes should be actuated with a braking system that is capable of providing a maximum hydraulic pressure of 1,600 psi.

Electric/Hydraulic Actuation Systems

To effectively operate your hydraulic trailer brakes, we recommend the Dexter E/H electro/hydraulic actuator, controlled by the Predator DX2™ electronic brake controller. These high performance hydraulic power modules will supply pressurized brake fluid to your trailer brakes in proportion to the amount of braking effort called for by the towing vehicles' deceleration rate.

CAUTION

It is the responsibility of the end user to ensure that their in-cab electronic controller is compatible with the Dexter E/H actuator. Dexter Axle attempts to provide compatibility with most controllers available, but is unable to anticipate design changes that might be introduced by the various controller manufacturers.

The E/H 1000 will supply 1,000 psi for your drum brakes and the E/H 1600 will generate 1,600 psi for maximum output for your Dexter disc brakes. The sealed, weather tight housing contains the electronics necessary to control the high pressure piston pump and proportioning valve for smooth, efficient braking.

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.

Introduction to Troubleshooting

Proper brake function is critical to the safe operation of any vehicle. A properly installed vacuum/hydraulic, electric/hydraulic, or air/hydraulic system should not require any special attention with the exception of routine maintenance as defined by the manufacturer. If problems occur, the entire tow vehicle/trailer braking system should be analyzed by a qualified mechanic.

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
- Actuation system malfunction

Please consult the following troubleshooting charts to determine the causes and solutions for common problems found in trailer braking systems.





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

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



Unit will not run when the ignition is on and the brake pedal is depressed

1. Verify that the trailer and tow vehicle are wired as detailed on the electrical schematic.
2. With the ignition switch on and the brakes not applied, you should have 12-13 volts between the black and white wires on the E/H unit.
3. Clean and replace the ground between the trailer and the E/H unit.
4. Test operation of the unit using the breakaway test procedure.

Breakaway test procedure - do not leave the breakaway switch pulled for more than two minutes during any of the steps outlined below

1. Pull the breakaway switch on the trailer.
2. If the unit runs and builds pressure, that indicates the actuator is functioning properly. The problem most likely is a defective electronic brake controller in the tow vehicle or defective wiring between the tow vehicle and the E/H unit.
3. If the unit runs but will not build pressure, the problem most likely is a defective solenoid valve in the E/H unit and the actuator should be returned for repair.
4. If the unit still does not run after the breakaway battery is fully charged, verify that the voltage between the white wire and yellow wire is at least 12 volts.
5. If the voltage is less than 12 volts, either the breakaway switch or the breakaway wiring is defective.
6. If the voltage is greater than 12 volts, the E/H unit should be returned for repair.

Trailer brakes too aggressive

1. Reduce the gain setting on the in-cab electronic brake controller.





General Maintenance - Hydraulic Brakes

Drum Brake Adjustment

Most Dexter 12¼" hydraulic brakes have a self adjusting feature. If manual adjusting is required, use the following procedure:

Brakes should be adjusted (1) after the first 200 miles of operation when the brake shoes and drums have "seated," (2) at 3,000 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 manufacturer's recommendations for lifting and supporting the unit. Make sure the wheel and drum rotates freely.

CAUTION

Do not lift or support the trailer on any part of the axle or suspension system. Never go under any trailer unless it is properly supported on jack stands which have been rated for the load. Improperly supported vehicles can fall unexpectedly and cause serious injury or death.

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 star wheel 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.
4. Then rotate the star wheel 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. For best results, the brakes should all be set at the same clearance.

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:

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. Use DOT3 or DOT4 brake fluid, and replace as necessary.

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 $\frac{1}{16}$ " or less), contaminated with grease or oil, or abnormally scored or gouged. Hairline heat cracks are normal in bonded linings and should not be cause for concern. When replacement is necessary, it is important to replace both shoes on each brake and both brakes of the same axle. This will help retain the "balance" of your brakes.

CAUTION

POTENTIAL ASBESTOS DUST HAZARD!

Some older brake linings may contain asbestos dust, which has been linked to serious or fatal illnesses.

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).**





After replacement of brake shoes and linings, the brakes must be re-burnished to seat in the new components. This should be done by applying the brakes 20 to 30 times from an initial speed of 40 m.p.h., slowing the vehicle to 20 m.p.h. Allow ample time for brakes to cool between applications. This procedure allows the brake shoes to seat in to the drum surface.

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.

Instructions for 10-12K Hydraulic Disc Brakes

Notice to Buyer

It is recommended that all brakes be replaced at the same time to insure balanced braking performance.

Preparation

1. Jack up trailer and secure on adequate capacity jack stands. Follow trailer manufacturers recommendations for lifting and supporting the unit.



CAUTION

Do not lift or support the trailer on any part of the axle or suspension system. Never go under any trailer unless it is properly supported on jack stands which have been rated for the load. Improperly supported vehicles can fall unexpectedly and cause serious injury or death.

2. Remove the wheel from the hub, leaving the brake exposed.

Removal of Old Brake Caliper

1. With tire-wheel assembly(s) removed from hub and zero pressure in hydraulic system, remove hex nuts from slider bolts and withdraw bolts from brake assembly. Note orientation of anti-rattle springs. Lift calipers from assembly and secure to prevent damage to brake hose. Do not allow caliper to hang from the hose. Remove anti-rattle springs and brake pad.

Inspection

1. Slider bolts must be straight and free of rust pits, missing chrome, or cracks in the chrome plating. Replace if necessary. Anchor yoke bores must be free of corrosion and excessive wear. “O” rings must be free from nicks and cuts. Replace as necessary. Caliper assembly must be free of fluid leaks and torn or deteriorated dust boots and “O” rings. Repair as required.
2. Rotor-inspect for grooves, flaking, cracks, heat checking, excessive thickness variation, insufficient overall rotor thickness and overall width (measurement from inboard rotor face to rotor mounting surface). Machine or replace as necessary.
3. Rotor Specifications:

Rotor Thickness	1.185 New, 1.12 Min. Service Limit
Rotor Overall Width	3.655 New, 3.59 Service Limit
Lateral Runout	.003 T.I.R., .010 T.I.R. Maximum
Thickness Variation	.0008

Hub and Rotor Removal and Installation

1. With hubcap removed and oil drained, straighten locking tabs on tang washer and remove outer locknut, tang washer, inner locknut, bearing washer, and outer bearing. Remove hub and rotor assembly.

Note: A puller may be required due to unitized seal press fit on spindle. Remove inner bearing and seal. Service bearings as necessary.

2. Prior to reassembly, insure that the hub bearing housing is clean. Reinstall inner bearing. Coat the O.D. of a new seal with a bore sealant (Permatex or equivalent) prior to installation.
3. Mount hub and rotor assembly on spindle and install outer bearing, bearing washer, and inner bearing nut.
4. Tighten inner nut to **100 Ft. Lbs.** while turning hub to seat bearings.





5. Loosen nut to remove pre-load torque. Hand tighten nut, then back off $\frac{1}{8}$ turn minimum, $\frac{1}{4}$ turn maximum.
6. Install tab washer and outer locknut. Torque locknut to **100-175 Ft. Lbs.** Insure that the inner nut does not rotate. Bend 2 tabs over flat on outer locknut to secure.
7. Install hub cap and add oil to hub. Capacity is 2.5 oz. of SAE 90W gear oil.

Installation

1. Installation is reverse of disassembly. Use appropriate tools and methods to retract caliper pistons sufficiently to reinstall caliper over the new pads. Caliper and anchor yoke “O” rings should be lubricated with a light film of high temperature brake lubricant prior to slider bolt installations. Slider bolts should be installed from the outboard side of the caliper. Insure the anti-rattle springs are located properly.
2. Use extreme care when installing the slider bolts to prevent damage to the “O” rings. Installation tool #071-182-00 threaded onto the slider bolts is recommended.
3. **DO NOT FORCE OR HAMMER BOLTS IN.** Secure slider bolts with new locknut. Actuate brakes numerous times to remove excess pad clearance prior to operation of vehicle.

Torque Specifications:

Slider Bolts Locknuts	15-25 Ft. Lbs.
Anchor Yoke Mounting Nuts	45-55 Ft. Lbs.
Bleeder Screw	9-12 Ft. Lbs.
Rotor Mounting Nuts	85-95 Ft. Lbs.
Outer Spindle Nuts	100-175 Ft. Lbs.
Hub Cap	20-30 Ft. Lbs.
Wheel Mounting Nuts (with clamp ring)	200 Ft. Lbs.

Hydraulic Disc Brake Parts

Item	Description	Qty/ Brake	10K, 12K
1	Anchor Yoke Assembly (includes 6 of item #6)	1	090-002-02
2	Caliper Assembly (includes items #6, 3, 9, 10)	1	089-002-002
3	Caliper Piston	2	054-066-00
12	Shoulder Screw $\frac{5}{8}$ x 5	2	007-186-00
13	Hex Screw $\frac{7}{16}$ -20 x 1.75	7	007-116-00
14	Flange Nut	8	006-046-00
15	Hex Nut $\frac{7}{16}$ -20	7	006-017-00
16	Rotor Mounting Stud	8	025-014-00
17	ABS Sensor (straight)	1	097-004-00
19	ABS Sensor Retaining Clip	1	097-002-00
20	ABS Tone Ring	1	024-203-00
Caliper Repair Kit contains:		1	K71-181-00
6	"O" Ring	4	010-062-00
7	Bleeder Screw	1	054-069-00
9	Caliper Seal	2	054-067-00
10	Dust Boot	2	054-068-00
Disc Brake Replacement Pad Kit contains:		1	K71-180-00
4	Brake Pad	4	091-003-00
5	Anti-Rattle Spring	4	046-105-00
6	"O" Ring	20	010-062-00
8	Hex Locknut	4	006-125-00
11	Installation Tool	1	071-182-00

Recommend hose with banjo fitting.
 $\frac{7}{16}$ -20 threaded hole for fitting.

