

# INSTRUCTIONS

916-31926

Master Cylinder and Pedal Assembly  
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## Master Cylinder and Pedal Assembly Model T Model A, and '32 Fords

The master cylinder is suitable for 4-wheel disc or disc/drum brake setups. The bracket can be bolted or welded to the left frame rail (boxed or stock).

**Please Read Instructions Completely Before Starting Your Installation**

QTY.	PART NO.	DESCRIPTION
1	910-31420	1" Bore dual feed master cylinder
1	916-31946	Master cylinder push rod
1	910-31200	Brake pedal pad
1	617-6702	Brake pedal pad mount (weld on)
1	175-0203	Heim
1		Brake pedal frame mount
1		Brake pedal arm
1		1/2"-20 x 4-1/2" GR 5 hex cap screw
2		1/2"-20 nylon lock nut
4		1/2" flat washer
1		1/2"-20 x 1-1/4" GR 5 hex cap screw
1		3/8"-24 x 1-1/4" GR 5 hex cap screw
2		3/8"-24 x 1-1/2" GR 5 hex cap screw
2		3/8"-24 nylon lock nut
1		3/8"-24 thin nylon lock nut
2		3/8" flat washer

**Warning:** The selection and installation of brake components should only be done by personnel experienced in the proper installation and operation of braking systems. The installer must use his/her own discretion to determine the suitability of the brake components and brake kits for every particular application.

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1. Pick a location that bests lines up with a proper brake pedal location. The brake pedal mount can be bolted in or welded in on either a channeled or a boxed frame rail. This kit is supplied with the correct hardware to bolt it into a channeled frame. If you are using a boxed frame you will need to supply the correct hardware. Try to keep the master cylinder mounted as level as possible. When selecting a pedal location you will need to make sure you have enough pedal travel. Make sure the pedal will bottom out the master cylinder before the pedal touches the floor. Total pedal travel should be about 5½". The pedal can be bent or modified for driver comfort but avoid shorting the height of the pedal as this will result in increased pedal effort.
2. Assemble the master cylinder to the brake pedal frame mount with the 3/8"-16 x 1-1/2" bolts, washers and nylock nuts. Torque these to 18-24 ft. lbs. Assemble the brake pedal on to the brake pedal frame mount. Install the clevis on to the brake pedal and adjust the pedal location so the center of the clevis pin is ½" forward from the center line of the brake pedal pivot.
3. The push rod can now be cut to the correct length. **NOTE: REMOVE THE RETAINING CLIP ON THE PUSH ROD WHILE MOCKING UP YOUR INSTALATION.** Measure for the correct push rod length and cut it making sure you have a minimum of ½" of engagement in the clevis. If you are using our 1" bore master cylinder 910-31420 the push rod will need to cut to 4" long.
4. Once you have determined the correct location of the brake bracket mark and drill the two ½" mounting holes in your frame and bolt it into position with the two ½" bolts, washers and nylon lock nuts supplied. Torque these to 38-57 ft. lbs.
5. Mark the location and angle of the pedal pad and weld the brake pedal pad mount to the brake pedal.
6. Reinstall the retaining clip on the push rod and install it in the master cylinder piston. With the pedal returned to its non-depressed position adjust the push rod plunger so there is slight free play between the plunger and the piston on the master cylinder.
7. The brake pedal should be free to return when no pressure is applied, allowing the master cylinder pushrod to return to its non-depressed position. Any preload will not allow the hydraulic system to function properly.

In some cases the master cylinder spring (internal) may not be strong enough to fully return the push rod; in this case an additional pedal return spring can be used. When using an additional return spring the pedal should have an adjustable return stop on it. This will stop the piston from excessively banging the snap ring located under the rubber boot on the master cylinder. Adjust the stop so the pedal stops returning at the point when the master cylinder piston retracts against the snap ring.

8. The reservoir closest to the plunger is the front reservoir and gets routed to both front brakes and the rear reservoir is routed to both rear brakes. If the master cylinder reservoir level is mounted lower than the horizontal plane of the brake calipers a residual check valve will have to be mounted in line as close to the master cylinder as possible to prevent fluid drain back. A two pound residual check valve is used for disc brakes and a ten pound is used for drum brakes. An adjustable proportioning valve should be plumbed in the rear line to adjust the front to rear brake bias.
9. Install the hydraulic brake lines using 3/16" hard lines. Attention must be made to the routing and location of the hydraulic brake lines. Avoid any heat sources such as exhaust pipes. Install new flex lines making sure you check that the lines have clearance through the entire suspension travel and turning radius.
10. Remove the master cylinder and bench bleed it following the attached instructions for bench bleeding. Reinstall the master cylinder, connect the lines and bleed the entire system per the attached bleeding instructions.
11. Before operating the vehicle test the brakes under controlled conditions. Make several stops in a safe area from low speeds gradually working up to operating speeds.
12. Adjust the front to rear brake bias following the instructions supplied with your proportioning valve.



Speedway Motors Inc.,  
P.O. Box 81906 Lincoln, NE 68501  
402-323-3200 [www.SpeedwayMotors.com](http://www.SpeedwayMotors.com)



## BENCH BLEEDING THE MASTER CYLINDER

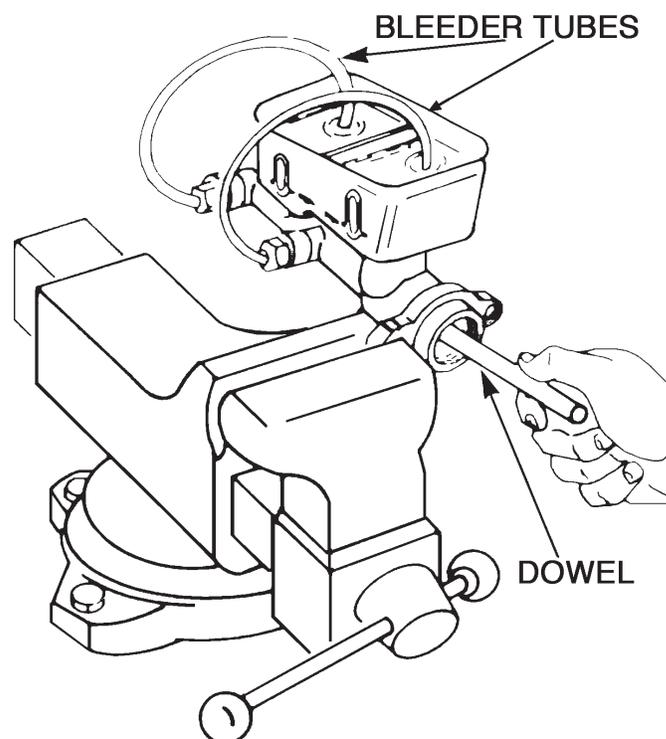
**NOTE:** "Bench bleeding" (removing air from the master cylinder) must be completed BEFORE the replacement unit is installed in the vehicle. Otherwise, the brake pedal will be insufficient and THE WARRANTY WILL BE VOID!

1. Position the replacement master cylinder in a vise so that the jaws clamp onto the mounting flange. DO NOT TIGHTEN THE VISE JAWS ON THE MASTER CYLINDER BODY! This will cause damage and void the warranty.
2. Install brake failure warning switch and proportioning valve, if so equipped, onto the replacement master cylinder BEFORE bench bleeding the unit. Use the new O-rings supplied with the replacement unit on the valves and switch. Install plugs in the proportioning valve ports, if so equipped, before bench bleeding.
3. Install bleeder tubes, if available, into the brake line outlet ports or use plugs to seal the ports.
4. Add enough clean brake fluid to the reservoir so that the bleeder tube ends are submerged beneath the fluid level.
5. Use a wooden dowel or similar tool to slowly push the master cylinder piston in about one inch, then release the piston slowly.

**CAUTION:** Be careful to avoid spraying brake fluid! Keep your face away from the open reservoir.

6. Wait 15 seconds and repeat step 5 until you no longer see air bubbles in the reservoir.
7. Replace the reservoir cover. Do not remove bleeder tubes from the brake line fittings yet.

**NOTE:** Some fluid around the mouth of the piston bore is normal and does not indicate leakage. This is a rust inhibitive bore lubricant used during assembly.



## BLEEDING THE LINES

1. Remove the master cylinder cover and check the fluid level. Be sure to check the fluid level often during the bleeding process. And add fluid as necessary to prevent air from entering the master cylinder. If this happens you **MUST** start over at bench bleeding the master cylinder.
2. Replace the master cylinder cap.
3. The use of our speed bleeders will allow you to perform this job by yourself by simply cracking the speed bleeder enough to allow fluid to be forced through. The speed bleeder has an internal check valve that prevents fluid from returning into the caliper once the pedal is released. This removes the necessity of closing the bleeder screw before the pedal is released, allowing one person to bleed the brakes. Otherwise you will need an assistant to pump the brake pedal while you open and close the bleeder screws at the appropriate times during this process.
4. The wheel farthest away from the master cylinder is bled first which in most cases is in this order: Right rear, left rear, right front and left front. Failure to bleed in the proper order will cause air to remain in the lines.
5. It may be necessary to remove the calipers from the caliper brackets while leaving the hoses attached. The calipers must be oriented in such a way as to ensure the bleeder screws point up. If you bleed the calipers while mounted on the rotors, air may become trapped inside the caliper reservoir and bleeding will be unsuccessful. The caliper should be oriented in such a way as to allow air inside the calipers internal reservoir to escape. Sometimes this means the bleeder screw is pointing straight up and sometimes it is at a bit of an angle. It is recommended that you do not allow the caliper to hang from the brake hose. Instead use a piece of wire to position the calipers correctly. Otherwise damage to the brake hoses may result. If you find it necessary to remove the calipers from the rotor, be certain to insert a block of wood that is approximately the same thickness as the rotor between the brake pads to prevent the caliper pistons from being pushed out of the caliper.
6. Crack the bleeder screws at the appropriate wheel just enough to make it easy to loosen later. Attach a length of 3/16" clear plastic tube to the end of the bleeder screw. Submerge the other end of the tube into a container filled with brake fluid.
7. Crack the bleeder screw open just enough to allow fluid to leave the valve and have an assistant slowly and firmly apply pressure to the pedal. Have the assistant hold pressure on the pedal until you see no more air bubbles coming out of the hose. Close the bleeder screw and have the assistant release the brake pedal. Repeat this step until no more air is seen leaving the tube.
8. Proceed to the next wheel in the bleeding order and repeat steps 6 & 7 for each. Be sure to check the fluid level in the master cylinder frequently.
9. Refill the master cylinder to the appropriate level when finished with the entire bleeding process.
10. Check the pedal, it should feel solid when depressed with no sponginess and should hold under constant pressure without dropping. If you still have a spongy pedal, repeat the entire process.
11. Before operating the vehicle test the brakes under controlled conditions. Make several stops in a safe area from low speeds gradually working up to operating speeds.

## **THE MOST COMMON REASON FOR A POOR PEDAL**

1. The bleeder screws on the calipers are not facing up.
2. The master cylinder was not bench bled or was not bled completely.
3. Defective rebuilt master cylinder with pitted cylinder bore or defective seals.
4. Master cylinder bore size too small for system volume requirements.
5. Master cylinder mounted lower than the calipers or wheel cylinders.
6. Lines or components near a heat source.
7. Low drag metric calipers without the use of a quick take up master cylinder.
8. No residual valve to rear drums.
9. Drum brake wheel cylinders too large.
10. Use of Silicone brake fluid.
11. Rear caliper parking / pistons not set up properly with a rear disc system.
12. Rear calipers not being bled properly. Most four wheel disc brake problems come from the rear.
13. Improper pedal adjustment with too much play.
14. Old or inferior quality brake hoses.

## **HOW TO PROPERLY DIAGNOSE A BRAKE PROBLEM**

If you have very poor brakes, a spongy pedal or no pedal at all you will have to do some diagnostics to determine where the problem is in your system. Is it the master cylinder, the front brakes or the rear brakes?

These tests assume that your system is properly installed and bled. Perform these simple tests to find where the problem is. Once you know where the problem is it will be much easier to fix.

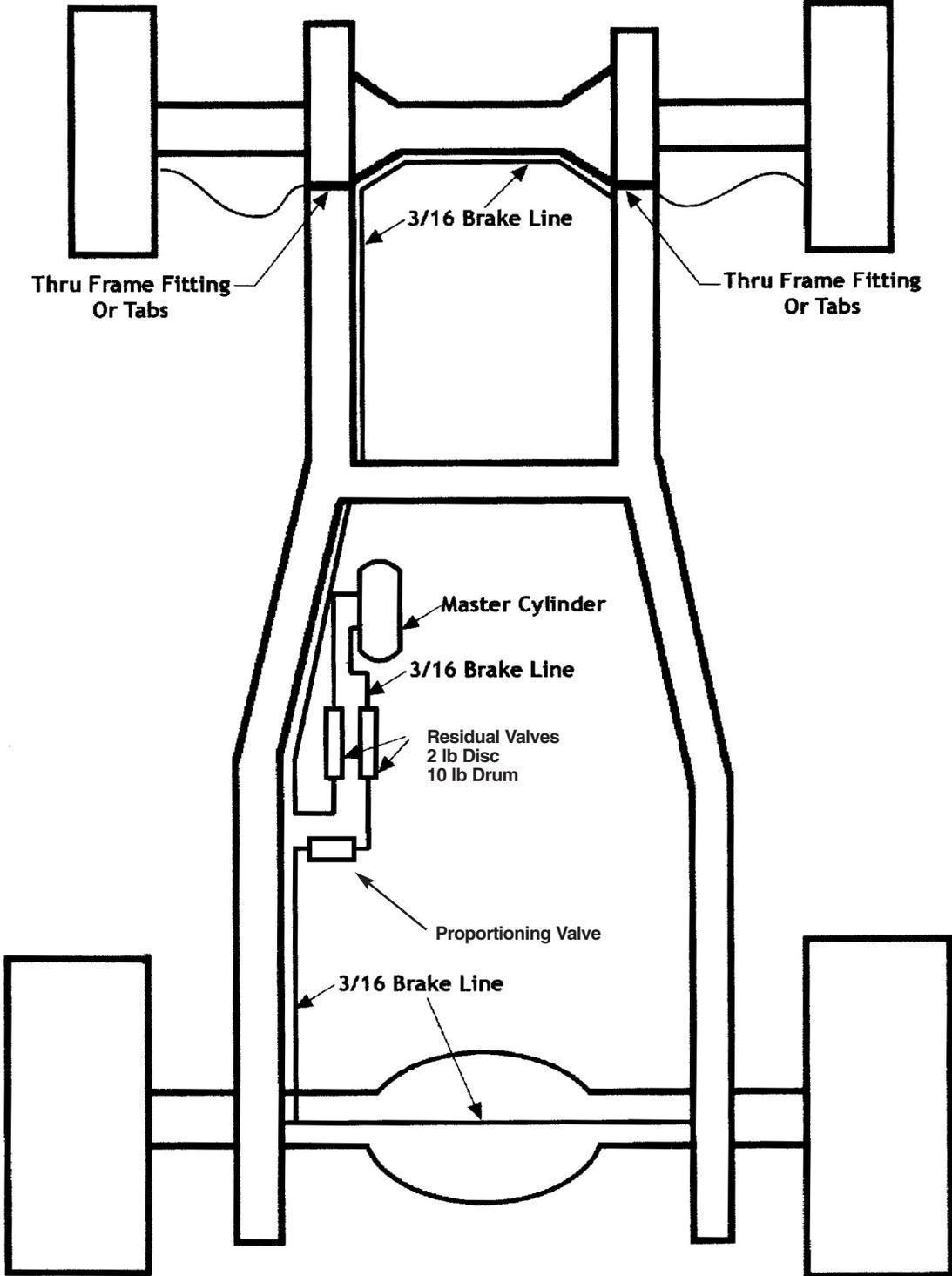
1. Disconnect the brake lines from the master cylinder while leaving it on the vehicle.
2. Obtain solid tapered plugs for the master cylinder outlets with the correct thread pitch.
3. Plug the master cylinder outlets. Step on the pedal and hold pressure for about 30 seconds. If the pedal remains firm then the master cylinder is good. If the pedal sinks to the floor then the master cylinder is bad.
4. If the master cylinder is fine, connect the line to the front brakes. If the pedal remains firm then the problem is not coming from the front brakes. If the pedal sinks to the floor or is excessively spongy then the problem is with the front brakes.
5. Connect the rear line and if the pedal goes bad then the problem is in the rear. You may also check whether your lack of a pedal comes from the front or rear this way. If you are sure the master cylinder is good, clamp off the front rubber hoses and try the pedal. If you get a good pedal then you know the problem is from the front calipers. Be very careful not to damage the hoses and try to protect them from damage by placing the hose between something smooth. There is a special tool sold in auto parts stores for this purpose. Try it on the rear if the front is fine.

**IF YOU HAVE A GOOD PEDAL BUT YOUR CAR WILL NOT STOP, YOU MUST OBTAIN PRESSURE READINGS AT THE MASTER CYLINDER AND THE FRONT AND REAR WHEELS.**

Disc brakes minimum pressure 800 PSI

Drum brakes minimum pressure 400 PSI

# BRAKE SET-UP



# IMPORTANT

## DISCLAIMER

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## DAMAGE CLAIMS

Always inspect your package upon delivery. Inspect all packages in the presence of the delivery driver. The driver must note any damage. Ask the driver the Carrier's procedures for handling damage claims. You must hold the original box, packing material and damaged merchandise for inspection or the carrier will not honor the claim. Notify Speedway Motors customer service department for instructions on returning damaged goods. Speedway is not responsible if no notification is given within 5 days of receipt.

## SHORTAGES

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## REFUSALS

All refused COD customers will be billed a 15% restocking charge plus freight to and from the destination! If you have questions please contact Speedway's customer service department.

## WARRANTY CLAIMS

If an item has a manufacturer's warranty as being free from defects we will exchange only. If the item has been used and you are requesting warranty work, this may take up to 30 days as warranty work is done by the manufacturer NOT Speedway Motors. If you have any questions please contact customer service.

## RETURNS

Speedway wants you to be satisfied with your purchase. If within 30 days after you receive your shipment you are not satisfied, you may return the item for refund or exchange. All exchanged or returned merchandise must be in original factory condition with no modifications or alterations. Returned merchandise must include all packaging materials, warranty cards, manuals, and accessories. If the items being returned need to be repackaged there will be a re-packing charge. Re-pack the item in a sturdy box and include a copy of your invoice and complete the form on the back of the invoice. You must ship orders back **PRE-PAID. WE DO NOT ACCEPT COD SHIPMENTS.** All exchanges need to have reshipping charges included. Items that are returned after 30 days are subject to 15% restocking charges. All fiberglass returned will have 15% restocking charge. No returns on electrical parts, video tapes, and books. Absolutely no returns on special order or close out merchandise.

## FREE CATALOGS

Speedway Motors offers FREE catalogs for Race, Street, Sprint and Midget, Sport Compact and Pedal Car Restoration.

Some items are not legal for sale or use in California on pollution controlled motor vehicles. These items are legal in California for racing vehicles only which may never be used upon a highway.

Speedway Motors Inc.,  
P.O. Box 81906 Lincoln, NE 68501  
402-323-3200 [www.SpeedwayMotors.com](http://www.SpeedwayMotors.com)

