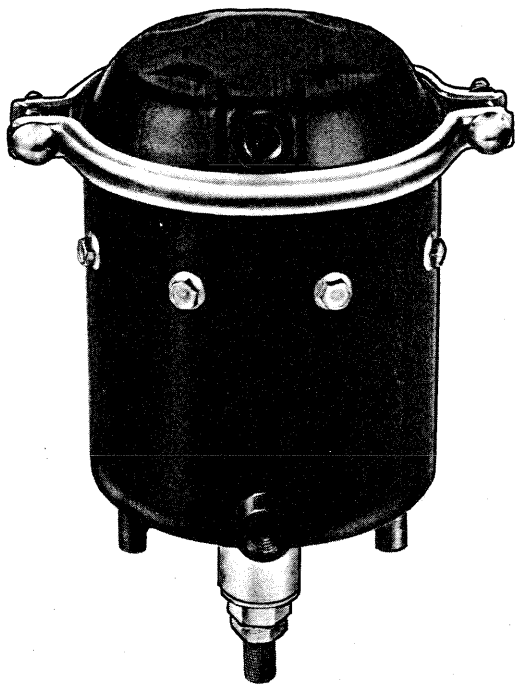
# maxibrake™

## spring brake



# Service

Rel: 2/87

wagner
a division of allied systems company

80-314

## Maxibrake spring brake operation

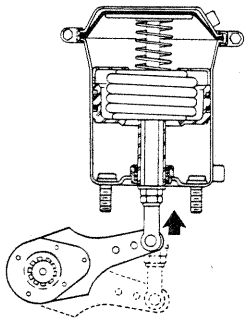
The operating principle is sound and simple. The primary service chamber applies the foundation brake with the admission of air pressure and the secondary spring chamber applies the brake mechanically when air pressure is lost.

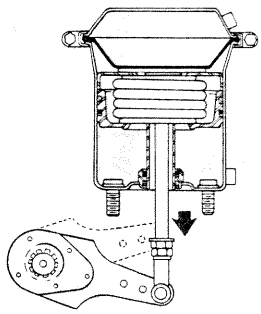
**Normal Driving**
Air pressure in the spring chamber acts against the piston to keep the spring compressed. The spring brake is released, but is ready for parking or emergency applications.

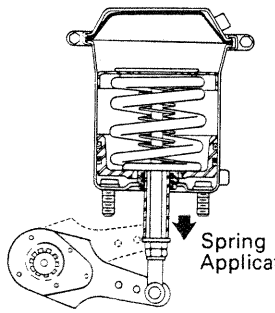
**Service Brake Application**
Operation of the foot valve releases air into the service chamber. Air pressure on the diaphragm actuates the push rod. The push rod operates independently through the piston tube for normal operation.

**Spring Brake Operation**
**Parking.** The dash control valve in the cab is operated to exhaust air in the spring chamber. The spring, acting against the piston, forces the push rod down as pressure is exerted against the push rod flange nut by the piston tube.

**Emergency.** The same principles apply, however, the system can be piped so the spring brakes can be actuated manually by the dash control valve to exhaust air from the spring chamber, or to serve as a modulating brake by metering the air in and out of the chamber through the control valve.


Normal Driving

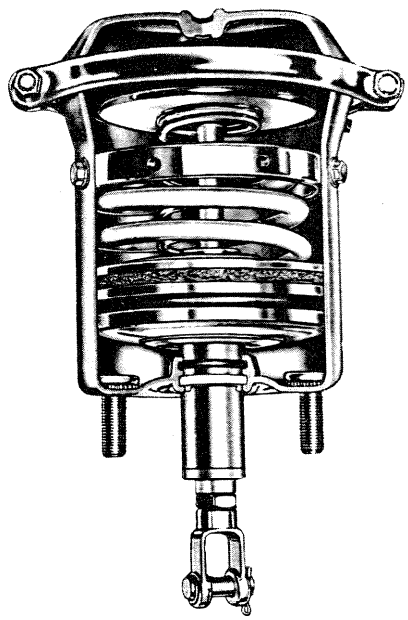

Service Brake Application


Spring Brake Application

### Spring release & holdoff pressures

The release pressure is the air pressure required to release the brake completely as the air pressure builds up. As the air pressure in the spring brake chamber is reduced, the holdoff pressure is the point where the brakes start to apply. Holdoff pressure should be as low as possible to prevent brake drag and to minimize air tank size.

| Spring type | Maximum release pressure (psi/Kpa) | Holdoff pressure (psi/Kpa) |
|---|---|---|
| #50 | **58** 400 | **52** 359 |
| #60 | **73** 504 | **67** 462 |
| #75 | **92** 635 | **87** 600 |

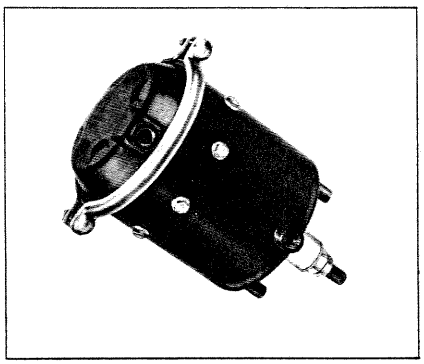


Maxibrake units cannot be released manually making them inoperative. Once actuated, they cannot be released until there is sufficient air to compress the spring. Therefore, the vehicle cannot be moved until the air supply is at a safe level.

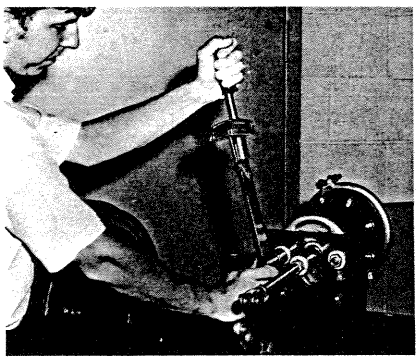
Inspection or replacement of the service chamber diaphragm is easy. The service brake diaphragm is readily accessible without first caging the spring brake. Simply loosen the band clamp and remove the pressure plate.

Complete spring brake units with heavy-duty service chambers are available on 20", 24", 30" and 36" sizes with #50, #60 or #75 springs.

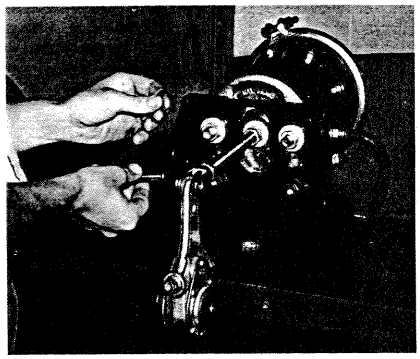
## Installation



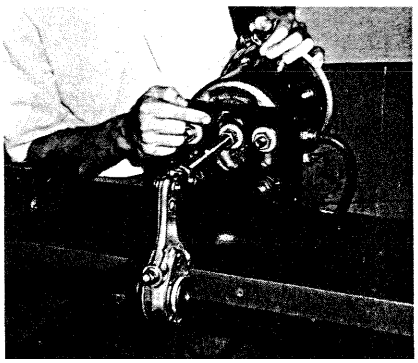
**CAUTION:** Always block wheels to prevent vehicle moving when deactivating brake system. Install all spring brake components and piping in accordance with approved system diagram.



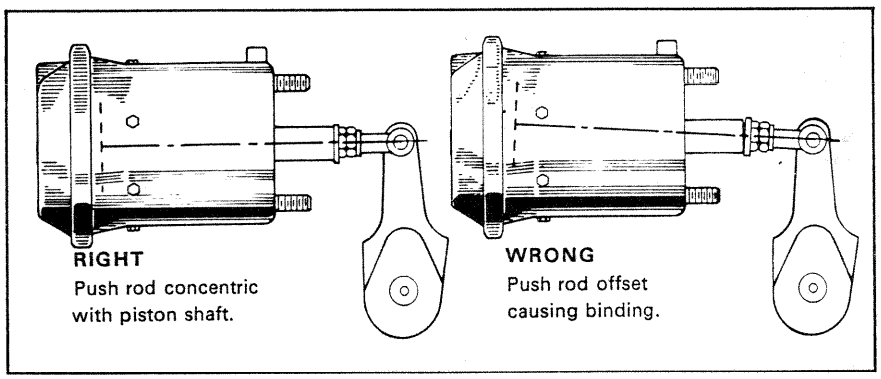
**1** Remove service brake chambers from mounting brackets (observe location of air inlets). Position spring brake on bracket; run on stud nuts and torque to 110–150 ft./lbs.



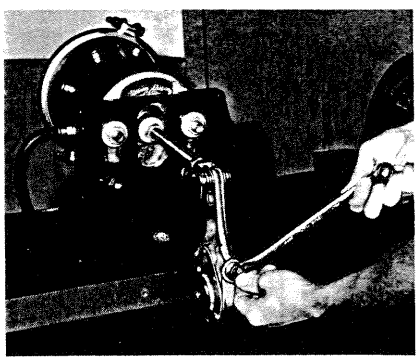
**2** Connect shop air to spring chamber to compress spring. Adjust slack adjuster so it is perpendicularto push rod at 50% of stroke. Connect yoke to slack adjuster. Remove air.



**3** Connect service air to spring brake. With spring brake released, check clearance between flange nut and piston neck. Gap should be 1/16" to 1/8". Tighten jam nut.




**4** Check push rod operation. Apply service brake. Push rod should clear opening in piston shaft at minimum and maximum service brake stroke.



**5** Adjust service brake so push rod travel is short as possible without brake shoe dragging.

## Brake system leakage check

**Service brake air supply system**
Start engine and build up maximum air pressure. With engine stopped and spring brake applied, check air gauge for drop in pressure. A drop will indicate leaks in the supply.

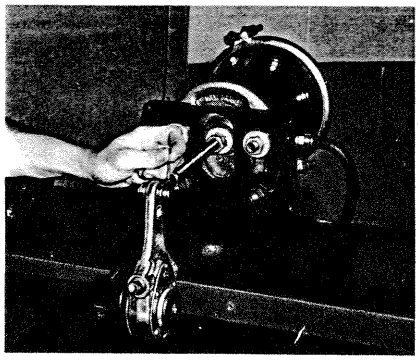
**Maxibrake spring brake system**
Release spring brake. Check air gauge for drop in pressure. A drop will indicate leaks in the system beyond the control valve.

**Service brake application system**
With the unit released, fully apply service brake by the use of the foot valve. Check air gauge for drop in pressure. A drop will indicate leaks in the application system beyond the foot valve. An air pressure drop of over 3 pounds in 1 minute for single vehicles, or 4 pounds in 1 minute for vehicle combinations, indicates that there are excessive leaks and they should be repaired.

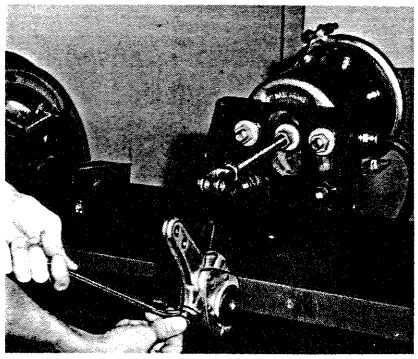
**CAUTION: Aeroquip Maxibrake spring brake products are mechanical devices, which are subject to wear after extended use. Inspection and service of the unit at regular intervals, but no less than once per year, is recommended. Parts showing sign of wear, deterioration or damage require replacement to insure maximum operating efficiency.**

## Removal

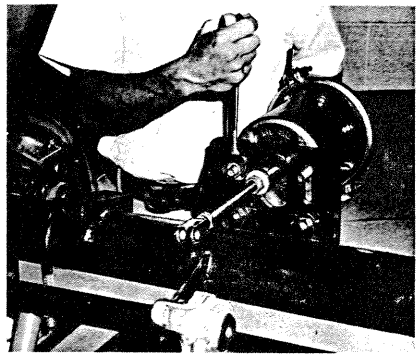
**WARNING: Spring brake chambers are under compressed spring force. Installation and maintenance should be performed in full accordance with manufacturer's written instructions as covered on pages 2-8.**



1 Disconnect air lines. Apply shop air to spring chamber to release tension on slack adjuster and disconnect push rod yoke.

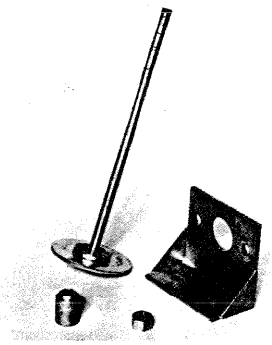


2 Remove or reposition slack adjuster so as not to come in contact with yoke when air in chamber is released.



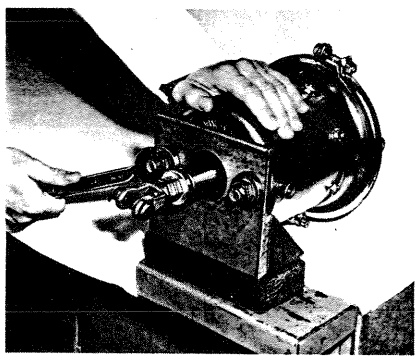
3 Disconnect shop air to spring chamber. Remove mounting nuts and lift unit from bracket being careful not to score threads on mounting studs.

## Disassembly

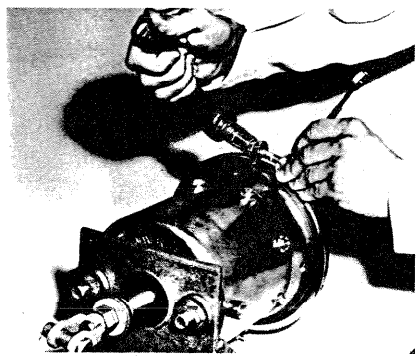


1 This Maxitool and 90° bracket (Part Number * ) is recommended for disassembly. You can service a standard unit quickly and safely—without danger of spring explosion.

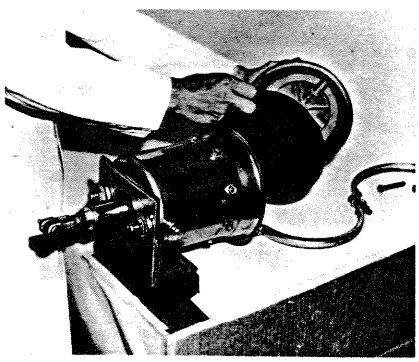
***See Parts Book**



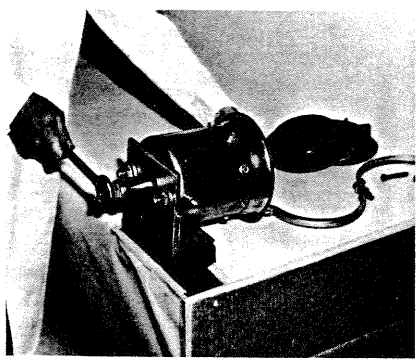
2 Mount the unit on 90° bracket and secure with stud nuts.



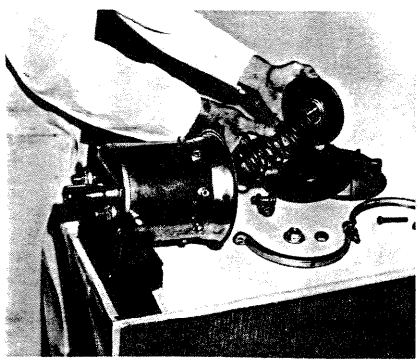
3 Note location of pressure plate inlet port with respect to spring chamber. Loosen clamp band nuts and bolts and remove clamp band halves.



4 Remove pressure plate and diaphragm.

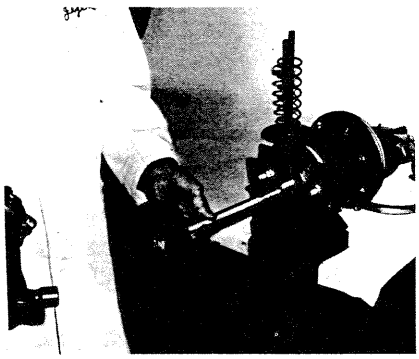


5 Press down on push rod plate to remove jam nut and flange nut securing push rod.

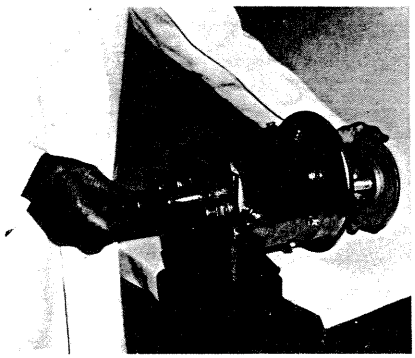


6 Pull out push rod assembly (push rod spring retainer and return spring).

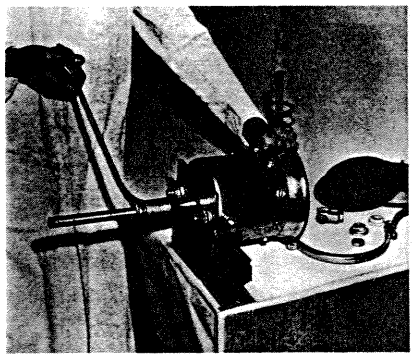
## **Disassembly** / continued



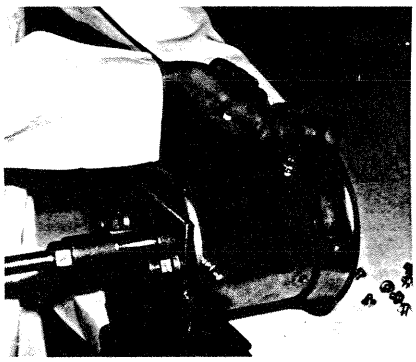
**7** Free push rod bushing from cylinder boss by inserting Maxitool shaft through piston tube and tapping lightly. Remove bushing from cylinder.



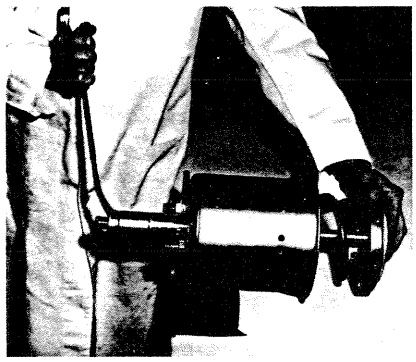
**8** Insert Maxitool, from the back of the unit, through the piston tube. Insert machined end of Maxitool bushing into piston neck. Screw nut on in back of bushing and tighten.



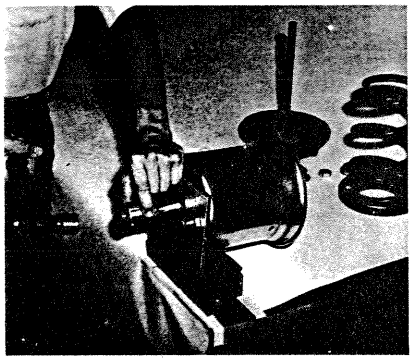
**9** Tighten nut until Maxitool is centered and resting firmly against the spring support releasing spring pressure.



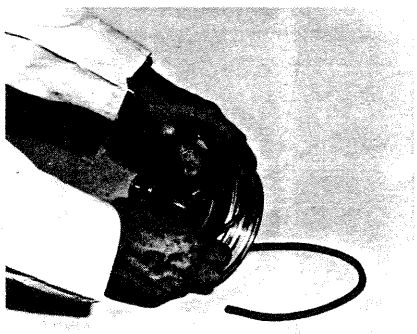
**10** Remove the eight cap screws holding the spring support.



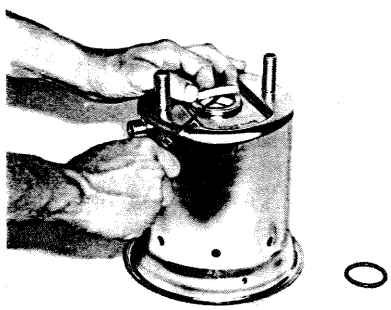
**11** Gradually back off the nut on the Maxitool until all pressure is off the spring. Remove the Maxitool, power spring and spring support.



**12** Using the Maxitool guide collar on piston neck, drive piston assembly from cylinder boss. Remove piston assembly from cylinder.



**13** Remove felt wiper ring and O-Ring from piston.



**14** Remove O-Ring and nylon bushing from cylinder center boss. Use a sharp pointed instrument to remove bushing; work clockwise from cut to pry bushing out of groove; then remove backup ring.

**15** Wash all metal parts in cleaning solvent.

## Inspection and reconditioning

Maxibrake spring brakes require only a minimum of maintenance to assure satisfactory service. It is our recommendation that the following procedures of inspection and reconditioning of parts be performed on a twenty-four month basis, or more often where extreme operating conditions are encountered on a continuing basis.

**Cylinders**—Check the bore diameter for rust, scoring or dents. Sandblasting of cylinders removes the plating and is not recommended. Inspect cylinders with satisfactory bore finish for other defects which might lead to failure within the next normal service period, such as damaged or worn studs and center bushing wear.

**Piston**—Remove all nicks and scratches from the piston skirt. The piston neck is chrome plated, and only pistons with necks in good condition should be reused. If it is determined that the piston stem is corroded, scored or notched, corrective action should be taken to prevent reoccurrence. Using boots and periodically cleaning and lubricating the neck with TR-3 lubricant have proven successful in extending the service life of this part. Painting the outside diameter of the piston neck must be avoided.

**Power spring**—This part should be wire brushed and immediately coated with rust inhibitor compound. It is important that all rust on the inside diameter be removed.

**Spring support**—This part should be wire brushed if rusted, and coated with rust inhibitor compound.

**Push rod**—Inspect for loose pressure plate and rod wear due to misalignment. If rust is present, wire brush and coat with rust inhibitor compound.

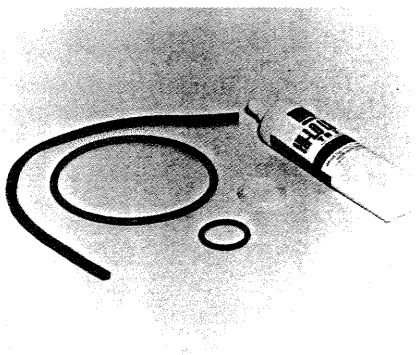
**Push rod return spring**—If rust is present, wire brush and coat with rust inhibitor compound.

**The remainder of parts**—Should be inspected in accordance with standard service brake practices and shop procedures.

If a pattern of wear or parts failure becomes apparent in a given area, it should be reported to your Aeroquip representative for further investigation.

**NOTE:** When rebuilding Maxibrake spring brakes, use only genuine Aeroquip repair parts and lubricants.

## Service and lubrication

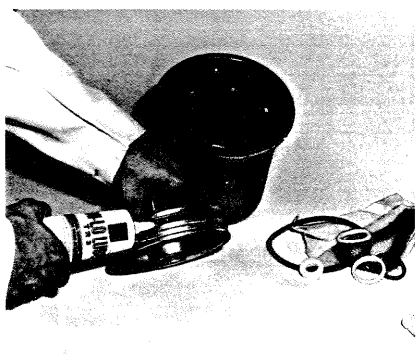


### Service kit

—This kit contains two complete sets of rings, bushings and lubricant for routine maintenance of two standard units. These parts should be replaced whenever the unit is disassembled at regularly scheduled service periods.

### Service kit components

| Description | Part No. | Qty. |
|---|---|---|
| Small O-Ring | * | 2 |
| Large O-Ring | * | 2 |
| Felt Wiper | * | 2 |
| Nylon Bushing | * | 2 |
| Push Rod Bushing | * | 2 |
| TR-3 HI-LO Lube | * | Tube |



**Lubrication**—For maximum protection and service life, relubricate the chambers at reassembly as follows:

**a. Cylinder**—Fill inside center boss groove and lightly grease the cylinder bore with TR-3 HI-LO Lube.

**b. Power spring (large)**—Coat with rust inhibitor compound.

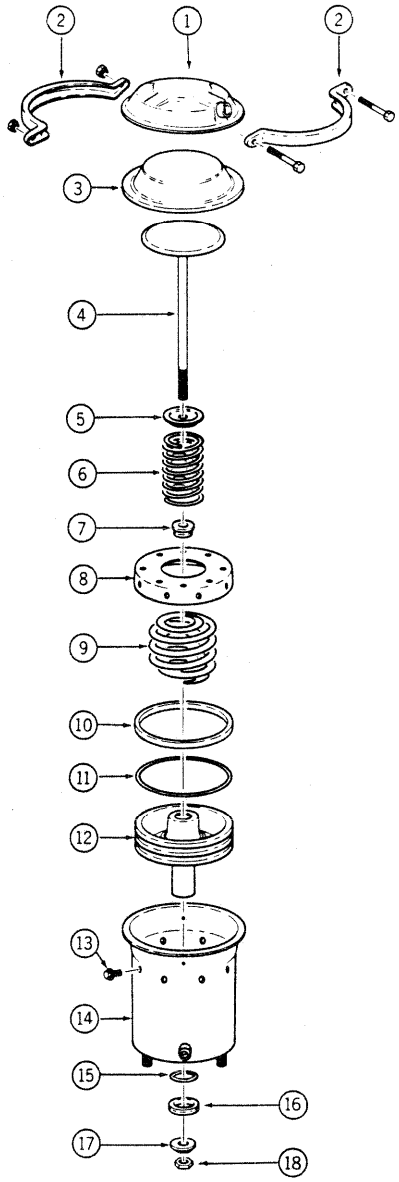
**c. Piston**—Fill O-Ring groove (groove nearest neck) about half full of TR-3 HI-LO Lube.

**d. Wiper felt**—is prelubricated and sealed in a plastic bag.

| Description | Part No. | Qty. |
|---|---|---|
| TR-3 HI-LO Lube | * | 8 oz. |
| TR-3 HI-LO Lube | | 1 lb. |
| TR-3 HI-LO Lube | | 5 lb. |
| Rust Inhibitor Comp. | | 1 gal. |
| Rust Inhibitor Comp. | | 5 gal. |

*** See Parts Book**

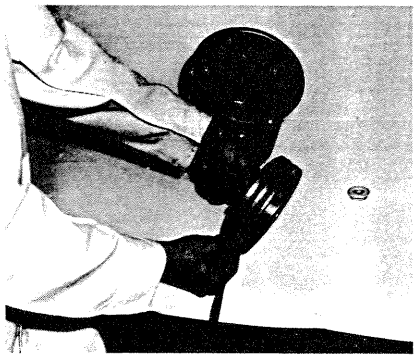
# Parts Identification




| Item | Description | Qty. |
|---|---|---|
| 1 | Pres. Plate—Steel | 1 |
| 2 | Clamp Band Assy. | 1 |
| 3 | Diaphragm | 1 |
| 4 | Push Rod | 1 |
| 5 | Spring Retainer | 1 |
| 6 | Push Rod Ret. Spring | 1 |
| 7 | Push Rod Bushing | 1 |
| 8 | Spring Support | 1 |
| | | 1 |
| 9 | No. 75 Spring | 1 |
| 10 | Felt Wiper Ring | 1 |
| 11 | O-Ring (large) | 1 |
| 12 | Piston Assy. | 1 |
| 13 | Cap Screw | 8 |
| 14 | Cyl. Assy. 3/8" NPT Inlet "T" | 1 |
| 15 | O-Ring (small) | 1 |
| 16 | Nylon Bushing | 1 |
| 17 | Flange Nut | 1 |
| 18 | Jam Nut | 1 |

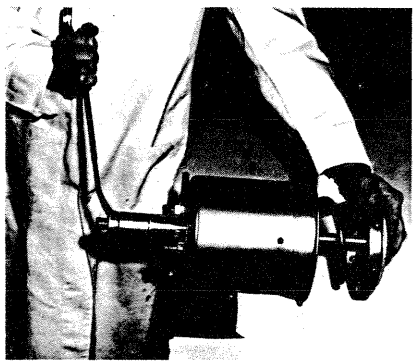
## Reassembly

1 Install nylon bushing in cylinder center boss groove. Bushing must be installed so that side with bevel edge faces toward inside of cylinder. Lubricate and install small O-Ring in other groove.

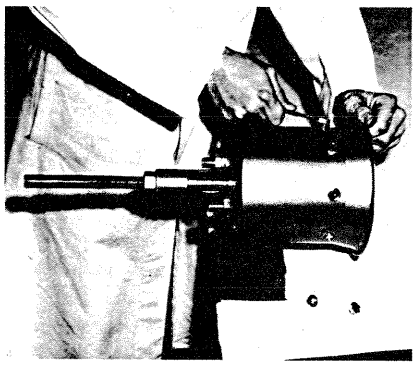


2 Lubricate and install large O-Ring in bottom groove of piston (groove nearest neck) and saturated felt wiper ring in top groove.

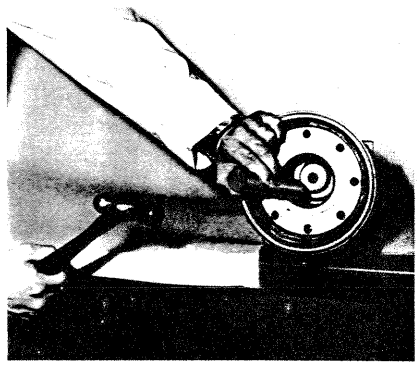
3 Insert piston assembly all the way into cylinder, holding felt wiper ring in place as piston is inserted.



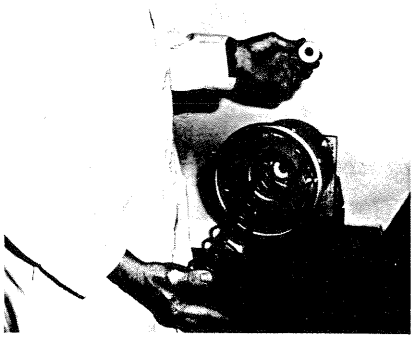
4 Assemble spring support and power spring onto Maxitool and insert through piston assembly. Run on Maxitool guide collar and ¾" nut. Tighten nut slightly and center spring over piston hub and spring support.



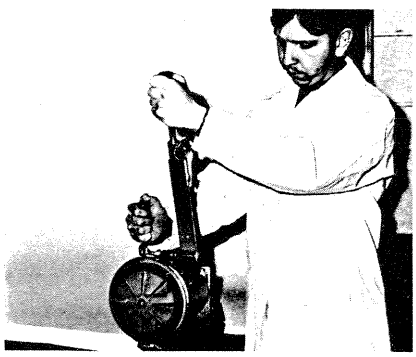
5 Tighten nut down until holes in spring support align with cylinder holes. Install the eight cap screws securing spring support to cylinder, alternately tightening (approx. 125 in./lbs.).



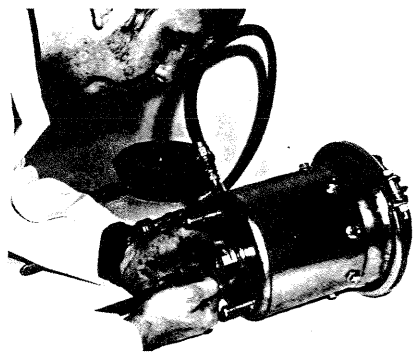
6 Remove Maxitool. Install push rod bushing into piston; tap lightly, making sure it is seated properly.



7 Assemble spring retainer and push rod return spring, install through bushing and piston tube, then secure with flange nut.



8 Install diaphragm with crowned surface in pressure plate and center over cylinder. Apply pressure to top of plate to squeeze diaphragm. Align clamp band assembly with pressure plate and cylinder. Torque bolts to 120-180 in./lbs.



9 Apply shop air to spring chamber. Run flange nut on piston rod to provide 1/16" to ⅛" gap at piston neck. Secure with jam nut. Test both chambers for air leaks. Maximum permissable leakage per chamber is 1 lb./min. with total volume of 200 cu. in./100 psi test pressure.

# troubleshooting

These trouble shooting tips cover the service chambers and spring chambers for both piston and double diaphragm cam type spring brake actuators.

**Insufficient service brake application when service pedal is depressed**

1. Restricted air flow or low air pressure being supplied to service chamber.
2. Worn brake lining or excessive drum wear.
3. Service brakes out of adjustment at slack adjuster.
4. Automatic adjusters not operating properly.
5. Improper alignment angle between chamber push rod and slack adjuster.
6. Bent or broken cam bracket or chamber mounting bracket.
7. Bent or broken chamber mounting tube.
8. Broken non-pressure half of service chamber.
9. Improper size actuators.
10. Ruptured diaphragm.
11. Foreign material blockage in non-pressure half of service chamber.
12. Air leak in supply hose/tubing, fittings, valves, or at clamp ring.

**Insufficient spring brake application when dash control valve actuated**

While most of the causes of malfunction listed above for insufficient service brake application will apply here also, there are a few more causes related directly to the spring brake assembly.

1. Spring brake not properly reset for full stroke. (Back-off type)
2. Ruptured seal on spring brake piston or diaphragm on double diaphragm type.
3. Broken power spring.
4. Insufficient size of spring brake or inadequate spring brake output force.

**Excessive air leakage when service brakes are applied**

1. Ruptured diaphragm in service chamber.
2. Clamp ring improperly installed.
3. Defective supply hose/tubing, fittings, or in-line valves.
4. Seal on center bulkhead (on add on type or double diaphragm.)

**Excessive air leakage when spring brakes released with air pressure**

1. Ruptured seal on spring brake piston or diaphragm on double diaphragm type.
2. Leaking push rod seal between service chamber and spring brake.
3. Defective supply hose/tubing fittings, or in-line valves.

**Dragging brakes**

(Service Brake Problem)

1. Broken return spring in service chamber.
2. Service application air not exhausting properly or fast enough due to blockage in air inlet, restricted or collapsed supply hose/tubing, in-line valve malfunction.
3. Broken brake shoe retracting spring.
4. Binding in camshaft linkage.

(Spring Brake Problem)

1. Ruptured seal on spring brake piston or diaphragm on double diaphragm type.
2. System air pressure insufficient to fully hold off spring brake.
3. Broken return spring in spring brake. (Only in double diaphragm models.)
4. If brakes drag when towing a disabled vehicle the spring brake may not have been properly released manually.

**Service brakes apply when spring brakes are released with air pressure**

1. Supply lines have been "crossed" to brake actuator.
2. Leaking push rod seal between spring brake and service chamber. (Add on type or double diaphragm type.)

**Air leak through service inlet when spring brake charged with air pressure**

1. Leaking push rod seal between spring brake and service chamber. (Add on type or double diaphragm type.)

**Spring brake will not release when charged with air pressure**

1. Insufficient level of air pressure being supplied to spring brake to compress power spring.
2. Air leak in spring brake.
3. Restriction in supply hose/tubing leading to spring brake.
4. Broken power spring blocking spring brake piston movement.
5. Malfunctioning in-line valve.

**Spring brakes cannot be manually released**

1. Release bolt or piston threads stripped.
2. Release bolt broken (internal type back-off mechanisms).
3. Release nut missing or damaged (internal type back-off mechanisms).

**Spring brake maintenance hints**

1. Follow to the letter the manufacturer's written instructions for maintenance, service, disassembly, repair, and re-assembly.
2. NEVER disassemble any spring brake while it is mounted on a vehicle or without following the recommended disassembly procedures.
3. Be sure the vehicle air supply system is kept clean.
4. Be sure, if applicable to the particular model of spring brake, that the filters, plugs, caps or breathers are kept securely in place.
5. To provide maximum performance from your spring brakes, keep the service brakes properly adjusted and in good working condition at all times.