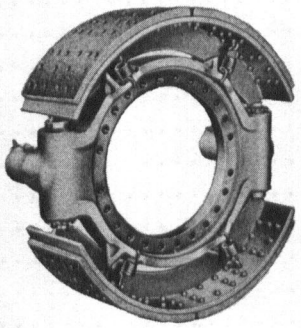
Field Maintenance Manual No. 4P

Stopmaster Brakes

HEAVY-DUTY 17 TO 36 INCH MANUAL OR AUTOMATIC ADJUSTMENT FAIL-SAFE UNIT



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Field Maintenance Manual 4P

Stopmaster HEAVY DUTY Brakes

Off-Highway RS, RD & RT Models
17" Through 42" Diameter

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SUPPLEMENT

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Automotive Operations
Communications
2135 West Maple Road
Troy, Michigan, U.S.A. 48084

SUPPLEMENT INDEX

SUBJECT PAGE

GENERAL

SERVICE AND MAINTENANCE

STOPMASTER HEAVY DUTY BRAKES

Description of Brakes

The heavy duty Stopmaster brakes are wedge actuated. The brake power units most commonly employed are hydraulic cylinders, however, some of the smaller diameter heavy duty brakes may also be operated with air chambers. Further, current hydraulic operated heavy duty Stopmaster brakes may also employ Fail-Safe spring brake units to provide a manually activated parking and emergency braking system.

There are three basic types of heavy duty Stopmaster brakes, single actuated (one power unit per brake), double actuated (two power units per brake) and triple actuated (three power units per brake).

The basic Stopmaster brakes are identified as model RSH or RSA, RDH or RDA and RTH. The letters denote the following: R = Stopmaster brake (wedge actuated); S = single actuated; D = double actuated; T = triple actuated; H = hydraulic operated; A = air operated.

Some major variations within the basic designs include automatic or manual brake shoe adjustment, a cast spider brake support with integral plunger (actuation) housings, stamped backing plate support with bolted on plunger housings and a shoe removable feature which allows removal of shoes without removing the brake drum.

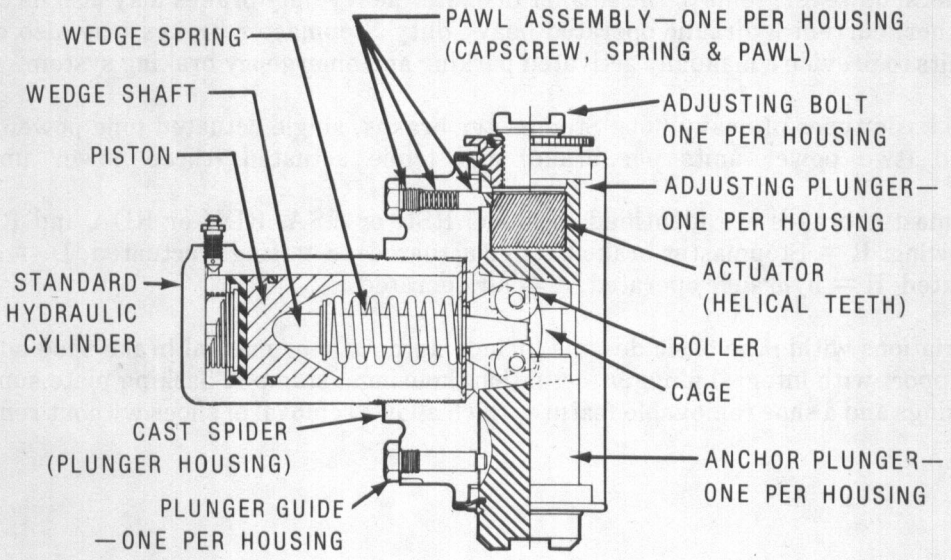
Description of Actuating System

Basically the brake power unit (hydraulic or air) forces a wedge between two rollers and two plungers inside the actuation or plunger housing. This causes the plungers to spread apart and push the brake shoes and linings against the brake drum for the braking action.

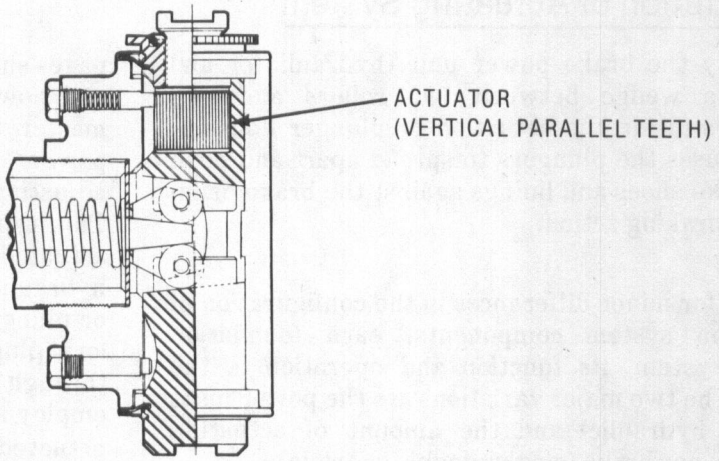
Except for minor differences in the configuration of actuation system components, each foundation brake system, its function and operation is the same. The two major variations are the power units (air or hydraulic) and the amount of actuating systems per brake (single, double or triple).

The cutaway illustrations on the following two pages shows the various types of actuating systems and power units employed by heavy duty Stopmaster brakes. A typical actuating system and power unit is the double actuated, automatic adjusting type with a standard hydraulic cylinder. This type of system is used in both the double actuated (RD) and triple actuated (RT) brakes. The hydraulic power unit is threaded into a cast spider or plunger housing and can be secured by either a lock plug and set screw or collet nut. With 17" through 22" diameter brakes this system can also employ air chambers. When the brake is applied or actuated the cylinder piston pushes on the wedge shaft and when the brake is released the wedge spring acts as a return spring for both the shaft and piston.

A pair of rollers are held in place against the wedge head by a roller cage. The rollers are engaged in corresponding slots in the inner ends of the plungers. The unslotted portions of the inner ends are resting on abutments in the actuation housing. The outer ends of the plungers are engaged with and support the brake shoes.



AUTOMATIC ADJUSTING

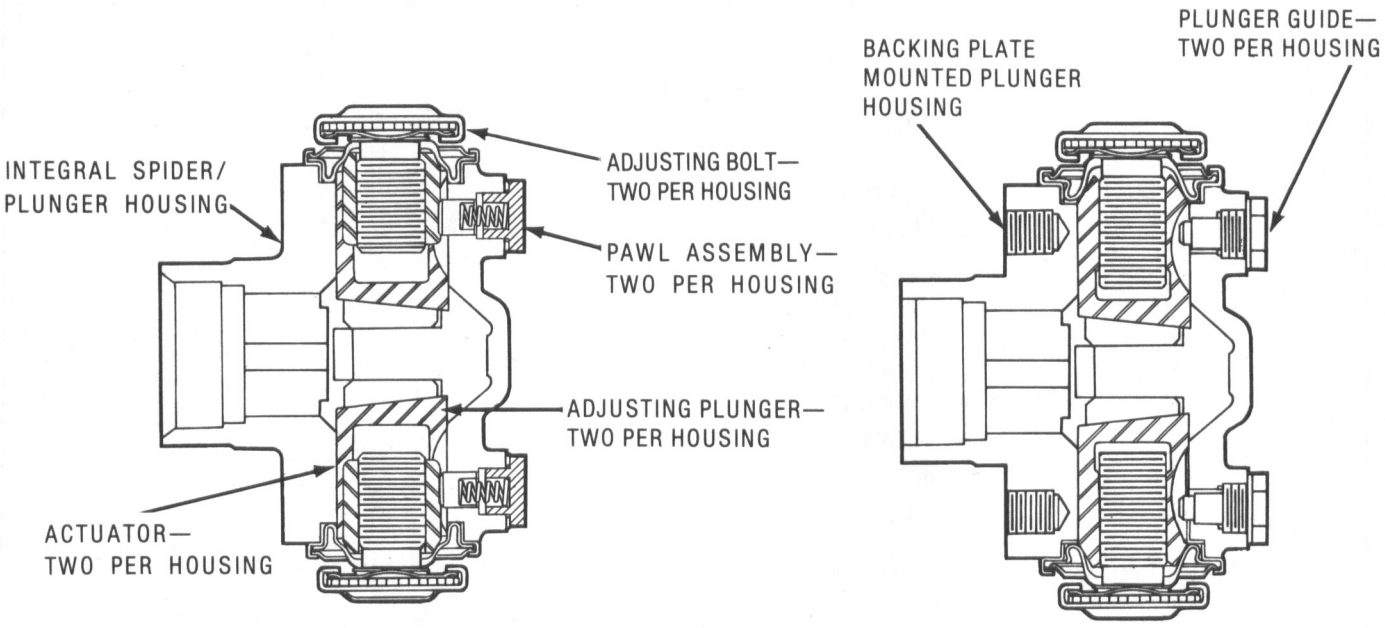


MANUAL ADJUSTING

DOUBLE OR TRIPLE ACTUATED, [RD & RT MODELS]
TYPICAL 28'' THROUGH 42'' DIAMETER

On double and triple actuated brakes, each of the two or three systems has one anchor (solid) plunger and one adjusting plunger. On a single actuated brake the one actuating system has two adjusting plungers. The anchor and manual adjusting plungers are retained in the housing and the roller slots are kept in proper alignment by means of plunger guides (guide screws) which engage slots in the side of the plungers. The automatic adjusting plungers are kept in proper alignment by means of a pawl assembly which serves as the plunger guide. The pawl assembly is made up of a hollow capscrew, spring and guide pawl that has flats on its O.D. that engage a slot in the side of the plunger.

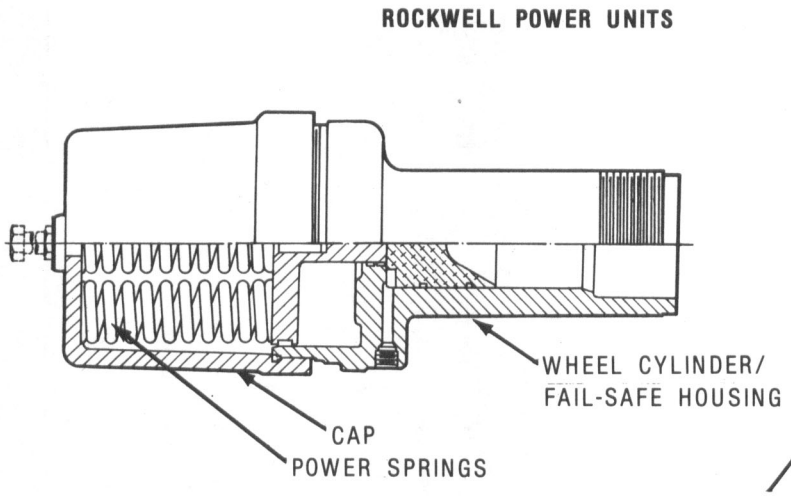
When the brake is applied, the cylinder piston pushes the wedge deeper between the rollers. This spreads the rollers and plungers apart and pushes the brake shoe and lining assembly out against the drum. Initially, all the plungers are lifted off their abutments and are momentarily suspended. As the shoes contact the drum, the drum drags the shoe and suspended plungers around with it.



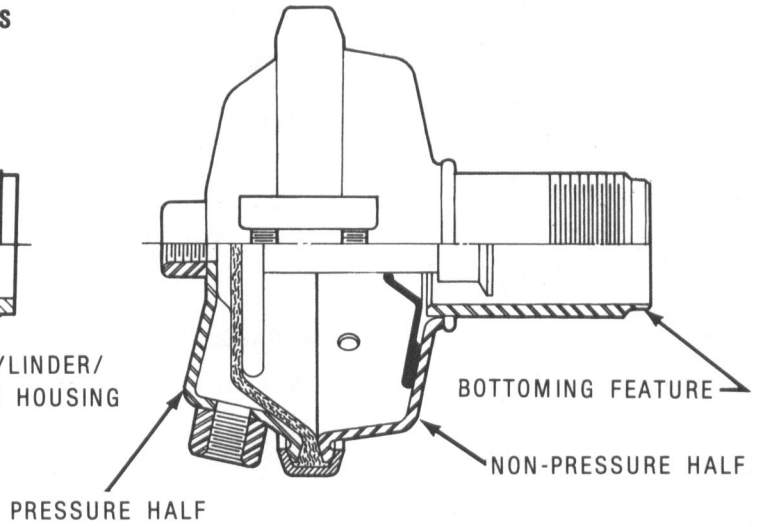
AUTOMATIC ADJUSTING **MANUAL ADJUSTING**

SINGLE ACTUATED, [RS MODELS]
TYPICAL 20¼'' THROUGH 26'' DIAMETER

ROCKWELL POWER UNITS



HYDRAULIC FAIL-SAFE ASSEMBLY

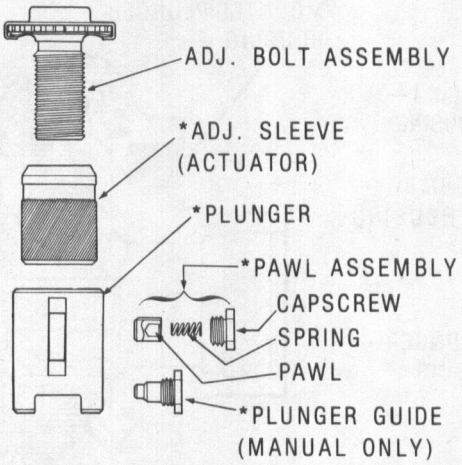


STANDARD AIR CHAMBER
[BOTTOMING TYPE]

With RD and RT brakes, this causes the anchor plungers at the trailing end of each shoe to reseat on their abutments and thus absorb and transfer the brake torque to the brake support. With RS brakes, the torque is absorbed through the brake shoe anchor pins and transfered to the brake support. When the brake is released, the wedge spring returns the wedge shaft and cylinder piston to the off position. At the same time, the shoe return springs push the raised plungers back on their abutments.

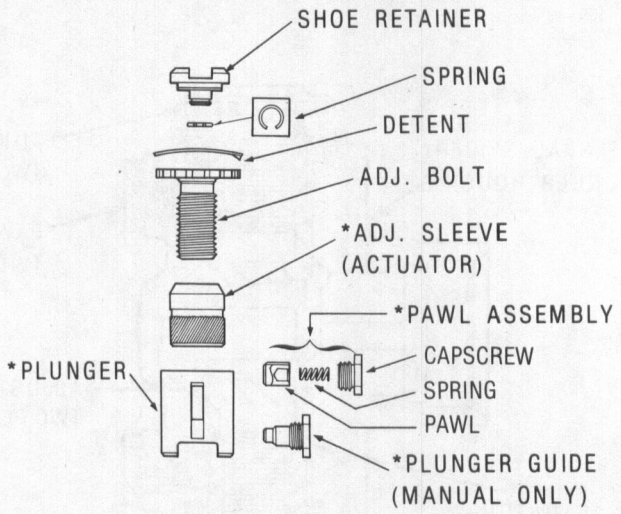
Description of Brake Shoe Adjustment

There are two types of adjustment in use, automatic and manual. These two types can employ one of the four adjusting component designs shown below. Except for minor differences in configuration, the functions of these adjusting assemblies are the same.



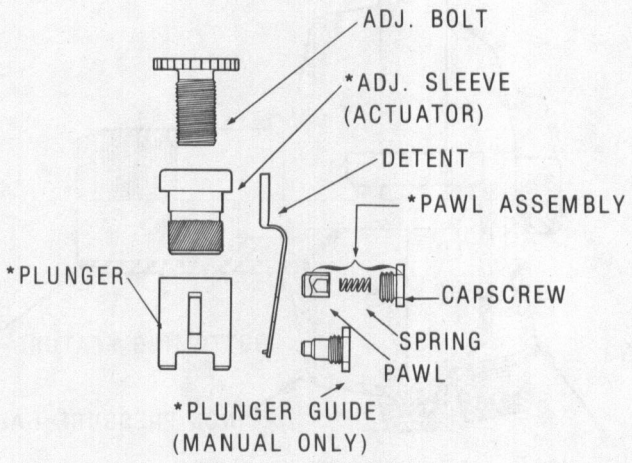
One piece adjusting bolt assembly (three pre-assembled pieces)

Bolt head has integral adjusting star wheel and pressed on shoe retainer clip and detent spring. Individual parts are not serviceable separately.



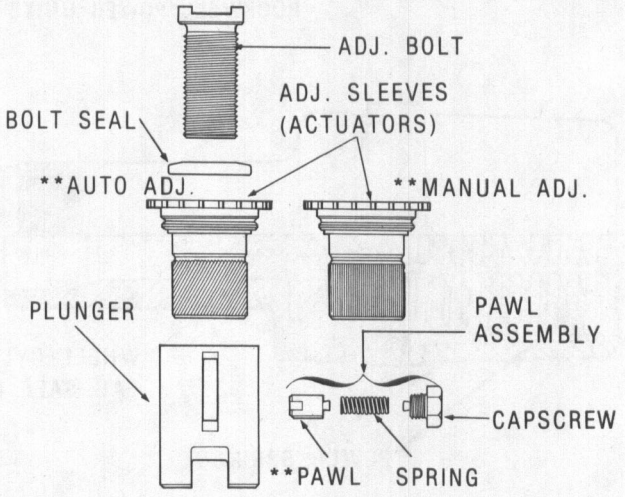
Four piece adjusting bolt

Bolt head has integral adjusting star wheel a separate "snap together" shoe retainer, spring and detent spring washer. Some bolts may employ a bolt retainer snap ring.



One piece adjusting bolt

Flat head bolt has integral adjusting star wheel. A separate finger type spring detent is held in position against the star wheel by the pawl hollow capscrew or plunger guide.



One piece adjusting bolt (28" thru 42" diameter RD & RT)

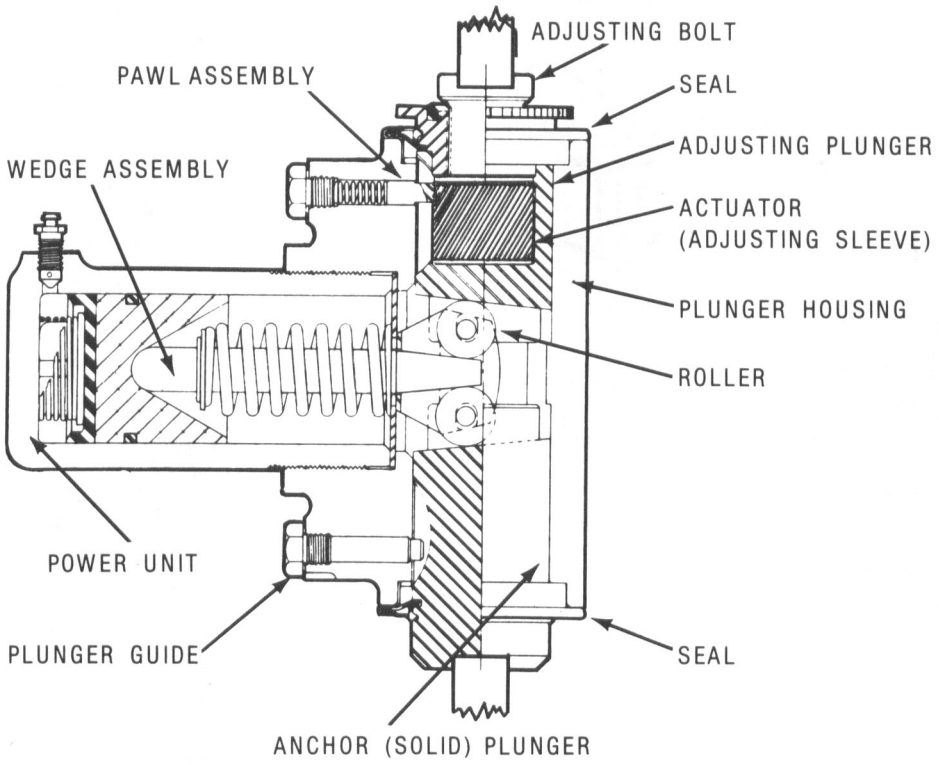
Bolt head is grooved to retain brake shoe. The adjusting star wheel is integral with the adjusting sleeve (actuator).

*When manual adjusters are employed the bolt threads directly into the adjusting plunger. The plunger is held in position by a plunger guide. The adjusting sleeve and pawl assembly is not used.

**When manual adjusters are employed on the 28" thru 42" RD & RT brakes the actuator and pawl with helical teeth are replaced by an actuator and pawl with vertical (parallel) teeth.

Automatic Adjustment

The automatic adjusting assembly consists of four basic components. The adjusting plunger, actuator (adjusting sleeve), adjusting bolt assembly and pawl assembly.
The adjusting bolt is threaded into the actuator which is in turn free fitted into the adjusting plunger. The plunger is held in correct alignment in the plunger housing by a pawl assembly (guide pawl, spring and hollow capscrew) which engage a slot in the adjusting plunger. The end of the pawl has teeth that mesh with corresponding helical teeth on the O.D. of the actuator.



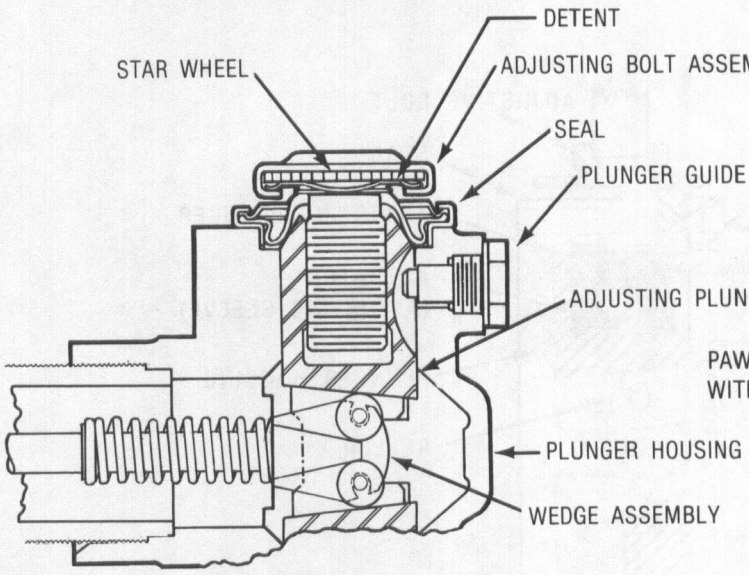
DOUBLE OR TRIPLE ACTUATED, MANUAL ADJUSTING
(RD & RT MODELS)
TYPICAL 28'' THROUGH 42'' DIAMETER

As the brake is actuated, the plunger, actuator and bolt move outward and the sloping face of the teeth on the actuator lift the adjusting pawl against the spring. When the brake is released all parts return to their starting point. As the lining wears, the plunger stroke and resulting pawl lift gradually increases until the pawl climbs over and drops into the next tooth space on the actuator. This time, when the brake is released and the plunger is pushed into its bore, the upright face of the pawl teeth causes the actuator to rotate and advance the adjusting bolt. This reduces the drum to lining clearance and the cycle is repeated. One manual adjustment is initially required at each automatic adjusting assembly to properly start the automatic adjusting cycle. Refer to page 24 for adjusting procedures.

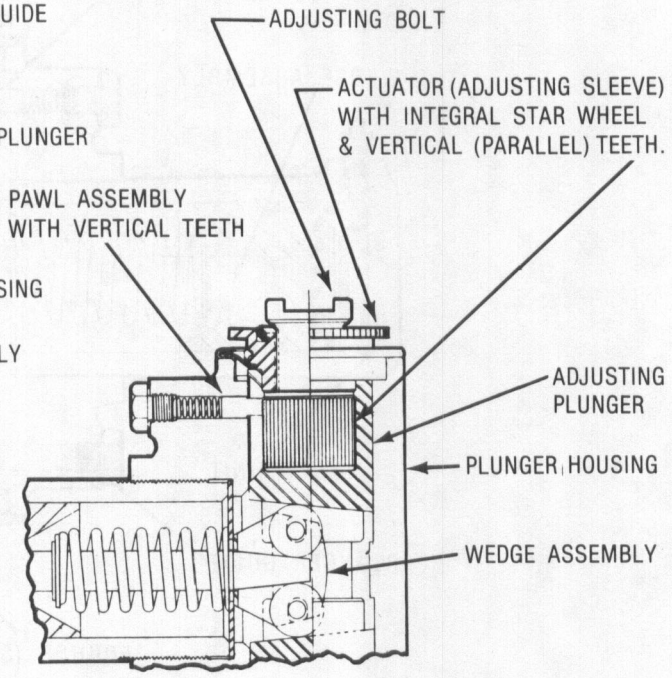
Manual Adjustment

The manual adjusting assemblies of 17" through 26" diameter heavy duty Stopmaster brakes consists of three basic components. The adjusting bolt, adjusting plunger and plunger guide screw. The larger 28" through 42" diameter brakes employ four major components in the manual adjusting assembly. The adjusting bolt, adjusting sleeve (actuator with vertical teeth), adjusting plunger and pawl assembly (pawl, with vertical teeth, spring and hollow capscrew).

With the 17" through 26" diameter brakes the adjusting bolt is threaded directly into the plunger. In turn, the plunger is held in correct alignment in the plunger housing by a plunger guide screw which engages a slot in the plunger O.D. Further, each adjusting bolt head is scalloped (star wheel) to facilitate adjustment and has a detent arrangement (three types) that engages the star wheel to prevent rotation of the bolt.



17" THROUGH 26" DIAMETER



28" THROUGH 42" DIAMETER

The manual adjusters of 28" through 42" diameter brakes are similar to the automatic adjusters used with the same size brakes. The major difference is the angle of the teeth on the actuator and pawl, automatics have helical teeth while manual have vertical teeth.

The bolt threads into the actuator which in turn is free fitted into the plunger. The plunger is held in correct alignment in the plunger housing by a spring loaded pawl assembly which engages a slot in the plunger. The end of the pawl has teeth on the O.D. of the actuator which prevents it from rotating. Further, the adjusting star wheel is integral with the actuator rather than the bolt.

As the brake is actuated, the plunger and bolt (also actuator with larger brakes) move outward to press the shoes and linings against the drum. When the brake is released all parts return to their starting point. As the lining wears, the lining to drum gap increases and it becomes necessary to adjust or reduce the gap back to the required clearance. With 17" through 26" diameter brakes this is accomplished by manually turning the bolt by the star wheel counterclockwise.

With 28" through 42" diameter brakes turn the actuator by the star wheel clockwise to adjust the brake.

Refer to page 22 for detailed adjustment procedures.

Recommended Grease

A high temperature water-proof grease in NLGI Grade No. 1 is recommended for lubricating the Stopmaster heavy duty brake actuating system. It should be a smooth textured corrosion resistant grease free of fillers and abrasives. It should maintain a satisfactory softness under normal parking and storage temperatures so the brakes can be applied and released. The Rockwell lubricant specification that meets these requirements is 0-616-A* and can be obtained under Rockwell part number A-1779-W-283.

The following greases also meet the requirements of the recommended lubricant:

Texaco Thermotex EP #1
Shell Darina #1
Marathon 528 H.D.

Sunaplex #1 EP
Amdex #1 EP
Philube B #1

Vehicles operating in extremely cold weather (below -40°F or -40°C) may require a grease conforming to military specification MIL-G-25013C.

**Our grease recommendations are based on commercial products that have given satisfactory results in normal operation. However, there are many proprietary grease products on the market which will perform satisfactorily, and may be preferable because of supply problems, common usage for other truck components, etc. Where such products are recommended by reputable grease suppliers for the specific lubrication of our components, Rockwell has no objections, provided that these substitute products are equal or better than the Rockwell recommendations in lubrication properties, water resistance, corrosion protection, high and low temperature characteristics, oxidation stability, shear stability, etc.*

The lubricant supplier may obtain copies of any of the referenced Rockwell Material Specifications by writing to the following address: Technical Communications, Rockwell International, 2135 West Maple Road, Troy, Michigan 48084.

In all cases the lubricant supplier assumes all responsibility for the performance of his product and for product and patent liability.

Recommended Grease Change Interval

Change grease every twelve (12) months Maximum, whenever seals are replaced and when brakes are relined. However, the change interval may be shorter than twelve (12) months depending on the severity of service operation. This can be determined by initially scheduling an inspection of internal parts and lubricant every two (2) months until the first twelve (12) month period is up. At each inspection look for contaminated or hardened grease or for the lack of grease.

Before greasing, clean all internal parts free of old grease.

RECOMMENDED PREVENTIVE MAINTENANCE

A. Periodic Inspection Every Two (2) Months:

1. Check lining wear to determine proper reline time.

2. When automatic adjusters are used, check drum to lining clearance. If clearances are less than shown below, adjusters are working properly.

DIA. BRAKE	ADJUSTMENT
28" thru 42"	.100"
17" thru 26"	.080"
*17¼" backing plate only	.060"

3. Check service and parking/emergency (Fail-Safe spring brake) systems by cycling the hydraulic or air application valves. (Vehicles employing 17" - 22" diameter brakes may have air systems)

B. Inspection Every Twelve (12) Months:

1. Cage Fail-Safe or other spring brake unit power spring and remove all wheels and drums.

2. Inspect plunger seals. If they are cut, torn or leaking disassemble and overhaul brake actuation system components.

*Same adjustment as 15" dia. on-highway Stopmaster brake.

3. If seals are in good condition, remove the upper adjusting plunger and its seal. Check internal condition. If grease is contaminated or hardened, or if parts are dry, disassemble and overhaul brake actuation system components.

4. If internal condition is satisfactory, reassemble adjusting plunger and replace seal. Run until next inspection.

C. At Each Reline:

1. If reline is greater than one (1) year, disassemble and overhaul all brake actuation components.

2. If reline is appreciably less than one (1) year:

   a. Remove adjusting plungers and related parts.

   b. Clean and regrease adjusting bolt and actuator (adjusting sleeve) and/or plunger.

   c. Check balance of internal parts, if in satisfactory condition reassemble. If unsatisfactory overhaul entire actuation system.

PROBLEM ANALYSIS GUIDE

IF BRAKES ARE POOR OR DO NOT APPLY — Check system hydraulic or air pressure at source and at brakes — Possible restriction or leak in brake lines, valves, etc. — Brakes out of adjustment — Leaking cylinder cup or air chamber diaphragm.

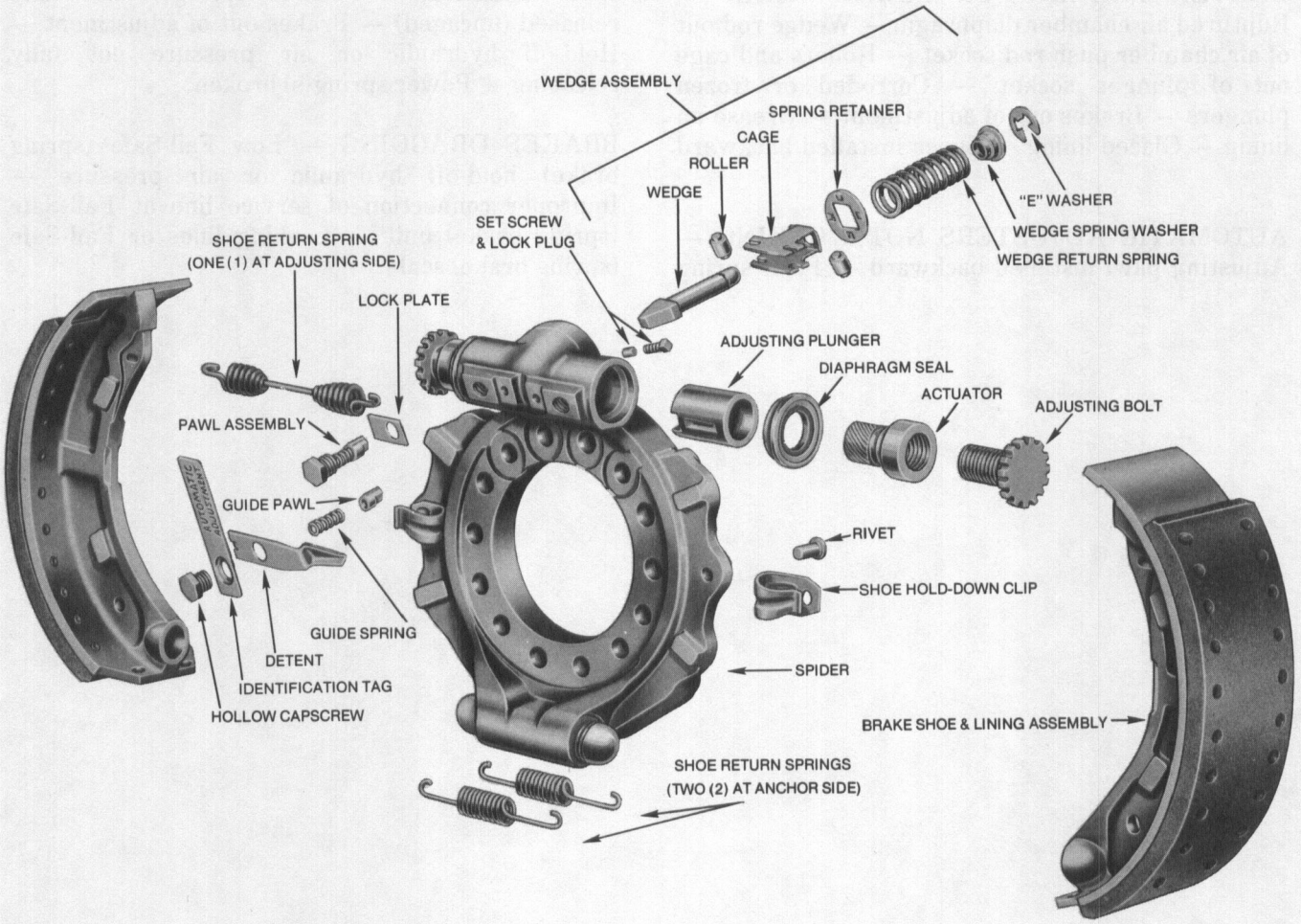
UNEVEN BRAKING OR LINING WEAR — Ruptured air chamber diaphragm — Wedge rod out of air chamber push rod socket — Rollers and cage out of plunger socket — Corroded or frozen plungers — Brakes out of adjustment — Grease on lining — Glazed lining — Shoes installed backward.

AUTOMATIC ADJUSTERS NOT WORKING — Adjusting pawl installed backward — Pawl spring collapsed or missing — Bolt frozen in actuator (adjusting sleeve) — Detent damaged and allowing bolt to rotate with actuator — Adjusting plunger in wrong position (should be at leading end of shoe) — Seals not installed correctly.

FAIL-SAFE OR OTHER SPRING BRAKE UNIT NOT HOLDING — Power spring(s) not fully released (uncaged) — Brakes out of adjustment — Hold-off hydraulic or air pressure not fully releasing — Power spring(s) broken.

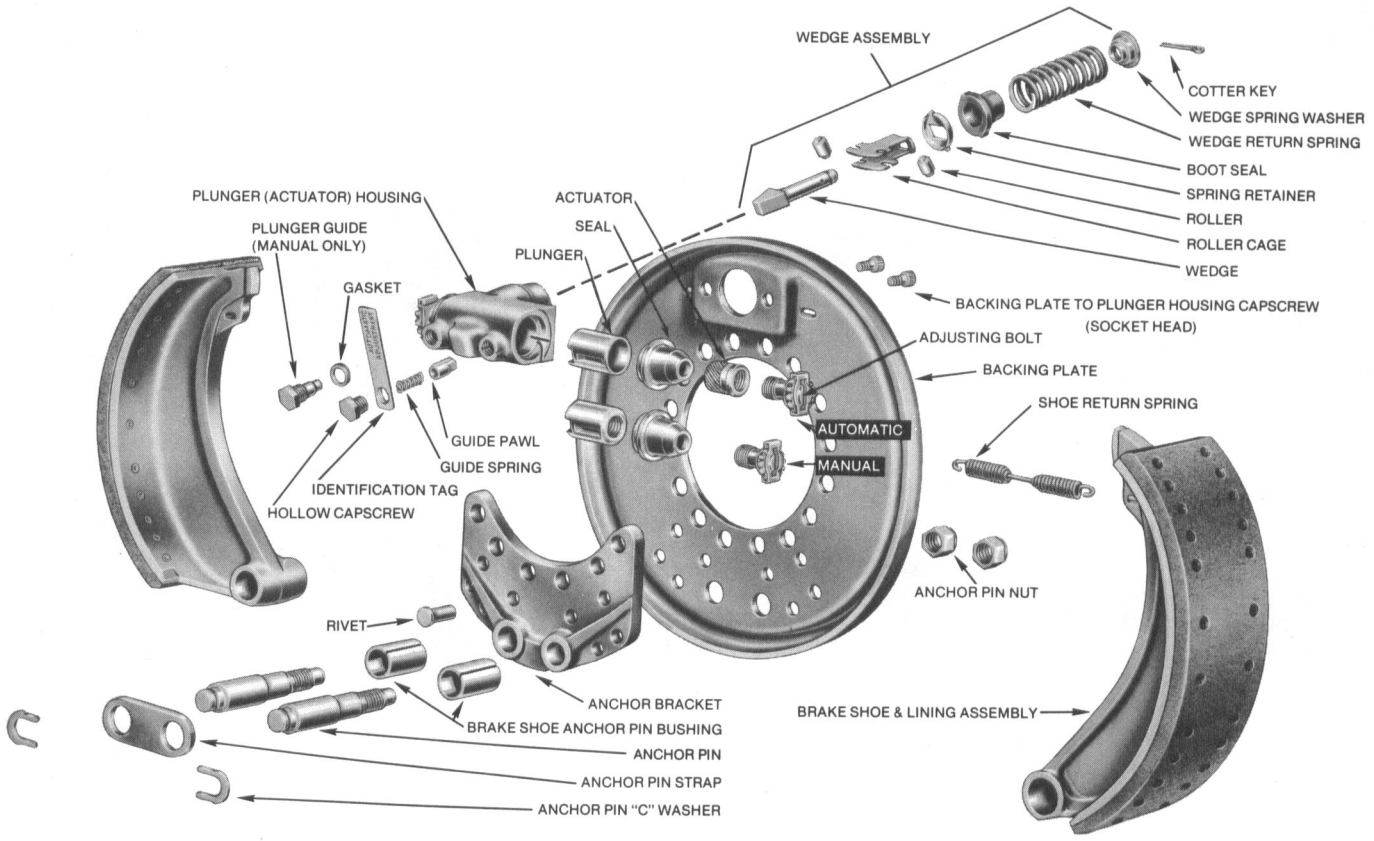
BRAKES DRAGGING — Low Fail-Safe (spring brake) hold-off hydraulic or air pressure — Improper connection of service line at Fail-Safe (spring brake) unit — Leaking lines or Fail-Safe (spring brake) seals.

RS HEAVY DUTY STOPMASTER
17¼ INCH DIAMETER
SPIDER MOUNTED



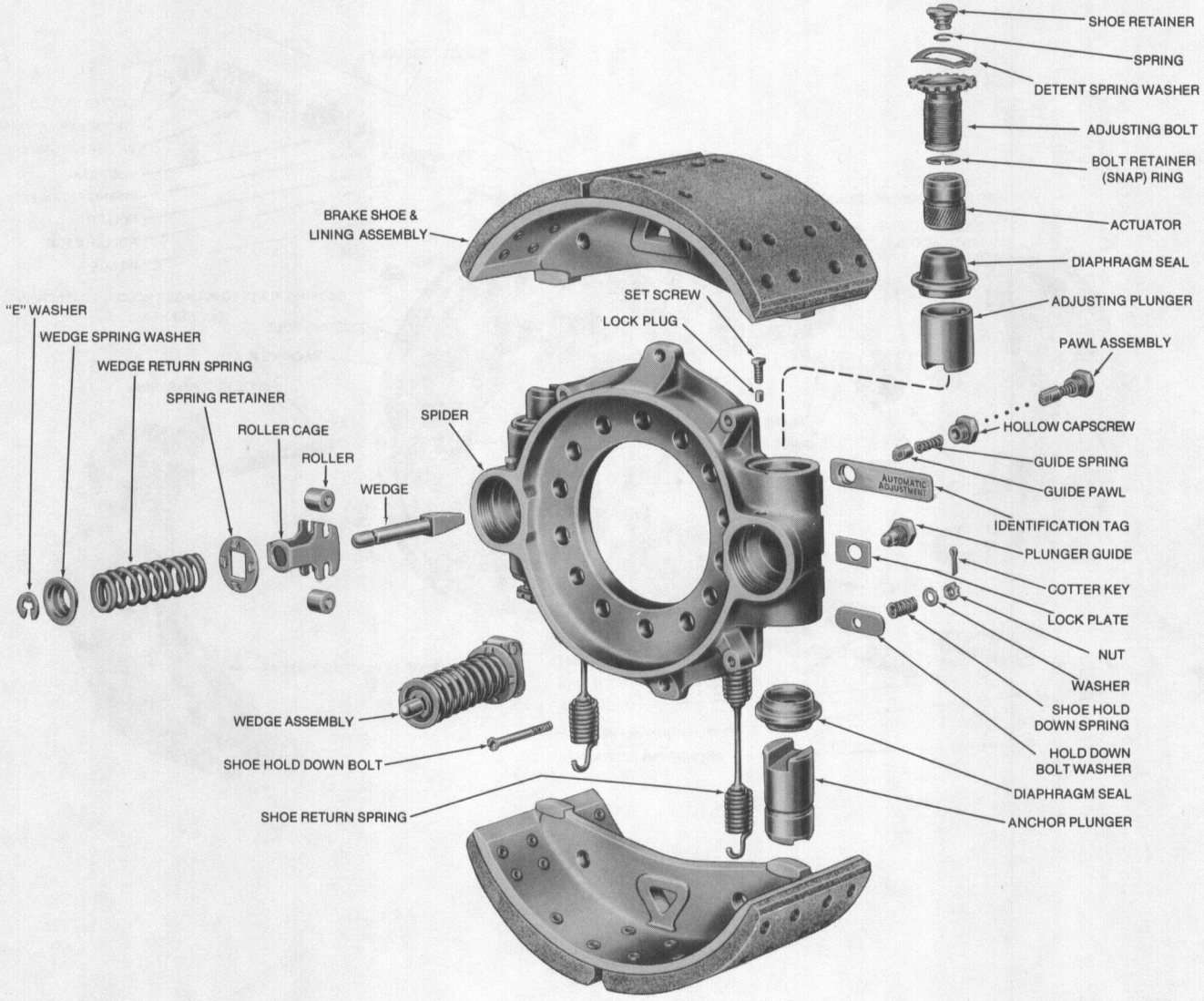
Single actuated (RS), cast spider brake support with integral plunger (actuation) housing, bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece flat head adjusting bolt). Power units may be air or hydraulic. Brake shoes have riveted on and/or bonded linings and are held in position with hold down clips and three return springs. The anchor side of the brake support employs ball type shoe pivots.

RS HEAVY DUTY STOPMASTER
17¼ INCH DIAMETER
BACKING PLATE MOUNTED



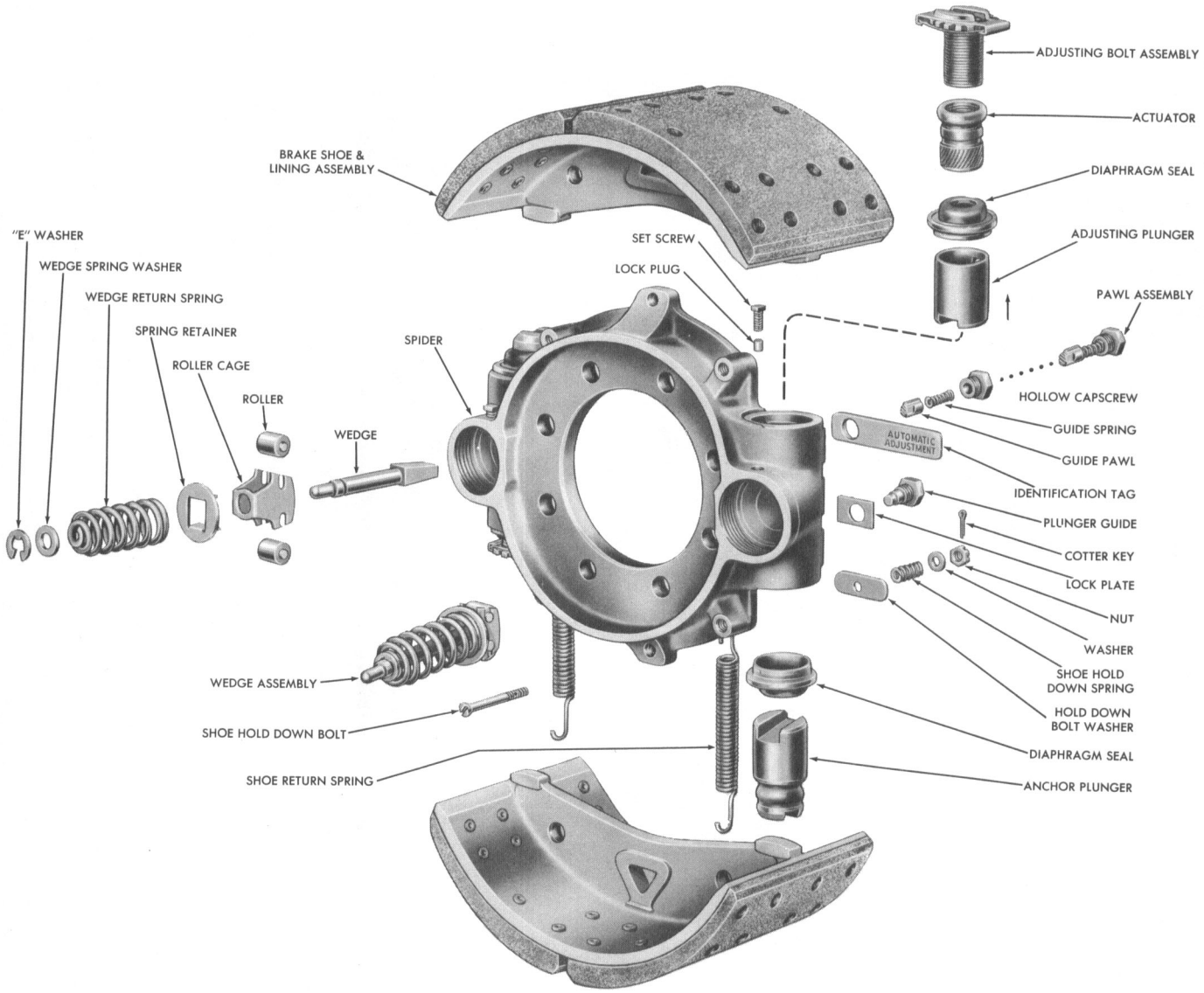
Single actuated (RS), backing plate brake support with bolted on plunger (actuation) housing. Adjusters may be automatic or manual (both are shown with the one piece pre-assembled adjusting bolt assembly). Power unit may be air or hydraulic. Brake shoes have riveted on and/or bonded linings and are held in position with one return spring. The anchor side of the brake employs an anchor bracket, bushings and pins.

TYPICAL
RD HEAVY DUTY STOPMASTER
17 INCH DIAMETER X 6 INCHES
SPIDER MOUNTED



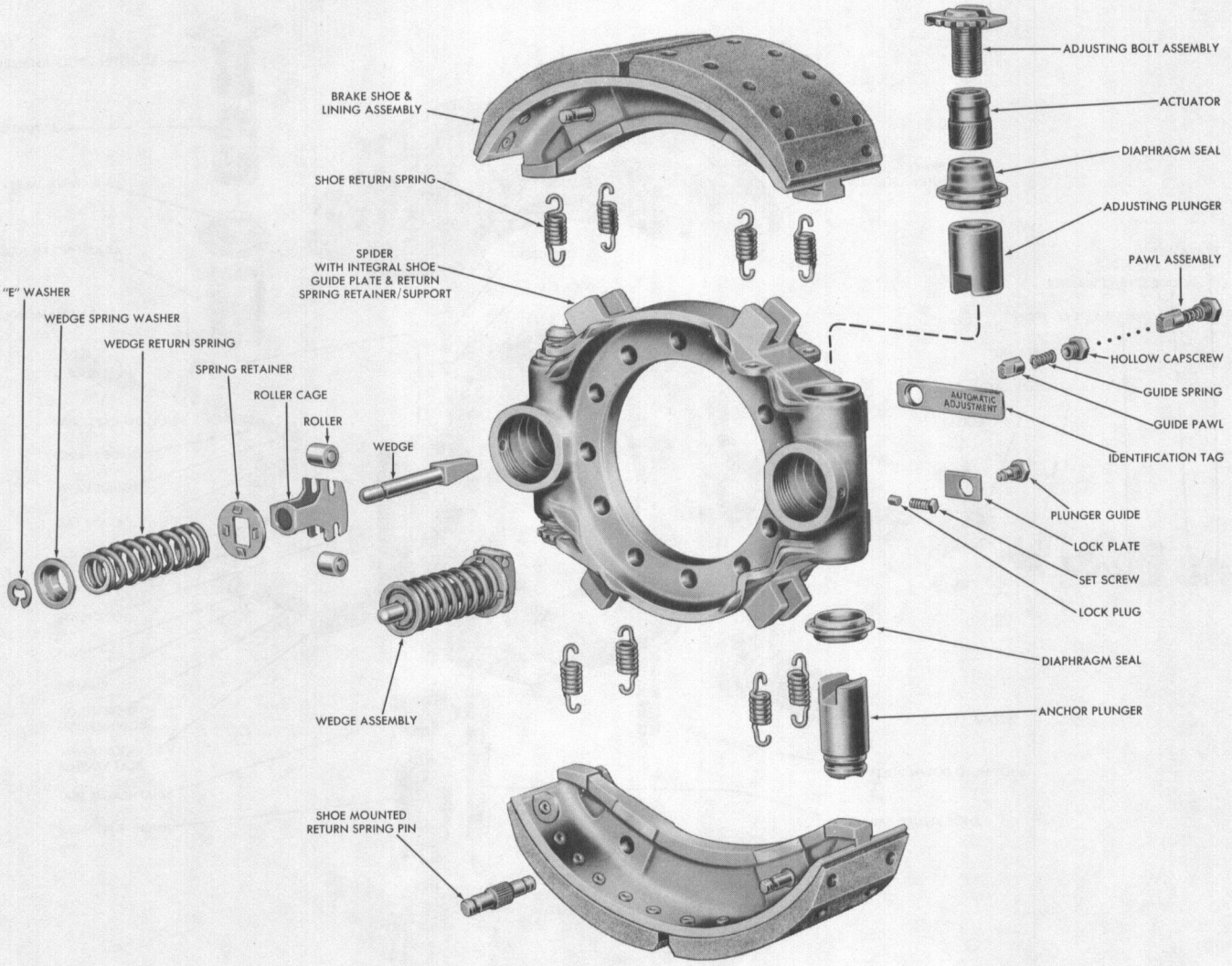
Double actuated (RD), cast spider brake support with integral plunger (actuation) housings, bolt to axle housing flange. Adjusters may be automatic or manual (automatic shown with four piece adjusting bolt). Power units may be air or hydraulic. Brake shoes have rivited on linings, shoe hold down bolt and standard shoe removal.

TYPICAL
RD HEAVY DUTY STOPMASTER
17 INCH DIAMETER X 7 INCHES
SPIDER MOUNTED



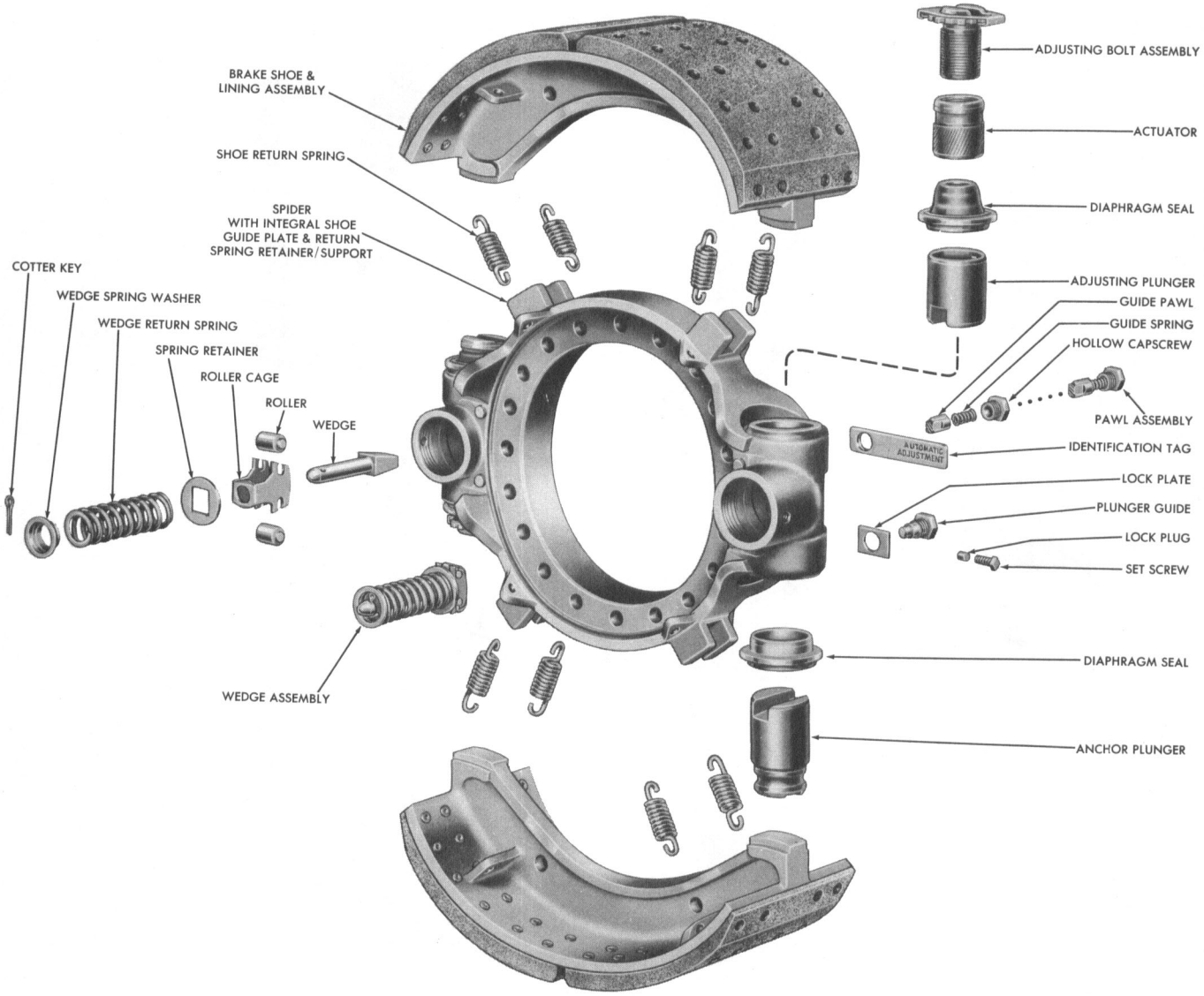
Double actuated (RD), cast spider brake support with integral plunger (actuation) housings, bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece pre-assembled adjusting bolt). Power units may be air or hydraulic. Brake shoes have riveted on linings, shoe hold down bolt and standard shoe removal.

RD HEAVY DUTY STOPMASTER
20 INCH and 20¼ INCH DIAMETER
SPIDER MOUNTED



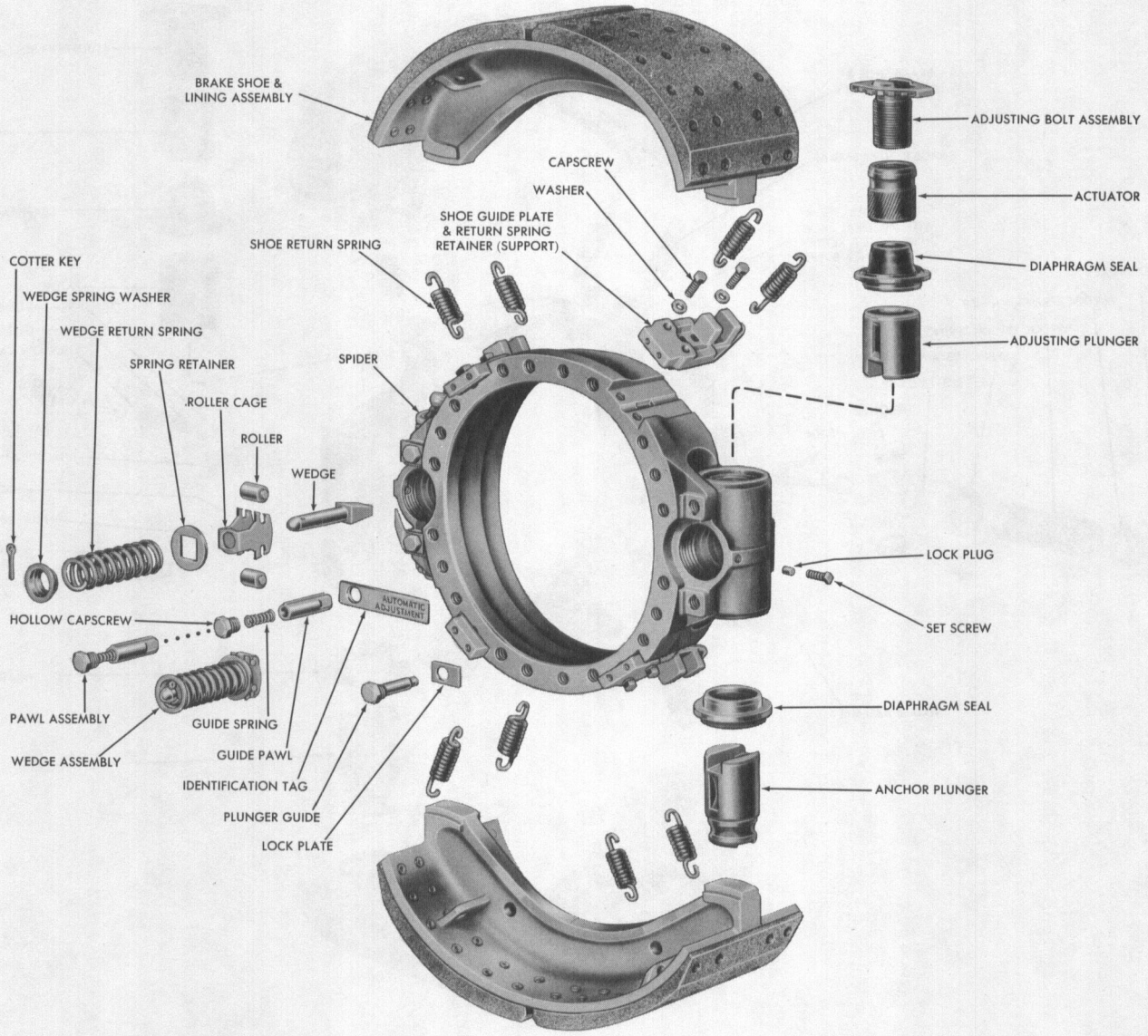
Double actuated (RD), cast spider brake support with integral plunger (actuation) housings and integral shoe guide plate and return spring retainer/support. Spider bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece pre-assembled adjusting bolt). Power units may be air or hydraulic. Brake shoes have riveted on linings and standard shoe removal.

RD HEAVY DUTY STOPMASTER
26 INCH DIAMETER
(STANDARD SHOE REMOVAL)
SPIDER MOUNTED



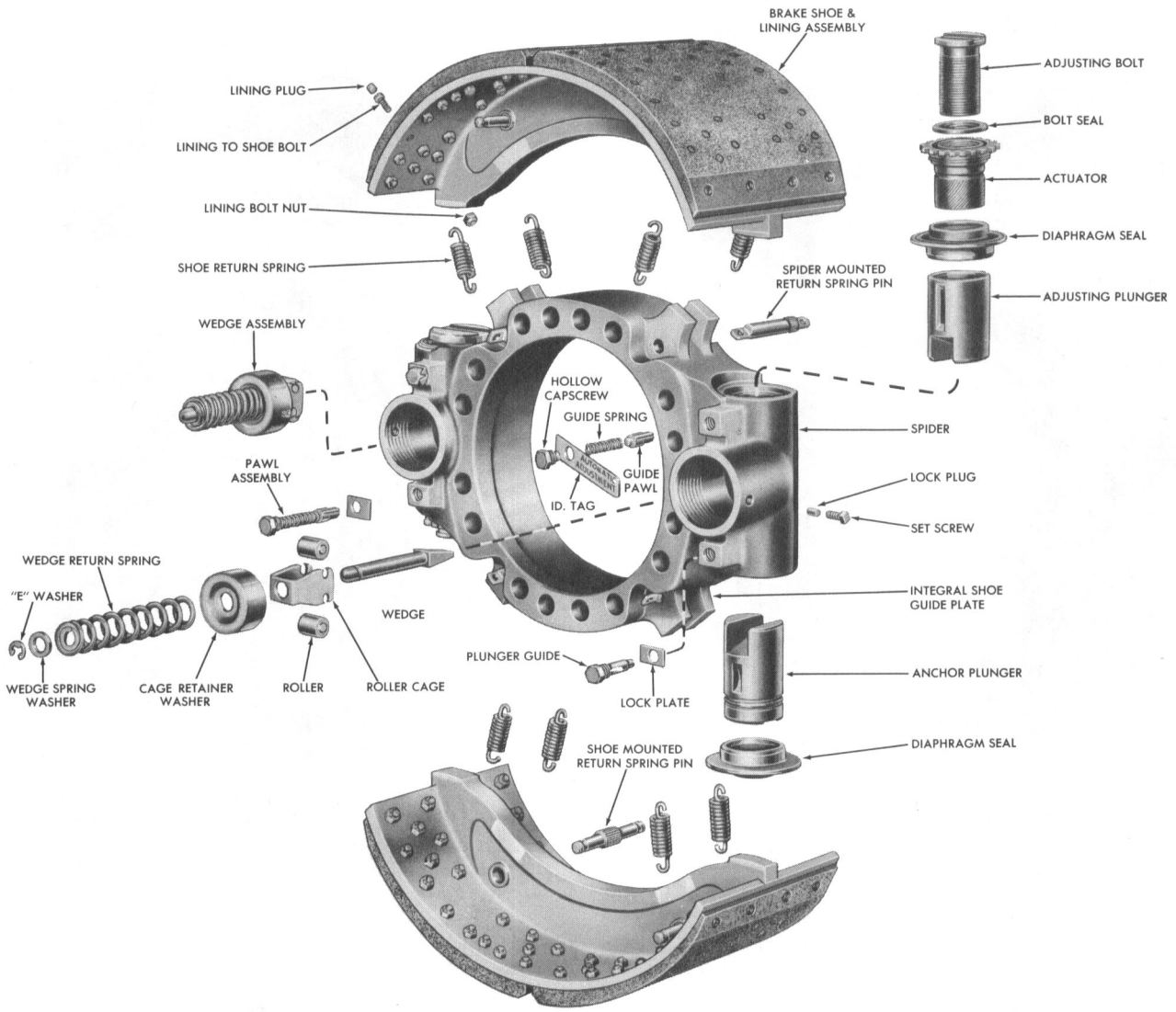
Double actuated (RD), cast spider brake support with integral plunger (actuation) housings and integral shoe guide plate and return spring retainer/support. Spider bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece pre-assembled adjusting bolt). Power units are hydraulic and brake shoes have riveted on linings and standard shoe removal.

RD HEAVY DUTY STOPMASTER
26 INCH DIAMETER
(SHOE REMOVABLE FEATURE)
SPIDER MOUNTED



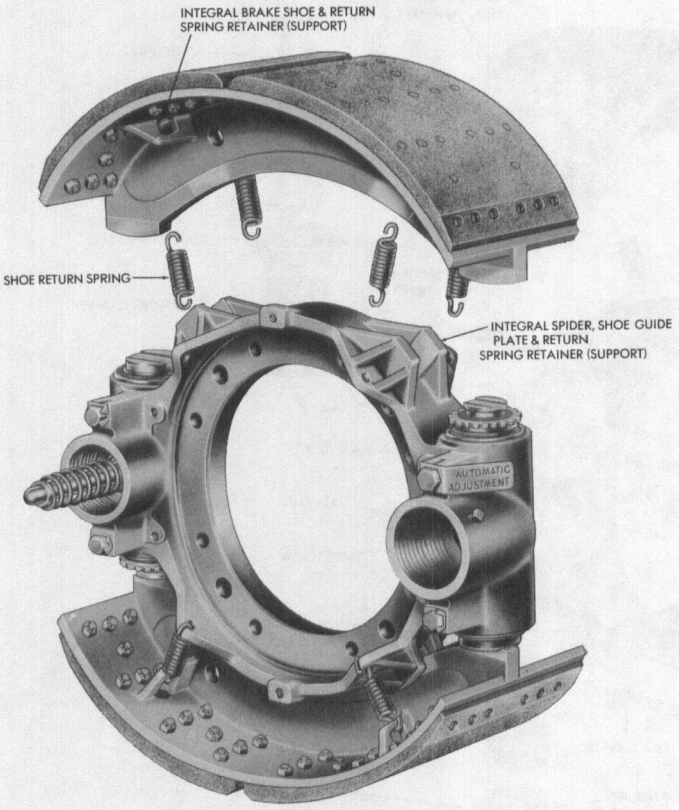
Double actuated (RD), cast spider brake support with integral plunger (actuation) housings, bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece pre-assembled adjusting bolt). Power units are hydraulic and brake shoes have riveted on linings. This brake employs bolted on shoe guide plates which allows the shoe removable feature.

RD HEAVY DUTY STOPMASTER
28 INCH DIAMETER
SPIDER MOUNTED

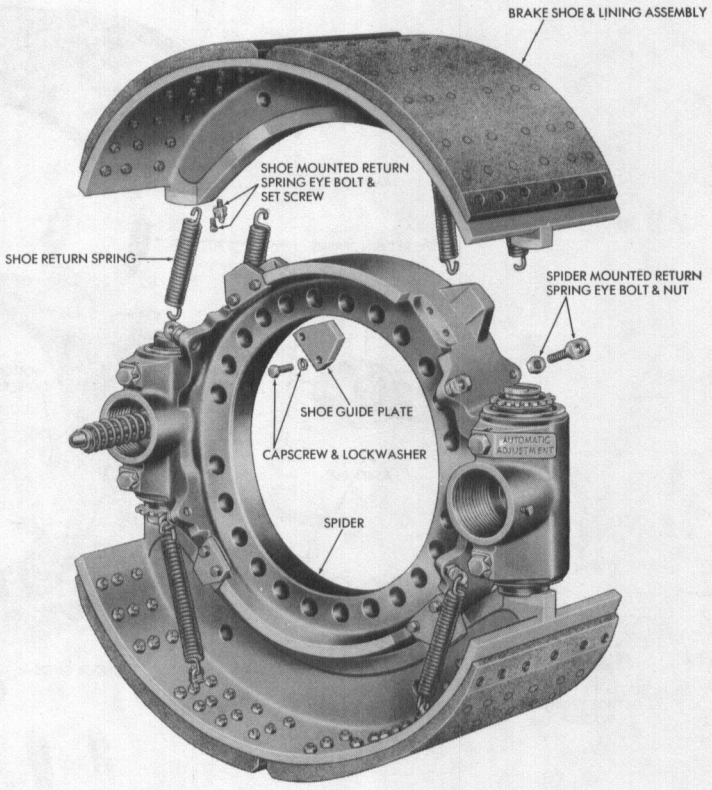


Double actuated (RD), cast spider brake support with integral plunger housings and integral shoe guide plates. Spider bolts to the axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece adjusting bolt and integral actuator/star wheel). Power units are hydraulic and brake shoes have bolted on linings and standard shoe removal.

RD HEAVY DUTY STOPMASTER
SPIDER MOUNTED



NOTE: ALL OTHER PARTS NOT CALLED OUT ARE SIMILAR TO THOSE OF THE 28" DIA. RD STOPMASTER



NOTE: ALL OTHER PARTS NOT CALLED OUT ARE SIMILAR TO THOSE OF THE 28" DIA. RD STOPMASTER

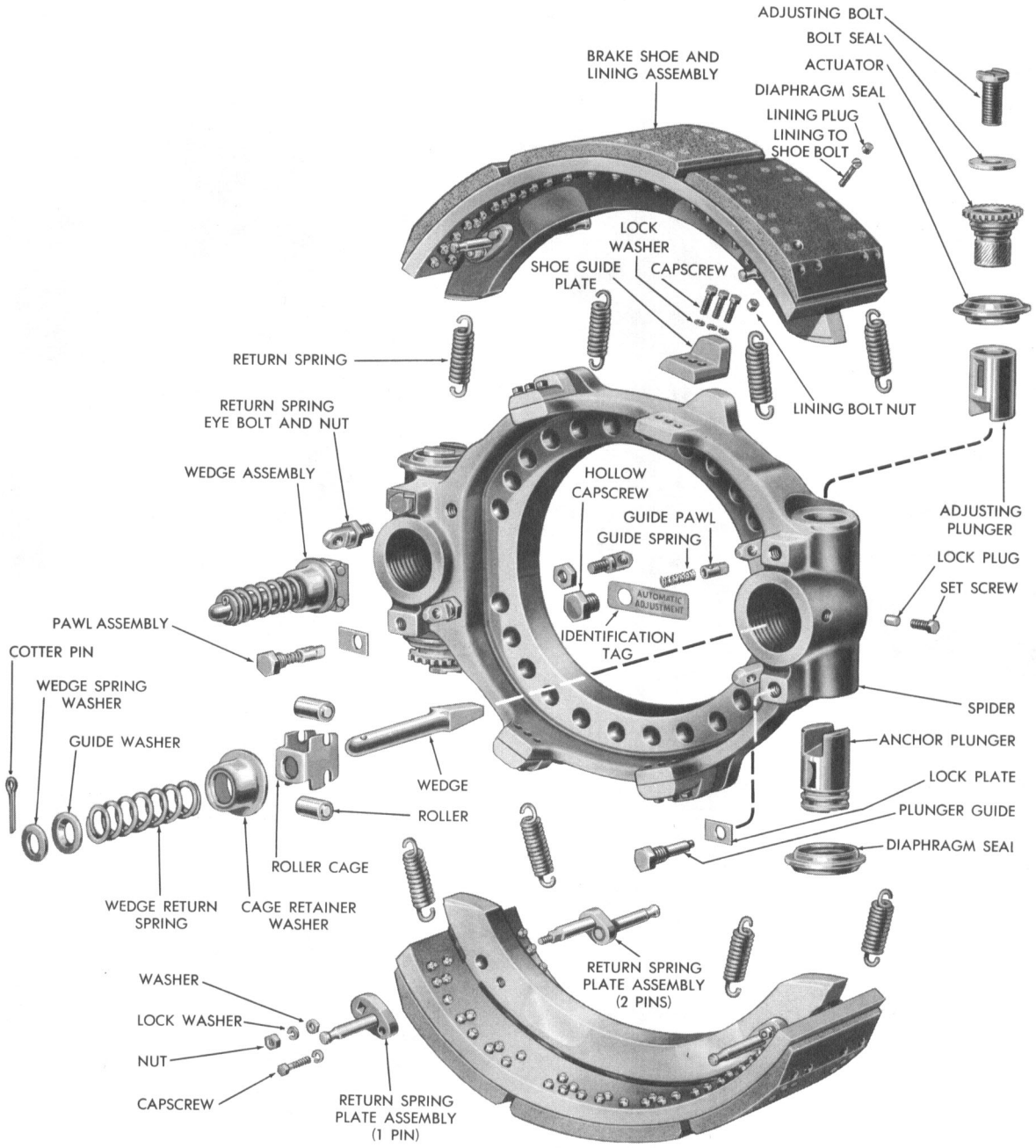
30 Inch Diameter

Double actuated (RD), cast spider brake support with integral plunger (actuation) housings and integral shoe guide plates. Spider bolts to the axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece adjusting bolt and integral actuator/star wheel). Power units are hydraulic and brake shoes have bolted on linings and standard shoe removal.

36 Inch Diameter

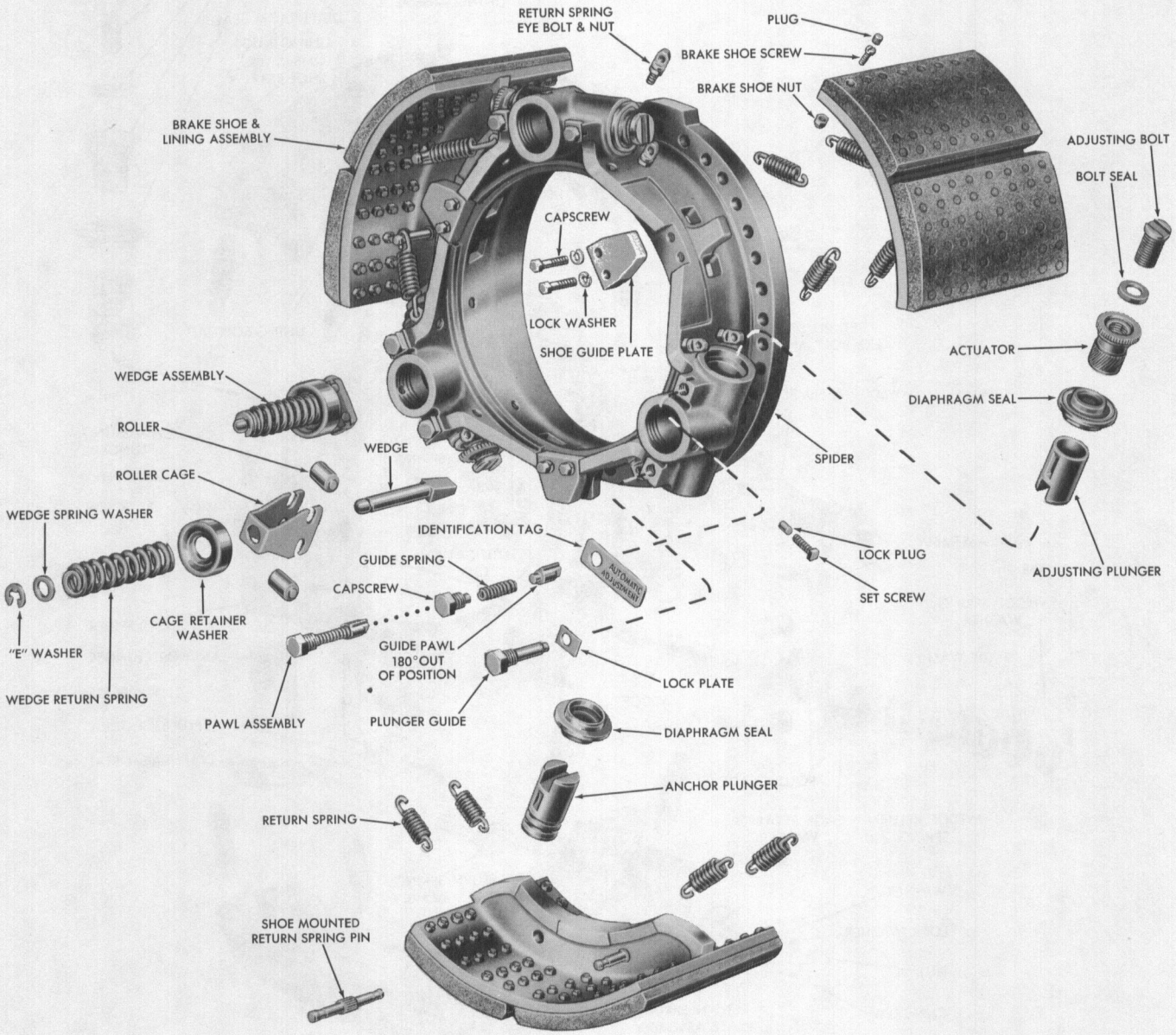
Double actuated (RD), cast spider brake support with integral plunger (actuation) housings, bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece adjusting bolt and integral actuator/star wheel). Power units are hydraulic and brake shoes have bolted on linings. This brake employs bolted on shoe guide plates which allows the shoe removable feature.

RD HEAVY DUTY STOPMASTER
42 INCH DIAMETER
SPIDER MOUNTED



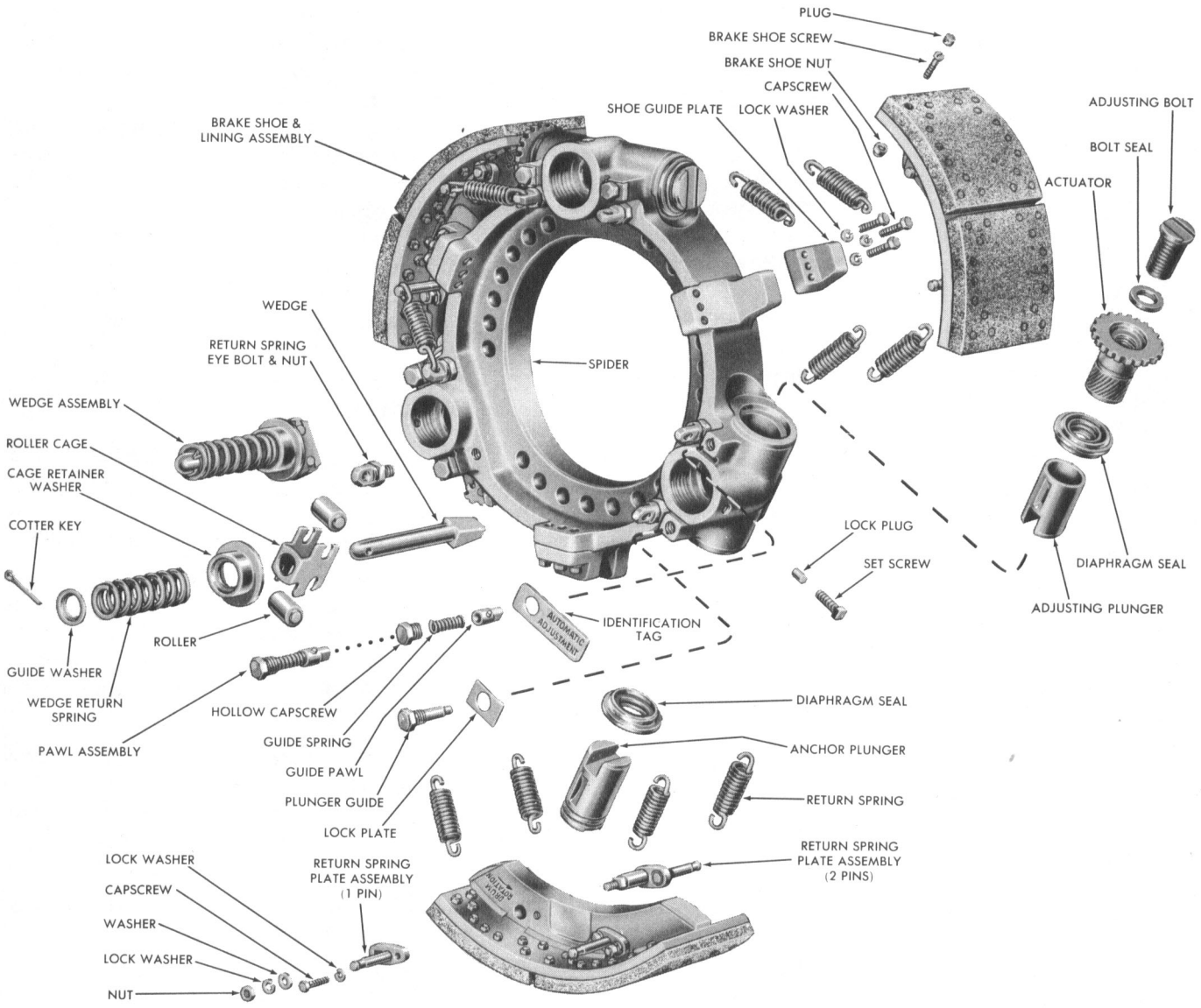
Double actuated (RD), cast spider brake support with integral plunger (actuation) housings, bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece adjusting bolt and integral actuator/star wheel). Power units are hydraulic and brake shoes have bolted on linings. This brake employs bolted on shoe guide plates which allows the shoe removable feature. Also employed are shoe return spring plate assemblies which facilitate shoe return spring installation.

RT HEAVY DUTY STOPMASTER
36 INCH DIAMETER
SPIDER MOUNTED



Triple actuated (RT),cast spider brake support with integral plunger (actuation) housings, bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece adjusting bolt and integral actuator/star wheel). Power units are hydraulic and brake shoes have bolted on linings. This brake employs bolted on shoe guide plates which allows the shoe removable feature.

RT HEAVY DUTY STOPMASTER
42 INCH DIAMETER
SPIDER MOUNTED



Triple actuated (RT), cast spider brake support with integral plunger (actuation) housings, bolts to axle housing flange. Adjusters may be automatic or manual (automatic shown with one piece adjusting bolt and integral actuator/star wheel). Power units are hydraulic and brake shoes have bolted on linings. This brake employs bolted on shoe guide plates which allows the shoe removable feature. Also employed are shoe return spring plate assemblies which facilitate shoe return spring installation.

Lining to Drum Clearance

Automatic Adjusters

There are four designs of automatic adjusting assemblies employed throughout the Stopmaster heavy duty brake series (17" through 42" dia.). The basic difference between the four types is the adjusting bolt and detent design, as shown on page 6.

All automatic adjusters can be adjusted and backed off manually. One manual adjustment is initially required at each automatic adjusting assembly to arrive at correct lining to drum clearance and to properly start the automatic cycle. Further, with 17" through 26" dia. brakes the initial manual adjustment is the same, however, with 28" through 42" dia. brakes this adjustment is slightly different due to the star wheel located at the actuator rather than at the bolt.

Final lining to drum clearances must be as follows:

DIA. BRAKE	ADJUSTMENT
28" thru 42"	.100" max. or less
17" thru 26"	.080" max. or less
17¼" backing plate only.	.060" max. or less

Check clearance with a feeler gage, if it is greater than shown, use the following procedures to adjust the brake:

A. Jack or hoist wheel free of ground. Block up vehicle securely in this position, and remove jacks or hoist.

CAUTION: DO NOT ATTEMPT TO DO ANY TYPE OF WORK UNDER A VEHICLE THAT IS SUPPORTED BY JACKS OR HOIST ONLY.

B. Remove the adjusting slot covers from dust shields if employed.

C. Working with one shoe at a time, use an adjusting spoon or screwdriver and turn the star wheel to advance the adjusting bolt until the shoe and lining assembly is against the drum and develops a heavy drag.

NOTE: On 17" through 26" dia. brakes turn the integral star wheel/adjusting bolt counterclockwise. On 28" through 42" dia. brakes turn the integral star wheel/actuator clockwise.

D. Using the adjusting spoon or screwdriver turn the star wheel to back off the adjusting bolt until a very light drum drag is felt. Check the lining to drum clearance with a feeler gage. When clearance is as shown in chart, adjustment is correct.

NOTE: On 17" through 26" dia. brakes turn the integral star wheel/adjusting bolt clockwise. On 28" through 42" dia. brakes first loosen the hollow capscrew and either back out the pawl assembly to relieve guide spring tension on the pawl or completely remove the pawl assembly from the spider. Turn the integral star wheel/actuator counterclockwise until correct clearance is achieved then replace the pawl assembly into the spider. Tighten the hollow capscrew to 15-25 lb. ft. torque.

E. Repeat the above procedures for the other shoe(s) on brake.

IF WHEELS OF VEHICLE CANNOT BE RAISED FREE OF GROUND – Use the following procedures:

1. Remove adjusting slot covers from dust shields if employed.
2. Working with one shoe at a time, adjust brake shoe and lining assemblies out against drum by advancing the integral star wheel/bolt or actuator – DO NOT FORCE. Refer to "note" under item "C".
3. Back off the integral star wheel/bolt or actuator approximately eight (8) notches or clicks of the detent. Refer to "note" under item "D" above. This will allow correct initial lining to drum clearance.
4. Repeat the above procedures for the other shoe(s) on brake.

Manual Adjusters

The four types of manual adjusting assemblies Stopmaster Heavy Duty Brakes are the same as for similar to the automatic adjusters of the same general design. However, with manual assemblies for 17" through 26" dia. brakes the actuator and pawl assemblies are eliminated. The adjusting bolt is threaded directly into the adjusting plunger, while the pawl assembly is replaced with a guide screw (plunger guide). The manual assemblies for 28" through 42" dia. brakes have the same components as the automatic assembly. However, the integral star wheel/actuator and guide pawl have vertical teeth instead of helical teeth.

The correct adjustment procedures and lining to drum clearance for all manual assemblies of

Stopmaster Heavy Duty Brakes are the same as for the automatic adjusters. However, with 28" through 42" dia. brakes it is not necessary to back out or remove the pawl assembly when turning the integral star wheel/actuator counterclockwise.

When brakes are equipped with manual adjusters it will be necessary to periodically check the lining to back to the correct clearance. Refer to chart on page 24.

Plunger Position

1. Single Actuated (RS) Brakes — These brakes employ one actuation housing with two adjusting plungers at one end of the brake shoes. At the opposite end, the brake shoes are retained on the spider by anchor pins (one per shoe). When braking action takes place the torque is absorbed through the anchor pins and transferred to the brake support (spider).

2. Double Actuated (RD) Brakes — These brakes employ two actuation housings with one anchor plunger and one adjusting plunger seated in each housing. The anchor (solid) plungers should be positioned at the trailing end of each shoe where they will absorb the brake torque during forward wheel rotation. This will position the adjustable plungers at the leading end of the shoes.

3. Triple Actuated (RT) Brakes — These brakes employ three actuation housings with one anchor plunger and one adjusting plunger seated in each housing. The anchor and adjusting plunger position with respect to forward wheel rotation is the same as for the double actuated brakes.

Power Unit Adjustment

The hydraulic cylinder (or air chamber) should be threaded into the wedge bore of the plunger housing to a depth such that the wedge is ready to lift the plungers off of the abutment seats at the first movement of the piston (or diaphragm). This provides the least lost motion and maximum useful piston (or chamber) stroke.

Current power units are designed to "bottom-out" in the wedge bore and provide this optimum adjustment automatically. The bottoming type units have a short unthreaded portion on the leading end to achieve this. The earlier power units do not have the unthreaded end and must be adjusted manually. The newer bottoming type units can be used as replacements for the earlier units to obtain the bottoming feature. Use the following procedures to adjust both types.

Bottoming Units

A. Check position of the wedge in plunger housing to make certain wedge assembly is properly seated. Be sure to replace automatic adjusting idnetification ring (if used) on threaded end of hydraulic cylinder or air chamber tube.

B. With some 17" dia. through 22" dia. brakes the power units may be retained in the wedge bore with a collet nut. Thread the collet nut onto the power unit, taper toward tube end. Apply a non-hardening sealer to the first three threads of the cylinder or chamber.

C. Thread the power unit into the plunger housing until it bottoms (collet nut loose if used).

D. Align connection ports with brake lines if necessary. Unscrew power unit not more than one full turn for alignment and connect brake lines.

E. With 26" through 42" dia. brakes, retain the power unit in the wedge bore by installing the nylon lock plug and set screw into the plunger housing. Tighten the set screw to 10-15 lb. ft. torque.

IMPORTANT: Overtightening the set screw will distort and damage the cylinder or chamber tube bore.

If the brake assembly is 17" dia. through 22" dia. and employs a collet nut to retain the power unit in the wedge bore, make and hold a full pressure brake application. Drive the collet nut with a drift and hammer 1½ teeth (3/16 turn) and release brake pressure.

F. Check for leaks at all connections. If hydraulic operated brakes are employed, bleed the system and after installing drums, if removed, uncage power spring of spring brake units if used.

Installing Adjustable Type Units
(Without Depth Mark)

A. Follow procedures in items "A" and "B" of "Bottoming Units".

B. Thread the power unit into the plunger housing until it bottoms. This will push the wedge assembly between plungers and lift them off their seats inside the housing. By pushing on one shoe or plunger, the opposite shoe or plunger will be seen to move.

C. Unscrew the power unit one full turn. Push on one shoe or plunger and then the other alternately

while observing movement of the opposite plunger. If there is movement of the opposite plunger, unscrew the power unit another full turn and continue this procedure until no plunger movement can be detected. This point is usually two or three turns from the bottomed position.

D. Continue by using procedures in items "D" through "F" of "Bottoming Units".

Installing Adjustable Type Units (With Depth Mark)

A. Follow procedures in items "A" and "B" of "Bottoming Units".

B. Thread the power unit into the plunger housing until depth mark (on threads of cylinder or chamber tube) is even with the plunger housing (just exposed).

C. Continue by using procedure in items "E" and "F" of "Bottoming Units".

If the brake assembly is 17" dia. through 22" dia. and employs a collet nut to retain the power unit, thread the collet nut onto the power unit so the depth mark on threads is just exposed past flat side of nut. Thread the power unit into the plunger housing until it bottoms on collet nut. Continue by using procedures in items "E" and "F" of "Bottoming Units".

Wedge Alignment

Whenever the power unit is removed from the brake plunger housing, the wedge assembly may also become dislodged from between the plungers. Before reinstalling the power unit, reposition the wedge assembly so that the rollers and roller retaining cage are properly engaged in the plunger slots. Proper alignment is accomplished manually, and can be checked by pushing on the wedge rod while visually checking for brake shoe and plunger lift. If no plunger or shoe lift is observed, the wedge assembly is crossed between the plungers. Reinstall the wedge assembly and repeat check.

POWER UNITS

Caging Fail-Safe (Spring Brake) Units

Rockwell Hydraulic Fail-Safe Units for 26" - 42" Dia. Brakes

CAUTION: WHEN THE BRAKES ARE EQUIPPED WITH FAIL-SAFE UNITS (OR OTHER AUXILIARY SPRING BRAKE POWER UNITS) CAGE THE POWER SPRINGS BEFORE STARTING ANY DISASSEMBLY OR REMOVAL OF WHEELS AND DRUMS TO AVOID POSSIBLE INJURY AND DAMAGE TO EQUIPMENT. NOTE THE WARNING TAG OR THE CAUTION CAST IN THE HOUSING O.D. OR CAP OF SOME UNITS, i.e. "DANGER SPRING PRE-LOADED".

A. To facilitate the caging operation, apply and hold hydraulic pressure to the Fail-Safe piston, using the vehicle emergency and parking system.

B. Disassemble the breather from the cap by removing capscrew, lock washer, warning tag, breathercap and filter.

C. Assemble the nut and washer onto release (caging) bolt until nut bottoms against head of bolt. (If new bolt is required, purchase from a Rockwell distributor or Rockwell Parts Department or make from scrap stock.)

NOTE: Release bolt, nut and washer are originally used for shipping. They must be removed when vehicle is in use and breather parts assembled. They must be replaced to cage power springs before servicing.

D. Insert caging bolt through hole in top of cap. Push bolt inward until contact with piston plunger is felt. Continue by threading bolt (approx. 18-22 turns) into piston plunger until it bottoms firmly in the tapped hole.

E. Back off the caging bolt nut until nut bottoms on washer and cap assembly. The nut acts as a jam nut to hold the power springs and piston plunger in the caged position.

NOTE: If hydraulic pressure is not used in the caging operation, the caging bolt, nut and washer is installed as above, however, the nut must be turned clockwise to draw the bolt and piston plunger up to cage the power springs.

Rockwell Air Fail-Safe units for 17"—22" Dia. Brakes

A. For Standard, Custom and Super Fail-Safe units refer to the Rockwell Field Maintenance Manual No. 4R "Stopmaster Brakes".

B. For the Super "B" Fail-Safe II unit refer to the Rockwell Advance Field Maintenance Manual

"Stopmaster II and Super "B" Fail-Safe II."

NOTE: To cage spring brake units other than the Rockwell Fail-Safe units, refer to the manufacturer or O.E.M. manual for recommended procedures.

WEDGE ASSEMBLY

Disassemble

A. Remove the power unit from the brake assembly. Refer to "Power Unit Removal".

CAUTION: IF A SPRING BRAKE POWER UNIT IS EMPLOYED, THE POWER SPRING MUST BE CAGED BEFORE REMOVING IT FROM THE BRAKE. IF A FAIL-SAFE UNIT IS EMPLOYED, REFER TO "CAGING FAIL-SAFE (SPRING BRAKE) UNITS" ON PAGE 26.

B. Remove the wedge assembly from plunger housing by pulling it straight out of the housing bore.

C. Remove the cotter pin or "E" washer from wedge shaft while holding the wedge return spring compressed.

NOTE: The larger wedge assemblies will require the use of a vise to hold the spring compressed. Use soft metal covers over vise jaws.

D. Slide the wedge spring washer, guide washer (some models only), return spring and spring or cage retainer washer from the wedge shaft.

E. Insert a thin bladed screwdriver between one flat of the wedge head and roller retainer cage. Spread the cage open just far enough to remove the rollers.

IMPORTANT: *Do not* mix components from the various types of wedge assemblies.

Reassemble

A. Clean all parts thoroughly and inspect. Check angled faces of wedge and O.D. of rollers to see that they are free from pits or marks. If "E" washer type lock is used, inspect wedge shaft lock groove to see that it is sharp and clean. Inspect roller retainer cage to make sure it will contain rollers properly and inspect the spring for marks that would cause breakage. Replace parts if necessary.

B. Insert the wedge shaft into roller retainer cage so angled faces of the wedge head are exposed.

C. Insert a thin bladed screwdriver between flat of wedge head and roller retainer cage. Spread cage open just far enough to insert roller (journal hub into cage slot). Tip roller into cage and position other journal hub into slot of retainer. Install the second roller in same manner and remove screwdriver. DO NOT force rollers through ends of the cage slots.

D. Install the spring or cage retainer over wedge shaft and position centrally over or against cage and roller assembly.

NOTE: There are four (4) different types of retainers (depending on design of wedge assembly). Install each type as follows:

Flat type — pilots and seats against the roller retaining cage.

Flat type with four (4) spring locating tabs — pilots on the cage and must be assembled with tabs facing spring (away from rollers).

Flat type with two (2) large cage retaining tabs — pilots on the cage and must be assembled with the tabs facing toward the rollers.

Cup type — Two designs, pilot on either the wedge shaft or spring. They must be assembled with the cup (concave) covering over the roller retainer cage.

E. Install the wedge return spring over wedge shaft. If spring ends have one large and one small coil, assemble the end with large coil first (against retainer). Next install the guide washer (some models only) and/or the spring washer. Compress spring by hand far enough to expose cotter pin hole or "E" washer lock groove in shaft and install lock (cotter pin or "E" washer).

NOTE: The larger wedge assemblies will require the use of a vise to hold the spring compressed. Use soft metal covers over vise jaws.

F. Install the wedge assembly into the plunger housing between plungers. Check for correct roller-plunger engagement. Refer to "Wedge Alignment" on page 26.

G. Install the power unit into the plunger housing. Refer to "Power Unit Adjustment" on page 25.

2.M (3-77)

PRINTED IN U.S.A.

Rockwell Service Instructions

Automotive Operations/Rockwell International, 2135 West Maple Road, Troy, Michigan 48084, U.S.A.

SUBJECT: RECOMMENDED LUBRICATION

MODELS: ON-HIGHWAY AND OFF-HIGHWAY STOPMASTER® BRAKES AND AUTOMATIC SLACK ADJUSTERS

A high temperature water-proof grease in NLGI grade No. 1 is recommended for lubricating Stopmaster Brakes and Automatic Slack Adjusters. It should be a smooth textured, corrosion resistant grease, free of fillers and abrasives. The grease should maintain a satisfactory softness under normal parking and storage temperatures so the brakes can be applied and released.

The following greases meet all of these recommendations:

Texaco Thermotex EP #1
Shell Darina #1

A suitable grease can also be obtained under Rockwell International part number A-1779-W-283.

Vehicles operating in extremely cold weather (below −40°F) may require a grease conforming to MIL-G-23827 (Rockwell Part Number 1199-C-3409, Material Specification O-632).

The greases listed above supersede all other information on this subject printed in Rockwell International service and maintenance literature dated prior to June 30, 1980.

Rockwell International

...where science gets down to business

PRINTED IN U.S.A. ISSUED 7-31-80 TS-62

RDH HEAVY DUTY STOPMASTER
30 INCH AND 36 INCH DIAMETER
SPIDER MOUNTED

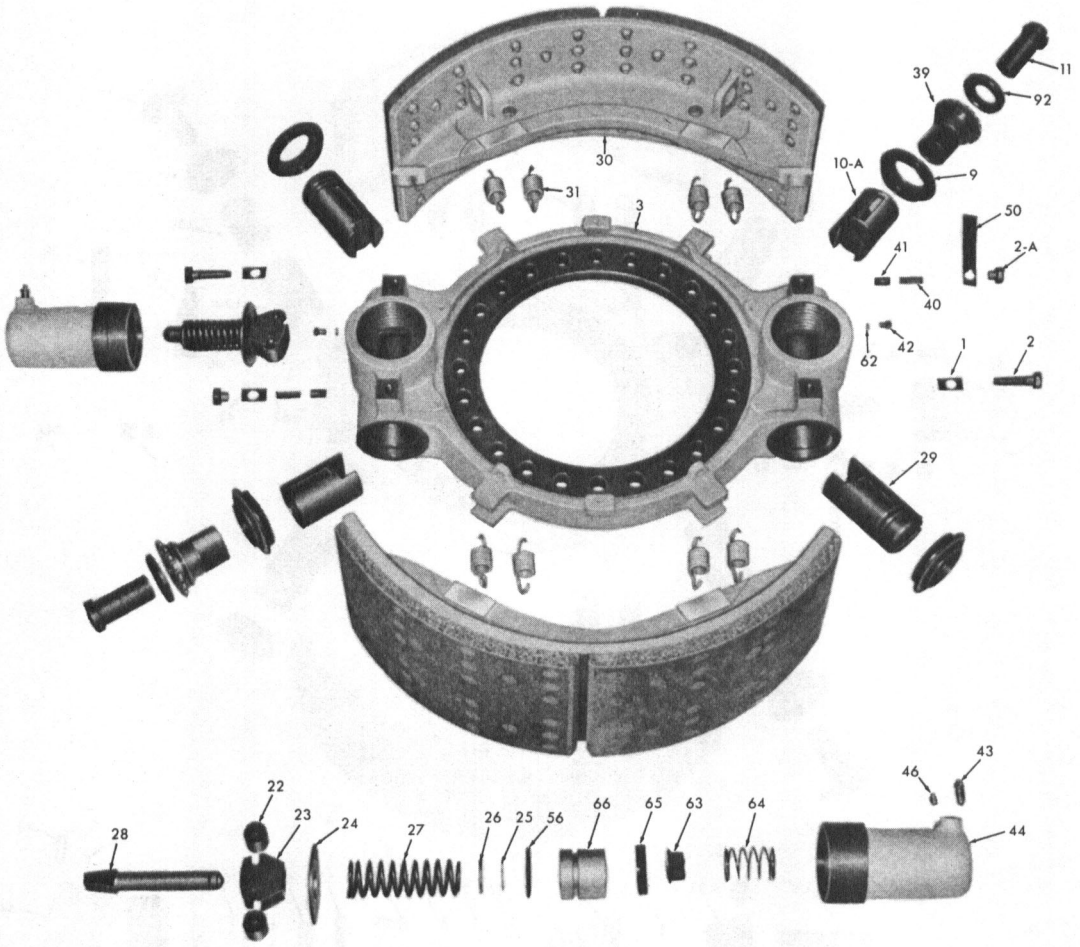


Fig. 1

1. Lock
2. Plunger Guide
2A. Cap Screw
3. Spider
9. Diaphragm Seal
10A. Adjusting Plunger
11. Adjusting Bolt
22. Roller
23. Roller Cage
24. Spring Retainer
25. "E" Washer
26. Washer
27. Wedge Spring
28. Wedge
29. Anchor Plunger
30. Brake Shoe and Lining
31. Return Spring
39. Actuator
40. Guide Spring
41. Guide Pawl
42. Set Screw
43. Bleeder Screw
44. Wheel Cylinder Housing
46. Tube Seat
50. Identification Tag
56. "O" Ring
62. Nylon Insert
63. Spacer
64. Piston Spring
65. Piston Cup
66. Piston
92. Bolt Seal

Note: Some heavy duty brakes have removable shoe supports and require special return springs and a special return spring tool.

The RDH brake shown in Fig. 1 uses a cast spider with integral plunger housings. It bolts to a flange on the axle housing. Adjustment may be either manual or automatic. Fail-Safe units optional. Dust shields are recommended and are available through some Original Equipment Manufacturers.

RDH HEAVY DUTY STOPMASTER

17 INCH, 20–1/4 INCH, 22 INCH, 26 INCH DIAMETER

SPIDER MOUNTED

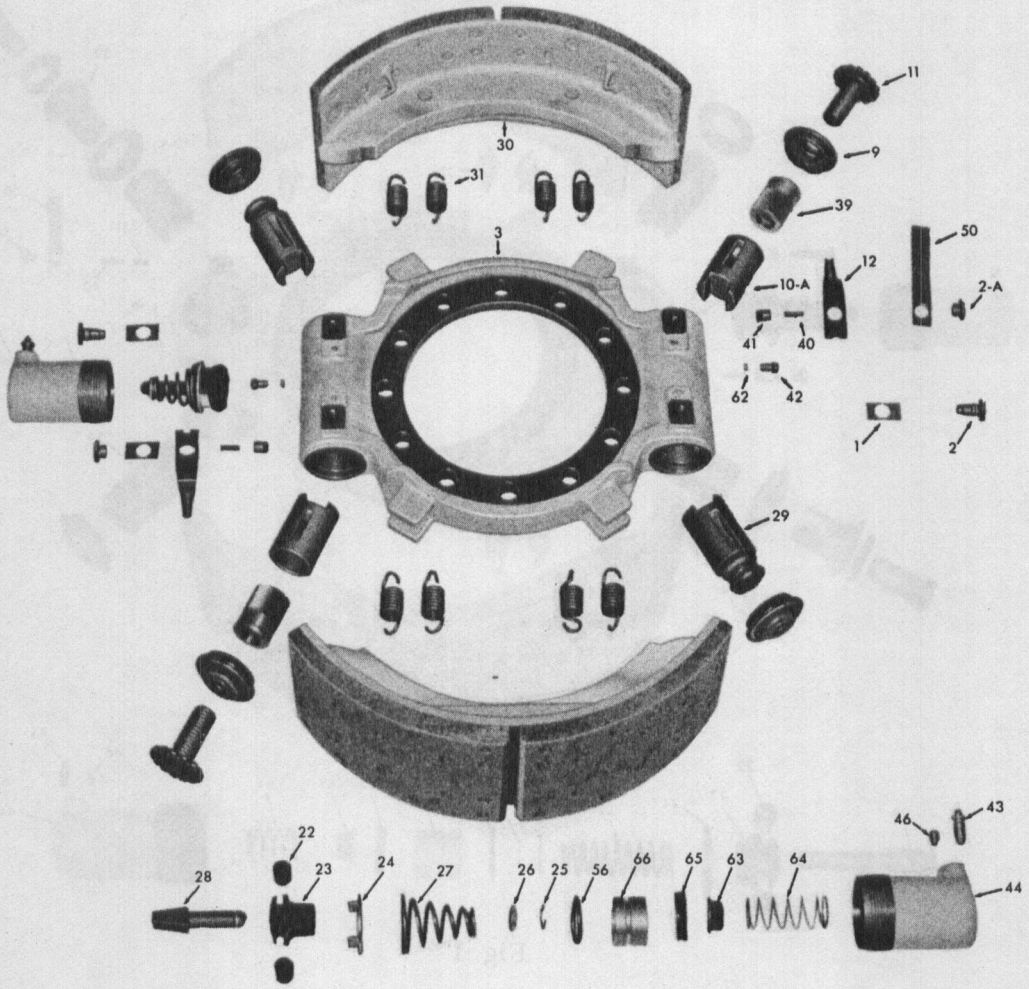


Fig. 2

1. Lock	22. Roller	30. Brake Shoe & Lining	46. Tube Seat
2. Plunger Guide	23. Roller Cage	31. Return Spring	50. Identification Tag
2A. Cap Screw	24. Spring Retainer	39. Actuator	56. "O" Ring
3. Spider	25. "E" Washer	40. Guide Spring	62. Nylon Insert
9. Diaphragm Seal	26. Washer	41. Guide Pawl	63. Spacer
10A. Adjusting Plunger	27. Wedge Spring	42. Set Screw	64. Piston Spring
11. Adjusting Bolt	28. Wedge	43. Bleeder Screw	65. Piston Cup
12. Detent	29. Anchor Plunger	44. Wheel Cylinder Housing	66. Piston

The following are found on the 17 inch diameter brake only, and are not shown on the above view.

Hold Down Bolt, Washer, Spring } On Brake Spider { Spring Washer, Nut, Cotter Pin

The RDH brake shown in Fig. 2 uses a cast spider with integral plunger housings. It bolts to a flange on the axle housing. Adjustment may be either manual or automatic. Fail-Safe units are optional. Dust Shields are recommended and are available through some Original Equipment Manufacturers.

RSH HEAVY DUTY STOPMASTER
17 INCH, 20-1/4 INCH, 22 INCH, 26 INCH DIAMETER
SPIDER MOUNTED

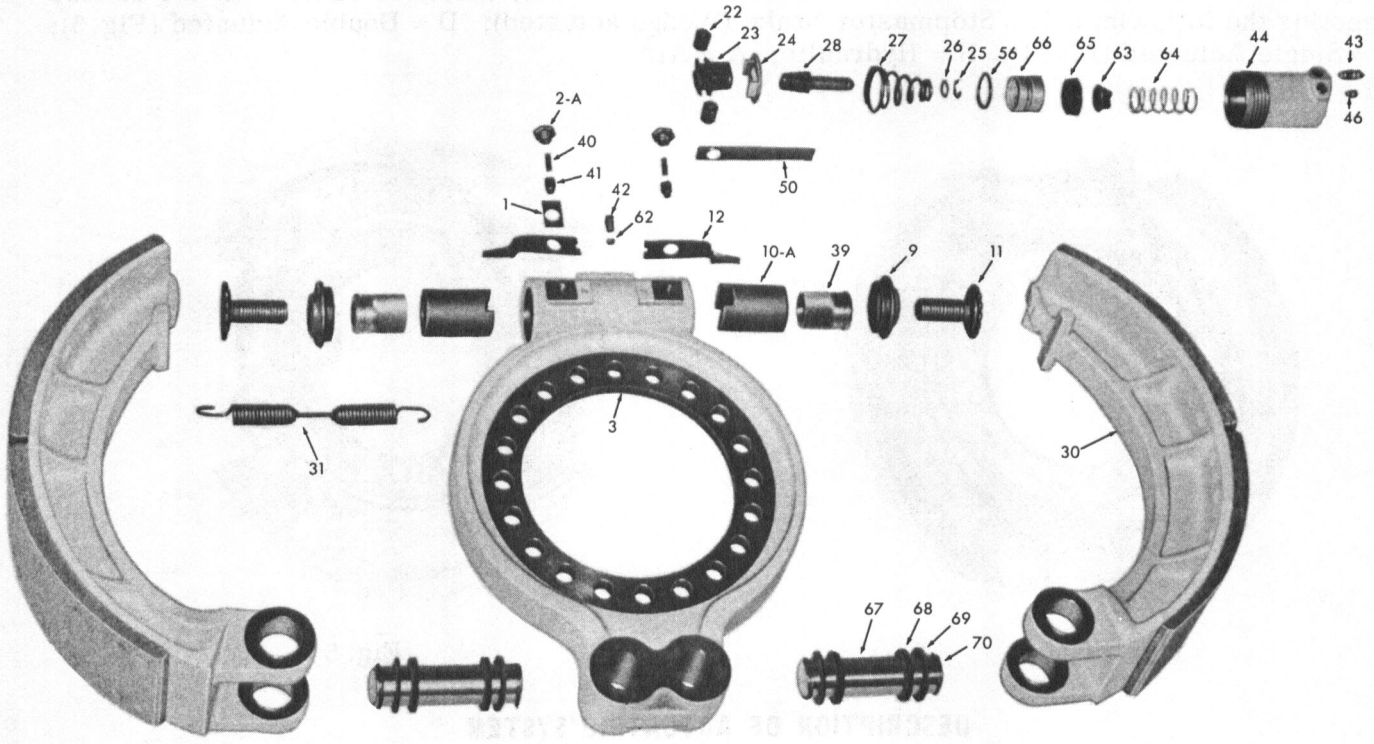


Fig. 3

2A.	Cap Screw	27.	Wedge Spring	50.	Identification Tag
3.	Spider	28.	Wedge	56.	"O" Ring
9.	Diaphragm Seal	30.	Brake Shoe and Lining	62.	Nylon Insert
10A.	Adjusting Plunger	31.	Return Spring	63.	Spacer
11.	Adjusting Bolt	39.	Actuator	64.	Piston Spring
12.	Detent	40.	Guide Spring	65.	Piston Cup
22.	Roller	41.	Guide Pawl	66.	Piston
23.	Roller Cage	42.	Set Screw	67.	Anchor Pin
24.	Spring Retainer	43.	Bleeder Screw	68.	Felt Seal
25.	"E" Washer	44.	Wheel Cylinder Housing	69.	Felt Retainer
26.	Washer	46.	Tube Seat	70.	Lock Ring

The RSH brake shown in Fig. 3 uses a cast spider with integral plunger housings. It bolts to a flange on the axle housing. Adjustment may be either manual or automatic. Fail-Safe units are optional. Dust shields are recommended and are available through some Original Equipment Manufacturers.

DESCRIPTION OF BRAKE

The Stopmaster brake is wedge actuated. The brake power units are hydraulic cylinders. The brakes can be equipped with Fail-Safe units to provide parking and emergency braking. The brake power unit forces a wedge between two rollers and two plungers. This causes the plungers to spread apart and push the brake shoes and linings against the brake drum.

There are several variations of Stopmaster brakes in use. Some have two power units per brake and others only one.

The brake support is a cast spider with integral plunger housings. Brake shoe adjustment may be either manual or automatic.

The basic Stopmaster brakes are identified as model RDA, RDH, or RSH, with the letters denoting the following: R = Stopmaster brake (Wedge actuated); D = Double Actuated (Fig. 5); S = Single Actuated (Fig. 4); H = Hydraulic; A = Air.

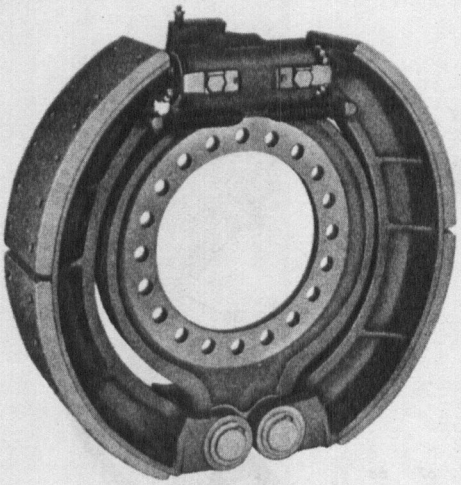


Fig. 4

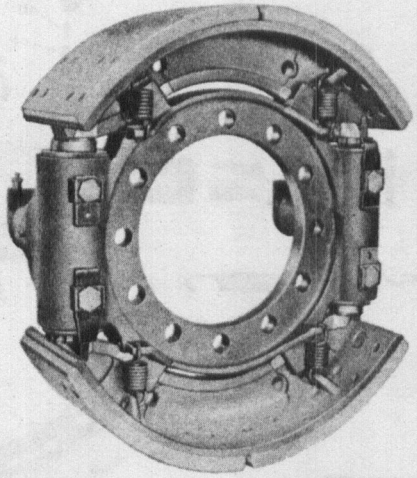


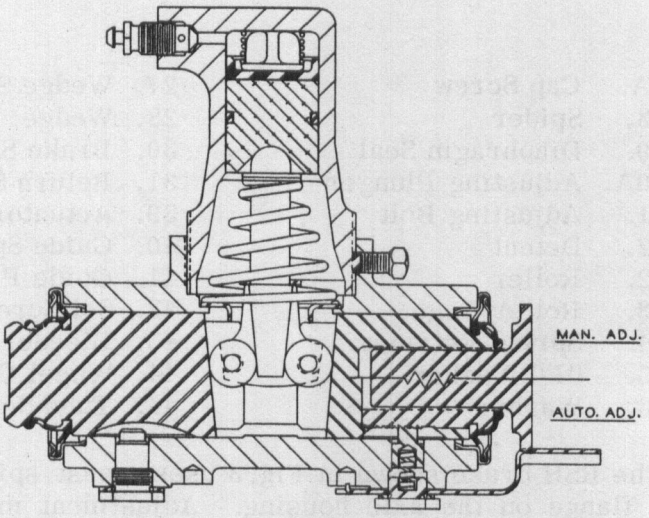
Fig. 5

DESCRIPTION OF ACTUATING SYSTEM

The drawing (Fig. 6) shows one of the actuating systems of a hydraulic Stopmaster brake.

This system has a hydraulic power unit threaded into a cast spider. The socket in the end of the wheel cylinder piston pushes on the wedge shaft. The wedge retracting spring acts as a return spring for both the wedge and piston. A pair of rollers are held in place on the wedge head by a roller cage. The rollers are engaged in corresponding slots in the inner ends of plungers. The unslotted portions of the inner ends of the plungers are resting on abutments in the actuation housing. The outer ends of the plungers are engaged with and support the brake shoes.

On double actuated brakes, each of the two systems has one anchor (solid) plunger and one adjusting plunger.



20 1/4, 22 IN. DIA. SINGLE & DOUBLE & 26 IN. DOUBLE ONLY.

Fig. 6

On a single actuated brake the one actuating system would have two adjusting plungers.

All of the plungers are retained in the housings and the roller slots are kept in proper alignment by means of guide bolts that engage slots in the sides of the plungers.

When the brake is actuated, the cylinder piston pushes the wedge head deeper between the rollers. This spreads the rollers and plungers apart and pushes the brake shoes outward. Initially all the plungers are lifted off their abutments and are momentarily suspended. As the shoes contact the drum, the drum drags the shoes and the suspended plungers around with it. This causes the plungers at the trailing end of each shoe to reseat on their abutments and thus absorb and transfer the brake torque to the brake support (spider). When the brake is released, the wedge spring returns the wedge and wheel cylinder piston to the off position. At the same time, the shoe return springs push the raised plungers back on their abutments.

DESCRIPTION OF BRAKE SHOE ADJUSTMENT

AUTOMATIC ADJUSTMENT

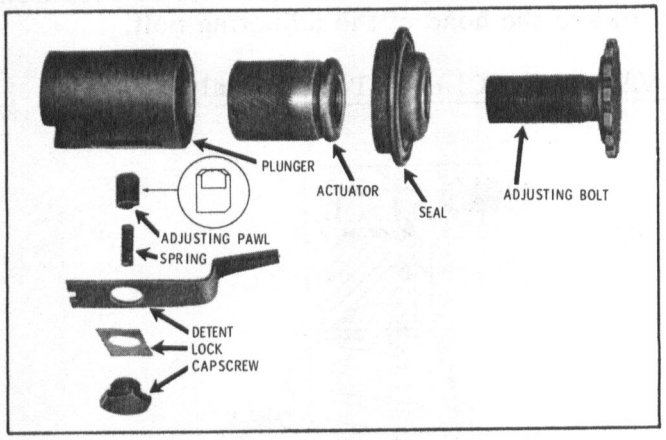


Fig. 7

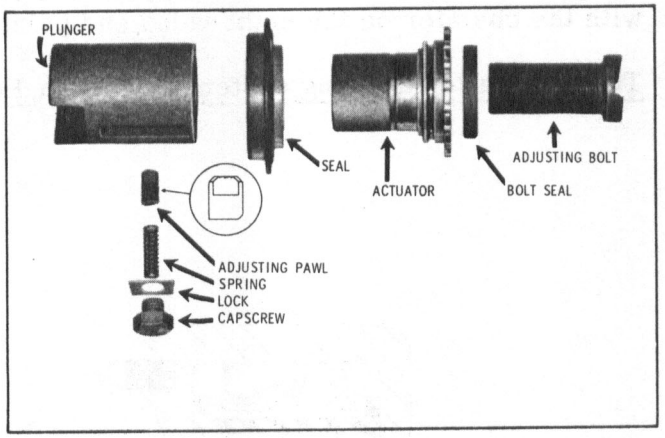


Fig. 8

Two types of adjustable plungers are in use -- manual and automatic.

The manually adjusted plunger has an adjusting bolt threaded into the plunger. The bolt head is scalloped to facilitate adjustment. A detent arrangement engages the star wheel and prevents rotation of the bolt.

On automatically adjusted plungers, the adjusting bolt is threaded into an adjusting sleeve (actuator), which in turn is free fitted into the adjusting plunger. The plunger guide bolt is replaced by a cap screw. A spring, and an adjusting pawl which serves as the plunger guide bolt. The end of the guide (pawl) has teeth that engage corresponding helical teeth on the outside of the adjusting sleeve (actuator).

The adjusting pawl must be installed with the 45° chamfer pointing toward the head of the adjusting bolt (Fig. 7).

As the brake is actuated, the plunger, actuator and bolt move outward and the sloping face of the teeth on the actuator lift the adjusting pawl against the spring. When the brake is released all parts return to their starting point. As the lining wears, the plunger stroke and resulting pawl lift gradually increases until the pawl climbs over and drops into the next tooth space on the actuator. This time, when the brake is released and the plunger is pushed into its bore, the upright face of the pawl teeth causes the actuator to rotate and advance the adjusting bolt. This reduces the drum to lining clearance and the cycle is repeated.

On brakes 30 inches in diameter or larger, the automatic system can be adjusted and backed off manually. (Fig. 8).

On brakes 30 inches in diameter or larger, the following procedure must be followed when automatic adjustment is used.

The automatic system may be manually adjusted by turning the star wheel on the actuator clockwise.

Backing off the automatic system may be accomplished as follows:

Remove the cap screw, guide spring, and guide from the brake spider. Back off the adjustment by rotating the actuator counterclockwise. Replace the guide, guide springs, and cap screw. Tighten cap screw to 15-25 ft. lbs. torque (not necessary to pull wheels).

This is necessary because the teeth on the guide and the actuator are "one way" type. This tooth design allows the actuator to be rotated clockwise without removing the guide but will not permit counterclockwise rotation. The tooth design also requires the guide to be installed with the chamfer on the unthreaded end pointing toward the head of the adjusting bolt.

The automatic adjusting system adjusts in FORWARD VEHICLE ROTATION only.

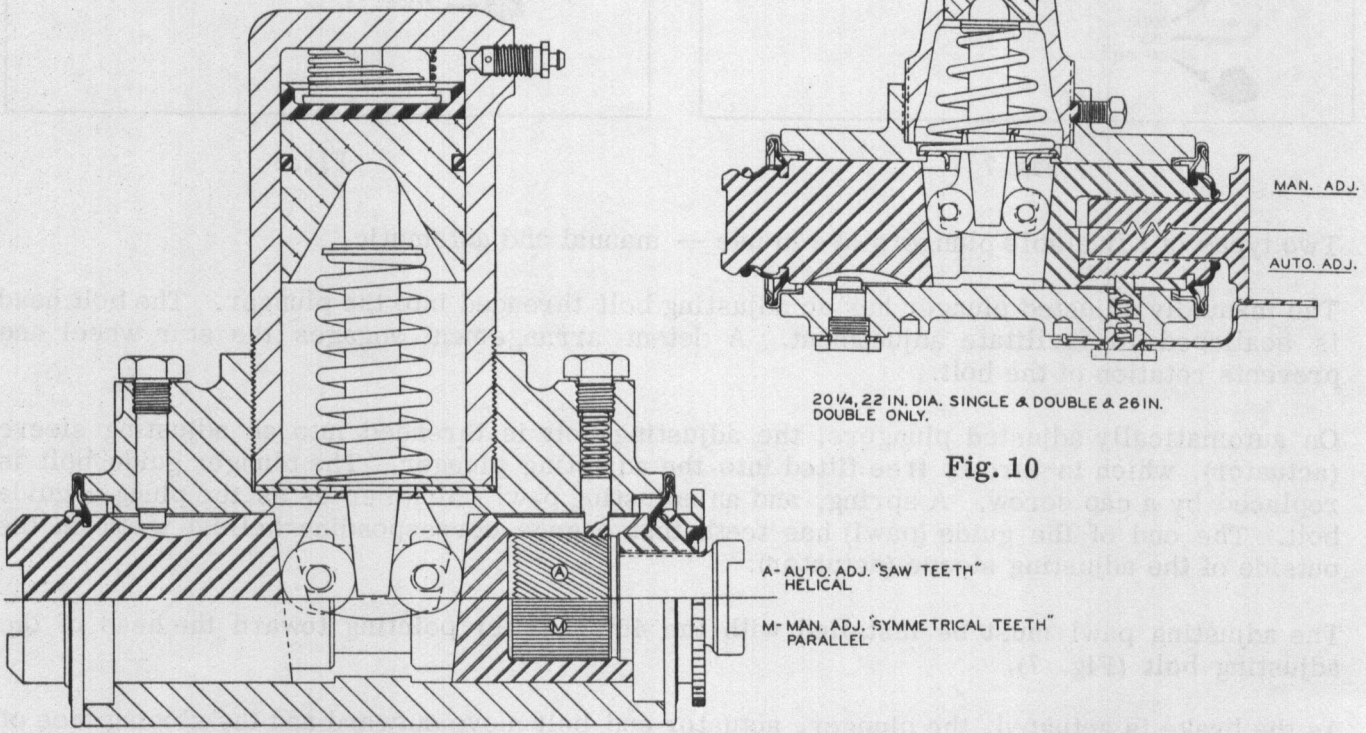


Fig. 9

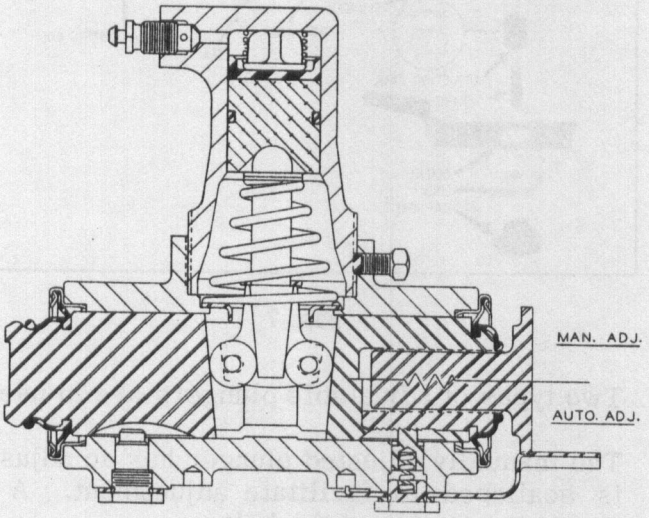


Fig. 10

MANUAL BRAKE ADJUSTMENT

Manual brake adjustment may be accomplished as follows: Raise the vehicle, remove the adjusting slot covers on the brake if dust shields are used. With an adjusting spoon or screwdriver, turn the star wheel, one shoe at a time, until the shoe (lining) moves out against the drum and creates a heavy drag. Back off the adjustment until a minimum free running clearance is established. Repeat for the other shoe.

If the wheels can not be raised, adjust both brake shoes out against the drum (do not force).

Back off the star wheel eight notches or clicks of the detent. This will allow about .040 inch running clearance. Rotate the star wheel counterclockwise for adjustment on all brakes up to 30 inches diameter.

On brakes 30 inches in diameter or larger, the detent is replaced by a spring loaded guide (pawl) working against the teeth on the actuator. The adjusting bolt does not turn. It is locked in place by pressure from the brake shoe riding in the shoe retaining slot in the bolt head. The actuator turns around the adjusting bolt, making the brake shoe adjustment.

On brakes with manual adjustment the spring loaded guide (pawl) and the actuator have symmetrical teeth, allowing the actuator to be turned on the adjusting bolt making the brake shoe adjustment. The spring loaded guide also acts as a detent.

Rotating the actuator clockwise adjusts the brake. Due to the symmetrical teeth on both the actuator and the guide, it is not necessary to remove the guide to adjust or back off the brakes.

DESCRIPTION OF POWER UNITS

HYDRAULIC SERVICE CYLINDERS

The hydraulic service cylinders are screwed directly into the bore of the actuation housing. Current cylinders are designed to bottom out in the actuation housing bore and provide the optimum adjustment automatically. The bottoming type cylinders have a short unthreaded portion on the leading edge and have "bottoming" cast in raised letters on the housing.

Earlier type units must be adjusted to obtain correct standout and minimum wedge stroke (see Page 12).

Bottoming units may be used as replacements for the earlier adjustable cylinders.

The four types of cylinders shown in Fig. 11 are determined by fitting location only.

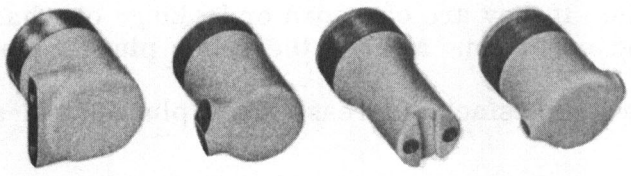


Fig. 11

AIR CHAMBERS

In some cases the 17 inch diameter brake is air actuated. A 16 square inch service chamber is used, as shown in Fig. 12. Service to component parts is the same as for the hydraulic cylinders (see Page 12).

On the air chamber, the chamber boot and diaphragm are additional items requiring service. Service consists of inspection for damage and replacement, if necessary.

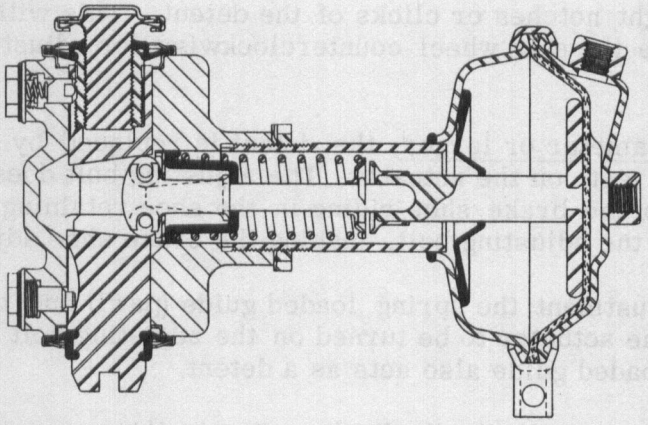


Fig. 12

RECOMMENDED GREASE

Rockwell-Standard -- A-1779-W-283

Texaco Thermotex -- EP #1

Shell Darina -- #1

Marathon -- #528HD

Sunaplex -- #1EP

Amdex #1 -- EP

Philube #B-1

Military -- Mil. -- G-25013-C (Below -40°F.)

RECOMMENDED PREVENTIVE MAINTENANCE

A. Periodic inspection every two months.
   1. Check lining wear.
   2. When automatic adjusters are used, check drum to lining clearance. If clearance is .060" or less, adjusters are working correctly.
   3. Check service and Fail-Safe hydraulic system by cycling the application valves.

B. Inspection once a year.
   1. Cage Fail-Safe and remove wheels and drums.
   2. Inspect plunger seals. If they are cut, torn or leaking, overhaul the actuation system.
   3. If seals are in good condition, remove the upper plunger and its seal. Check the internal condition.
   4. If internal condition is satisfactory, reassemble plunger and seal and run until next inspection.

C. At each reline:
   If reline period is more than one year, disassemble and overhaul all actuating components.

SERVICING POWER UNITS

1. Cage power springs if Fail-Safe unit is used. Remove and tag brake service and hydraulic lines.
2. Determine type of power unit used, bottoming or adjusting. Bottoming type units have "bottoming" cast in raised letters on the housing.
3. If the adjusting type unit is used, mark the position of the assembly on the first exposed thread of the cylinder tube with a scribe or punch, to aid reassembly.
4. Loosen the locking cap screw in the spider. Note that there is a nylon insert installed ahead of the cap screw to avoid damage to the wheel cylinder housing threads.
5. Unscrew the power unit from the spider housing. Remove and inspect wedge assembly. Service if necessary.
6. Remove bleeder screws and drain all brake fluid.
7. Remove piston, cup seal, spring and spacer from the cylinder. Earlier piston design used a post to retain the cup and act as a spacer. For service, remove post and install latest design spring, spacer, and cup seal.
8. Clean all parts with the brake fluid that is to be used. If cylinder bore is scored, scratched or corroded, replace cylinder. Polish cylinder bore with crocus cloth. Inspect bleeder screws for defects. Replace if necessary.
9. Lubricate cylinder bore with clean hydraulic fluid that is to be used in the system.
10. Install spring and spacer in the bottom of cylinder.
11. Install cup seal into cylinder bore, entering lip of cup into bore, flat end of cup out.
12. Install piston, flat end first, into the cylinder and push piston and cup down to the bottom of the bore. Install bleeder screw. Note that all cups to be used with mineral oil are so marked and must not be used with hydraulic brake fluid (marked with a colored stripe).

SERVICING WEDGE ASSEMBLY

1. Remove wedge assembly from actuating housing by pulling it straight out of the housing bore.
2. Remove the "E" washer from wedge shaft while holding wedge spring compressed.
3. Remove wedge spring washer, wedge spring, and wedge spring retainer.
4. Insert a thin bladed screwdriver between one flat on the wedge head and roller cage (Fig. 13). Spread the cage open just far enough to remove the rollers.
5. Remove the roller cage by sliding it off the wedge shaft.

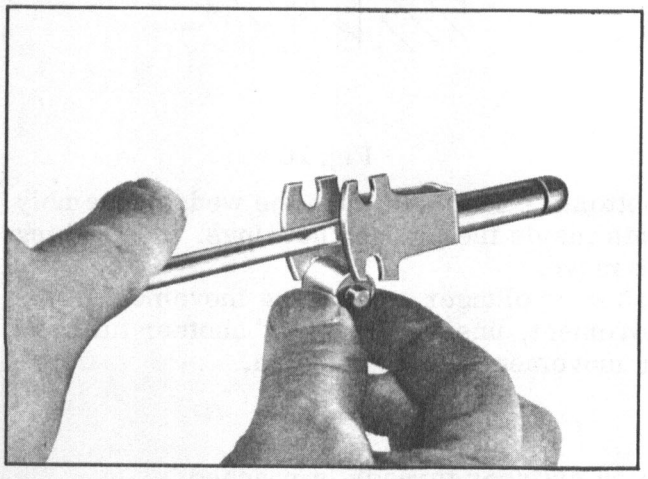


Fig. 13

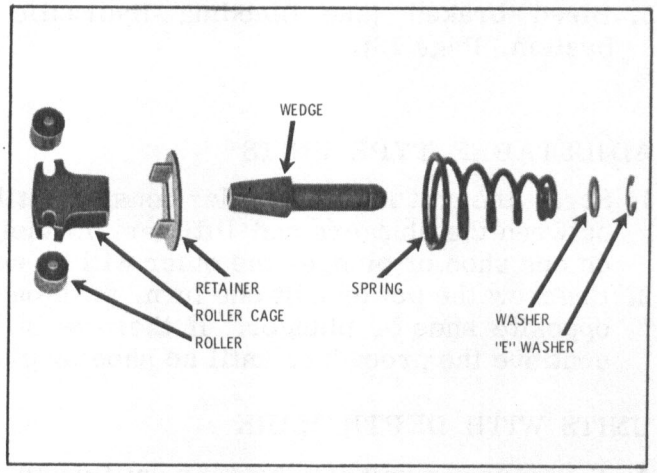


Fig. 14

WEDGE ASSEMBLY

1. Inspect and clean all parts. Check angled faces of wedge to see that they are free from pits or marks. If the "E" washer is used, inspect wedge shaft lock groove to see that it is sharp and clean. Inspect roller cage to make sure it will retain roller correctly. Inspect wedge spring for defects that may cause breakage.
2. Insert wedge shaft into roller cage so angled faces are exposed.
3. Insert a thin bladed screwdriver between the flat of the wedge head and the roller cage. Spread the roller cage open only far enough to insert the rollers. Do not force.

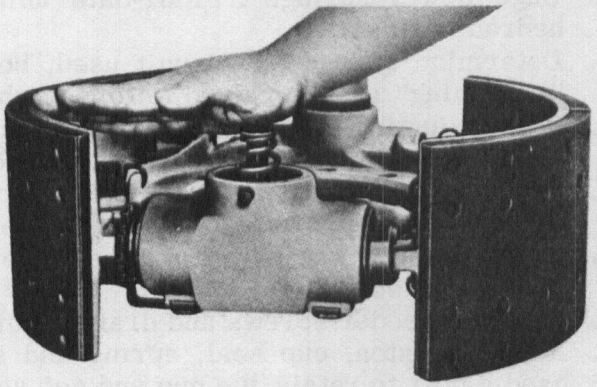


Fig. 15

4. Install spring retainer over wedge shaft, position centrally on cage and roller assembly.
5. Install wedge spring over wedge shaft, large coil diameter first. Add spring washer and compress spring far enough to expose the "E" washer lock groove. Install lock ("E" washer).
6. Install wedge assembly into housing. Check for correct roller and plunger engagement by pushing on the wedge rod while watching for plunger and shoe lift (Fig. 15). If no plunger or shoe lift is observed, the wedge assembly is crossed. Reinstall and repeat check.

INSTALLING POWER UNITS

BOTTOMING UNITS

1. Screw the unit into the spider housing until it bottoms.
2. Align connection ports with brake lines. If necessary, unscrew power unit not more than one full turn for alignment.
3. Connect brake lines.
4. Install nylon insert into the capscrew lock hole in the spider. Tighten lock screw (overtightening will distort cylinder bore).
5. Check for hydraulic leaks.
6. Bleed brakes (see Bleeding Hydraulic System, Page 13).

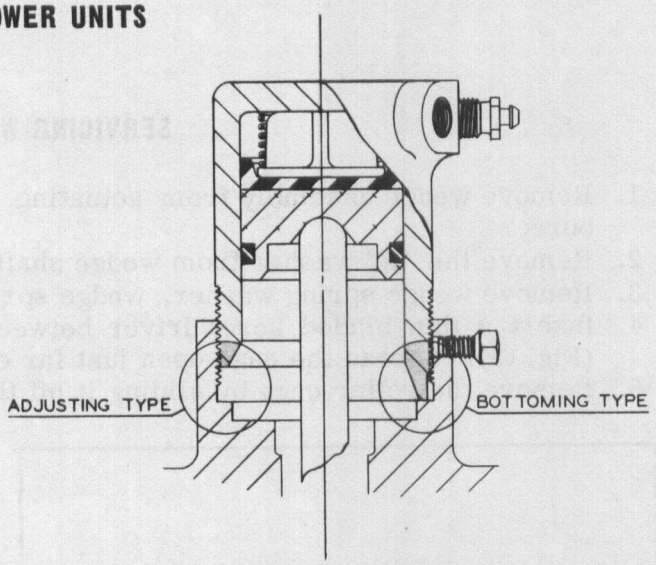


Fig. 16

ADJUSTABLE TYPE UNITS

1. Screw the unit into the spider housing until it bottoms. This will push the wedge assembly between the plungers and lift them off their seats inside the plunger housings. By pushing on one shoe or plunger the other will be seen to move.
2. Unscrew the power unit one turn, push on one shoe or plunger, observing movement of the opposite shoe or plunger. If there is still movement, unscrew the unit another turn and continue the procedure until no shoe or plunger movement can be detected.

UNITS WITH DEPTH MARK

1. Screw power unit into housing until depth mark on cylinder threads is reached.
2. Follow procedure on bottoming units to complete the installation.

BLEEDING HYDRAULIC SYSTEM

In order to obtain satisfactory results it is necessary to bleed all components of the hydraulic system. Bleeding should start first with the hydrovac, power cluster, or master cylinder, whichever is used. The first wheel cylinder to be bled should be the one the greatest distance from the master cylinder.

Hydraulic Fluid -- SAE 70R or equivalent to be used. The procedure listed below should be followed.

1. Fill the master cylinder with brake fluid. Connect the bleeder hose to the bleeder screw allowing it to hang loose in a clean container.
2. Loosen bleeder screw and slowly depress the brake pedal all the way. Lock bleeder screw before allowing pedal to return to the off position. If the bleeder hose is kept submerged in brake fluid in the container it will not be necessary to lock the bleeder screw on each application. Repeat this operation eight or ten times on each component bled.
3. Refill master cylinder or power cluster and check pedal for reserve (be sure brakes have been adjusted).

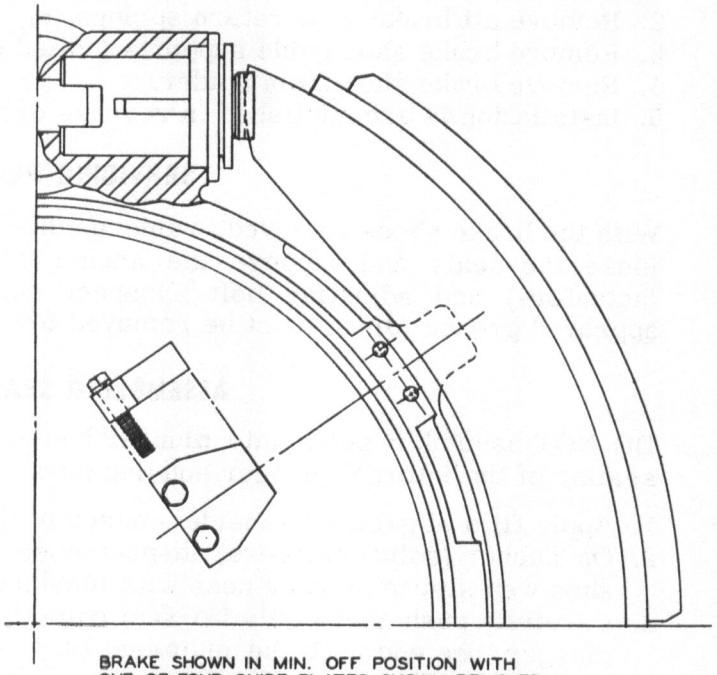
If pressure bleeding equipment is used, connect the outlet hose to the master cylinder or power cluster, and bleed the system in the same order as outlined for manual bleeding. The flow of brake fluid should be watched, keeping the bleeder hose submerged in brake fluid in a container. When air bubbles cease to appear or the fluid stream is a clean solid mass, bleeding is complete.

SERVICING BRAKE SHOES

Remove the brake shoe and lining assembly as follows:

1. Cage the Fail-Safe units if used.
2. Remove wheel hub and drum assemblies.
3. Remove brake shoe return springs -- use spring tool.
4. Lift the brake shoe and lining assembly from the spider.
5. Inspect shoe and lining for defects.
6. Coat shoe bearing points with approved grease.
7. Coat inside of integral brake shoe supports with approved grease.
8. Reverse above procedure for installation.

On most heavy duty brakes the brake shoes are supported by shoe supports cast integral with the spider.



BRAKE SHOWN IN MIN. OFF POSITION WITH ONE OF FOUR GUIDE PLATES SHOWN REMOVED. IT IS NOT NECESSARY TO PULL WHEEL TO REMOVE OR INSTALL BRAKE SHOES.

Fig. 17

On the 17 inch diameter brake the shoes are supported by a spring hold down clip bolted to the spider.

On some 36 inch diameter brakes it is necessary to use a special shoe return spring (2758-V-178) and spring tool (Figs. 18 and 19).

On some 36 inch diameter brakes, the shoe guide supports may be removed from the spider permitting the brake shoes to be removed for service without pulling wheels (Fig. 17).

All 30 and 36 inch diameter brakes use bolted-on linings with lining plugs.

All other brakes use 1/4" diameter brass rivets.

Spring Part No.
2758-V-178

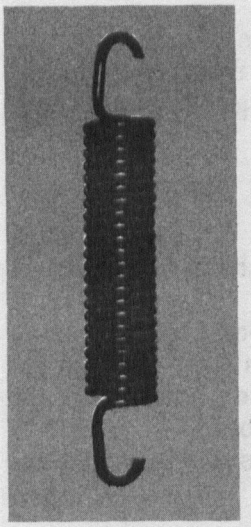


Fig. 18

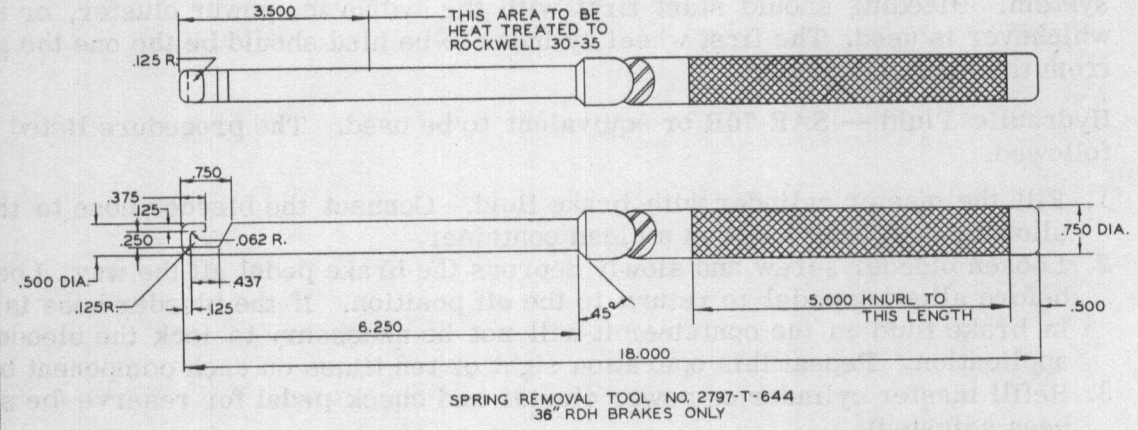


Fig. 19

Shoe guide supports may be removed as follows:

1. Back off brake shoe adjustment to minimum.
2. Remove all brake shoe return springs (8), using spring tool shown in Fig. 19.
3. Remove brake shoe guide supports (bolted on).
4. Remove brake shoe from spider.
5. Installation is accomplished in reverse order.

SERVICING PLUNGER HOUSINGS

With the brake shoes removed, remove guide bolts and locks from the plunger housings. Pry loose the seals and remove the anchor plungers, adjusting plungers, adjusting sleeves (actuators) and adjusting bolt. Inspect and clean the housing bore. Lubricate it with approved grease (drum must be removed to allow plunger removal).

ASSEMBLING SEALS ONTO PLUNGERS

DO NOT assemble seals into plunger housings first. This will result in a complete lack of sealing of the internal plunger housing parts.

1. Apply film of grease to inside surface of the seals.
2. On anchor (solid) plungers, inspect nose for burrs and remove if present. Mask brake shoe web slot in plunger nose with masking tape to protect the seals.
3. Carefully push the double lip seal onto the plunger, stretching the outer seal lip over the plunger nose end until the inner seal lip is completely in the second plunger groove (Fig. 20). Remove masking tape.

Brakes using single grooved plungers and single lip seals should be assembled in the same manner, except that masking tape is not required.

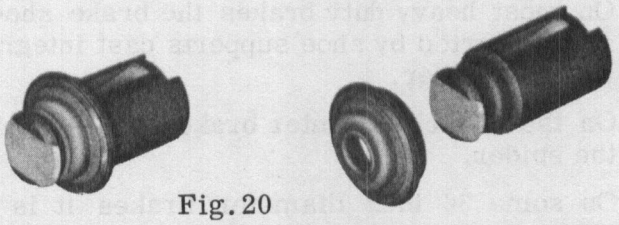


Fig. 20

4. On manual adjusting plungers, push the inner seal lip over the threaded hole end of the plunger until the lip enters the plunger seal groove. Coat the adjusting bolt with approved grease and turn the bolt into the plunger by working it through the hole in the outer seal flap, being careful not to pinch the seal on the bolt threads. Turn the bolt in just short of the seal. Do not bottom the bolt on the seal.
5. Seals are assembled onto automatic adjuster actuators as in paragraph no. 4. The adjusting bolt is turned into the seal and actuator in the same manner.

DRUM ROTATION AND PLUNGER POSITION

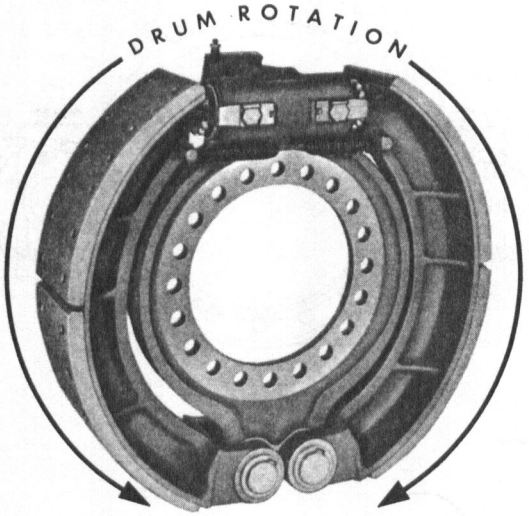


Fig. 21

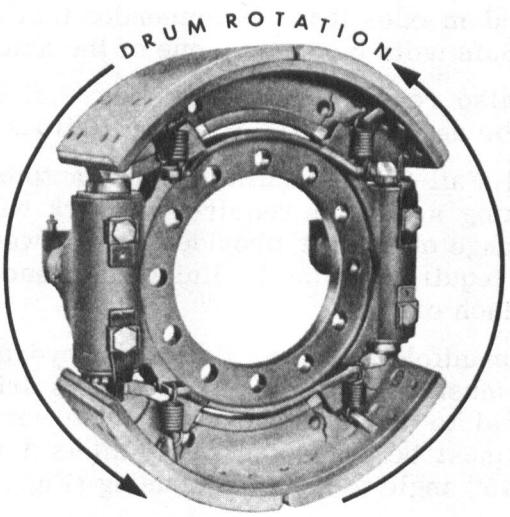


Fig. 22

On double actuated brakes, the anchor (solid) plungers should be positioned at the trailing end of each brake shoe where they will absorb the brake torque during forward wheel rotation (Fig. 22).

On single actuated brakes the actuation housing will have two adjusting plungers and the brake torque will be absorbed by the brake shoe anchor pins (Fig. 21).

INSTALLING PLUNGERS

Coat all plunger bores with approved grease. Coat entire plunger with grease, packing cavity behind seal, insert plunger and seal into plunger housing with plunger key slot aligned with guide bolt hole. Make certain that the plunger goes all the way into the plunger bore and seats on the abutments at the bottom. Seat the plunger seal in the plunger housing with the correct seal driving tool (Fig. 24, 25, 26). Install guide bolts. Tighten bolts to 15-25 ft. lbs. torque.

On manual adjusting plungers, apply grease to outside of plunger and install plunger and seal into plunger housing, as described in preceding paragraph. Follow same procedure for seating the seals. Coat adjusting bolts with approved grease and turn adjusting bolts into adjusting plungers by working them through the holes in the outer seal flap. Do not bottom bolt on seal. Install guide and lock. Tighten to 15-25 ft. lbs. torque.

On automatic adjusting plungers, grease coat both the outside and inside surfaces of the adjusting plungers and the actuator. Place the plunger into the plunger housing, aligning the keyway slot with the guide hole, and assemble adjusting pawl, gasket, spring and cap screw. The adjusting pawl must be installed with the 45^{o} chamfer pointing toward the head of the adjusting bolt. Assemble the plunger seal onto the actuator. Insert the actuator into the plunger, wiggling it until pawl and actuator mesh. If necessary, back off the cap screw to enable the meshing of pawl and actuator teeth. Push the actuator into the plunger until it bottoms. Seat the plunger seal into the plunger housing with the correct seal driving tool (Fig. 24, 25, 26).

Grease coat adjusting bolt threads and thread the bolt into the actuator after working it through the seal flap hole. Thread the adjusting bolt into the actuator until it bottoms. A clicking sound and a ratcheting feel will indicate meshing of the teeth. Turn the bolt out three turns. If there is no clicking sound, threads are properly meshed. Tighten cap screw to 15-25 ft. lbs. torque.

MANIFOLDING

On tandem axles it is recommended that four Fail-Safe units be used on one of the axles.

It is also recommended that four Fail-Safe units be used on single axle installations.

On all Fail-Safe installations the automatic adjusting system is required to work within the range of the lift provided by the wedge. This requires drum to lining clearance of .060 inch or less.

For manifolding, the Fail-Safe hydraulic lines must be connected to the inlets drilled vertical to the base housing. The service lines must be connected to the inlets drilled on a 45° angle to the base housing (Fig. 23).

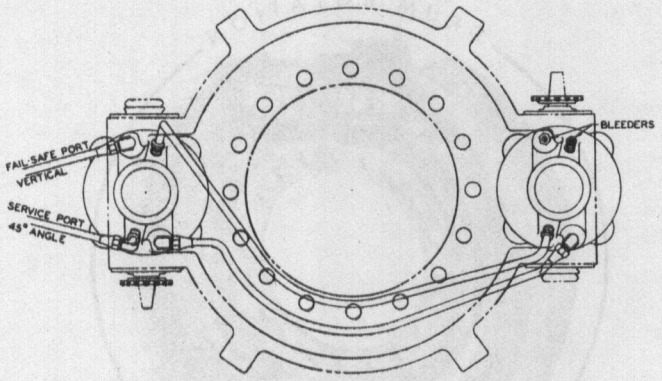
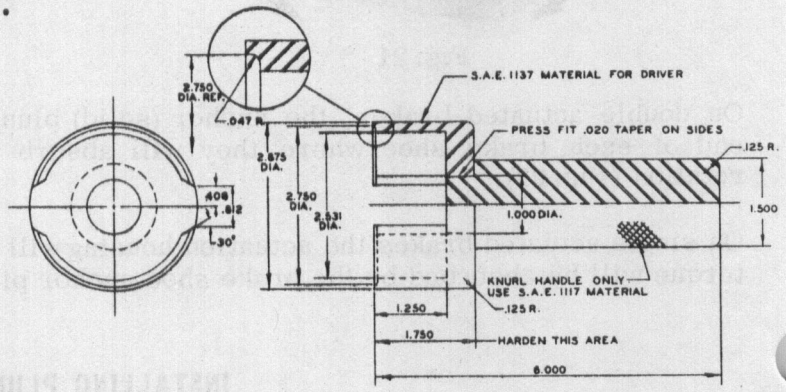


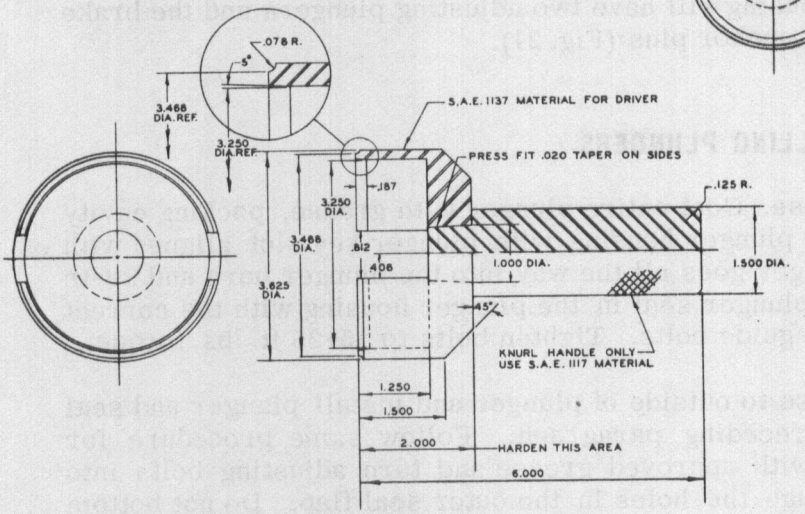
Fig. 23

MANIFOLDING FOR FAIL-SAFE CHAMBERS HYDRAULIC



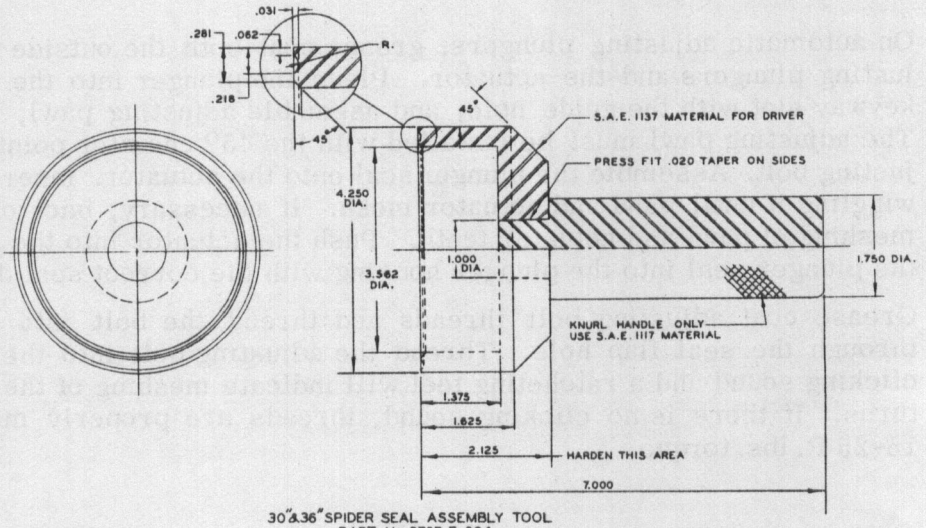
20¼" & 22" SPIDER SEAL ASSEMBLY TOOL
PART No. 3787-D-992
TOOL No. A-3324

Fig. 24



26" SPIDER SEAL ASSEMBLY TOOL
PART No. 3787-E-993
TOOL No. A-3259

Fig. 25

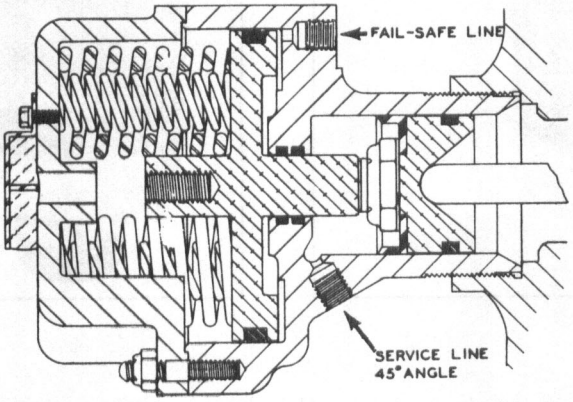


30" & 36" SPIDER SEAL ASSEMBLY TOOL
PART No. 3787-F-994
TOOL No. A-3490

Fig. 26

HYDRAULIC FAIL-SAFE

The hydraulic Fail-Safe unit is a multi spring powered brake actuator. When 300 PSI or more of hydraulic pressure is applied against the Fail-Safe piston the springs will be held in a compressed position. When hydraulic pressure is removed, the springs will push the wheel cylinder piston against the wedge shaft and apply the brake.



HYDRAULIC FAIL-SAFE
(4 DOUBLE POWER SPRINGS)

Fig. 27

SAFETY PRECAUTION

When brakes are equipped with Fail-Safe units, cage the power springs before starting any disassembly or removal of wheels or drums.

Unit design limits hydraulic pressure to the Fail-Safe at 500 psi max.

When a vehicle is disabled due to lost line pressure, block the wheels and cage the power springs before attempting to move the vehicle.

The hydraulic service lines must be connected to the inlets drilled at a 45° angle to the base housing.

The Fail-Safe lines must be connected to the inlets drilled vertical to the base housing.

GENERAL MAINTENANCE

The following procedure should be used for caging and uncaging the fail-safe springs.

First loosen the breather cap screw and swing breather and breather cap out of the way. (Fig. 28). Insert the caging bolt with the nut and washer in position, through the opening in the Fail-Safe cap. Thread the caging bolt into the piston plunger by hand until tight. By using two wrenches (Fig. 29) turn the nut 18 full turns clockwise to completely cage power springs. Do not force the caging bolt beyond its normal stop.

To uncage the power springs, turn the caging bolt nut 18 to 21 full turns counterclockwise.

SERVICING HYDRAULIC FAIL-SAFE

First, cage the power springs (Fig. 29). Remove the self locking nuts and warning tag from the studs holding the Fail-Safe cap to the base housing. Uncage the power springs and lift the cap off the base housing (Fig. 30). The power springs are not fastened to the housing and may be lifted out.

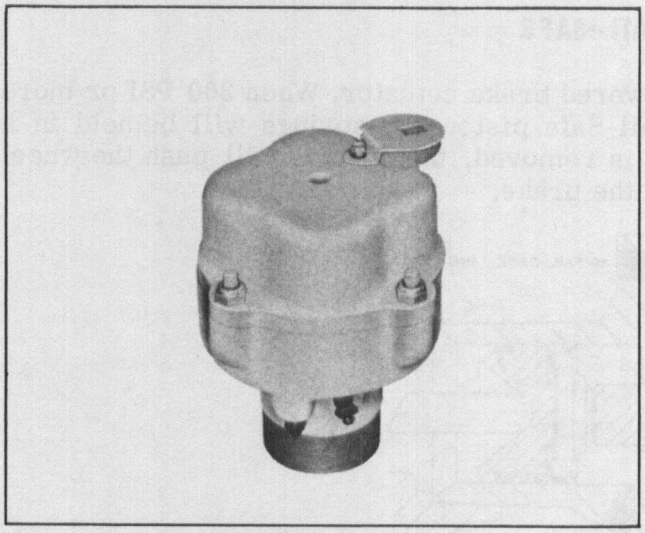


Fig. 28

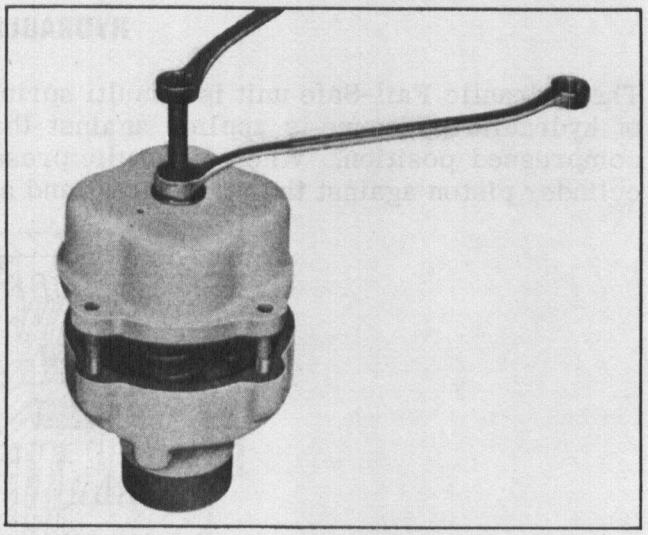


Fig. 29

Separate the small diameter springs from the large. Clean in solvent. Inspect for cracks and corrosion. Coat with approved grease.

Pull the Fail-Safe piston out of the base housing (Fig. 31). Remove the piston "O" Ring (Fig. 32). Remove the two "O" rings (smaller diameter) from the base housing. Inspect for defects. Do not clean "O" rings in solvent. Use the same fluid that will be used in the hydraulic system (either brake fluid or mineral oil). "O" rings for mineral oil use are marked with a colored stripe.

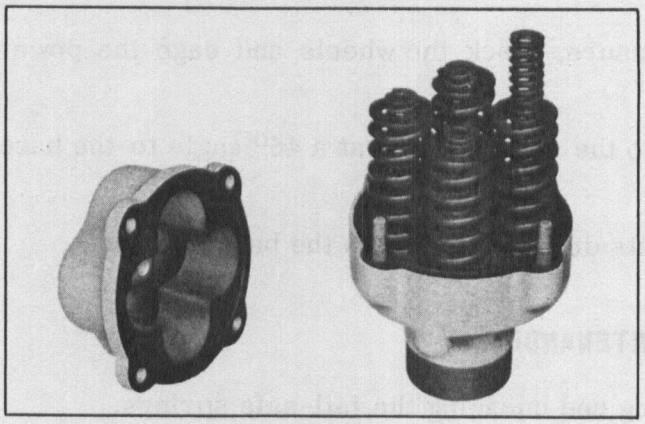


Fig. 30

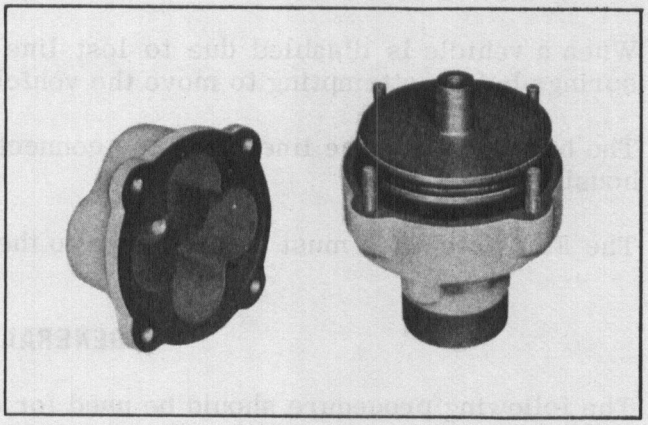


Fig. 31

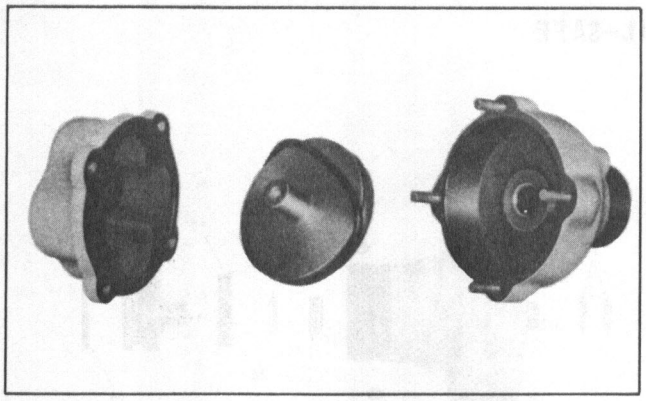


Fig. 32

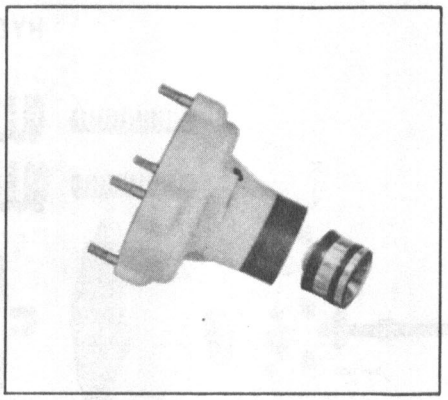


Fig. 33

Remove the wheel cylinder piston from the base housing, as shown in Fig. 33. Remove the piston cup and "O" ring, as shown in Figs. 34 and 35. Note that "O" rings for mineral oil use will be marked with a colored stripe. The piston cup will be marked the same way. Do not clean in solvent. Use same fluid that will be used in the system.

Remove and inspect all bleeder screws for defects. Lubricate the wheel cylinder bore with the same fluid used in the system. Reverse the above procedure for assembly.

Fail-Safe chamber adjustment is made the same way as standard power units. (See page 12). A cap screw and nylon insert are provided to lock the Fail-Safe in position after adjustment and to avoid damage to the chamber tube threads. Permatex is to be used on all chamber threads.

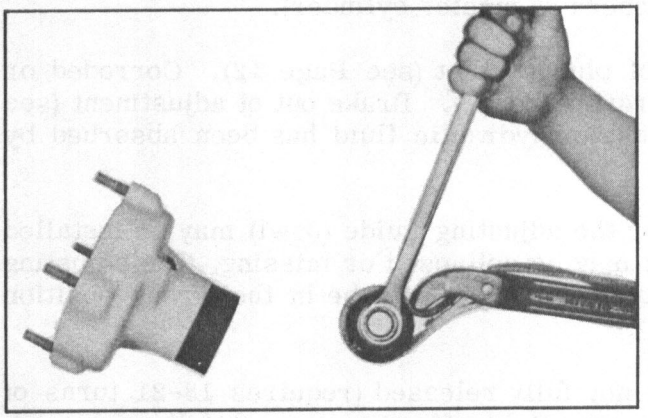


Fig. 34

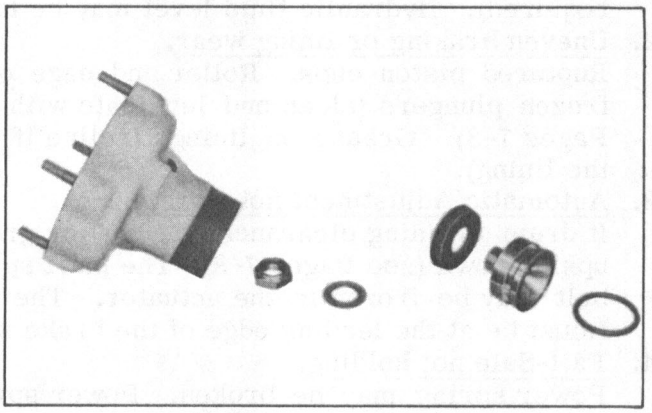


Fig. 35

HYDRAULIC FAIL-SAFE

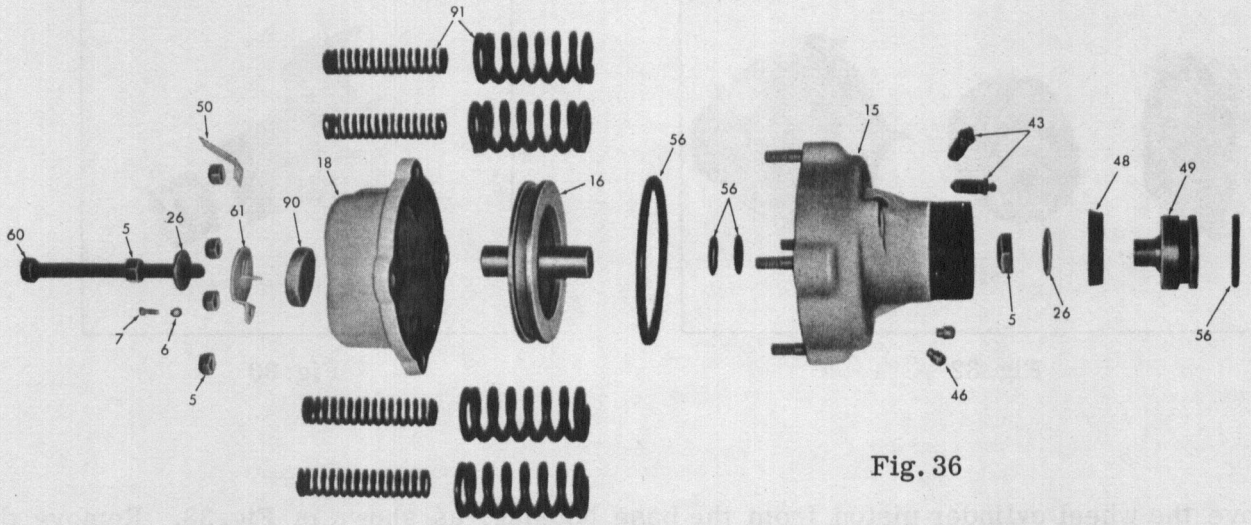


Fig. 36

5. Nut	16. Piston Plunger	46. Tube Seat	56. "O" Ring	91. Power Springs
6. Lockwasher	18. Cap	48. Piston Cup	60. Release Bolt	
7. Filter Cap Bolt	26. Washer	49. Piston	61. Breather Cap	
15. Base Housing	43. Bleeder Screw	50. Warning Tag	90. Breather	

DUST SHIELDS

Dust shields are available thru certain vehicle manufacturers, and their use is recommended.

TROUBLE SHOOTING GUIDE

1. Brakes poor or do not apply.
   Check system pressure at source and at brake (1500 psi min.). Possible line restrictions or wheel cylinder leaks. Brakes out of adjustment (.060" Min. drum to lining clearance required). Hydraulic fluid level may be low (check at master cylinder).
2. Uneven braking or lining wear.
   Ruptured piston cups. Roller and cage out of plunger slot (see Page 12). Corroded or frozen plungers (clean and lubricate with approved grease). Brake out of adjustment (see Pages 7-8). Grease on linings (reline if grease or hydraulic fluid has been absorbed by the lining).
3. Automatic Adjustment not working.
   If drum to lining clearance is .060" or greater the adjusting guide (pawl) may be installed upside down (see Pages 7-8). The pawl spring may be collapsed or missing. The adjusting bolt may be frozen in the actuator. The adjusting plunger may be in the wrong position (must be at the leading edge of the brake shoe).
4. Fail-Safe not holding.
   Power spring may be broken. Power spring not fully released (requires 18-21 turns of released bolt). Brake may be out of adjustment. Hold off pressure not fully released. Improper connection of hydraulic lines at Fail-Safe (the service line must be connected to the 45^{o} inlet).
5. Inefficient brake.
   Wedge assembly installed incorrectly (see pages 11-12). Power unit installed incorrectly (see Page 12).
6. Improper release.
   Brake not bled correctly (see Page 13). Plunger seals may be ruptured. Plungers may be frozen. Wedge spring may be broken. Shoe return springs may be weak or broken.

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