

300M Series, Type MBEM Electric Shoe Brakes and MBEP Brakes

Mondel 300M Series MBEM Electric Shoe Brakes and MBEP Brakes
Instruction Manual



MAGNETEK
MATERIAL HANDLING

MONDEL

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Installation and Maintenance Instructions

**300M Series, Type MBEM
Electric Shoe Brake**

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Chapter 1.0: 300M, Type MBEM Electric Shoe Brake and MBEP Brake Warnings and Cautions

Read and Understand All Warnings And Cautions Printed In This Manual Before Commencing Installation, Adjustment, Or Repair.

Anyone involved in the installation or service of this brake must have:

- Received specific training.
- Had experience on similar equipment.
- Knowledge of the equipment on which the brake is installed.
- The ability to understand the terminology.
- The ability to understand the diagrams.

Do not proceed unless technically qualified for the work involved.

Chapter 3.0: INSTALLATION – Warnings and Cautions

Never lift the brake assembly by the brake rod. The brake rod will bend from the weight of the brake, causing the linings to drag as well as damaging the rod itself.

Chapter 4.0: BRAKE SHOE AND COIL REPLACEMENT – Warnings and Cautions

Do not operate the brake unless all shoe holders are in their normal position and the holder screws are fully into the clearance holes in the side of the shoe assembly. Damage to the brake may result if this precaution is not strictly observed.

Disconnect and lock open power supply on crane before starting any work on the coil. Failure to observe this warning may result in injury and/or death.

Chapter 5.0: COMPLETE ADJUSTMENT – Warnings and Cautions

Under no circumstances is it permissible to adjust the dimension below the minimum or above the maximum dimension listed. Improper brake operation and loss of control will result, leading to possible injury or death of personnel.

A hoist brake must be set to its rated torque, as indicated in the brake model number (e.g., 13MBEM 550 ASCI; '550' is the rated torque). This model number appears on the brake nameplate. Failure to observe this precaution may result in damage to the brake.

The pinch point between the armature nut and base can cause personal injury. Never place fingers or hand between the armature nut and the base. Use a tool or device to move and hold the spacer in position.

Chapter 6.0: RELEASING THE BRAKE – Warnings and Cautions

Do not attempt to hold the spacer in place with fingers. Personal injury may result due to pinching.

Take extra precautions to ensure that the brake coil is not energized upon completion of service. The spacer will fall out, allowing the brake to set when the coil is de-energized. Personal injury may result if this warning is not strictly observed.

Without fail, the nut must be returned to its original position on the armature bolt and secured with the cotter pin. If not, it may restrict armature travel and the braking torque will be lost without prior warning. Failure to observe this warning could lead to loss of control, possibly resulting in personal injury.

Chapter 8.0: PARTS REPLACEMENT – Warnings and Cautions

The brake release spring will still be partially compressed when the adjusting nut comes off the link while removing and installing a new cylinder wheel. The spring could release suddenly, causing injury. Remove the adjusting nut slowly and very carefully.

Chapter 9.0: STORAGE – Warnings and Cautions

Data plates and labels must not be removed or painted over.

Chapter 2.0: Description and Application

DESCRIPTION

The MBEM Electric Shoe Brake is used with a manual hydraulic system, and its wheel cylinder is designed for compatibility with commercial brake fluid. The MBEP brake is used with power-assist systems, and its wheel cylinder is designed for compatibility with a mineral-based hydraulic oil. Both MBEM and MBEP brakes are used to manually control the slowing and stopping of bridge and/or trolley motions. The MBEM and MBEP brakes are spring set and electrically released. However, after being electrically released, the brake can be hydraulically closed. The rate of deceleration is proportional to the force applied to the foot pedal.

The MBEM and MBEP brakes are available in a number of sizes ranging from 5 inches to 19 inches. The construction and operation, however, is the same regardless of the size of the brake (see Figure 1 on page 7).

The MBEM and MBEP brakes combine a hydraulically set, spring-released service brake function, with a spring-set, magnetically released parking function.

Note:

This type of brake is intended for traverse motions only, and is not for hoist motion applications. Service brakes used for hoist applications require dynamic braking combined with a spring-set, magnetically released motor brake.

During normal operation the magnet coil is energized, which allows the spring to hold the shoes away from the brake wheel. Shutting the crane down, either intentionally or due to a power failure or other malfunction, will de-energize the magnet coil, allowing the torque spring to set the brake.

With the magnet coil energized, brake operation is controlled by a foot-operated master cylinder located in the operator's area. Brake force is proportional to the force applied to the master cylinder foot pedal.

These brakes are designed to require a minimum of periodic maintenance. Permanently lubricated bushings are used at all pivot points, eliminating the need for periodic lubrication. A self-adjustment feature is also incorporated, basically consisting of a stack of spacer plates enclosed in a housing through which the rod that connects the two brake jaws passes. As lining wear progresses, the rod moves further through the spacer plate housing each time the brake releases. The stroke required to set the brake is proportional to the rod movement. When the stroke length reaches a certain point, the spacer plate nearest the brake wheel will automatically drop from the stop on the end of the brake rod. Then, the next time the brake is set, the stop butts against the spacer that just dropped onto the rod and the brake rod travel is shortened by an amount equal to that of the spacer. This cycle will repeat throughout the service life of the brake linings. The spacer plates must be reset after each change in brake linings.

Note:

During heavy brake use, the brake wheel will remain hot and its diameter will remain larger than when the wheel is cold. With the MBEM and MBEP brakes, which have a small lining clearance, if a self-adjustment should occur during the first few brake applications while the wheel is still cold, the thermal expansion of the wheel may reach a point where the lining clearance that existed with a cold wheel has closed up. As such, the linings may temporarily drag lightly on the wheel. The dragging could, in some cases, be serious enough to cause the linings to smoke slightly. The condition described here will occur only infrequently, and will be of brief duration.

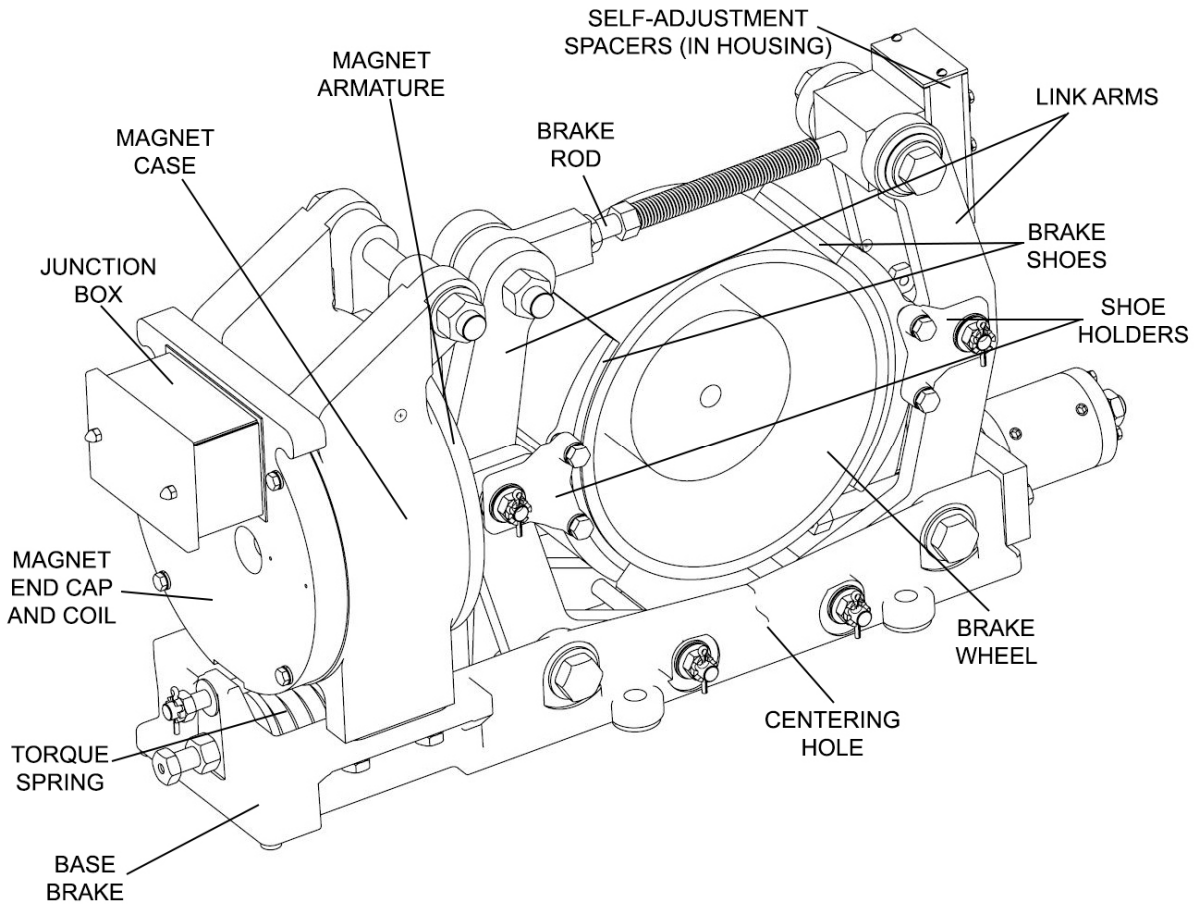
APPLICATION

These brakes are designed to operate in extremes of temperatures and duty cycles. Every brake, however, has a specific torque rating, which is adjustable within a prescribed range. The torque rating is dependent upon the brake size and by the type of magnet coil (shunt or series wound) which is used.

For reasons of safety, and to ensure normal service life, a brake must never be placed in an application where the torque and energy requirements exceed the ratings of that brake.

Figure 1

Type MBEM Brake, Component Identification



Chapter 3.0: Installation

Before a brake assembly is shipped from the factory, all operating adjustments are properly made and the brake should be ready for installation.

Note:

These brakes are shipped from the factory in the 'released' condition, unless equipped with the quick-release option. Those brakes without the quick-release option have the release spacer pinched between the nut on the armature bolt and the brake base (see Figure 9 on page 19) holding the armature against the magnet case. The brake must remain in the released condition to allow the shoes to clear the brake wheel during installation.

Under no circumstances should the brake be operated electrically or hydraulically unless a brake wheel is in place between the shoes, either on a motor shaft or secured to a suitable fixture. The release spacer will drop when the brake coil is energized, allowing the torque spring to move the armature away from the magnet case when the coil is de-energized. Without a brake wheel in place, an abnormally large magnet air gap will be introduced and the brake coil may not be capable of drawing the armature magnetically.

After unpacking, make a thorough visual inspection of the brake assembly to ensure that no damage has occurred during shipment and that there are no loose or missing parts. All self-adjustment spacers must be hanging loosely within the housing.

The brake is designed for operation on DC power. If only AC power is available, a suitable DC power supply will be required for brake operation.

Operating ranges of voltage and current comply with NEMA-AISE standards.

After mounting the brake wheel on the motor shaft, install the brake assembly using the following procedure:

- 3.1: Reach under the self-adjustment spacer housing and make sure that all of the spacers are in the "up" position (see Figure 2 on page 10).
- 3.2: Before installing the brake, check to ensure that the brake linkage is centered. To do this, lay a rule across the shoe holder pivot bolts and note the exact dimension between the linings.

Drop a plumb bob from the center point between the linings to the centering hole in the base. Gently tap the linkage, as necessary, to place the plumb bob directly on the centering hole.
- 3.3: Position the brake assembly over the brake wheel. The brake assembly must be aligned with the motor shaft in three axes (horizontal, vertical and longitudinal), within $\pm 1/8$ " maximum in each axis. Adjust the brake mounting bracket to achieve the specified vertical and longitudinal alignment and shim under the brake base for the horizontal alignment.
- 3.4: When the brake assembly is properly aligned, set the linings against the brake wheel to ensure that uniform lining contact with the wheel is attained before the mounting hardware is tightened. This can be done electrically after connecting the brake coil. Otherwise, remove the cotter pin from the armature bolt and back off the locknut (see Figure 17 on page 29) until the linings are in firm contact with the wheel and the release spacer is free. The torque spring will set the brake as the armature locknut is backed out.
- 3.5: Carefully check the lining contact with the wheel, along each side of both shoes. Shift the brake assembly, if required, to obtain uniform contact.

- 3.6: Make sure no adjustments, previously set, were moved if an adjustment was necessary in Step 3.5. Then install and tighten the mounting hardware.
- 3.7: If the armature bolt locknut was turned to set the linings against the wheel in step 3.4, the locknut must be reset to achieve proper release spacer clearance. This must be done after power is available to the brake, as described under the topic, Brake Release Spacer Gap Adjustment.
- 3.8 Install the brake hydraulic control system per the instructions provided with that system. Use caution to prevent contaminants from getting into the brake fluid or system components.
- 3.9 Bleed the hydraulic system to remove trapped air as instructed in the hydraulic control system's documentation.
- 3.10 Test the operation of the brake as described in the following topic, Operational Test.

OPERATIONAL TEST

Note:

Always perform an operational test of the motor brake after replacement, adjustment, or repair. If the motor brake has erratic braking, or fails to stop and hold the traverse motion stationary, do not attempt to operate the crane until the proper adjustments and/or repairs are performed.

Test the brakes as follows:

- 3.11 Operate the traverse motion and release the control lever.
- 3.12 Depress the brake pedal to stop traverse motion.
- 3.13 Repeat step 3.11.
- 3.14 Depress the stop pushbutton to test the brake. If the brake fails to stop and hold the motion stationary, repair the brake as necessary. Visually inspect the brake during its operation to ensure that it releases completely.

Chapter 4.0: Brake Shoe and Coil Replacement

Replacing the Brake Shoes (Use Only Mondel Approved Spare Parts)

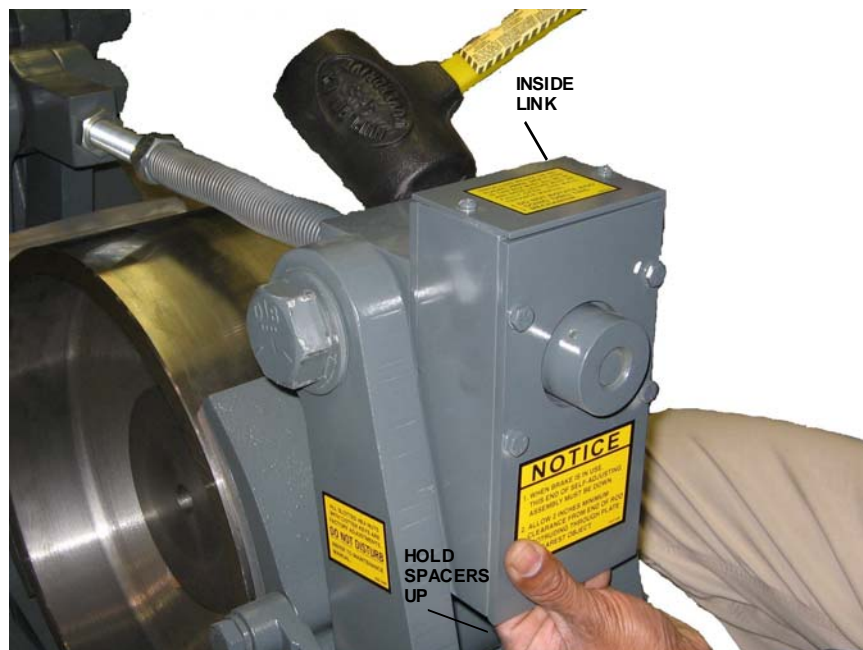
Remove and install the brake shoes using the following procedure:

Note:

No adjustments, including the brake rod adjustment, need to be made during brake shoe replacement if the procedure is performed exactly as described. However, if it is known that a brake rod adjustment was made for some reason with anything but new linings in place, an adjustment must be made after the new linings (shoes) are installed.

Figure 2

Opening Up Clearance for Brake Shoe Removal



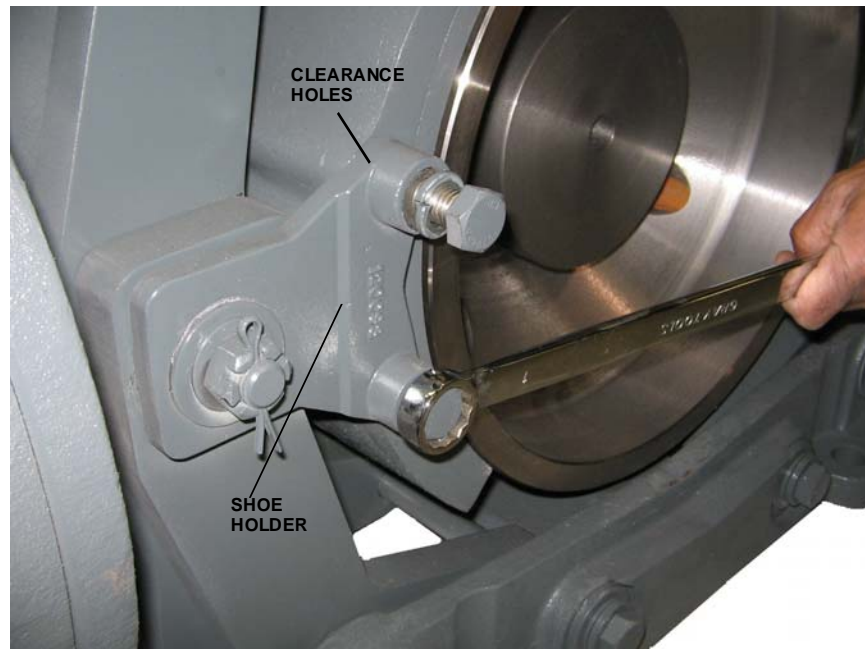
- 4.1: Release the brake using either manual or the magnetic method, as described under the topic, Releasing the Brake.
- 4.2: Reach under the adjusting spacer housing and push all of the spacer plates up against the top cover (see Figure 2 on page 10).
- 4.3: Hold the spacer plates against the housing cover and gently (alternately) tap against the brake links nearest the spacer housing with a babbitt hammer (see Figure 2 on page 10).
- 4.4: When there is sufficient clearance between the brake wheel and the shoe assembly for a new lining, back out the two screws in the shoe holder until the screw ends are free of the clearance holes in the shoe (see Figure 3 on page 11).

Note:

If sufficient clearance cannot be obtained to install one (or both) new shoe assembly, a misadjusted brake rod is the likely cause. Back the brake rod out of the pivot link an amount necessary to allow the new shoes to be installed (see Figure 13 on page 23). Adjust the brake rod as instructed under the topic, Brake Rod and Self-Adjusting Mechanism Adjustment.

Figure 3

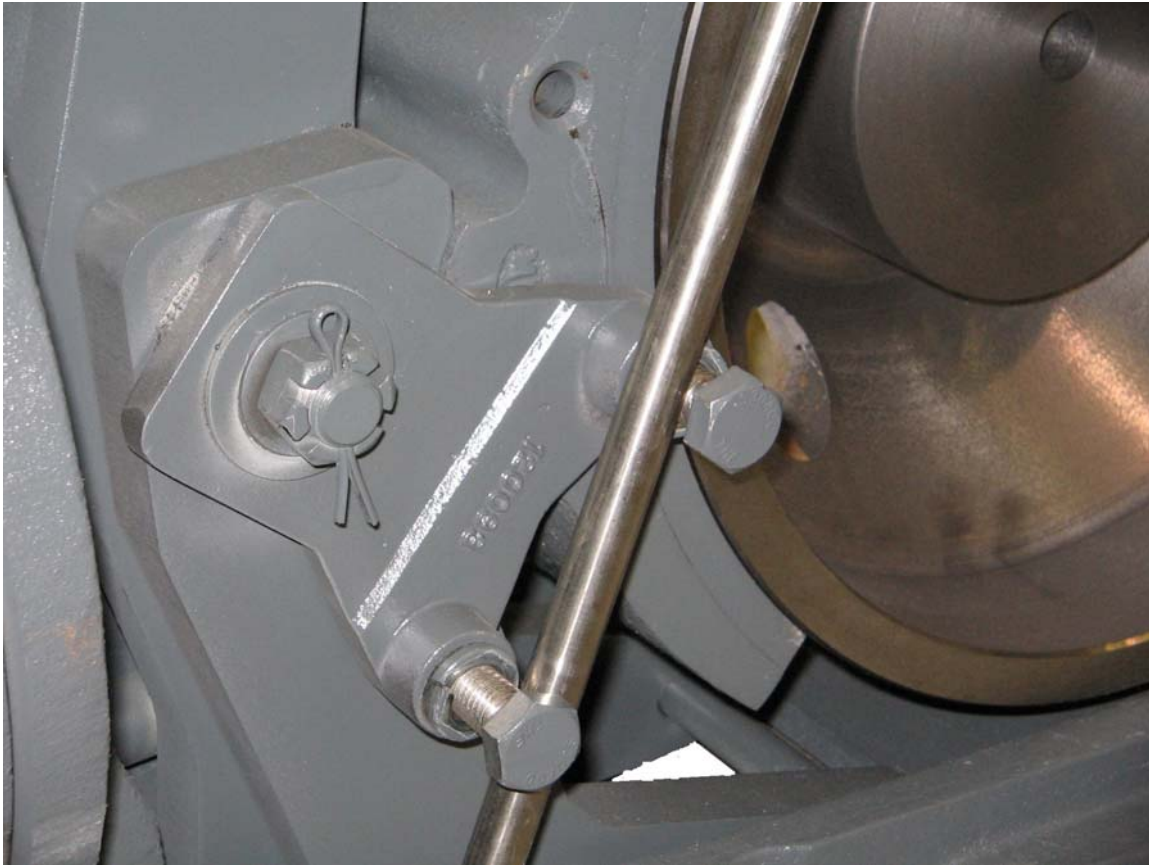
Detaching Shoe Holders from Brake Shoes



- 4.5: Rotate the shoe holder out of the way (see Figure 4 on page 12) and remove the shoe assembly through the side of the brake (see Figure 5 on page 13).
- 4.6: Slide the replacement shoe assembly into place between the holders. If necessary, tap the assembly with a babbitt hammer to achieve alignment with the far side shoe holder.

Figure 4

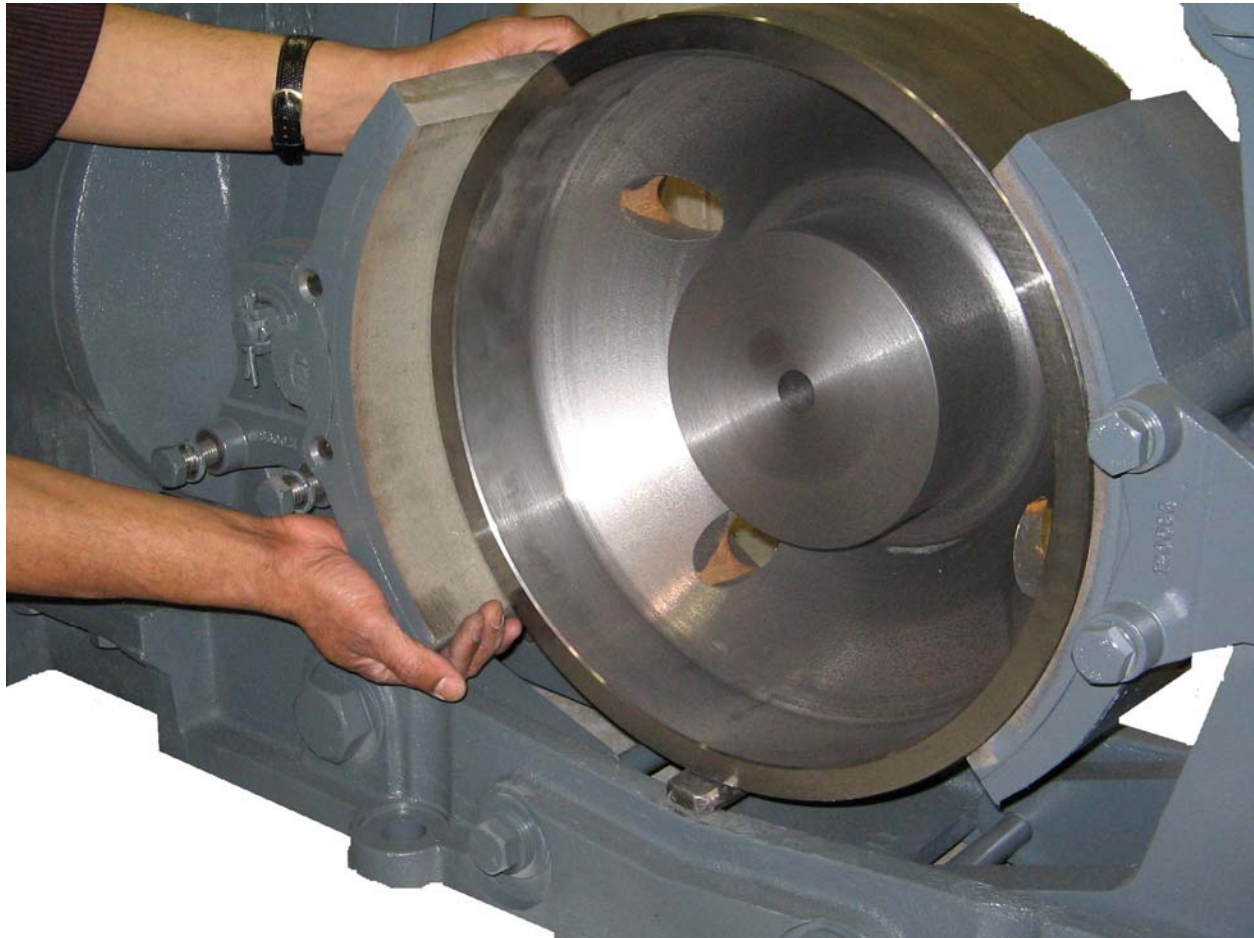
Rotating Shoe Holders to the Down Position



- 4.7: Rotate the shoe holder back into position, and tighten the two screws until they are tight against the holder and are sticking into the clearance holes in the side of the brake shoe. If necessary, gently tap the heads of the screws to rotate the shoe holder into alignment to allow the screws to easily enter the clearance holes in the shoe holder.
- 4.8: Again, reach under the adjusting spacer housing and push any spacers, still in the down position, up against the top cover.
- 4.9: Hold the spacers up, and tap gently against the insides of the links (alternately) furthest from the spacer housing, using a babbitt hammer. This will move the shoe holder with the new lining tightly against the wheel, and move the other shoe assembly away from the wheel.
- 4.10: When sufficient clearance exists for a new lining between the wheel and the near side shoe assembly, loosen the screws in one of the holders for that shoe, until they are out of the clearance holes in the shoe.

Figure 5

Replacing Brake Shoes



- 4.11: Replace the shoe assembly using the procedure previously described in steps 4.5, 4.6, and 4.7.
- 4.12: Restore the brake to normal service as described under the topic, Releasing the Brake. The shoes will automatically center themselves on the wheel and the correct clearance will automatically be achieved during the first brake application.

Replacing the Coil

To replace a faulty coil, proceed as follows:

Note:

Follow appropriate Lock-Out/Tag-Out procedures.

- 4.13: Disconnect, lock open, and tag the mainline power disconnect which feeds the electrical power to the brake.
- 4.14: Disconnect the coil leads and remove any conduit that may be present behind the area of the end cap.
- 4.15: Slightly loosen the capscrews attaching the coil to the end cap. This will make the end cap removal easier in step 4.18.

- 4.16: Attach a suitable lifting device to the coil and end cap and take up any slack. The lifting sling must be around the lifting ears provided on the end cap (see Figure 6 on page 14). Do not lift at any other point.
- 4.17: Remove the coil subassembly mounting screws and pull the coil and end cap from the magnet case (see Figure 6 on page 14).
- 4.18: Set the assembly on the floor, or a suitable work bench, and remove the capscrews attaching the coil to the end cap (see Figure 7 on page 15). Separate the coil and the end cap.
- 4.19: Assemble the new coil to the end cap and install the attaching capscrews.
- 4.20: Install the new assembly in the magnet case, using the hoist, and tighten the four attaching capscrews.
- 4.21: Reinstall the conduit, if applicable, and reconnect the coil leads.

Figure 6

Removing Magnet Coil and End Cap

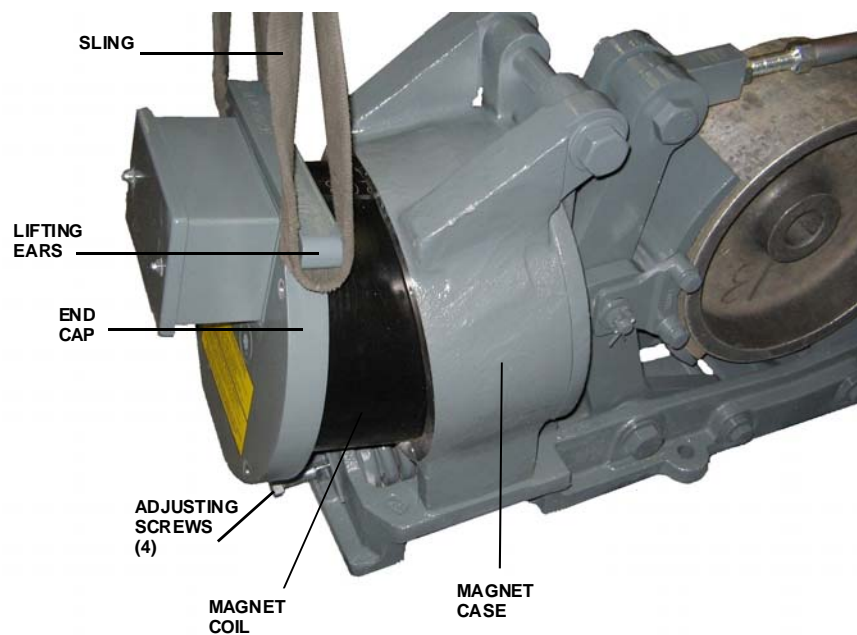


Figure 7

Removing End Cap to Coil Attaching Bolts



Chapter 5.0: Complete Adjustment

General

There are no periodic adjustments of any kind that have to be made on an MBEM or MBEP brake. A complete series of adjustments will be required only following a major repair in which all the adjustments were moved, or if they have been moved for any other reason. When a complete adjustment is necessary, the individual procedures should be performed in the exact order in which they are presented below:

- 5.1: Lower the load to the floor and disconnect the load from the hook if adjustments are being performed on a hoist brake. Reset the bottom block on the floor or on a suitable support to remove all unnecessary weight from the load line.
- 5.2: Adjust the torque spring as described under the topic, Torque Adjustment, or verify the previous setting as applicable.
- 5.3: Check the brake release spacer gap and adjust as necessary to ensure that the spacer falls when the brake is released. Refer to the topic, Brake Release Spacer Gap Adjustment.
- 5.4: Adjust the shoe holder pivot tension as described under the topic, Shoe Holder Pivot Tension Adjustments.
- 5.5: Adjust the base friction bolts as described under the topic, Base Friction Bolt Adjustment.

Note:

It is essential that the base friction bolt adjustments be made before attempting to adjust the brake rod in step 5.6.

- 5.6: Adjust the brake rod and self-adjusting mechanism as instructed under the topic, Brake Rod and Self-Adjusting Mechanism Adjustments.

Note:

Do not attempt to adjust the brake rod and the self-adjustment mechanism unless the brake linings are new. If spare shoes with new linings are available, install them temporarily on the brake. The used linings can be reinstalled upon completion of the brake rod adjustment. The brake will adjust to the reduced lining thickness automatically. If a brake rod adjustment must be made with worn linings, make absolutely certain that an adjustment is performed following the installation of the next set of new linings.

Torque Adjustment

Brake torque is a function of the compression of the large spring located beneath the coil assembly that sets the brake. The spring compression can be varied (see the following note) over a limited range by means of the spring adjustment bolt located in the brake base. A number of specific adjustment dimensions and the corresponding torque values are listed on the brake nameplate, which is mounted on the cover of the coil connection box. If the present torque setting is considered to be either too high or too low for the particular application(s), the torque can be adjusted as outlined below:

Note:

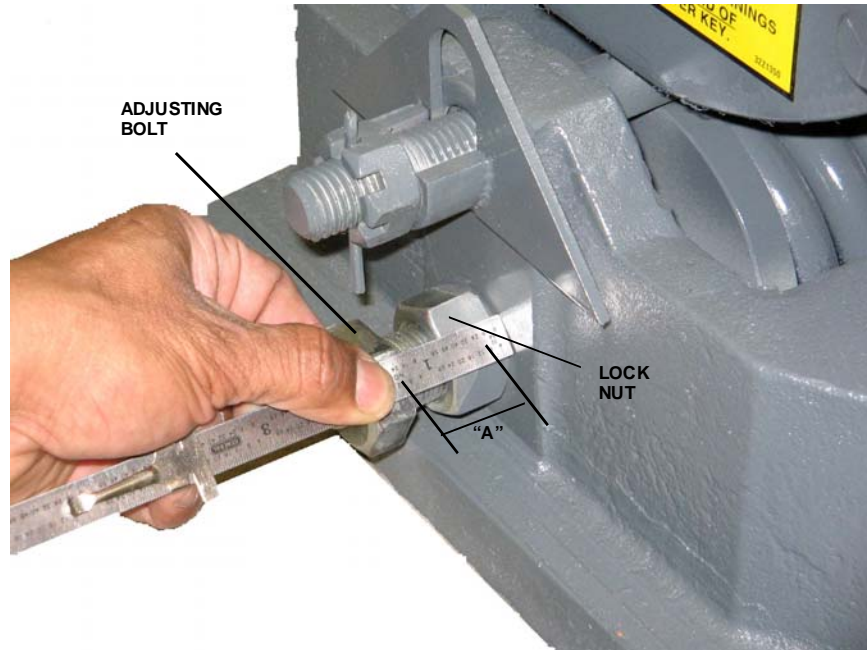
Adjusting to any dimension (designated as 'A') between the smallest and the largest listed on the nameplate is permissible. Adjustment is not limited to only those exact dimensions listed, if some intermediate torque is desired.

- 5.7: Loosen the locknut on the adjusting bolt.

- 5.8: Turn the adjusting bolt in or out to achieve the desired dimension 'A' (see Figure 8 on page 18). Turning the bolt clockwise increases the torque and turning the adjusting bolt counter-clockwise decreases the torque.
- 5.9: When the desired setting is obtained, hold the adjusting bolt and tighten the locknut against the brake base.

Figure 8

Brake Torque Adjustment



BRAKE SIZE	DIM. A.	TORQUE (LB/FT)
5 IN.	1-1/4"	16
	1"	30
	13/16"	40
8 IN.	1-7/8"	40
	1-3/8"	75
	1"	100
10 IN.	11/16"	120
	1-7/8"	80
	1-3/8"	165
13 IN.	1-1/8"	200
	7/8"	240
	1-1/8"	220
16 IN.	2-1/8"	400
	1-5/8"	770
	1-1/4"	1000
	1"	1200

BRAKE SIZE	DIM. A.	TORQUE (LB/FT)
*19 IN.	2-1/8"	800
	1-3/4"	1275
	1-7/16"	1750
	1-1/4"	2000
**19 IN.	2-1/8"	2000
	1-15/16"	2325
	1-3/4"	2650

* With Standard Spring and Coil

** With Optional Spring and Coil

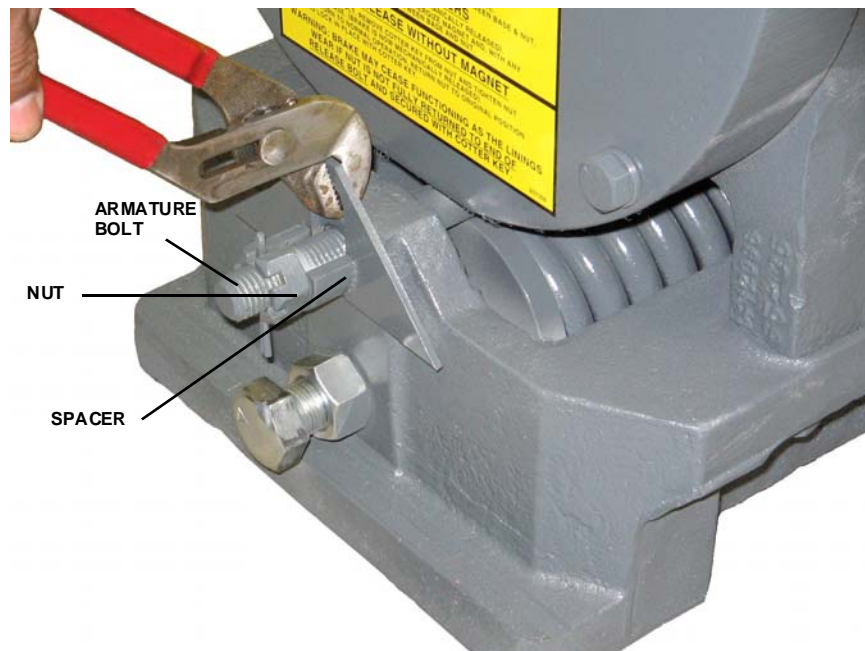
Brake Release Spacer Gap Adjustment

If the nut on the armature bolt has been moved, the spacer gap must be adjusted as follows:

- 5.10: If this is a hoist brake, lower the load and/or bottom block to the floor.
- 5.11: Energize the brake coil to close the gap between the magnet case and the armature (brake released).
- 5.12: Lift the spacer up so its thick portion is directly between the nut on the armature bolt and the base (see Figure 9 on page 19). Remove the cotter pin and turn the nut in until it is finger-tight against the spacer, pinching the spacer against the brake base.
- 5.13: Back the nut off just enough so the spacer falls freely. Continue loosening the nut until the nearest slot aligns with the hole through the armature bolt. Insert a cotter pin to lock the nut in position.
- 5.14: To check the adjustment, slide the spacer up using a suitable tool and hold it in place. De-energize the magnet and then release the spacer. The thick end of the spacer should now be pinched between the nut and the base, and there should be little or no gap between the magnet case and the armature. Energize the magnet. The spacer should fall freely to the lower position.

Figure 9

Brake Release Spacer in Released Position



Shoe Holder Pivot Tension Adjustments

Provisions are made to adjust the tension at the pivot points of all four shoe holders. The shoe holders nearest the armature are equipped with a pivot shaft, which has a nut at each end (see Figure 10 on page 20). The other shoe holders are attached at their pivot points by a bolt and nut (see Figure 11 on page 21). Separate procedures are outlined below for each shoe holder:

Note:

At all shoe holder pivot points, the Belleville spring washers must be assembled with the outer rims against the flat washers and the inner rims against the nuts.

5.15: If this is a hoist brake, lower the load and/or bottom block to the floor.

5.16: Adjust the shoe holders nearest the armature using the following procedure (see Figure 10 on page 20):

5.16.(a): Tighten the hex nuts on each end of the pivot to pull the parts together. The pivot shaft must extend an equal amount beyond the nuts on both ends, to ensure that the shoulder of the pivot shaft remains within the hole in the link.

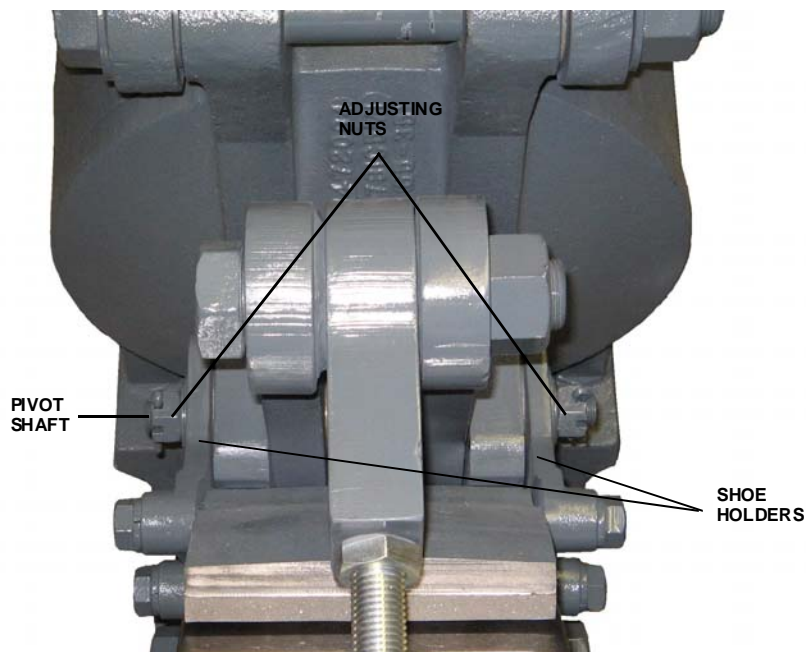
5.16.(b): Loosen both nuts an equal number of turns until completely loose.

5.16.(c): Tighten one nut, finger-tight. Then tighten it an additional 1/6 of a turn (60°) plus an amount necessary to align a slot in the nut with a hole in the shaft. Install the cotter pin to lock the nut into position.

5.16.(d): Tighten the other nut, finger-tight and then tighten it an additional 1/3 of a turn (120°). Either loosen or tighten the nut to align the nearest slot in the hole through the pivot shaft. Insert a cotter pin to lock the nut in position.

Figure 10

Shoe Holder Pivot and Adjusting Nuts



5.17: Adjust the pivot tension of the opposite shoe holder as follows (see Figure 11 on page 21):

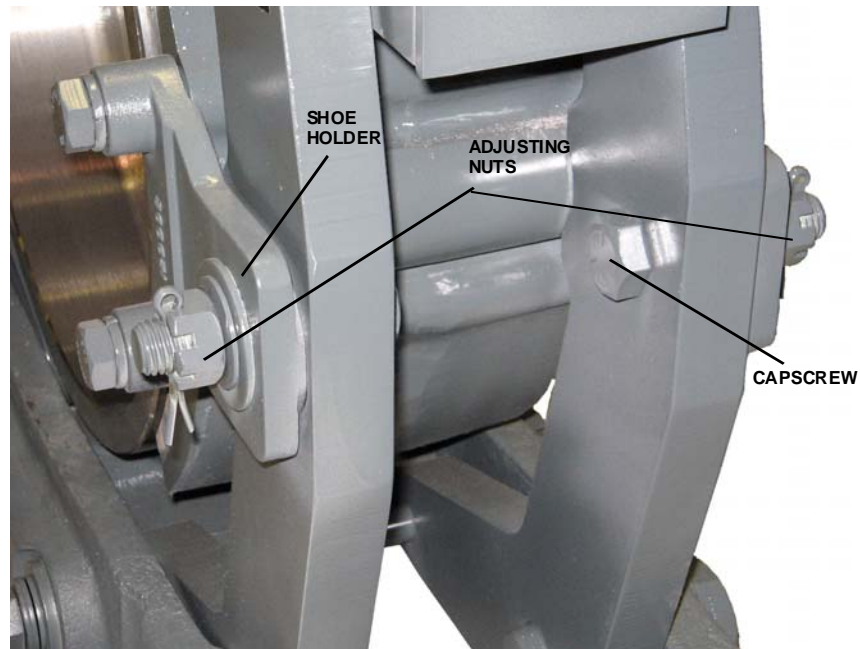
5.17.(a): Tighten the nuts on the pivot bolts finger-tight.

5.17.(b): Tighten the nuts and additional 1/6 of a turn (60°).

5.17.(c): Either tighten or loosen each nut to align the nearest slot in the nut with the hole through the bolt. Insert a cotter pin to lock each nut in position.

Figure 11

Shoe Holder Pivot Capscrews and Adjusting Nuts



Base Friction Bolt Adjustment

This adjustment preloads the friction bolts by compressing the Belleville spring washers, located under the heads of the friction bolts and under the nuts threaded onto the bolts (see Figure 12.a on page 22). The correct setting is vital to proper operation of the self-adjustment feature. Make the adjustment as follows:

Note:

Each set of Belleville spring washers must be assembled as shown in Figure 12.a.

5.18: Tighten the nuts on the friction bolts evenly until all Belleville spring washers are just flattened out. Do not over tighten.

5.19: In turn, loosen the nuts a full ½ turn (180°). Then, either tighten or loosen each nut to align the nearest slot in the nut with the hole through the bolt. Insert cotter pins to hold the nuts in position. This completes the adjustment.

Brake Rod and Self-Adjusting Mechanism Adjustment

The brake rod adjustment is very critical in that it affects operation of the self-adjustment mechanism as well as establishing both the magnet air gap and lining-to-brake wheel clearance. A misadjusted brake rod can greatly accelerate lining wear. By preventing a sufficient number of adjusting spacers from

dropping onto the rod as the lining wears, a misadjusted brake rod can lead to failure of the brake to hold. Once the brake rod adjustment has been properly made, consider it to be a permanent adjustment.

The self-adjusting mechanism should be kept clean to ensure the correct operation of adjustment spacers.

Note:

Perform the adjustment procedure outlined under the topic, Base Friction Bolt Adjustment, before attempting to make the brake rod adjustment.

Figure 12.a

Base Friction Stop Adjustment

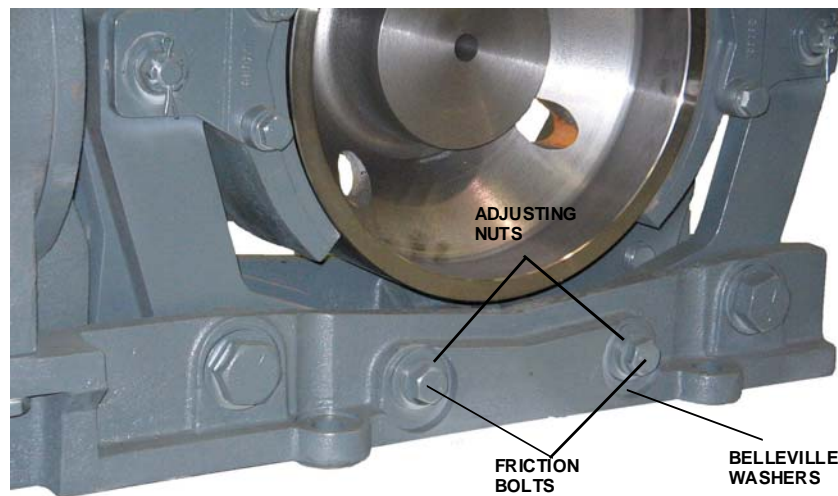
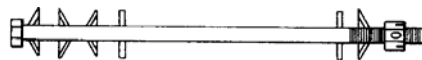


Figure 12.b

Side view of Friction Bolts, Adjusting Nuts, and Belleville Washers



5.20: Release the brake, either manually or magnetically, as described under the topic, Releasing the Brake.

5.21: Remove the top cover from the adjusting spacer housing, to allow the spacers to be observed.

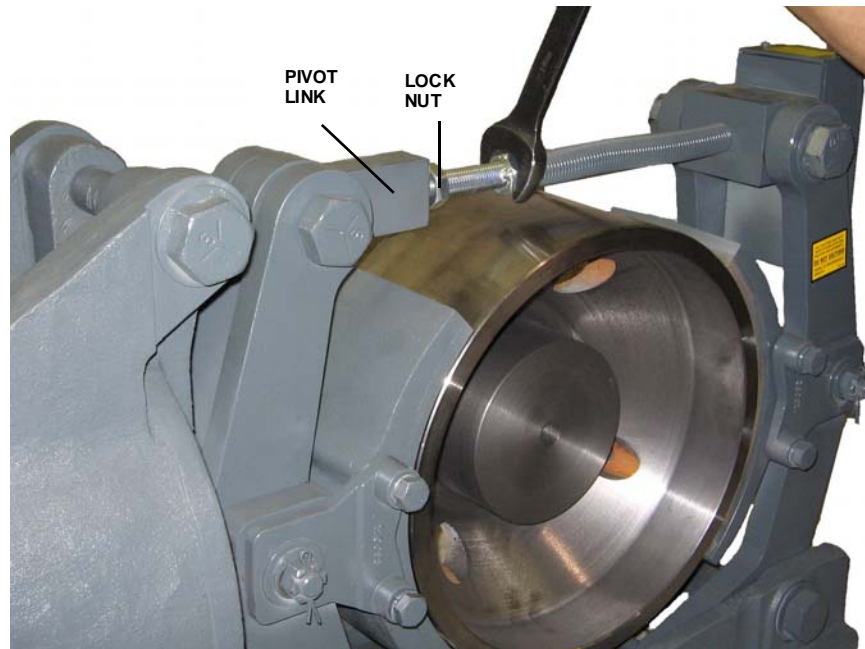
Note:

The objective in steps 5.22, 5.23, and 5.24 is to set the base friction bolts in their upper-most position. In performing step 5.24, the brake shoe links are used as levers to raise the base friction bolts in their mounting holes. The Belleville spring washers will hold the bolts in position.

5.22: Loosen the brake rod locknut (see Figure 13 on page 23).

Figure 13

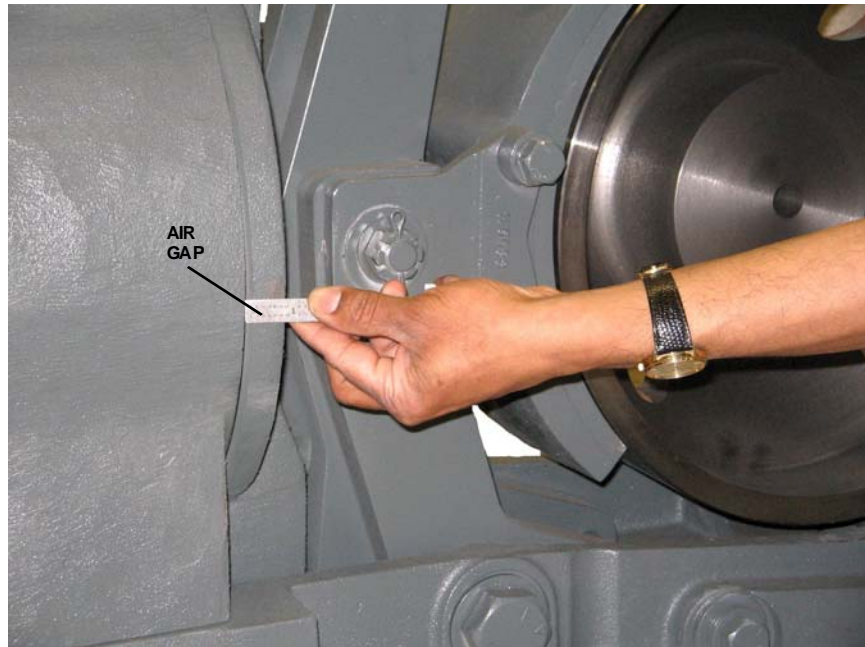
Turning Brake Rod



- 5.23: Back the brake rod out of the pivot link until a total of five adjusting spacers are in the DOWN position.
- 5.24: Move all of the adjusting spacers to the UP position and hold them there while tapping against the tops of the brake shoe links with a babbitt hammer (or equal). This will open up clearance between both linings and the brake wheel. When no more link movement occurs, the base friction bolts are fully set in their uppermost position. All adjusting spacers should now remain in the UP position and will be hanging freely within the housing.
- 5.25: Turn the brake rod back in, until both linings are in contact with the wheel. Proper contact is achieved at the point where the wheel can no longer be rotated by hand.
- 5.26: Recheck to ensure that all the adjustment spacers are still UP and that none are binding within the housing.
- 5.27: Back the brake rod out until one spacer drops down. The correct lining clearance exists at that point.
- 5.28: Hold the brake rod to keep it from turning, and tighten the locknut against the pivot link.
- 5.29: Replace the top plate on the adjusting spacer housing.
- 5.30: After several applications of the brake, check the magnet air gap (brake set) at the mid-point of the armature (see Figure 14 on page 24). A gap in excess of the value listed indicates that there is considerable mechanical wear in the brake and a complete brake overhaul or replacement should be considered in the near future. No adjustment should be attempted as a corrective measure.

Figure 14

Measuring Magnet Air Gap



BRAKE SIZE	MIN AIR GAP	MAX AIR GAP
5 Inch	0.04	0.09
8 Inch	0.08	0.15
10 Inch	0.09	0.18
13 Inch	0.13	0.24
16 Inch	0.15	0.28
19 Inch	0.17	0.31

Armature Position Indicator Switch Adjustment

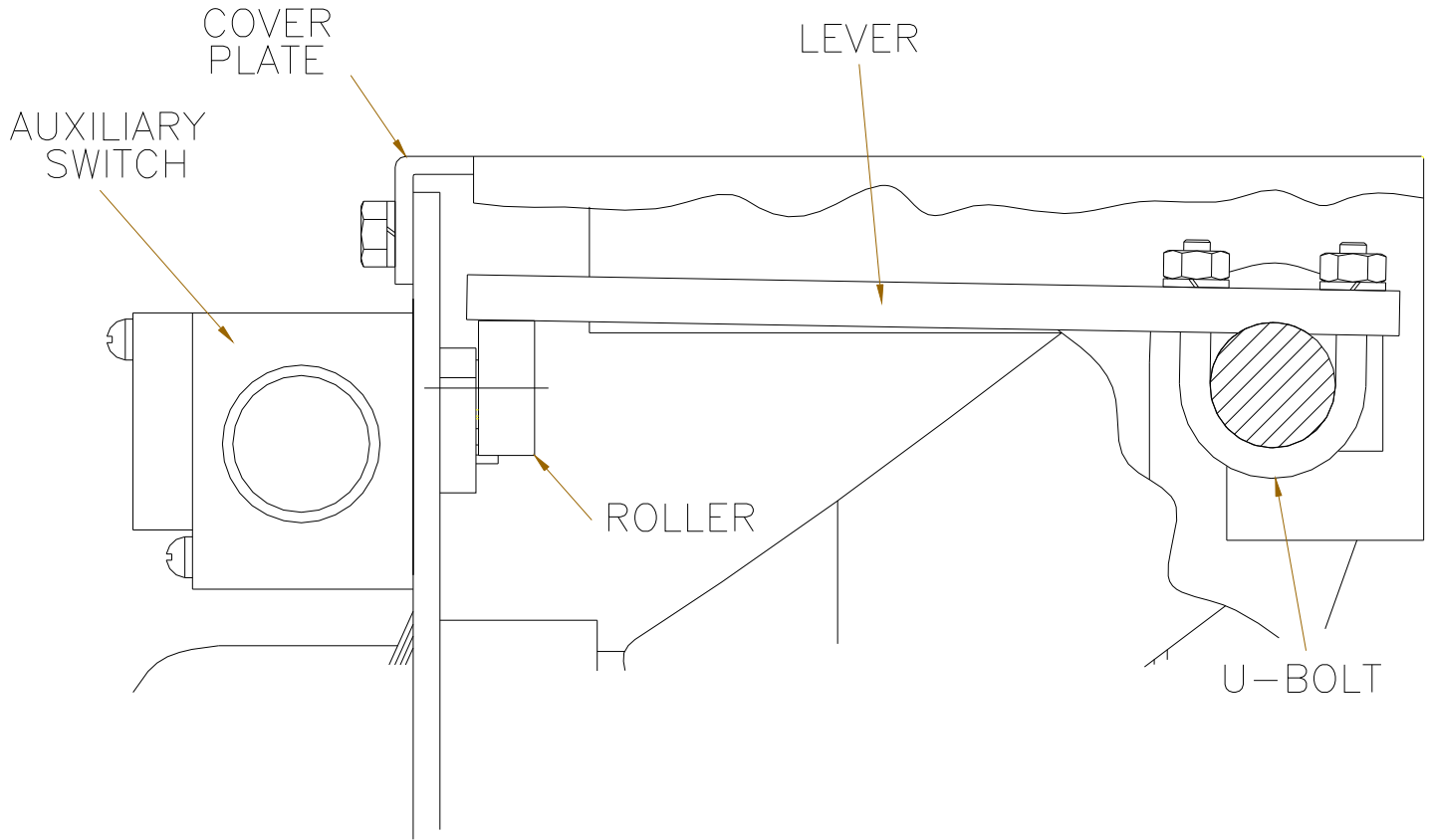
This switch has one set of normally open contacts and one set of normally closed contacts. It is a 'snap-action' switch that 'trips' each time the brake reaches its fully released position and again as the brake leaves its fully released position. Adjust the switch using the following procedure:

- 5.31: If this is a hoist brake, lower the load and/or bottom block to the floor.
- 5.32: Disconnect the electrical leads from the switch terminals.
- 5.33: Loosen the nuts on the U-bolt that attaches the lever to its mounting bar (see Figure 15 on page 26). Do not allow the lever to contact the switch roller.
- 5.34: Connect an ohmmeter from the common terminal to either of the other two terminals. Note whether the contacts being monitored are open or closed via the ohmmeter reading.
- 5.35: Energize the magnet (brake released).

- 5.36: Insert a 1/32 inch (0.03) shim or feeler gauge between the switch roller and lever, and rotate the lever down until the switch just trips, as observed by the ohmmeter reading.
- 5.37: Tighten the nuts on the U-bolt equally to lock the lever in position. Do not change the lever position.
- 5.38: Remove the shim from between the lever and roller. The switch should again trip, as indicated by the change in ohmmeter reading.
- 5.39: Check the adjustment by setting and releasing the brake a number of times, with the ohmmeter connected.
- 5.40: With the brake set, the ohmmeter should read as in step 5.36. With the brake released, the ohmmeter should read as in step 5.38. Repeat the adjustment procedure as necessary to achieve these results. Reconnect the switch leads.

Figure 15

Armature Position Indicator Switch Adjustment



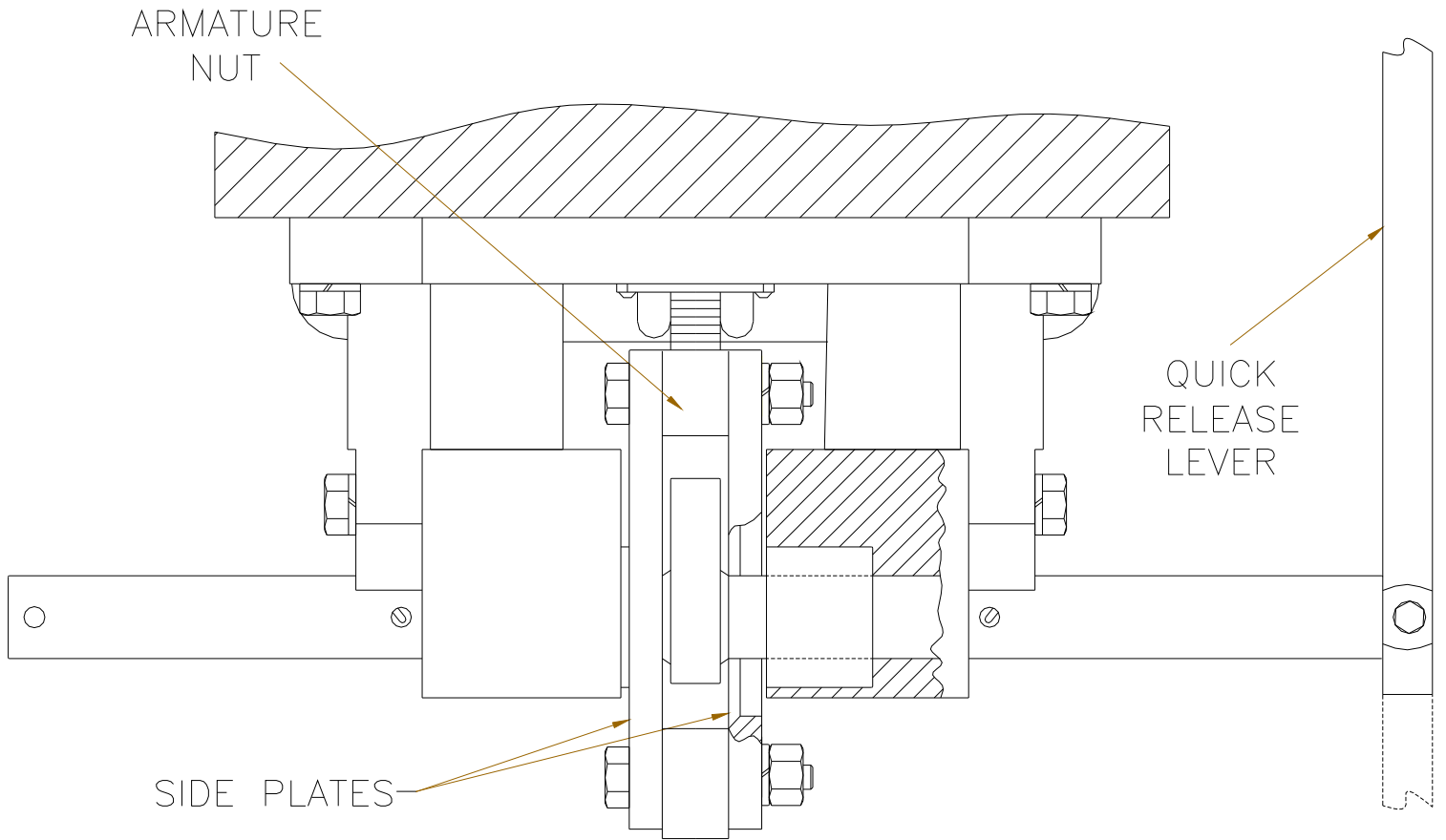
Quick Release Adjustment

The quick release mechanism must be adjusted so when the brake is fully released (the gap between magnet case and armature is closed up), the handle is parallel to the floor and pointing away from the brake wheel. Proceed as follows only if required:

- 5.41: If this is a hoist brake, lower the load and/or bottom block to the floor.
- 5.42: Position the quick release handle in the 'set' position.
- 5.43: Remove the two bolts that attach the side plates to the armature nut (see Figure 16 on page 28). Slide the side plates off the armature nut.
- 5.44: Remove the two bolts that attach the support to the end cap. Remove the quick release mechanism assembly (see Figure 16 on page 28).
- 5.45: Determine which direction the armature nut must be rotated to correct the position of the quick release handle.
- 5.46: Adjust the armature nut, reassemble the mechanism, and recheck the handle position with the brake released.
- 5.47: Repeat steps 5.41 through 5.46 until the handle position is correct.

Figure 16

Quick Release Mechanism Adjustment



Hydraulic Cylinder Adjustment

The following adjustment should only be made with new linings, and need to be repeated only if the adjusting nut has been disturbed, or if a new (or rebuilt) wheel cylinder has been installed. It is not necessary to re-adjust the cylinder after changing the linings. Adjust as follows:

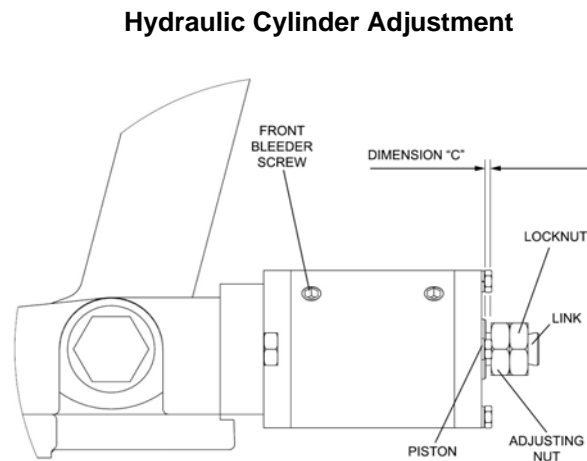
- 5.48: Close the armature against the magnet case using either of the methods described in the topic, Releasing the Brake. The magnet air gap must be tightly closed when the following adjustment is made.

Note:

Steps 5.49 and 5.51 are not required if the wheel cylinder is connected for normal operation. The purpose of those steps is to vent the ends of the wheel cylinder, allowing the piston to move freely if the brake is on a bench or if the hydraulic lines are not connected to the wheel cylinder for some reason. Venting can be accomplished by loosening one port plug or bleeder screw on each end of the wheel cylinder. If the wheel cylinder lines are connected, any fluid displaced from the cylinder in the following procedure is easily forced out through the connecting lines.

- 5.49: Vent the wheel cylinder if applicable (see the note above).
- 5.50: Tighten the adjusting nut on the end of the link until the linings are solidly against the brake wheel, and the cylinder piston is as far as it will go into the cylinder barrel.
- 5.51: Close the port plugs or bleeder screws on the wheel cylinder.
- 5.52: With the armature closed firmly against the magnet case and the cylinder piston against its end stop, back off the adjusting nut to a point where dimension "C" (Figure 17) equals 1/16" in.

Figure 17



Note:

Dimension "C" is measured from the end of the piston to the inner face of the flat washer located under the adjusting nut.

- 5.53: Tighten the locknut against the adjusting nut without changing dimension "C".
- 5.54: Restore electrical power to the brake as described under the topic, Releasing the Brake.
- 5.55: Test the brake for proper operation before returning it to normal service.

Chapter 6.0: Releasing the Brake

A standard brake can be released and then retained in that position by the two methods described below.

6.1: Release the brake using magnet assist, as follows:

6.1.(a): Energize the magnet, releasing the brake.

6.1.(b): Grasp the end of the armature bolt and pull the bolt outward.

6.1.(c): Using a suitable tool, hold the thick portion of the spacer between the armature nut and the brake (see Figure 9 on page 19).

6.1.(d): De-energize the brake coil. The spacer will prevent inward movement of the armature nut, thereby preventing the brake from resetting.

6.1.(e): To return the brake to normal operation, energize the magnet. The spacer should fall from behind the armature nut; if not, push it down using a suitable tool, and then re-adjust the nut.

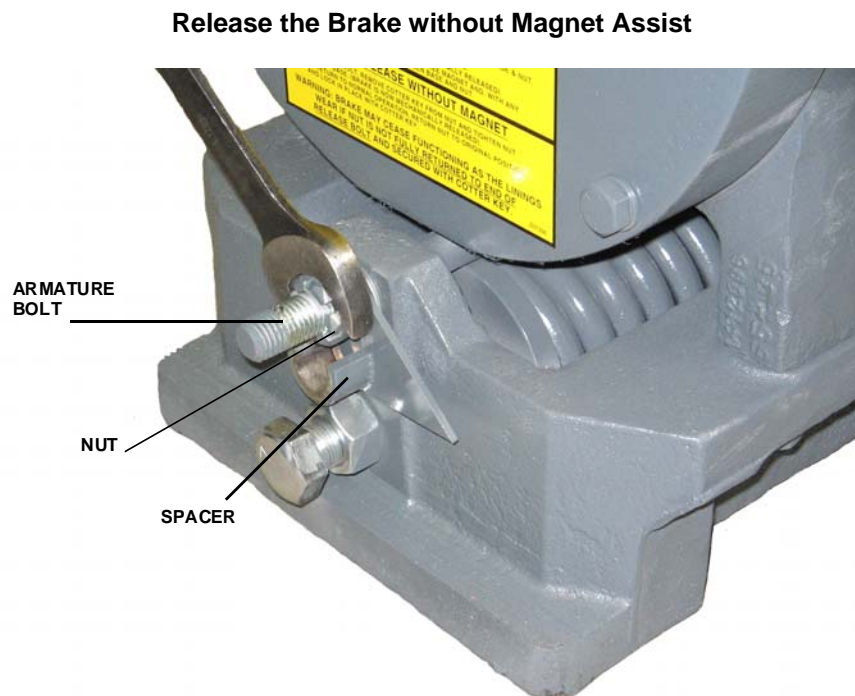
6.2: To release the brake without using the magnet, proceed as follows:

6.2.(a): Mark the position of the armature nut on the armature bolt.

6.2.(b): Remove the cotter pin from the armature nut and tighten the nut against the base until the gap between the magnet case and armature closes up solidly (see Figure 18 on page 30). The brake should then be released.

6.2.(c): To restore the brake to normal operation, return the nut to its original position and lock the nut in place with cotter pin.

Figure 18



Chapter 7.0: Maintenance

LUBRICATION. No periodic lubrication is required on these brakes. All pivot points are equipped with needle bearings, which are packed with a life-time lubricant and sealed. Oil or any other lubricant applied to any moving part of the brake will only trap airborne contaminants, thereby accelerating wear.

ADJUSTMENTS. The adjustments described previously in this manual, once made, will not change with normal brake service. The spacer pack through which the brake rod passes automatically compensates for lining wear. Therefore, no periodic adjustments are required.

Maintenance and inspection periods depend on the operating conditions. High duty cycle applications obviously require more frequent inspections and maintenance than brakes operating on low duty cycle applications. In any case, it is recommended that brake installations are inspected generally every 100 hours of operation or at least every month. This should include visual inspection of the entire brake for evidence of mechanical failures, misalignment, or other defects. Also check the mounting bolts to ensure that they are tight.

INSPECTION:

At regular intervals, check the thickness of the brake shoe linings. If the measured thickness at the center point of the shoe curvature of either lining is equal to or less than the allowable minimum listed the following table, replace or re-line both brake shoes.

BRAKE SIZE	Min. Allowable Aver. Lining Clearance (Inch)
5 Inch	0.014
8 Inch	0.016
10 Inch	0.020
13 Inch	0.026
16 Inch	0.032
19 Inch	0.038

Brakes should be inspected to verify that the magnet air gaps and the brake torque spring settings are correct. Electrical connections and mechanical joints should be inspected for tightness. Inspect the brake mounting bolts for proper tightness.

Inspect the brake wheel for unusual scoring, overheating, cracking, or wear. Replace a damaged, cracked, or excessively worn brake wheel.

Inspect the magnet air gap for accumulation of dirt and/or magnetic particles. If necessary, shut down operation of the motion, and remove all contaminants from the air gap between the armature plate and the coil housing assembly using compressed air. The frequency of this inspection and cleaning of the magnet air gap will depend upon the environmental conditions in which the brake operates.

Inspect the condition of the bushings, as well as the electrical and mechanical integrity of the complete braking system. Make any repairs or adjustments required to ensure proper brake system operation.

After the first year of service, and semi-annually thereafter, measure the clearance between each lining and the brake wheel, with the brake released, and calculate the average of the two clearance dimensions. Lining clearance is a result of the difference between the size of the holes in the toes of the brake links and the diameters of the friction stop bolts. This size difference will eventually increase, due to wear of the friction bolts, to the point where a measurable increase in average lining clearance will result. When

the average lining clearance reaches the maximum allowable size (see the following table) the friction stop bolts should be replaced. The average lining clearance dimension is obtained by measuring the clearance between both linings and the wheel, and dividing the sum of these dimensions by two.

BRAKE SIZE	Max. Allowable Aver. Lining Clearance (Inch)
5 Inch	0.019
8 Inch	0.029
10 Inch	0.036
13 Inch	0.047
16 Inch	0.057
19 Inch	0.066

HYDRAULIC CONTROL SYSTEM MAINTENANCE. The instructions provided with the hydraulic control system should contain sufficient maintenance information. The main items of concern in maintaining a hydraulic control system are:

- 7.1: Check the fluid level regularly, and if necessary, refill to the prescribed level.
- 7.2: Never mix fluids of different types in one system. Start with a fluid type recommended by the system manufacturer, and continue to use that specific type.
- 7.3: A manual system uses conventional brake fluid, and a power-assist system uses mineral-based hydraulic oil. It is important to understand that the seals and tubing used in one type of system are not compatible with the fluid required for use in the other type of system.
- 7.4: Keep the system bled of air, as the operating characteristics indicate the need. Frequent need for bleeding means that air is being drawn into the system, usually as a result of loose connections and/or a low fluid level.
- 7.5: The tubing that connects the system components should be checked from time to time for signs of damage, loose mounting clips, and leaks. Correct any such condition at the earliest possible convenience.

Chapter 8.0: Parts Replacement (Use Only Mondel Approved Spare Parts)

Note:

Following any adjustment or repair of the brake, test the operation of the brake as describe under the topic, Operational Test.

General

Detailed procedures for both brake shoe and coil replacement are covered earlier in this manual. Procedures for removing and installing the brake wheel and motor are found in the following topic.

Note:

After a brake has been repaired or rebuilt, perform a complete adjustment of the brake, as outlined under the topic, Complete Adjustment.

Removal and Installation of the Brake Wheel and Brake

If it is necessary to remove the brake wheel and brake for any reason, use the following procedure:

Note:

If any machining is done to a brake wheel, it must be balanced before it is returned to service.

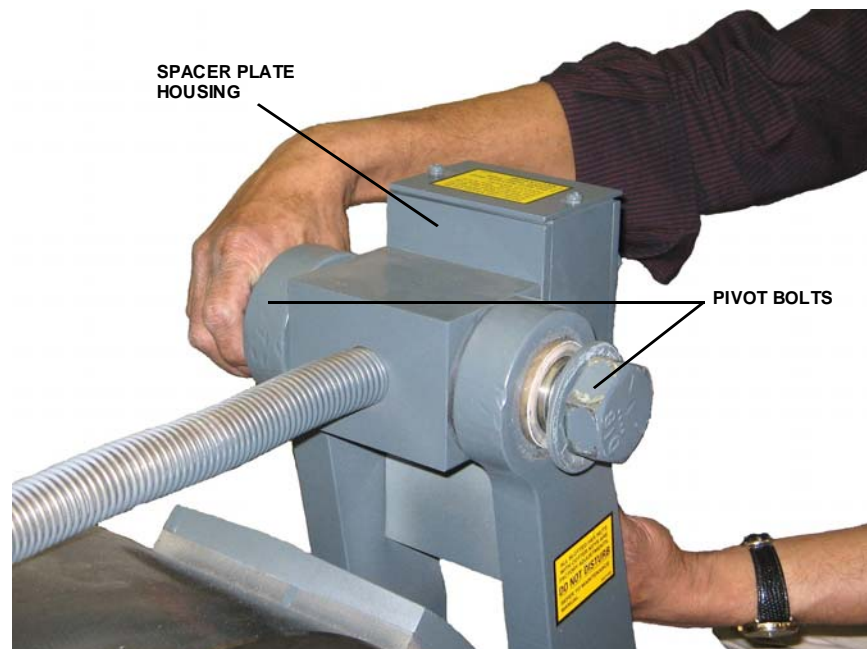
- 8.1: Remove both shoe assemblies as described under the topic, Replacing Brake Shoes.
- 8.2: Remove the bolts from the pivot block, while holding the spacer plate housing to prevent it from falling (see Figure 19 on page 33).

Note:

Hold the flat washer against the inner face of the bushings to prevent the inner face from withdrawing with the bolt.

Figure 19

Removing Bolts from the Link Pivot Block



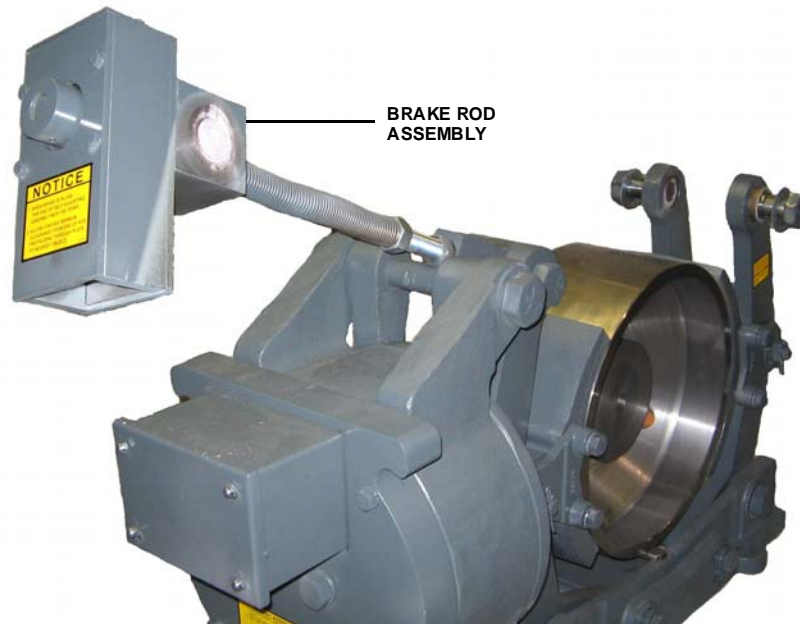
- 8.3: Swing the entire brake rod assembly back toward the coil assembly (see Figure 20 on page 34).

Note:

Do not disturb the position of the brake rod by turning it into or out of the pivot link. Doing so will alter the adjustment.

Figure 20

Brake Rod Assembly Swung Clear of the Brake Assembly



- 8.4: Remove the motor and brake wheel by lifting straight up until the wheel clears the brake links.

- 8.5: Install the motor and brake wheel by lowering it into place.

- 8.6: Reinstall the shoe assemblies as described under the topic, Replacing the Brake Shoes.

Note:

If the brake links were bumped out of position by the wheel during removal or installation, tap or push the links back into position against the new wheel.

- 8.7: Lower the brake rod assembly until it is nearly in place. Then, reach into the adjusting spacer housing and push all spacers up against the top cover, beginning with the closest spacer. This will allow the spring to pull the spacer stop back into the housing and the spacer plates will all be in the UP position.

- 8.8: Slowly push the adjusting spacer housing toward the brake wheel until the pivot bolts can be screwed into the pivot block. Then install and tighten the pivot bolts (see Figure 21 on page 35).

Note:

Performing steps 8.7 and 8.8 as described ensures that the same number of adjusting spacers will be DOWN as were down prior to removing the motor and brake wheel. Therefore, the magnet air gap will remain within the specified range.

- 8.9: Check to ensure that all shoe holder screws and pivot block bolts are tight. Refer to the table below for pivot bolt torques.
- 8.10: Restore the brake to normal operation as described in step 6.1.(e) or 6.2.(c) of the topic, Releasing the Brake.

Pivot Bolt Torques Table

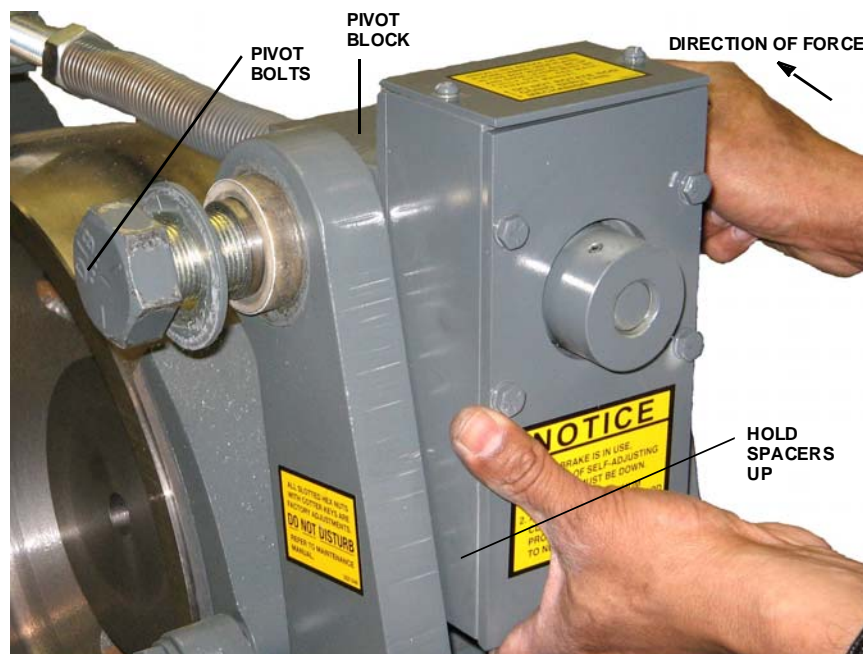
Note:

When reinstalling or replacing pivot bolts (Items 1, 2 and 3) tighten them to the recommended torques listed in the following table. Clean the threads thoroughly before installing and apply Loctite 277 (or equal) to 5 full threads in the area that engages the mating threads when assembled.

BOLT	RECOMMENDED TORQUE (FT.-LBS)					
	5SB	8SB	10SB	13SB	16SB	19SB
1	25	25	25	30	45	90
2	25	80	90	130	230	400
3	25	80	90	130	230	400

Figure 21

Reinstalling Bolts In Pivot Block



Removing and Installing Wheel Cylinder

Rebuilding the wheel cylinder is not recommended. A defective wheel cylinder should be removed and replaced with an identical cylinder, using the following procedure:

Note:

Clean all fittings and the surrounding area to remove all dirt and other contaminants before disconnecting the lines from the cylinder. Leave all plugs and caps in place for the cylinder ports and fittings until just before the connections are made.

8.11: Disconnect, lock open, and tag the power source that feeds the crane or equipment to prevent power from being applied to the machinery while repairs are being performed.

8.12: Disconnect both lines from the wheel cylinder.

Note:

Fluid will flow from the rear line on the cylinder when it is disconnected. Cap the line immediately to limit fluid loss. This line connects to the reservoir, and will drain it if left open.

8.13: Remove the two bolts that attach the cylinder mounting plate to the brake base.

8.14: Remove the lock nut and adjusting nut from the end of the link.

8.15: Slide the cylinder and mounting plate off the link.

8.16: Remove the two attaching screws and separate the cylinder from its mounting plate.

8.17: Assemble the replacement cylinder to the mounting plate, and slide the assembly into place over the link.

8.18: Tighten the adjusting nut against the cylinder, thereby compressing the brake release spring and moving the assembly into position on the base, permitting easy installation of the attaching bolts.

8.19: Secure the mounting plate to the brake base using the two attaching screws.

8.20: Connect the hydraulic lines to the cylinder. Thread the rear line into the cylinder quickly as to limit the loss of fluid from the line.

8.21: Slip a bleeder hose over the rear bleeder screw, and insert the other end of the hose in a container held at a level below the cylinder. Open the bleeder screw and keep it open until fluid that is free of air bubbles flows from the hose. Then close the bleeder screw. The rear end of the cylinder is now filled with fluid, which is necessary to reduce corrosion and to prevent air from being drawn past the piston as it moves inside the cylinder body.

8.22: Adjust the hydraulic cylinder as outlined under the topic, Hydraulic Cylinder Adjustment.

8.23: While the piston is against its end stop and the linings are solidly against the wheel, bleed the system through the front bleed screw. Use the bleeding procedure recommended in the literature provided with the hydraulic brake system.

Relining Brake Shoes (Use Only Mondel Approved Spare Parts)

New shoe lining assemblies can be ordered as repair parts. Factory rebuilt shoes are also available through the Magnetek Service Department. Under this program, credit will be allowed for old shoes in usable condition.

Chapter 9.0: Storage

In the event that a new brake assembly will not be immediately installed, it can be stored for a reasonable length of time with only a minimum of preparation. All that is recommended is that the brake assembly be protected from direct exposure to the elements. Covering the assembly with canvas or a heavy plastic sheet will provide adequate protection while in storage.

Note:

During storage, some rust may form on the surface of the brake wheel. This is no cause for concern, nor is it necessary to clean the wheel before placing the wheel in service. The first few brake applications will polish the wheel.

If a brake assembly that has been in service is to be removed and stored temporarily, the same preparations recommended above for a new brake should be made. In addition, the complete assembly should be thoroughly cleaned and painted surfaces should be touched up or completely repainted, as appropriate.