



502-MSB8-001-00

SERVICE MANUAL

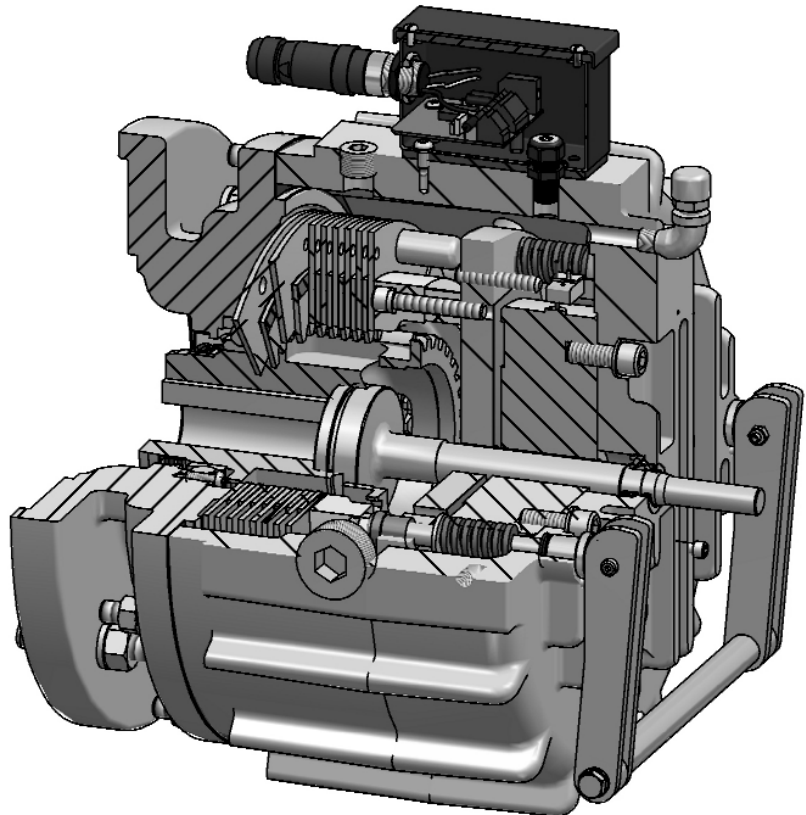
FOR

MSB8 MSB9 MSB10 MSB12

QuickMount

MagnaShear™
FULLY ELECTRIC

OIL SHEAR MOTOR BRAKE



WARNING - Read this manual before any installation, maintenance or operation.



FORCE CONTROL INDUSTRIES, INC.

MANUFACTURERS OF MECHANICAL AND ELECTRICAL POWER TRANSMISSION EQUIPMENT

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Section 1

DESCRIPTION and OPERATION

1-1 UNIT DESCRIPTION

Large **MagnaShear Fully Electric Motor Brakes** with Oil Shear dependability are available in three sizes which have NEMA standard mounting flanges from 10-1/2" FAK to 16" FAK. Spring set torque ratings range from 325 Ft. Lbs to 1250 Ft. Lbs.

A spring set brake stack is released when 120/230 VAC power is supplied to the Brake. Control logic is made simple by use of the motor starter auxiliary contactors. Back EMF effect from the motor windings is eliminated.

The units are ideal for a wide variety of applications including winches, transfer conveyors and other heavy duty start/stop devices. Applications requiring the brake to be released on an average of more than 50% of the time or for long durations must be reviewed and approved by our engineering department.

1-2 The OIL SHEAR PRINCIPLE

Conventional brakes depend on the friction between solid surfaces operating in air to transmit torque. Friction does the job but produces a great amount of heat and wear. The MagnaShear Motor Brake is an Oil Shear Brake, with the friction surfaces operating in a constantly replenished film of oil. The oil molecules cling to each other and to the friction surfaces. As moving and stationary elements are brought together, a thin but positive film of oil is maintained between them which is controlled by the clamping pressure and carefully designed grooves in the friction discs. Torque is transmitted from one element to the other through the viscous shear of the oil film. As long as there is relative motion between the elements, they are protected by the oil, thus greatly reducing wear. The replenished oil film also effectively transmits heat away from the friction elements.

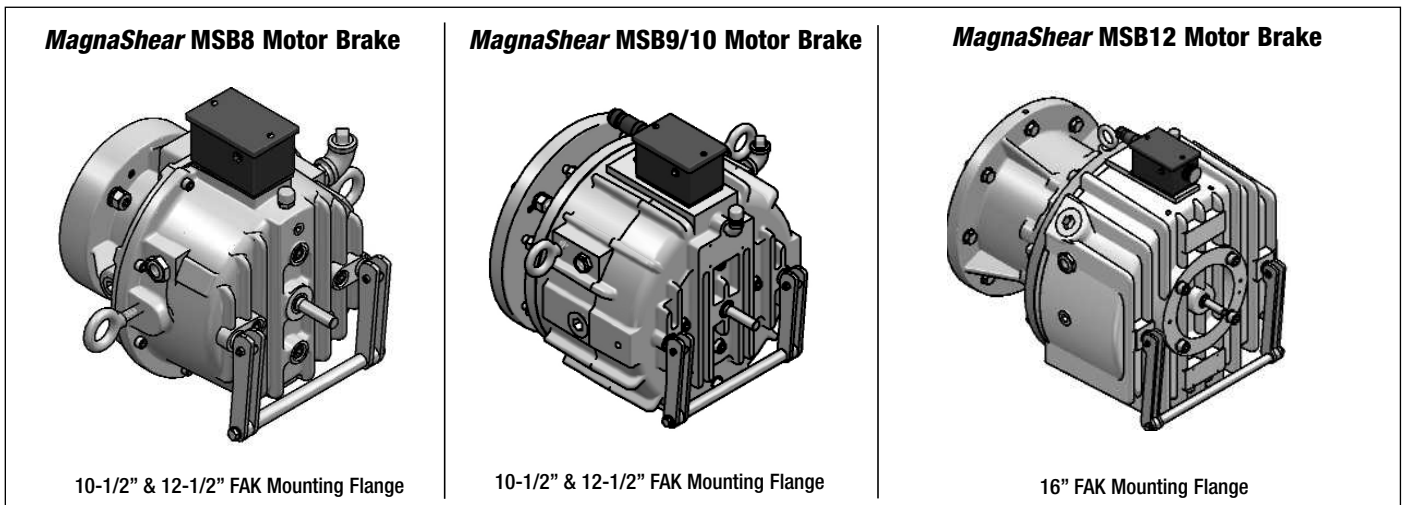
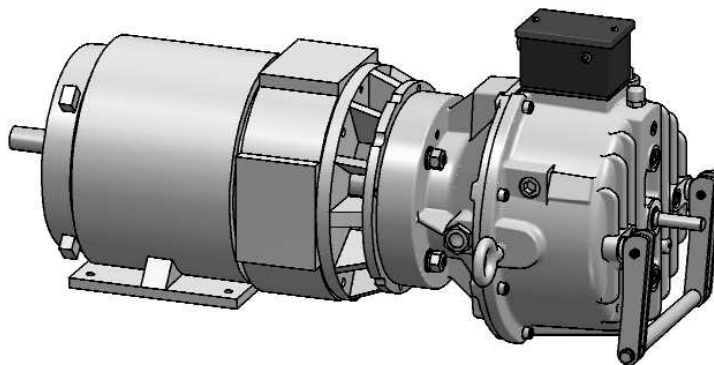


Figure 1.1 - MagnaShear Motor Brakes with C-Face Mounting



The Large **MagnaShear Motor Brake** is also available as an **Assembled Brake Motor (ABM)** in a wide variety of sizes.

1-3 OPERATION

The cross section in *Figure 1.2* shows the **MagnaShear Motor Brake** in the Stopped position with the brake stack engaged. The **MagnaShear Motor Brake** will default to this position when all power is lost.

To run the Drive Motor the Brake Coil is energized, pulling the Armature Plate Assembly away from the

Brake Stack which allows the splined hub and drive motor to rotate independently from the motor brake.

To stop the Drive Motor the Brake Coil is de-energized. This allows the brake springs to push the Armature Plate Assembly against the Brake Stack, clamping it and stopping the splined hub and drive motor.

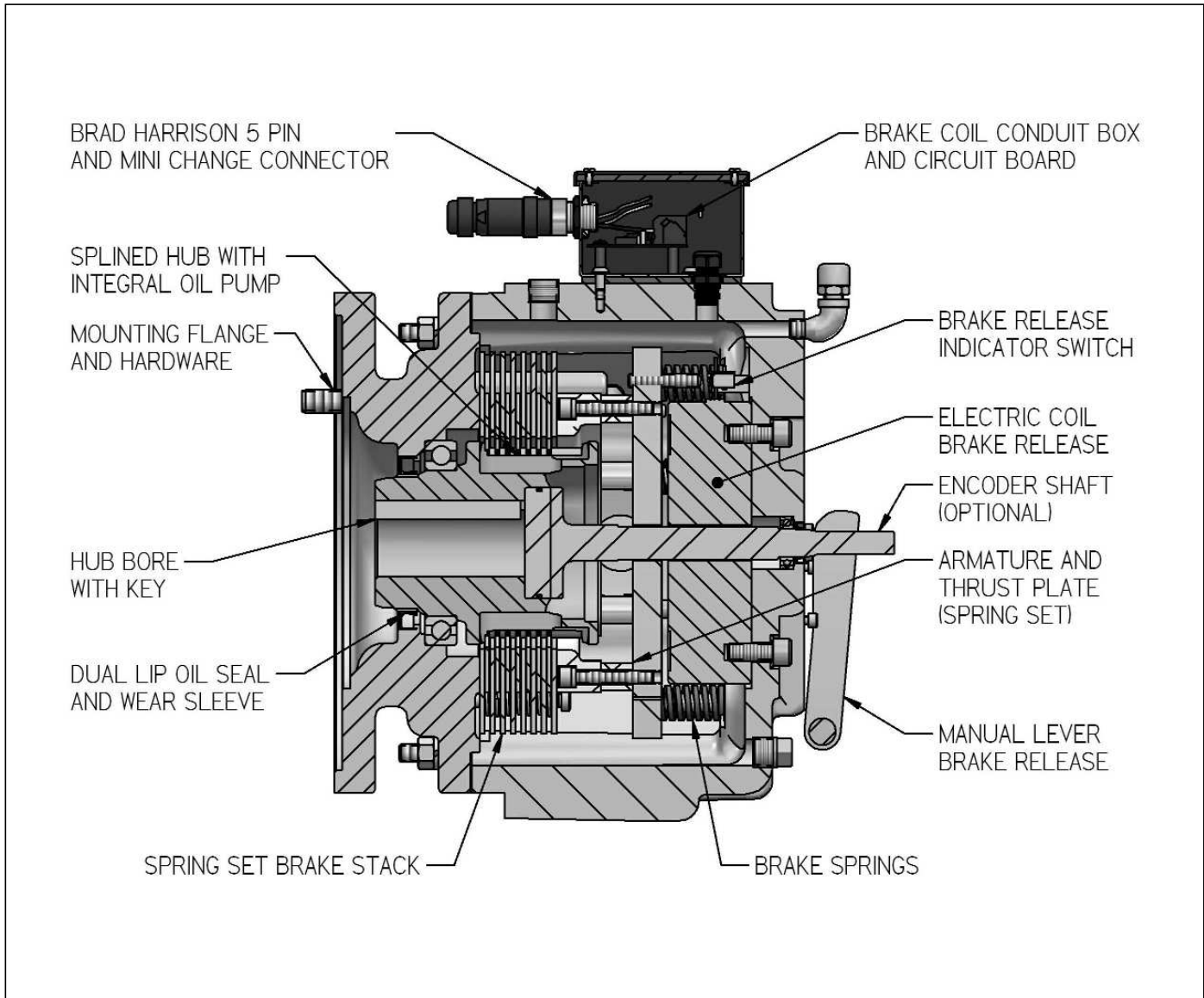


Figure 1.2 - MagnaShear Motor Brake Cross Section

Section 2 SPECIFICATIONS

2-1 Technical Specifications (With Pulse Width Modulation "PWM")

BRAKE SIZE	AVAILABLE PILOT DIA. (Inches)	SHAFT DIA. (Inches)	STATIC TORQUE (Lb. Ft.)	DYNAMIC TORQUE (Lb. Ft.)	MAX KE per ENGMT. (Lb. Ft.)	INERTIA (Lb. Ft. ²)	WEIGHT (Lbs.)	OIL CAP. (Fl. Oz.)	INPUT VOLTAGE (VAC)	INRUSH CURRENT (Amps)	HOLDING CURRENT (Amps)	INRUSH TIME (Sec.)	COIL RESISTANCE @ 20 Deg. C. (Ohms)
MSB8	8.50 ----- 10.50	1.375	100	86	41,500	0.267	170	180	115 ----- 230	6 ----- 3	1.8 ----- 0.9	0.44	21.5 ----- 86
		1.625	150	129									
		1.875	200	172									
			250	215									
MSB9	10.50 ----- 12.50	1.625	250	215	48,000	0.962	270	192	115 ----- 230	6 ----- 3	1.8 ----- 0.9	0.44	21.5 ----- 86
		1.875	300	258									
		2.000	350	301									
		2.125	450	387									
		2.250	500	430									
MSB10	10.50 ----- 12.50	1.875	600	516	69,000	1.244	270	192	115 ----- 230	6 ----- 3	1.8 ----- 0.9	0.44	21.5 ----- 86
		2.000	650	559									
		2.125	750	645									
		2.250	900	774									
MSB12	16.00	2.125 (Min)	625	538	158,000	2.068	600	384	115 ----- 230	8 ----- 4	2.5 ----- 1.3	1.4	15 ----- 60
		3.625 (Max)	950	817									
			1250	1075									

NOTES:

- 1) 1.626" shaft is limited to 350 Lb. Ft. maximum torque
- 2) 1.875" shaft is limited to 750 Lb. Ft. maximum torque
- 3) 2.125" and 2.375" shafts are limited to 950 Lb. Ft. maximum torque

How To Order MSB8, 9, 10 and 12 Quickmount Brakes:

1 2 3 4 5 6 7 8 9 10

0 1 - M S B □ □ □ □ □ □ □ □ □ □

Size (1)

8	= 8
9	= 9
A	= 10
C	= 12

Pilot Dia. (2)

Q	= 8-1/2" QuickMount
R	= 10-1/2" QuickMount
S	= 12-1/2" QuickMount
T	= 16" QuickMount

Mounting (3)

H	= Horizontal
J	= Horizontal, High Oil Level
Z	= Horizontal, Marine Duty

Manual Release (7)

R	= Release
B	= Stub W/Release

Torque (4,5,6)

MSB8	100	150	200	250	
MSB9	250	300	350	450	500
MSB10	650	750	900		
MSB12	625	950	1250*		

* use "125" in characters 4, 5, & 6

Shaft Dia. (8)

3	= 1-3/8"
5	= 1-5/8"
7	= 1-7/8"
C	= 2-1/8"

Revision (10)

D	= 2-1/4"
E	= 2-3/8"
R	= 3-5/8"

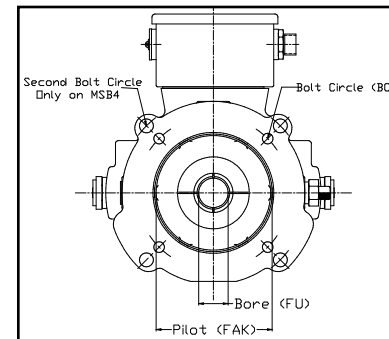
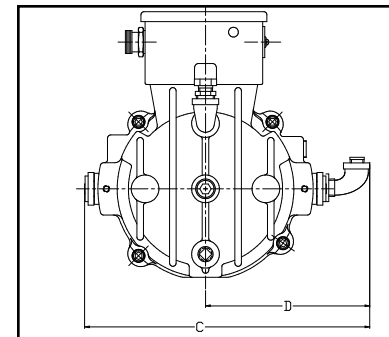
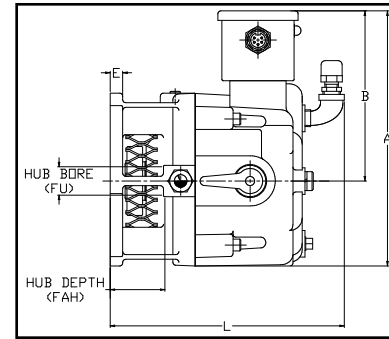
Voltage (9)

M	= 115 Volts / Release Switch
N	= 230 Volts / Release Switch

- Consult factory for other shaft sizes

2-2 Dimensional Specifications

BRAKE SIZE	PILOT DIA. FAK (Inches)	BORE DIA. FU (Inches)	BORE DEPTH FAH (Min/Max)	OVERALL DIMENSIONS (Inches)			NEMA FRAME SIZE
				A	C	L	
MSB8	8.50 ----- 10.50	1.375	3.00/4.38	15.12	14.46	14.82	254
		1.625					256
		1.875					284
							286
MSB9	10.50 ----- 12.50	1.625	2.75/4.62	17.70	16.84	15.51	284
		1.875					286
		2.000					324
		2.125					326
		2.250					364
MSB10	10.50 ----- 12.50	1.875					365
		2.000					404
		2.125					405
		2.250					
2.375							
MSB12	16.00	2.125 (Min)	3.00/5.12	23.40	20.10	22.97	444
		3.625 (Max)					445
							447
							449



Dimensions are subject to change without notice. Certified Installation Drawings are available upon request.

Section 3 INSTALLATION

IMPORTANT SAFETY PRECAUTIONS

The *MagnaShear* Motor Brake units described in this manual must not be installed in any manner except as specified and must not be operated at speeds, horsepower loads or temperatures other than those specified in this manual.

Failure to limit the operation of the drive to the conditions specified could damage the unit or damage interconnected equipment and void the Warranty.

WARNING

BEFORE INSTALLATION OR ATTEMPTING ANY REPAIRS TO THE MOTOR BRAKE, OPEN THE DISCONNECTS TO THE DRIVE MOTOR. LOCK IT OUT TO AVOID THE POSSIBILITY OF PERSONAL INJURY.

3-1 RECEIVING THE *MagnaShear* BRAKE

Check the brake for shortage or damage immediately after arrival. Prompt reporting to the carrier's agent, with notations made on the freight bill, will expedite satisfactory adjustment by the carrier.

The standard *MSB MagnaShear Brake* has been completely assembled and filled with fluid. The Air Breather, (4) Mounting Bolts, Key and (4) Lockwashers are shipped separate in a plastic bag stapled to the shipping skid.

A red plastic plug is installed in place of the Air Breather to prevent fluid from spilling out in shipment.

IMPORTANT - This red plastic plug must be removed and the Air Breather installed before operating your *MagnaShear* Brake.

Also check the fluid level to see if any has spilled out in transit. **The fluid must be in the center of the Sight Gauge.** Add fluid if necessary.

3-2 INSTALLING THE *MagnaShear* BRAKE

1. Always lift with appropriate lifting device.
2. **IMPORTANT** - Make sure the motor shaft and motor mounting surfaces are thoroughly cleaned before installing the Brake.
3. The motor shaft must meet NEMA Standards to

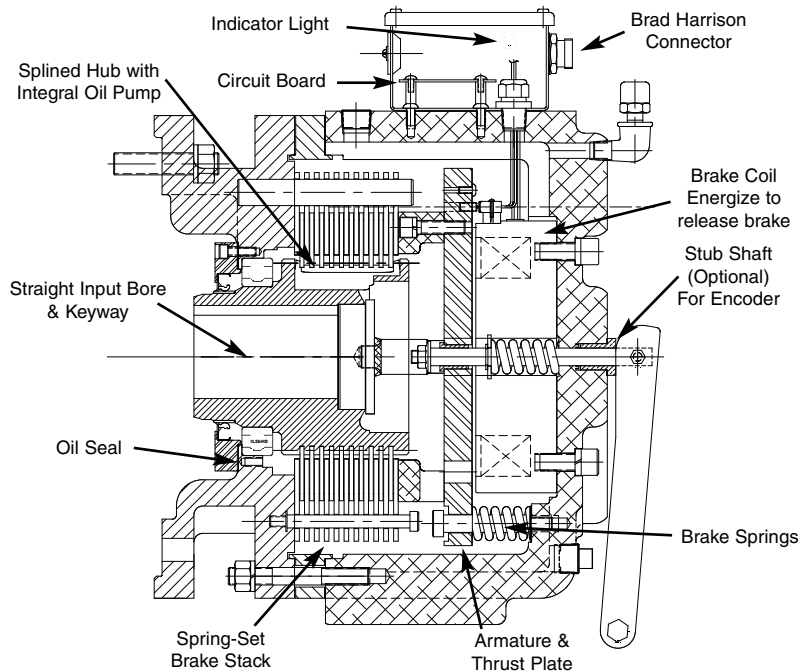


Figure 1 - Unit Description and Operation

ensure reliability of the Motor Brake Oil Seal. To verify, measure (1) Motor Shaft Runout and (2) Mounting Face Runout with a Dial Indicator.

Maximum Allowable T.I. R. as per NEMA MG 1 Standard:

1. Motor Shaft Runout - .002"
2. Mntg. Face Runout - .004"

4. Install Key into keyway of motor. Lubricate shaft of motor with anti-seize lubricate. Slide the Brake Unit onto the motor shaft until the brake mounting flange contacts the motor face. Align the mounting holes with the motor and attach with Mounting Bolts and Mounting Lockwashers. Finger tighten the (4) bolts. **Make sure the brake is snug against the motor face.**
5. Connect the electrical service to the Brad-Harrison Connector and actuate the brake coil to release the brake. (See Figures 3 and 4)
6. Turn the motor shaft by hand to make sure the bearings turn freely.
7. Evenly torque the (4) Mounting Bolts in an opposite manner to following values:

1/2"-1360 Lb. Ft.
5/8"-11120 Lb. Ft.
3/4"-10200 Lb. Ft.

● **VERTICAL MOUNTING**

Vertical Mounting vs. Horizontal Mounting is determined by the mounting angle. See Figure 2 below to determine the correct mounting configuration for your MagnaShear Motor Brake.

3-3 WIRING SPECIFICATIONS (See Figure 3 and 4)

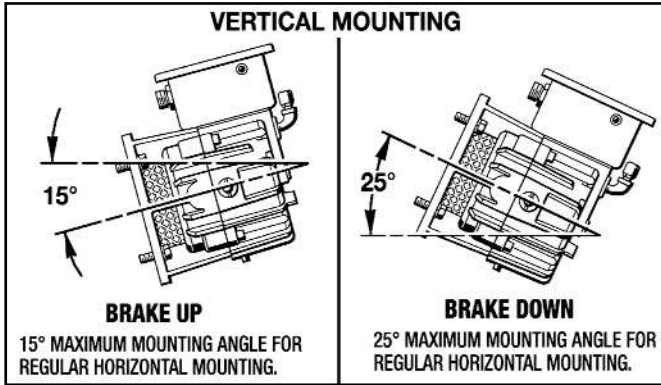


Figure 2 - Vertical Mounting Angles

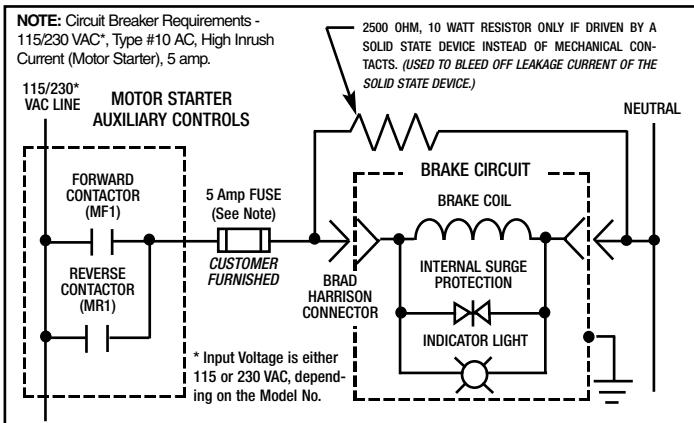
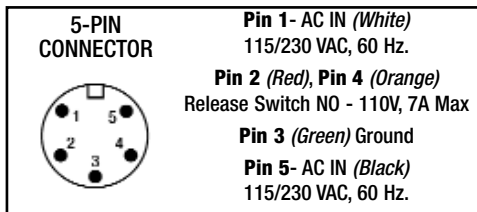


Figure 3 - Electrical Wiring Diagram

3-4 START-UP

Figure 4 - Electrical Connector



Verify that the Brake Coil is connected correctly. Check to see if the Motor is wired correctly, fuses are in place and the motor disconnect is turned on. Verify that the Brake Coil Indicator Light on the Conduit Box is **ON** while the drive motor is running. **(The indicator light comes on bright for .4 seconds and then dims after that.)** Next, complete a cycle to insure that there are no interference problems within the system.

Section 4

LUBRICATION

4-1 CHECKING THE OIL LEVEL

When the brake is installed and weekly thereafter, check the oil level and oil color. Always check the oil with the brake at room temperature and while it is not running.

The **MagnaShear Brake** has an Oil Sight Gauge to visually check the fluid level. It is located on the side of the End Housing for a Horizontal brake and on the side of the Input Housing for a Vertical Down brake. The oil level is to be at the center of this Sight Gauge.

The **MagnaShear Brake** uses Mobil AFT transmission fluid which is red in color when new. As the fluid wears, it darkens and eventually turns black. Oil should be changed immediately if oil turns black.

4-2 OPERATING TEMPERATURES

The standard oil used in the **MagnaShear Brake** was designed to operate with a maximum ambient temperature of 125° F and maximum operational oil sump temperature is 200° F. If the ambient temperature or operational sump temperature is higher than these values please contact Force Control for recommendations.

4-3 CHANGING THE OIL

IMPORTANT - Always open the disconnects to the drive motor and lock them out before changing the oil.

Every three months completely drain the oil from the brake by removing the Drain Plug. The Sight Gauge and Air Breather should also be removed and cleaned at this time.

The oil should be changed more frequently when used in harsh environments or high cyclic applications.

1. Remove Pipe Plug and drain out all the oil into a suitable container. Discard used oil in an approved manner. Replace the pipe plug when finished.
2. Remove the Pipe Plug and fill with fresh oil to the center of the sight Gauge. Replace the pipe plug when finished.

CAUTION - Do not overfill the brake unit. Excess oil will cause the brake to over heat.

4-4 TYPE OF OIL

Use only Mobil Automatic Transmission Fluid ATF or Mobil Multi-Purpose Automatic Transmission Fluid for most drives. Other fluids may be specified for special applications.

Always use the type of oil specified on the Name Plate.

Section 5 OPERATIONAL CHECKS

Make these Operational Checks with the **MagnaShear Motor Brake** shut down and completely assembled with the drive motor attached.

Provisions for manual operation checks must be made if the drive unit has been removed for service and repair. 120 VAC or 230 VAC, 60 Hz. electrical service is required to release the brake. (See *Figure 5.1* below for the Test Set-Up)

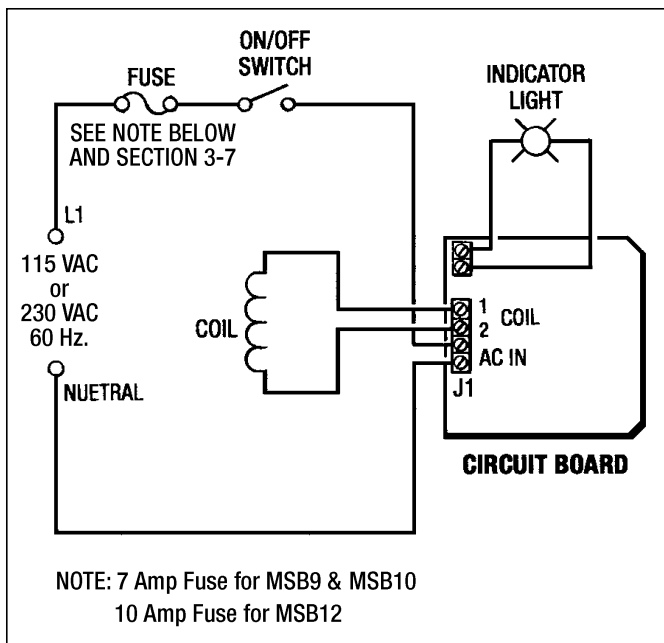


Figure 5.1 - Test Set-Up Electrical Schematic

5-1 CHECKING THE BRAKE OPERATION

To check the Brake Operation electrical power is not required to energize the coil since the **Magna Shear Motor Brake** has a spring applied brake when the coil is de-energized.

Disconnect the load to the motor. Install a torque wrench on the motor shaft and apply torque. The brake should slip at or higher than the static torque rating of the brake. (Refer to page 3 for torque ratings.)

5-2 CHECKING THE BRAKE COIL OPERATION

1. Remove the cover from the Conduit Box (#405).
2. Disconnect the black and white power leads from the Brad-Harrison Cable Connector (# 416) to "AC In" on Terminal Strip J1. located on the Circuit Board (#400).
3. Connect the test power leads to "AC In" on J1. Turn the On/Off Switch to ON. The Power Indicator Light should come on and indicate the brake is released.
4. Manually turn the Drive Motor Output Shaft. If the shaft turns then the Brake Coil and Control Circuit is operating properly.

If it is not able to be turned, then the Brake Coil or Circuit Board is not functioning properly. (See Section 6 Trouble Shooting.)

CAUTION

Physical damage or mal-function in the motor or brake stack can also prohibit shaft rotation.

Section 6 TROUBLE SHOOTING

6-1 TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
1. Brake fails to engage properly.	Electrical control circuit. Faulty <i>Magna Shear</i> circuit board. Worn friction surfaces.	Check control circuit. Replace circuit board. Check disc stack for wear and replace if necessary.
2. Brake fails to release properly.	Electrical control circuit. Faulty <i>Magna Shear</i> circuit board. Faulty coil. Low voltage at circuit board.	Check control circuit. Replace circuit board. Replace coil. Verify control power.
3. Brake torque too high.	Excessive spring force. Low oil level.	Contact Force Control. Check oil level and add oil. Inspect for oil leak.
4. Brake torque too low	Inadequate spring force./Wrong oil.	Contact Force Control.
5. Noise and vibration	Motor mounted on poor foundation.	Improve installation. Tighten mounting bolts.
6. Drive overheats (200° F max.)	Brake fails to engage or disengage properly. Improper oil level.	See #1 and #2 above. Check oil level. Add/Drain as req'd.
7. Oil leakage.	Worn oil seal. Gaskets. Poor ventilation.	Disassemble and replace. Tighten all external screws. Remove breather and clean.
8. Brake does not repeat. (Inconsistent Stopping.)	Electrical control circuit. Faulty <i>Magna Shear</i> circuit board. * Oil temperature change. Machine resistance changed.	Check control circuit/PLC scantime. Replace circuit board. Check temperature. Lubricate bearings.

* For installations requiring precise starting and stopping, operating temperatures are important. Operating temperatures between 115° F and 165° F are recommended.

6-2 TROUBLE SHOOTING COILS

(Sizes MSB9 & MSB10 MagnaShear Motor Brake)

Pulse Width Modulation (PWM) Board

A. Coil Resistance Test

Remove the cover from the Junction Box (#405) and disconnect the (2) Coil Leads from both terminals on the Terminal Strip J1 located on the Circuit Board (#400).

Hook-Up a Meg-Ohmmeter to both coil leads as shown in *Figure 6.1*. Set the Meg-Ohmmeter to "Ohm" range and test Resistance at 500 VDC.

The Resistance should read as follows:

MSB9 & 10 Coil Resistance-

115 VAC	21.5 Ohms ± 10%
230 VAC	86 Ohms ± 10 %

A reading outside of this range would indicate that the Coil is bad and needs to be replaced. See Section 7 for Coil Replacement.

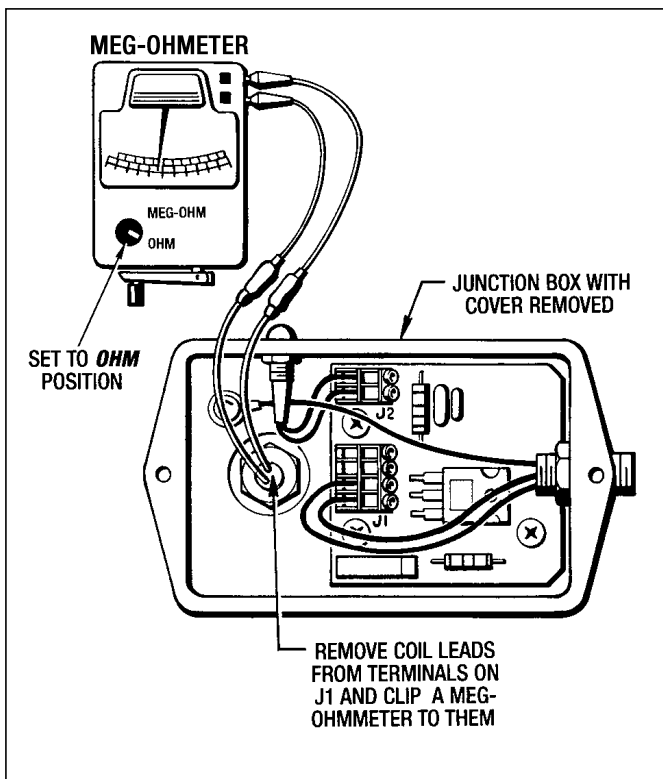


Figure 6.1 - Coil Resistance Testing

NOTE:

A Hi-Pot Tester can be used for this test but do not exceed 1250 VDC.

B. Coil Current Leakage Test

Remove the cover from the Junction Box (#405) and disconnect the (2) Coil Leads from both terminals on the Terminal Strip J1 located on the Circuit Board (#400).

Connect (1) alligator clip to both Coil Leads and the other one to Chassis Ground Screw (#426). (See *Figure 6.2*)

A reading of **10 Meg-Ohms or greater** indicates that the Coil is fine and does not need to be replaced. Anything much less would indicate that there is a short to ground and the Coil would need to be replaced. See Section 7 for Coil Replacement.

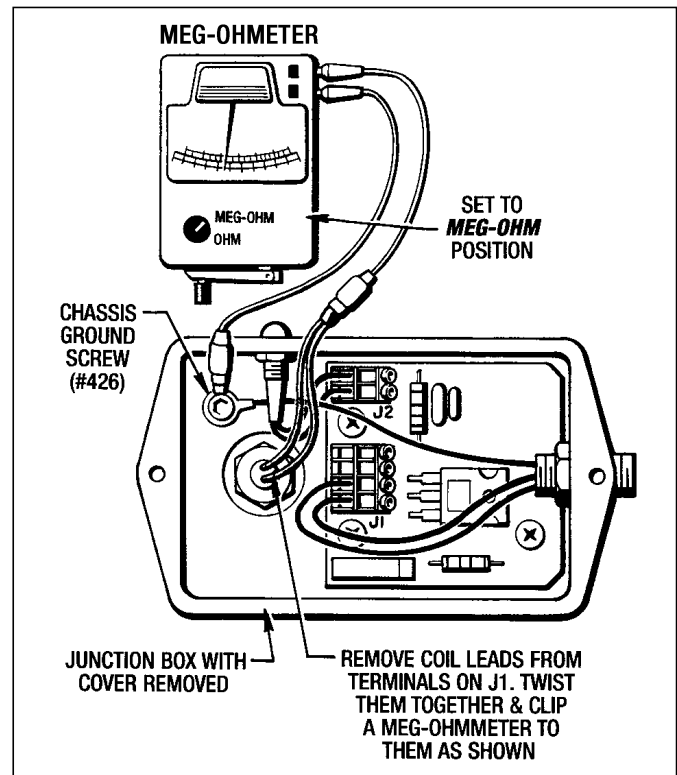


Figure 6.2 - Coil Current Leakage Testing

NOTE:

A Hi-Pot Tester can be used for this test but do not exceed 1250 VDC.

(Size MSB12 MagnaShear Motor Brake)
Pulse Width Modulation (PWM) Board With External Heat Sink

A. Coil Resistance Test

Remove the cover from the Junction Box (#405) and disconnect the (2) Coil Leads from both terminals on the Terminal Strip J1 located on the Circuit Board (#400).

Hook-Up a Meg-Ohmmeter to both coil leads as shown in Figure 6.3. Set the Meg-Ohmmeter to "Ohm" range and test Resistance at 500 VDC.

The Resistance should read as follows:

MSB12 Coil Resistance-

115 VAC	15 Ohms ± 10%
230 VAC	60 Ohms ± 10 %

A reading outside of this range would indicate that the Coil is bad and needs to be replaced. See Section 7 for Coil Replacement.

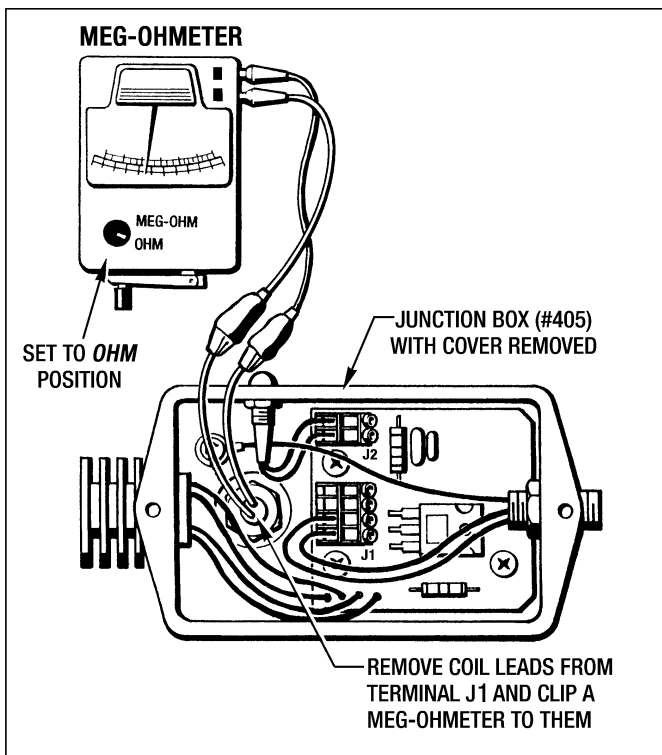


Figure 6.3 - Coil Resistance Testing

NOTE:

A Hi-Pot Tester can be used for this test but do not exceed 1250 VDC.

B. Coil Current Leakage Test

Remove the cover from the Junction Box (#405) and disconnect the (2) Coil Leads from both terminals on the Terminal Strip J1 located on the Circuit Board (#400).

Connect (1) alligator clip to both Coil Leads and the other one to Chassis Ground Screw (#426). (See Figure 6.4)

A reading of **10 Meg-Ohms or greater** indicates that the Coil is fine and does not need to be replaced. Anything much less would indicate that there is a short to ground and the Coil would need to be replaced. See Section 7 for Coil Replacement.

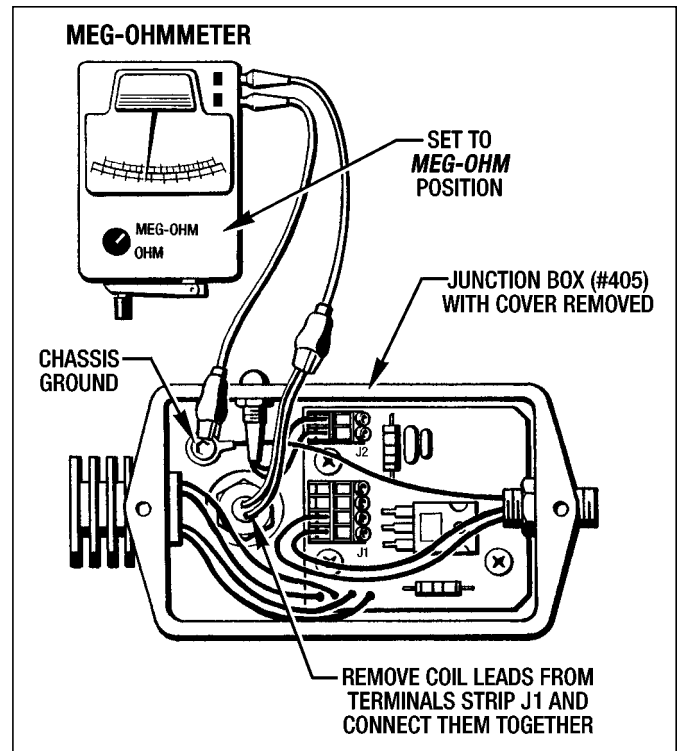


Figure 6.4 - Coil Current Leakage Testing

NOTE:

A Hi-Pot Tester can be used for this test but do not exceed 1250 VDC.

Section 7

REPAIR and REPLACEMENT

WARNING
SHUT-OFF AND LOCK-OUT ALL ELECTRICAL POWER
BEFORE ATTEMPTING TO MAKE ANY REPAIRS TO
THE BRAKE UNIT.

7-1 GENERAL INFORMATION

Unless the Motor Brake is to be completely overhauled, it should be disassembled only to the extent necessary to gain access to the worn or damaged parts.

An overhead crane and soft sling is recommended to be used to remove any heavy parts.

Tips For Handling Circuit Board:

1. Only touch the outer edges of the Circuit Board. **Do not touch any components on the Circuit Board.**
2. Make sure you always remove all static electricity from your body before handling any Circuit Boards.

Use a "Static Wrist Strap", if available, or always ground yourself first by holding on to a non-painted surface on the brake unit.

7-2 CLEANING AND INSPECTION

Clean metal parts in a suitable solvent and dry with low pressure compressed air. After cleaning inspect parts for cracks, distortion, scoring, nicks, burrs or any other damage that would affect the operation of the brake.

Pay particular attention to the Wear Sleeve (#32) on the Hub (#2) and the Oil Seal (#31) located in the Mounting Flange (#8) for the MSB9 & MSB10; for the MSB12 it is

located in the Motor Adapter Housing (#7). Check for nicks, scratches or any damage that would cause leakage.

7-3 REPAIR OR REPLACEMENT

A fine stone or #600 Grit Paper may be used to remove minor surface defects from parts if the operation or sealing action of the part is not affected. The use of coarser abrasives or other machining methods should not be attempted and damaged parts should be replaced.

Recommended Spare Parts:

1. Replace all Gaskets, O-Rings, Oil Seals and Wear Sleeves removed at disassembly.
2. Replace Brake Stack as a complete Assembly.
3. The Circuit Board (#400) is a common replacement part.

7-4 MEASURING STACK HEIGHT

The Stack Height must be measured to determine whether or not the Brake Stack needs to be replaced. If it measures under the Minimum Worn Stack Height then the Brake Stack needs to be replaced. (See Figure 7.1)

Section 8 shows exploded view drawings for each size of **MagnaShear Motor Brake**. Refer to these illustrations for all disassembly and reassembly procedures.

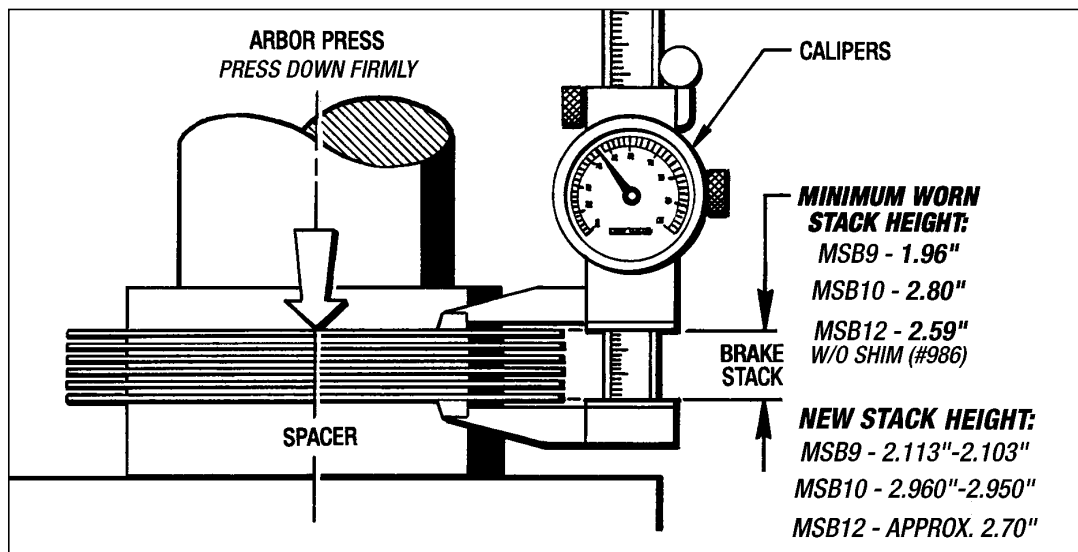


Figure 7.1 - Measuring Stack Height

Figure 8.1 - MSB9 and MSB10 Motor Brakes.

Figure 8.2 - MSB12 Motor Brake.

Figure 8.3 - Brake Coil Circuit Board and Junction Box.

7-5 REPLACING BRAKE STACK

A. General Instructions for all Sizes

1. First drain all the oil from the unit into a suitable container. Save or recycle as condition warrants.
2. Disconnect the 5-Pin Brad Harrison Cable from the Conduit Box (#405). (See Figure 8.3)
3. Lift the Manual Release Lever to release the Brake.

B. Sizes MSB9 and MSB10 Motor Brakes

(See Figures 7.2 and 8.1)

1. Remove the (8) Hex Nuts (#261 and (8) Lockwashers (#127) off of the (8) Studs (#72). Pull the End Housing (#9) off the Mounting Flange (#8). Remove the Gasket (#121) and discard it
2. The Brake Stack (#12) can now be removed by unscrewing the (2) Shoulder Bolts that attaches the Drive Plates to the Mounting Flange (#8). Pull the whole Brake Stack (#12) off the Hub (#2) spline and the (4) Pins (#176). (See Figure 7.2)

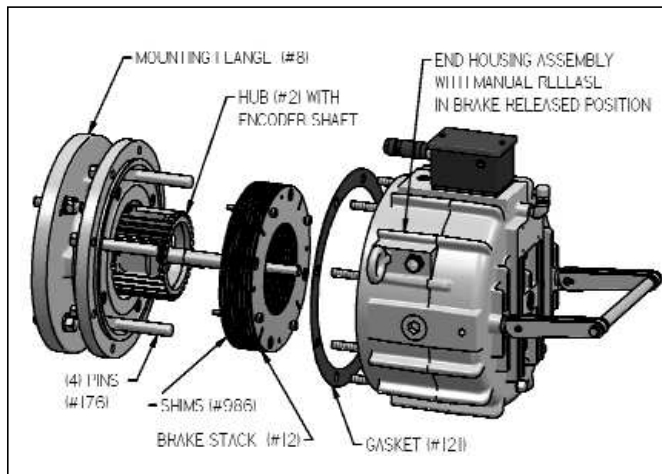


Figure 7.2 - Replacing the Brake Stack (MSB9 & MSB10)

3. Take the (2) Shoulder Bolts out and place the Brake Stack (#12) in an arbor press and measure the Stack Height to determine whether or not the Brake Stack (#12) needs replaced. (See Section 7-4 and Figure 7.1)
4. If the old Brake Stack (#12) needs replaced then take the new Brake Stack (#12) and remove the (4) Retaining Rings on the (4) Shoulder Bolts that holds the whole stack together. Discard these Retaining

Rings they will not be needed.

5. If needed, install the (2) Guide Pins (#12) 180° apart into the Mounting Flange (#8). Use **Blue Loctite #242**.
6. Take the First Drive Plate from the Brake Stack (#12) and place it over the (4) Pins (#176) and the (2) Guide Pins (#12).
7. Place the First Friction Disc on the Hub (#2) spline.
8. Place a Separator Spring on each Guide Pin.
9. Repeat Steps 12, 13 and 14 until all Drive Plates, Friction Discs and Separator Springs have been installed, ending with a Drive Plate.
10. Install the (2) Shoulder Bolts (#12), using **Blue Loctite #242**, thru the two remaining holes in the Drive Plates (#12) into the Mounting Flange (#8).
11. Torque all (4) Shoulder Bolts to **14 Lb. Ft.**
12. Place the Gasket (#121) on the mounting face of the End Housing (#9).
13. Slide the End Housing (#9) into place and attach with (8) Lockwashers (#127) and (8) Hex Nuts (#261). Torque these (8) Hex Nuts (#261) to **60 Lb. Ft.**
NOTE: There will be an extra Gasket (#121) and a Spacer (#60) between the End Housing (#9) and the Mounting Flange (#8) for Size MSB10.
14. Lower the Manual Release Lever to engage the brake.

C. Size MSB12 Motor Brake

(See Figures 7.3 , 7.4 and 8.2)

1. Remove the (8) Screws (#149) and (8) Lockwashers (#127) from the Housing (#8).

Pull the End Housing Assembly away from the Housing (#8). Remove the Gasket (#122) and discard it.

2. Unscrew the (4) Shoulder Bolts (#138) from the Housing (#8), but do not pull them out of the Brake Stack. Pull the complete Brake Stack including the (4) Shoulder Bolts (#138) off the (4) Pins (#176) and the Hub (#2) Spline. (See Figure 7.3)

NOTE - The complete Brake Stack consists of (9) Drive Plates (#12), (8) Friction Discs (#13), Shims (#986) if required, (32) Separator Springs (#17) and (4) Shoulder Bolts (#138).

3. Place all the Drive Plates (#12) and Friction Discs (#13) into an arbor press and measure the Stack Height to determine whether or not the Brake Stack needs replaced. **See previous Section 7-4 and Figure 7.1.**

If the Brake Stack needs replaced then the new Brake Stack, consisting of (9) Drive Plates (#12) and (8) Friction Discs (#13), needs to be measured to determine

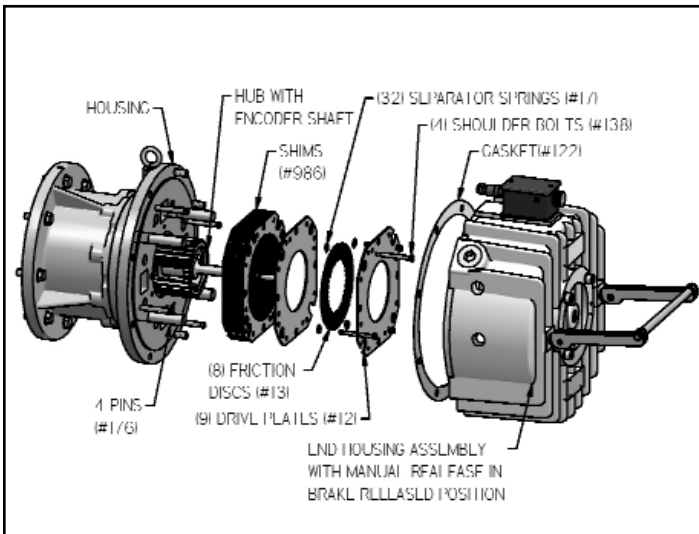


Figure 7.3 - Removing MSB12 Brake Stack

whether or not any Shims (#986) are required in the stack to attain an **Air Gap of .07"-.09"**. The Air Gap is the space between the front face of the Coil (#59) and the back face of the Armature Plate (#56) with the Brass Shim (#184) attached to it. (See Figure 7.4)

D. Checking Air Gap

1. Energize the Coil.
2. Measure the distance from the face of the Armature Plate (#56) to the back mounting face of the End Housing (#9) with Gasket (#122) removed. This gives **Dimension "A"**.
3. Measure the new Brake Stack in an Arbor Press as shown in Figure 7.1. This gives **Dimension "B"**.
4. Use the formula **"A" + .026" - "B" = Air Gap**.
5. Use .020" Shim (#986) to attain **.07"-.09" Air Gap** if necessary.
6. Install the new Brake Stack and Reassemble the Brake with the same procedure as described in **Section 7-11**.

7-6 REPLACING CIRCUIT BOARD (#400)

A. Sizes MSB9 and MSB10 Motor Brake

(See Figure 7.5)

1. Take the cover off the Conduit Box (#405) & remove the Brad-Harrison Cable.
2. Disconnect all the wires from the (2) Terminal Strips J1 and J2 on the Circuit Board (#400).

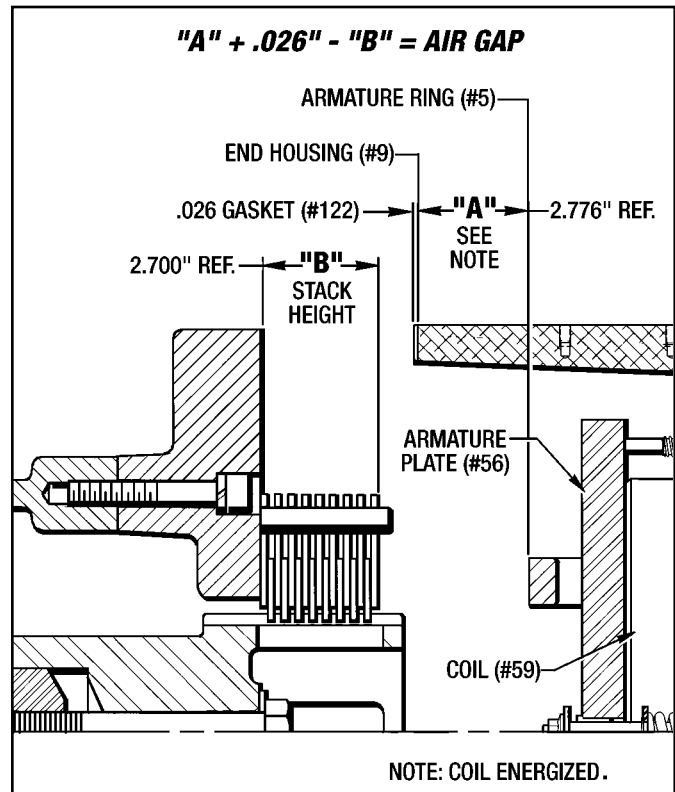


Figure 7.4 - Checking Air Gap for MSB12

3. Disconnect the wire on the Ground Screw (#426).
4. Remove the (3) Screws (#428) and (3) Nylon Washers (#431).
5. Take the old Circuit Board (#400) off and replace it with a new one. **See Section 7-1 for Tips on Handling Circuit Boards.**
6. Reattach the Circuit Board (#400) with the (3) Screws (#428) and (3) Nylon Washers (#431).
7. Reconnect the wires to J1 and J2 Terminal Strips and the Ground Screw.
8. Replace the cover on the Conduit Box (#405) & the Brad-Harrison Cable.

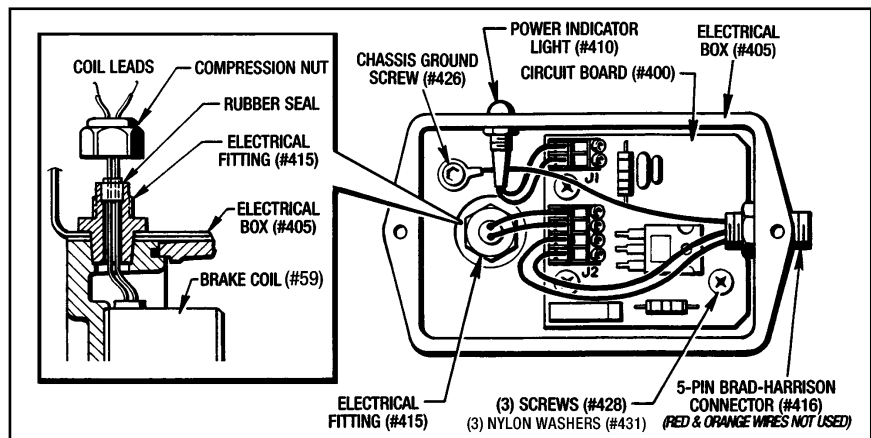


Figure 7.5 - Conduit Box with Cover Removed for Sizes MSB9 and MSB10

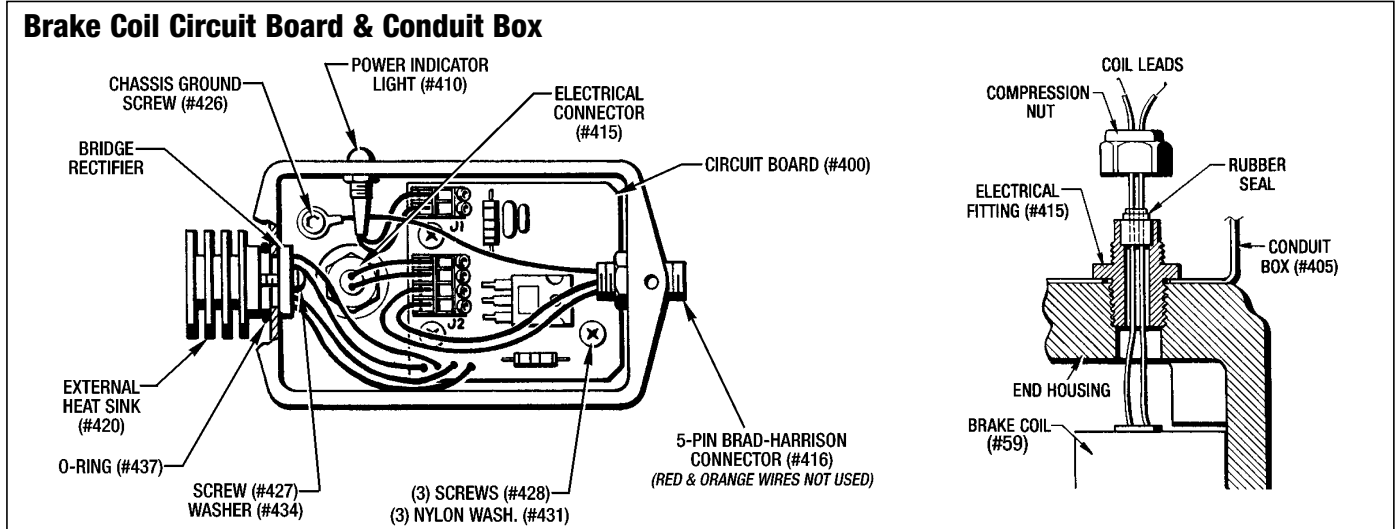


Figure 7.6 - Conduit Box with Cover Removed for Size MSB12 Motor Brake

B. Size MSB12 Motor Brake

(See Figure 7.6)

1. Take the cover off the Conduit Box (#405) & remove the Brad-Harrison Cable.
2. Disconnect all the wires from the (2) Terminal Strips J1 and J2 on the Circuit Board (#400) and the wire on the Chassis Ground Screw (#426).
3. Remove the Screw (#427) and Flat Washer (#434) which holds the Bridge Rectifier and External Heat Sink (#420) to the Conduit Box (#405). Remove the External Heat Sink (#420) and O-Ring (#437) and store for reassembly.
4. Remove the (3) Screws (#428) and (3) Nylon Washers (#431).
5. Take the old Circuit Board (#400) off and replace it with a new one. **See Section 7-2 for Tips on Handling Circuit Boards.**
6. Re-attach with (3) Screws (#428) and (3) Nylon Washers (#431). Re-connect the wires to J1 and J2 Terminal Strips and the wire on the Chassis Ground Screw (#426).
7. Place the O-Ring (#437) back on the External Heat Sink (#420) and re-attach it with the Bridge Rectifier back onto the Conduit Box (#405) with Screw (#427) and Flat Washer (#434). Replace conduit box cover & Brad-Harrison Cable.

7-7 REPLACING HOLDING COIL (#59)

(See Figure 8.1 for Sizes MSB9 and MSB10)

(See Figure 8.2 for Size MSB12)

A. Disassembly

(MSB9, MSB10 and MSB12 Motor Brakes)

1. First drain all the oil from the unit into a suitable container. Save or recycle oil as condition warrants.

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2. Disconnect the 5-Pin Brad Harrison Cable from the Conduit Box (#405) and the wires from the Brake Indicator Switch Box (#251).

3. Lift the Manual Release Lever to release the brake.

(MSB9 and MSB10 Motor Brakes Only)

4. Remove the (8) Hex Nuts (#261 and (8) Lockwashers (#127) off of the (8) Studs (#72) Pull the End Housing (#9) off the Mounting Flange (#8).
5. Remove the Gasket (#121) and discard it.

NOTE: On the MSB10 there will be another Gasket (#121) and a Spacer (#60) between the End Housing (#9) and the Mounting Flange (#8). Discard this Gasket (#121) also.

(MSB12 Motor Brake Only)

4. Remove the (8) Screws (#149) and (8) Lockwashers (#127) from the Housing (#8). Pull the End Housing (#9) off the Housing (#8).
5. Remove the Gasket (#122) and discard it

(MSB9, MSB10 and MSB12 Motor Brakes)

6. Take the cover off of the Conduit Box (#405) and disconnect the coil leads from J1 terminal strip located on the Circuit Board (#400). Also remove the compression nut from the Electrical Fitting (#415) and pry the rubber seal out of the fitting and off of the coil leads. (See Figures 7.5 or 7.6)

7. Lower the Brake Manual Release Lever.

8. Turn the End Housing (#9) over with the Armature Plate (#56) and Thrust Plate (#5) in an Up position. **Do not rest the end housing on the Conduit Box (#251).**

(MSB9 and MSB10 Motor Brakes Only)

9. Remove the (2) Hex Nuts (#315) and (2)

Lockwashers (#129) from the (2) Manual Release Shafts (#189).

(MSB12 Motor Brake Only)

- Remove the (2) Hex Nuts (#315) and (2) Flat Washers (#274) from the (2) Manual Release Shafts (#189).

(MSB9, MSB10 and MSB12 Motor Brakes)

- Loosen and remove the (2) Shoulder Bolts (#144) that holds the Armature Plate (#56) in place. Lift the Armature Plate (#56) and Thrust Plate (#5) up and out of the End Housing (#9).

CAUTION: This Armature Plate (#56) is under spring pressure so loosen the (2) Shoulder Bolts evenly and very carefully.

- Note the quantity and position of Springs (#36). Make a sketch of their location to help you at reassembly or as shown in Figure 7.7.
- Remove the (4) Screws (#150) and (4) Seal Washers (#167) from the End Housing (#9). Lift the Holding Coil (#59) out of the End Housing (#9).

B. Reassembly

(MSB9 and MSB10 Motor Brakes)

- Place a new Holding Coil (#284) into the End Housing (#9), pushing the coil leads up through the Electrical Fitting (#415).
- Attach the Coil (#59) with (4) Seal Washers (#167) and (4) Screws (#150).

IMPORTANT - Torque the (4) 1/2"-13 Screws to 45 Lb. Ft.

- Set the End Housing (#9) so the Coil (#59) is facing upright. Install the Brake Springs (#36) as described below and shown in Figure 7.7.

NOTE - There are (4) Pins (#177) & (2) Pins (#179) installed in the End Housing (#9) and also (2) 3/8"-16 tapped holes for the (2) Shoulder Bolts (#144). The Pins (#177), (#179) and Shoulder Bolts (#144) are all used for the installation of the required number of Brake Springs (#36).

- Install a 3/8"-16 x 3" Lg. Set Screw in any of the shoulder bolt holes that will require a Brake Spring (#36). *This will insure that the Brake Springs (#36) stays in position when the Armature Plate (#56) and Thrust Plate (#5) is placed on the springs.*
- Set the Armature Plate (#56) and Thrust Plate (#5) in position on the Springs (#36). Remove any set screws. Insert the (2) Shoulder Bolts (#144) and tighten down evenly to compress the Springs (#36).

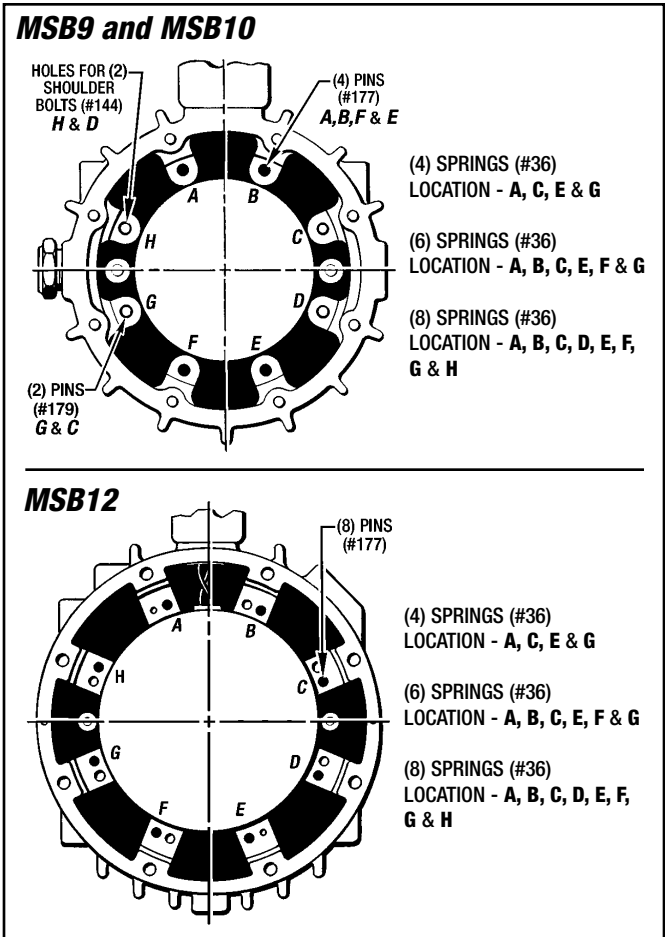


Figure 7.7 - Correct Placement of Brake Springs (#36)

Use Blue Loctite #242 and Torque to 25 Lb. Ft.

(MSB12 Motor Brakes)

- Place a new Holding Coil (#59) into the End Housing (#9), pushing the coil leads up through the Electrical Fitting (#415).
- Attach the Coil (#59) with (4) Seal Washers (#167) and (4) Screws (#150).

IMPORTANT - Torque the 5/8"-11 Screws to 60 Lb. Ft.

- Set the End Housing (#9) so the Coil (#59) is facing upright.
- Place the correct number of Springs (#36) over the Pins (#177 as shown in Figure 7.7 .
- Set the Armature Plate (#56) and Thrust Plate (#5) in position on the Springs (#36). Insert the (4) Shoulder Bolts (#144) and tighten down evenly to compress the Springs (#36). **Use Blue Loctite #242 and torque to 25 Lb. Ft.**

(MSB9 and MSB10 Motor Brakes Only)

- Attach the (2) Lockwashers (#129) and (2) Flange Nuts (#315) to the (2) Manual Release Shafts

(#189). Torque to 25 Lb. Ft.

(MSB12 Motor Brake Only)

6. Attach the (2) Flat Washers (#274) and (2) Flange Nuts (#315) to the (2) Manual Release Shafts (#189). Use Blue Loctite #242 and torque to 25 Lb. Ft.

(MSB9, MSB10 and MSB12 Motor Brakes)

7. Place the rubber seal on the coil leads and pull the wires through, taking up all the slack in the wires. Seat the rubber seal into the threaded part of the Electrical Fitting (#415). Tighten down the compression nut. (See Figure 7.5 or 7.6)
8. Attach the coil leads to Terminal Strip J1 on the Circuit Board (#400) and replace the Conduit Box cover. (See Figure 7.5 or 7.6).

(MSB9 and MSB10 Motor Brakes Only)

9. Position a new Gasket (#121) on Mounting Flange (#8) mounting face. **Do not use any gasket sealant on this gasket.**
10. Attach the End Housing Assembly with (4) Hex Nuts (#261) and (4) Lockwashers (#127). Torque to 60 Lb. Ft.

(MSB12 Motor Brake Only)

9. Position a new Gasket (#122) on the Housing (#8) mounting face. **Do not use any gasket sealant on this gasket.**
10. Attach the End Housing Assembly with (4) Screws (#148) and (4) Lockwashers (#127). Torque to 120 Lb. Ft.

(MSB9, MSB10 and MSB12 Motor Brakes)

11. Replace Drain Plug (#64) in bottom of End Housing (#9). Fill with fresh oil to center of Sight Gauge (#46) as specified in **Section 4 - LUBRICATION.**

7-8 REPLACING WEAR SLEEVE (#32)

A. Removing Wear Sleeve (#32)

(MSB9, MSB10 and MSB12 Motor Brakes)

1. Place the Hub (#2) into a V-Block. Using a chisel the same width as the Wear sleeve (#32), make about 5 or 6 notches in the Wear Sleeve (#32).as shown in Figure 7.10. It can now be removed by hand.

B. Installing Wear Sleeve (#32)

(Sizes MSB9 and MSB10 Only)

A Special Wear Sleeve Installation Tool must be used to install the Wear Sleeve (#32) onto the Hub (#2).

Dimensions and Specifications are given in the following Figure 7.11 if you prefer to make your own. It can be ordered from Force Control with the following **Part**

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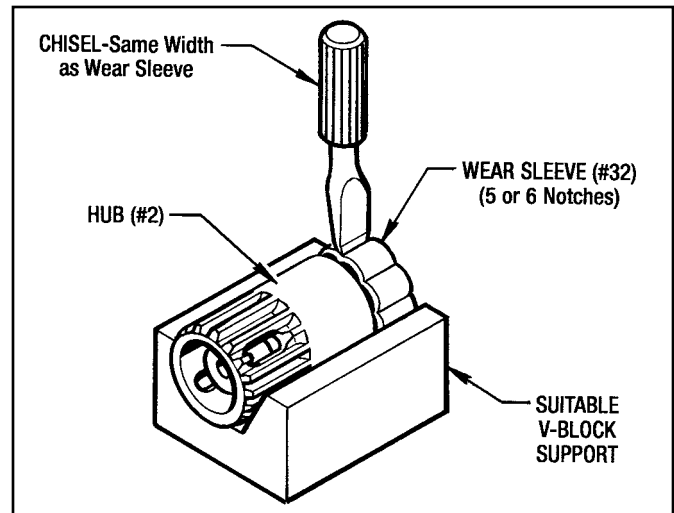


Figure 7.10 - Removing Wear Sleeve (#32)

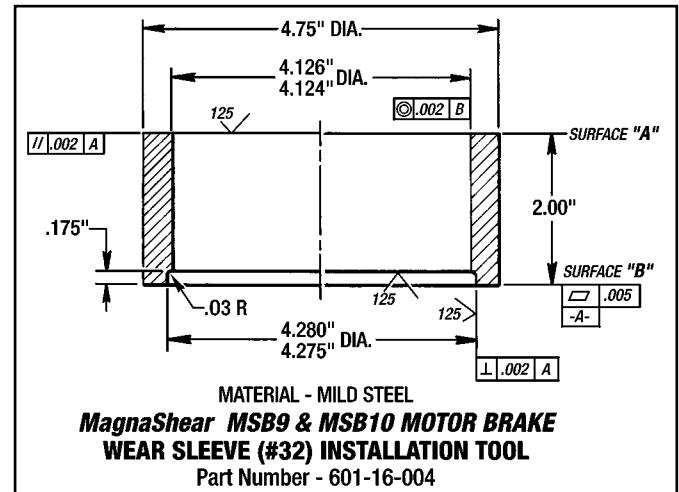


Figure 7.11 - Wear Sleeve Installation Tool

Number 601-16-004.

1. Clean the surface of the Hub (#2) with **Loctite Primer-T** and then apply **Red Loctite #271** to the hub surface.
2. Place the Hub (#2) into an Arbor Press and with **Surface "A"** of the Installation Tool press the Wear Sleeve (#32) on as far as it will go. (See Step #1 in Figure 7.12)

Turn the Installation Tool over and with **Surface "B"** continue pressing the Wear Sleeve (#32) until it bottoms out on the shoulder. (See Step #2 in Figure 7.11)

Clean off any excess Loctite.

(Size MSB12 Only)

Just a flat plate is required to install the Wear Sleeve (#32) on to the Hub (#2)

1. Clean the surface of the Hub (#2) with **Loctite Primer-T** and then apply **Red Loctite #271** to the hub surface.

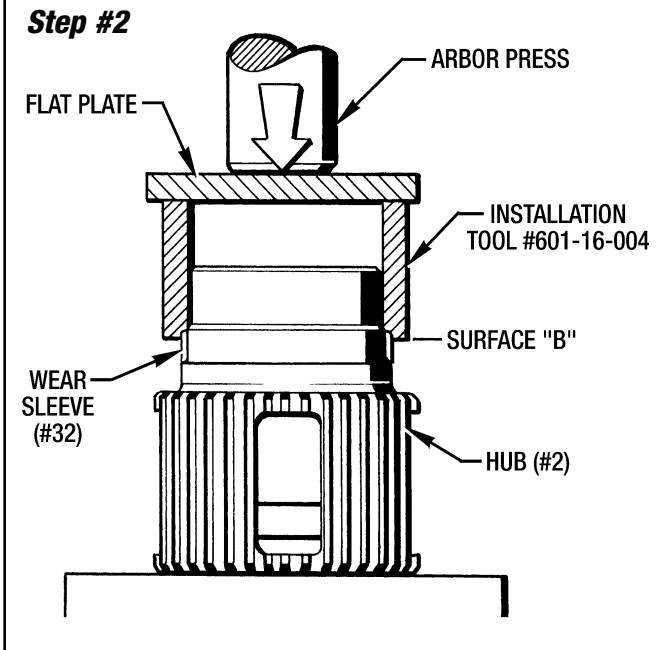
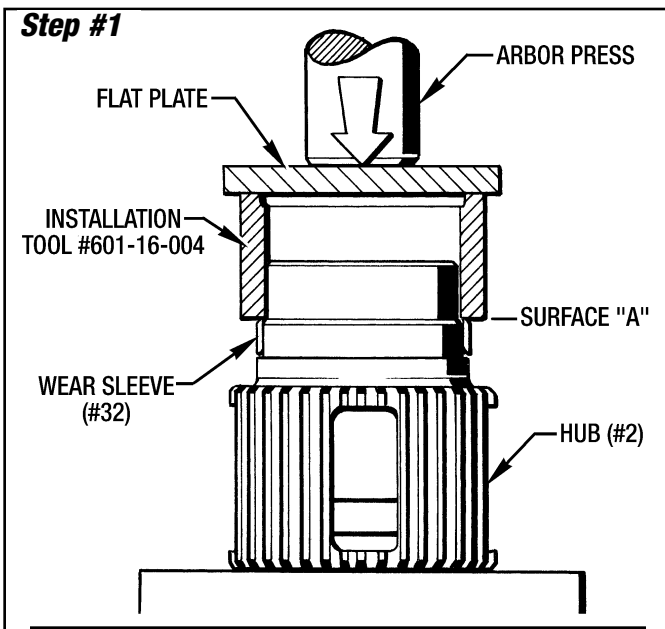


Figure 7.12 - Installing Wear Sleeve (#32) on Sizes MSB9 and MSB10

2. Place the Hub (#2) into an Arbor Press and with a flat plate as shown in Figure 7.13 on the next page press the Wear Sleeve (#32) on to the Hub (#2) as far as it will go. Clean off any excess Loctite

7-9 REPLACING OIL SEAL (#31)

(MSB9 and MSB10 Only)

1. Remove (4) Hex Nuts (#392) and (4) Lockwashers (#168). Pull the Mounting Flange (#8) off of the motor face.
2. Press the Oil Seal (#31) out of the Mounting Flange

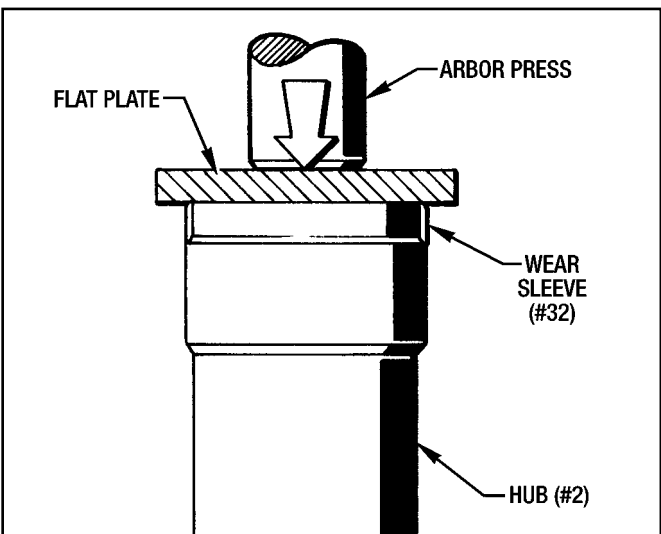


Figure 7.13 - Installing Wear Sleeve (#32) on MSB12

- (#8) with an arbor press.
3. Clean out the oil seal bore in the Mounting Flange (#8) and lightly coat the bore with Permatex #30 Sealant.

CAUTION - Be very careful not to get any of the sealant on the rubber parts of the Oil Seal (#31).

4. Press the new Oil Seal (#31) into the bore with an arbor press as shown in Figure 7.14.

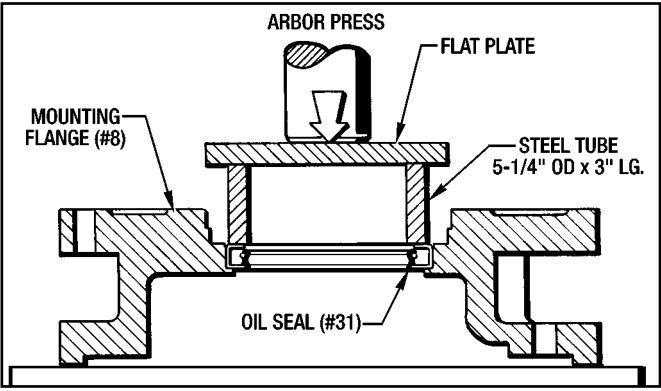


Figure 7.14 - Installing Oil Seal for MSB9 and MSB10

5. Clean off any excess sealant.

(MSB12 Only)

1. Remove the (8) Screws (#151) and (4) Lockwashers (#129). Pull the Housing (#8) and the Gasket (#121) off of the Motor Adapter Housing (#7). Discard the Gasket (#121).
2. Remove (8) Screws (#166) and (8) Lockwashers (#168). Pull the Motor Adapter Housing (#7) away from the motor face.
3. Press the Oil Seal (#31) out of the Motor Adapter Housing (#7).

- Clean out the oil seal bore in the Motor Adapter Housing (#7) and lightly coat the bore with Permatex #30 Sealant.

CAUTION - Be very careful not to get any of the sealant on the rubber parts of the Oil Seal (#31).

- Press the new Oil Seal (#31) into the bore with an arbor press as shown in *Figure 7.15*.
- Clean off any excess sealant.

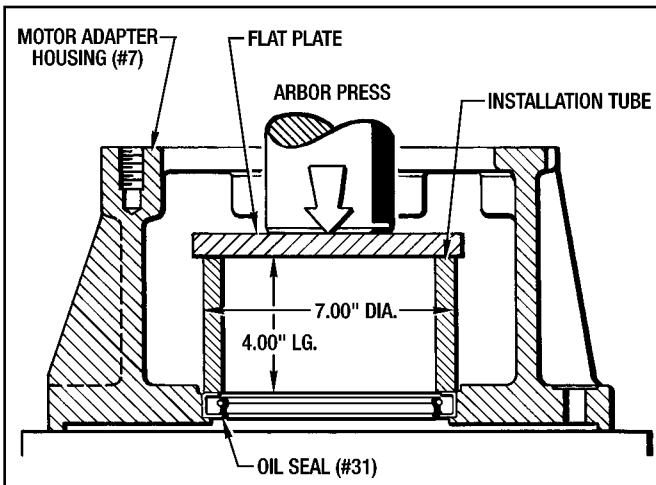


Figure 7.15 - Installing Oil Seal for MSB12

7-10 REPLACING HUB BEARING

A. Disassembly

- First drain all the oil from the unit into a suitable container. See **Section 4 - LUBRICATION** for location of drain plugs. Save or recycle as condition warrants.
- Also disconnect the Brad Harrison Cable from the Electric Box (#405).
- Remove the (4) Motor Mounting Screws and (4) Lockwashers and pull the Brake Assembly off the motor flange and motor shaft.
- Remove the Screws and Lockwashers from the End Housing (#9).
- Take the End Housing (#9) and Gasket (#121) or (#122) off.
- The Brake Stack can now be removed by unscrewing the (4) shoulder bolts that attaches the drive plates to Housing (#15). Pull the Stack off the Hub (#2) spline and the (4) Pins (#176). (See *Figure 7.4*)
- Remove the Bearing Retainer Screw (#168) and Flat Washer (#170).
- Apply a little white grease to the input end of the Hub (#2) and pull it and the Bearing (#20 or #41) out of the Input Housing (#8).

CAUTION - If the Oil Seal (#31) is not to be replaced, be very careful not to damage the sealing lip.

- Remove the Bearing (#20 or #41) from the Hub (#2) with a bearing puller if it is to be replaced.
- Push the Oil Seal (#31) out of the Input Housing (#8) with an arbor press.

B. Reassembly

- Clean out the oil seal bore and lightly coat the bore with **Permatex #3D Sealant**. Press the Oil Seal (#31) into the bore with an arbor press until it is seated. Clean off any excess sealant.

CAUTION - Be very careful not to get any sealant on the rubber sealing lip.

- Clean off the O.D. of the Hub (#2) where the Bearing (#20) will be seated with **Loctite Primer T**. Also clean the I.D. of the Bearing (#20 or #41) with **Loctite Primer T**.
- Apply **Green Loctite #609** to the I.D. of Bearing (#20) and install it on to the Hub (#2) with an arbor press until it is completely seated on the hub shoulder. Clean off any excess Loctite.
- Apply a little white grease to the lip of the Oil Seal (#31) and to the mating surface of the Hub (#2).
- Carefully insert the Hub (#2) into the Oil Seal (#31) until the Bearing (#20) is completely seated in the bearing bore.
- Install the Flat Washer (#182) and Screw (#63) into the Input Housing (#8). Use **Loctite Primer T** and **Blue Loctite #242** on the threads.
- Install the Brake Stack onto the Hub (#2) and the (4) Pins (#176). Push it on as far as it will go and tighten the (4) shoulder bolts in the stack.

NOTE: Make sure the teeth in the friction discs are aligned with each other so the Brake Stack (#41) will slide on to the Hub (#2) spline.
- Install the End Housing Assembly back over the Brake Stack with a new Gasket (#121) or (#122). **Do not use any gasket sealant on this gasket.**
- Slide the Brake Unit onto the motor shaft as far as it will go. Align the (4) mounting holes with the motor and attach with (4) Mounting Bolts and (4) Lockwashers.

Finger tighten the (4) bolts at this time. Make sure the brake is snug against the motor face.
- Connect the electrical service to the 5-Pin Brad Harrison Connector and actuate the brake coil to release the brake.

-
-
11. Turn the motor shaft by hand to make sure the bearings turn freely. Adjust if necessary.
 12. Evenly torque the (4) Mounting Bolts.
 13. Replace any pipe plugs or fittings removed at disassembly and fill with fresh transmission fluid as described in **Section 4 - Lubrication**.
 14. Make an Operational Check to make sure that everything is properly reassembled. See **Section 5 Operational Checks**.

7-11 BRAKE REASSEMBLY PROCEDURE

(MSB9 and MSB10 Only)

1. Attach the Mounting Flange (#8) to the motor face with (4) Hex Nuts (#392) and (4) Lockwashers (#168). **Torque to 120 Lb. Ft.**
2. Install and align the Hub (#2) and Collet (#110) on the motor shaft with the same procedure given in **Section 3 - INSTALLATION, 3-4-A Mounting the MSB9 and MSB10 to the Drive Motor, Steps 7 thru 10**.
3. Install the Brake Stack (#12) with the same procedure given in **Section 3 - INSTALLATION, 3-4-A Mounting the MSB9 and MSB10 to the Drive Motor, Steps 11 thru 19**.
4. Install the End Housing (#9) with the same procedure given in **Section 3 - INSTALLATION, 3-4-A Mounting the MSB9 and MSB10 to the Drive Motor, Steps 20 thru 22**.

(Make sure the Manual Release Lever is in the Up Position.)

(MSB12 Only)

1. Attach the Motor Adapter Housing (#7) to the motor face with (8) Screws (#166) and (4) Lockwashers (#158). **Torque to 120 Lb. Ft.**
2. Place a new Gasket (121) onto the Motor Adapter Housing (#7). **Do not use any gasket sealant on this gasket**
3. Attach this Housing (#8) and Gasket (#121) to the Motor Adapter Housing (#7) with (8) Screws (#151) and (8) Lockwashers (#129). **Torque to 120 Lb. Ft.**
4. Install and align the Hub (#2) and Collet (#110) on the motor shaft with the same procedure given in **Section 3 - INSTALLATION, 3-4-B Mounting the MSB12 to the Drive Motor, Steps 6 thru 9**.
5. Install the Brake Stack with the same procedure given in **Section 3 - INSTALLATION, 3-4-B Mounting the MSB12 to the Drive Motor, Steps 10 thru 19**.

6. Install the End Housing (#9) with the same procedure given in **Section 3 - INSTALLATION, 3-4-B Mounting the MSB12 to the Drive Motor, Steps 20 thru 22**.

(Make sure the Manual Release Lever is in the Up Position.)

(All Sizes)

Make sure Air Breather, Sight Gauge and all pipe plugs are installed. Fill with fresh oil to level of the Sight Gauge. **See Section 4 - LUBRICATION**.

Section 8

ILLUSTRATED PARTS LIST

8-1 GENERAL INFORMATION

This section illustrates, lists and describes all parts for **Sizes MSB9, MSB10 and MSB12 MagnaShear Motor Brakes**. Parts are identified on the exploded views with Part Reference Numbers. These Numbers correspond to the Part Reference Number given in the Parts Lists. The Part Name and Quantity Used is also given in the Parts List. This Part Reference Number, Part Name and Quantity should be used when ordering Replacement Parts.

8-2 DRIVE MOTORS

The Drive Motors used with these **MagnaShear Motor Brakes** are standard motors and may be repaired or replaced by any qualified Motor Re-build Facility or Supplier.

8-3 FACTORY REBUILD SERVICE

Reconditioning Service is offered by Force Control Industries, Inc. at the factory. A complete factory rebuild will be 50% the cost of a new unit if the housings are reusable. If Housings need to be replaced, there will be an additional cost.

Contact Force Control Industries, Inc. for authorization and shipping instruction before returning a drive unit for this service. Force Control cannot be responsible for units returned to the factory without prior notice and authorization.

Care must be given to the packing of returned drives. Always protect mounting feet by attaching to a skid. Shipment-damaged drives always delays repairs. It is usually impossible to recover damage costs from the carrier. When possible, describe the problem experienced on your shipping papers.

Return to: **Force Control Industries, Inc.**
3660 Dixie Highway
Fairfield, Ohio 45014
Phone: (513) 868-0900
Fax: (513) 868-2105
E-Mail: info@forcecontrol.com
Web: www.forcecontrol.com

8-4 ORDERING REPLACEMENT PARTS

When ordering replacement parts, please specify all of the following information:

1. Brake Model Number (On the Name Plate.)

2. Brake Serial Number (On the Name Plate.)
3. Part Reference Number (From the parts list or exploded view drawing.)
4. Part Name (From the parts list.)
5. Quantity (From the parts list.)
6. Complete Shipping Information.



Failure to include information for items 1 through 6 will only delay your parts order. Unless another method is specified for item 6, parts weighing less than 150 Lbs. will be shipped United Parcel Service. Parts weighing more than 150 Lbs. will be shipped Motor Freight. Air freight and other transportation services are available but only if specified on your order.

8-5 NAME PLATE AND MODEL NUMBER

The Name Plate shown is located on the Brake End Housing.

The Example shown is a size MSB9, 12-1/2" Pilot Dia., Horizontal Mounting, 488 Ft. Lbs. Torque, with Manual Release, 2-1/8" Collet Bore Dia., 115 VAC and Engineering Revision 1.

Refer to 2.1 How to Order for the model number breakdown.

Force Control Industries, Inc.	
	For Service/Parts Call 513-868-0900
	
MagnaShear® MOTOR BRAKE	
Model No.	<input type="text" value="01-MSB-9-2-H-488-R-C-1-1"/>
Serial No.	<input type="text"/>
Use Mobil® ATF 210 Type F	
U.S. PATENTS 5,172,789 - 5,242,039 - 5,389,049 - 5,533,425 5,603,395 - OTHER U.S. & FOREIGN PATENTS PENDING	

REPAIR PARTS LIST
MSB9 and MSB10 MagnaShear MOTOR BRAKE
(Figure 8.1)

Ref. No.	Part Name	Qty.	Ref. No.	Part Name	Qty.
1	Hub Extension	1	77	Pipe Nipple, 1/2" x 1-1/2" Lg. NPT	1
2	Hub	1	84	Spacer	1
5	Thrust Plate	1	#97	Flat Washer	
8	Mounting Flange	1	*104	O-Ring	1
9	End Housing	1	*107	Poly-Pak Seal	2
**12	Brake Stack Assembly	1	115	Keensert Insert	2
*31	Oil Seal	1	116	Bronze Bushing	4
*32	Wear Sleeve	1	**121	Gasket	1
*36	Spring		127	Lockwasher, 1/2"	8
	(MSB8) 100 Ft. Lbs. Torque	4	128	Lockwasher, 3/8" Hi Collar	6
	(MSB8) 150 Ft. Lbs. Torque	6	129	Lockwasher, 3/8"	2
	(MSB8) 200 Ft. Lbs. Torque	8	137	Eyebolt, 1/2"-13	2
	(MSB8) 250 Ft. Lbs. Torque	4	144	Shoulder Bolt	2
	(MSB9) 250 Ft. Lbs. Torque	6	145	Soc. Hd. Screw, 1/4"-20 x 1/2" Lg.	1
	(MSB9) 300 Ft. Lbs. Torque	2	147	Soc. Hd. Screw, 1/4"-20 x 1/2" Lg.	2
	(MSB9) 350 Ft. Lbs. Torque	8	149	Soc. Hd. Screw, #8-32 x 5/8" Lg.	2
	(MSB9) 450 Ft. Lbs. Torque	6	150	Soc. Hd. Screw, 1/2"-13 x 1-1/4" Lg.	4
	(MSB9) 500 Ft. Lbs. Torque	6	152	Soc. Hd. Screw, 3/8"-16 x 1-1/2" Lg.	6
	(MSB10) 600 Ft. Lbs. Torque	6	155	Stud, 5/8"-11 x 3" Lg.	4
	(MSB10) 650 Ft. Lbs. Torque	4	*167	Dyna-Seal, 1/2"	4
	(MSB10) 750 Ft. Lbs. Torque	6	168	Lockwasher, 5/8"	4
	(MSB10) 900 Ft. Lbs. Torque	8	176	Dowel Pin 3/4" x 5" Lg.	4
*37	Spring		177	Roll Pin, 1/2" x 2" Lg.	4
	(MSB8) 100 Ft. Lbs. Torque	0	179	Dowel Pin, 1/2" x 4" Lg.	2
	(MSB8) 150 Ft. Lbs. Torque	0	180	Key, 1/2" Sq. x 4" Lg.	1
	(MSB8) 200 Ft. Lbs. Torque	0	182	Flat Washer, 1/4"	2
	(MSB8) 250 Ft. Lbs. Torque	4	183	Spacer	2
	(MSB9) 250 Ft. Lbs. Torque	0	*184	Brass Shim	1
	(MSB9) 300 Ft. Lbs. Torque	4	*187	Oil Seal	1
	(MSB9) 350 Ft. Lbs. Torque	0	189	Manual Release Shaft	2
	(MSB9) 450 Ft. Lbs. Torque	0	192	But. Hd. Screw, #10-24 x 1/4" Lg.	2
	(MSB9) 500 Ft. Lbs. Torque	2	193	Flat Washer, 1/2"	2
	(MSB10) 600 Ft. Lbs. Torque	0	211	Retaining Ring	2
	(MSB10) 650 Ft. Lbs. Torque	4	*261	Hex Nut, 1/2"-13	8
	(MSB10) 750 Ft. Lbs. Torque	2	286	Spacer	6
	(MSB10) 900 Ft. Lbs. Torque	0	304	Soc. Hd. Set Screw, 1/4"-28 x 3/4" Lg.	1
*38	Bearing	1	306	Release Lever	4
*41	Bearing	1	307	Release Handle	1
44	Retaining Ring	1	313	Drill Bushing	2
*45	Air Breather	1	*314	Hex Nut, #10-24	2
*46	Sight Gauge	1	*315	Flanged Locknut, 3/8"-16	2
56	Armature Plate	1	317	Lockwasher, 3/8"	2
59	Holding Coil	1	*320	Spring	2
61	Street Elbow, 1/2" NPT	1	326	Shoulder Bolt, 1/4" x 1" Lg.	2
63	Button Hd. Screw, 1/4"-20 x 3/4" Lg.	2	327	Soc. Hd. Set Screw, 1/2"-13 x 3/4" Lg.	2
64	Pipe Plug, Mag. Sq. Hd., 1/2" NPT	1	332	Micro Switch Bracket	1
72	Stud, 1/2"-13 x 3" Lg.	8	353	Micro Switch	1
73	Pipe Plug, 1/2" NPT	1	357	Hex Hd. Screw, 3/8"-16 x 1-1/2" Lg.	2
74	Pipe Plug, Sq. Hd., 1/2" NPT	1	*392	Hex Nut, 5/8"-11	4
75	Pipe Plug, 1-1/4" NPT	2			

NOTES:

* - Indicates parts in Overhaul Kit. ** - Indicates parts in Stack Replacement Kit. # - Consult Factory.

REPAIR PARTS LIST
MSB12 MagnaShear MOTOR BRAKE
(Figure 8.2)

Ref. No.	Part Name	Qty.	Ref. No.	Part Name	Qty.
1	Hub Extension	1	154	Soc Hd. Set Screw, 3/18-16 x 1" Lg.	3
2	Hub	1	158	Dowel Pin, 3/8" x 1"	4
5	Armature Ring	1	*162	Bearing	1
7	Housing, Motor Adapter.....	1	166	Hex Hd. Screw, 5/8"-11 x 2" Lg.....	8
8	Housing	1	167	Seal Washer, 5/8"	4
9	End Housing	1	168	Lockwasher, 5/8"	8
**12	Drive Plate	9	172	Hub Extension	1
**13	Friction Disc.....	8	176	Dowel Pin, 1" x 5"	4
**17	Separator Springs	32	177	Roll Pin, 3/8" x 1-3/4".....	8
*20	Bearing	1	179	Dowel Pin, 5/8" x 4"	2
*31	Oil Seal	1	180	Key, 7/8" Sq. x 2-5/8" Lg.	1
*32	Wear Sleeve	1	183	Spacer	2
*35	Oil Seal	1	*184	Brass Shim	1
*36	Spring	8	189	Manual Release Shaft	2
*45	Air Breather	1	192	But. Hd. Screw, 1/4"-20 x 3/8" Lg.	2
*46	Sight Gauge.....	1	193	Flat Washer, 1/2"	2
52	Keensert Insert, 3/8"-16.....	4	204	Retaining Ring	1
53	Threaded Insert, 5/8"-11	8	205	Snap Ring	1
56	Armature Plate.....	1	206	Spacer	1
59	Coil.....	1	211	Retaining Ring	2
62	Pipe Plug, 1" NPT	3	304	Soc Hd. Set Screw, 1/4-28 x 3/4" Lg.	1
64	Pipe Plug, Magnetic, 1/4" NPT	1	306	Release Lever	4
73	Pipe Plug, Sq. Hd., 2" NPT	1	307	Release Handle	1
*105	O'Ring	1	313	Drill Bushing	2
*107	Poly-Pak Seal	2	*314	Hex Nut, #10	2
*121	Gasket	1	*315	Flanged Locknut, 3/8"-16.....	2
**122	Gasket	1	316	Lockwasher, 1/4"	1
127	Lockwasher, 5/8"	8	317	Lockwasher, 3/8"	2
128	Lockwasher, 5/16"	4	*320	Spring	2
129	Lockwasher, 5/8"	8	324	Bronze Bushing	2
137	Eye Bolt, 5/8"-11	1	326	Shoulder Bolt	2
138	Shoulder Bolt, 3/8"-16 x 3" Lg.	4	327	Hex Hd. Screw, 3/8"-16 x 1-1/2" Lg.	2
144	Shoulder Bolt, 1/2"-13 x 2-1/2" Lg.	4	328	Soc Hd. Set Screw, #8-32 x 1/4" Lg.	2
147	Soc. Hd. Cap Screw, 1/4"-20 x 1/2" Lg.	2	332	Micro Switch Bracket	1
149	Soc. Hd. Cap Screw, 5/8"-11 x 2-1/2" Lg. ..	8	353	Micro Switch	1
150	Soc Hd. Cap Screw, 5/8"-18 x 2-3/4" Lg. ..	4	356	Key, 7/8" Sq. x 4-5/8" Lg.	1
151	Soc. Hd. Cap Screw.....	8	**901	Stack Guide Pin.....	4
152	Soc Hd. Cap Screw, 5/16"-18 x 1-1/4" Lg. ..	4	986	Aluminum Shim, .02"	AR
153	Soc Hd. Cap Screw, 1/4-20 x 1" Lg.	1			

NOTES:

* - Indicates parts in Overhaul Kit. ** - Indicates parts in Stack Replacement Kit.

MSB12 MagnaShear MOTOR BRAKE

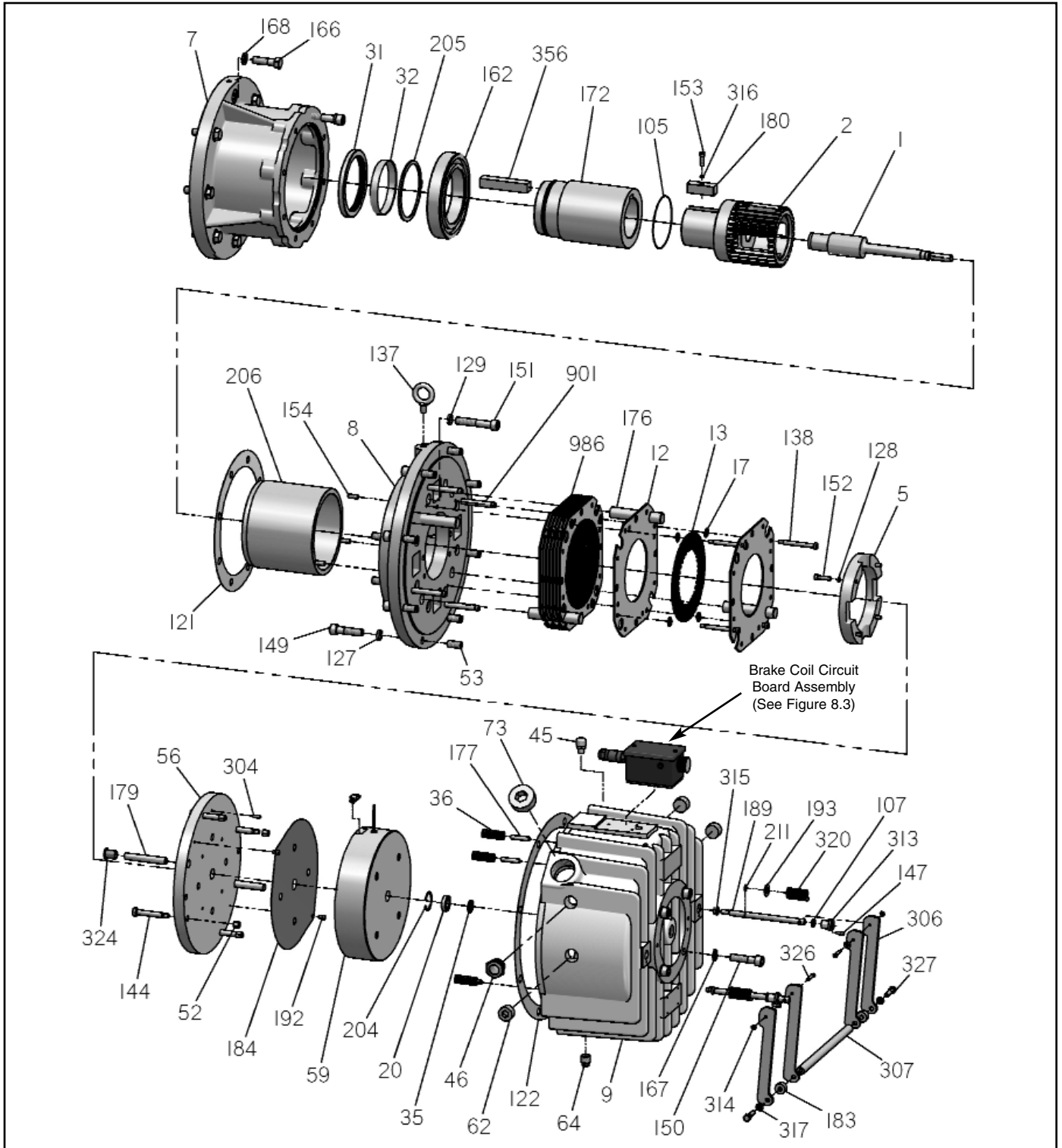


Figure 8.2 Repair Parts - MSB12 MagnaShear Motor Brake

REPAIR PARTS LIST
BRAKE COIL CIRCUIT BOARD & JUNCTION BOX
MSB9 and MSB10 MagnaShear Brake
(Figure 8.3)

Ref. No.	Part Name	Qty.	Ref. No.	Part Name	Qty.
398	Knockout Seal	1	*425	Gasket	1
400	Circuit Board	1	426	But. Hd. Screw, #10-24 x 1/4" lg.	1
405	Electric Box	1	428	Pan Hd. Screw, #8-32 x 1/2" Lg.	3
410	Indicator Lamp.....	1	429	But. Hd. Screw, 1/4"-20 x 1/2" Lg.	3
415	Electrical Fitting	1	431	Washer, Nylon	3
416	Receptical, 5-Pin	1	432	Lockwasher, 1/4"	3
417	Receptical Nut	1	435	Stand-off	3
418	Sealing Ring	1			

NOTES:

* - Indicates parts in Overhaul Kit.

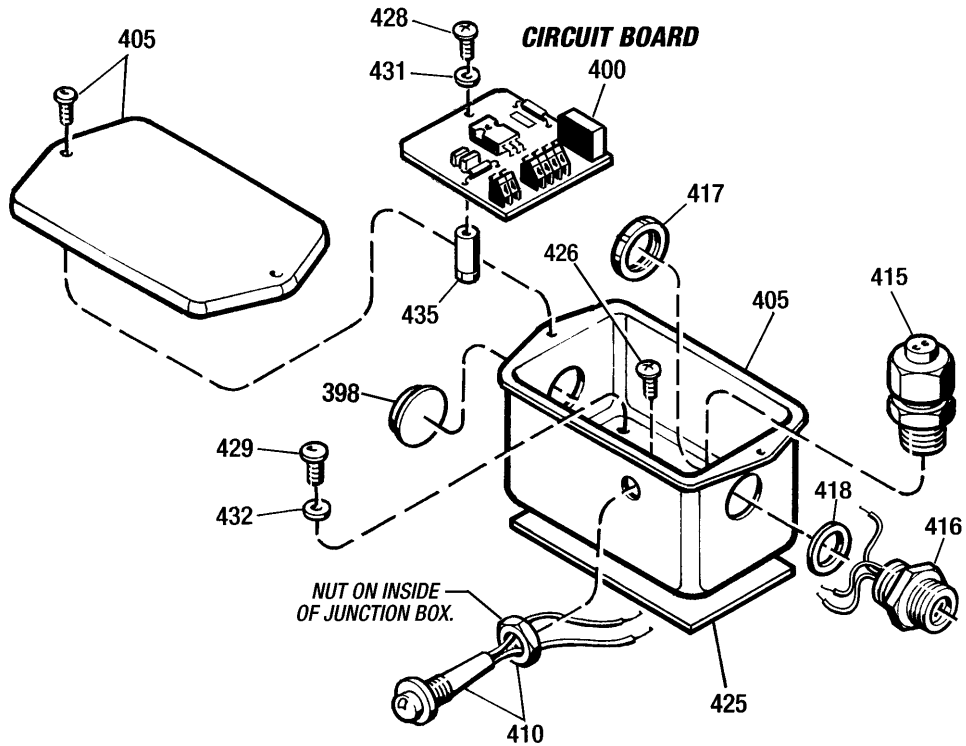
REPAIR PARTS LIST
BRAKE COIL CIRCUIT BOARD & JUNCTION BOX
MSB12 MagnaShear Brake
(Figure 8.3)

Ref. No.	Part Name	Qty.	Ref. No.	Part Name	Qty.
400	Circuit Board	1	427	Soc. Hd. Screw, #10-24 x 3/4" Lg.....	1
405	Electric Box	1	428	Pan Hd. Screw, #8-32 x 1/2" Lg.	3
410	Indicator Lamp.....	1	429	But. Hd. Screw, 1/4"-20 x 1/2" Lg.	3
415	Electrical Fitting	1	431	Washer, Nylon	3
416	Receptical, 5-Pin	1	432	Lockwasher, 1/4"	3
417	Receptical Nut	1	433	Lockwasher, #10	1
418	Sealing Ring	1	434	Flat Washer, #10	1
420	External Heat Sink.....	1	435	Stand-off	3
*425	Gasket	1	*437	O-Ring	1
426	But. Hd. Screw, #10-24 x 1/4" Lg.	1			

NOTES:

* - Indicates parts in Overhaul Kit.

BRAKE COIL CIRCUIT BOARD & JUNCTION BOX MSB9 and MSB10 MagnaShear Brake



MSB12 MagnaShear Brake

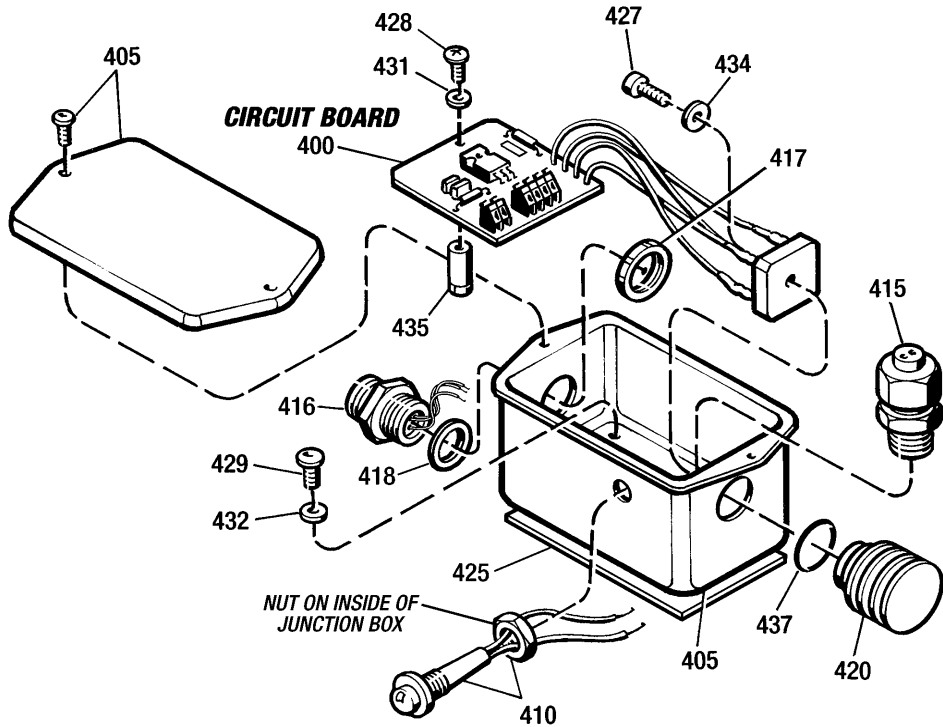


Figure 8.3 - Electric Box and Circuit Board

Manual Revision & Printing History
MSB8, MSB9, MSB10 & MSB12 *MagnaShear* Motor Brake

REVISION NUMBER	REVISION DATE (Mo./Yr.)	PRINTING DATE (Mo./Yr.)		REVISION INITIATED BY (Name)	REVISION MADE BY (Name)
502-MSB8-001-00		07/2009	Printed		

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FORCE CONTROL INDUSTRIES, INC.

MAIN OFFICE

P.O. Box 18366
Fairfield, Ohio 45018

3660 Dixie Highway
Fairfield, Ohio 45014

Tel: (513) 868-0900

Fax: (513) 868-2105

E-Mail: info@forcecontrol.com

Web: www.forcecontrol.com