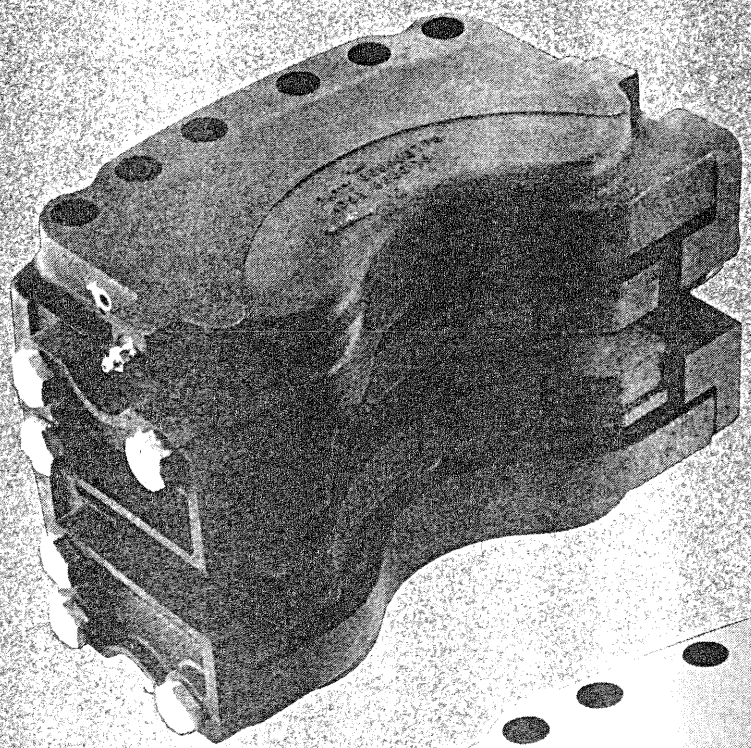
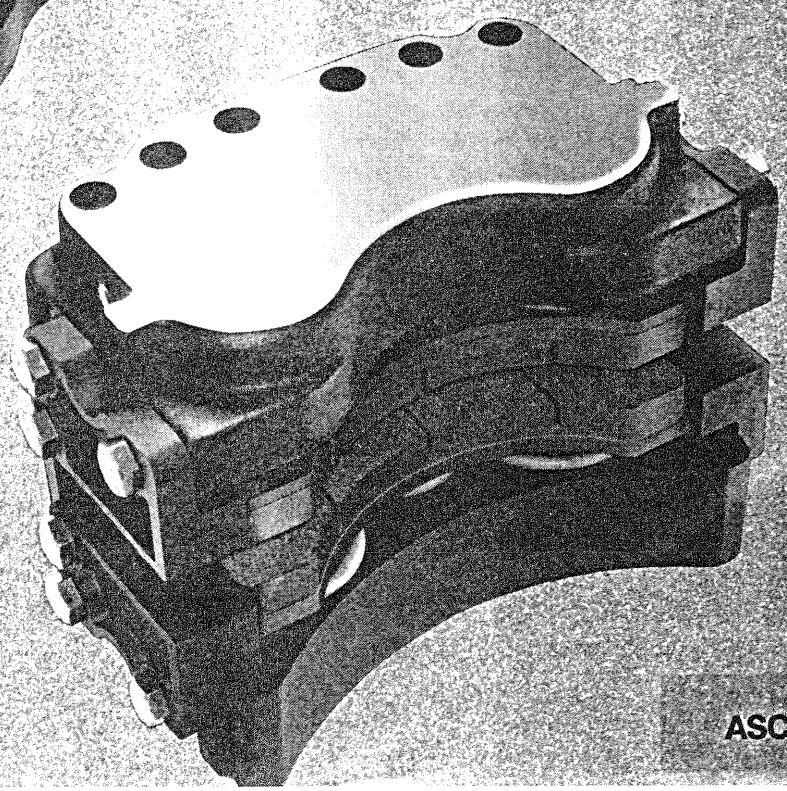
Rockwell Automotive

SCL-19 and SCL-56 Dry Disc Brake Calipers

Maintenance Manual No. 4U
Issued 9-96



SCL-19



SCL-56

ASC Form 80-249

SERVICE NOTES

This Maintenance Manual describes the correct service and repair procedures for Rockwell SCL 19 and SCL 56 Dry Disc Brake Calipers.

The information contained in this manual was current at the time of printing and is subject to change without notice or liability.

You must follow your company safety procedures when you service or repair equipment. Be sure you understand all the procedures and instructions before you begin work on the unit.

Rockwell uses the following types of notations to give warning of possible safety problems and to give information that will prevent damage to equipment.

⚠ *WARNING*

A WARNING indicates procedures that must be followed exactly. Serious personal injury can occur if the procedure is not followed.

⚠ *CAUTION*

A CAUTION indicates procedures that must be followed exactly. If the procedure is not followed, damage to equipment or components can occur. Serious personal injury can also occur in addition to damaged or malfunctioning equipment or components.

T *TORQUE*

This symbol is used to indicate fasteners that must be tightened to a specific torque value.

NOTE:

A NOTE indicates an operation, procedure or instruction that is important for correct service.

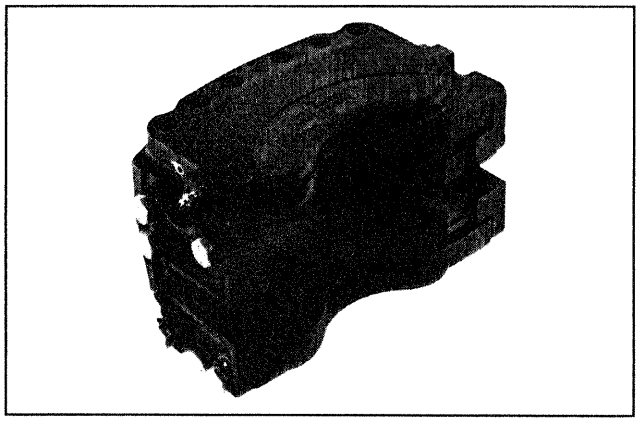
Some procedures require the use of special tools for safe and correct service. Failure to use these special tools when required, can cause serious personal injury to service personnel or damage to vehicle components.

⚠ *Asbestos and Non-Asbestos Fibers Warnings*

Rockwell SCL 19 and SCL 56 Dry Disc Brake Caliper linings do not use asbestos fibers. Some aftermarket brake linings contain asbestos fiber, a cancer and lung disease hazard. Some brake linings contain non-asbestos fibers whose long term effects are unknown. Caution should be exercised in handling both asbestos and non-asbestos materials as described on page 2.

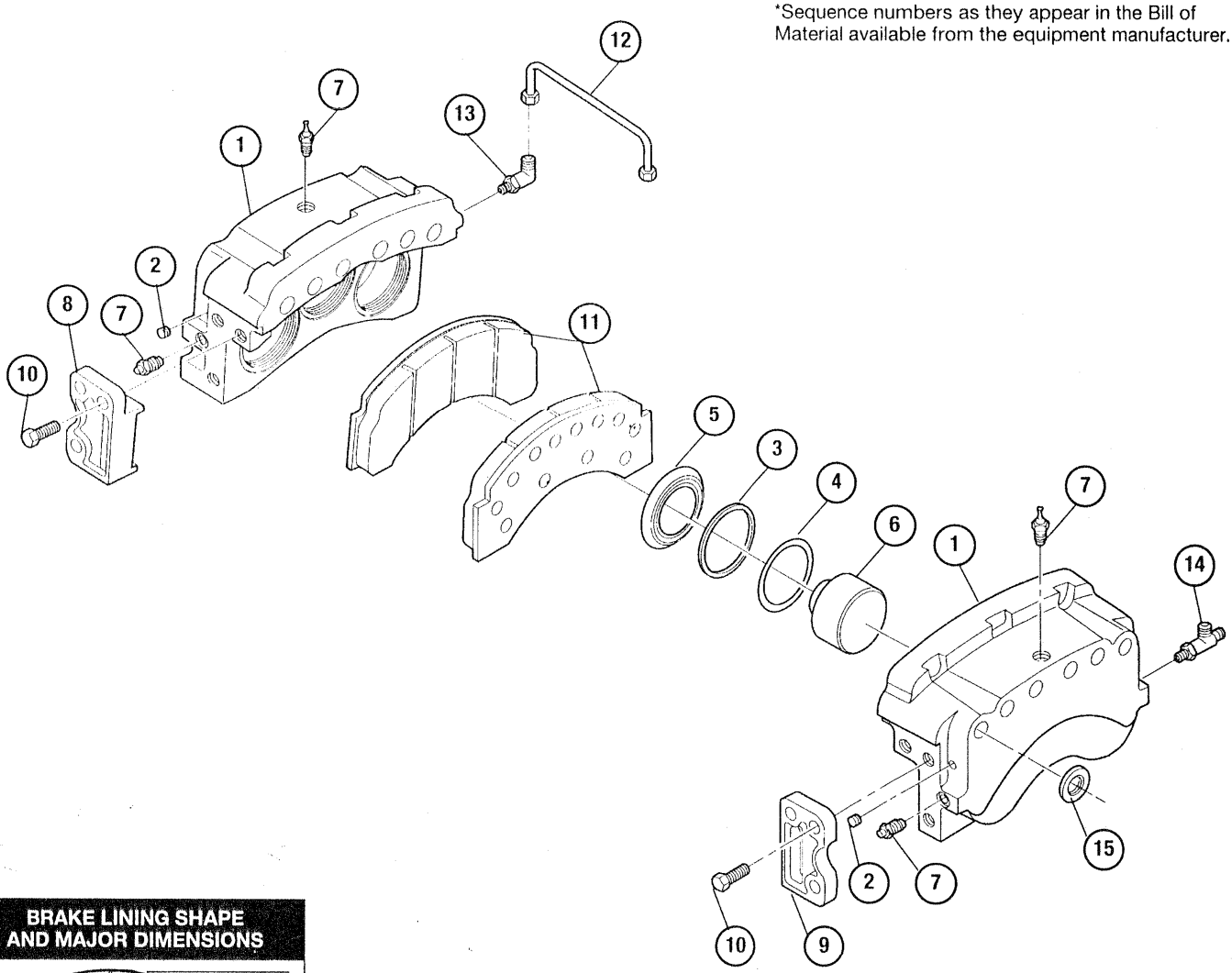
SCL 19 Series

BASE MODEL: SCL 19
MODEL: SCL 19-2
SCL 19-6

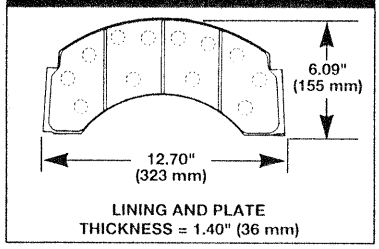


ITEM	DESCRIPTION	QTY.	SEQ. NO.*
1	Brake Housing	2	00100
2	Plug	4	00120
3	Back Up Ring	6	00130
4	O-Ring	6	00140
5	Dust Boot	6	00150
6	Piston	6	00160
7	Bleeder Screw	4	00200
8	End Plate LH	2	00220
9	End Plate RH	2	00230
10	End Plate Bolt	12	00240
11	Brake Lining Assembly	2	00250
12	Crossover Tube	1	00260
13	Elbow Fitting	1	00270
14	Tee Fitting	1	00290
15	Special Washer	12	00300

*Sequence numbers as they appear in the Bill of Material available from the equipment manufacturer.



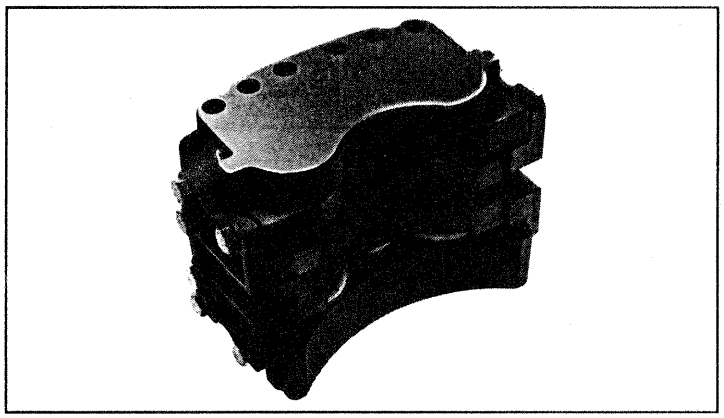
BRAKE LINING SHAPE AND MAJOR DIMENSIONS



LINING AND PLATE
THICKNESS = 1.40" (36 mm)

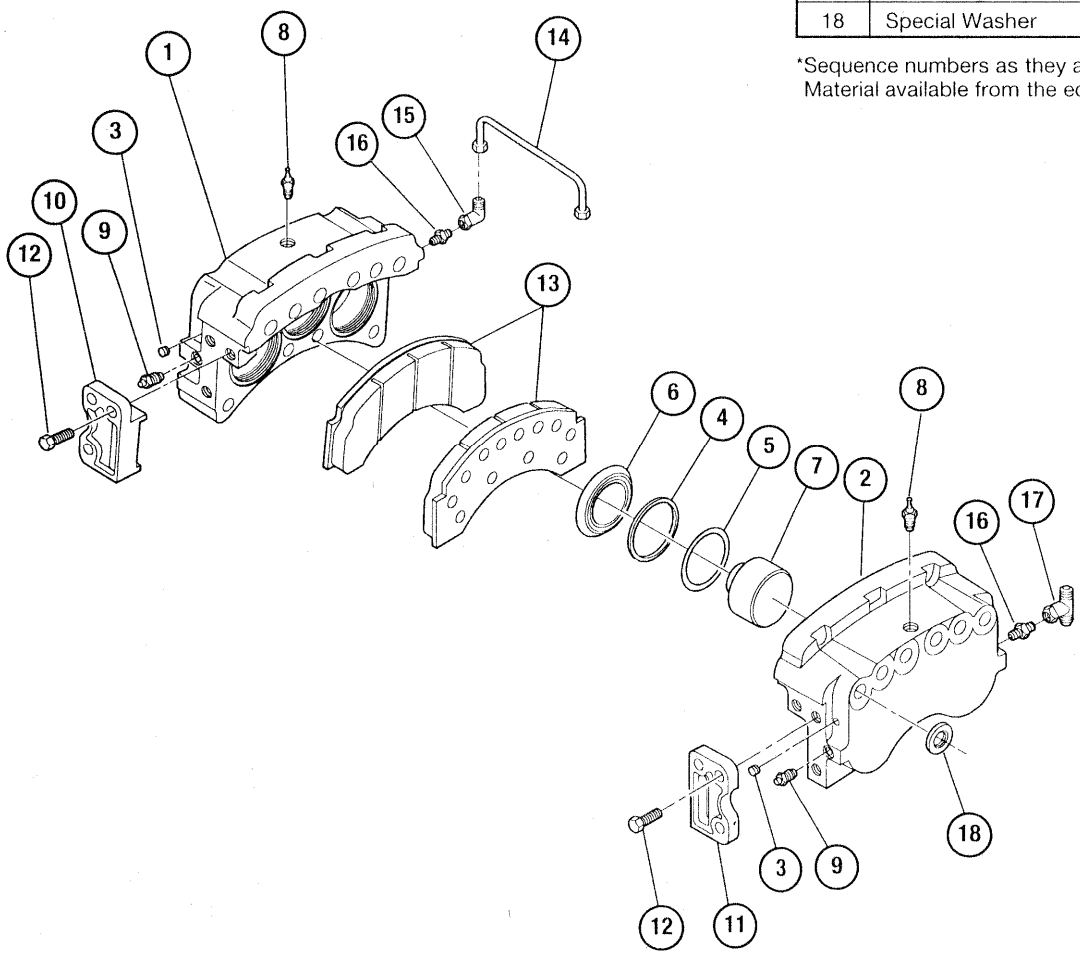
SCL 56 Series

BASE MODEL: SCL 56
MODEL: SCL 56-2

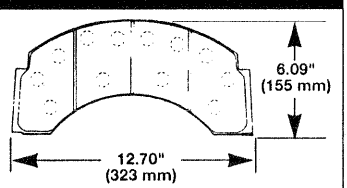


ITEM	DESCRIPTION	QTY.	SEQ. NO.*
1	Brake Housing	1	00100
2	Brake Housing	1	00110
3	Plug	4	00120
4	Back Up Ring	6	00130
5	O-Ring	6	00140
6	Dust Boot	6	00150
7	Piston	6	00160
8	Bleeder Screw	2	00200
9	Bleeder Screw	2	00210
10	End Plate LH	2	00220
11	End Plate RH	2	00230
12	End Plate Bolt	12	00240
13	Brake Lining Assembly	2	00250
14	Crossover Tube	1	00260
15	Elbow Fitting	1	00270
16	Connector Fitting	2	00280
17	Tee Fitting	1	00290
18	Special Washer	6	00300

*Sequence numbers as they appear in the Bill of Material available from the equipment manufacturer.



BRAKE LINING SHAPE AND MAJOR DIMENSIONS



LINING AND PLATE
THICKNESS = 1.40" (36 mm)

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SUBJECT PAGE

ASBESTOS FIBER WARNING

The following procedures for servicing brakes are recommended to reduce exposure to asbestos fiber dust, a cancer and lung disease hazard. Material Safety Data Sheets are available from Rockwell.

Hazard Summary

Because some brake linings contain asbestos, workers who service brakes must understand the potential hazards of asbestos and precautions for reducing risks. Exposure to airborne asbestos dust can cause serious and possibly fatal diseases, including asbestosis (a chronic lung disease) and cancer, principally lung cancer and mesothelioma (a cancer of the lining of the chest or abdominal cavities). Some studies show that the risk of lung cancer among persons who smoke and who are exposed to asbestos is much greater than the risk for non-smokers. Symptoms of these diseases may not become apparent for 15, 20 or more years after the first exposure to asbestos.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to asbestos dust follow. Consult your employer for more details.

Recommended Work Practices

1. Separate Work Areas. Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons. OSHA has set a maximum allowable level of exposure for asbestos of 0.1 f/cc as an 8-hour time-weighted average and 1.0 f/cc averaged over a 30-minute period. Scientists disagree, however, to what extent adherence to the maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling asbestos dust. OSHA requires that the following sign be posted at the entrance to areas where exposures exceed either of the maximum allowable levels:

DANGER: ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA

2. Respiratory Protection. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA for use with asbestos at all times when servicing brakes, beginning with the removal of the wheels.

3. Procedures for Servicing Brakes.

a) Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.

b) As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

c) If an enclosed vacuum system or brake washing equipment is not available, employers may adopt their own written procedures for servicing brakes, provided that the exposure levels associated with the employer's procedures do not exceed the levels associated with the enclosed vacuum system or brake washing equipment. Consult OSHA regulations for more details.

d) Wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.

e) **NEVER** use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. **NEVER** use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.

4. Cleaning Work Areas. Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. **NEVER** use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA for use with asbestos. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.

5. Worker Clean-Up. After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.

6. Waste Disposal. Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

Regulatory Guidance

References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.

NON-ASBESTOS FIBER WARNING

The following procedures for servicing brakes are recommended to reduce exposure to non-asbestos fiber dust, a potential cancer and lung disease hazard. Material Safety Data Sheets are available from Rockwell.

Hazard Summary

Most recently manufactured brake linings do not contain asbestos fibers. These brake linings may contain one or more of a variety of ingredients, including glass fibers, mineral wool, aramid fibers, ceramic fibers and silica that can present health risks if inhaled. Scientists disagree on the extent of the risks from exposure to these substances. Nonetheless, exposure to silica dust can cause silicosis, a non-cancerous lung disease. Silicosis gradually reduces lung capacity and efficiency and can result in serious breathing difficulty. Some medical experts believe other types of non-asbestos fibers, when inhaled, can cause similar diseases of the lung. In addition, silica dust and ceramic fiber dust are known to the State of California to cause lung cancer. U.S. and international agencies have also determined that dust from mineral wool, ceramic fibers and silica are potential causes of cancer.

Accordingly, workers must use caution to avoid creating and breathing dust when servicing brakes. Specific recommended work practices for reducing exposure to non-asbestos dust follow. Consult your employer for more details.

Recommended Work Practices

1. Separate Work Areas. Whenever feasible, service brakes in a separate area away from other operations to reduce risks to unprotected persons.

2. Respiratory Protection. OSHA has set a maximum allowable level of exposure for silica of 0.1 mg/m³ as an 8-hour time-weighted average. Some manufacturers of non-asbestos brake linings recommend that exposures to other ingredients found in non-asbestos brake linings be kept below 1.0 f/cc as an 8-hour time-weighted average. Scientists disagree, however, to what extent adherence to these maximum allowable exposure levels will eliminate the risk of disease that can result from inhaling non-asbestos dust.

Therefore, wear respiratory protection at all times during brake servicing, beginning with the removal of the wheels. Wear a respirator equipped with a high-efficiency (HEPA) filter approved by NIOSH or MSHA, if the exposures levels may exceed OSHA or manufacturer's recommended maximum levels. Even when exposures are expected to be within the maximum allowable levels, wearing such a respirator at all times during brake servicing will help minimize exposure.

3. Procedures for Servicing Brakes.

a) Enclose the brake assembly within a negative pressure enclosure. The enclosure should be equipped with a HEPA vacuum and worker arm sleeves. With the enclosure in place, use the HEPA vacuum to loosen and vacuum residue from the brake parts.

b) As an alternative procedure, use a catch basin with water and a biodegradable, non-phosphate, water-based detergent to wash the brake drum or rotor and other brake parts. The solution should be applied with low pressure to prevent dust from becoming airborne. Allow the solution to flow between the brake drum and the brake support or the brake rotor and caliper. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

c) If an enclosed vacuum system or brake washing equipment is not available, carefully clean the brake parts in the open air. Wet the parts with a solution applied with a pump-spray bottle that creates a fine mist. Use a solution containing water, and, if available, a biodegradable, non-phosphate, water-based detergent. The wheel hub and brake assembly components should be thoroughly wetted to suppress dust before the brake shoes or brake pads are removed. Wipe the brake parts clean with a cloth.

d) Wear a respirator equipped with a HEPA filter approved by NIOSH of MSHA when grinding or machining brake linings. In addition, do such work in an area with a local exhaust ventilation system equipped with a HEPA filter.

e) **NEVER** use compressed air by itself, dry brushing, or a vacuum not equipped with a HEPA filter when cleaning brake parts or assemblies. **NEVER** use carcinogenic solvents, flammable solvents, or solvents that can damage brake components as wetting agents.

4. Cleaning Work Areas. Clean work areas with a vacuum equipped with a HEPA filter or by wet wiping. **NEVER** use compressed air or dry sweeping to clean work areas. When you empty vacuum cleaners and handle used rags, wear a respirator equipped with a HEPA filter approved by NIOSH or MSHA, if the exposure levels may exceed OSHA or manufacturers' recommended maximum levels. When you replace a HEPA filter, wet the filter with a fine mist of water and dispose of the used filter with care.

5. Worker Clean-Up. After servicing brakes, wash your hands before you eat, drink or smoke. Shower after work. Do not wear work clothes home. Use a vacuum equipped with a HEPA filter to vacuum work clothes after they are worn. Launder them separately. Do not shake or use compressed air to remove dust from work clothes.

6. Waste Disposal. Dispose of discarded linings, used rags, cloths and HEPA filters with care, such as in sealed plastic bags. Consult applicable EPA, state and local regulations on waste disposal.

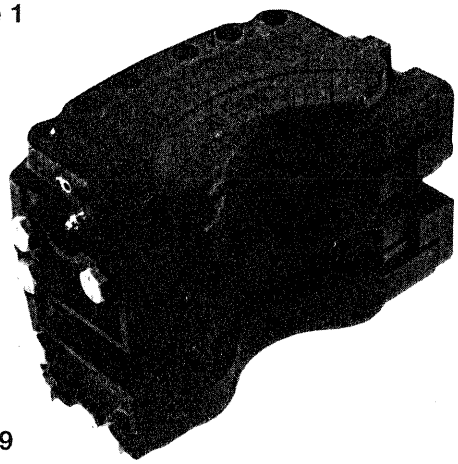
Regulatory Guidance

References to OSHA, NIOSH, MSHA, and EPA, which are regulatory agencies in the United States, are made to provide further guidance to employers and workers employed within the United States. Employers and workers employed outside of the United States should consult the regulations that apply to them for further guidance.

Section 1
Introduction

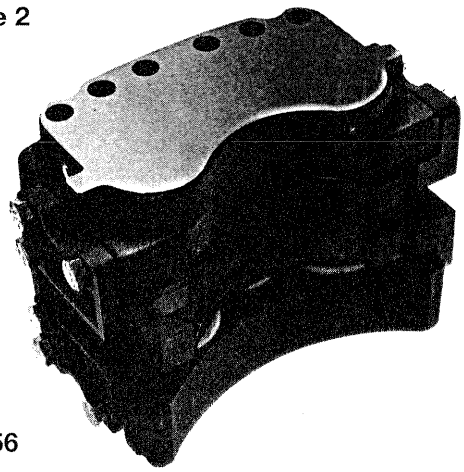
Description

Figure 1



SCL 19

Figure 2



SCL 56

The SCL 19 and SCL 56 dry disc brake calipers are intended only for service use on hydraulic brake systems.

The SCL 56 is a heavy-duty version of the SCL 19. The SCL 56 has a more massive caliper housing. It has four extra mounting bolts. All other parts, except the crossover tube, elbow fittings, tee fittings, connector fittings and bleeders are interchangeable.

Both calipers mount to a fixed position on fixed position discs and have two-piece housings. Three pistons are installed in each housing half. End plates hold the non-asbestos lining assemblies in the housing.

One, two or three calipers can be installed on one disc.

- If one caliper is installed, install it at the twelve o'clock position.
- If two calipers are installed, install them at the three o'clock and nine o'clock positions.
- If three calipers are installed, install them at the four, eight and twelve o'clock positions.

Hydraulic Fluid

WARNING

- ***Use only the type of hydraulic fluid specified by the equipment manufacturer. Do not use or mix different types of hydraulic fluid. The wrong hydraulic fluid will damage the rubber parts of the caliper and cause damage, loss of braking and serious personal injury.***
- ***Do not reuse hydraulic fluid. Used fluid can be contaminated and can cause incorrect operation which could result in serious personal injury.***

The SCL 19 and SCL 56 brake systems use one of two types of hydraulic fluid:

- Petroleum Base Hydraulic Fluid (Mineral Oil)
  Example: Meets MIL-H-5606 specifications.
- Non-Petroleum Base Hydraulic Fluid (Automotive Brake Fluid)
  Example: Glycol DOT 3, meets SAE J-1703 specifications.

Section 1
Introduction

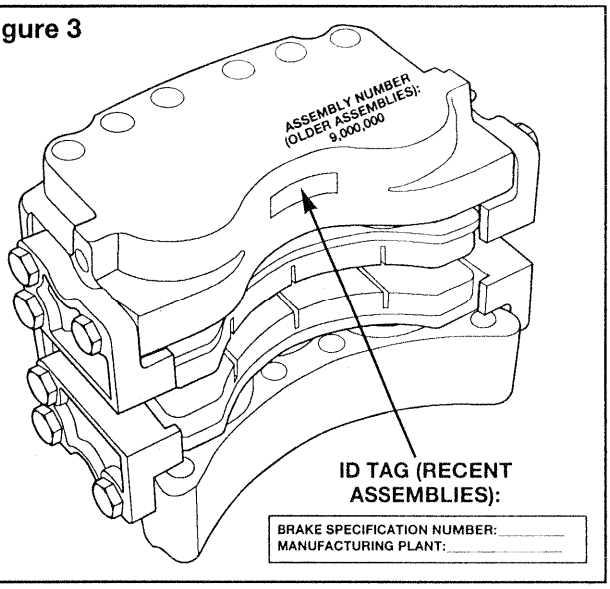
Identification

A seven digit assembly number located on the side of the caliper that is opposite from the mounting plate identifies older assemblies. More recent assemblies are identified by an identification tag located on the inside radius of the caliper opposite from the mounting plate. **Figure 3.**

⚠ *CAUTION*

Use only the specified components when you assemble the caliper. Do not mix components from other calipers. If you install the wrong components, the caliper cannot operate correctly and may cause damage to the equipment. Use of non-Rockwell parts may cause improper operation of the brakes.

Figure 3



Remove Caliper

WARNING
To prevent serious eye injury, always wear safe eye protection when doing maintenance or service.

WARNING
If it is necessary to raise the vehicle to service the brakes, support the vehicle with safety stands. Do not work under a vehicle only supported by jacks. Jacks can slip or fall over and cause serious personal injury.

1. Make sure vehicle is on a level surface.
2. Place blocks under the wheels not being serviced to keep the vehicle from moving.
3. If necessary, raise the vehicle so that the wheels to be serviced are off the ground. Support the vehicle with safety stands.

WARNING
The housings are very heavy. Make sure the housings are supported during removal and installation. Serious personal injury or damage to the caliper can occur if the caliper housings fall.

NOTE:
To lessen the weight of the caliper, the brake linings can be removed from the caliper before the caliper is removed from the vehicle.

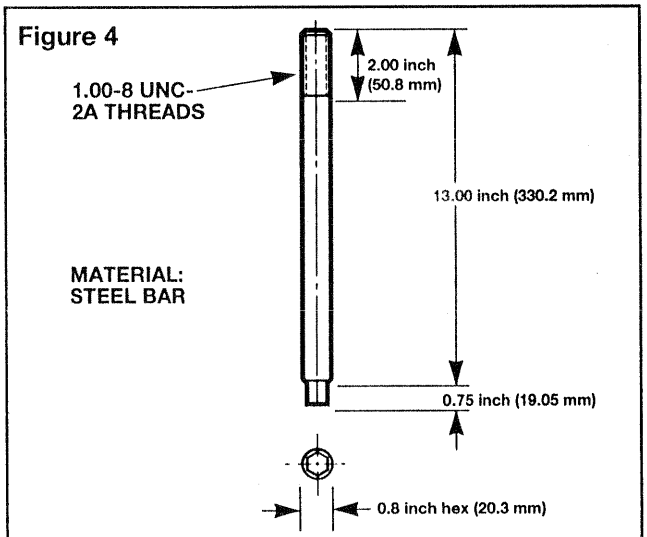
Remove Brake Linings

1. Remove the bolts that fasten the end plates to one side of the caliper housing. Remove the end plates. Replace worn or damaged end plates.
2. Loosen the bleeder screws in the caliper housings to release hydraulic pressure.
3. Use a piece of wood to pry the linings away from the disc and push the pistons completely into the housing. Tighten the bleeder screws.
4. Remove the linings from the housing. Inspect the linings as described in Section 3.

Remove Caliper Housing

1. Disconnect the brake line from the inlet fittings. Remove the cross-over tube from the housings. Place plugs in the brake lines and the fittings to prevent contamination of the system.
2. Remove the two center O.D. brake mounting fasteners. Replace them with two long brake installation studs. **Figure 4.**

Figure 4



Brake Installation Stud

Section 2
Removal and Disassembly

3. Remove the remaining brake mounting fasteners.

4. Slide the outer housing subassembly off over the studs.

5. If the disc is to be removed, remove it. Slide the remaining housing subassembly off over the studs.

WARNING

To avoid serious personal injury and possible damage to components, be very careful when using lifting devices:

- ***Inspect to make sure that the lifting straps are not damaged.***
- ***Always use both lifting straps when lifting.***
- ***Do not subject lifting straps to any shock or drop loading.***

6. If the disc is not removed, support the housing subassembly with a lifting device while the studs are being removed. Lift the caliper housing clear of the disc.

7. If any shims are removed, mark the shim positions for reassembly later.

Disassemble Caliper

1. Remove brake linings. Refer to page 5.

WARNING

Do not put your hand in front of the pistons when you force out the pistons. Serious personal injury may occur.

2. Push the pistons completely into the housing.

3. Remove the dust boots.

4. Remove the pistons.

5. Remove the bleeder screws from the housing.

6. Remove and discard the O-rings and the back-up rings. Inspect the ring grooves in the housing for scratches and rust. Remove small scratches and rust with emery cloth. Replace the housing if there are large scratches or large amounts of rust. See Section 3, "Inspect Caliper Parts."

7. Inspect the pistons and the bores for scratches and rust. Remove small scratches and rust with emery cloth. Replace the components if they are worn or if there are large scratches or large amounts of rust. See Section 3, "Inspect Caliper Parts."

Section 3
Inspecting and Cleaning

Periodic On-Vehicle Inspections

> ***WARNING***
> ***To prevent serious eye injury, always wear safe eye protection when doing maintenance or service.***

Inspect the caliper, linings and disc as specified by the maintenance schedule of the vehicle or equipment manufacturer.

Inspect Shoes, Linings and End Plates

Remove the shoes and linings. To help prevent abnormal lining wear, replace worn, bent or cracked end plates and distorted shoes. End plate bolts are highly stressed. Inspect end plate bolts for wear. Replace the bolts if worn.

Inspect the linings for:

Lining Wear. Replace the linings when the thickness of the lining is 0.125 inch (3.2 mm) from the backplate.

Lining Wear Not Even. Replace the linings if the thickness of the two linings is significantly different. Check the pistons for correct operation. Replace the piston and/or housing if a piston is cocked in the bore. Check that the disc surface is flat and parallel to the linings.

Oil or Grease on Linings. Replace the linings.

Cracks on Linings. Replace linings that have larger or deeper cracks than the small, tight cracks on the surface of the lining which are normal when the caliper is used under high temperature conditions. These cracks are referred to as "heat check cracks."

> ***CAUTION***
> ***Always replace both linings. If only one lining is replaced, possible disc damage can occur.***

Inspect for Caliper Leaks

Inspect the following areas for fluid leaks.

- **Pistons.** If fluid leaks at a piston, disassemble the caliper. Inspect the piston, the bore, the O-rings and the back-up rings. Service as necessary.
- **Elbow Fitting, Tee Fitting or Connector.** If fluid leaks at the fitting, tighten the fitting. If the leak continues, replace the O-ring and/or the fitting.
- **Tube Assembly.** If fluid leaks from the tube assembly, tighten or replace the tube or fitting.
- **Bleeder Screw.** If fluid leaks at the bleeder screw, tighten the bleeder screw. If the leak continues, replace the bleeder screw.
- **Inlet Fitting.** If fluid leaks at the inlet fitting, tighten the fitting. If the leak continues, replace the O-ring.

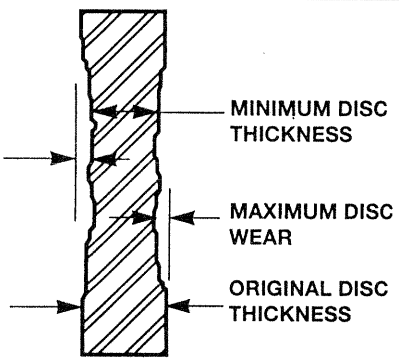
Inspect Dust Boots

Make sure the dust boots are soft and flexible. Disassemble the caliper and replace dust boots that are hard or damaged.

Inspect Disc

If the disc is worn beyond the wear limits, replace the disc. **Figure 5.** See the specifications of the vehicle manufacturer for wear limits that may be different from those shown below.

Figure 5



TYPICAL SECTION THROUGH DISC SHOWING RECOMMENDED MAXIMUM WEAR LIMITS

ORIGINAL DISC THICKNESS	MAXIMUM DISC WEAR	MINIMUM DISC THICKNESS
1.250 inch (31.8 mm)	0.06 inch (1.5 mm)	1.12 inch (28.6 mm)

Section 3
Inspecting and Cleaning

Inspect Caliper Parts

1. Inspect the pistons, housing bores and O-ring grooves for scratches or corrosion. Remove small scratches or corrosion with fine emery cloth. Replace the component if they are worn beyond wear limits or if there are large scratches or large amounts of corrosion.

2. Measure the outer diameter of the piston. Replace the piston if the outer diameter is less than 3.621 inches (91.97 mm).

3. Measure the diameter of the housing bore. Replace the housing if the diameter exceeds 3.629 inches (92.18 mm).

4. Inspect the linings as described earlier in this section.

5. Inspect caliper ports and end plate bolt holes for thread damage. Use the appropriate taps lubricated with light oil to inspect tapped holes for thread damage and to clean up minor thread damage.

   - Fluid ports: 0.4375-20 UNF-2B Tap
     0.5625-18 UNF-2B Tap
   - End plate bolt holes: 0.7500-16 UNF-2B Tap

NOTE:
Replace any component that has thread damage that cannot be repaired.

6. Discard all back-up rings, O-rings and dust boots. Use new ones when you assemble the caliper.

Cleaning

WARNING
If you use cleaning solvents, hot solution tanks or alkaline solutions incorrectly, serious personal injury can occur. To prevent serious personal injury, follow the instructions supplied by the manufacturer of these products. Do NOT use gasoline to clean parts. Gasoline can explode and cause serious personal injury.

CAUTION
Use only solvent cleaners to clean ground or polished metal parts. Hot solution tanks or water and alkaline solutions will damage these parts. Isopropyl alcohol, kerosene or diesel fuel can be used for this purpose.

- Use solvent cleaners to clean all metal parts that have ground or polished surfaces. Examples of ground or polished parts are the piston and the piston bore in the caliper.
- Metal parts with rough surfaces can be cleaned with solvent cleaners or with alkaline solutions.
- Use a wire brush to clean the threads of fasteners and fittings.
- Use soap and water to clean parts that are not made of metal.
- Scrape away build-ups of mud and dirt on the linings. **Replace all linings contaminated with oil or grease.**
- Immediately after cleaning, dry all parts with clean paper or rags.

Corrosion Protection

Apply brake system fluid to the cleaned and dried parts that are not damaged and are to be immediately assembled. Do NOT apply fluid to the brake linings or the disc.

If parts are to be stored, apply a special material that prevents corrosion to all surfaces. Do NOT apply the material to the brake linings or the disc. Store the parts inside special paper or other material that prevents corrosion.

Assemble Caliper

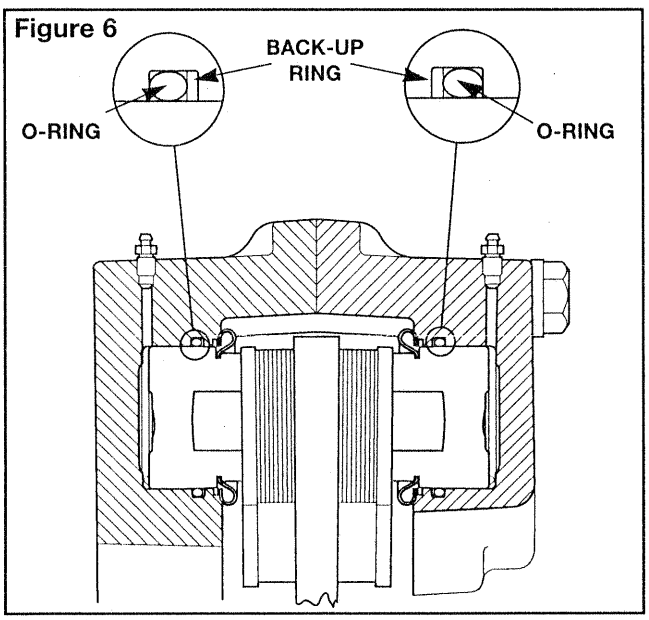
⚠ WARNING
To prevent serious eye injury, always wear safe eye protection when doing maintenance or service.

⚠ CAUTION
Use only the specified components when you assemble the caliper. Do not mix components from other calipers. If you install the wrong components, the caliper will not operate correctly and may cause damage to the equipment. Use of non-Rockwell parts may cause improper operation of the brakes.

1. Lubricate all pistons, bores, new O-rings and new back-up rings with silicone grease such as Dow Corning DC-4 or equivalent. If silicone grease is not available, use the same type of fluid that is used in the brake system. Do not use silicone grease on the dust boot.

2. Install new O-rings and new back-up rings in the bore grooves. **Figure 6.**

Figure 6



   a. Install the back-up rings toward the lining side of the bore.

   b. Install the o-rings into the groove behind the back-up rings.

3. Install the pistons in the housings. Be careful not to pinch the seals.

   a. Push the pistons in from the lining side of the housing. Make sure the pistons are straight in the bores.

   b. Push each piston completely into the bore.

⚠ CAUTION
If dust boots are not completely installed into the housing groove, the piston will cut and damage the dust boot when pressure is applied.

4. Install dust boots. Make sure they are completely installed into the housing groove and into the piston groove.

⚠ CAUTION
Always replace both linings. If only one lining is replaced, possible disc damage can occur.

⚠ WARNING
To avoid serious personal injury, be careful when using Loctite. Follow the manufacturer's instructions for safe use to prevent irritation to eyes and skin. Wash after skin contact. If the Loctite gets in the eyes, flush the eyes with water for 15 minutes. Have eyes checked by a doctor.

5. Install brake linings in caliper housing:

   a. Apply Loctite 271 or equivalent to threads of end plate bolts.

   b. Install end plates on housing. Tighten bolts to 380-460 lb-ft (515-624 N•m). T

   c. Check that linings slide freely within end plates without binding.

6. Install the inlet fittings and bleeders so the bleeders are at the high end of the housing when installed on the vehicle. Tighten bleeders to 100-120 lb-in (11.3-13.5 N•m). T

Section 4
Assembly and Installation

7. Low pressure test both halves of the caliper at 50 psi (3.45 bar) to check for leaks. Use same type of hydraulic fluid used in the braking system. If any leaks are found refer to Section 3. For testing, bolt one half of the caliper to a fixture plate or bolt the two caliper halves together.

   a. If the caliper halves are bolted together, place a four inch (101.6 mm) thick spacer between the pistons.

   b. If one half of the caliper is bolted to a fixture, place a two inch (50.8 mm) thick spacer between the fixture and the pistons.

CAUTION

If the housing is to be stored, put caps over the fittings to prevent contamination inside the housing.

Install Caliper

WARNING

The housings are very heavy. Make sure the housings are supported during installation. Serious personal injury or damage to the caliper can occur if the caliper housings fall.

NOTE:

If shims are used, put the shims in the position marked during removal.

1. Use a lifting device to move the inner caliper housing in position. Install special studs in the center two O.D. mounting holes. **See Figure 4.**

2. If the disc was removed, reinstall the disc. Tighten the disc fasteners to the vehicle manufacturer's specified torque. T

3. Slide the outer housing subassembly over the studs.

CAUTION

The attaching fasteners must be tightened to the specified torque. The torque puts preload on the caliper housings. If the fasteners are not tightened to the specified torque, the brake will be damaged when hydraulic pressure is applied.

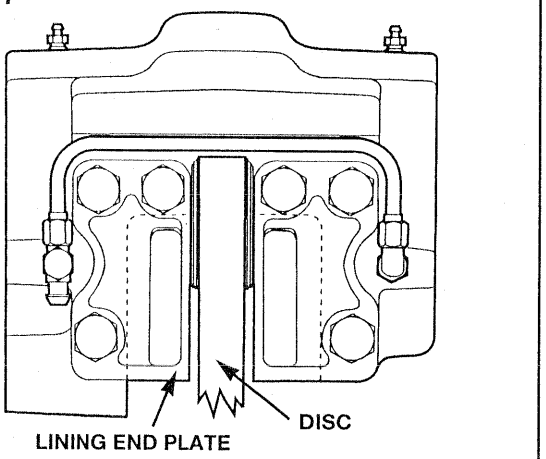
4. Install the fasteners that attach the housings to the vehicle.

   - If the fastener threads are lubricated with oil, tighten the fasteners to 725 lb-ft (982 N•m). T
   - If the fastener threads are dry, tighten the fasteners to 967 lb-ft (1311 N•m). T

NOTE:

The disc must be within ±0.06 inch (1.5 mm) of being centered between the lining end plates. To increase outboard clearance and decrease inboard clearance, install a shim either between the housing and mounting bracket or between the hub and disc. The shims must be steel, ground flat and parallel and must cover the entire mounting surface of the hub or housing. The linings must move freely in the housing and between the end plates. **Figure 7.**

Figure 7



5. If necessary, reverse the locations of the bleeders and the inlet fittings so the bleeders are at the highest end of the housings. Install the bleeder screws, T-fitting and elbow fitting. Connect the crossover tube to the fittings. Tighten all the fittings.

6. Remove the plug from the brake line. Connect the brake line to the inlet fitting.

7. If not installed during caliper assembly, install the brake linings. See page 9.

8. Bleed the brakes. Refer to the following section.

9. Apply and release the brakes three times to make sure the caliper operates correctly. Check for fluid leaks. Make sure the linings move freely in the caliper.

10. Burnish new brake linings before releasing vehicle for operation see page 12.

Bleed Brakes

⚠ *WARNING*

When you loosen any brake system hydraulic connection, you must bleed the brakes to remove all air from the system. Air can prevent hydraulic pressure from applying the brakes properly which could increase the stopping distances and result in serious personal injury.

NOTE:

The SCL 19 and SCL 56 brakes are designed to bleed properly when mounted at the three, nine or twelve o'clock position.

Always start at the point in the system that is furthest from the master cylinder and work back toward the master cylinder. Bleed every bleeder screw on every caliper on every wheel. When you complete a bleeder screw, go to the next closest bleeder screw on the same caliper. When you complete a caliper, go to the next closest caliper on the same wheel. When you complete a wheel, go to the furthest bleeder screw on the next closest wheel.

⚠ *WARNING*

- ***Use only the type of hydraulic fluid specified by the equipment manufacturer. Do not use or mix different types of hydraulic fluid. The wrong hydraulic fluid will damage the rubber parts of the caliper and cause damage, loss of braking and serious personal injury.***

- ***Do not reuse hydraulic fluid. Used fluid can be contaminated and can cause incorrect operation which could result in serious personal injury.***

1. Make sure that the master cylinder is filled to the specified level with the type of hydraulic fluid specified by the equipment manufacturer. Keep the master cylinder filled during bleeding so that you do not pull air into the system through the master cylinder. Make sure the master cylinder is filled when you are done bleeding the system.

2. Put a clear tube on the bleeder screw. Submerge the other end of the tube in a clear container of the specified fluid.

3. Bleed brakes.

   For full hydraulic systems:

   Slowly apply low hydraulic pressure to the caliper. Loosen the bleeder screw. Continue to apply pressure until there are no air bubbles in the fluid. Tighten the bleeder screw 100-120 lb-in (11.3-13.5 N•m) and then release the pressure to the caliper. T

   For air/hydraulic or mechanical actuator systems:

   Apply the brake pedal and then loosen the bleeder screw. Tighten the bleeder screw 100-120 lb-in (11.3-13.5 N•m) before you release the brake pedal so that air is not pulled back into the system. Repeat until there are no air bubbles in the fluid when you apply the brake pedal and loosen the bleeder screw. T

4. Check for fluid leaks.

Burnish Linings

CAUTION

Front brakes may require burnishing independently from rear brakes in order to control disc temperatures. Do not exceed 800° F (427° C) disc temperatures during burnish.

1. If necessary, disconnect rear brakes so that front brakes can be burnished independently.

2. Drive vehicle on level terrain while dragging only front brakes until front disc temperatures reach or exceed 600° F (316° C).

3. Cool front brake discs to approximately 250° F (121° C) between brake dragging cycles.

4. Repeat step 2 to burnish front brakes a second cycle.

5. If linings smoke or smell, continue burnishing until smoke and smell are gone.

6. Reconnect system to operate front and rear brakes. After front brakes are cooled to approximately 250° F (121° C), release vehicle for operation.

Brake Does Not Apply

CONDITION	POSSIBLE CAUSES	CORRECTION
No pressure to brake.	1. Empty fluid reservoir. 2. Damaged hydraulic system.	1. Fill reservoir to correct level with specified fluid. 2. Repair hydraulic system.
Piston does not move.	1. No pressure to brake. 2. Piston cocked in bore.	1. Fill reservoir to correct level with specified fluid. 2. Piston diameter is less than 3.621 inches (91.97 mm): Replace caliper housing if bore diameter is more than 3.629 inches (92.18 mm). Replace linings if lining wear is tapered. Remove dirt and other material between lining and piston.
Brake leaking.	1. Loose bleeder screw. 2. Loose inlet fitting. 3. Damaged inlet fitting. 4. Worn or damaged O-rings or backup rings.	1. Tighten bleeder screw to 100-120 lb-in. (11.3-13.5 N•m). 2. Tighten inlet fitting. 3. Replace inlet fitting. 4. Replace O-rings or backup rings. Inspect piston for wear and damage. Service as necessary.
Damaged linings.	1. Lining thickness less 0.125 inch (3 mm). 2. Lining wear not even. 3. Cracked or broken linings. 4. Oil or grease on linings.	1. Replace linings. 2. Replace piston if diameter less than 3.621 inches (91.97 mm). Replace caliper if bore diameter is more than 3.629 inches (92.18 mm). Inspect housing for clogged fluid passages. Service as necessary. Replace worn end plates. 3. Replace linings. 4. Replace linings.

Brake Does Not Release

CONDITION	POSSIBLE CAUSES	CORRECTION
Vehicle does not move.	1. Parking brake applied. 2. Damaged hydraulic system.	1. Release parking brake. 2. Repair hydraulic system.
Brakes dragging on disc and running too hot.	1. Pressure (more than 3 psi or 0.207 bar) applied when brakes are released. 2. Vehicle or equipment not operated correctly. 3. Piston cocked in bore. 4. Worn or damaged end plates.	1. Repair hydraulic system so that pressure is less than 3 psi (0.207 bar) when brakes are released. 2. Advise operator on correct vehicle or equipment operation. 3. Replace piston if diameter is less than 3.621 inches (91.97 mm). Replace caliper housing if bore diameter more than 3.629 inches (92.18 mm). Replace linings if lining wear is tapered. Remove dirt and other material between lining and piston. 4. Replace worn or damaged end plates. Make sure linings move freely between end plates.

Section 6
Specifications

Torque Chart

Bleeder screws	100-120 lb-in (11.3-13.5 N•m)	
Pipe plug	120 lb-in (13.5 N•m)	
End plate bolts	380-460 lb-ft (515.2-623.6 N•m)	
Mounting bolts	Lubricated:	725 lb-ft (982 N•m)
	Dry:	967 lb-ft (1311 N•m)

NOTE:

For more information on parts and kits, see Rockwell publication PB-9201, "Hydraulic Dry Disc Brake Parts." This catalog is available from:

Rockwell Literature Distribution Center
c/o Vispac, Inc.
35000 Industrial Road
Livonia, MI 48150

Or call (313) 435-8689

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