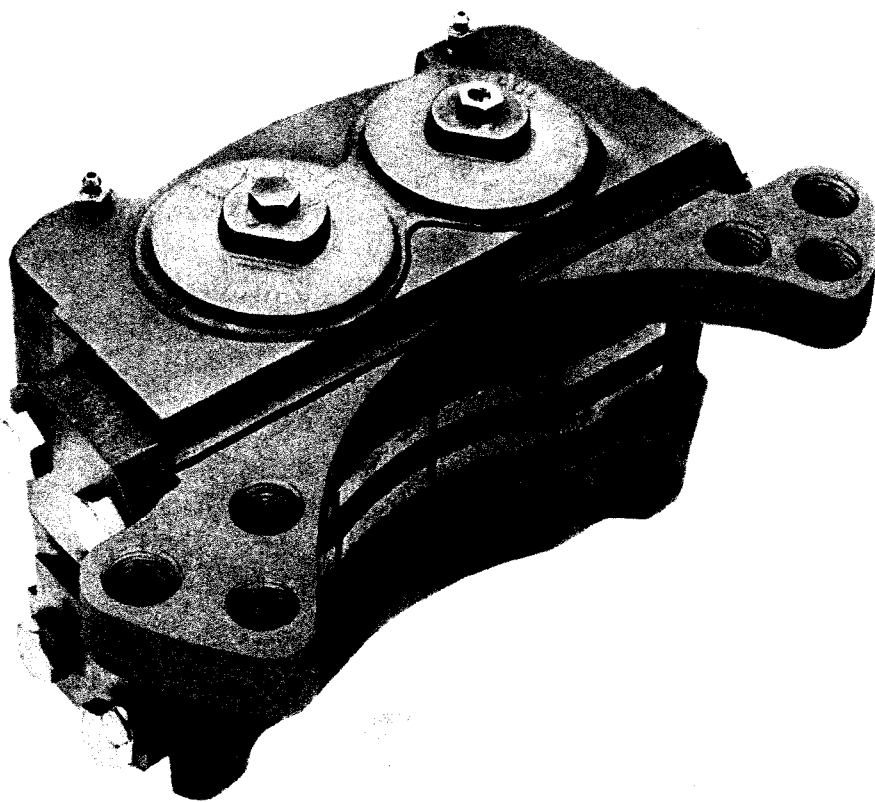


SCL 2 SERIES Dry Disc Brake Calipers



- SCL 2-13
- SCL 2-15
- SCL 2-22
- SCL 2-24
- SCL 2-26
- SCL 2-28

Use only genuine Rockwell Parts.

SERVICE NOTES

This Maintenance Manual describes the correct service and repair procedures for the Rockwell SCL 2-13, SCL 2-15, SCL 2-22, SCL 2-24, SCL 2-26 and SCL 2-28 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 notes 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.



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. A note can also give information that will make service quicker and easier.

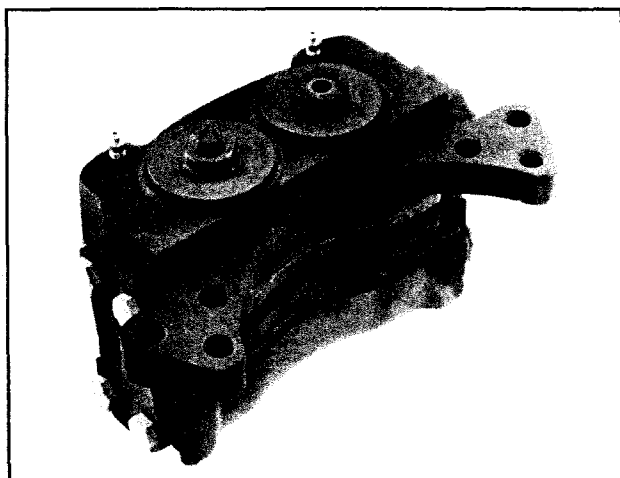
Some procedures require the use of special tools for safe and correct service. Failure to use these special tools when required, can cause serious personal injury to service personnel or damage to vehicle components.



ASBESTOS AND NON-ASBESTOS FIBER WARNING

Rockwell SCL 2 Series 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.

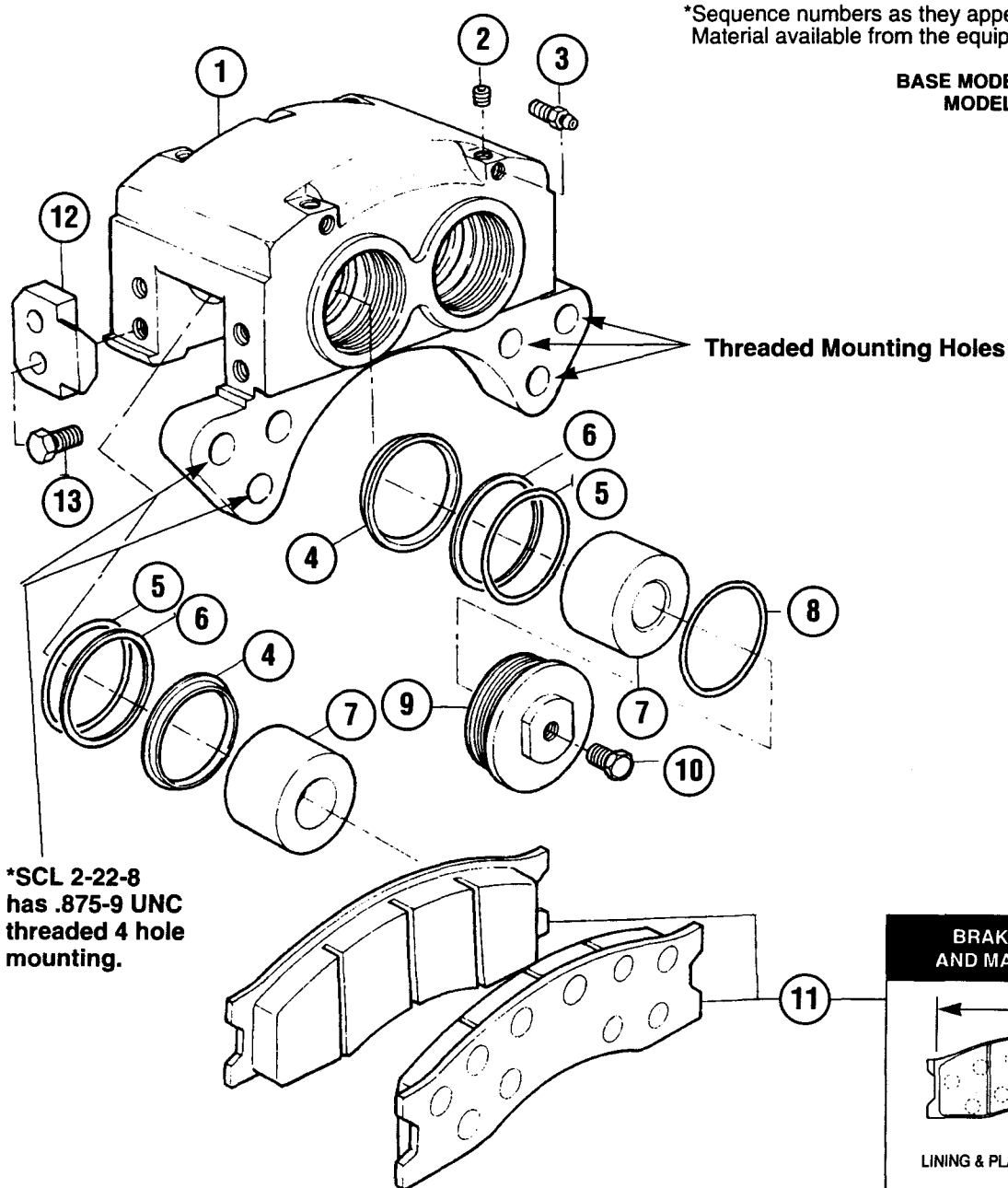
Caution should be exercised in handling both asbestos and non-asbestos materials as described on page 2.

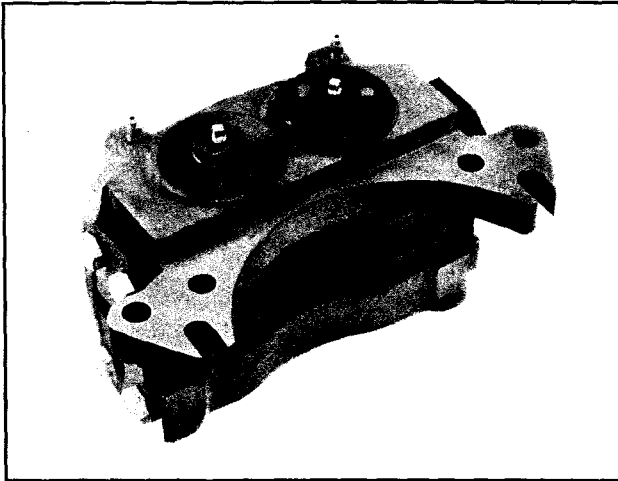


ITEM	DESCRIPTION	QTY.	*SEQUENCE NUMBER
1	Housing	1	00100
2	Plug	4	00110
3	Bleeder Screw	2	00230
4	Dust Seal	4	00140
5	O-Ring	4	00130
6	Back-up Ring	4	00120
7	Piston	4	00150
8	O-Ring	2	00160
9	Cylinder Cap	2	00170
10	Plug	1	00210
11	Lining Assembly	2	00180
12	End Plate	4	00190
13	Capscrew	8	00200

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

BASE MODEL: SCL 2
 MODELS: SCL 2-13
 SCL 2-22
 SCL 2-28

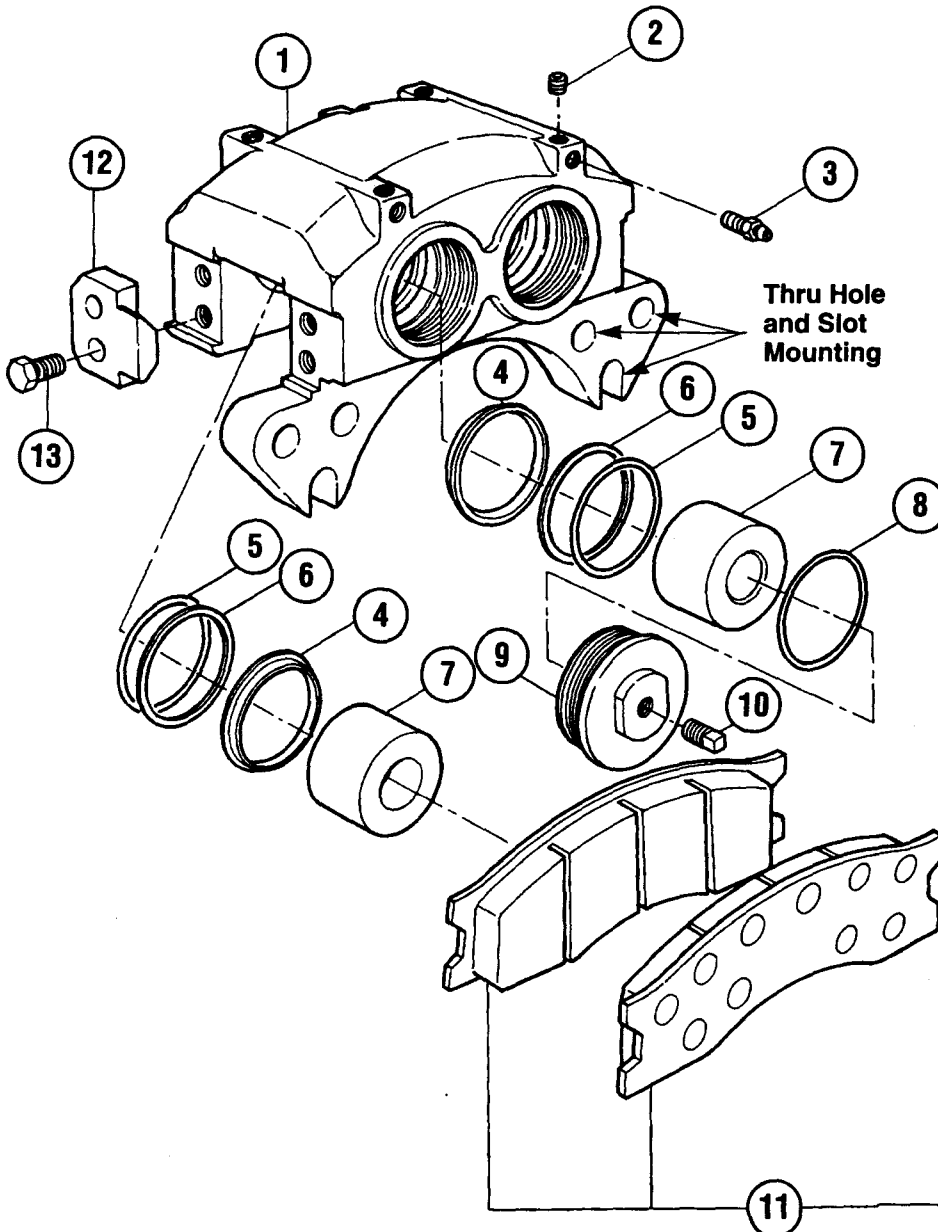




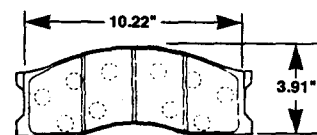
ITEM	DESCRIPTION	QTY.	*SEQUENCE NUMBER
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2	Plug	4	00110
3	Bleeder Screw	2	00230
4	Dust Seal	4	00140
5	O-Ring	4	00130
6	Back-up Ring	4	00120
7	Piston	4	00150
8	O-Ring	2	00160
9	Cylinder Cap	2	00170
10	Plug	2	00210
11	Lining Assembly	2	00180
12	End Plate	4	00190
13	Capscrew	8	00200

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

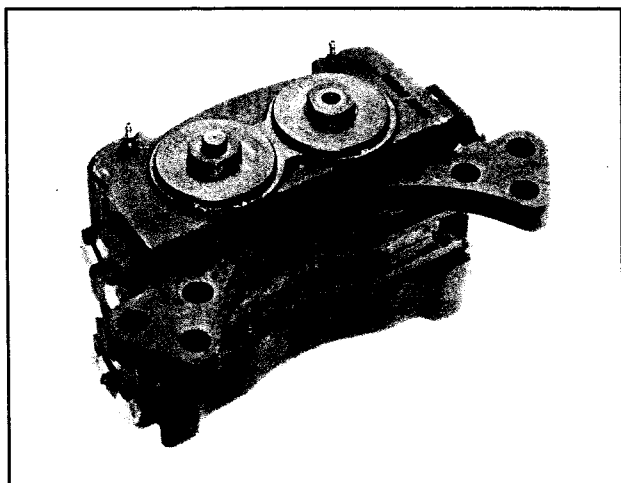
BASE MODEL: SCL 2
MODEL: SCL 2-15



BRAKE LINING SHAPE AND MAJOR DIMENSIONS



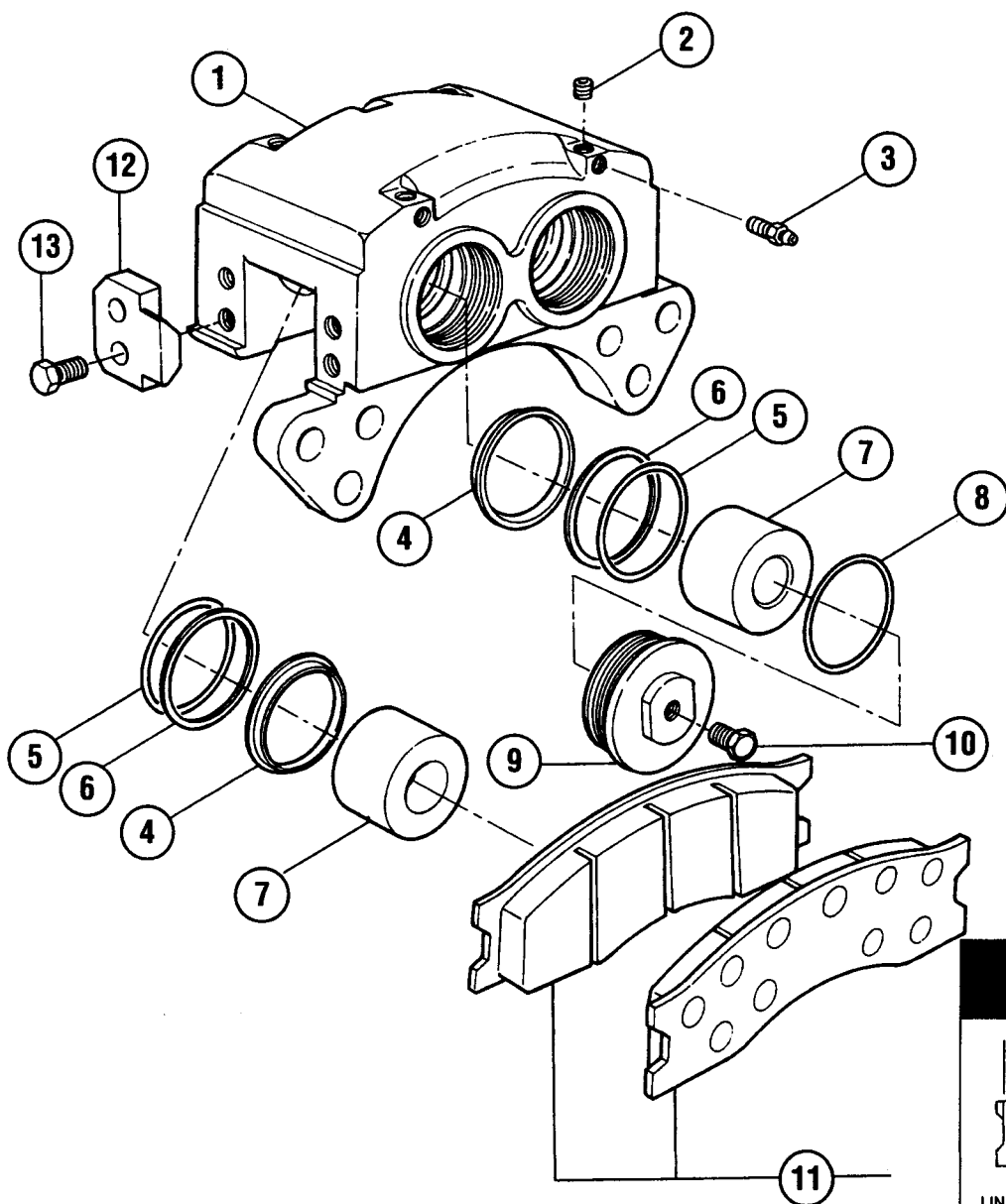
LINING & PLATE THICKNESS = .923"



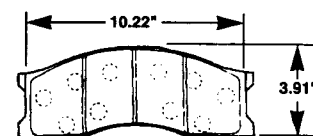
ITEM	DESCRIPTION	QTY.	*SEQUENCE NUMBER
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2	Plug	4	00110
3	Bleeder Screw	2	00230
4	Dust Seal	4	00140
5	O-Ring	4	00130
6	Back-up Ring	4	00120
7	Piston	4	00150
8	O-Ring	2	00160
9	Cylinder Cap	1	00170
10	Plug	2	00210
11	Lining Assembly	2	00180
12	End Plate	4	00190
13	Capscrew	8	00200

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

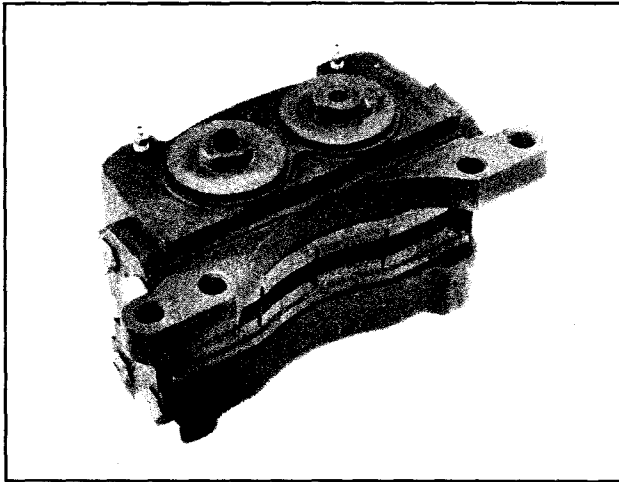
BASE MODEL: SCL 2
MODEL: SCL 2-24



BRAKE LINING SHAPE AND MAJOR DIMENSIONS



LINING & PLATE THICKNESS = .923"



ITEM	DESCRIPTION	QTY.	*SEQUENCE NUMBER
1	Housing	1	00100
2	Plug	4	00110
3	Bleeder Screw	2	00230
4	Dust Seal	4	00140
5	O-Ring	4	00130
6	Back-up Ring	4	00120
7	Piston	4	00150
8	O-Ring	2	00160
9	Cylinder Cap	2	00170
10	Plug	1	00210
11	Lining Assembly	2	00180
12	End Plate	4	00190
13	Capscrew	8	00200

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

BASE MODEL: SCL 2
MODEL: SCL 2-26

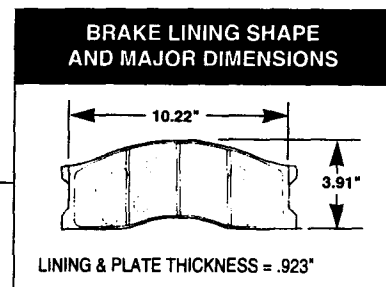
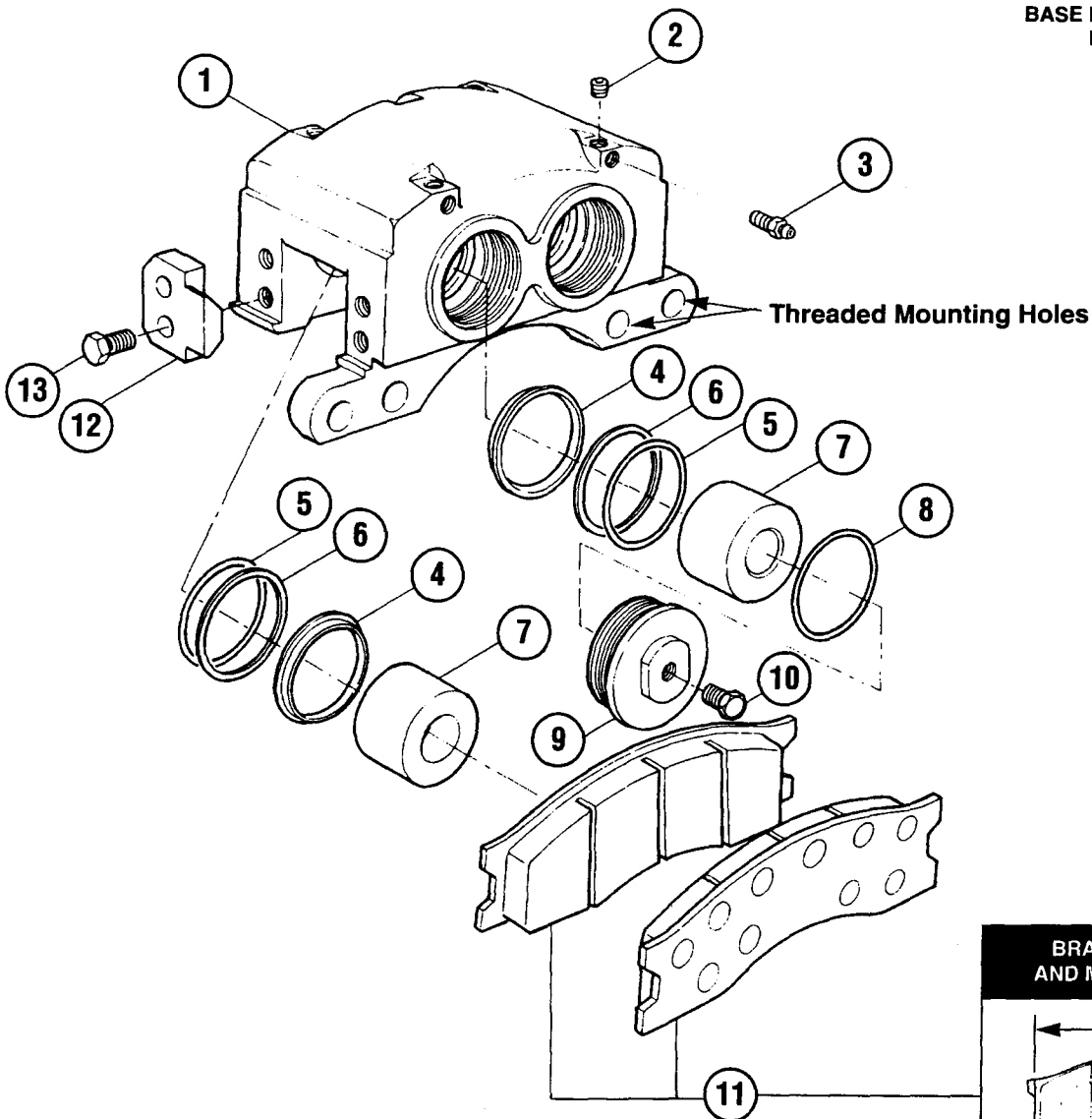



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ASBESTOS WARNING

Recommended Procedures for Reducing Asbestos Dust, a Cancer and Lung Disease Hazard. For All Rockwell Brake Linings with Asbestos.

1. Because some brake linings contain asbestos, it is important that people who handle brake linings know the potential hazards of asbestos and the precautions to be taken. Exposure to airborne asbestos dust can cause serious and possibly fatal diseases; namely, asbestosis (a chronic lung disease) and cancer, principally lung cancer and mesothelioma (a cancer of the lining of the chest or abdominal cavities). The risk of lung cancer among asbestos workers who smoke is much greater than that among non-smokers. Symptoms of these diseases are not usually seen until 15 or 20, or more, years after the first exposure to asbestos.

2. OSHA has set the maximum allowable level for asbestos at 0.2 fibers of asbestos per cubic centimeter of air (0.2 f/cc) as an eight hour time weighted average and at 1.0 fiber per cubic centimeter (1.0 f/cc) averaged over a 30-minute sampling period. There is scientific debate whether even these levels will eliminate all risk of asbestos-related disease. Therefore, workers doing brake work should take steps to minimize exposure to asbestos to the extent possible.

3. Areas where brake work is done should be separate from other operations if possible. OSHA requires that the following sign be posted at the entrance to areas where exposures exceed either 0.2 f/cc (as an eight hour time weighted average) or 1.0 f/cc (averaged over a 30-minute sampling period).

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

4. During brake servicing, the mechanic should wear an air purifying respirator with high-efficiency filters approved by NIOSH or MSHA for asbestos dust. (Disposable dust masks are no longer allowed by OSHA.) The respirator should be worn during all procedures, starting with the removal of wheels and including reassembly.

5. OSHA recommends that enclosed cylinders equipped with vacuums with high-efficiency (HEPA) filters be used in brake repairs. Under this system, the entire brake assembly is placed within the cylinder and the mechanic works on the brake through sleeves attached to the cylinder. Compressed air is blown into the cylinder to clean the assembly, and the dirty air is removed from the cylinder by the vacuum.

6. If such an enclosed system is not available, the mechanic must carefully clean the brake assembly in the open air. During disassembly, all parts should be carefully placed on the floor to minimize creation of airborne dust. Dust should first be cleaned from the brake drums, brake backing plates and brake assemblies using an industrial vacuum cleaner equipped with a HEPA filter system. After vacuum cleaning, any remaining dust should be removed using a rag soaked in water and wrung until nearly dry.

7. Compressed air or dry brushing should **never** be used for cleaning brake assemblies.

8. If grinding or other machining of brake linings is necessary, other precautions must be taken because exposure to asbestos dust is the highest during such operations. In addition to use of an approved respirator, there must be local exhaust ventilation such that worker exposures are kept as low as possible.

9. Work areas should be cleaned by industrial vacuums with HEPA filters or by wet wiping. Compressed air or dry sweeping should **never** be used for cleaning. Asbestos-containing waste, such as dirty rags, should be sealed, labeled and disposed of as required by EPA and OSHA regulations. Respirators should be used when emptying vacuum cleaners and handling asbestos waste products. Workers should wash before eating, drinking, or smoking, should shower after work, and should not wear work clothes home. Work clothes should be vacuumed after use and then laundered, without shaking, to prevent the release of asbestos fibers into the air.



NON-ASBESTOS FIBER WARNING

Most recently manufactured brake linings no longer contain asbestos fibers. In place of asbestos, these linings contain a variety of ingredients, including glass fibers, mineral wool, aramid fibers, ceramic fibers and carbon fibers. At present, OSHA does not specifically regulate these non-asbestos fibers, except as nuisance dust. Medical experts do not agree about the possible long-term risks from working with and inhaling non-asbestos fibers. Some experts nonetheless think that long term exposure to some non-asbestos fibers could cause diseases of the lung, including pneumoconiosis, fibrosis and cancer. Therefore, Rockwell recommends that workers use caution to avoid creating and breathing dust when working on brakes that contain non-asbestos fibers.

1. Whenever possible, work on brakes in a separate area away from other operations.

2. Always wear a respirator approved by NIOSH or MSHA during all brake service procedures. Wear the respirator from removal of the wheels through assembly.

3. **Never** use compressed air or dry brushing to clean brake parts or assemblies. OSHA recommends that you use cylinders that enclose the brake. These cylinders have vacuums with high efficiency (HEPA) filters and worker's arm sleeves. But, if such equipment is not available, carefully clean parts and assemblies in the open air.

4. Clean brake parts and assemblies in the open air. During disassembly, carefully place all parts on the floor to avoid getting dust into the air. Use an industrial vacuum cleaner with a HEPA filter system to clean dust from the brake drums, backing plates and other brake parts. After using the vacuum, remove any remaining dust with a rag soaked in water and wrung until nearly dry.

5. Grinding or machining brake linings. If you must grind or machine brake linings, take additional precautions because contact with fiber dust is higher during these operations. In addition to wearing an approved respirator, do such work in an area with exhaust ventilation.

6. Cleaning the work area. **Never** use compressed air or dry sweeping to clean the work area. Use an industrial vacuum with a HEPA filter and rags soaked in water and wrung until nearly dry. Dispose of used rags with care to avoid getting dust into the air. Use an approved respirator when emptying vacuum cleaners and handling used rags.

7. Worker clean-up. Workers should wash their hands before eating, drinking or smoking. Do not wear your work clothes home. Vacuum your work clothes after use and then launder them separately, without shaking, to prevent fiber dust from getting into the air.

8. Material safety data sheets on this product, as required by OSHA, are available from Rockwell or from the Original Equipment Manufacturer (OEM) from whom the product was purchased.

Section 1

Introduction

Description

The SCL 2 Series dry disc brake calipers are intended only for service use on hydraulic brake systems. All calipers mount to a fixed position on fixed position discs.

The calipers have four pistons with two pistons on each side of the disc. The linings are made from non-asbestos material.

CALIPER	MOUNTING
SCL 2-13	M20 X 2.5 threaded 6 hole mounting (metric)
SCL 2-15	0.766" (19.15 mm) diameter 4 through hole and 2 slot hole mounting
SCL 2-22	0.750-10 UNC threaded 6 hole mounting except SCL 2-22-8 has 0.875-9 UNC threaded 4 hole mounting
SCL 2-24	0.828" (21 mm) diameter 6 through hole mounting
SCL 2-26	0.875-9 UNC threaded 4 hole mounting
SCL 2-28	0.750-10 UNC threaded 6 hole mounting

One or two calipers can be used on a disc. If one caliper is used, it is mounted at the 12 o'clock position. **Figure 1**. If two calipers are used, they are mounted at the 3 o'clock and the 9 o'clock positions. **Figure 1A**.

Figure 1

**TWELVE O'CLOCK
MOUNTING POSITION**

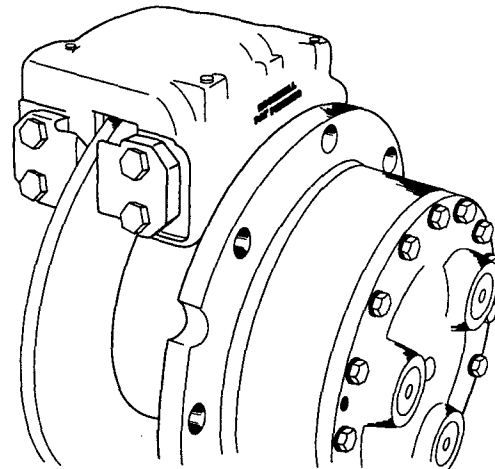
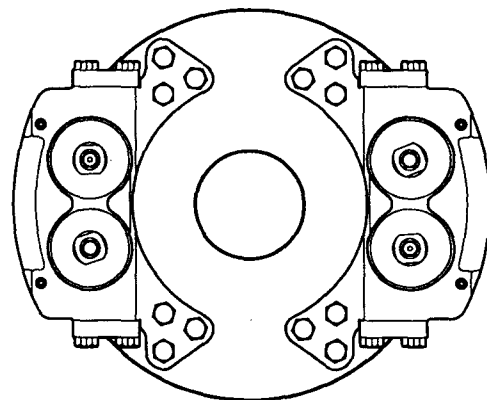


Figure 1A

**THREE O'CLOCK AND
NINE O'CLOCK
MOUNTING POSITION**



Section 1

Introduction

Hydraulic Fluid

WARNING

Use only the type of hydraulic fluid specified by the equipment manufacturer. Do not use different types of hydraulic fluid. The wrong hydraulic fluid will damage the rubber parts of the caliper. Different types of hydraulic fluid should not be mixed. This may cause loss of braking and serious personal injury.

The brake system uses one of two types of 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.

For the type of fluid and specifications, see the recommendations of the equipment manufacturer.

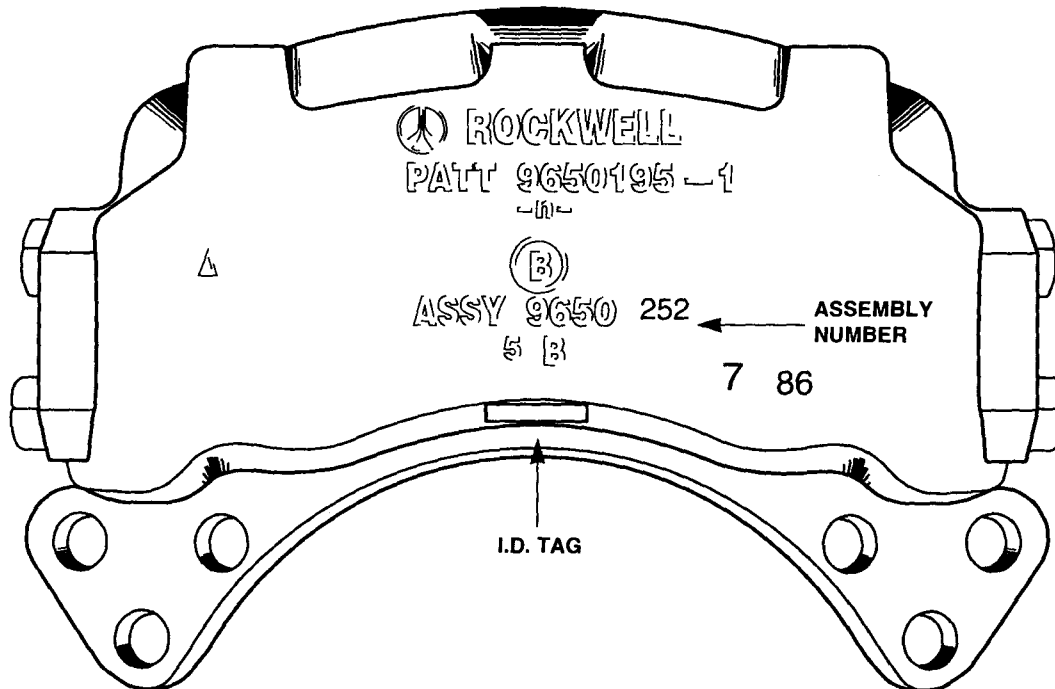
Identification

Older assemblies can be identified by a seven-digit assembly number marked on the side of the caliper that is opposite from the mounting plate. More recent assemblies are identified by an identification tag located on the inside radius of the caliper opposite from the mounting plate. **Figure 2.**

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.

Figure 2



Section 2 Troubleshooting

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 worn less than 2.995 inches (76.073 mm): • Replace piston. Caliper bore diameter worn more than 3.003 inches (76.276 mm): • Replace caliper housing. Tapered lining wear: • Replace linings. 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 and/or backup rings. 5. Loose cylinder cap.	1. Tighten bleeder screw to 100-120 lb-in (11.3-13.6 N•m). 2. Tighten inlet fitting. 3. Replace inlet fitting. 4. Replace O-rings and/or backup rings. Inspect piston for wear and damage. Service as necessary. 5. Tighten cylinder cap to 75 lb-ft (100 N•m).
Damaged linings.	1. Lining thickness less than 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. Inspect piston. Service as necessary. Caliper bore diameter worn more than 3.003 inch (76.276 mm): • Replace caliper. Inspect housing for clogged fluid passages. Service as necessary. Worn end plates: • Replace 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. More than 3 psi (.2 bar) pressure applied when brakes are released. 2. Vehicle or equipment not operated correctly. 3. Piston cocked in bore.	1. Repair hydraulic system so that pressure is less than 3 psi (.2 bar) when brakes are released. Bleed brakes. 2. Advise operator on correct vehicle or equipment operation. 3. Piston diameter worn less than 2.995 inches (76.073 mm): • Replace piston. Caliper bore diameter worn to more than 3.003 inches (76.276 mm): • Replace caliper housing. Tapered lining wear: • Replace linings. Remove dirt and other material between lining and piston.

Section 3

Removal and Installation

Remove Linings



WARNING

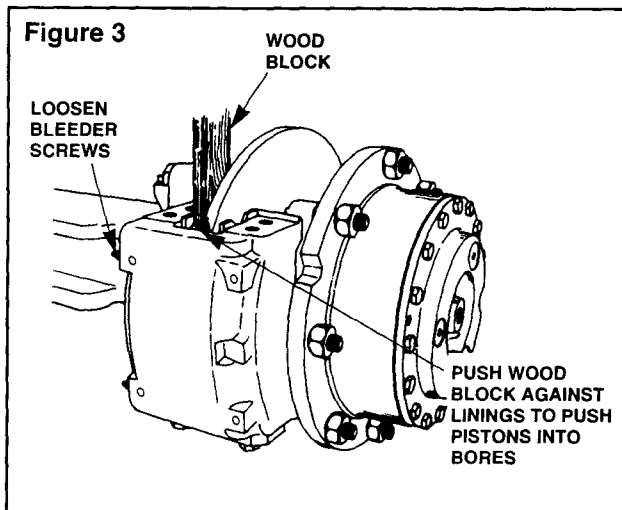
To prevent serious eye injury, always wear safe eye protection when doing maintenance or service.



WARNING

Support the vehicle with safety stands. Do not work under a vehicle supported only by jacks. Jacks can slip or fall over and cause serious personal injury.

1. Put blocks under the wheels of the vehicle to keep the vehicle from moving.
2. Remove the bolts that fasten the end plates to one side of the caliper housing. Remove the end plates. If end plates are worn, replace end plates.
3. Loosen the bleeder screws to release the hydraulic pressure in the caliper. **Figure 3.**



4. Use a piece of wood against the linings as a pry bar to push the pistons completely into the housing. Tighten the bleeder screws. **Figure 3.**
5. Remove the linings from the caliper housing. If necessary, discard the linings.

Install Linings



CAUTION


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

1. Put blocks under the wheels of the vehicle to keep the vehicle from moving.
2. Install the linings in the caliper housing.



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.

3. Apply Loctite 271 or equivalent to the threads of the bolts and fasten the end plates to the housing.
4. Put the end plates on the housing. Install and tighten the bolts to 170 lb-ft (230 N•m). Make sure the linings move freely in the housing. 
5. Remove the air from the brake system. See Bleed Brakes in this manual.
6. 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 housing.

Bleed Brakes



WARNING

Failure to bleed the brakes will allow air to remain in the brake system. This could prevent the hydraulic pressure in the brake system from rising enough to apply the brakes properly. This will cause the stopping distance to increase and may result in serious personal injury.

NOTE:

The SCL 2 Series dry disc brake calipers are designed to bleed properly when mounted at the 3, 9 or 12 o'clock position.

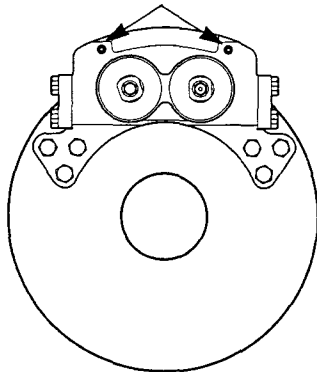
Section 3

Removal and Installation

If you loosen any brake system hydraulic connection, then you must bleed the brakes to remove all air from the system. Always start at the point in the system that is furthest from the master cylinder. **Figures 4 and 5.** Bleed every bleeder screw on every caliper at every brake position. 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 at the same position. When you complete a position, go to the furthest bleeder screw at the next closest position.

Figure 4

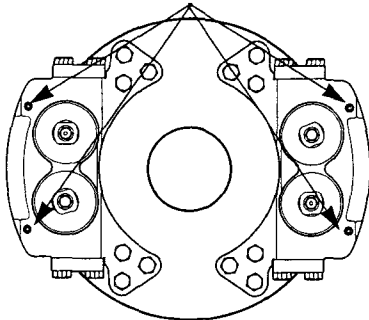
**TWELVE O'CLOCK
MOUNTING POSITION
Bleeder Screws**



•Bleed the side of the caliper that is further from the master cylinder first.

Figure 5

**THREE O'CLOCK AND
NINE O'CLOCK
MOUNTING POSITION
Bleeder Screws**



• Bleed the caliper that is further from the master cylinder first.
• Bleed the side of the caliper that is further from the master cylinder first.



WARNING

Use only the type of hydraulic fluid specified by the equipment manufacturer. Do not use different types of hydraulic fluid. The wrong hydraulic fluid will damage the rubber parts of the caliper. Different types of hydraulic fluid should not be mixed. This may cause loss of braking and serious personal injury.



WARNING

Properly discard hydraulic fluid that is removed from the brake system. Fluid that is removed may be contaminated. Contaminated fluid may cause incorrect operation, damage and 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. **Full Hydraulic System**
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 and then release the pressure to the caliper.

Air/Hydraulic or Mechanical Actuator System

Apply the brake pedal and then loosen the bleeder screw. Tighten the bleeder screw 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.

Remove Caliper

1. Put blocks under the wheels of the vehicle to keep the vehicle from moving.
2. Disconnect the brake line from the inlet fitting. Put a plug in the brake line and the inlet fitting to prevent contamination of the system.

Section 3

Removal and Installation

3. Remove the linings as described earlier in this section.
4. Remove the fasteners that hold the caliper housing on the mounting bracket. Remove the caliper housing from the mounting bracket. If shims are used between the housing and the bracket, mark the position of the shims.

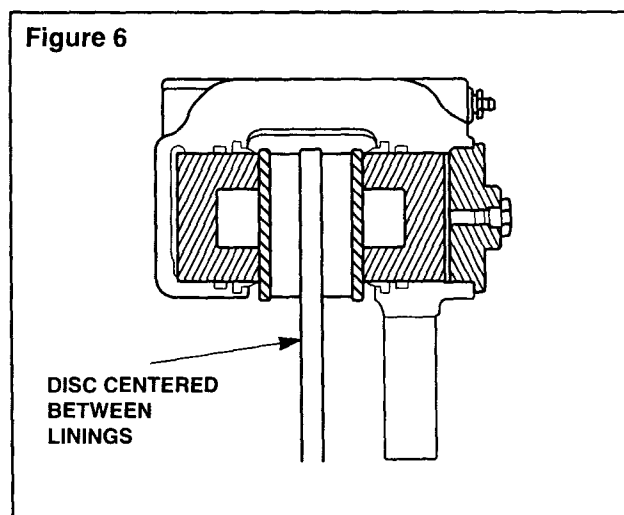
Install Caliper

1. Put blocks under the wheels of the vehicle to keep the vehicle from moving.
2. If shims are used, put the shims in the position marked during removal.
3. Put the caliper housing on the mounting bracket. Install the fasteners that hold the caliper on the bracket. Tighten the fasteners to the torque specified by the equipment manufacturer.
4. Install the brake linings in the caliper housing. Apply Loctite 271 or equivalent to the threads of the bolts that fasten the end plates to the housing.
5. Put the end plates on the housing. Install and tighten the bolts to 170 lb-ft (230 N•m).
6. Make sure the housing is installed correctly on the mounting bracket. The disc must be within $\pm .06$ inches (± 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 6.**

Figure 6



7. Remove the plugs from the brake line and the inlet fitting. Connect the brake line to the inlet fitting.
8. Remove the air from the brake system. See Bleeding the Brakes in this manual.
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.

Section 4

Disassembly and Assembly

Disassemble Caliper



WARNING

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

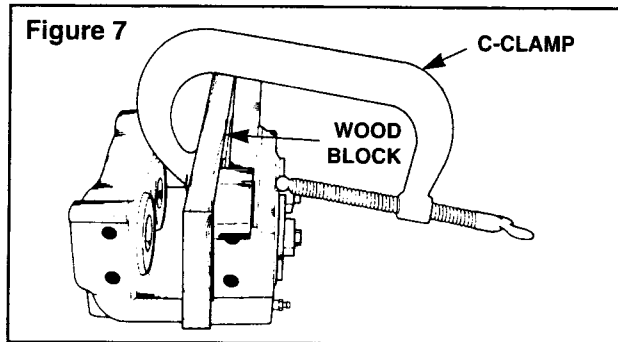


WARNING

Properly discard hydraulic fluid that is removed from the brake system. Fluid that is removed may be contaminated. Contaminated fluid may cause incorrect operation, damage and serious personal injury.

1. Remove the inlet fitting and the O-ring from the cylinder cap. Drain the hydraulic fluid from the caliper. Discard the fluid.
2. Clean the outside of the housing with isopropyl alcohol. Dry the housing with a clean cloth.
3. If installed, remove the bolts that hold the end plates on the housing. Remove the end plates and linings.
4. Remove the pistons from the side of the housing opposite the mounting plate according to the following procedure:
 - A. Use a C-clamp to hold a 0.50 inch (50 mm) block of wood against two pistons on the mounting side of the housing. Make sure the C-clamp is not in the area in front of the piston bore. **Figure 7.**

Figure 7

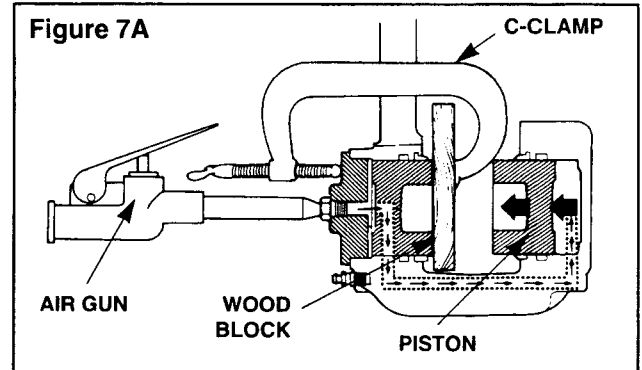


WARNING

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

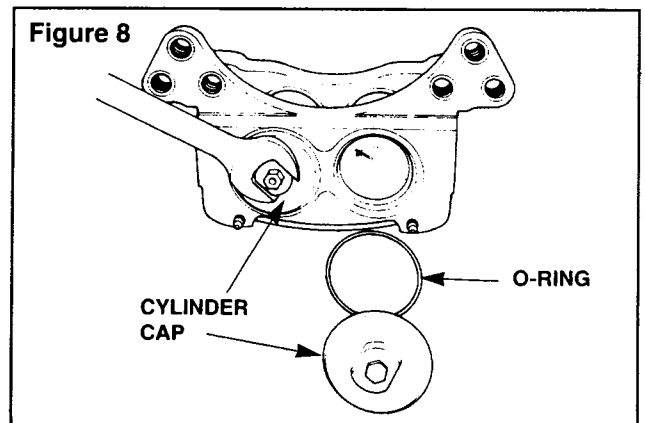
- B. Apply compressed air to the inlet fitting to force the pistons out of the housing. If one piston comes out before the other piston, put a piece of wood in front of the piston that comes out first. Apply compressed air to force the other piston out of the housing. **Figure 7A.**

Figure 7A



- C. Remove the wood block and the C-clamp from the housing.
 - D. Remove the pistons from the bores that are opposite from the mounting plate.
5. Remove the two bleeder screws from the housing.
 6. Put an open-end wrench on the two flat areas on top of the cylinder cap. Remove the cylinder caps from the housing. Remove and discard the O-ring. **Figure 8.**

Figure 8

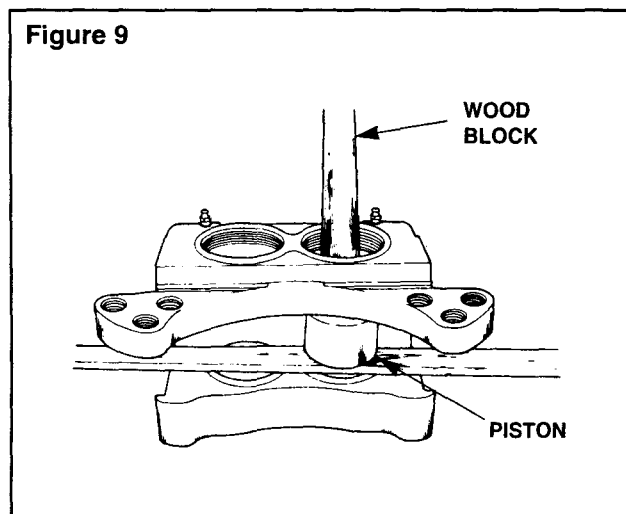


Section 4

Disassembly and Assembly

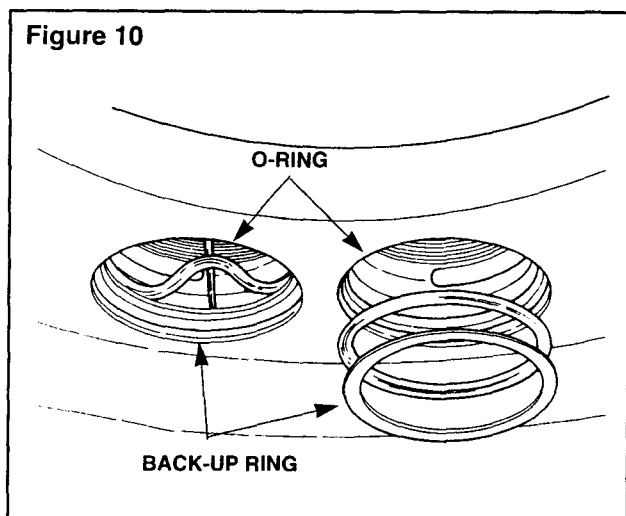
- Remove the pistons from the mounting plate side of the housing. Push on the ends of the pistons to force them out of the disc side of the housing.

Figure 9.



- Remove the dust seals from the housing.
- Remove and discard the O-rings and the back-up rings. **Figure 10.** 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 5, Inspecting Caliper Parts.

Figure 10



- 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 5, Inspecting Caliper Parts.

Assemble Caliper



CAUTION

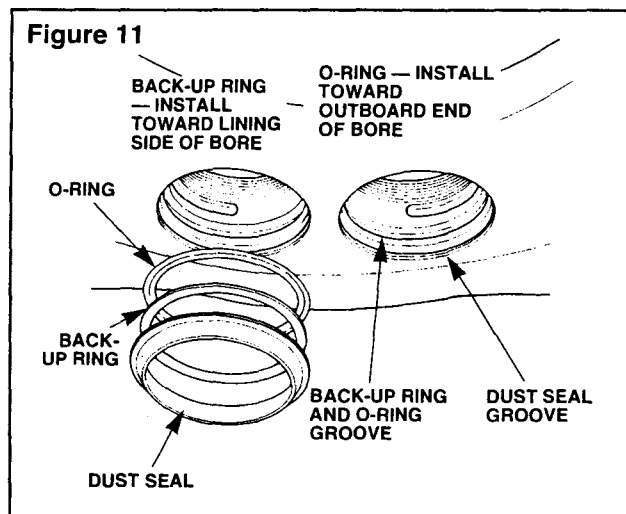
Use only the specified components when you assemble the caliper. Do not mix components from other calipers. If you install the wrong components, the caliper will not operate correctly and may cause damage to the equipment. Use of non-Rockwell parts may cause improper operation of the brakes.

- Lubricate all pistons, bores, O-rings, and 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.
- Install a new O-ring and a new back-up ring in the groove in the middle of the bore. The O-ring is installed toward the outboard end of the bore. The back-up ring is installed toward the lining side of the bore. **Figure 11. Do not use silicone grease on the dust seal.**
- Install a new dust seal in the top groove of the bore. **Figure 11.**

NOTE:

The O-rings, back-up rings, pistons and bores must be lubricated before you can install the pistons.

Figure 11



Section 4

Disassembly and Assembly

4. Install the pistons in the housing. Push the pistons in from the lining side of the housing. Make sure the pistons are straight in the bores. Push each piston into the bore until the top of the piston is even with the top of the dust seal. **Figures 12 and 13.**

Figure 12

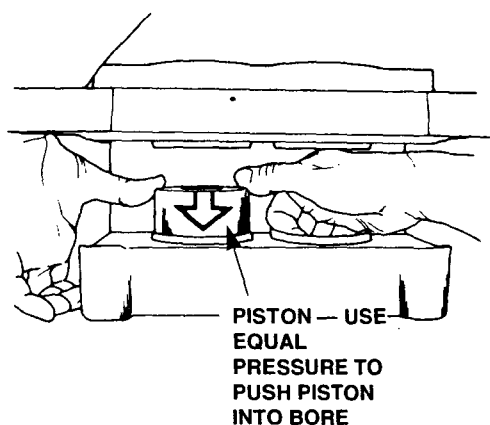
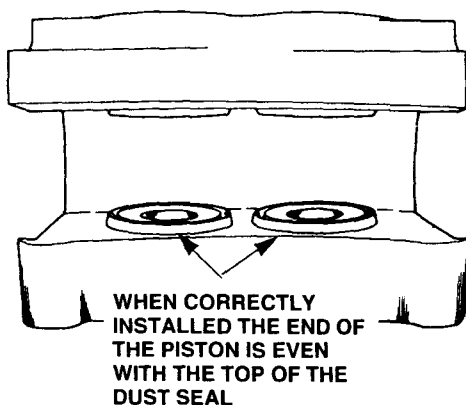


Figure 13

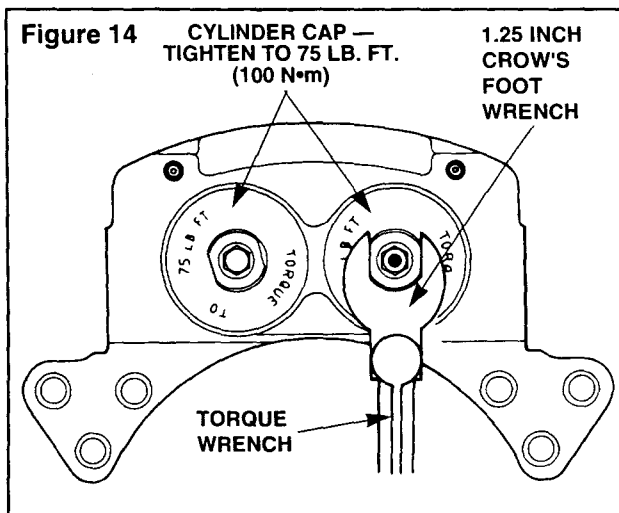


5. Install a new O-ring in the groove on the cylinder cap. Make sure the O-ring is not cut by the threads on the cylinder cap.

NOTE:

Apply extra grease on O-ring before installing cylinder caps. This will keep O-ring from catching on threads as cylinder cap is threaded into housing.

6. Install the cylinder caps in the caliper housing. Tighten the cylinder caps to 75 lb-ft (100 N•m) as shown in **Figure 14.**



7. Install the bleeder screws in the housing. Tighten to 100-120 lb-in (11.3-13.6 N•m)



8. Install the O-ring and the inlet fitting in the cylinder cap.

Section 5

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, always replace worn, bent or cracked end plates and distorted shoes. Inspect the end plate bolts for apparent wear. These bolts are highly stressed and should be replaced when their condition appears questionable. Inspect the linings for:

Lining Wear. Replace the linings when the thickness of the lining is less than 0.125 inch (3.2 mm) from the back plate. **Figure 14A.**

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. **Figure 14A.**

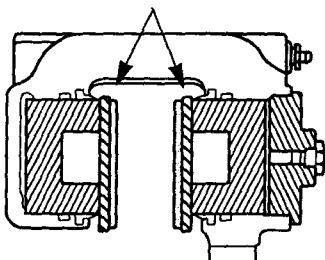
Oil or Grease on Linings. Replace the linings.

Cracks on Linings. Replace linings that have large or deep cracks.

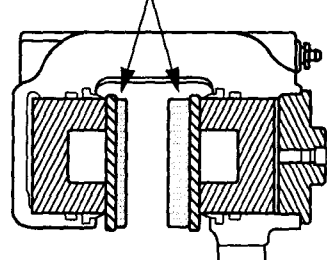
NOTE:

Small, tight cracks on the surface of the lining are normal when the caliper is used under high temperature conditions.

Figure 14A MINIMUM LINING THICKNESS
—0.125 INCH (3.2 MM) FROM
BACKING PLATE



**UNEVEN LINING
WEAR**

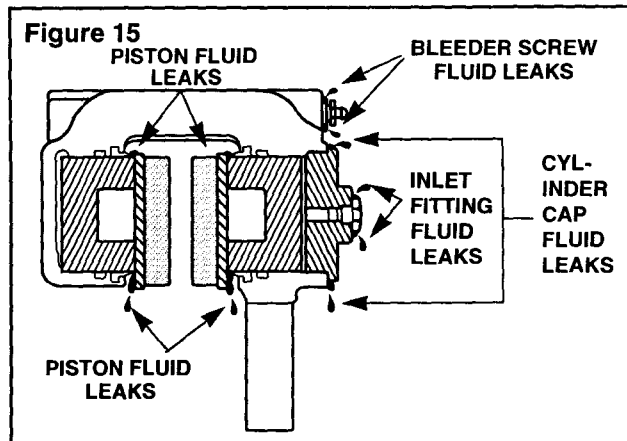


CAUTION

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. **Figure 15.**



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.

Cylinder Cap. If fluid leaks at a cylinder cap, tighten the cylinder cap, the inlet fitting and the plug. If the leak continues, disassemble the caliper. Inspect the cylinder head threads, the housing threads and the O-ring. Service as necessary.

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.

Section 5

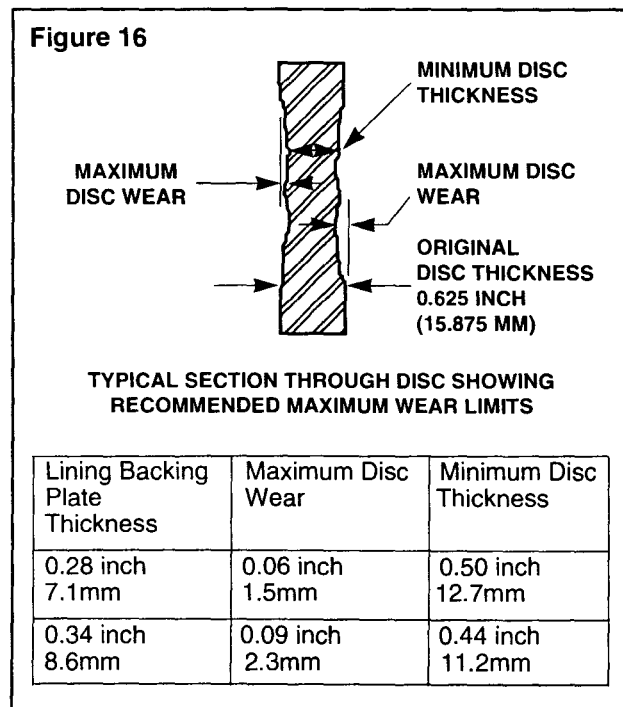
Inspecting and Cleaning

Inspect Dust Seals

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

Inspect Disc

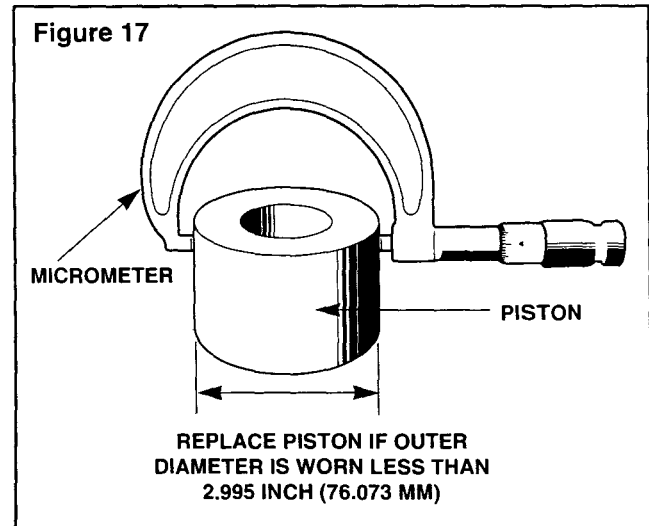
If the disc is worn beyond the wear limits, replace the disc. **Figure 16.** See the specifications of the vehicle manufacturer for wear limits that may be different from those shown below.



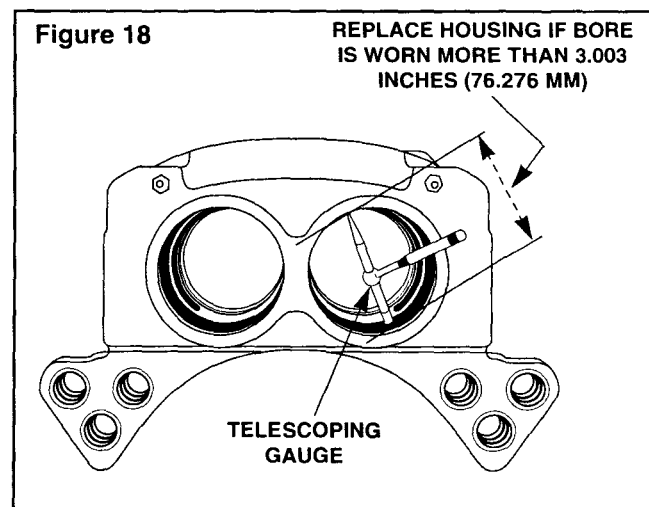
Inspect Caliper Parts

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 components if they are worn beyond wear limits or if there are large scratches or large amounts of corrosion.

2. Measure the diameter of the piston. Replace the piston if the diameter is worn less than 2.995 inches (76.073 mm). **Figure 17.**



3. Measure the diameter of the housing bore. Replace the housing if the diameter is worn more than 3.003 inches (76.276 mm). **Figure 18.**



Section 5

Inspecting and Cleaning

4. Inspect the linings as described earlier in this section.
5. Inspect the threads of the caliper, cylinder caps and all fittings. Replace any component that has thread damage that cannot be repaired.
6. Discard all back up rings, O-rings and dust seals and 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.

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
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35000 Industrial Road
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For More Information Contact:

Specialty Products
Rockwell International Corporation
2135 West Maple Road
Troy, MI 48064 USA
800-535-5560

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