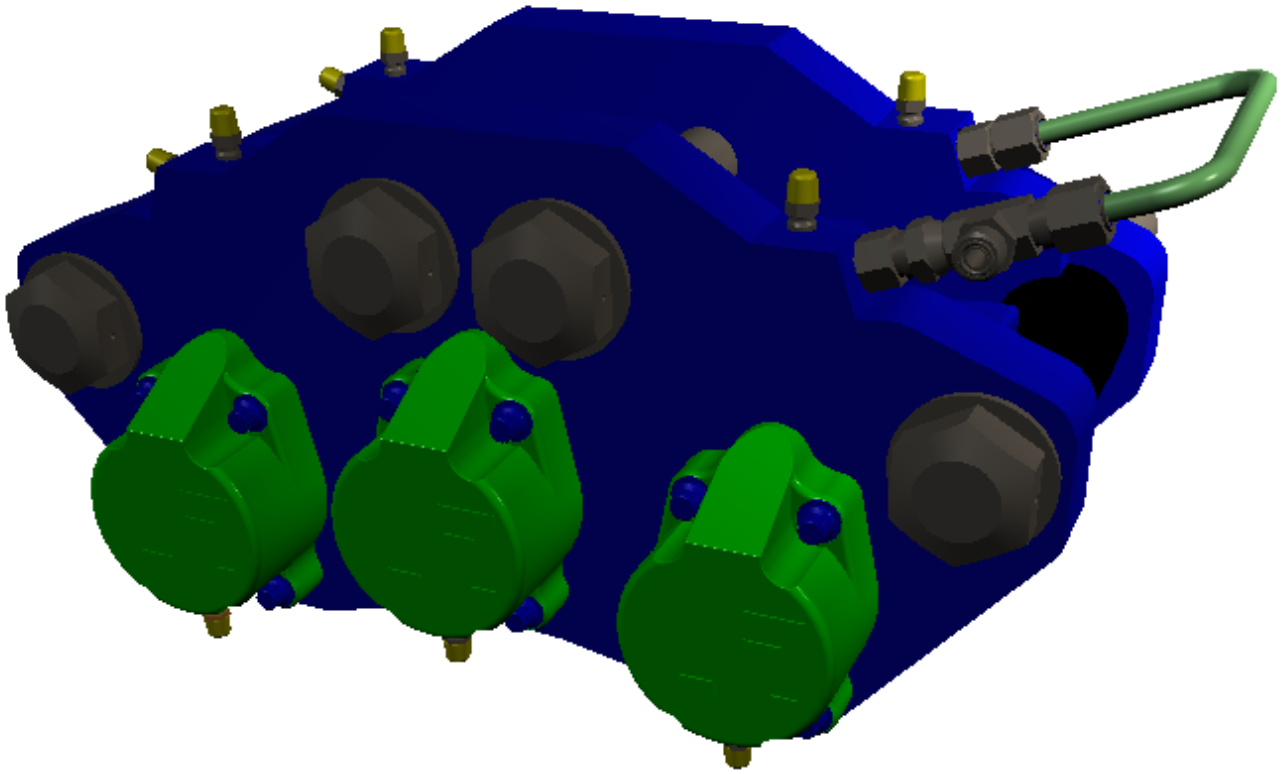
440-1087

CARLISLE INSTALLATION AND SERVICE MANUAL

FF6 Series Brake

419-9302 & 419-9303



Hydraulic Service Brake Assembly

REV	ECN	DESCRIPTION	DATE	DFT	CHK
-	15033	PRODUCTION RELEASE	26JAN2015	PAP	
A	103940	REFER TO ECN	18DEC2018	CJB	PAP

ALWAYS READ THIS MANUAL BEFORE INSTALLATION, START-UP, OR MAINTENANCE:

WARNINGS:

Installation! This unit must be considered as a partial machine according to the Machine Directive. Before starting up the machinery, of which this unit is a part, it must be evaluated in order to ensure accordance with the Machine Directive. It is assumed that electric and hydraulic components have been connected, according to present standards, by trained personnel.

It is recommended that only hydraulic service personnel, or people with other relevant training, perform operation, maintenance, and overhaul of the unit.

Protection! During installation/service always wear proper safety equipment such as safety glasses, facial protection, hearing protection, gloves as well as apron or protective suit and safety shoes.

Pressure! Only use components, tubes, fittings, hoses and other equipment designed for use at unit's maximum pressure.

If hydraulic components are mounted near personnel, a cover must be mounted so that no one can be injured by oil jets. Oil jets can cause severe damage by burst of a hose or a tube etc.

In some occasions, the unit may be heated leading to injury from scalds occurring by contact with fluids or heated surfaces.

Use! The unit must only be used for the specific purpose for which it has been designed.

Note! Instructions in this manual shall be followed to avoid damage to personnel or equipment.

Note! Modifications to the unit or procedures specified within this manual are not permitted.

Welcome

Carlisle Brake & Friction (CBF) is a leading solutions provider of high performance and severe duty brake, clutch and transmission applications to OEM and aftermarket customers in the wind energy, mining, construction, military, agricultural, performance street, motorsports, industrial and aerospace markets. The strength of CBF's brands, including Wellman Products, Carlisle Industrial Brake & Friction, Hawk Performance, Japan Power Brake, VelveTouch, and Field Pro, gives our customers access to a diverse range of the most highly engineered braking, friction, clutch and transmission products available to the market today. With multiple manufacturing facilities globally located in the U.S., U.K., Italy, China, and Japan, and with over 2,000 employees, CBF serves over 100 leading original equipment manufacturers in 50 countries, making CBF the right choice for your new brake or friction design, no matter where you are in the world or what you want to be.

If you have any questions or comments about the information presented in this manual, please contact your local salesperson or the CIBF office.

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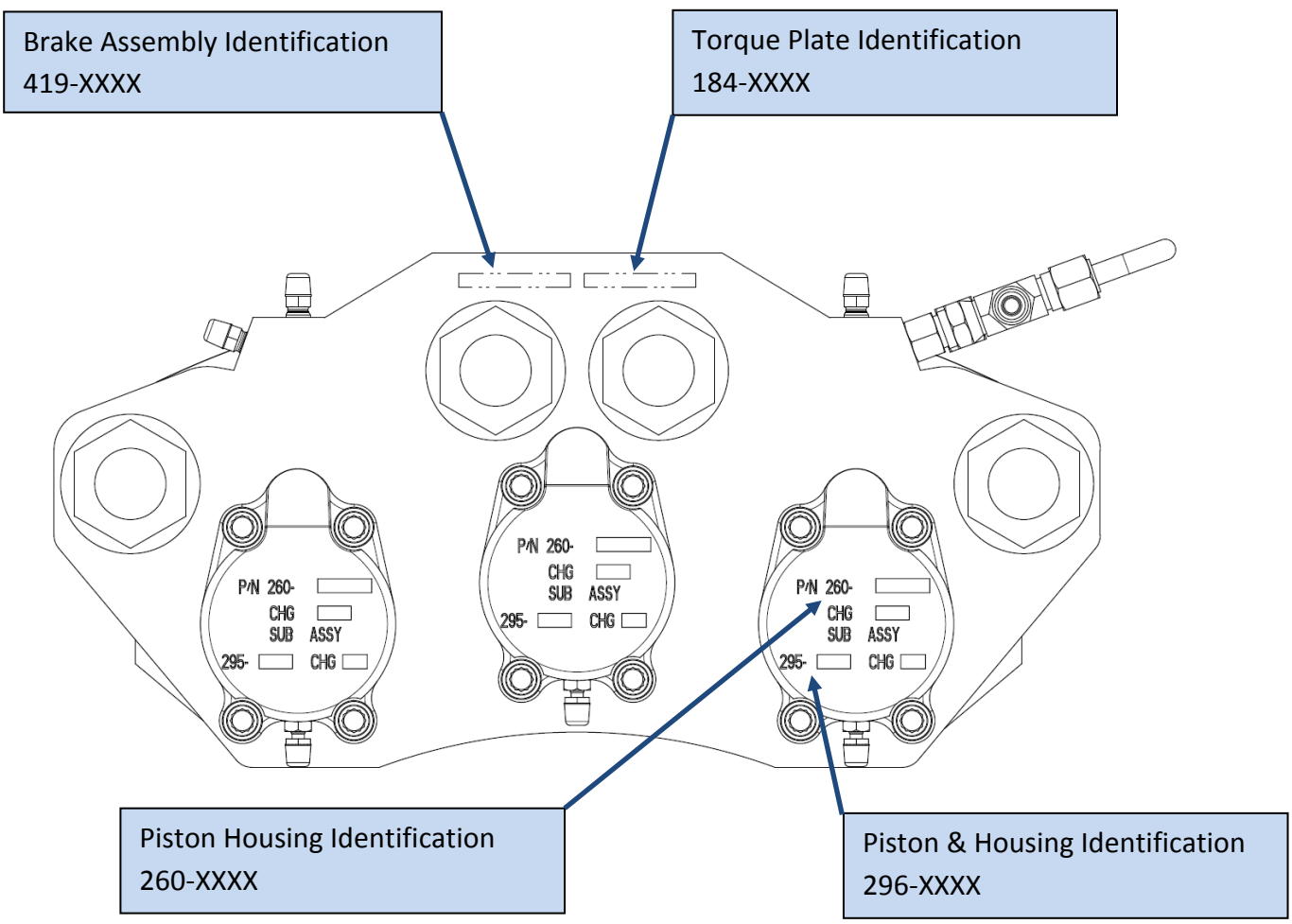
Contents

1. Description

This manual covers installation and service procedures for the Carlisle FF6, a hydraulically actuated, six piston, disc brake with springs and automatic adjusters.

This brake is designed to provide dynamic and static braking torque to slow and stop a rotor disc, while using the approved fluid types. The use of this brake outside the approved design is prohibited.



2. Illustration

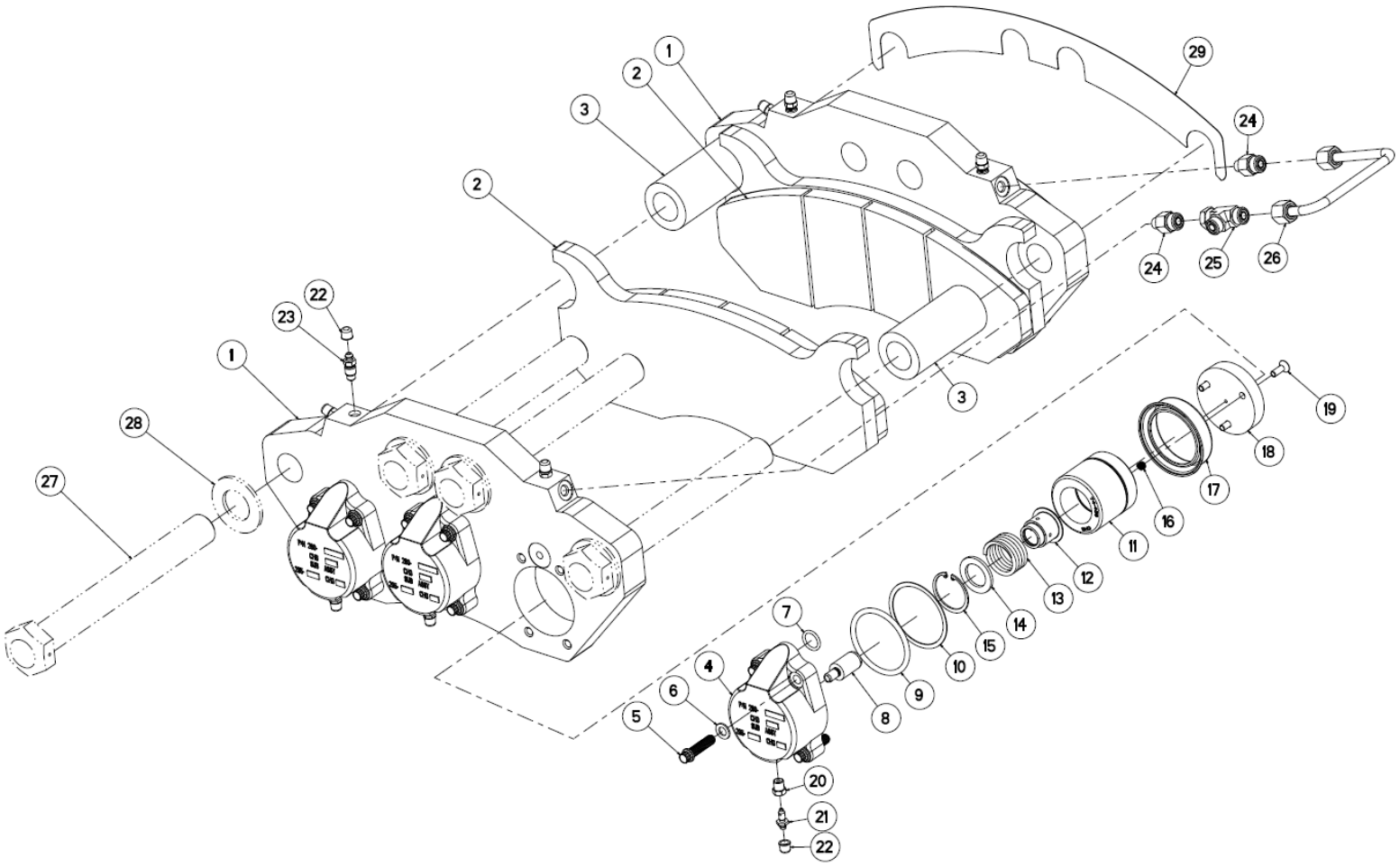


Figure 2.0: Exploded View

3. Parts List

ITEM	PART NO.	DESCRIPTION	QTY.
1	+	Torque Plate	2
2	*	Brake Pad	2
3	#	Spacer	2
4	*	Piston Housing	6
5	-	Screw	24
6	80-7862	Washer	24
7	*	O-Ring Seal	6
8	*	Guide	6
9	*	O-Ring Seal	6
10	*	Backup Ring	6
11	*	Piston	6
12	*	Sleeve	6
13	*	Spring	6
14	*	Washer	6
15	*	Snap Ring	6
16	*	Heli-Coil Insert	18
17	*	Boot	6
18	*	Insulator	6
19	*	Screw	18
20	49-198	Plug	6
21	84-30	Bleeder Valve	6
22	3266U1399	Cap	12
23	84-35	Bleeder Valve	6
24	*	Straight Tube Fitting	2
25	*	T-Fitting	1
26	*	Tube and Nut Assembly	1
27	N/A	Mounting Screw (Not Provided)	4
28	N/A	Mounting Washer (Not Provided)	4
29	*	Shim	AR

* ITEMS NOT SOLD SEPARATLY. SEE SERVICE PARTS KITS.
+ NOT A REPAIRABLE OR REPLACEABLE ITEM. DO NOT STOCK.

75-1610 FOR BRAKE ASSEMBLY 419-9302 AND 60-7899 FOR BRAKE ASSEMBLY 419-9303

4. Service Part Kits

ITEM	PART NO.	DESCRIPTION	QTY.
	304-7069	**PISTON HOUSING ASSEMBLY OVERHAUL KIT**	**1**
16		HELI-COIL INSERT	3
19		SCREW	3
18		INSULATOR	1
17		BOOT	1
15		SNAP RING	1
14		WASHER	1
13		SPRING	1
12		SLEEVE	1
9		BACKUP RING	1
10		O-RING SEAL	1
8		GUIDE	1
11		PISTON	1
7		O-RING SEAL	1

ITEM	PART NO.	DESCRIPTION	QTY.
	306-7139	**SEAL KIT**	**1**
17		BOOT	6
10		O-RING SEAL	6
7		O-RING SEAL	6
9		BACKUP RING	6

ITEM	PART NO.	DESCRIPTION	QTY.
	328-7948	**LINING KIT**	**1**
2		BRAKE PAD	2

ITEM	PART NO.	DESCRIPTION	QTY.
	380-7214	**PARTS KIT**	**1**
29		SHIM	8

ITEM	PART NO.	DESCRIPTION	QTY.
	116-128B	**PISTON ASSEMBLY**	**1**
11 & 16		PISTON WITH HELI-COLI	1

ITEM	PART NO.	DESCRIPTION	QTY.
	295-7010B	**PISTON AND HOUSING ASSEMBLY**	**1**
4,7,8,9, 10,11,12, 13,14,15, 16,17,18, 19,20,21, & 22		COMES AS A COMPLETE ASSEMBLY READY TO BOLT ON TO THE TORQUE PLATE.	1

ITEM	PART NO.	DESCRIPTION	QTY.
	306-7205	**SEAL KIT (LOW TEMPERATURE)**	**1**
17		BOOT	6
10		O-RING SEAL	6
7		O-RING SEAL	6
9		BACKUP RING	6

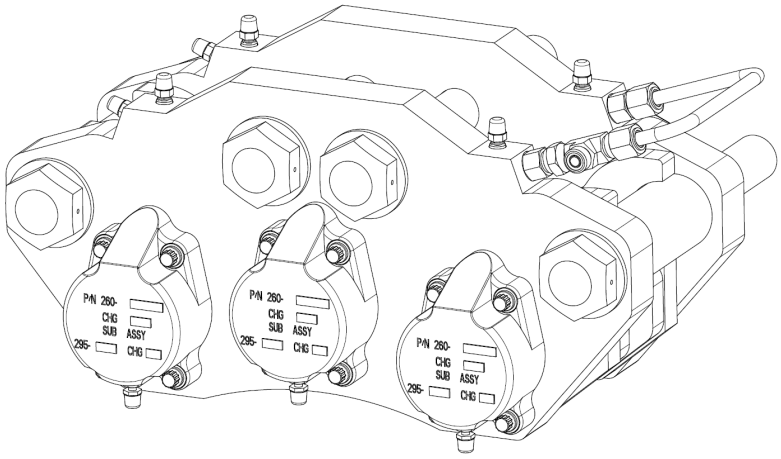
ITEM	PART NO.	DESCRIPTION	QTY.
	304-7364	**CROSS OVER TUBE KIT**	**1**
23		BLEEDER VALVE	6
24		STRAIGHT TUBE FITTING	2
25		T-FITTING	1
26		TUBE AND NUT ASSEMBLY	1

* CROSS OVER TUBE KIT ONLY AVAIBLE FOR 419-9302 BRAKE ASSEMBLY

ITEM	PART NO.	DESCRIPTION	QTY.
	304-7515	**OVERHAUL KIT**	**1**
2		BRAKE PAD	2
19		SCREW	18
8		GUIDE	6
15		SNAP RING	6
14		WASHER	6
13		SPRING	6
9		O-RING SEAL	6
10		BACKUP RING	6
18		INSULATOR	6
17		BOOT	6
3		SPACER	2
25		T-FITTING	1
22		CAP	12
7		SEAL O-RING	6
N/A		CAP	2
23		BLEEDER VALVE	6
20		PLUG	6
5		SCREW	24
6		WASHER	24
21		BLEEDER VALVE	6
26		TUBE AND NUT ASSEMBLY	1
24		STRAIGHT TUBE FITTING	2
29		SHIM	8
12		SLEEVE	6
16		HELI-COIL INSERTS	18

*OVERHAUL KIT ONLY AVAIBLE FOR 419-9303 BRAKE ASSEMBLY

5. Operation



Note: Numbers in parenthesis correspond to the component item number displayed in the brake assembly illustration and parts list on pages 6 and 7.

5.1 Operation

The brake is hydraulically actuated by applying hydraulic pressure to six opposing pistons (11). Each piston (11) then applies force to the active side brake pad (2) and transfers the force against the brake disc. The hydraulic port for brake inlet must have no residual pressure or fluid flow restrictions to ensure brakes do not drag. Each piston self-adjusts and retracts. When hydraulic pressure is applied it compresses the spring (13). When the spring compresses fully, the hydraulic pressure forces the sleeve (12) to slide on the guide (7) adjusting the piston assembly as needed. When the pressure is released, the spring decompresses, pulling the piston back, creating the appropriate running clearance.

6. Storage

6.1 Recommendations for storage

6.1.1 Brake skids and containers shall be stored in a controlled, indoor environment until installation or use.

6.1.2 Each brake shall remain in its unopened, protective packaging until installation or use.

6.1.3 Brake release port plugs should only be removed during the installation of the hose and connection fittings during assembly.

6.1.4 Brakes shall not be stored or exposed to uncovered, outdoor environments.

7. Installation

7.1 Lifting and Handling

Care should be used while lifting, moving, and installing the FF6 Series Brake which has a weight of 172lbs (78kg). Do not support the brake by the bleeder screws (21 & 23), cross over tube (26), or the hydraulic line.

WARNING:

Solvent cleaners can be flammable, poisonous and can cause burns.
Always observe all rules and regulations when working with solvents and adhere to the following procedures:

- Wear adequate eye protection
- Wear clothing that protects your skin
- Keep your work area well ventilated

7.2 Cleaning the brake disc

Before installing the brake disc, it must be cleaned from any contaminants and all foreign substances.

- Use a cleaning solvent such as clear methylated, white spirits or isopropyl alcohol to ensure that any residual oil or anti-corrosion protection substances are removed. Failure to do so will result in significant reduction to the brake pad coefficient of friction.

7.3 Handling the Brake Pads

7.3.1 Friction material is a very essential part of the brake system. The brake pads/ friction material should be handled carefully to avoid being damaged.

7.3.2 The brake pad/ friction material should be kept clean and protected against any contact they might have with grease or oil. Any contamination of grease or oil will significantly reduce the friction coefficient.

CAUTION

The friction material surface (porous material) must be facing toward the disc.

7.4 Recommended mounting hardware and service tools

- Mounting Bracket (customer supplied)
- Mounting Hardware- 4X 1.25 INCH grade 8 screws and 4X hardened washers for 1.25 INCH screws
- Two Guide Pins- 12 inches long 1.25 inches in diameter with 1 inch minimum thread length that matches the mounting hole thread. Threaded rod or headless bolts may be used as guide pins.
- Flat Blade Screw Driver
- Pry Bar
- 3/8 INCH 12 Point Socket
- 5/32 INCH Hex Key or Hex Socket
- 6MM Hex Key or Hex Socket
- Snap Ring Pliers
- Pick
- Torque Wrench
- Piston Assembly Tool- See Figure 7.4.1
- Piston Puller Tool- See Figure 7.4.2

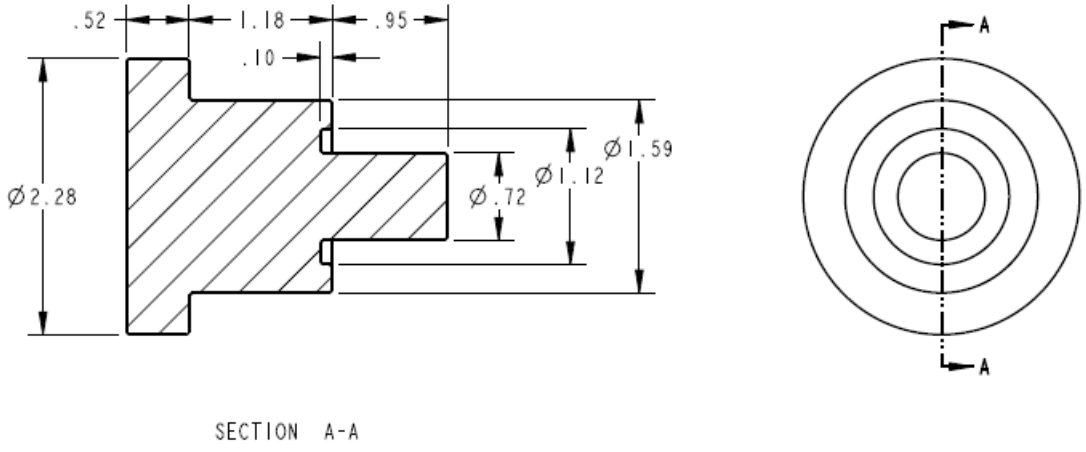


Figure 7.4.1
Piston Assembly Tool
See Section 8.3.17 for Usage

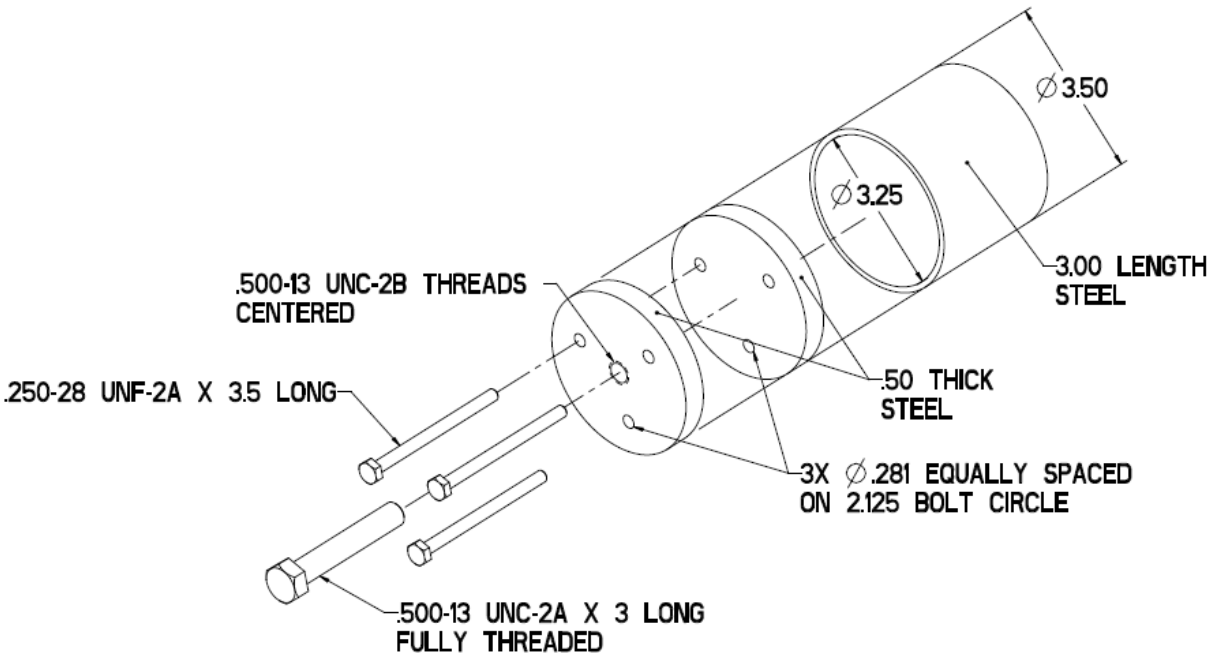


Figure 7.4.2
Piston Puller Tool
See Section 8.3.6 for Usage

7.5 Brake Assembly Installation and Mounting

WARNING:

-Block or lock the rotor disc in place to prevent movement prior to beginning brake installation.

-Lockout/Tagout the pressure source for the brake application circuit per "OSHA 29 CFR 1910.147" or equivalent local safety standard to prevent any accidental activations of the brake, which could damage nearby maintenance personnel or equipment.

WARNING:

The torque specifications in this manual must be observed. Failure to do so may result in failure of the brake or damage to surrounding components and machinery.

Screw and Torque Specification

All screws, unless otherwise specified, shall be "DRY" and installed "as is" with no lubrication. If a torque is specified as "LUBED", the screw shall be lubricated with **MoS_2, Molybdenum Disulfide,** based lubrication on the threads and seating surface of the screw head. All screws shall be torqued with a tool capable of a tightening factor of 1.6 per VDI 2230.

7.5.1 Insert guide pins, as defined in section 7.4, in the two center mounting holes on the mounting bracket.

7.5.2 Place one of the two torque plate assemblies over the guide pins.

Note: Make sure the pistons are bottomed out prior to installation. A suitable C-Clamp may be used to make sure each piston is bottomed out.

7.5.3 Assemble the disc as necessary to meet OE requirements.

Note: See section 7.2 for proper cleaning instructions for the disc.

7.5.4 Place the second torque plate assembly over the guide pins.

Note: Make sure the pistons are bottomed out prior to installation. A suitable "C-Clamp" may be used to make sure each piston is bottomed out.

7.5.5 Insert a spacer (3) between the two torque plates (1). Align it with one of the two outer mounting holes.

7.5.6 Insert mounting screw (27) and washer (28) through the mounting hole that the spacer (3) is lined up with. Use Lub Tork anti-seize thread compound (or similar product) on mounting screw prior to installation. Tighten mounting screw (28) enough to hold assembly in place.

Note: Mounting hardware note provided. Do not us a lock washer.

7.5.7 Brake assembly should be centered within .010 INCH.

7.5.8 Measure from the center of the disc to each end of the spacer (3). Shims (29) can be installed between the mounting surface and first installed torque plate assembly as necessary to achieve proper centering. Each Shim is .010 INCH thick.

Note: Shims (29) can be added without removing the brake assembly. Shims (29) will slide over the mounting hardware between the mounting bracket and torque plate (1).

7.5.9 Install a brake pad (2) on each side of the disc. Make sure the friction material is facing the disc. The brake pads (2) will slide onto the installed spacer (3).

Note: See section 7.3 on handling brake pads.

7.5.10 Slide the other spacer (3) into the opposite end of the installed spacer (3). Make sure brake pads (2) slide onto the spacer (3). Loosen the opposite mounting screw if needed to slide spacer into place.

7.5.11 Insert mounting screw (27) and washer (28) into final outer mounting hole. Apply Lub Tork anti-seize thread compound (or similar product) on mounting screw prior to installation.

7.5.12 Remove guide pins one at a time and install mounting screw (27) and washer (28). Apply Lub Tork anti-seize thread compound (or similar product) on mounting screw prior to installation.

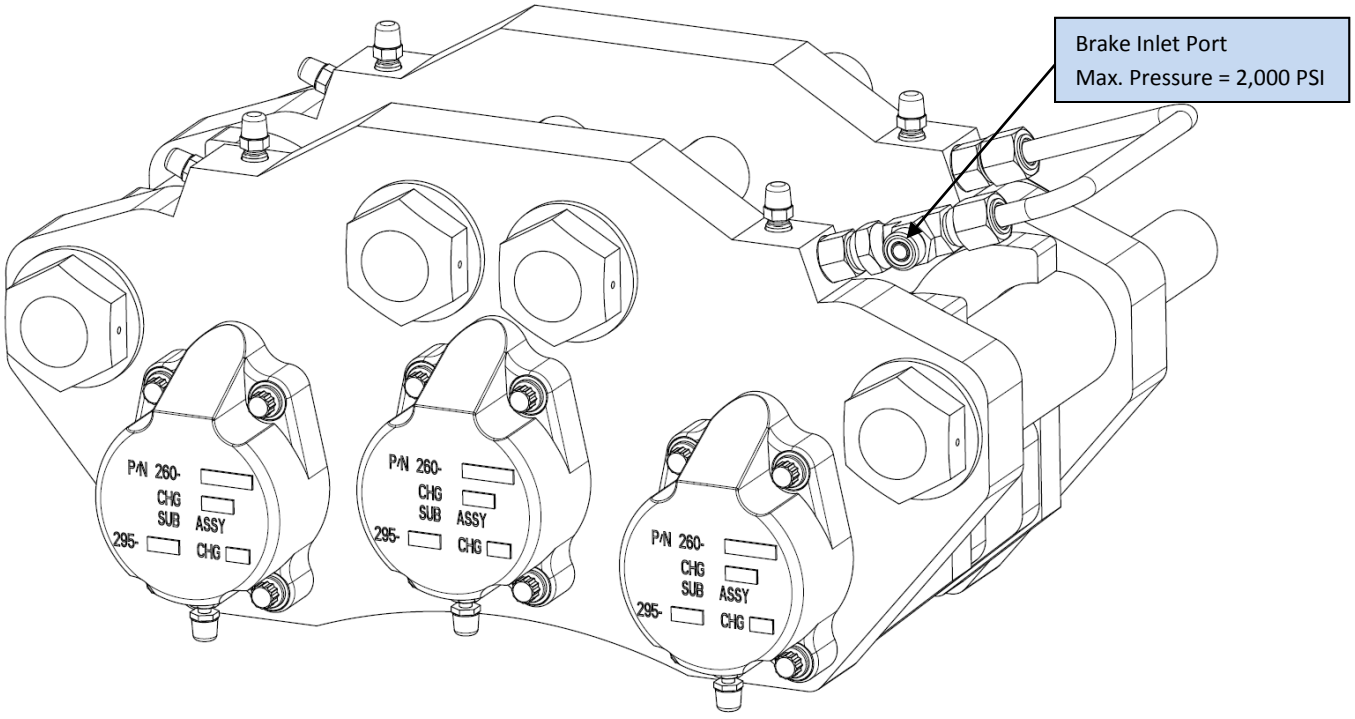
7.5.13 Torque mounting screws (27) to 1360 LB-FT Make sure each one has Lub Tork anti-seize thread compound (or similar product) prior to installation.

Note: Check and verify the brake assembly is still centered within .010 INCH. Loosen mounting screws and add shims as necessary. Shims are .010 INCH thick.

7.5.14 Install both straight fittings (24) and toque to 33-40 LB-FT

7.5.15 Install T-Fitting (25) onto one of the straight fittings and toque to 33-40 LB-FT

7.5.16 Install the tube assembly (26). The short end goes to the t-fitting (25). Toque 33-40 LB-FT



CAUTION

Brake linings are susceptible to contamination. To prevent poor brake performance, keep all oil and fluids away from friction linings during installation or service.

7.6 Connection of hydraulic lines

7.6.1 Confirm all rubber hydraulic lines are “soft” and free from all fluid pressure and fluid pressure sources (i.e. hydraulic power unit, manual pressure pump, accumulators, etc.).

7.6.2 Remove only the plug from the brake inlet port which connects to hydraulic pressure lines as specified per the vehicle manufacturer’s instructions.

7.6.3 Ensure the sealing surfaces of the hydraulic port are clean and free of contaminates, debris, corrosion, paint, or other substances which may inhibit proper sealing of elastomeric face seal fittings.

7.6.4 Attach the hydraulic pressure line to the port per the vehicle manufacturer's instructions.

Note: It is recommended to connect multiple brakes in parallel to have even fluid flow between brakes.

7.6.5 All hydraulic lines connected to the port shall have unrestricted flow to the fluid reservoir of the hydraulic power unit or system. Ensure there are no restrictions or blockages between the brake and the reservoir.

Note: Any restriction to the port will cause the brake performance to be severely reduced or render the brake nonoperational.

7.6.6 Confirm all fluid connections, fittings, hoses, plugs, etc. are correctly installed and tightened and all ports are sealed before the brake or system is pressurized.

7.6.7 Remove Lockout/Tagout items from the system and apply the brake pressure to the brake.

7.6.8 Check the system for fluid leaks.

7.7 Bleeding the caliper

7.7.1 Bleed the hydraulic system of air through one of the bleeder screws (23 & 21) at the highest point on the brake system per the vehicle manufacturer's instructions:

- After installation or assembly.
- After changes have been made to the system.
- Recommended during annual maintenance.

Note: Use a bleeder hose attached to the bleeder valve to perform bleeding operation. Keep fluid away from brake pads and disc.

8. Maintenance

WARNING:

*Before performing **ANY** maintenance on the brake caliper, be sure to:*

-Block or lock the rotor disc in place prior to relieving the brake circuit hydraulic pressure.

-Relieve all hydraulic pressure from the brake application circuit.

-Lockout/Tagout the pressure source for the brake application circuit per "OSHA 29 CFR 1910.147" or equivalent local safety standard to prevent any accidental activations of the brake, which could damage nearby maintenance personnel or equipment.

8.1 Replacing the brake pads

The brake pads must be replaced **AS A PAIR** on the brake when either lining material has worn to less than .125 INCH at the thinnest point. The thickness of a new brake pad is 1.428 INCH minimum.

WARNING:

Always ensure that there is no hydraulic pressure in the brake before starting work. Follow all warnings presented at the beginning of Section 8!

8.1.1 Release the hydraulic pressure from the brake.

8.1.2 Confirm that the brake pads (2) are free and remain unloaded.

8.1.3 Remove the main inlet brake line from the t-fitting (25). Ensure all remaining lines and fittings maintain proper cleanliness.

8.1.4 Remove one of the outer mounting screws (27), washer (28), and spacer (3).

Note: The other three mounting screws (27) may have to be loosened to remove spacer.

8.1.5 Remove both brake pads (2) from the brake assembly.

8.1.6 Open bleeder screws (21 & 23) to relieve pressure.

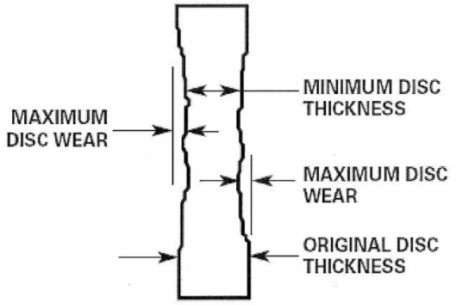
8.1.7 Use a suitable pry bar, placed between the disc and insulator (18), to force the pistons back into the piston housings (4) until piston is bottomed out.

8.1.8 Close the bleeder screws (21 & 23). Torque to 200-250 LB-IN.

8.1.9 Clean excess fluid from brake assembly.

8.1.10 Clean the disc per section 7.2.

8.1.11 Check disc wear. If the disc is worn to the wear limits, replace disc.



TYPICAL SECTION THROUGH DISC SHOWING RECOMMENDED MAXIMUM WEAR LIMITS

Original Disc Thickness (in.)	Lining Part Number	Maximum Disc Wear (in.)	Minimum Disc Thickness (in.)
1.250	244-8100	0.110	1.030
1.850	244-8100	0.110	1.630

WARNING

CONTINUED USE OF DISC BEYOND MINIMUM THICKNESS MAY RESULT IN LOSS OF BRAKING AND POSSIBLE CATASTROPHIC FAULURE

8.1.12 Insert two new brake pads (2) into the brake assembly engaging them into the spacer (3).

8.1.13 Install the removed spacer (3), making sure it is engaged into the brake pads (2).

8.1.14 Insert mounting screw (27) and washer (28). Apply Lub Tork anti-seize thread compound (or similar product) on mounting screw prior to installation.

8.1.15 Tighten mounting screws (27) to1360 LB-FT.

8.1.16 Connect the inlet brake line to the t-fitting (25).

8.1.17 Confirm all fluid connections, fittings, hoses, plugs, etc. are correctly installed and tightened and all ports are sealed before the brake or system is pressurized.

8.1.18 Remove Lockout/Tagout items from the system and apply the brake pressure to the brake.

8.1.19 Check the system for fluid leaks.

8.1.20 Bleed brake assembly per section 7.7.

8.2 Dismounting the brake for service

WARNING:

Always ensure that there is no hydraulic pressure in the brake before starting work.
Follow all warnings presented at the beginning of Section 8!

8.2.1 Support the brake caliper according to section 7.1, Lifting and Handling.

8.2.2 Confirm that the brake pads are free and remain unloaded.

8.2.3 Remove all connected hydraulic lines and plumbing. Remove cross over tube (26), t-fitting (25), and straight fittings (24). Ensure all lines and fittings maintain proper cleanliness.

8.2.4 Plug all open ports in the brake caliper to prevent residual fluid from exiting the brake.

8.2.5 Remove the middle mounting screws (27) and washers (28) one at a time and replace with the guide pins as described in section 7.4.

8.2.6 Remove one of the outer mounting screws (27), washer (28), and spacer (3).

8.2.7 Remove brake pads (2). The brake pads (2) engage with the opposite spacer (3) and slides off.

Note: Check brake pad (2) thickness per section 8.1. Replace as a pair if necessary.

8.2.8 Remove the last mounting screw (27), washer (28), and spacer (3).

8.2.9 Remove outer torque plate assembly.

8.2.10 Remove disc per OE manufacturer recommendations.

Note: Check disc thickness per section 8.1.11 and replace if necessary. If disc is reusable clean per section 7.2.

8.2.11 Remove inner torque plate assembly.

8.3 Disassembling the brake

Note: It is recommended to replace all of the brake seals at the same time during service.

CAUTION

All brake disassembly and service shall be performed in a safe and clean work environment with appropriate tools and equipment. Each brake shall be safely secured on a workbench or designated rebuild area before service. Only use genuine Carlisle parts for rebuild.

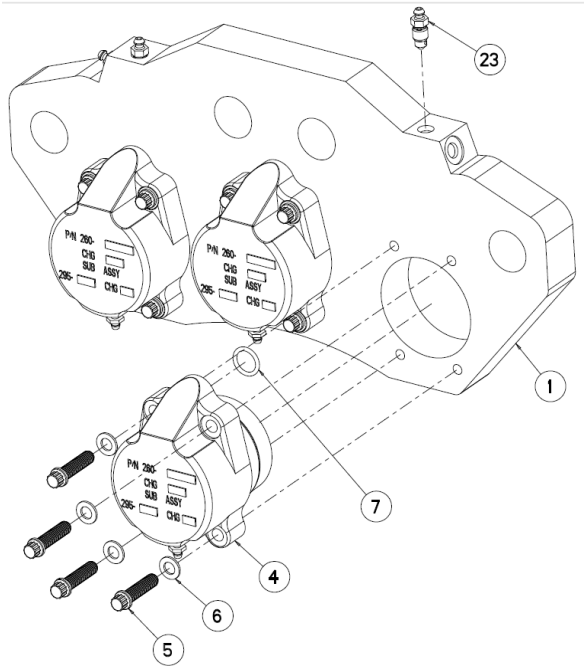
8.3.1 Use a 3/8 INCH, 12 point socket to remove the 4 mounting screws (5) and washers (6) holding each of the pistons housing assembly to the torque plate (1).

Note: Piston housing assembly kits are available. The kit comes completely assembled and ready to install. See kits in Section 4.

Note: All piston housing assemblies are the same. Use the following steps to rebuild each housing.

CAUTION: New seals must be installed whenever the brake is disassembled.

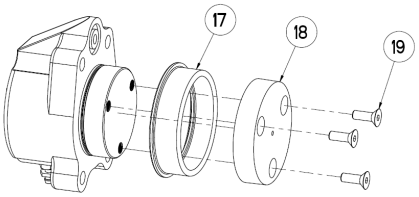
8.3.2 Remove and discard O-Ring Seal (7).



8.3.3 Remove and replace any damaged or corroded bleeder valves (23) in the torque plate(1).

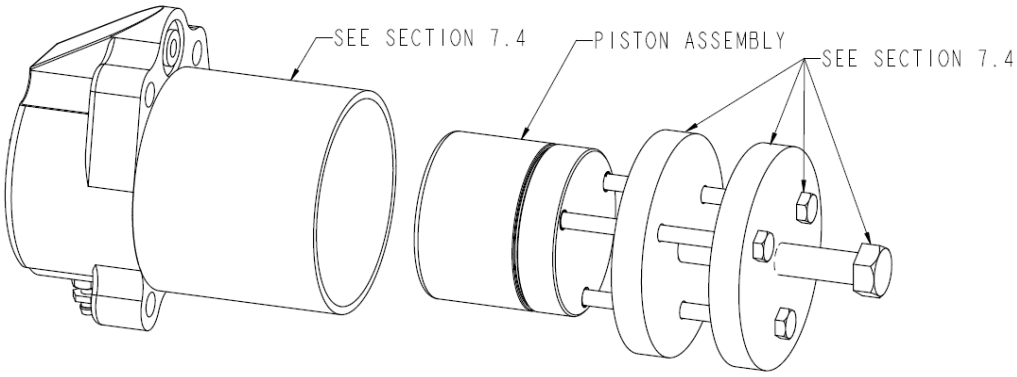
8.3.4 Use a 5/32 INCH hex socket to remove the 3 screws (19) holding the piston insulator (18) and remove the insulator (18). Discard the insulator if they are broken, cracked, or warped.

8.3.5 Remove and discard boot (17).



8.3.6 Remove the piston assembly from the piston housing (4) using a suitable puller. See Section 7.4 for an example.

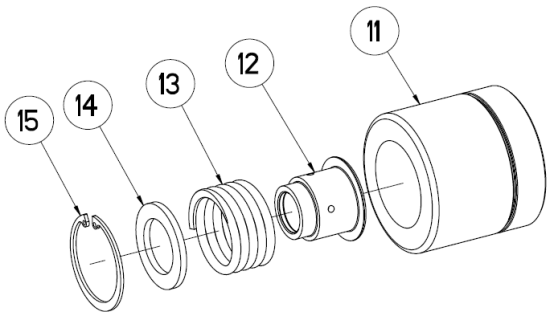
Note: A low, regulated amount of hydraulic or pressure may be used to remove the piston from the housing.



8.3.7 Use snap ring pliers to remove snap ring (15) from piston assembly.

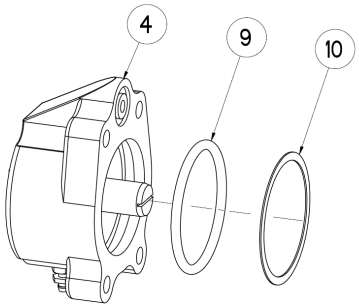
Warning: Snap ring (15) is under pressure from spring (13). Remove with caution.

8.3.8 Remove washer (14), spring (13), and sleeve (12) from piston.



8.3.9 Remove and discard backup ring (10) and O-ring seal (9) from the piston housing (4).

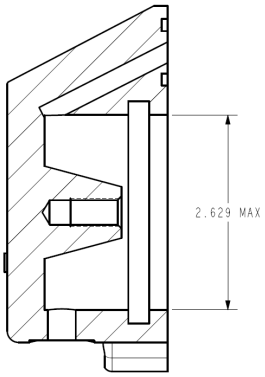
Note: A pick may be used to remove the backup ring and O-ring seal. Use extreme caution not to gouge or scratch the seal groove or piston bore.



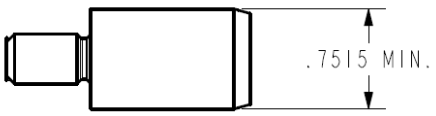
8.3.10 Remove and discard bleeder valve (21).

8.3.11 Clean and dry all metal parts thoroughly prior to reassembly. Ensure all internal brake piston housing (4) and torque plate (1) fluid passages are free and clean of contaminates or debris.

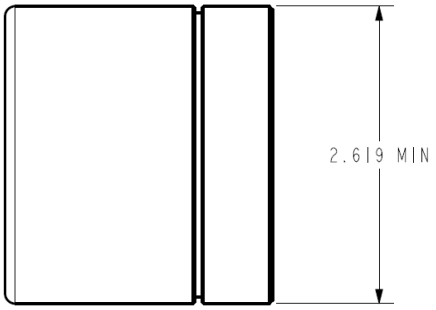
8.3.12 Inspect piston housing (4) for cracks or excessive wear. Use crocus cloth to remove light scratches and corrosion in the piston bore. Discard any piston housing if the piston bore measures greater than 2.629 INCH in diameter.



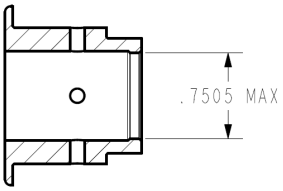
8.3.13 Inspect guide (8) in the piston housing (4) for excessive wear. Use crocus cloth to remove light scratches and corrosion from outer diameter of the guide (8). Use a flat blade screw driver or 6mm hex key or socket to remove and replace guides that measure less than .7515 INCH in diameter. Apply Scotch-Weld No. 2158 B/A adhesive to the threads and torque to 130-145 LB-IN. allow 12-24 hours for adhesive to set.



8.3.14 Inspect piston (11) for excessive wear, cracks, nicks, or other surface damage. Use crocus cloth to remove light scratches and corrosion to the piston outer diameter. Discard any piston with an outer diameter less than 2.619 INCH.

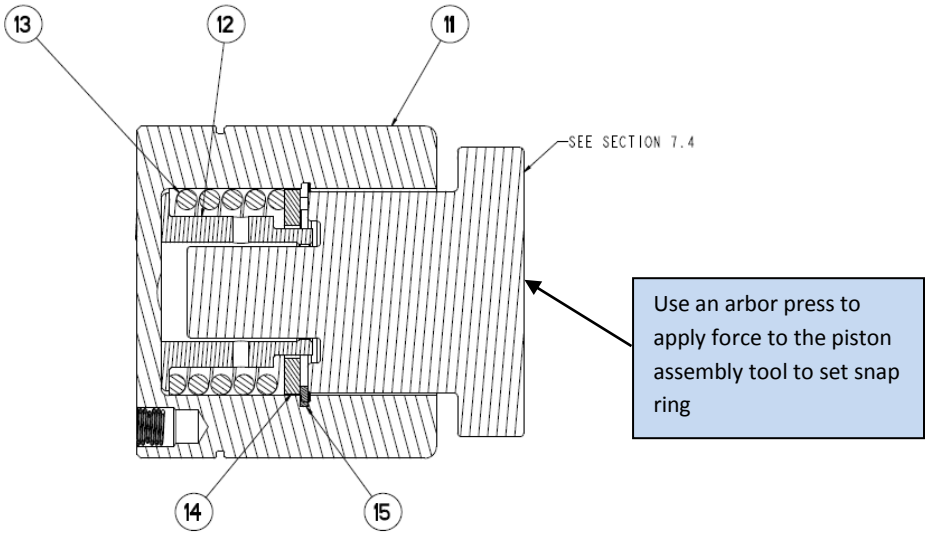


8.3.15 Inspect sleeve (12) for excessive wear. Replace sleeve (12) if inner diameter measures greater than .7505 INCH.



8.3.16 Replace springs if measured load at .900 INCH height is less than 100 LBF.

8.3.17 Install sleeve (12), spring (13), and washer (14) into the piston. Start the snap ring in the inner diameter of the piston and use the piston assembly tool, described in section 7.4, and an arbor press to set the snap ring in position.

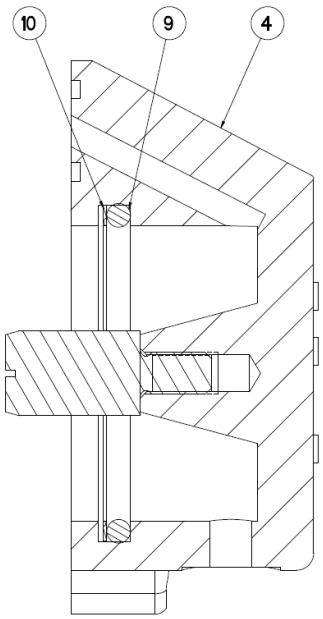


Note: A suitable tool of the customer's choice can replace the piston assembly tool.
Note: Wear proper PPE when pressing the snap ring in location.

8.3.18 Lubricate O-ring seal (9) and backup ring (10) generously with the fluid used in the brake system.

Note: The fluid used to lubricate the seals shall be clean and unused.

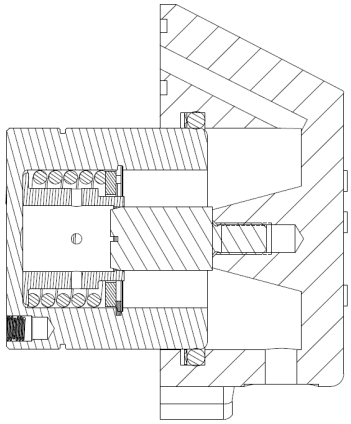
8.3.19 Install the backup ring (10) in the seal groove of the piston housing. Install the O-ring seal (9) directly behind the backup ring (10).



8.3.20 Lubricate the piston (11), piston bore in the piston housing (4), guide (8), and sleeve (12) with the fluid used in the brake system.

Note: The fluid used to lubricate shall be clean and unused.

8.3.21 Position the piston assembly in the piston housing seals (9 & 10) and over the guide (8). Make sure the piston is not cocked in the housing.



8.3.22 Use an arbor press or a suitable C-Clamp to bottom the piston in the piston housing bore.

Note: Make sure the piston goes down evenly and does not cock in the piston housing bore. Failure to do so can cause failure in the automatic adjuster/retraction system or complete brake failure.

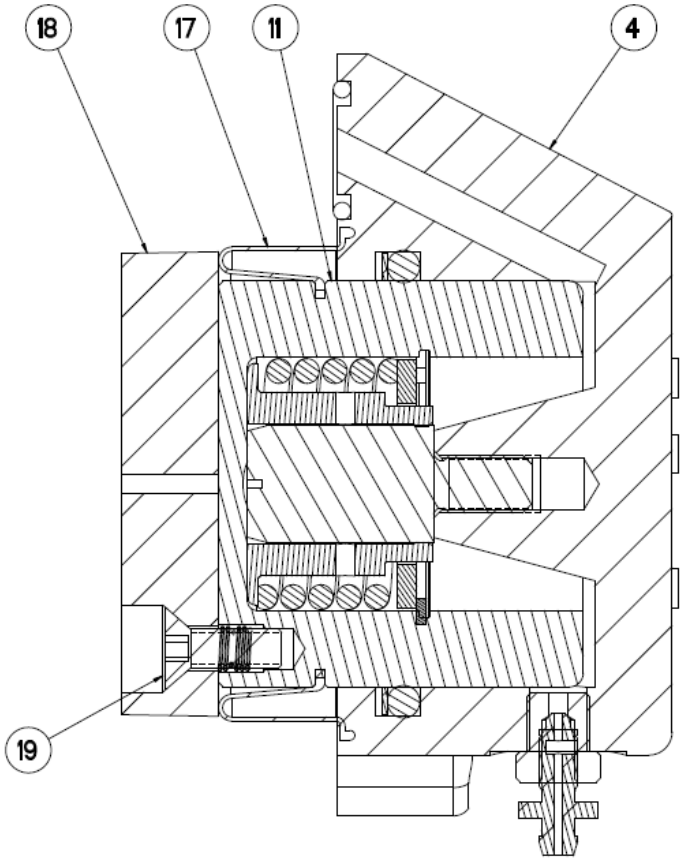
8.3.23 Coat threads of plug (20) with Scotch-Weld No. 2158 B/A adhesive and insert it into the bottom of the piston housing (4). Torque to 12 LB-FT max. Let adhesive set up for 12-24 hours.

8.3.24 Install bleeder (21) into bottom of plug (20) and torque to 200-250 LB-IN.

8.3.25 Install boot (17) in the groove on the outer diameter of the piston (11).

8.3.26 Attach insulator (18) to top of piston (11) with three screws (19).

8.3.27 Install O-ring seal (7) into the groove at the top of the piston housing (4).



8.3.28 Install the piston housing assembly with four screw (5) and washers (6). Apply Loctite NO.242 sealant to threads and torque to 43-45 LB-FT.

Note: Rebuild criteria the same for all 6 piston housing assemblies.

9. Torque Specifications

WARNING:

The torque specifications in this manual must be observed. Failure to do so may result in failure of the brake or damage to surrounding components and machinery.

10. Approved Fluids

WARNING:

Use of any hydraulic fluid not on the approved fluids list may cause premature failure of the sealing components in this brake.

10.1 Approved Fluids

Petroleum base (mineral oil) hydraulic fluid only.

10.2 Filtration

All hydraulic fluid in the brake and system must be filtered. It is recommended that fluid used is filtered through an off-line filter unit during installation and refilling. Do not reuse hydraulic fluid. Used fluid may be contaminated and can cause incorrect operation.

11. Testing

Note: Make sure the brake pads stay clean and dry from any contaminants.

11.1 Caliper must be fully assembled with proper torque applied to the mounting bolts.

11.2 Insure there are bleeders in all the ports except the one port to be used for oil supply. Install the hydraulic inlet line to this port.

11.3 For the 419-9302 brake assembly, place a 1.85 inch steel spacer in between the linings to limit piston travel.

11.4 For the 419-9303 brake assembly, place a 1.25 inch steel spacer in between the linings to limit piston travel.

11.5 Evacuate air from the brake assembly using bleeder(s) orientated at the top of the brake assembly.

11.6 Clean the assembly of any in of any oil and debris

11.7 Apply 2,000 PSI to the assembly and allow pressure to stabilize for 2-3 minutes.

11.8 Inspect brake assembly for any signs of leakage or drop in pressure.

11.9 After a successful test remove spacer and brake pads. Press pistons back into their bore completely before installing the brake assembly on the vehicle.