

Installation Instructions



BENDIX® SPRING BRAKE CHAMBER AND SERVICE BRAKE CHAMBER INSTALLATION AND CLOCKING (S-CAM)

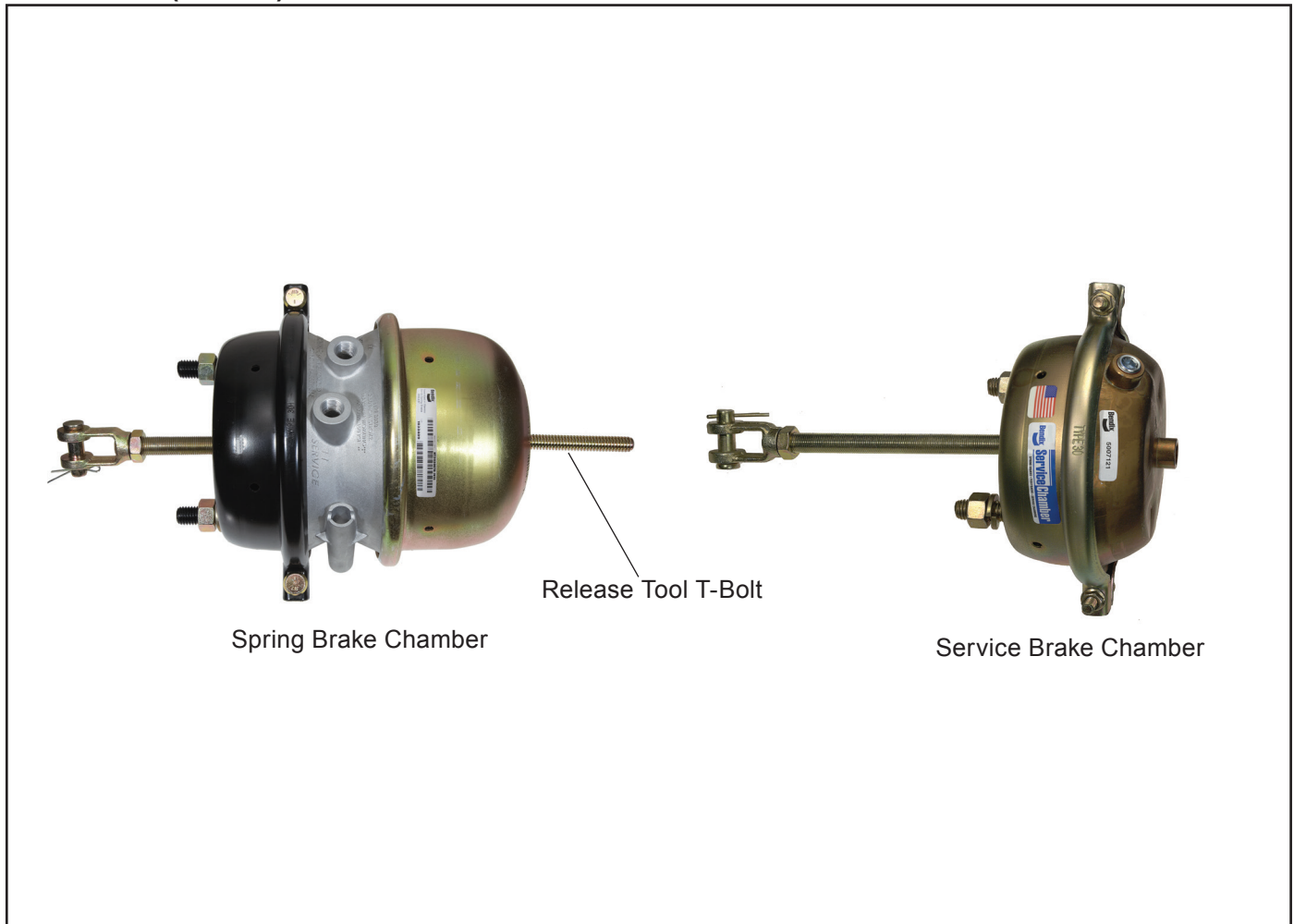


Figure 1 – Spring Brake Chamber and Service Brake Chamber for Bendix® Brand S-Cam Brake Assemblies

DESCRIPTION

These instructions cover the removal, clocking, and installation of the service replacement Spring Brake Chamber Assembly and the Service Brake Chamber Assembly on Bendix® brand S-Cam brakes.

FOLLOW ALL GENERAL SAFETY GUIDELINES, INCLUDING THOSE LISTED ON PAGE TWO OF THESE INSTRUCTIONS.



GENERAL SAFETY GUIDELINES

WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS

TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following guidelines should be observed **AT ALL TIMES**:

- ▲ Park the vehicle on a level surface, apply the parking brakes and always block the wheels. Always wear personal protection equipment.
- ▲ Stop the engine and remove the ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically-charged components.
- ▲ Do not attempt to install, remove, disassemble or assemble a component until you have read, and thoroughly understand, the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
- ▲ If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system, a Bendix® DRM™ dryer reservoir module, or a Bendix® AD-9si® air dryer, be sure to drain the purge reservoir.
- ▲ Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
- ▲ Never exceed manufacturer's recommended pressures.
- ▲ Never connect or disconnect a hose or line containing pressure; it may whip and/or cause hazardous airborne dust and dirt particles. Wear eye protection. Slowly open connections with care, and verify that no pressure is present. Never remove a component or plug unless you are certain all system pressure has been depleted.
- ▲ Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, wiring, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
- ▲ Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
- ▲ Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
- ▲ For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.
- ▲ The power **MUST** be temporarily disconnected from the radar sensor whenever any tests **USING A DYNAMOMETER** are conducted on a vehicle equipped with a Bendix® Wingman® system.
- ▲ You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.



WARNING: Not all wheels and valve stems are compatible with Bendix® Air Disc Brakes. Use only wheels and valve stems approved by the vehicle manufacturer to avoid the risk of valve stem shear and other compatibility issues.



WARNING: AVOID CREATING DUST. POSSIBLE CANCER AND LUNG DISEASE HAZARD.

While Bendix Spicer Foundation Brake LLC (BSFB, Bendix) does not offer asbestos brake linings, the long-term effects of some non-asbestos fibers have not been determined. Current Occupational Safety and Health Administration (OSHA) Regulations cover exposure levels to some components of non-asbestos linings, but not all. The following precautions must be used when handling these materials.

- ▲ Avoid creating dust. Compressed air or dry brushing must never be used for cleaning brake assemblies or the work area.
- ▲ Bendix recommends that workers doing brake work must take steps to minimize exposure to airborne brake lining particles. Proper procedures to reduce exposure include working in a well-ventilated area, segregation of areas where brake work is done, use of local filtered ventilation systems or use of enclosed cells with filtered vacuums. Respirators approved by the Mine Safety and Health Administration (MSHA) or National Institute for Occupational Safety and Health (NIOSH) should be worn at all times during brake servicing.
- ▲ Workers must wash before eating, drinking or smoking; shower after working, and should not wear work clothes home. Work clothes should be vacuumed and laundered separately without shaking.
- ▲ OSHA Regulations regarding testing, disposal of waste and methods of reducing exposure for asbestos are set forth in 29 Code of Federal Regulations §1910.001. These Regulations provide valuable information which can be utilized to reduce exposure to airborne particles.
- ▲ Material Safety Data Sheets on this product, as required by OSHA, are available from Bendix. Contact the Bendix Tech Team at 1-800-247-2725, option 2, or techteam@bendix.com.

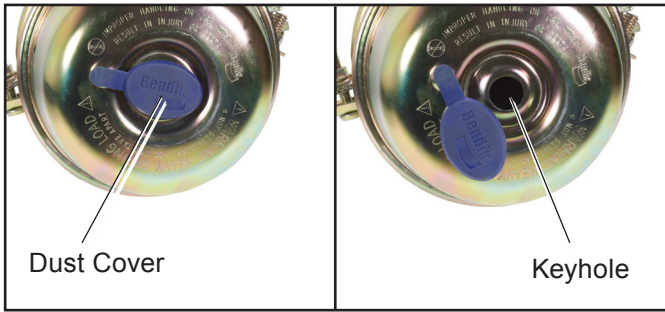


Figure 2 – Dust Cover Removal

⚠ WARNING

⚠ Spring brake chambers and piggyback assemblies contain a loaded compression spring. Property damage, serious injury, or death may occur if instructions are not followed completely.

⚠ DO NOT service a spring brake chamber if it has structural damage of any kind. Replace the complete assembly. Dismount a damaged spring brake by first cutting the service pushrod with an acetylene torch to relieve any force it might have.

⚠ Do not strike any part of a spring brake chamber for any reason. This may cause structural damage.

⚠ Be careful not to drop a spring brake chamber at any time. If dropped, inspect for signs of structural damage. Replace complete assembly if damaged.

⚠ The emergency diaphragm of a piggyback assembly cannot be replaced. Replace the whole piggyback spring brake assembly.

⚠ Always work from the side of the spring brake chamber. Never work from the front or back.

SPRING BRAKE CHAMBER REMOVAL

Before removing the existing Spring Brake Chamber assembly, be sure to perform the caging process.

CAGING THE SPRING BRAKE CHAMBER (RELEASE THE PARK BRAKE)

⚠ WARNING

⚠ DO NOT MECHANICALLY RELEASE (CAGE) THE SPRING IF THERE IS ANY STRUCTURAL DAMAGE TO THE ACTUATOR. CAGING THE SPRING IN SUCH A CHAMBER MAY CAUSE SERIOUS INJURY OR DEATH!

1. This procedure will be made much easier if air pressure (100-120 psi; 6.6-8.0 bar) is used to collapse the power spring, by applying air to port 12, before turning the release bolt nut with a hand wrench or simply by hand.
2. Remove the dust plug or weather seal from the keyhole located at the rear center of the spring brake chamber. See Figure 2.
3. Remove the release tool assembly from the side pocket of the spring brake chamber.
4. Insert the release tool (T-bolt) through the release tool keyhole and into the power spring piston plate.
5. Turn the release tool one quarter turn clockwise.

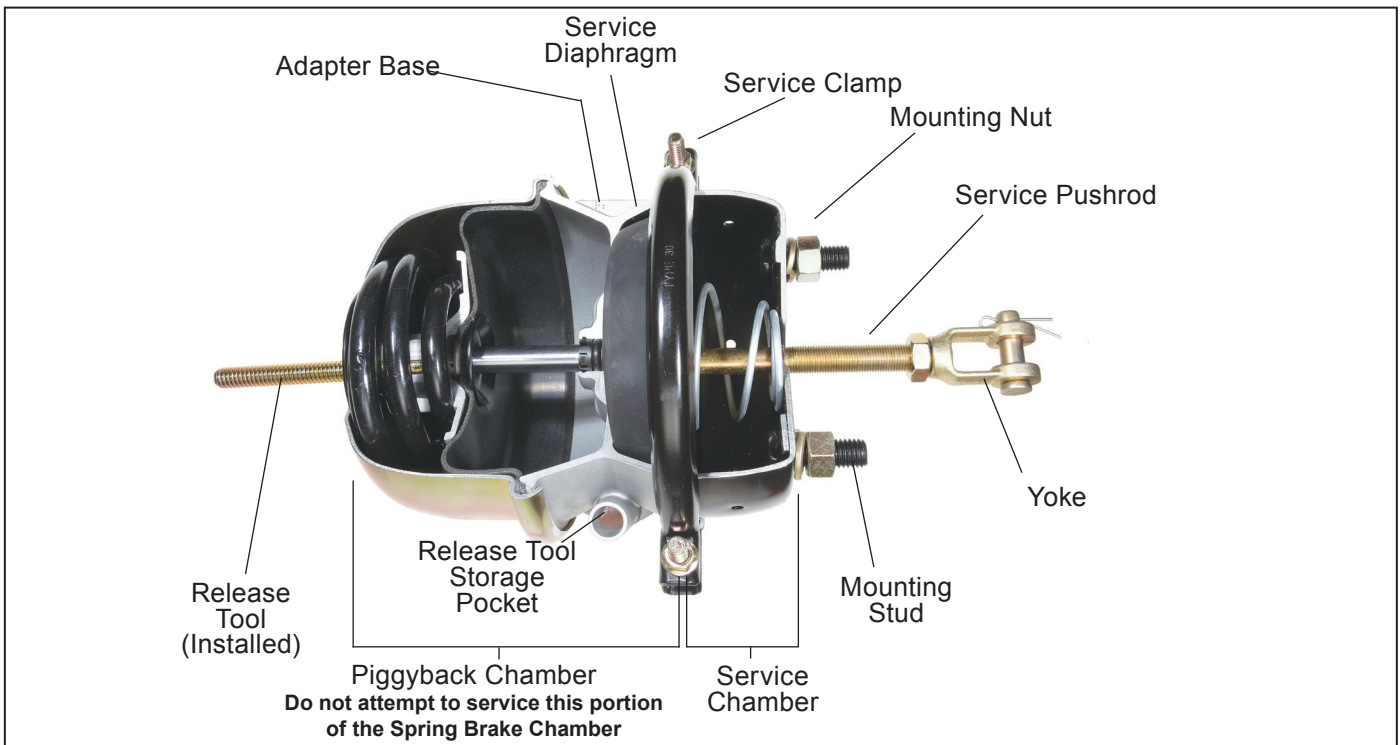


Figure 3 – Spring Brake Chamber Assembly

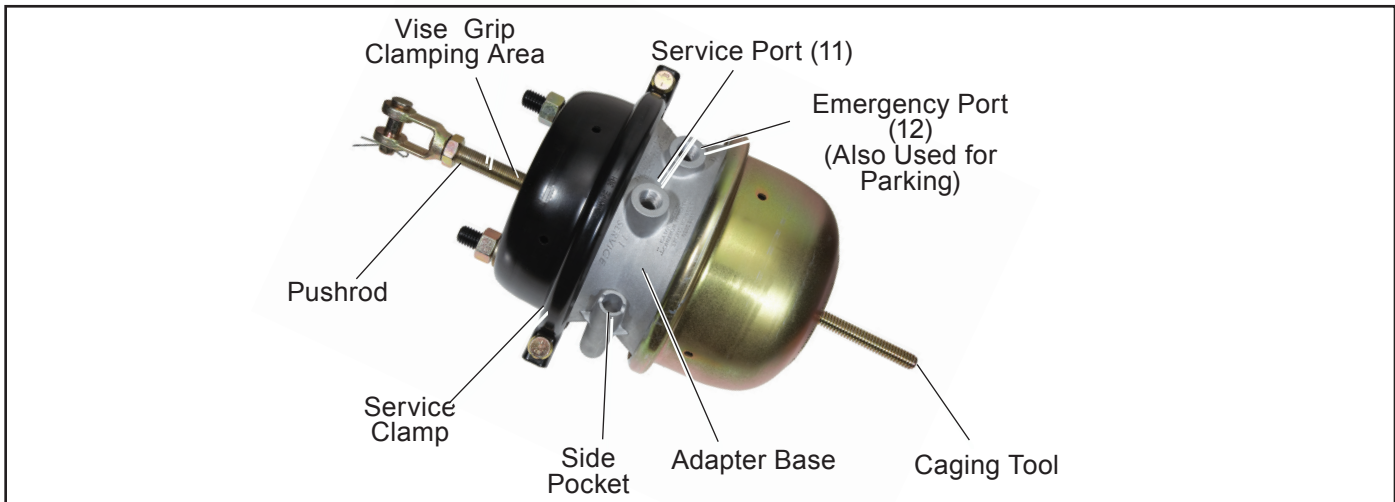


Figure 4 – Caged Spring Brake Chamber

6. Pull on the release tool to ensure the T-section is properly seated in the power spring piston plate.
7. Assemble the release tool washer and nut onto the release bolt and finger tighten only. If caging is being done manually - it is recommended that some type of lubrication be applied to the release bolt threads prior to tightening to prevent galling or stripping.
8. To manually cage the spring brake, turn the release tool nut clockwise with a hand wrench. The maximum releasing torque should not exceed 50 ft-lbs (67.8 Nm). If the spring has not previously been compressed by the use of air (Step 1, above), verify that the service side pushrod is retracting during the process and that the release bolt is extending from inside the spring brake housing. (DO NOT USE A HIGH SPEED AND/OR POWER DRIVEN IMPACT WRENCH).
9. Rotate the release bolt nut clockwise until an increased resistance is encountered. This should indicate that proper caging is complete. The release bolt should be extended all the way back, as shown in *Figure 4*. (DO NOT OVER TORQUE RELEASE BOLT. OVER TORQUING CAN CAUSE SPRING BRAKE DAMAGE).
10. Release the air pressure from the emergency/parking port (port 12) after caging and prior to any disassembly or removal from vehicle.

IMPORTANT: To ensure the power spring is fully caged, the extended release tool length should be fully backed out as shown in *Figure 4*.



⚠ Do not use an impact wrench. An impact wrench may over torque the release tool and cause damage to the pressure plate.

SPRING BRAKE CHAMBER REMOVAL

1. With the spring brake chamber caged and all air pressure drained from the air brake system, disconnect the air hoses from the spring brake chamber.
2. Remove the cotter pin from the yoke. Remove the yoke pin.
3. While supporting the spring brake chamber in position, remove and discard brake chamber mounting nuts and washers (*see Figure 3*). Nuts and washers must not be re-used. Remove the spring brake.

CLOCKING THE BENDIX SERVICE REPLACEMENT SPRING BRAKE CHAMBER

NOTE: For proper installation, the service replacement spring brake chamber may need to be clocked (rotated) to properly position the ports or clamp band hardware. To do so, follow the clocking procedure. Additionally, the pushrod may need to be cut to the proper length for the application. Refer to Bendix® ASA-5® slack adjuster Service Data sheet SD-05-1269 or Bendix® Versajust® slack adjuster Service Data sheet SD-05-4630 as applicable, or see guidelines on proper pushrod lengths for use with these slack adjusters.

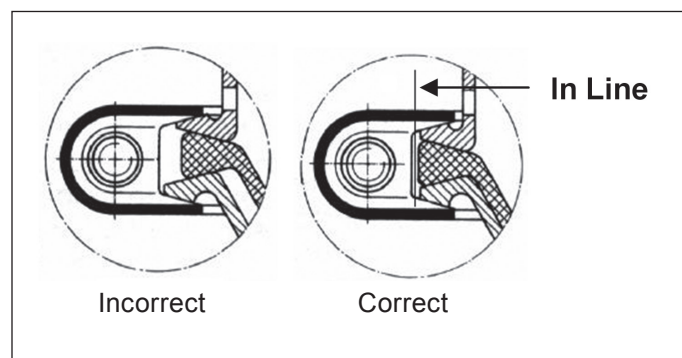


Figure 5 – Correct Diaphragm Position

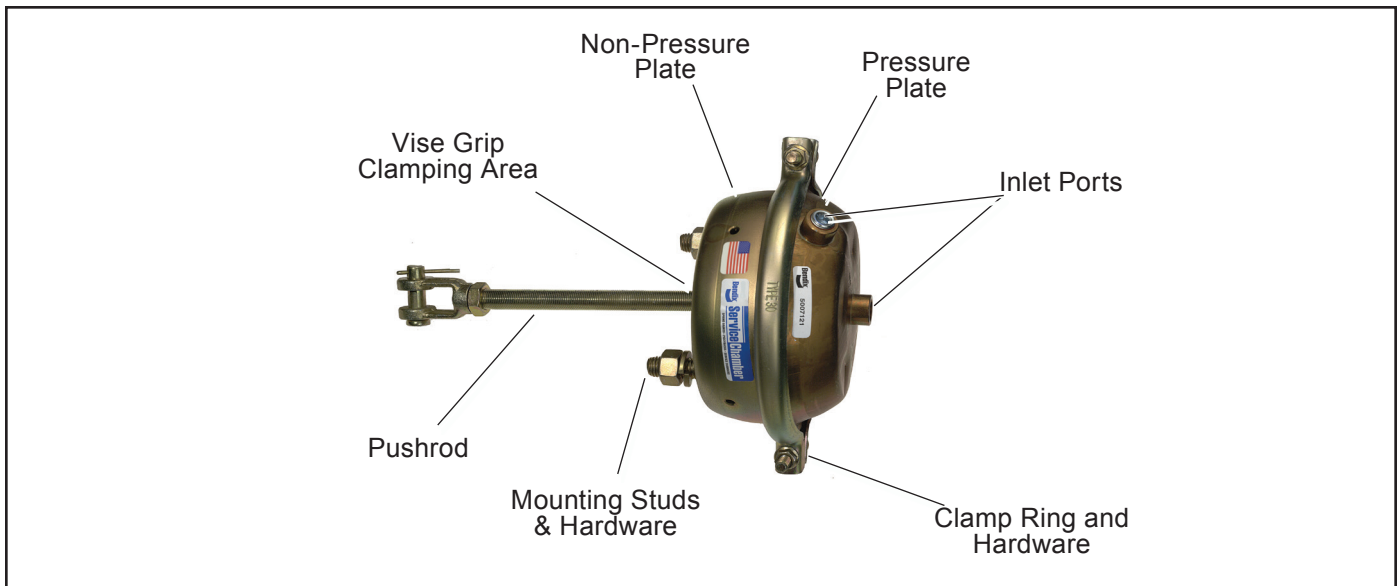


Figure 6 – Service Brake Chamber



⚠ Do not mechanically release (cage) the spring if there is any structural damage to the brake. Caging the spring in such a chamber may cause serious injury or death. Replace the complete spring brake assembly.

1. If the service replacement spring brake chamber is not caged, mechanically release (cage) the replacement spring brake chamber by following the original manufacturer's instructions. See *Mechanical Release (Caging) of the Bendix® Spring Brake*.



⚠ DO NOT SERVICE DOUBLE CLAMP BAND-STYLE ACTUATORS. REPLACE THE COMPLETE ASSEMBLY.

Clocking the Replacement Spring Brake Chamber

1. Apply 10 psi (1 bar) of air pressure to the service port (11) of the spring brake chamber.
2. Since you will be using vise grips to hold the service pushrod in place, be sure to protect the threads before clamping down. The vise grips will prevent the pushrod from retracting when they are used at the pushrod opening of the replacement spring brake chamber.
3. Release the air pressure from the service port.
4. Remove the two-piece clamp ring and hardware from the spring brake chamber.
5. Position the adapter base inlet port by rotating it with respect to the mounting studs as needed.

6. Make sure that the diaphragm is properly aligned and seated. See Figure 5. Be sure that the service diaphragm is fully inserted into the clamp.
7. Reinstall the clamp rings and hardware. Check the arrangement of the removed actuator and position the hardware with respect to the mounting studs as required. Tighten each clamp nut evenly in an alternating pattern. Torque each clamp nut to a final torque of 20-30 ft-lbs. (28-40 Nm).
8. Inspect the clamp ring and hardware for proper seating.
9. Apply up to around 10 psi air pressure to the service port of the spring brake chamber. (Do not exceed 10 psi.) Remove the vise grips from the brake chamber pushrod.
10. Perform the Leakage Test as shown in this document on page 7 before installing the spring brake on the vehicle.

SPRING BRAKE CHAMBER INSTALLATION

1. Clean and inspect the mounting bracket.
2. If the service replacement is a type that provides an extra-long threaded pushrod, thread a nut onto the rod past the point that it will need to be cut. Taking all necessary safety precautions, cut the rod to the required length and remove burrs. Remove the nut installed earlier to ensure that the threads are clear.
3. Install the spring brake assembly using new hardware. Torque the mounting nuts to 133-155 ft-lbs (180-210 Nm). Connect the yoke to the slack adjuster and install the yoke pin(s) and the cotter pin(s) as necessary.
4. Reconnect the emergency air line to the emergency/parking port (12) and reconnect the service air line to the service port (11). Torque fittings to 30 ft-lbs (40 + 5 Nm).

UN-CAGING THE SPRING BRAKE CHAMBER (APPLY PARK BRAKE)


1. Verify that the spring brake has been properly installed on the spring brake bracket and properly attached to the slack adjuster.
2. Apply air pressure (100-120 psi; 6.6-8.0 bar) to restrain the power spring by air force.
3. Turn the release bolt nut counterclockwise with a hand wrench. (DO NOT USE HIGH SPEED OR POWER DRIVEN IMPACT WRENCH).
4. Connect a regulated air line to the emergency/parking brake port (marked 12) of the chamber (if not connected previously).
5. Continue to turn the release bolt nut until the caging tool is loose. Remove caging bolt nut and washer.
6. Push the release bolt tool in, turn the release bolt a quarter-turn counterclockwise, and remove it from the pressure plate key hole.
7. With hands clear of moving parts, slowly release the air pressure to the emergency/parking brake port (12). Be sure to exercise caution to prevent pinching of fingers.
8. Place caging bolt in spring brake tool holder with T-head down and seated in slot. Install washer and nut up on exposed threads (this allows the washer to protect the holder cavity and caging bolt from corrosive elements), and torque the caging bolt nut to 10-15 ft-lbs (14-20 Nm).
9. Mount the dust plug /weather seal in the keyhole located at the rear center of the spring brake chamber. Check around the edge of the dust plug/weather seal to be sure it is firmly seated.

IMPORTANT

Always re-install the tethered dust plug/weather seal in the spring brake caging tool key hole. Failure to do so will result in corrosion and foreign material ingestion through the key hole which may void the warranty. Do not use excessive force when installing the dust plug/weather seal. Extreme force may cause damage and make it unusable.

Replacement dust plugs or weather seals can be purchased from your local Bendix® distributor.


WARNING

 **Check for proper service and emergency operation after servicing any part of the spring brake chamber(s). Check the brake adjustment. (Follow vehicle manufacturer's instructions to adjust the brakes).**


SERVICE BRAKE CHAMBER REPLACEMENT AND CLOCKING

NOTE: For proper installation, the service replacement brake chamber may need to be clocked to properly position the ports or clamp band hardware. To do so, follow the clocking procedure. Additionally, the pushrod may need to be cut to the proper length.

CAUTION

 Replace the brake chamber with the same type and size as originally installed on the vehicle. Replacement with alternate equipment (without written authorization from Bendix and the vehicle manufacturer) could compromise brake performance. Service brake chambers can be clocked to ensure the proper alignment of mounting studs, drain holes, and ports.

CAUTION

 **Follow all standard safety procedures including, but not limited to, those on this instruction sheet. See the vehicle manufacturer's recommendations. When working on foundation brakes, be sure that the vehicle is on level ground, that the vehicle is parked by other means than the foundation brakes, and that the wheels are chocked.**

SERVICE BRAKE CHAMBER REMOVAL

Refer to Figure 5.

1. Drain system pressure and then disconnect the air hose from the service brake chamber.
2. Remove the cotter and yoke pin(s) that connect the actuator to the slack adjuster.
3. Remove the brake chamber mounting hardware from the mounting studs.
4. Remove the service brake chamber from its mounting bracket.

CLOCKING THE REPLACEMENT BRAKE CHAMBER

1. Apply 10 psi of air pressure to the service port of the chamber.
2. Since you will be using vise grips to hold the service pushrod in place, be sure to protect the threads before clamping down. The vise grips will prevent the pushrod from retracting when they are used at the pushrod opening of the replacement spring brake chamber.
3. Release the air pressure from the service port.
4. Remove the two-piece clamp ring and hardware from the brake chamber.
5. Position the pressure plate inlet port by rotating the pressure plate of the brake chamber with respect to the mounting studs, as needed.
6. Make sure that the diaphragm is properly aligned and seated. *See Figure 5.*
7. Reinstall the clamp rings and hardware. Position the hardware with respect to the mounting studs as required. Tighten each clamp nut evenly in an alternating pattern. Torque each clamp nut to 20-30 ft-lbs. (28-40 Nm).
8. Inspect the clamp ring and hardware for proper seating. Apply 10 psi of air pressure to the service port of the chamber. Remove the vise grips from the brake chamber pushrod. Release the air pressure from the service port.
9. Perform the Leakage Test, as shown, before installing the brake chamber on the vehicle.

INSTALLATION

1. Clean and inspect the mounting bracket. Mount the service brake chamber to the mounting bracket.
2. If the service replacement is a type that provides an extra-long threaded pushrod, thread a nut onto the rod past the point that it will need to be cut. Taking all necessary safety precautions, cut the rod to the required length and remove burrs. Remove the nut installed earlier to ensure that the threads are clear.
3. Connect the air hose to brake chamber. Torque the fitting to 30 ft-lbs (40 + 5 Nm). Check to be sure the air hoses are properly supported and clamped, if necessary, to provide proper clearance, including checking for proper length when under full steer conditions.

OPERATING AND LEAKAGE TESTS

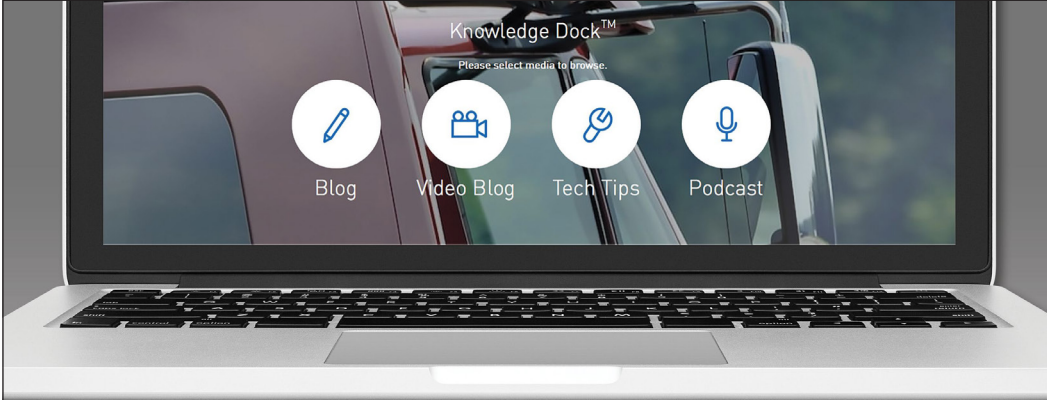
A. OPERATING TEST

1. Apply the brakes and verify that the pushrods move out promptly and without binding.
2. Release brakes and verify that the pushrods return to the released position promptly and without binding.
3. Check the pushrod travel. Pushrod travel should be as short as possible without brakes dragging. Adjust the travel of the pushrod at the slack adjuster, if necessary, following the automatic slack adjuster manufacturer's instructions.


B. LEAKAGE TEST

1. Make and hold a full brake application.
2. Using soap solution, coat the clamping ring(s). If leakage is detected, tighten the clamping ring only enough to stop leakage. **DO NOT OVERTIGHTEN** as this can distort sealing surface or clamping ring. Coat the area around push rod hole (loosen boot if necessary). Minimal leakage is permitted (100 SCCM). If abnormal leakage is detected, the diaphragm must be replaced.
3. Using a soap solution, check the hose fitting for leakage. A one-inch bubble in one minute is acceptable.

For additional service information see SD-02-1302.



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