

AIR SYSTEM MAINTENANCE: FOCUSING ON THE COMPRESSOR

Tips on Troubleshooting the Heart of the Air System and Replacing an ESS Piston

At the heart of a commercial vehicle's air brake system is its air compressor, which pressurizes air in the primary and secondary tanks to provide power for the air brakes and other pneumatic systems. With commercial vehicle technology advancing and expanding the use of compressed air for non-braking functions, knowledge of proper air compressor maintenance and operation has become even more important. As part of its Bendix Tech Tips series, Bendix Commercial Vehicle Systems LLC offers insight on air compressor troubleshooting and replacement of an ESS (energy-saving system) piston.

"Although the compressor is the key component of the air system, it's important to note that some symptoms of poor compressor performance may actually be caused by faults elsewhere within the system, particularly in the air pressure governor, control valves inside the air dryer, and the air lines and fittings," said Richard Nagel, Bendix director of marketing and customer solutions, Air Charging. "Compressor failure to load or unload, or excessive purge frequency, for instance, can be caused by leaks in the governor's control lines, loose fittings, or simply a faulty governor."

Before removing or performing maintenance on the compressor, take the following steps:

- Using shop air, pressurize the unloader line to 120 psi and check for leaks in the line.
- Remove the air pressure and ensure the unloader line is properly sealed in the governor fitting, then use shop air to check the line again for leaks.
- Inspect the adapters at both ends of the intake hose for damage.
- Inspect the intake hose clamps and tighten if needed.
- Inspect the intake hose for signs of drying, cracking, chafing, and ruptures; replace if necessary.
- Ensure all metal tubes are tight to the mating fitting.
- Inspect all metal tubes for cracks or breaks and replace if necessary.
- Check the compressor's exterior for signs of leakage (oil or air), referring to the service data sheet or manual for appropriate tests and corrective action.

Once these checks and fixes have been carried out, if any of the following symptoms remain, they likely point to trouble with the ESS piston:

- ESS leaking when pressurized
- Compressor safety valve popping off
- Air dryer purge valve and compressor cycling rapidly
- Compressor failing to unload
- System building air pressure slowly or not at all
- Compressor leaking air

About the ESS Piston

The ESS piston, located in the head of the compressor, controls the flow of air within the compressor itself. The piston allows the charging or pressurizing of the system's air tanks. In the "loaded" mode, the ESS piston is down – or sealed – and air enters the system through the air inlet reed valve. The air is then exhausted through the discharge reed valve to build system air pressure. In the "unloaded" mode, the ESS piston is up, opening the cylinder to the compressor inlet. The air shuttles between the cylinder and the inlet, allowing the compressor piston to continue to reciprocate without building pressure.

Replacing the ESS piston is a relatively straightforward process, although before doing so, you should take a few moments to inspect the compressor for any obvious issues once you have removed it from the vehicle. In particular, check the discharge line for excessive carbon buildup: If a film greater than 10 percent of the inside diameter is present, the entire compressor should be replaced.

If there aren't any clear issues unrelated to the ESS piston, replace it with the appropriate kit.

ESS Piston Removal and Cleaning

Begin by removing the ESS cover plate screws and the cover plate itself. Be sure to use the proper screwdriver head for your particular compressor.

Next, remove the assembly consisting of the balance piston, balance piston O-ring, spring, and ESS piston from the cylinder head.

Thoroughly clean the cylinder head and ESS cover plate, removing all dirt, carbon, grease, gasket materials, or foreign matter from the ESS piston cavity.

Installing the New ESS Piston

During the new ESS piston assembly and installation, apply lubricant generously. If lubricant is supplied, as in the case of Bendix kits, the entire amount should be used during the process.

Lubricate the new balance piston, including thorough lubrication of the O-ring groove. Then lubricate the balance piston O-ring and install it on the balance piston, taking care not to twist or tear the O-ring. Set the balance piston aside.

Lubricate the inside and outside of the new piston assembly housing, then apply lubricant to the spring itself. Carefully slide the spring into the assembly housing.

With the spring slid all the way into the housing, retrieve the balance piston and slide its step into the spring seated in the assembly housing.

Once the entire assembly is complete and well lubricated, slide it down into the ESS cavity in the compressor cylinder head.

Install the new gasket on the boss of the ESS port, aligning the gasket with the boss contours and holes, then place the cover plate over the gasket and re-secure it to the cylinder head with the screws. Tighten the screws manually, using a torque meter to achieve the recommended torque – 7 newton-meters for Bendix compressors.

If your compressor is a twin-cylinder style, it uses two ESS pistons, and you will need to repeat the process for the second piston.

Bendix provides commercial fleets, technicians, and drivers with the tools they need to ensure safe operation through assessment, maintenance, and repair. The Bendix On-Line Brake School at www.brake-school.com provides 24/7/365 access to the company's knowledge database and technical resources on all aspects of electronics and air brake maintenance and product education. The online school delivers a series of courses on Bendix air compressors and air dryers, covering topics such as installation, troubleshooting, maintenance, and air treatment. Each course offers a quiz after viewing the complete content, providing a record of course completion.

The in-person Bendix Brake Training School, one of the industry's longest-running training programs, has educated more than 250,000 students since its founding more than 50 years ago. Among other tools, the company offers field-tested sales and service professionals; a 100 percent ASE-certified field technical support team; and the Bendix Tech Team (at 1-800-AIR-BRAKE), an expert technical support group providing service advice, brake system troubleshooting, and product training.

For more information about Bendix air compressors and air system technologies, call Bendix at 1-800-AIR-BRAKE or visit www.bendix.com.

About the Bendix Tech Tips Series

Bendix, the North American leader in the development and manufacture of leading-edge active safety and braking system technologies, is committed to helping keep commercial vehicles on the road and in good working condition. The Bendix Tech Tips series addresses common commercial vehicle maintenance questions and issues concerning the total range of components found within foundation and air brake systems, as well as advanced safety systems.

About Bendix Commercial Vehicle Systems LLC

Bendix Commercial Vehicle Systems, a member of the Knorr-Bremse Group, develops and supplies leading-edge active safety technologies, energy management solutions, and air brake charging and control systems and components under the Bendix® brand name for medium- and heavy-duty trucks, tractors, trailers, buses, and other commercial vehicles throughout North America. An industry pioneer, employing more than 2,800 people, Bendix is driven to deliver solutions for improved vehicle safety, performance, and overall operating cost. Bendix is headquartered in Elyria, Ohio, with manufacturing plants in Bowling Green, Kentucky; Huntington, Indiana; North Aurora, Illinois; and Acuña, Mexico. For more information, call 1-800-AIR-BRAKE (1-800-247-2725) or visit www.bendix.com. To learn more about career opportunities at Bendix, visit www.bendix.com/careers. Follow Bendix on Twitter at http://twitter.com/Bendix_CVS. Log on and learn from the Bendix experts at www.brake-school.com.