

Bendix® Dryer Reservoir Module (DRM™) with Bendix® AD-IS® Air Dryer

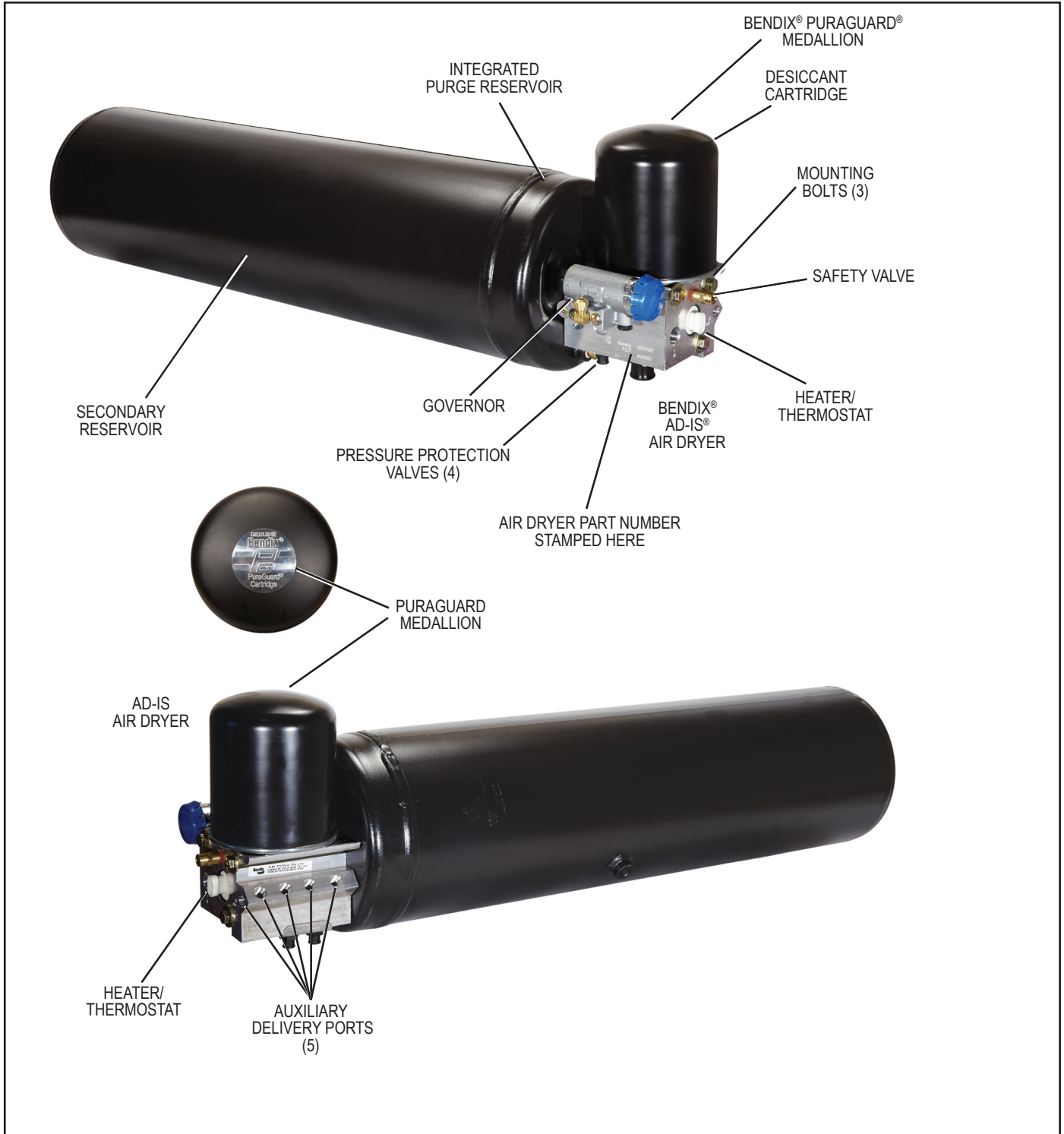


FIGURE 1 - BENDIX® DRM™ DRYER RESERVOIR MODULE

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.
- ▲ You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.
- ▲ 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.

DESCRIPTION

The function of both the Bendix® DRM™ (Dryer Reservoir Module) with the Bendix® AD-IS® air dryer and reservoir system, and the Bendix® AD-IS® PuraGuard® oil coalescing air dryer and reservoir system, is to collect and remove air system contaminants in solid, liquid, and aerosol form before they enter the brake system and to provide—as a module—heavy vehicles with an integrated vehicle air dryer, purge reservoir, governor, and a number of charging valves. These components have been designed as an integrated air supply system.

Both air dryer and reservoir systems provide clean, dry air to the components of the brake system which increases the life of the system and reduces maintenance costs. The necessity for daily manual draining of the reservoirs is eliminated.

The Bendix AD-IS PuraGuard oil coalescing air dryer has an identical appearance to the standard Bendix AD-IS air dryer, but contains a coalescing media at the inlet of the desiccant bed. The coalescing media provides a higher level of oil removal over the standard AD-IS air dryer. The AD-IS PuraGuard oil coalescing air dryer has all of the same functions as the standard AD-IS air dryer and is used in applications where lower oil concentration levels are required.



When servicing, note that standard AD-IS air dryers or air dryer cartridges may be serviced with PuraGuard oil coalescing air dryers or cartridges, however, PuraGuard oil coalescing air dryers or cartridges must only be serviced with like replacements.

Note: *Unless otherwise stated in this manual, AD-IS air dryer and reservoir systems refers to both the standard and PuraGuard oil coalescing air dryer and reservoir systems.*

The function of the pressure protection valves is to protect each reservoir from a pressure loss in the other reservoir or a pressure loss in an air accessory. Each of the pressure protection valves in the AD-IS air dryer and reservoir systems may have different pressure settings. These are factory set and must not be changed or adjusted.

Air Connection Port ID	Function/Connection	No.
1 IN	Inlet Port (air in)	1
21 PRI	Delivery Port out (to Primary reservoir)	1
22 AUX 1	Auxiliary Delivery Port (air out)	4
23 AUX 2	Auxiliary Delivery Port (air out)	1
UNL	Unloader Control Air (Bendix® D-2A™ Governor)	2
RES	Common Reservoir Pressure (D-2A Governor)	2
EXH	Governor Exhaust	1

TABLE 1 - BENDIX® DRM™ DRYER RESERVOIR MODULE PORT IDENTIFICATION

The air dryer and reservoir system consists of a “spin on” desiccant cartridge secured to a base assembly. The base assembly contains a delivery check valve assembly, safety valve, heater and thermostat assembly, pressure protection valves, threaded air connections and the purge valve assembly.

The removable purge valve assembly incorporates the purge valve mechanism and a turbocharger cut-off feature that is designed to prevent loss of engine “turbo” boost pressure during the purge cycle of the Bendix AD-IS air dryer and reservoir system. For ease of maintenance, all replaceable assemblies can be serviced without removal of the air dryer and reservoir system from its mounting on the vehicle. Refer to the *Preventive Maintenance* section.

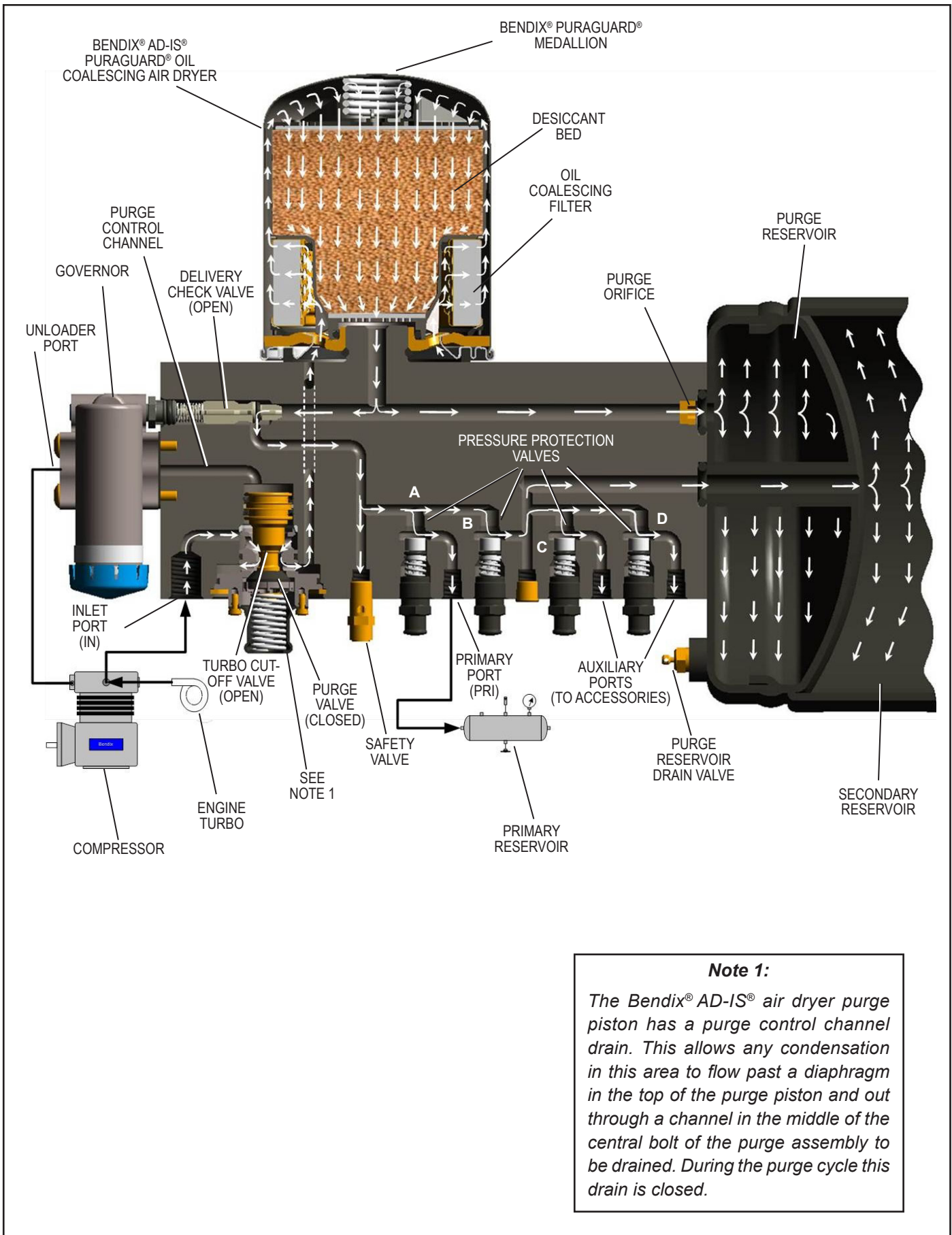


FIGURE 2 - BENDIX® AD-IS® AIR DRYER CHARGE CYCLE

BENDIX® DRM™ AIR DRYER MODULE

OPERATION: GENERAL (Refer to Figure 2)

The Bendix® DRM™ air dryer module is designed to receive compressed air from the vehicle air compressor, clean and dry the air using the Bendix® AD-IS® air dryer, deliver air to the vehicle's primary reservoir, secondary reservoir and accessories, and control the compressor/dryer charge cycle.

AIR DRYER OPERATION: GENERAL

The AD-IS air dryer alternates between two operational modes or “cycles” during operation: the *Charge Cycle* and the *Purge Cycle*. The following descriptions are separated into these “cycles” of operation.

CHARGE CYCLE (Refer to Figure 2)

When the compressor is loaded (compressing air) compressed air, along with oil, aerosol, water and water vapor flows through the compressor discharge line to the inlet (1 IN) port of the air dryer body.

As air travels through the AD-IS air dryer, its temperature falls, causing some of the contaminants to condense and drop to the bottom of the air dryer purge valve assembly, ready to be expelled at the next purge cycle. The air then flows into the desiccant cartridge, where it flows through an oil separator—or coalescing filter if equipped with a Bendix® PuraGuard® oil coalescing cartridge—which removes water in liquid form as well as liquid oil and solid contaminants.

Air then flows into the desiccant drying bed and becomes progressively drier as water vapor adheres to the desiccant material in a process known as “ADSORPTION.”

Dry air exits the desiccant cartridge through the center of the base assembly. The air then flows to the delivery check valve and also through an orifice into the purge reservoir. The delivery check valve opens, supplying air to the pressure protection valves (A) and (B), the safety valve, and also to the reservoir port of the attached governor. The purge reservoir fills, storing air that will be used to reactivate the desiccant during the purge cycle.

When the air pressure reaches approximately 103 psi, the first pressure protection valve (A) will open and air will be supplied to the primary reservoir. When the air pressure in the primary reservoir reaches approximately 109 psi, the second pressure protection valve (B) opens and air will be supplied to the secondary reservoir and to the accessory pressure protection valves (C & D). (Note: there is no external air hose feeding the secondary reservoir, instead air is supplied by a connector passing through the bulkhead of the purge reservoir section of the reservoir.) When the air pressure in the secondary reservoir reaches approximately 55 psi and 85 psi respectively, the two remaining pressure protection valves (C & D) will open and supply air to the vehicle accessories.

The air dryer will remain in the charge cycle until the air brake system pressure builds to the governor cut-out setting of approximately 130 psi.

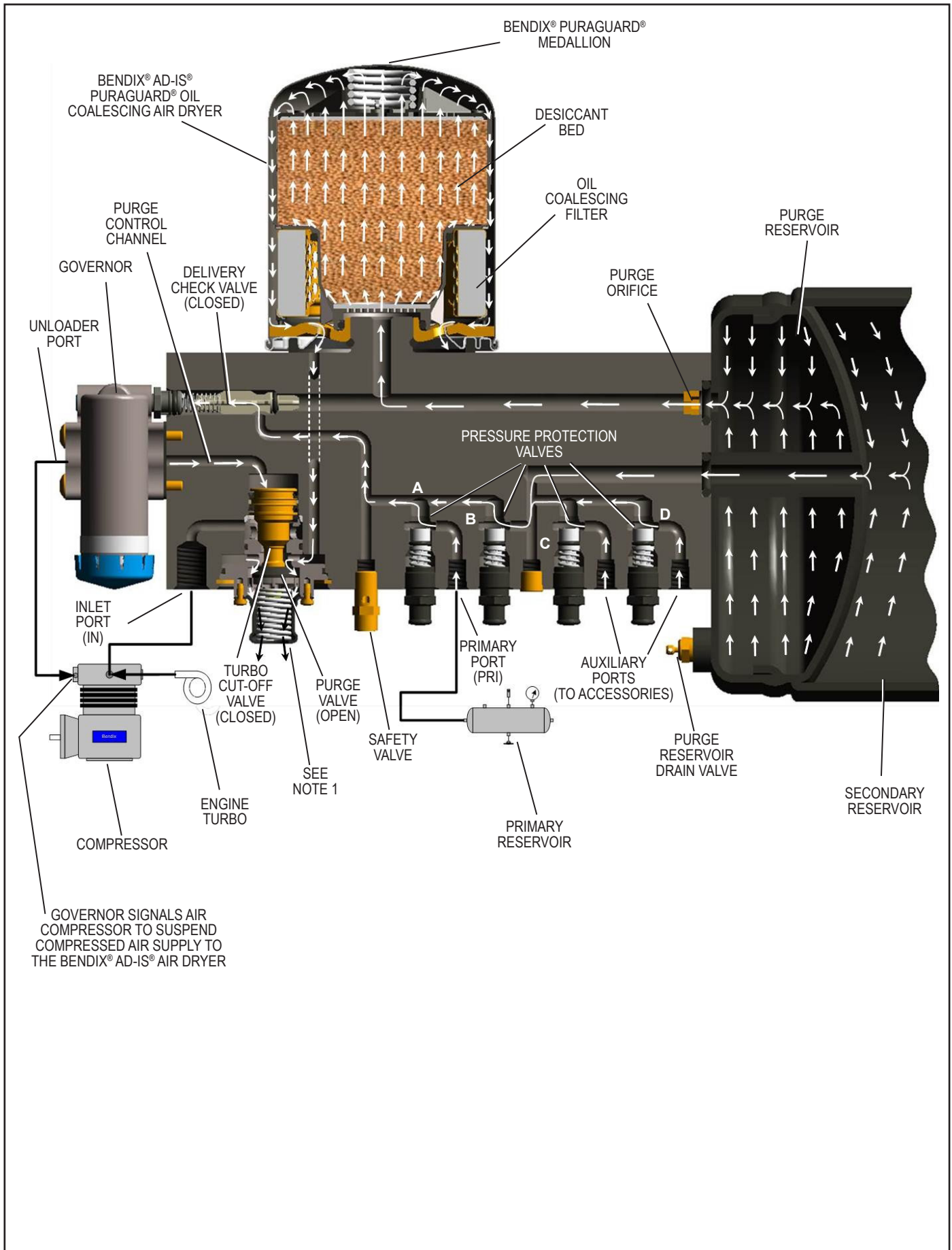


FIGURE 3 - AD-IS® AIR DRYER PURGE CYCLE

PURGE CYCLE (Refer to Figure 3)

When the air brake system pressure reaches the cut-out setting of the governor, the governor unloads the compressor and the purge cycle of the air dryer begins.

The governor unloads the compressor by allowing air pressure to fill the line leading to the compressor unloader mechanism—causing the delivery of compressed air to the Bendix® AD-IS® air dryer to be suspended.

Similarly, the governor also supplies air pressure to the AD-IS air dryer purge control channel. The AD-IS air dryer purge piston moves down in response to this air pressure, causing the purge valve to open to the atmosphere and the turbo cut-off valve to close off the supply of air from the compressor (this will be further discussed in the *Turbo Cut-off Feature* section). Water and contaminants which have collected in the purge valve base are expelled immediately when the purge valve opens. Also, air which was flowing through the desiccant cartridge changes direction and begins to flow toward the open purge valve. Oil and solid contaminants collected by the oil separator are removed by air flowing from the purge reservoir through the desiccant drying bed to the open purge valve.

The initial purge and desiccant cartridge decompression lasts only a few seconds and is evidenced by an audible burst of air at the AD-IS air dryer exhaust.

The actual reactivation of the desiccant drying bed begins as dry air from the purge reservoir flows through the purge orifice into the desiccant bed. Pressurized air from the purge reservoir expands after passing through the purge orifice; its pressure is lowered and its volume increased. The flow of dry air through the drying bed reactivates the desiccant material by removing the water vapor adhering to it. Approximately 30 seconds are required for the entire contents of the purge reservoir of a standard AD-IS air dryer to flow through the desiccant drying bed.

The delivery check valve assembly prevents air pressure in the brake system from returning to the air dryer during the purge cycle. After the purge cycle is complete, the air dryer is ready for the next charge cycle to begin.

TURBO CUT-OFF FEATURE (Refer to Figure 3)

The primary function of the turbo cut-off valve is to prevent loss of engine turbocharger air pressure through the AD-IS air dryer in systems where the compressor intake is connected to the engine turbocharger.

At the onset of the purge cycle, the downward travel of the purge piston is stopped when the turbo cut-off valve (tapered portion of purge piston) contacts its mating metal seat in the purge valve housing. With the turbo cut-off valve seated (closed position), air in the compressor discharge line and AD-IS air dryer inlet port cannot enter the air dryer. In this manner, the turbo cut-off effectively maintains turbo charger boost pressure to the engine.

PREVENTIVE MAINTENANCE

Important: Review the warranty policy before performing any intrusive maintenance procedures. An extended warranty may be voided if intrusive maintenance is performed during this period. Purge valve maintenance is permissible during the warranty period only when using a genuine Bendix® purge valve kit.

Because no two vehicles operate under identical conditions, maintenance and maintenance intervals will vary. Experience is a valuable guide in determining the best maintenance interval for any one particular operation.

Every 900 operating hours, or 25,000 miles, or three (3) months:

1. Check for moisture in the air brake system by opening reservoir drain valves and checking for the presence of water. If moisture is present, the desiccant cartridge may require replacement; however, the following conditions can also cause water accumulation and should be considered before replacing the desiccant:
 - A. An outside air source has been used to charge the system. This air did not pass through the drying bed.
 - B. Air usage is exceptionally high and not normal for a highway vehicle.

This may be due to accessory air demands or some unusual air requirement that does not allow the compressor to load and unload (compressing and non-compressing cycle) in a normal fashion. Check for high air system leakage. If the vehicle vocation has changed, it may be necessary to upgrade the compressor size. Refer to *Bendix Specification BW-100-A / Appendix D*, to determine if any changes are necessary. Specification BW-100-A is available from the Bendix Tech Team at 1-800-247-2725, option 2, or www.bendix.com.
 - C. The location of the air dryer and reservoir system is too close to the air compressor. Refer to *Bendix Specification BW-110-A / Appendix B*, for discharge line lengths.
 - D. In areas where more than a 30 degree range of temperature occurs in one day, small amounts of water can temporarily accumulate in the air brake system due to condensation. Under these conditions, the presence of small amounts of moisture is normal.

For Bendix® AD-IS® air dryers: Preventive Maintenance is as easy as 1-2-3

Adhering to a preventive maintenance schedule is crucial to keeping a vehicle's air system clean and ensuring superior performance of all components that utilize system air—such as brakes, emissions equipment and automated manual transmissions. Depending on vocation, Bendix recommends a 1-, 2- or 3-year air dryer cartridge replacement on vehicles equipped with a Bendix® compressor.

For severe service applications—such as residential refuse trucks or school buses—the air dryer cartridge should be replaced every year or 100,000 miles; for pick-up and delivery operations, or for double- and triple-trailer line haul trucks, every two years or 200,000 miles is the recommendation. Line-haul operations using a single trailer should swap the filter out every three (3) years or 300,000 miles. The recommended intervals for trucks equipped with non-Bendix compressors are 6 months (50,000 miles), one year (100,000 miles) and two years (200,000 miles), respectively.

More frequent intervals may be required depending on a vehicle's age, its compressor condition, use of a non-Bendix compressor, the operating environment, the vehicle's vocation, and its usage. In conjunction with these guidelines, fleets can determine the functionality of their filters by checking for moisture in the air brake system monthly. If moisture is present, the air dryer cartridge may require replacement. Reference the Bendix Service Data Sheet of the specific air dryer for additional information. (Recommended intervals for trucks equipped with non-Bendix compressors are six months (50,000 miles), one year (100,000 miles) and two years (200,000 miles), respectively.)

2. Visually check for physical damage, such as chafed or broken air and electrical lines, and broken or missing parts.
3. Check the Bendix® AD-IS® air dryer and purge reservoir bolts for tightness. *See Figure 1.* Re-torque the three air dryer bolts to 360–420 in-lbs and the four purge reservoir bolts to 300–360 in-lbs.
4. Perform the Operation & Leakage Tests listed in this publication.



1. **This air dryer is intended to remove moisture and other contaminants normally found in the air brake system. Do not inject alcohol, anti-freeze, or other de-icing substances into — or upstream of — the air dryer. Alcohol is removed by the dryer, but reduces the effectiveness of the device to dry air. Use of these or other substances can damage the air dryer and may void the warranty.**

OPERATION & LEAKAGE TESTS

(For additional information order "*Air Leakage Video*" BW2327 — available on www.Bendix.com)

1. Check all lines and fittings leading to and from the air dryer for leakage and integrity. Repair any leaks found.
2. Build up system pressure to governor cut-out and note that the Bendix AD-IS air dryer purges with an audible escape of air. Watch the system pressure and note the pressure fall-off for a ten minute period. If pressure drop exceeds, for a single vehicle - 1 psi/minute from either service reservoir; or for tractor trailer - 3 psi/minute from either service reservoir, inspect the vehicle air systems for sources of leakage and repair them. Refer to section entitled *Troubleshooting*, Symptoms 1 and 4.
3. Check for excessive leakage around the purge valve with the compressor in the loaded mode (compressing air). Apply a soap solution to the purge valve exhaust port and observe that leakage does not exceed a 1" bubble in one (1) second. If the leakage exceeds the maximum specified, refer to section entitled *Troubleshooting*, Symptom 4.
4. Build up system pressure to governor cut-out and note that the AD-IS air dryer purges with an audible burst of air, followed immediately by approximately 30 seconds of air flowing out of the purge valve. Apply and release the service brakes multiple times to reduce system air pressure to governor cut-in. Note that the system once again builds to full pressure and is followed by an AD-IS air dryer purge. If system does not follow this pattern, refer to section entitled *Troubleshooting*, Symptoms 5 and 6.
5. Check the operation of the end cover heater and thermostat assembly during cold weather operation as follows:

A. Electric Power to the Dryer

With the ignition or engine kill switch in the RUN position, check for voltage to the heater and thermostat assembly using a voltmeter or testlight. Unplug the electrical connector at the air dryer and place the test leads on each of the connections of the female connector on the vehicle power lead. If there is no voltage, look for a blown fuse, broken wires, or corrosion in the vehicle wiring harness. Check to see if a good ground path exists.

B. Thermostat and Heater Operation

Note: These tests are not possible except in cold weather operation.

Turn off the ignition switch and cool the thermostat and heater assembly to below 40 degrees Fahrenheit. Using an ohmmeter, check the resistance between the electrical pins in the air dryer connector half. The resistance should be 1.5 to 3.0 ohms for the 12 volt heater assembly and 6.0 to 9.0 ohms for the 24 volt heater assembly.

Warm the thermostat and heater assembly to approximately 90 degrees Fahrenheit and again check the resistance. The resistance should exceed 1,000 ohms. If the resistance values obtained are within the stated limits, the thermostat and heater assembly is operating properly. If the resistance values obtained are outside the stated limits, replace the heater and thermostat assembly.

6. Pressure protection valves. Observe the pressure gauges of the vehicle as system pressure builds from zero. The primary gauge should rise until it reaches approximately 109 psi (± 5 psi), then level off (or a momentary slight fall) as the second pressure protection valve opens supplying the secondary reservoir. When the secondary pressure gauge passes through approximately 55 (± 5 psi) and then 85 psi (± 5 psi) there should be an associated leveling off (or momentary slight fall) of pressure as the third and fourth pressure protection valves open. Finally, both the primary and secondary gauges should reach their full pressure of approximately 130 psi (± 5 psi).

If the Bendix® AD-IS® air dryer does not perform within the pressure ranges as described above, recheck using gauges known to be accurate. If the readings remain outside of the ranges outlined above, replace the AD-IS air dryer. **NOTE:** There are no kits available for the servicing of the pressure protection valves.



WARNING

Do not attempt to adjust or service the pressure protection valves—incorrect pressure protection valve settings can result in automatic application of the vehicle spring brakes without prior warning.

Maintenance Kits	
Kit Description	Piece No.
Delivery Check Valve Replacement Kit	5004052
Desiccant Cartridge Replacement Kit (Standard)	5008414
Desiccant Cartridge Replacement Kit - Bendix® AD-IS® PuraGuard® air dryer (can be used to replace the standard cartridge)	5008414PG
Drain Valve	5004961N
Governor and Check Valve Replacement Kit	5004049
Governor Gasket	5007834
Heater & Thermostat Replacement (12 volt)	109495
Heater & Thermostat Replacement (24 volt)	109496
Bendix® PuraGuard® Oil Coalescing Desiccant Cartridge Service New Kit	K020366
Mounting Bolt Kit	5009233
Protective Boots (for pressure protection valves)	5005163
Safety Valve	800350
Splash Shield Kit (includes bracket and cover)	K052469
Splash Shield Cover	5005266N
Silencer Kit	K021189
Wiring Harness & Splice Kit	109871N

Purge Valve Assembly Type	Configuration	Service Kit Pc. No.
Purge Valve Assembly for climate conditions above -40°C (-40°F)	Bendix® AD-IS® Air Dryer	K022105
	AD-IS® EverFlow® Module	K031560
	AD-IS® Discharge Line Unloader	K031562
Arctic Purge Valve Assembly for climate conditions of -40°C to -50°C (-40°F to -58°F)	AD-IS® Air Dryer	K031559
	AD-IS® EverFlow® Module	K031561
	AD-IS® Discharge Line Unloader	K031563

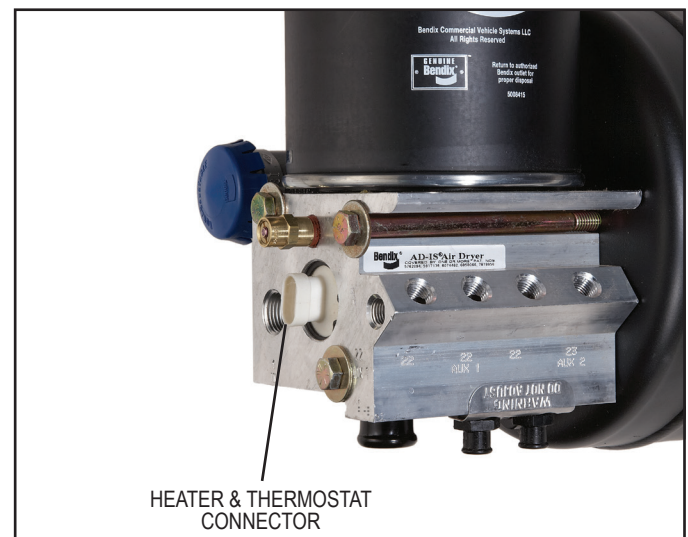


FIGURE 4 - BENDIX® AD-IS® AIR DRYER HEATER AND THERMOSTAT CONNECTOR

REBUILDING THE BENDIX® AD-IS® AIR DRYER

GENERAL

When rebuilding or replacing components of the air dryer use only genuine Bendix parts. For ease in servicing, the Bendix® AD-IS® air dryer has been designed so that any of the following maintenance kits can be installed without removing the air dryer from the vehicle.



Always depressurize the air dryer and purge reservoir — and all other reservoirs on the vehicle — to 0 psi before servicing the air dryer.

If, after completing the routine operation and leakage tests, it has been determined that one or more components of the air dryer requires replacement or maintenance, refer to the following list to find the appropriate kit(s).

MAINTENANCE KITS AVAILABLE:

For a complete list of all maintenance kits see the *Bendix Quick Reference Catalog (BW1114)*. This and other literature are available for download or order on www.bendix.com

NOTE: Kits are not available for the pressure protection valves (See *Figure 5*). They are non-serviceable — do not attempt to adjust or service them.

TESTING THE BENDIX AD-IS AIR DRYER

Before placing the vehicle in service, perform the following tests.

1. Close all reservoir drain valves.
2. Build up system pressure to governor cut-out and note that the Bendix AD-IS air dryer purges with an audible burst of air, followed immediately by approximately 30 seconds of air flowing out of the purge valve.
3. Apply and release the service brakes several times to reduce system air pressure to governor cut-in. Note that the system once again builds to full pressure and is followed by a purge at the AD-IS air dryer exhaust.
4. It is recommended that the total air system be tested for leakage to ensure that the AD-IS air dryer will not cycle excessively.

See *Bendix publication BW5057 "Air Brake Handbook."*

BRAKING SYSTEM PROTECTION

The Bendix® DRM™ dryer module allows the system to maintain one brake circuit up to about 100 psi even after a pressure loss in the other brake circuit. This allows a vehicle to be moved (in an emergency), but with reduced braking capacity. Compare this to a conventional system where a loss of pressure in one service tank leaves the vehicle with a limited number of reduced braking capacity applications before the parking brakes automatically apply and stay on. See *Bendix publication BW5057 "Air Brake Handbook."*

ROADSIDE INSPECTION

In the event of a roadside inspection, the system behavior will be as follows: When the system is charged to governor cut-out, and then one reservoir drain valve is opened, initially both reservoir gauges will fall, however, the AD-IS air dryer's primary and secondary pressure protection valves will close at pressures above 70 psi, protecting the remaining brake circuit from further loss of pressure.



It is important to read and adhere to the following instruction, to ensure the brake system operates safely after bypassing the air dryer.

TEMPORARY AIR DRYER BYPASS

To temporarily bypass the air dryer, the following procedure needs to be followed.

Follow the *Maintenance Precautions* outlined elsewhere in this document.

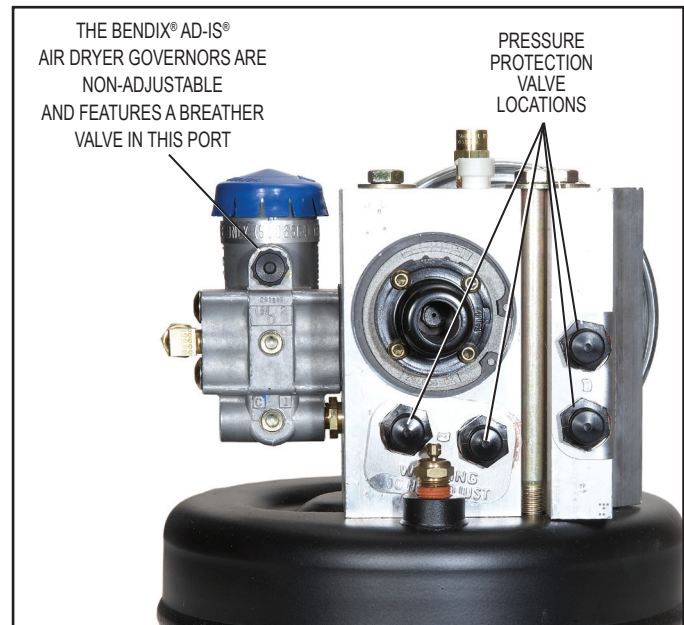


FIGURE 5 - PRESSURE PROTECTION VALVE LOCATIONS

WARNING:

DO NOT ATTEMPT TO ADJUST OR SERVICE THE PRESSURE PROTECTION VALVES. INCORRECT PRESSURE PROTECTION VALVE SETTINGS CAN RESULT IN AUTOMATIC APPLICATION OF VEHICLE SPRING BRAKES WITHOUT PRIOR WARNING.

Make sure that all residual pressure has been released, then remove the air supply line from the compressor to the inlet port (1 IN). Remove the safety valve from the Bendix® AD-IS® air dryer body (see Figure 1 for location) and install a T-fitting into the port. Using any adapters necessary, re-install the safety valve in one of the branches of the T-fitting. Using any adapters necessary, install the air supply line into the remaining T-fitting port. After testing the T-fitting for any air leakage, using a soap solution after charging system pressure (a 1" bubble in 10 seconds is acceptable), the vehicle may be returned to temporary service.

Note: This is a temporary bypass of the air dryer, and full repair of the unit must be carried out at the earliest opportunity. With the air dryer removed from the system, contaminants will be entering the air system: reservoirs will need to be manually drained daily until the repairs are completed. At the end of each working day, park vehicle and slowly drain pressure through the drain valves – leave open to the atmosphere, for several hours if possible. When repairs are carried out, be sure to check that all reservoirs (including the purge reservoir incorporated into the secondary reservoir) are emptied of all contaminants.

If after bypassing the dryer reservoir module the system pressure still does not build, use the following procedure to remove, clean and reinstall the delivery check valve.

DELIVERY CHECK VALVE CLEANING PROCEDURE

(Note: This is only required if system pressure does not build after temporary bypass is completed.)

Refer to Figure 6 throughout this procedure. Depressurize the air brake system following the general safety precautions outlined elsewhere in this document.

This procedure does not require removal of the Bendix AD-IS air dryer from the vehicle.

1. Remove the line from the governor and mark for easy reinstallation.
2. Remove the bolts attaching the governor to the air dryer and retain for reassembly.
3. Remove the governor and the adapter o-ring.
4. The spring/delivery check valve can now be removed. (Note: The spring/delivery check valve may be a previous design. See Figure 6.)
5. Remove the o-ring from the check valve body.

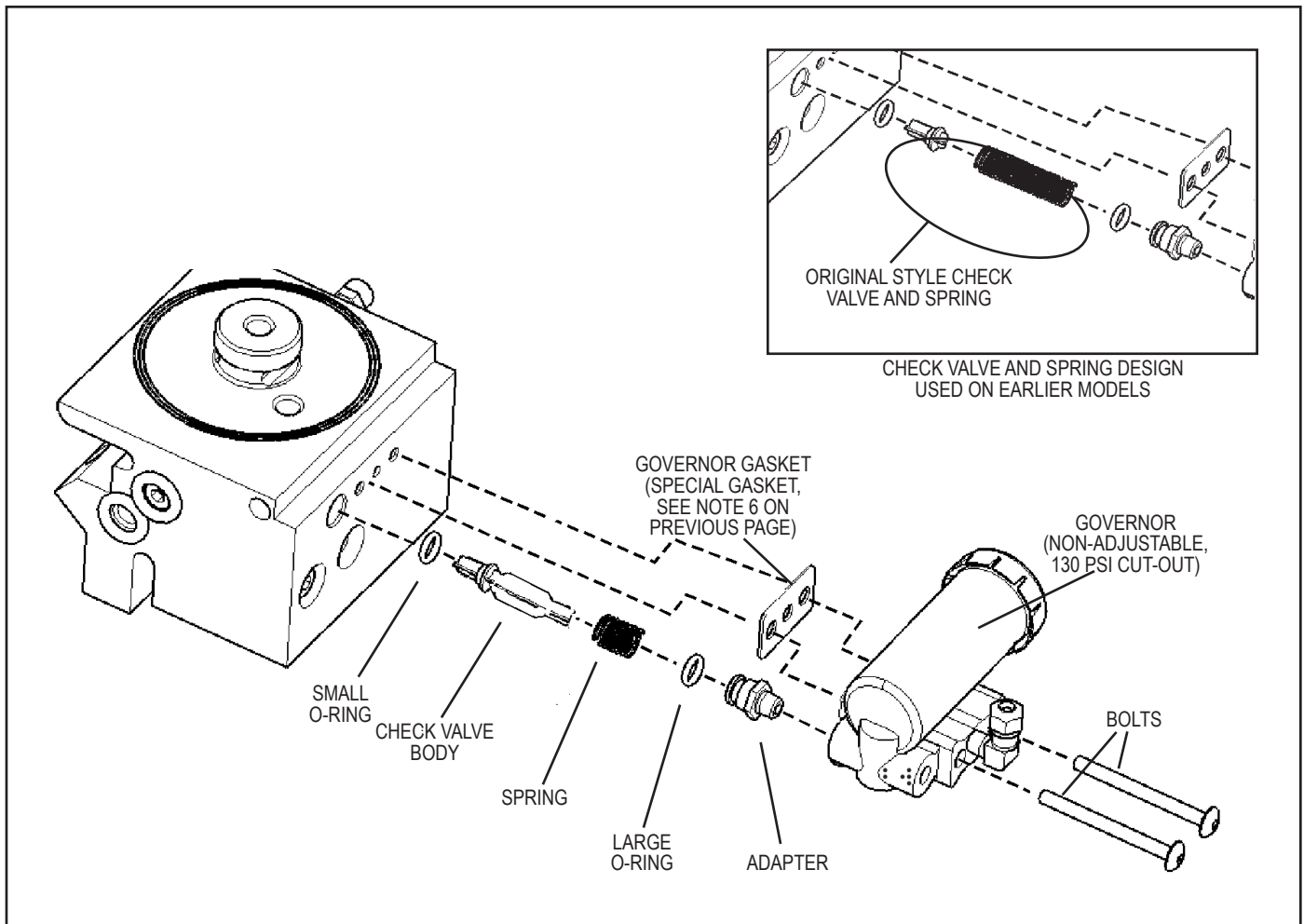


FIGURE 6 - BENDIX® AD-IS® AIR DRYER DELIVERY CHECK VALVE

CLEANING & INSPECTION

1. Use a suitable solvent to clean all metal parts, and use a cotton swab to clean the bore (Note: Do not use abrasives or tools to clean the bore: any scratches caused may necessitate replacing the Bendix® AD-IS® air dryer.) Superficial external corrosion and/or pitting is acceptable.
2. Clean the o-rings with a clean dry cloth. Do not use solvents.
3. Inspect for physical damage to the bore and the check valve seat. If the bore is damaged (by scratches etc. that would prevent delivery check valve from seating), replace the AD-IS air dryer.
4. Inspect the delivery check valve, o-rings, etc. for wear or damage. Replace if necessary using the check valve replacement kit available at authorized Bendix parts outlets.
5. Inspect all air line fittings for corrosion and replace as necessary.

ASSEMBLY

1. Lubricate the smaller o-ring and check valve body with barium or silicon grease.
2. Install this o-ring on the check valve body by sliding the o-ring over the set of 4 tapered guide lands. The o-ring groove holds the o-ring in its correct location.
3. At the other end of the check valve body, the spring is installed over the set of 4 straight guide lands. When the spring has been pushed to the correct location, the check valve body is designed to hold the end of the spring in position—be sure that the spring is not loose before continuing with this installation.
4. Install the assembled check valve body/o-ring/spring in the delivery port so that the o-ring rests on its seat and the free end of the spring is visible.
5. Grease the adapter and the remaining larger o-ring and install it onto the fitting.
6. Position the gasket, insert the bolts through the governor and tighten (to 125 in-lbs). **(Note: Do not replace with a standard compressor/governor gasket.)**
7. Reattach the air line to the governor.
8. Before placing vehicle back into service, check to see that the system pressure now builds to full operational pressure.

Bendix® DRM™ /AD-IS® AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
1. Air dryer is constantly "cycling" or purging.	<p>A. Excessive system leakage. IMPORTANT: Note whether air pressure loss IS SHOWN on dash gauge(s). Pressure loss shown on the gauges is caused by service brake system or component leakage.</p> <p>Pressure loss NOT SHOWN on the gauges is caused by supply system or component leakage.</p>	<p>A. If leakage IS SHOWN on the gauges, test for excessive service brake system leakage.</p> <p>Allowable leakage: Single vehicle - 1 psi / minute per service reservoir. Tractor trailer - 3 psi / minute per service reservoir. Repair and retest as required.</p>
	<p>B. Defective delivery check valve.</p>	<p>B. Build system pressure to the governor cut-out pressure. Wait 1 minute for completion of the purge cycle. Using soap solution at exhaust of purge valve, leakage should not exceed a one inch bubble in less than five seconds.</p> <p>If a rapid loss of pressure is found, the following procedure will determine if the delivery check valve is malfunctioning:</p> <p>Build the system pressure to governor cut-out and allow a full minute for the normal dryer purge cycle to empty the purge reservoir. Switch off the engine and apply and release the brakes multiple times so that the system pressure reaches governor cut-in. The purge valve will return to its closed position. The purge reservoir has a drain valve which is opened by moving the center lever away from its closed position. Open the drain valve and wait 10 seconds to allow any residual purge pressure to be released. Release the lever, closing the drain valve. Carefully remove the air dryer cartridge using a strap wrench and then test for air leaking through the center of the threaded boss by applying a soap solution to the boss. Replace the delivery check valve if there is excessive leakage (exceeding a one inch bubble in five seconds).</p> <p>Grease the seal on the air dryer cartridge before reinstalling. Be sure the drain valve on the purge reservoir is not leaking before returning the vehicle to service.</p>
	<p>C. Defective governor.</p>	<p>C. Check the governor at both the "cut-in" and "cut-out" position for proper pressures and excessive leakage at the fittings and exhaust.</p>
	<p>D. Compressor unloader mechanism leaking excessively.</p>	<p>D. Remove the air strainer or fitting from compressor inlet cavity. With the compressor unloaded, check for unloader piston leakage. Slight leakage is permissible.</p>

Bendix® DRM™/AD-IS® AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
2. Water in the vehicle reservoirs.	A. Maximum air dryer inlet temperature is exceeded due to improper discharge line length.	A. Check for excessive carbon build-up in the compressor discharge line. Replace the discharge line if required. Make certain that the discharge line length is at least 6 foot. Increase the discharge line length and/or diameter to reduce the air dryer inlet temperature.
	B. Air system charged from outside air source (outside air not passing through air dryer).	B. If the system must have an outside air fill provision, outside air should pass through the air dryer.
	C. Excessive air usage - Air dryer not compatible with the vehicle air system requirement (Improper air dryer/vehicle application).	C. <u>Note:</u> The Bendix® AD-IS® air dryer is not intended for use on applications with excessive air usage. The following applications require more dry air than the AD-IS air dryer is designed to supply. Do not use on: <ol style="list-style-type: none"> 1) City buses. 2) Vehicle combinations with more than 8 braked axles. 3) City refuse vehicles, except those with work brakes. 4) Concrete mixers. 5) Dump trucks with more than 3 axles. 6) Off-highway/construction vehicles with more than 7 braked axles. 7) Vehicles with compressor "on times" in excess of 20%. If the vehicle is equipped with high air usage accessories such as trailer pump-off systems or central tire inflation, the air for these accessories must by-pass the dryer.
	D. Desiccant requires replacement.	D. Replace the desiccant cartridge assembly.
	E. Air by-passes desiccant cartridge assembly.	E. If the vehicle uses a Holset compressor, inspect the feedback check valve for proper installation and operation.
	F. Air dryer not purging.	F. Refer to Symptom 6.
	G. Purge (air exhaust) time insufficient due to excessive system leakage.	G. Refer to Symptom 1.

Bendix® DRM™/AD-IS® AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
3. Safety valve on air dryer “popping off” or exhausting air.	A. Faulty Bendix® AD-IS® air dryer delivery check valve.	A. Test to determine if the air is passing through check valve. Repair or replace. Refer to Symptom 1, Remedy B.
	B. System pressure too high (>135 psi).	B. Test with an accurate gauge. Replace the governor if necessary.
	C. Excessive pressure pulsations from compressor. (Typical single cylinder type).	C. Increase the volume in discharge line. This can be accomplished by adding a 90 cubic inch (or larger) reservoir between the compressor and the AD-IS air dryer.
	D. Safety valve setting too low (<150 psi).	D. Replace safety valve.
4. Constant exhaust of air at air dryer purge valve exhaust or unable to build system pressure. (Charge mode.)	A. Air dryer purge valve leaking excessively.	A. With compressor loaded, apply soap solution on purge valve exhaust, to test for excessive leakage. Repair or replace the purge valve as necessary.
	B. Purge valve frozen open. Faulty heater and thermostat, wiring or blown fuse.	B. Refer to paragraph 5 of <i>Operation and Leakage Tests</i> for heater and thermostat test.
	C. Defective AD-IS air dryer delivery check valve.	C. Refer to Symptom 1, Remedy B.
	D. Leaking Turbo Cut-off valve.	D. Repair or replace the purge valve assembly.
	E. Defective governor.	E. Check the governor at both the “cut-in” and “cut-out” position for proper pressures and excessive leakage at fittings and exhaust.
	F. Leaking purge valve control piston quad-ring.	F. Repair or replace the purge valve assembly.
5. Can not build system air pressure.	A. Kinked or blocked (plugged) discharge line.	A. Check to determine if air passes through the discharge line. Check for kinks, bends, excessive carbon deposits, or ice blockage.
	B. Excessive bends in discharge line (water collects and freezes).	B. The discharge line should be constantly sloping from the compressor to air dryer with as few bends as possible.
	C. Pressure protection valve(s) in the air dryer will not open.	C. Replace the air dryer (pressure protection valves are not serviceable).
	D. Refer to Symptom 4.	D. Refer to Symptom 4, Remedy A.
	E. Refer to Symptom 7.	E. Refer to Symptom 7, Remedies A through D.
6. Air dryer does not purge or exhaust air.	A. Faulty air dryer purge valve.	A. After determining air reaches the purge valve control port by installing a T-fitting with a pressure gauge into the governor unloader port, repair the purge valve if necessary.
	B. See Causes, B, E, and G for Symptom #4.	B. Refer to Symptom 4, Remedies B, E, and G. Also refer to Symptom 1, Remedy B.

Bendix® DRM™ /AD-IS® AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
7. Desiccant material being expelled from the air dryer purge valve exhaust (may look like a whitish liquid, paste or small beads).	A. Faulty air dryer cartridge.	A. Replace the Bendix® AD-IS® air dryer cartridge and/or AD-IS air dryer.
	B. Excessive air dryer vibration.	B. Check the reservoir mounting for looseness or damage. Repair the mounting and replace the cartridge.
8. Unsatisfactory desiccant life.	A. Excessive system leakage.	A. Refer to Symptom 1, Remedy A.
	B. Wrong vehicle application for the AD-IS air dryer.	B. Refer to Symptom 2, Remedy C.
	C. Compressor passing excessive oil.	C. Check for proper compressor installation; if symptoms persist, replace the compressor. <i>Refer to the Bendix Advanced Troubleshooting Guide for Air Brake Compressors (BW1971).</i>
9. "Pinging" noise is excessive during compressor loaded cycle.	A. Single cylinder compressor with high pulse cycles.	A. A slight "pinging" sound may be heard during system build up when a single cylinder compressor is used. If this sound is deemed objectionable, it can be reduced substantially by increasing the discharge line volume. This can be accomplished by adding a 90 cubic inch reservoir between the compressor and the AD-IS air dryer.
10. The air dryer purge piston cycles rapidly in the compressor unloaded (non-compressing) mode.	A. Compressor fails to "unload".	A. Check the air hose from governor to the compressor for a missing, kinked or restricted line. Install or repair the air hose. Repair or replace the compressor unloader.



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