



# Service Data

SD-08-2414

## AD-IP INTEGRAL PURGE AIR DRYER

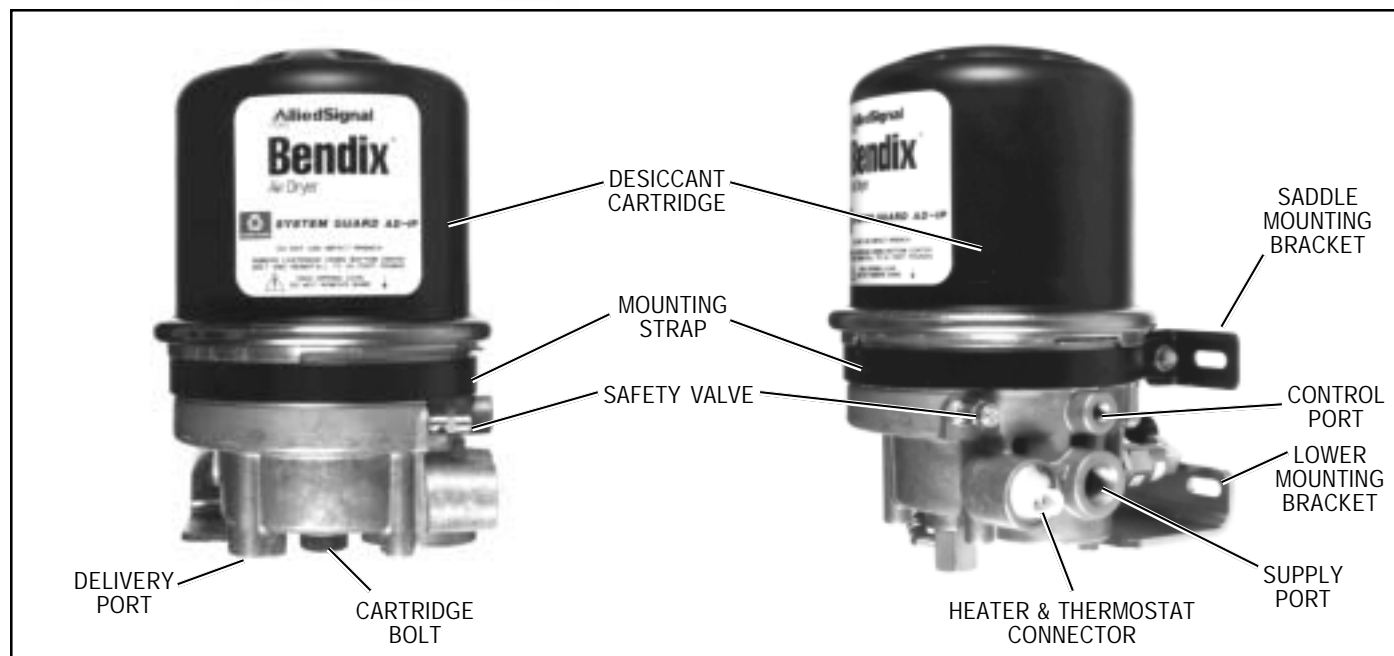


FIGURE 1 - AD-IP INTEGRAL PURGE AIR DRYER

### DESCRIPTION

The function of the AD-IP Integral Purge Air Dryer is to collect and remove air system contaminants in solid, liquid and vapor form before they enter the brake system. It provides clean, dry air to the components of the brake system which increases the life of the system and reduces maintenance costs. Daily manual draining of the reservoirs is eliminated.

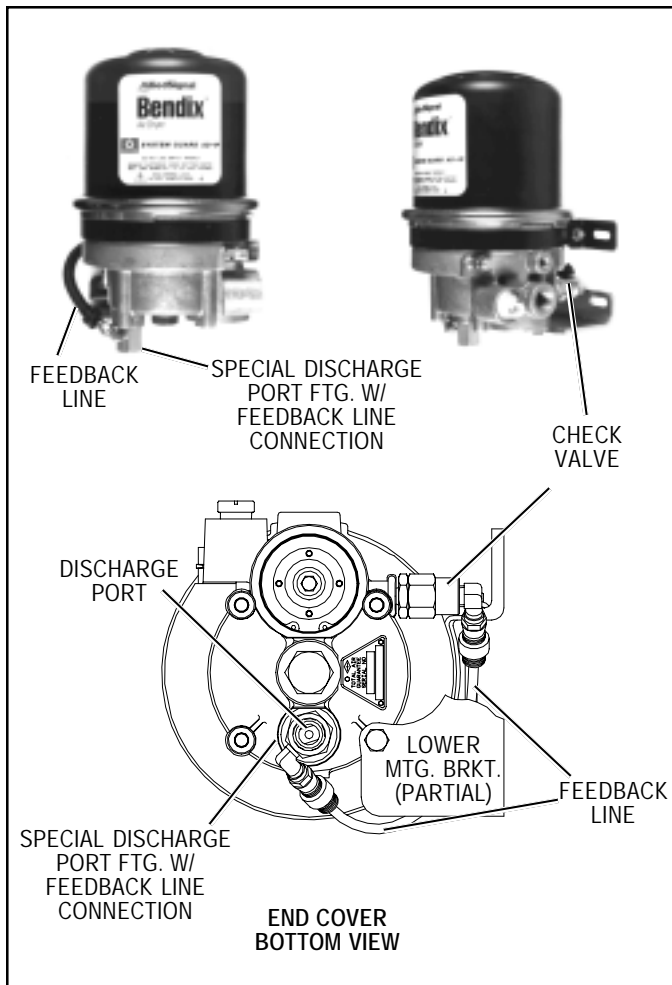
The AD-IP Air Dryer consists of a desiccant cartridge secured to a die cast aluminum end cover with a single, central bolt. The end cover contains a check valve assembly, safety valve, heater and thermostat assembly, three pipe thread air connections and the purge valve assembly. The removable purge valve assembly incorporates the purge valve mechanism and a turbo charger cutoff feature that is designed to prevent loss of engine "turbo" boost pressure during the purge cycle of the AD-IP air dryer. For ease of serviceability, all replaceable assemblies can be replaced without removal of the air dryer from its mounting on the vehicle.

The AD-IP has three female pipe thread air connections identified as follows:

Air Connection Port ID	Function/Connection
CON 4 .....	Control Port (purge valve control & turbo cutoff).
SUP 11 .....	Supply Port (air in).
DEL 2 .....	Delivery Port (air out).

### AD-IP DI "DROP IN" MODEL

In addition to the standard AD-IP, the AD-IP DI (Drop In) is also offered. It is a specialized version designed especially for air systems that use either the Holset (Cummins) Type E or QE air compressor. These Holset compressors utilize an unusual unloading system that requires that air pressure remain in the discharge line during the entire unloaded cycle of the compressor. To accomplish this, Holset compressors rely on air "feedback" from the supply reservoir as shown in Figure 3B. When an air dryer is installed the direct "feedback" from the supply reservoir is interrupted and an alternate source for "feedback" pressure must be provided. A standard AD-IP air dryer can be installed however a separate "feedback" line with a single check must be installed as shown in Figure 3B.



**FIGURE 2 - AD-IP DROP IN AIR DRYER FOR HOLSET COMPRESSORS**

The AD-IP Drop In model incorporates the feedback line and single check as an integral part of the dryer and eliminates the need for these components as shown in Figures 2 & 3C.

## OPERATION

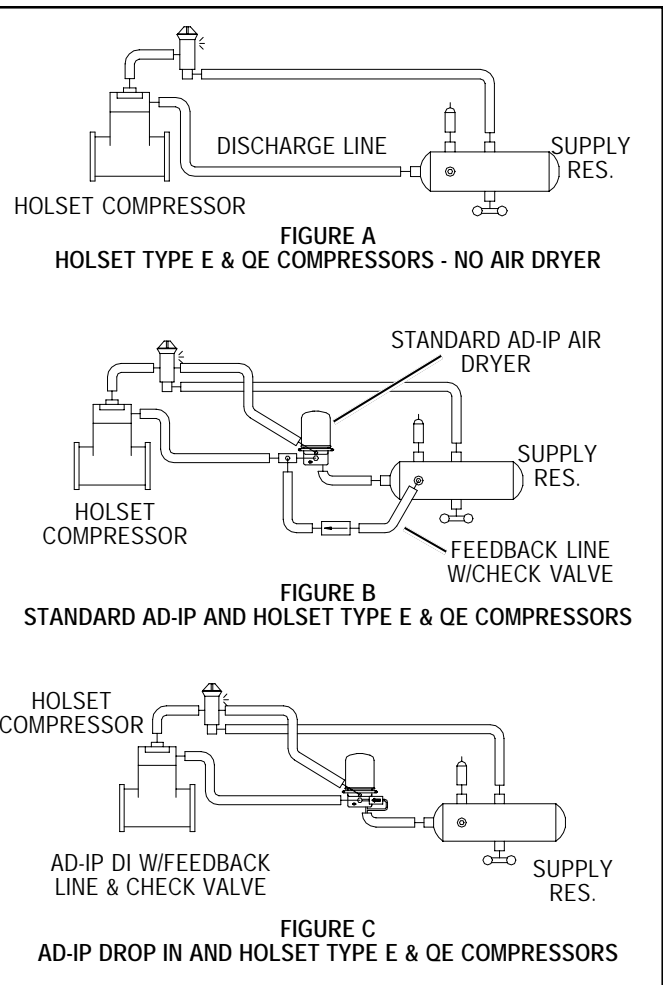
### GENERAL

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

### CHARGE CYCLE (refer to Figure 4)

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

As air travels through the end cover assembly, its direction of flow changes several times, reducing the temperature, causing contaminants to condense and drop to the bottom or sump of the air dryer end cover.

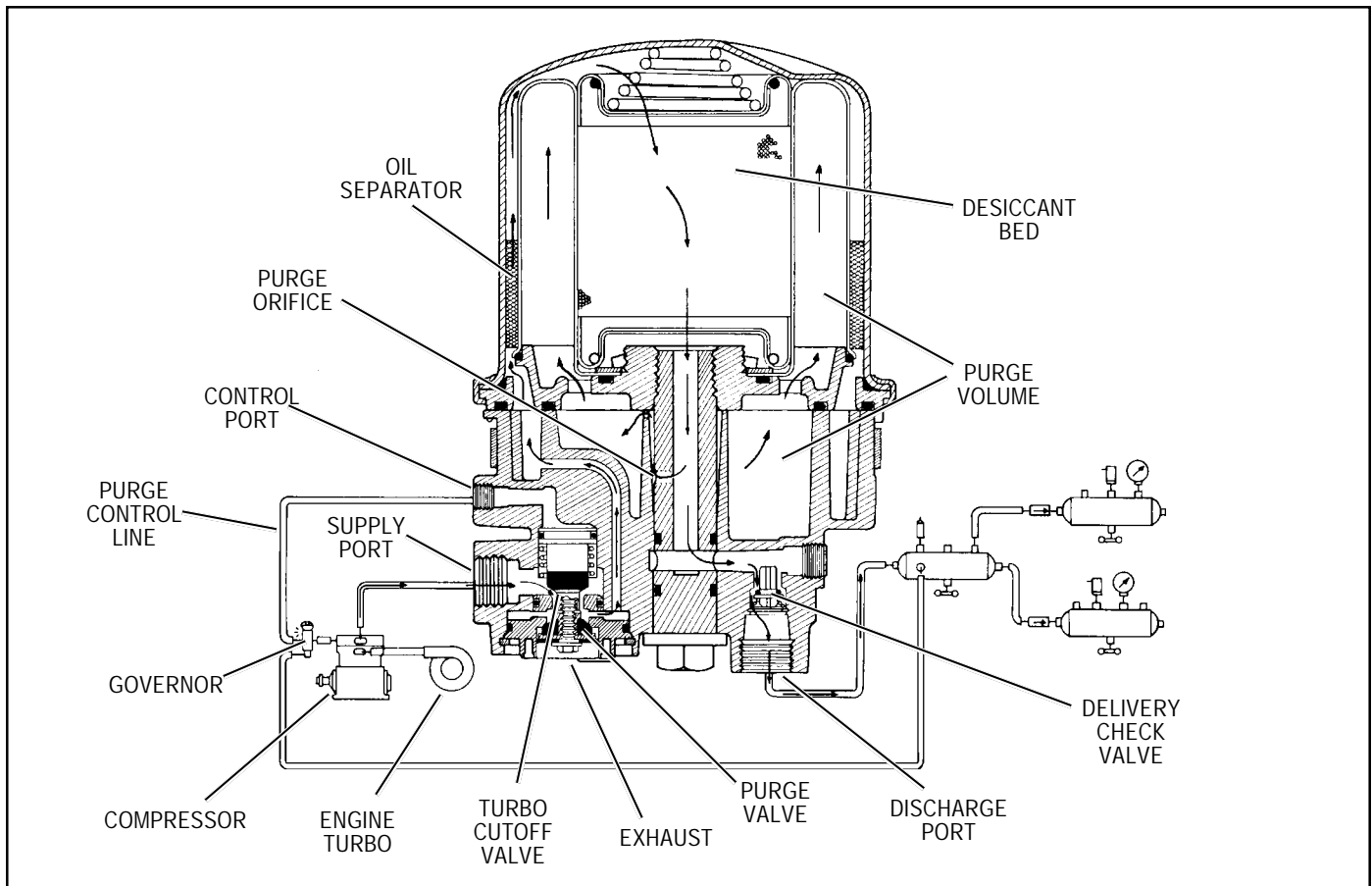


**FIGURE 3 - AD-IP AND HOLSET TYPE E & QE COMPRESSORS**

After exiting the end cover, the air flows into the desiccant cartridge. Once in the desiccant cartridge air first flows through an oil separator located between the outer and inner shells of the cartridge. The separator removes water in liquid form as well as oil and solid contaminants.

Air, along with the remaining water vapor, is further cooled as it exits the oil separator and continues to flow upward between the outer and inner shells. Upon reaching the top of the cartridge the air reverses its direction of flow and enters the desiccant drying bed. Air flowing down through the column of desiccant becomes progressively dryer as water vapor adheres to the desiccant material in a process known as “ADSORPTION.” The desiccant cartridge using the adsorption process typically removes most of the water vapor from the pressurized air.

Dry air exits the bottom of the desiccant cartridge and flows through the center of the bolt used to secure the cartridge to the end cover. Air flows down the center of the desiccant cartridge bolt, through a cross drilled passage and exits the air dryer delivery port through the delivery check valve.



**FIGURE 4 - AD-IP CHARGE CYCLE**

Dry air flowing through the center of the desiccant cartridge bolt also flows out the cross drilled purge orifice and into the purge volume.

The air dryer will remain in the charge cycle until the air brake system pressure builds to the governor cutout setting.

### **PURGE CYCLE** (refer to Figure 5)

As air brake system pressure reaches the cutout setting of the governor, the governor unloads the compressor (air compression is stopped) and the purge cycle of the air dryer begins. When the governor unloads the compressor, it pressurizes the compressor unloader mechanism and the line connecting the governor unloader port to the AD-IP end cover control port. The purge piston moves in response to air pressure causing the purge valve to open to the atmosphere and the turbo cutoff valve to close off the supply of air from the compressor (this will be further discussed in the *Turbo Cutoff Feature* section). Water and contaminants in the end cover sump 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 volume 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-IP exhaust.

The actual reactivation of the desiccant drying bed begins as dry air flows from the purge volume through the purge orifice in the desiccant cartridge bolt, then through the center of the bolt and into the desiccant bed. Pressurized air from the purge volume 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. Generally 30 seconds are required for the entire purge volume of a standard AD-IP 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 30 second purge cycle is complete the desiccant has been reactivated or dried. The air dryer is ready for the next charge cycle to begin. However the purge valve will remain open and will not close until air brake system pressure is reduced and the governor signals the compressor to charge the system.

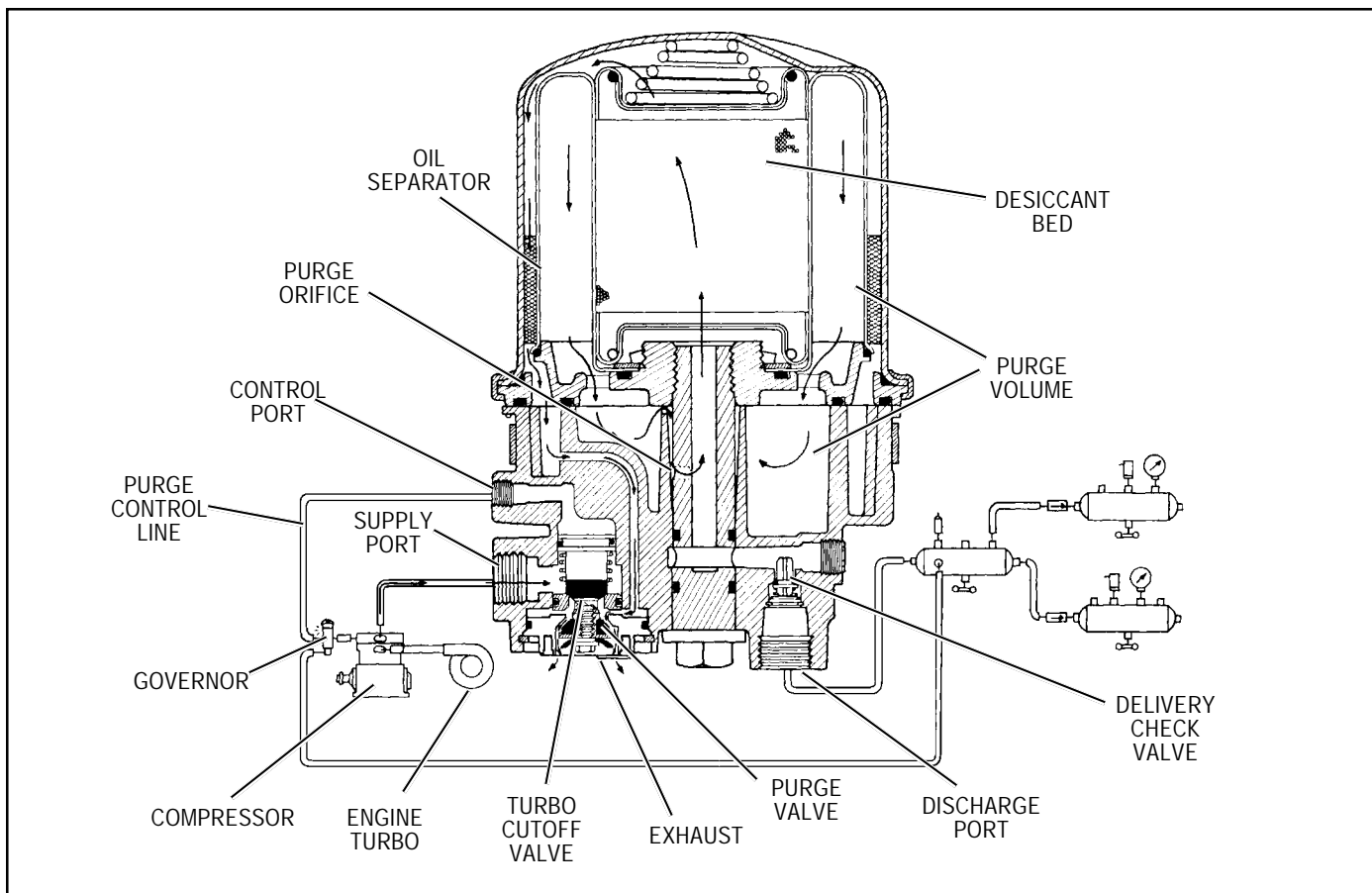


FIGURE 5 - AD-IP PURGE CYCLE

## TURBO CUTOFF FEATURE (Refer to Figure 6)

The primary function of the turbo cutoff valve is to prevent loss of engine turbocharger air pressure through the AD-IP in systems where the compressor intake is connected to the engine turbocharger. The turbo cutoff valve also removes the “puffing” of air out the open purge exhaust when a naturally aspirated, single cylinder compressor, equipped with an inlet check valve, is in use.

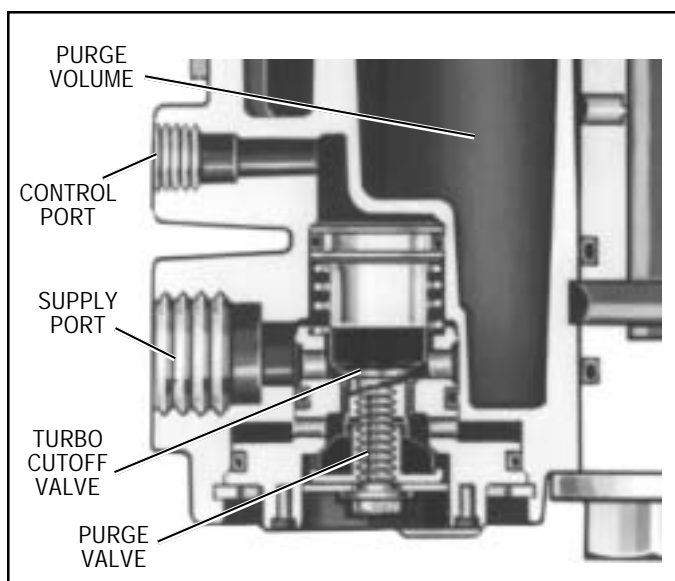


FIGURE 6 - AD-IP TURBO CUTOFF

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

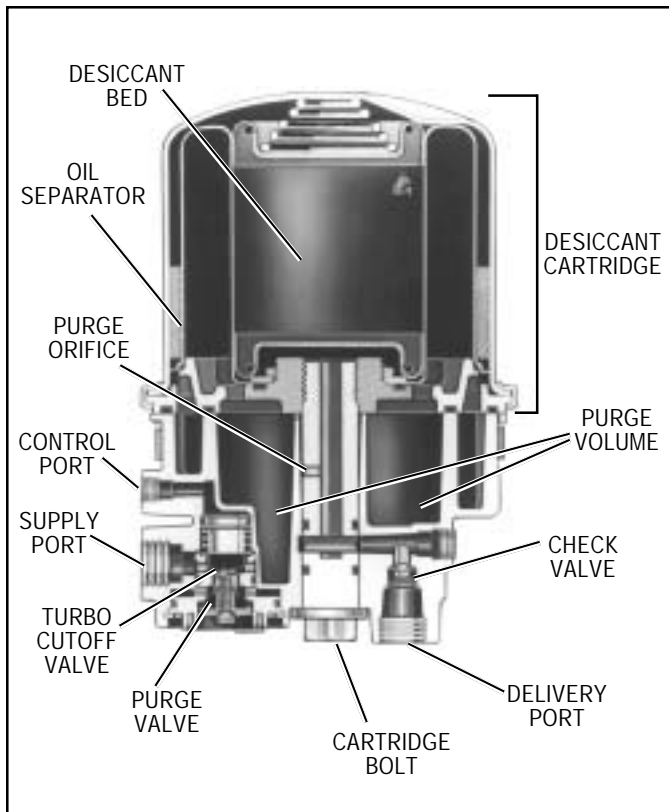
## PREVENTIVE MAINTENANCE

**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.

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:**

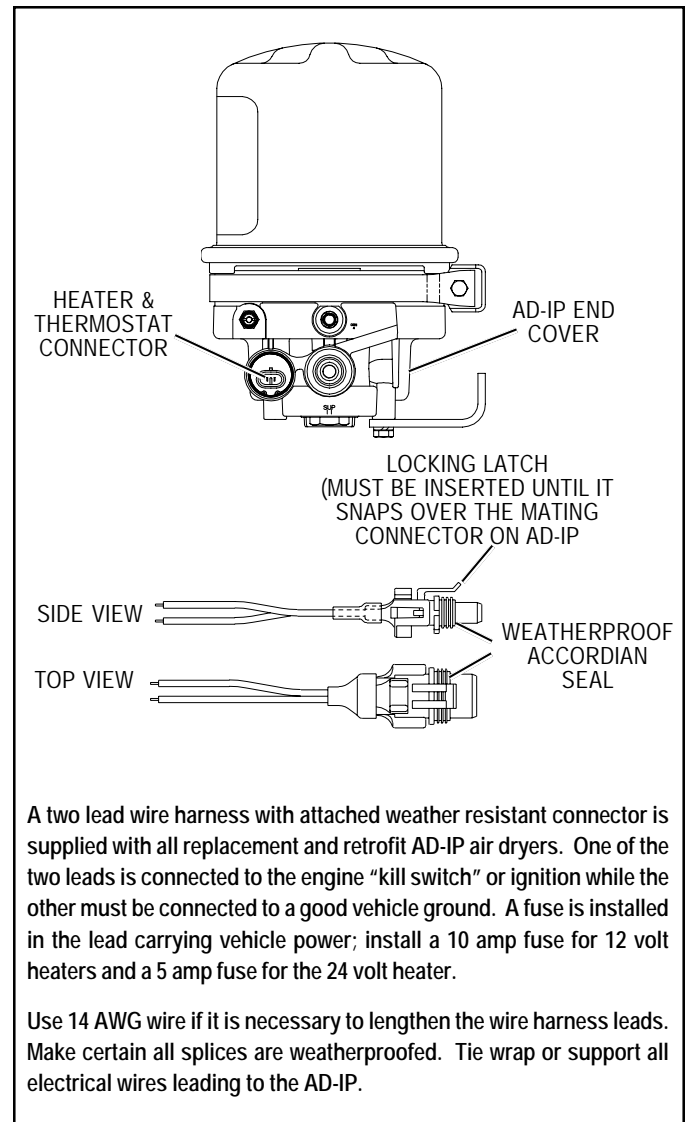
1. Check for moisture in the air brake system by opening reservoirs, drain cocks, or drain valves and checking for presence of water. If moisture is present, the desiccant cartridge may require replacement; however, the following conditions can also cause water accumulation and should be considered before replacing the desiccant:



**FIGURE 7 - AD-IP AIR DRYER SECTIONAL VIEW**

- A. An outside air source has been used to charge the system. This air does 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.
- C. The air dryer has been installed in a system that has been previously used without an air dryer. The system will be saturated with moisture and several weeks of operation may be required to dry it out.
- D. Location of the air dryer is too close to the air compressor. Refer to *Locating AD-IP On Vehicle* section.
- E. 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 and should not be considered as an indication that the dryer is not performing properly.

**Note:** A small amount of oil in the system is normal and should not be considered as a reason to replace the desiccant cartridge; oil stained desiccant can function adequately.



**FIGURE 8 - AD-IP HEATER AND THERMOSTAT CONNECTOR**

A two lead wire harness with attached weather resistant connector is supplied with all replacement and retrofit AD-IP air dryers. One of the two leads is connected to the engine "kill switch" or ignition while the other must be connected to a good vehicle ground. A fuse is installed in the lead carrying vehicle power; install a 10 amp fuse for 12 volt heaters and a 5 amp fuse for the 24 volt heater.

Use 14 AWG wire if it is necessary to lengthen the wire harness leads. Make certain all splices are weatherproofed. Tie wrap or support all electrical wires leading to the AD-IP.

2. Visually check for physical damage to the AD-IP such as chaffed or broken air and electrical lines and broken or missing parts.
3. Check mounting bolts for tightness. Re-torque to 270-385 inch pounds.
4. Perform the *Operation & Leakage Tests* listed in this publication.

### **WARNING!**

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 other substances can damage the air dryer and may void the warranty.

## OPERATION & LEAKAGE TESTS

1. Test the delivery port check valve assembly by building the air system to governor cutout and observing a test air gauge installed in the #1 reservoir. Check all lines and fittings leading to and from the air dryer for leakage and integrity. Note the pressure on the air gauge after governor cutout pressure is reached, a rapid loss of pressure could indicate a failed delivery port check valve. This can be confirmed by shutting the engine off, draining system pressure to a point below governor cutin (usually not less than 95 psi), draining residual air pressure in the compressor discharge line and removing the plug adjacent to the air dryer delivery port from the end cover. With air pressure present at the air dryer delivery, apply a soap solution to the opening where the plug was removed and note that leakage does not exceed a 1 inch bubble in 1 second. If leakage is excessive repair the check valve.
2. Check for excessive leakage around the purge valve. With the compressor in loaded mode (compressing air), apply a soap solution to the purge valve exhaust port and observe that leakage does not exceed a 1 inch bubble in 1 second. If the leakage exceeds the maximum specified, repair the purge valve assembly.
3. Close all reservoir drain cocks. Build up system pressure to governor cutout and note that AD-IP purges with an audible escape of air. "Fan" the service brakes 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-IP purge.
4. 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 ON position, check for voltage to the heater and thermostat assembly using a voltmeter or test light. Unplug the electrical connector at the air dryer and place the test leads on each of the pins of the male connector. 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 required 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 over 90 degrees Fahrenheit and again check the resistance. The resistance should exceed 1000 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.

## REBUILDING THE AD-IP AIR DRYER

### GENERAL

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).

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

### MAINTENANCE KITS AVAILABLE:

065624 ..... SERVICE NEW DESICCANT CARTRIDGE KIT

This kit contains the parts necessary to change the desiccant cartridge only.

109493 ..... REMANUFACTURED DESICCANT CARTRIDGE KIT

This kit contains the parts necessary to change the desiccant cartridge only.

5001247 ..... MOUNTING BRACKET KIT

This kit contains the upper and lower brackets as well as the necessary hardware items to mount them.

109498 ..... CARTRIDGE BOLT KIT

Contains a replacement desiccant cartridge bolt and related o-rings.

5003547 ..... PURGE VALVE HOUSING MAINTENANCE KIT

This kit contains the parts necessary to rebuild the purge valve housing.

800404 ..... PURGE VALVE KIT

This kit contains the parts necessary to replace the purge valve.

065626 ..... SERVICE NEW PURGE VALVE HOUSING ASSEMBLY

Contains a service new assembly and related components to accomplish replacement.

109494 ..... DELIVERY CHECK VALVE MAINTENANCE KIT

This kit contains the parts necessary to replace the delivery port check valve.

## 109495 & 109496 ..... HEATER & THERMOSTAT KIT

Contains a replacement heater and thermostat assembly and related components required for replacement.

### IMPORTANT: MAINTENANCE PRECAUTIONS

When working on or around a vehicle, the following general precautions should be observed.

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels.
2. Stop the engine when working around the vehicle.
3. Drain the air pressure from all reservoirs before beginning ANY work on the vehicle.
4. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that removes all electrical power from the vehicle.
5. When working in the engine compartment the engine should be shut off. 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.
6. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
7. Never exceed recommended pressures and always wear safety glasses.
8. 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.
9. Use only genuine Bendix replacement parts, components, and kits. Replacement hardware, tubing, hose, fittings, etc. should be of equivalent size, type, and strength as original equipment and be designed specifically for such applications and systems.
10. Components with stripped threads or damaged parts should be replaced rather than repaired. Repairs requiring machining or welding should not be attempted unless specifically approved and stated by the vehicle or component manufacturer.
11. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.

### AD-IP REMOVAL

This air dryer removal process is presented in the event it becomes necessary to replace the entire air dryer. **Normal**

### service and parts replacement does not require removal of the air dryer from the vehicle.

1. Park the vehicle on a level surface and prevent movement by means other than the brakes.
2. Drain **all** reservoirs to 0 p.s.i. — **Caution:** Compressor discharge line may still contain residual pressure.
3. Identify and disconnect the three air lines from the end cover and note the position of end cover ports relative to the vehicle.
4. Unplug the vehicle wiring harness from the heater and thermostat assembly connector on the end cover assembly.
5. Remove the four bolts that secure both the upper and lower mounting brackets to the vehicle, and remove the air dryer from the vehicle.
6. Mark the relationship of the saddle bracket (5) to the end cover assembly (6). Remove the 5/16" cap screw (1), washer (2), and nut (3) securing the upper mounting strap (4) to the saddle bracket (5). Remove the upper mounting strap (4) from the end cover assembly (6).
7. Mark the relationship of the lower bracket (9) to the end cover assembly (6). Remove the two 3/8" end cover cap screws (7) and two washers (8) that retain the lower mounting bracket (9) to the end cover (6).

### DISASSEMBLY

The following disassembly and assembly procedure is presented for reference purposes and presupposes that a major rebuild of the AD-IP is being undertaken. The replacement parts and maintenance kits available generally do not require full disassembly. The instructions provided with these parts and kits should be followed in lieu of the instructions presented here. Refer to Figure 9 during disassembly.

**Caution:** While performing service on the AD-IP air dryer, it is not recommended that a clamping device (vise, C-clamp, etc.) be used to hold any die cast aluminum component as damage may result. To hold the end cover, install a pipe nipple in the supply port and clamp the nipple into a vise.

1. Using an adjustable or socket wrench, loosen the desiccant cartridge bolt (10), then separate the desiccant cartridge (11) from the end cover (6). Pull the desiccant cartridge bolt out of the end cover (6).

**Caution:** Disassembly of the desiccant cartridge assembly should not be attempted! Detail parts for the cartridge are not available and the cartridge contains a 150# spring which can not be mechanically caged.

2. Remove both o-rings (12 & 13) from the desiccant cartridge bolt.

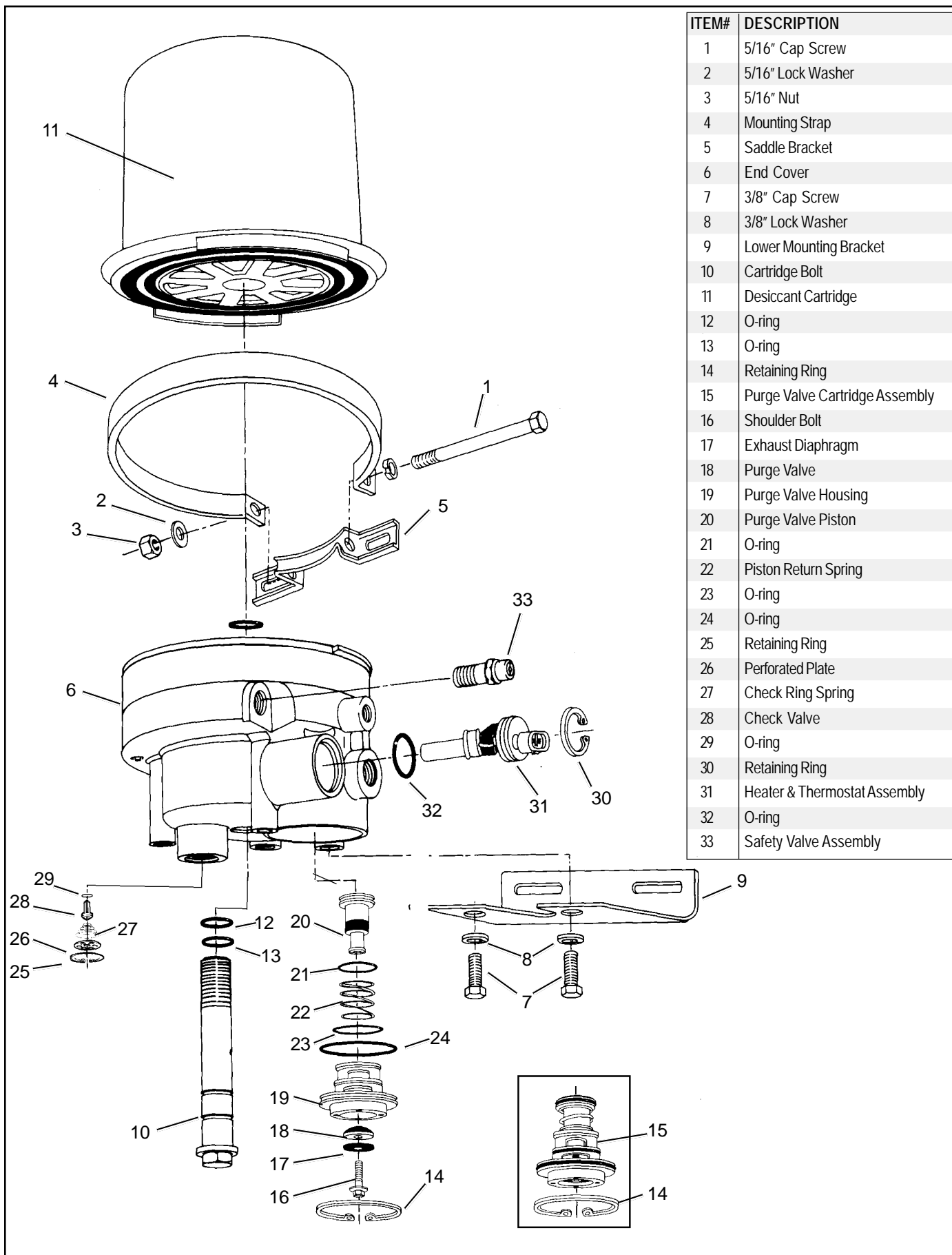


FIGURE 9 - AD-IP EXPLODED VIEW



3. Remove the retaining ring (14) that secures the purge valve assembly (15) in the end cover (6).
4. Remove the 1/4" shoulder bolt (16) from the bottom of the purge valve housing assembly (19) using a 3/8" socket wrench and a large blade screw driver, inserted in the slot on top of the purge piston (20). Remove the exhaust diaphragm (17), and the purge valve (18) from the purge valve housing (19).
5. Remove the o-rings (23 & 24) from the purge valve housing (19).
6. Remove the purge piston (20) and the return spring (22).
7. Remove the o-ring (21) from the purge piston (20).
8. Remove the retaining ring (25) that secures the delivery check valve assembly in the end cover (6). Remove and separate the perforated plate (26), spring (27), check valve body (28) and o-ring (29).
9. Remove the retaining ring (30) that secures the heater and thermostat assembly (31) in the end cover (6). Gently pull the heater and thermostat (31) out of the end cover (6) and remove the o-ring (32).
10. Using a 9/16" wrench, remove the safety valve assembly (33) from the end cover (6).

## CLEANING & INSPECTION

1. Using mineral spirits or an equivalent solvent, clean and thoroughly dry all metal parts except the desiccant cartridge.
2. Inspect the interior and exterior of all metal parts that will be reused for severe corrosion, pitting and cracks. Superficial corrosion and or pitting on the exterior portion of the end cover is acceptable.
3. Inspect the bores of both the end cover and the purge valve housing for deep scuffing or gouges.
4. Make certain that all purge valve housing and end cover passages are open and free of obstructions.
5. Inspect the pipe threads in the end cover. Make certain they are clean and free of thread sealant.
6. Inspect the purge valve housing bore and seats for excessive wear and scuffing.
7. Inspect the purge valve piston seat for excessive wear.
8. Make certain that the purge orifice in the cartridge bolt is open and free of obstructions.
9. Inspect all air line fittings for corrosion. Clean all old thread sealant from the pipe threads.
10. All o-rings removed should be discarded and replaced with new o-rings provided in appropriate kit(s).

## ASSEMBLY

Prior to assembly, coat all o-rings, o-ring grooves, and bores with a generous amount of silicone grease. (Refer to Figure 9 during assembly unless otherwise advised.)

1. Install the o-ring (21) in its groove on the O.D. of the purge piston (20). Place the return spring (22) in the bore of the purge valve housing (19), then insert the purge piston (20) into the I.D. of the spring (22).
2. Install and center the exhaust diaphragm (17) over the shoulder bolt (16) making certain that the diaphragm ID is over the bolt shoulder. Then install the purge valve (18) on the shoulder bolt making certain its metal support side is against the diaphragm (17).
3. Push the purge piston (20) into the housing (19) until it bottoms and insert a large blade screw driver in the piston's slotted head. While depressing the purge piston with the screw driver, install the shoulder bolt (16) with exhaust diaphragm (17) and purge valve (18) in the piston. Torque the shoulder bolt (17) to between 60-80 in. lbs.
4. Install the two o-rings (23 & 24) on the purge valve housing (19) placing each in its appropriate location. Install the assembled purge valve housing in the end cover (6) while making certain the purge valve housing is fully seated against the end cover. Secure the purge valve housing in the end cover using the retaining ring (14). Make certain the retaining ring is fully seated in its groove in the end cover (6).
5. Using a 9/16" wrench, install the safety valve assembly (34) into the end cover (6).
6. Install the o-ring (29) on the check valve body (28) and push the o-ring down, over the 3 guide lands until it is in the o-ring groove of the check valve body (28). Install the check valve spring (27) on the check valve body so that the **small** coils of the spring slip over the check valve body. Install the assembled check valve body, o-ring, and spring (27, 28 & 29) in the end cover (6) so that the o-ring rests on its seat in the end cover (6) and the spring is visible.
7. Install the perforated plate (26), in the end cover (6) and secure the check valve assembly using the retaining ring (25). Make certain the retaining ring is fully seated in its groove in the end cover (6).
8. Install the o-ring (32) on the heater and thermostat assembly (31). After making certain the sponge rubber cushion is positioned between the connector body and thermostat, gently push the heater and thermostat assembly (31) into the end cover (6), making certain the heating element enters the small diameter bore in the larger heater and thermostat bore in the end cover (6). Secure the heater and thermostat assembly in the body using the retaining ring (30). Make certain the retaining ring is fully seated in its groove in the end cover (6).
9. Install both o-rings (12 & 13) on the desiccant cartridge bolt (10) and using a twisting motion, insert the assembled desiccant cartridge bolt in the end cover (6).

10. Install the desiccant cartridge (11) on the end cover (6) making certain the cartridge is properly seated and flush on the end cover.  
**Note:** It may be necessary to rotate the cartridge slightly until the anti-rotation lugs are properly aligned and allow the cartridge to rest flush against the end cover.
11. Using an adjustable wrench or a socket, tighten the desiccant cartridge bolt (10), to secure the desiccant cartridge (11) to the end cover (6). Torque the desiccant cartridge bolt to 50 foot pounds.

**Caution:** Do not over torque.

## AD-IP INSTALLATION

1. Using the relationship marks made during step 7 of the “AD-IP REMOVAL”, install the lower mounting bracket (9) on the end cover (6) and secure it using the two 3/8” cap screws and washers (7 & 8). Torque the cap screws to 300-360 inch pounds.
2. Using the relationship marks made during step 6 of the *AD-IP Removal Procedure*, install the saddle bracket (5) and mounting strap (4) on the end cover (6), and using the 5/16” cap screw (1), washer (2), and nut (3) secure the strap to the saddle bracket. Tighten the 5/16” nut on the upper mounting bracket. Torque to 60-100 in lbs.
3. Install the AD-IP on the vehicle using the four bolts that secure both the upper and lower mounting brackets.
4. Reconnect the three airlines to the proper ports on the end cover (identified during step 3 of the *AD-IP Removal*).
5. Reconnect the vehicle wiring harness to the AD-IP heater and thermostat assembly connector by plugging it into the air dryer connector until its lock tab snaps in place.
6. Before placing vehicle back into service, perform the *Operation and Leakage Tests* stated elsewhere in this manual.

## RETROFITTING THE AD-IP AIR DRYER

### GENERAL

The following retrofit instructions are presented for reference purposes only since Bendix aftermarket retrofit and replacement air dryers are packaged with the most up-to-date installation instructions. The instructions packaged with the AD-IP should be followed in lieu of those presented here.

The preceding portion of this manual deals with “in-service” repair and or replacement of the AD-IP air dryer. The portion of the manual that follows is concerned with installing an AD-IP on a vehicle not previously equipped with one.

### VEHICLE APPLICATION REQUIREMENTS

The basic application requirements presented here apply to a standard air dryer installation. The majority of highway

vehicles in use today will meet these basic requirements however, some may not. Examples of vehicles that may not meet the requirements include, refuse trucks, city coaches, bulk trailer unloading operations and other high air consumption systems. While the AD-IP air dryer can be used on these vehicles the standard installation procedure presented in this manual may require modification to assure proper operation and service life. Consult your local authorized Bendix parts outlet or sales representative for additional information.

**Charge Cycle Time** — The AD-IP air dryer is designed to provide clean, dry air for the brake system. When a vehicle’s air system is used to operate non-brake air accessories it is necessary to determine that, during normal daily operation the compressor should recover from governor “cut-in” to governor “cutout” (usually 100 psi to 120 psi) in 90 seconds or less at engine RPMs normal to the vehicle vocation. If the recovery time consistently exceeds this limit, it may be necessary to “bypass” the air accessory responsible for the high air usage. Consult your local authorized Bendix parts outlet or sales representative for additional information.

**Purge Cycle Time** — During normal vehicle operation, the air compressor must remain unloaded for a minimum of 30 seconds. This minimum purge times is required to ensure complete regeneration of the desiccant material. If the purge time is occasionally shorter than the times specified, no permanent ill effect should be expected, however, if the purge time is consistently less than the minimum, an accessory bypass system must be installed. Contact the nearest authorized Bendix parts outlet or Bendix representative for additional information. **Note:** Reservoir Volume - Total vehicle reservoir volume can impact the Charge and Purge Cycle time. The chart below can be used as a guide in determining if additional help is required.

Total Vehicle Reservoir Volume (Cu. In.)	Air Dryer Model
Less than 9,000 .....	Standard AD-IP
Greater than 9,000 .....	AD-9 Extended Purge or Contact

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**Air Compressor Size** — Although the AD-IP air dryer can be used in conjunction with larger compressors, it was designed primarily for units rated for up to 30 CFM. It is recommended that when using the AD-IP air dryer with a compressor which has a rated displacement exceeding 30 CFM that an authorized Bendix parts outlet or Bendix marketing representative be contacted for assistance.

**Holset “E or QE” Type Air Compressors** - In order for these Holset compressors to function properly when installed

with an AD-IP air dryer, the required Holset feed back line and single check valve must be used. The standard AD-IP can be used with a separate feedback line and single check valve OR the AD-IP DI (Drop In) model can be used. With AD-IP DI in use the separate feed back line and single check valve can be eliminated since these components are part of the air dryer. Refer to Figures 2 & 3.

## VEHICLE PREPARATION

1. Park the vehicle on a level surface and prevent movement by means other than the brakes.
2. Drain all reservoirs to 0 p.s.i.

## LOCATING AD-IP ON VEHICLE

1. The AD-IP air dryer must be mounted vertically (purge exhaust toward road surface) outside the engine compartment in an area of air flow while the vehicle is in motion. The AD-IP must not be exposed to direct wheel splash. If the air dryer is located directly behind the axle, a mud flap is required.
2. Maintain a minimum clearance of 12" between the air dryer and any potential heat source (e.g. vehicle exhaust). If this is not feasible, a heat shield must be used.
3. Make certain that adequate clearance from moving components (e.g. drive shaft, suspension, pitman arm, etc.) is provided.
4. Locate the air dryer on vehicle so that a minimum of 1/2" inch clearance above the air dryer is available to allow desiccant cartridge removal. A minimum of 8" inches clearance below the air dryer is required to allow for desiccant cartridge bolt removal.
5. When choosing the mounting location for the AD-IP, note the discharge line length requirements stated under the heading *Connecting the Air Lines*, elsewhere in this manual.

**Important Note:** Under normal operating conditions, the maximum inlet air temperature for the AD-IP air dryer is 150 degrees Fahrenheit.

6. If possible locate the AD-IP so that the purge exhaust does not expel contaminants on vehicle components. If this is not feasible, the purge exhaust may be redirected away from the vehicle by installing an optional special exhaust cover (part number 112609). The exhaust cover is available as a separate item from authorized Bendix parts outlets. A 1 inch ID hose can be clamped on this special exhaust cover to allow the exhaust to be redirected.

## MOUNTING THE AD-IP (Refer to Figure 10)

1. Install the lower mounting bracket on the AD-IP air dryer. To accomplish this, it will be necessary to choose two, of the four available, mounting holes. To determine which two holes to utilize to attach the lower bracket, take into

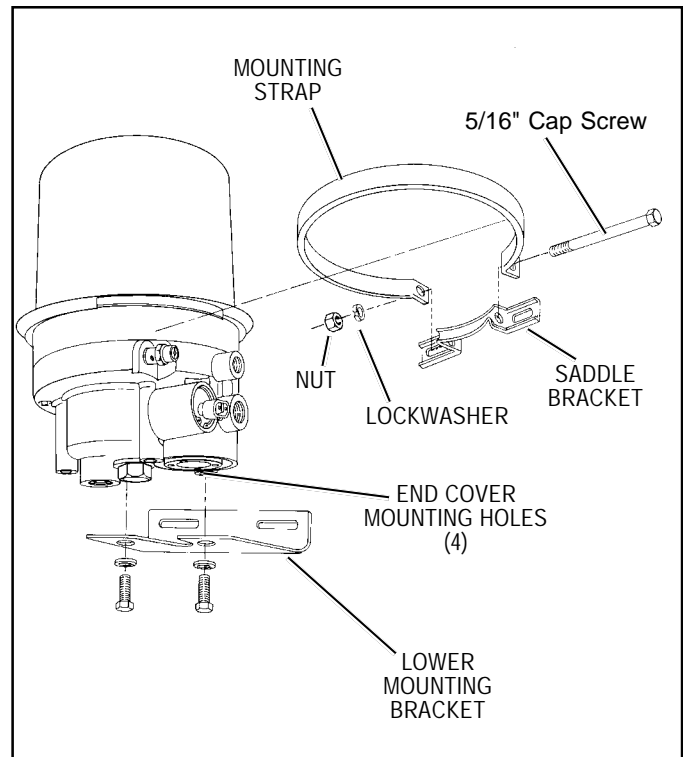


FIGURE 10 - AD-IP BRACKET INSTALLATION

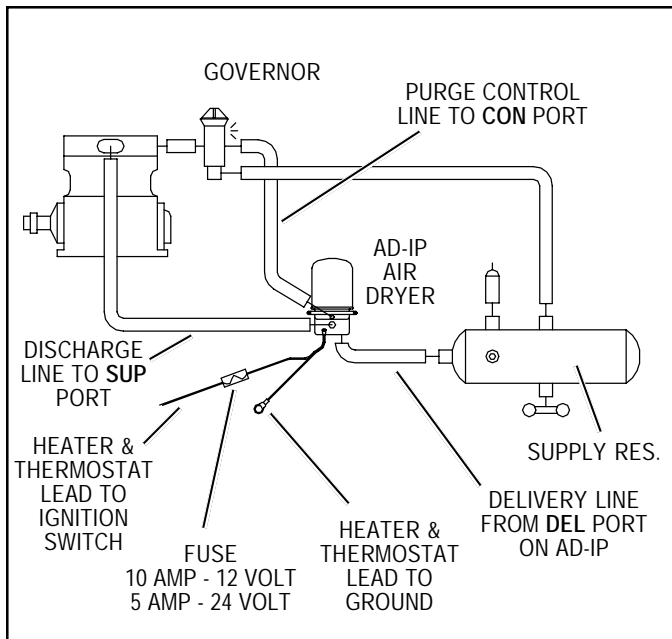
consideration the piping connections required to install the AD-IP air dryer and use those that will best position the unit for ease of installation. Utilizing the two cap screws and washers provided with the AD-IP air dryer retrofit unit, attach the lower mounting bracket and torque to 300-360 in. lbs

**Note:** The bracket mounting holes in the end cover may not be pre-tapped. In this case the mounting bolt will self tap the holes on initial installation.

2. Assemble the mounting strap and saddle bracket as illustrated, by utilizing the 5/16" cap screw, lock washer, and nut provided. Place the upper bracket strap in the end cover channel provided for it, then install the saddle bracket and secure the strap to the saddle bracket using the 5/16" cap screw, lock washer, and nut provided. Install but do not tighten the cap screw at this time. Orient the strap and saddle bracket so that it is in a flat plane with the lower bracket. Torque the 5/16" nut to 60-100 in. lbs. to tighten strap onto the shell.

**Note:** A universal mounting plate (Pc. No. 248478) is available to facilitate the mounting of the AD-IP air dryer to the vehicle. It can be obtained through an authorized Bendix parts outlet.

3. Components and location used to mount the AD-IP on the vehicle must be rigid enough to minimize air dryer vibration.
4. Mount the AD-IP air dryer on the vehicle using 3/8" bolts (grade 5 min.) and washers. Torque to 25 ft. lbs. (300 inch pounds.)



**FIGURE 11 - AD-IP INSTALLATION**  
**CONNECTING THE AIR LINES**

#### PURGE CONTROL LINE

1. Install a Purge Control air line having a minimum inside diameter of 3/16 inches between the AD-IP end cover control port and an unused unloader port on the governor. The control line must be connected directly to the governor and not in series with automatic drain valves, lubrication systems, etc.
2. The control line should slope downward to the end cover without forming sharp bends or "dips".

#### COMPRESSOR DISCHARGE LINE

##### GENERAL:

While minimum diameters are specified, larger line diameters generally improve performance and life and reduce temperatures, particularly in severe applications.

1. The compressor discharge line material should be wire braided "Teflon" hose, copper tubing or a combination of both.
2. The compressor discharge line should slope downward from the compressor discharge port to the AD-IP air dryer supply port without forming water traps, kinks or restrictions. Crossovers from one side of the frame rail to the other, if required, should occur as close as possible to the compressor.
3. Extension fittings and combination fittings (i.e. two supply fittings coupled together) must not be installed at the AD-IP supply port. A straight fitting installed at the AD-IP supply port is preferred; however a 45 deg., or a 90 deg. fitting can be used in that order of preference. Make certain the fitting orientation does not cause the compressor discharge line to "run uphill" to the air dryer supply port.

4. Compressor discharge line lengths and inside diameter requirements are dependent on the vehicle application and are as follows:

#### Typical P & D, School Bus and Line Haul

The minimum discharge line length is 6 feet and the maximum is 16 feet.

Discharge Line Length	Minimum Line	Other Requirements
6.0 - 9.5 ft. ....	1/2 in. ....	None
9.5 - 12.0 ft. ....	1/2 in. ....	Last 2-3 feet, including the supply port fitting, must be insulated with 1/2 inch thick closed cell polyethylene pipe insulation.
12.0 - 16.0 ft. ....	5/8 in. ....	Last 2-3 feet, including the supply port fitting, must be insulated with 1/2 inch thick closed cell polyethylene pipe insulation.

*If the discharge line length must be less than 6 feet or greater than 16 feet, contact your local Bendix Brakes representative or authorized parts outlet for further information.*

#### High Duty Cycle Vehicles (City Transit Bus, Refuse Trucks etc.)

The minimum discharge line length is 10 feet and the maximum is 16 feet.

Discharge Line Length	Minimum Line	Other Requirements
10.0 - 16.0 ft. ....	1/2 in. ....	None

*If the discharge line length must be less than 10 feet or greater than 16 feet, contact your local Bendix Brakes representative or authorized parts outlet for further information.*

#### DELIVERY LINE

1. Install an air line of the same approximate I.D. as the compressor discharge line between the AD-IP air dryer delivery port and the first (supply) reservoir. This line should also slope downward to the reservoir, if possible.

#### EXHAUST LINE

1. If it is necessary to direct AD-IP air dryer discharge contaminants away from vehicle components it will be necessary to purchase a special exhaust cover for the AD-IP air dryer (Pc. No. 112609) and install on the unit. A 1 inch (25.4 mm) I.D. hose can be clamped on the special AD-IP air dryer exhaust cover.

#### WIRING THE HEATER/THERMOSTAT

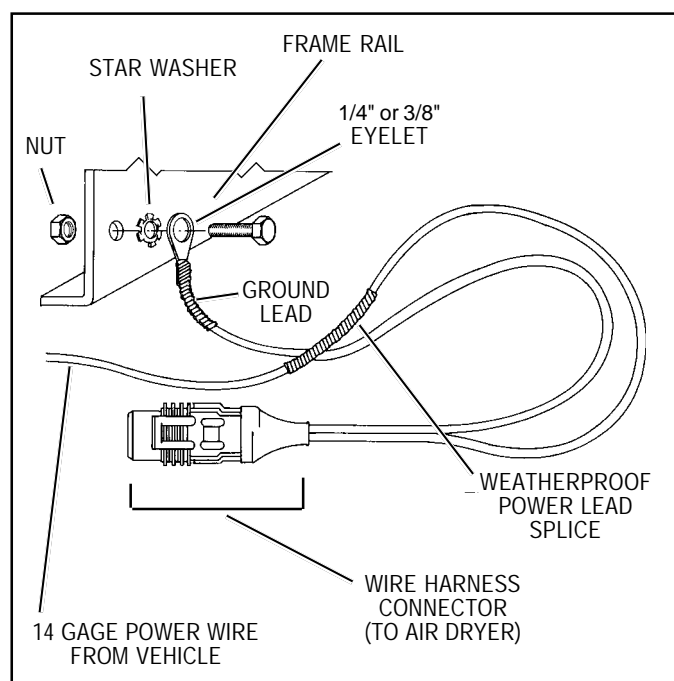
1. The air dryer is available with either a 12 or 24 volt heater which uses 90 watts of power. Determine the vehicle's electrical system voltage and make certain that the air dryer that is to be installed contains the same voltage heater. The air dryer's part number can be used to determine the air dryers heater voltage requirement. The heater voltage can also be identified by the color of the heater assembly connector as described in the table below.

Air Dryer Heater Voltage	Air Dryer Connector Identification
12 Volts .....	White, (No other markings)
24 Volts .....	Gray, or White w/Red Dot

A two lead, 24 inch, wire harness with attached weather resistant connector is supplied with all retrofit and replacement AD-IP air dryers. Connect one of the two leads of the wire harness to the engine kill or ignition switch. The remaining lead of the wire harness must be connected to a good vehicle ground (not to the air dryer or its mounting bracket). A fuse must be installed in the power carrying wire; install a 10 amp fuse for 12 volt heaters and a 5 amp fuse for a 24 volt heater.

3. Use 14 gauge wire if it is necessary to lengthen the wire harness provided with the AD-IP air dryer. Make certain all wire splices are waterproofed using the splice kit provided with all aftermarket AD-IP air dryers.
4. Tie wrap or support all electrical wires leading to the AD-IP air dryer at 6 - 8 inch intervals.

**Note:** Wires should have sufficient slack and not completely taught.



**FIGURE 12 - WIRING - REMOTE POWER & LOCAL GROUND**

## INSTALLING AD-IP WITH HOLSET COMPRESSOR

### GENERAL

The vehicle installation guidelines presented in the previous section apply to all AD-IP air dryer installations. Vehicles equipped with the Holset Type E or QE compressor require the following additional considerations.

**Standard AD-IP** (Refer to Figure 3B)

If the AD-IP is being installed on a vehicle that did not previously have an air dryer or air system aftercooler, a separate feedback line and single check valve must be installed

If the AD-IP is replacing an older style air dryer or air system aftercooler that did not incorporate an integral "Turbo Cutoff" device, the Holset ECON valve must be removed. The feedback line and single check valve must remain in place.

### AD-IP "Drop In" Model (Refer to Figure 3C)

If the AD-IP "Drop In" is being installed on a vehicle that did not previously have an air dryer or air system aftercooler, no additional considerations are necessary. Install the AD-IP DI in the manner described in the previous section.

If the AD-IP DI is replacing a standard AD-IP or air dryer or air system aftercooler which incorporated an integral "Turbo Cutoff" device, the old feedback line and single check valve must be removed.

If the AD-IP DI is replacing an older style air dryer or air system aftercooler that did not incorporate an integral "Turbo Cutoff" device, the Holset ECON valve and the old feedback line and single check valve must be removed.

## TESTING THE AD-IP

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

1. Close all reservoir drain cocks.
2. Build up system pressure to governor cutout and note that the AD-IP air dryer purges with an audible escape of air.
3. "Fan" the service brakes 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-IP air dryer exhaust.
4. It is recommended that the following items be tested for leakage to assure that the AD-IP air dryer will not cycle excessively.
  - (A) Total air system leakage (See Bendix publication BW-5057 "Air Brake Handbook.")
  - (B) Compressor unloader mechanism.
  - (C) Governor.
  - (D) Drain cock and safety valve in first (supply) reservoir.
  - (E) All air connections leading to and from the first (supply) reservoir.

## AD-IP AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
1. Dryer is constantly "cycling" or purging.	A. Excessive system leakage.	A. Test for excessive system leakage. Allowable leakage: Single vehicle - 1 psi/minute either service reservoir. Tractor trailer - 3 psi/minute either service reservoir.
	B. Excessive leakage in fitting, hoses and tubing connected to the compressor, air dryer and first reservoir.	B. Using soap solution, test for leakage at fittings, drain cock or valve (if any) and safety valve in first reservoir. Repair or replace as necessary.
	C. Defective check valve assembly in AD-IP air dryer end cover.	C. Test check valve. Build system pressure to governor cut-out. Wait 2 minutes for completion of purge cycle. Using soap solution at exhaust of purge valve, leakage should not exceed a 1 inch bubble in less than five seconds. Replace as necessary.
	D. Defective governor.	D. Test governor for proper cut-in and cut-out pressures and excessive leakage in both positions.
	E. Compressor unloader mechanism leaking excessively.	E. Remove air strainer or fitting from compressor inlet cavity. With compressor unloaded, check for unloader piston leakage. Slight leakage permissible.
	F. Holset "E" type compressor.	F. Test the Holset E Compressor unloader system with feedback line and check valve for proper operation. Make certain Holset ECON is not in use with the AD-IP air dryer, if so, remove and retest.
	G. Rapid cycling of the governor due to air starvation at the RES port of the governor.	G. With gauge installed at RES port of governor, pressure should not drop below "Cut-In" pressure at the onset of the compressor "Unloaded" cycle. If pressure drops, check for "kinks" or restrictions in line connected to RES port. Line connected to RES port on governor must be same diameter, or preferably larger than, lines connected to UNL port(s) on governor.
2. Water in vehicle reservoirs.	A. Improper discharge line length or improper line material. Maximum air dryer inlet temperature is exceeded.	A. Refer to section entitled <i>Connecting the Air Lines</i> and check line size and length.
	B. Air system charged from outside air source (outside air not passing through air dryer).	B. If system must have outside air fill provision, outside air should pass through air dryer. This practice should be minimized.

## AD-IP AIR DRYER TROUBLESHOOTING CHART (Continued)

SYMPTOMS	CAUSE	REMEDY
2. Water in vehicle reservoirs (continued).	C. Air dryer not purging (see Symptom #5).	C. See cause and remedy for Symptom #5.
	D. Purge (air exhaust) time insufficient due to excessive system leakage (see causes for Symptom #1).	D. Check causes and remedies for Symptom #1.
	E. Excessive air usage - Air dryer not compatible with vehicle air system requirement (Improper air dryer/vehicle application).	<p>E. Charge Cycle Time - The AD-IP is designed to provide clean, dry air for the brake system. When a vehicle's air system is used to operate non-brake air accessories it is necessary to determine that; during normal, daily operation the compressor should recover from governor "cut-in" to governor "cut-out" (usually 100 psi to 120 psi) in 90 seconds or less at engine RPM's commensurate with the vehicle vocation. If the recovery time consistently exceeds this limit, it may be necessary to "bypass" the air accessory responsible for the high air usage. An example of where a by-pass system would be required is when the compressor is used to pressurize a tank trailer for purposes of off-loading product. Consult your local authorized Bendix parts outlet or sales representative for additional information.</p> <p>Purge Cycle Time - During normal vehicle operation, the air compressor <b>must remain unloaded for a minimum of 30 seconds</b>. This minimum purge time is required to ensure complete regeneration of the desiccant material. If the purge time is consistently less than the minimum, an accessory by-pass system must be installed. Consult your local authorized Bendix parts outlet or sales representative for additional information.</p> <p>Air Compressor Size - Although the AD-IP can be used in conjunction with larger compressors, it was designed primarily for units rated for up to 30 CFM. It is recommended that when using the AD-IP with a compressor which has a rated displacement exceeding 30 CFM that an authorized Bendix parts outlet or Bendix marketing representative be contacted for assistance.</p>
	F. Air by-passes desiccant cartridge assembly.	<p>F. If vehicle uses Holset compressor, inspect feedback check valve for proper installation and operation.</p> <p>Replace desiccant cartridge. Make sure desiccant cartridge assembly is properly installed and sealing rings are in place on mounting surface of desiccant cartridge.</p>
	G. Desiccant requires replacement.	G. Replace desiccant cartridge assembly.

## AD-IP AIR DRYER TROUBLESHOOTING CHART (Continued)

SYMPTOMS	CAUSE	REMEDY
3. Safety valve on air dryer "popping off" or exhausting air.	A. Desiccant cartridge plugged.	A. Check compressor for excessive oil passing and/or correct compressor installation. Repair or replace as necessary. Replace desiccant cartridge.
	B. Defective discharge check valve in end cover of the AD-IP.	B. Test to determine if air is passing through check valve. Repair or replace.
	C. Defective fittings, hose or tubing between air dryer and first reservoir.	C. Check to determine if air is reaching first reservoir. Inspect for kinked tubing or hose. Check for undrilled or restricted hose or tubing fittings.
	D. Excessive pressure pulsations from compressor. (Typical single cylinder type).	D. Increase volume in discharge line. Add a ping tank (small reservoir).
	E. Safety valve setting lower than the maximum system pressure.	E. Reduce system pressure or obtain a higher setting 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 purge valve as necessary.
	B. Defective governor.	B. Check governor for proper "cut-in", "cut-out" pressure and excessive leakage in both positions. Repair or replace as necessary.
	C. Purge control line connected to reservoir or exhaust port of governor.	C. Purge control line must be connected to unloader port of governor.
	D. Purge valve frozen open - faulty heater and thermostat, wiring, blown fuse.	D. Test heater and thermostat as described in <i>Preventative Maintenance</i> Section.
	E. Excessive system leakage.	E. See Symptom #1's Cause and Remedy A.
	F. Purge valve stays open - supply air leaks to control side.	F. Repair purge valve and housing.
5. Can not build system air pressure.	A. Inlet and outlet air connections reversed.	A. Connect compressor discharge to air dryer supply port. Reconnect lines properly.
	B. Check valve between air dryer and first reservoir.	B. Test check valve for proper operation. Repair or replace as necessary.
	C. Kinked or blocked (plugged) discharge line.	C. Check to determine if air passes through discharge line. Check for kinks, bends, excessive carbon deposits, or ice blockage.



## AD-IP AIR DRYER TROUBLESHOOTING CHART (Continued)

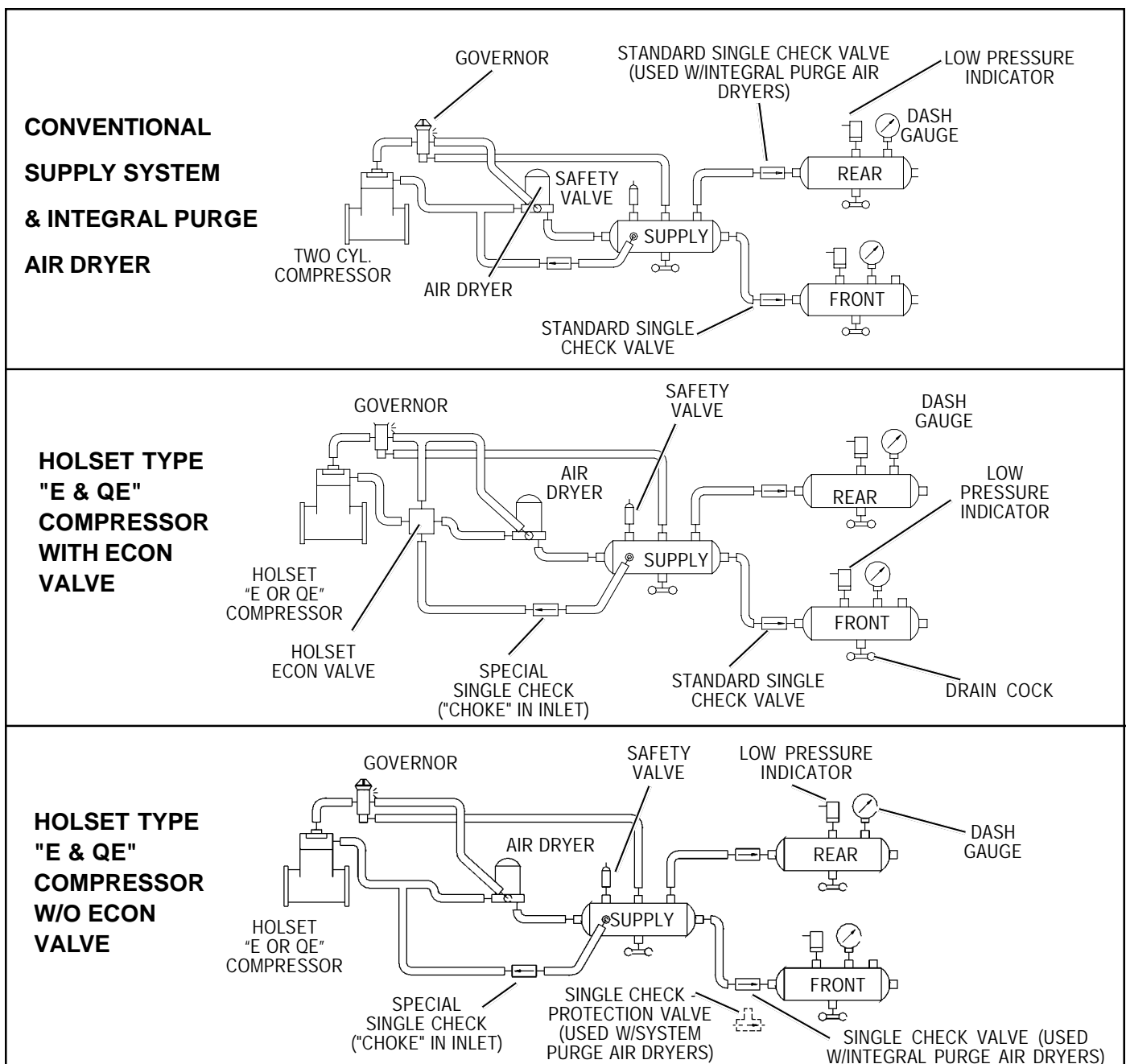
SYMPTOMS	CAUSE	REMEDY
5. Can not build system air pressure.	D. Excessive bends in discharge line (water collects and freezes). E. Refer to Symptom 4, causes E & F.	D. Discharge line should be constantly sloping from compressor to air dryer with as few bends as possible. E. Refer to Symptom 4, Remedies E & F.
6. Air dryer does not purge or exhaust air.	A. Broken, kinked, frozen, plugged or disconnected purge control line.	A. Test to determine air flows through purge control line when compressor unloaded. Check for undrilled fittings. (See Symptom #4, Remedy C.)
	B. Faulty air dryer purge valve.	B. After determining air reaches purge valve (Remedy A above), repair purge valve.
	C. See Causes, B, E, G for Symptom #4.	C. Refer to Remedies B, E, G for Symptom #4.
7. Desiccant material being expelled from air dryer purge valve exhaust (may look like whitish liquid or paste or small beads.)  - OR - Unsatisfactory desiccant life.	A. This symptom is almost always accompanied by one or more of Symptoms 1, 2, 3, 4 and 5. See related causes for these Symptoms above.	A. See Causes and Remedies for Symptoms 1, 2, 3, 4 and 5.
	B. Air dryer not securely mounted. (Excessive vibration.)	B. Vibration should be held to minimum. Add bracket supports or change air dryer mounting location if necessary.
	C. Malfunctioning or saturated desiccant cartridge.	C. Replace desiccant cartridge assembly.
	D. Compressor passing excessive oil.	D. Check for proper compressor installation; if symptoms persist, replace compressor.
	E. Desiccant cartridge not assembled properly to end cover. (Loose attachment)	E. Check the torque on the desiccant cartridge to end cover attachment. Refer to assembly section of this data sheet.
8. "Pinging" noise 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 an additional four feet of discharge line or adding a 90 cubic inch reservoir between the compressor and the AD-IP air dryer. <b>IMPORTANT:</b> Do not exceed the line lengths requirements specified in this manual.
9. Constant seepage of air at air dryer purge valve exhaust (non-charging mode.)	A. Defective check valve assembly in AD-IP air dryer end cover.	A. Refer to Remedy C, Symptom #1.
	B. Leaking Turbo Cutoff valve.	B. Repair or replace purge valve assembly.
	C. Leaking purge valve control piston o-ring.	C. Repair or replace purge valve assembly.

## AD-IP AIR DRYER TROUBLESHOOTING CHART (Continued)

SYMPTOMS	CAUSE	REMEDY
10. The air dryer purge piston cycles rapidly in the compressor unloaded (non-compressing) mode.	A. Compressor fails to "unload".	A. Faulty governor installation; no air line from governor to compressor or line is kinked or restricted. Install or repair air line.

### Additional Troubleshooting Information

The Troubleshooting procedure presented on pages 18 and 19 has been excerpted from a laminated card entitled: Troubleshooting Charging and Air Supply Systems. The complete card can be obtained from authorized Bendix parts outlets under literature number BW1779. It is presented here because of the air dryers connection to the supply air system and for convenience. The procedure is not all inclusive but rather represents the most commonly encountered complaints.



## COMPLAINTS COMMON TO THE CHARGING & AIR SUPPLY SYSTEM

### Complaint: Can Not Build System Pressure

- Discharge line plugged or restricted: see Common Test 1.
- Air pressure trapped between governor and compressor unloaders: see Common Test 2.
- Blow Leakage at Air Dryer Exhaust: see Common Test 3.

### Complaint: Air system Builds Too Slow

- Discharge line restricted: see Common Test 1.
- Discharge line leakage: see Common Test 5.
- Air Leaking at Air Dryer Exhaust: see Common Test 3.
- Compressor head gasket failure: apply soap solution around cylinder head. If leakage between head and block noted repair or replace comp.
- Air pressure trapped between governor and compressor unloaders: see Common Test 2.
- Air system leakage: see Common Test 4.

### Complaint: Can Not Build System Pressure Above "X" psi.

- Blow leakage at compressor unloaders: remove all hardware from comp. inlet then remove governor. With 120 psi shop air applied to comp. unloader port listen for leakage at inlet. If noted, repair leak or replace comp.
- Incorrect setting on governor: verify Safety Valve operation. Drain air from system, remove or disconnect governor from comp. and install gauge in governor unloader (UNL) port. Build system pressure and note when pressure on dash gauge and test gauge are equal. Should be equal at maximum setting of governor.
- Discharge line leakage: see Common Test 5.
- Air system leakage: see Common Test 4.
- Compressor head gasket failure: apply soap solution around cylinder head. If leakage between head and block noted repair or replace comp.

### Complaint: Air Dryer Cycles "ON & OFF" Constantly

This complaint caused by leakage, either Service system or Supply system. Service system leakage is shown on dash gauges Supply system leakage is not. *Note: System purge air dryers will purge more often than those with integral purge volume.*

Service system leakage: see Common Test 4.

Supply system component leakage: drain system, install gauge and shop air hose in place of drain cock in supply reservoir. Fill system to 120 psi, shut off shop air and check leakage on following components in order presented:

- Compressor unloader leakage
- Drain system, remove governor from comp. plug governor UNL port and re-test. If leakage OK repair comp. unloader mechanism or replace comp. If leakage NOT OK then next.
- Holset ECON valve (used with Holset Type "E & QE" comp.) missing, malfunctioning, leaking.
- Is ECON valve required but missing? If YES, install, along with special Holset check valve w/choke. If NO and ECON valve present replace ECON valve and special check valve. If NO and ECON not required then next
- Air dryer leakage: Remove line from air dryer inlet and with 120 psi in supply res. soap exhaust and inlet port of air dryer. If leakage greater than 1 inch bubble in 1 second at exhaust port, repair or replace check valve (on dryers with integral purge volume) or replace body assy. on system purge air dryers. If leakage greater than 1 inch bubble in 1 second at inlet port, repair or replace purge valve assy. (on dryers with integral purge volume) or replace turbo cut -off valve on system purge air dryers.

### Complaint: System Pressure Goes to 150+ psi

- Drain air system to 0 psi, remove/disconnect governor from comp. Start engine and note air pressure rise on dash gauges. Apply 120 psi shop air to comp. unloader port. If air pressure continues to rise, repair comp. unloaders or replace comp. If air ceases to rise, repair or replace governor.

### Complaint: Low Pressure Warning After Only 1 or 2 Applications

- Brakes out of adjustment: adjust brakes.
- Excessive system leakage on service (application) side of system: Build system pressure to 120 psi and shut off engine. With park brakes released, make full service application and note dash gauges for 2 minutes. Pressure drop on either gauge should not exceed 4 psi. (2 psi per min.) If pressure drop excessive, find leakage in service system, if OK, then next.
- Incorrect low pressure switch in use or setting incorrect: Build system to 120 psi. Engine OFF ignition ON, slowly drain air pressure from one service reservoir. Low pressure warning on at minimum 60 psi, maximum 10-15 psi less than governor cut-in pressure.

## TESTS COMMON TO MORE THAN ONE COMPLAINT

### 1. Discharge plugged or restricted

- Connect temporary discharge line from comp. discharge port to supply res. & re-check build-up. If build-up OK replace plugged discharge line. If build-up NOT OK go to next cause.

### 2. Air pressure trapped between governor and compressor

- Verify Safety Valve operation then remove or disconnect governor from comp. & check build-up.
- If build-up OK, repair or replace governor or line between gov. and comp.
- If build-up NOT OK repair or replace comp.

### 3. Blow Leakage at Air Dryer Exhaust

- Drain all air from Supply reservoir then remove control air line from Air Dryer, plug line and plug control port in Air Dryer. Re-check build-up.
- If build-up OK, repair or replace governor or line between governor and Air Dryer
- If build-up NOT OK, and below 32 deg. F, turn ignition ON and allow heater to warm Air Dryer then check build-up. If NOT OK, remove wire (connector or terminal) from Air Dryer. Using test light, check wire end or terminal for battery voltage with vehicle ignition ON. If voltage OK,

repair or replace Air Dryer heater and thermostat. If voltage NOT OK, Repair or replace the vehicle wire connected to Air Dryer. Retest build-up.

- If build-up still NOT OK or temp. above 32 deg. F, replace Air Dryer purge valve assembly.

### 4. Air system leakage

- Build system Pressure to governor cut-out, wait 2 minutes for dryer purge completion. Note pressures on dash gauges then watch dash gauges for 2 minutes. Leakage not to exceed 2 psi in 2 mins. for truck, bus, tractor (no trailer).
- If leakage NOT OK on gauges, find leak(s) in service and park system and repair. Retest and if system purge air dryer in use and still not OK repair or replace dryer.
- If leakage OK on gauges, drain air from supply reservoir, remove drain cock and install air gauge. Build system air in supply reservoir and note leakage. If OK continue checking. If NOT OK find leaks and repair.

### 5. Discharge line leakage

- Soap cover on flex discharge line, if leakage noted replace line.
- Soap fittings to check leakage, tighten as needed.

**IMPORTANT:** The Complaints, Causes and Remedies presented here should not be considered as the only situations possible. They are only meant to represent the most commonly encountered. It may be necessary to perform additional trouble shooting using the more detailed information presented in service manuals for the specific components.

