

BLACKMER PISTON AIR VALVE

960333
Page 1 of 8

**INSTRUCTIONS
AND PARTS LIST
NO. 201-G00**

Section 201
Effective FEB 2023
Replaces JAN 2023

INSTALLATION OPERATION AND MAINTENANCE INSTRUCTIONS WITH PARTS LIST

For Piston Air Valve Style AVC and Discontinued Style AVB

TABLE OF CONTENTS	Page
SAFETY DATA	1-2
VALVE DATA	2
Air Valve Technical Data.....	2
Initial Air Valve Settings	2
INSTALLATION	2
Pre-Installation Cleaning	2
Mounting the Air Valve.....	3
Air Valve Adjustment.....	3
TANK TRUCK FUEL OIL DELIVERY OPERATION	4
Air Systems	4
Electric / Hydraulic Systems.....	4
MAINTENANCE	5
Maintenance and Inspection Schedules	5
Air Valve Removal and Disassembly	5
Air Valve Assembly.....	6
PARTS LIST	7

NOTICE:

Keep this document with the appropriate Blackmer pump installation, operation and maintenance instruction manual.

NOTICE:

Review and follow all hazard warnings provided in the appropriate Blackmer pump installation, operation and maintenance instruction manual.

Blackmer pump manuals and parts lists may be obtained from Blackmer's website (www.blackmer.com) or by contacting Blackmer Customer Service

NOTE: Numbers in parentheses after individual parts indicate reference numbers on Blackmer Parts List

NOTE: A pump with a standard relief valve may be converted to use the Piston Air Valve with the installation of a Piston Air Valve Kit. See the Parts List, Table 3 for applicable pump models.

SAFETY DATA



This is a SAFETY ALERT SYMBOL.

When you see this symbol on the product, or in the manual, look for one of the following signal words and be alert to the potential for personal injury, death or major property damage



Warns of hazards that **WILL** cause serious personal injury, death or major property damage.



Warns of hazards that **CAN** cause serious personal injury, death or major property damage.



Warns of hazards that **CAN** cause personal injury or property damage.

NOTICE:

Indicates special instructions which are very important and must be followed.

NOTICE:

Blackmer Air Valves MUST only be installed in systems which have been designed by qualified engineering personnel. The system MUST conform to all applicable local and national regulations and safety standards.

This manual is intended to assist in the installation and operation of the Blackmer Air Valves, and MUST be kept with the pump.

Blackmer Air Valve service shall be performed by qualified technicians ONLY. Service shall conform to all applicable local and national regulations and safety standards.

Thoroughly review the pump manual and all Air Valve instructions and hazard warnings, BEFORE performing any work on the Blackmer Air Valves.

Maintain ALL system and Blackmer air valve pump operation and hazard warning decals.

SAFETY DATA


WARNING



Hazardous machinery can cause serious personal injury or property damage.

Failure to set the vehicle emergency brake and chock wheels before performing service can cause severe personal injury or property damage.


WARNING



Hazardous machinery can cause serious personal injury.

Failure to disconnect and lockout electrical power or engine drive before attempting maintenance can cause serious personal injury or death.

WARNING



Hazardous fluids can cause fire, serious personal injury or property damage.

All fluids pumped must be compatible with piston material. Incompatibility can cause fire, serious personal injury or property damage.


WARNING



Hazardous pressure can cause personal injury or property damage.

Disconnecting fluid or pressure containment components during pump operation can cause serious personal injury, death or major property damage.

WARNING



Hazardous or toxic fluids can cause serious injury.

If pumping hazardous fluids, the system must be flushed and decontaminated prior to performing service or maintenance.

WARNING



Hazardous pressure can cause serious personal injury or property damage.

Failure to relieve system pressure prior to performing pump service or maintenance can cause personal injury or property damage.

NOTICE:

Installation and maintenance shall be performed by qualified technicians only, following the appropriate procedures and warnings as presented in this manual and the appropriate pump installation, operation, and maintenance instructions.

VALVE DATA

AIR VALVE TECHNICAL DATA

Maximum Pump Pressure	125 psi (8.6 Bar)
Maximum Air Pressure	125 psi (8.6 Bar)
Minimum Air Pressure	70 psi (4.8 Bar)
Maximum Operational Temperature	240°F (115°C)
Minimum Operational Temperature	-20°F (-29°C)

INITIAL AIR VALVE SETTINGS

Pump Operating Pressure:	_____
Low Pressure Setting:	_____
High Pressure Setting:	_____
Peak Pressure Setting:	_____

INSTALLATION

The Blackmer Air Valve is a piston type actuator (see parts list drawing on page 7). The air valve is designed to work with a flow sensing pilot valve (air or electric) which puts pressure behind the piston when the nozzle is open and fluid is flowing. This permits high pressure operation of the pump. When the nozzle is closed and flow is stopped, the flow sensing pilot valve relieves the actuating pressure from behind the piston and the pump will automatically go into low pressure bypass.

Approximately 70 psi (4.8 bar) minimum air pressure is required to properly operate the air valve control system. Air pressure MUST NOT exceed 125 psi (8.6 bar).

PRE-INSTALLATION CLEANING

Foreign matter entering the pump WILL cause extensive damage. The pump and the surrounding area MUST be cleaned prior to attempting air valve installation.

NOTICE:

A preset, spring loaded air check valve must be installed in the vehicle air supply line to ensure minimum safe air pressure for the brake system.

INSTALLATION

MOUNTING THE AIR/RELIEF VALVE

1. Remove the pump relief valve cap (1) and turn the adjusting screw (2) counterclockwise to relieve spring tension, reference the pump maintenance manual.
2. Remove and discard the pump's four relief valve cover bolts (5 & 5C). Remove the cover assembly (4), spring guide (7), spring (8), and gasket (10). Clean and inspect the gasket surfaces, repairing as necessary.
3. Install a new gasket (10).

NOTICE:

The relief valve spring must be confined between the boss on the relief valve (9) and the boss on the piston (11A).

4. Attach the Air Valve assembly to the pump using the four new bolts provided (5 & 5C). Ensure the relief valve spring is seated in the piston boss. Position the valve cover (4) so that the air inlet pipe hole is accessible to attach the air line and breather vent is not facing upward.
5. Torque the air valve mounting bolts as indicated in Table 1.

PUMP MODEL	TORQUE * - lbs ft (Nm)
TXD2, TXD1220A, TXD2.5, TXD1225, TXH3	19 – 25 (25.8 – 33.9)
TXD3, TXD1230	

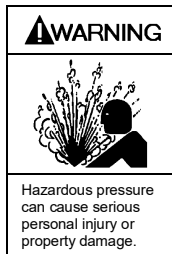
* Torque bolts in an alternating pattern.

Table 1

AIR/RELIEF VALVE ADJUSTMENT

NOTICE:

Maintenance shall be performed by qualified technicians only, following the appropriate procedures and warnings as presented in this manual and the appropriate pump installation, operation, and maintenance instructions.



Failure to relieve system pressure prior to performing pump service or maintenance can cause personal injury or property damage.

NOTICE:

If the air valve retaining ring (11F) is removed, and the jam nuts (11E) turned out beyond the retaining ring, the piston (11A) will not seal, allowing air to leak to the atmosphere.

The Blackmer Air Valve low and high pressure settings are adjustable within a specific range to suit the engine operating speed and operating conditions. See Table 2. Attach a suitable pressure gauge at the pump discharge gauge port (73) to make the required air valve adjustments. Record the air valve and pump operating pressures in the "Initial Air Valve Settings" chart.

Discharge Pressure Setting / Range – PSI (bar)			
Model	TXD2, TXD1220	TXD2.5, TXD1225, TXH3	TXD3, TXD1230
Pump Operating	100 (6.9) Maximum		
Low	10-35 (0.8-5.5)	40-80 (2.8-5.5)	55-85 (3.8-5.9)
High	70-125 (4.8-8.6)		80-125 (5.5-8.6)
	125 (8.6) Maximum – Do Not Exceed		
Peak	15-25 (1.0-1.7) above normal operating pressure		

Table 2 – Blackmer Piston Air Valve Settings

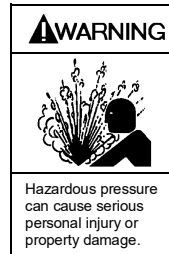
LOW PRESSURE ADJUSTMENT:

The air valve low pressure adjustment MUST be set first.

NOTICE:

The air valve low pressure setting regulates the delivery hose pressure when the nozzle is closed. Adjust the air valve only high enough to open the flow sensing valve.

1. Adjustment MUST be made with the pump at normal idle speed - 200 RPM minimum.
2. SLOWLY close the delivery nozzle, allowing the pressure to be relieved inside the air valve cap.
3. Remove the air valve cap (1) and O-ring (88).
4. Turn the adjusting bushing (2C) clockwise to increase the pressure setting, or counterclockwise to decrease the pressure setting. Refer to Table 2 for setting ranges.
5. Install O-ring and air valve cap, tighten the cap securely.
6. Open and close the delivery nozzle several times to ensure the correct setting.



Incorrect settings of the Blackmer air valve can cause system component failure, personal injury and property damage.

HIGH PRESSURE ADJUSTMENT: Do not exceed the maximum pressure listed in Table 2.

1. Adjustment MUST be made with the pump at normal operating speed and with air pressure behind the air valve piston.
2. Slowly close the delivery nozzle, allowing the pressure to be relieved inside the air valve.
3. Remove the air valve cap.

NOTICE:

Always use a counter wrench (opposing wrench) when tightening the jam nuts (11E). Always start with the jam nuts turned all the way down, clockwise, against the adjusting bushing.

4. Adjust the jam nuts counterclockwise to increase the pressure setting or clockwise to decrease the pressure setting, until the required high pressure setting is achieved. See Table 2 for setting ranges.
5. Install the air valve cap securely.
6. Open the delivery nozzle and observe the pump's discharge gauge. Repeat steps 2-5 until required high pressure setting is achieved.
7. After the final adjustment is made, ensure that the jam nuts (11E) are tight. Inspect the air valve cap O-ring (88) and replace as necessary.

NOTICE:

Where regulations require, holes in R/V cap (1) and capscrew w/hole (5C) are used by the Weights and Measures official(s) to apply a security seal or tag.

TANK TRUCK FUEL OIL DELIVERY OPERATION

Air Systems for Automatic Pressure and Speed Control

The pump is equipped with an adjustable spring actuated relief valve. The spring bears against a piston. With the air pressure on the piston, the valve controls pressure in the conventional manner. When air pressure is removed, the relief valve opens wide, reducing the system pressure.

The pilot valve senses flow. It closes when the nozzle closes and removes air pressure from the pump air valve and the air cylinder on the engine speed control.

When the nozzle is opened, the liquid flow actuates the pilot valve. Air pressure on the air cylinder then speeds up the engine and pump to a preset value and, by pressurizing the pump air valve, increases the system pressure to obtain the desired flow.

Closing the nozzle automatically reduces the engine and pump speed to an idle, and reduces the system pressure, making the hose easier to handle. The net effect also reduces wear and tear on the equipment.

The nozzle may be partially closed to "top off" a tank in the same manner as when a Blackmer pump with the standard relief valve is used.

Rigidly mount the engine speed control air cylinder to prevent variations in the speed control.

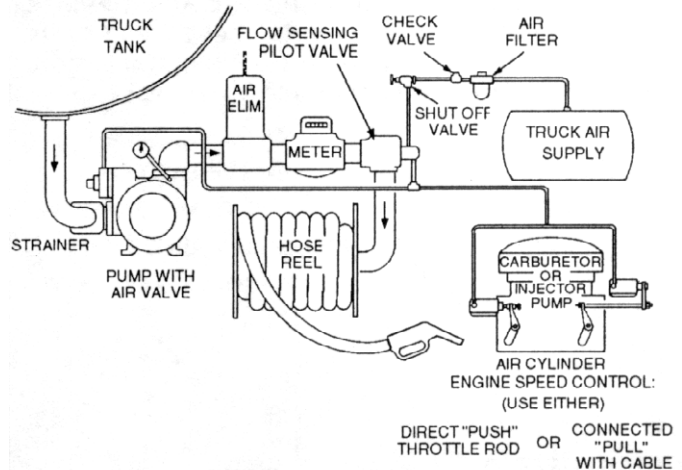
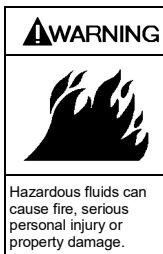


Figure 1 - Air System

Electric/Hydraulic Systems For Automatic Pressure And Speed Control



Failure to provide full flow discharge piping, a properly grounded system and system components will cause static electricity, incendiary sparks and ignition of explosive liquids.



Failure to mount the 3-way pneumatic valve away from heat, flame, sparks or outside the engine compartment can cause fire, personal injury or property damage.

The pump is equipped with an adjustable spring relief valve. The spring bears against the piston. With pump discharge pressure on the piston, the valve controls pressure in the conventional manner. When the pump discharge pressure is removed, the relief valve opens wide, reducing the system pressure.

The flow switch "senses" flow. With the pump running and the nozzle open, liquid causes the electrical switch to close and energize the solenoids. The solenoid on the carburetor or injection pump causes the engine and pump to speed up to a pre-set value. At the same time, the solenoid valve at the pump uses the pump discharge pressure to change the bypass setting at the pump, increasing the system pressure to obtain the desired flow.

Closing the nozzle opens the flow switch, automatically reduces the engine speed to an idle, and reduces the system pressure, making the hose easier to handle. The net effect also reduces wear and tear on the equipment. The nozzle may be partially closed to "top off" a tank in the same manner as when a Blackmer pump with the standard relief valve is used.

Rigidly mount the engine speed control solenoid to prevent variations of the engine speed.

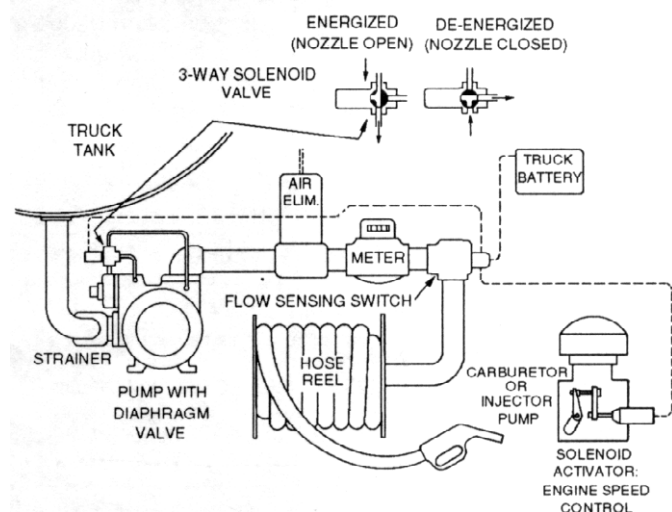



Figure 2 - Electric / Hydraulic System

MAINTENANCE

NOTICE:

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Failure to set the vehicle emergency brake and chock wheels before performing service can cause severe personal injury or property damage.


WARNING



Hazardous machinery can cause serious personal injury.

Failure to disconnect and lockout electrical power or engine drive before attempting maintenance can cause serious personal injury or death.


WARNING



Hazardous fluids can cause fire, serious personal injury or property damage.

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Disconnecting fluid or pressure containment components during pump operation can cause serious personal injury, death or major property damage.


WARNING



Hazardous or toxic fluids can cause serious injury.

If pumping hazardous fluids, the system must be flushed and decontaminated prior to performing service or maintenance.

WARNING



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Failure to relieve system pressure prior to performing pump service or maintenance can cause personal injury or property damage.

AIR VALVE MAINTENANCE AND INSPECTION SCHEDULES

Valve Assembly Part	Inspection Schedule	Action Required
Breather Vent (6A)	Weekly	If leakage is present, IMMEDIATE valve service is required.
Air Valve Assembly	Annually	Disassemble, inspect U-cup/ Quad Ring seals and replace if cracked, blistered or worn.
Piston Assy. (11)	3 Years (Or Less)	REPLACE

AIR VALVE REMOVAL AND DISASSEMBLY

- Remove the cap (1) from the air valve assembly. Remove and discard the cap O-ring (88).
- Remove the retaining ring (11F) and jam nuts (11E) from the adjusting rod. Turn the adjusting bushing (2C) counterclockwise to reduce spring tension.
- Remove the four capscrews (5 & 5C) and washers (5A & 5B).
- Carefully remove the air valve assembly, spring (8), and if necessary, the valve (9).
- Remove and discard the gasket (10). Clean gasket areas.
- Clean the breather vent (6A) with an air hose to remove any foreign matter.
- Remove the piston (11A) with the attached adjusting rod (11B). Inspect the coating on the piston outer diameter for scratches, wear and surface damage. Discard the piston if the coating is worn or damaged.
- Remove the U-cup (6) and quad ring seals (7), being careful not to scratch the grooves in the piston cover (4) and discard.
- Thread the adjusting bushing (2C), CLOCKWISE completely into the valve cover (4).

AIR VALVE ASSEMBLY

NOTICE:

Prior to assembly, the piston outer diameter and piston cover bore & U-cup/Quad Ring grooves must be lightly coated with a lithium based grease. Remove any grease in the breather vent hole.

1. Install the U-cup (6) and Quad Ring (7) seals as shown in Figure 3. Install the U-cup seal with the V-groove feature facing the air supply. Install the Quad Ring in the cover groove on the liquid side of the Air Valve. The U-cup and Quad Ring must be oriented as shown to properly seal and prevent cross-contamination between the air supply and pumpage.
2. Insert the piston with the attached adjusting rod (11B) into the adjustment bushing (2C).
3. Install both jam nuts (11E) all the way down to the adjusting bushing and replace the retaining ring (11F).

NOTICE:

The relief valve spring must be confined between the boss on the relief valve (9) and the boss on the piston (11A).

4. If removed, reinstall the valve (9). Place the spring (8) between the boss on the piston assembly and the valve. Mount the air valve assembly to the pump, ensuring that the gasket is properly seated. Torque the capscrews (5 & 5C) as indicated in Table 1.
5. Install a new gasket (10) and insert the four capscrews (5 & 5C) with washers (5A & 5B) into the air valve assembly.
6. With a new O-ring (88) installed, attach the air valve cap (1) securely.
7. Adjust the new valve as provided in the "Air Valve Adjustment" section of this manual.

Table 3 – PARTS LIST for PISTON AIR VALVE STYLE AVC ¹

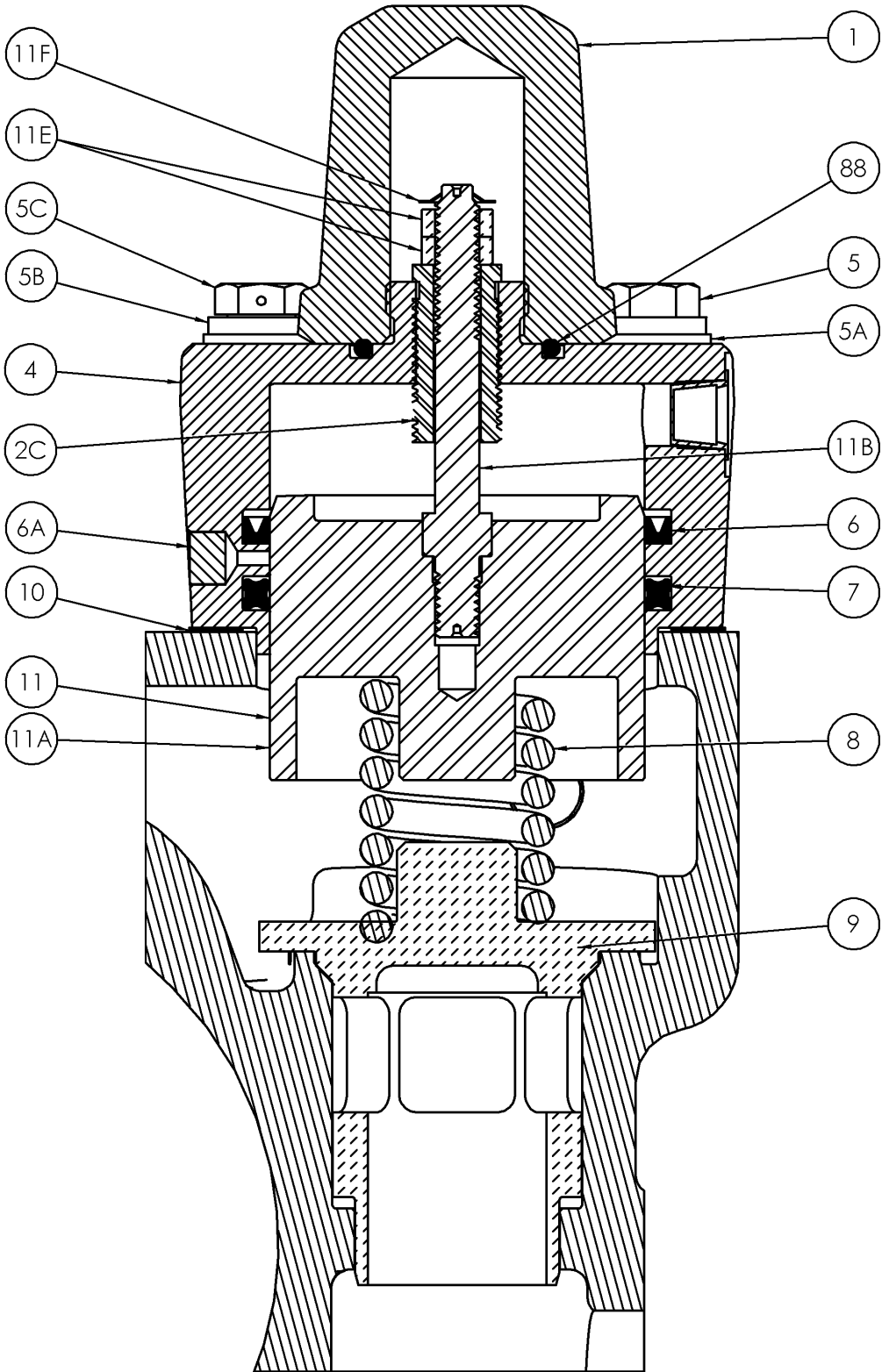
Ref. No.	Part Name	Parts Per Valve	Pumps	Pumps	Pumps
			TXD2 TXD1220	TXD2.5 TXD1225 TXH3	TXD3 TXD1230
			Part No.	Part No. ¹	Part No.
1	Cap	1	411754	411754	411754
2C	Adjustment Bushing	1	501703	501703	501703
4	Cover	1	411760	411758	411759
5	Capscrew	3	920444	920448	920425
5A	Flat washer	4	909662	909662	909662
5B	Lock washer	4	909649	909649	909649
5C	Capscrew w/ Hole	1	920433	920465	920430
6	U-cup packing ²	1	495035	495030	495032
7	Quad Ring seal ²	1	495036	495033	495034
6A	Breather Vent	1	495029	495029	495029
8	Spring	1	471429	471621	471816
9	Valve ³ Standard Corrosion Resistant	1	451626	451623	451807
			451415	451624	451808
10	Gasket ²	1	531604	531603	531803
11	Piston Assembly – includes:		897133	891714	891727
	11A	Piston (1)			
	11B	Adjusting Rod (1)			
	11E	Jam Nut (2)			
	11F	Retaining Ring (1)			
88	O-Ring ²	1	711917	701979	701979
	A/V Conversion Kit ³	—	891435	891725	891728
	Seal Kit	—	891734	891713	891726

¹ Previous style AVB used two U-cup packings (6), no Quad Ring Seal (7) and a different Piston Assembly (11) construction. All parts as listed above may be used in style AVB Piston Air Valves

² Parts included in Seal Kit

³ A/V Conversion Kit includes all above parts EXCEPT the Valve (ref. 9).

Figure 3 - PARTS ILLUSTRATION



NOTES



1809 Century Avenue, Grand Rapids, Michigan 49503-1530 U.S.A.
Telephone: (616) 241-1611 • Fax: (616) 241-3752
E-mail: blackmer@blackmer.com • Internet Address: www.blackmer.com