

IR DRIVEN GAS BOOSTER (DD) DOUBLE-ACTING, DOUBLE AIR DRIVE SG-VPB-100

DESCRIPTION AND OPERATING INSTRUCTIONS

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INTRODUCTION

You have just purchased an Air Driven Gas Booster with a 14:1 area ratio. This unit is designed to boost CO₂ vapor, supplied at 250 psi or more, to pressures up to 1,500 psi using shop air of up to 150 psi as the drive supply.

These instructions represent our experience in the use of CO₂ gas systems. Please call us if you have further questions regarding its use. We firmly believe that part of the sales process is helping the customer use their purchase successfully.

SAFETY CONSIDERATIONS

The Air Driven Gas Booster is of the latest design and as such it is important that everyone using this device understands the potential hazards. Va-Tran Systems, Inc. cannot control the applications of the purchaser, and therefore cannot be held responsible for injuries, accidents, or losses resulting from the use or misuse of this product.

- 1) Carbon dioxide (CO₂ CAS # 124-38-9) is an inert gas, and human beings have a very high tolerance of exposure. OSHA requirements effective March 1, 1990 specify a TWA of 10,000 ppm and a STEL of 30,000 ppm. In real English, this means that a person can be exposed to an average concentration of 10,000 ppm over an entire 8-hour workday. A person can also be exposed to a concentration of 30,000 ppm when exposure is averaged over 15 minutes.
- 2) The threshold for human detection of CO₂ is well below both of these limits. At moderate concentrations, a sharp odor or taste will be detected. If there is a concern regarding the accumulation of CO₂ in the working environment, several high quality monitors are available. The Air Driven Gas Booster should be used in a well-ventilated area where CO₂ vapor will not build up above these levels.
- 3) This unit is designed to operate with compressed air and high pressure CO₂. Be sure the air and CO₂ supplies are shut off before performing any work.
- 4) This unit has a rapid moving piston inside of it and other moving parts. If any screens or protection devices are missing from holes, do not use the system until they are replaced. Severe injury could result if the unit were to cycle.
- 5) The SG-VPB-100 is supplied with pressure protection devices, including a relief valve and an air pilot cut off switch. The purpose of these safety devices should not be defeated by their removal or replacement with unauthorized devices. These safety devices should only be replaced or repaired with authorized Va-Tran parts.
- 6) Do not exceed the published maximum pressure rating of either the gas booster unit or downstream components such as receivers, piping, valves, or gauges. Maximum pressures are listed below.

MODEL	GAS BOOSTING SECTION – MAXIMUM SAFE PSI	
	INLET	OUTLET
SG-VPB-100	2,500	2,500

USING THE AIR DRIVEN GAS BOOSTER

To install the unit, follow this list of instructions. For safety and the greatest efficiency of your unit, do not skip any of these steps.

Start up Procedure

1. Close all valves on the unit and attach the electrical cable to a source according to your specifications.
2. Adjust air pressure regulators to minimum pressure by turning adjustment knob counter clockwise until it stops.
3. Install the proper fitting, ½" npt, for compressed air hook-up.
4. Install the proper fitting, 3/8" tube, for inlet CO₂ gas.
5. Install the proper fitting, 3/8" npt, for outlet CO₂ gas.
6. Connect air and gas lines to appropriate fittings.
7. Open gas outlet valve (white), and check for leaks in your distribution line (outlet).
8. Allow gas to flow through Booster into distribution system. Pressure will equalize at supply pressure.
9. Open main compressed air valve (yellow).
10. Adjust air pressure regulator by turning adjustment knob clockwise to regulate air drive pressure to boosters.

Shut down Procedure

1. Shut off compressed air valve.
2. Shut off gas supply.
3. De-pressurize Booster system using valve (white) in downstream CO₂ distribution system.

RELIEF VALVE

This unit is equipped with a relief valve located before the micron filter in the CO₂ gas line. Never bypass or tamper with the relief valve. This valve prevents any damage excessively high pressure may cause in the line. The standard factory setting is 1,800 psi but can be set at a lower pressure upon request. Please contact Va-Tran before attempting any repair or replacement of this component.

LOW SUPPLY PRESSURE CUTOFF VALVE

The pressure cutoff valve is located at the beginning of the air drive and CO₂ supply gas lines. It allows the pilot air to flow if the CO₂ pressure is above 170 psi. If this pressure is not met then the pilot air will be shut off and the system will not cycle.

PRESSURE SWITCH

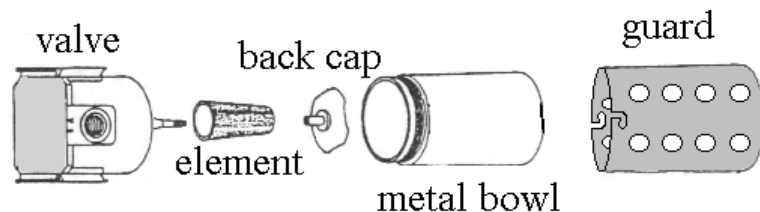
This unit has a field-adjustable pressure switch, which allows you to regulate the maximum outlet pressure. It is located on the left of the rear of the unit. The switch can be adjusted between 360 to 1,700 psi by simply twisting it. Turn the adjustment sleeve clockwise to increase the shut-off point, and turn counter-clockwise to decrease.



Front

AIR FILTER

The air filter, located at the air inlet directly after the air drive shutoff valve, is from a twenty-micron to a five micron filter (depending on requested specifications). It is designed to remove water and contaminants from the compressed air. The air filter comes with a polycarbonate plastic bowl which should never be exposed to materials such as carbon tetrachloride, trichlorethylene, acetone, paint thinner, cleaning fluids, synthetic oils, oils containing phosphate esters or chlorinated hydrocarbons. A metal bowl can be requested if the bowl is exposed to any of these chemicals either in the air or from the compressor. The filter is equipped with an automatic drain. Follow these



instructions should the filter element require changing.

1. Turn off and depressurize the whole system.
2. Grip the guard and valve in opposite hands and twist the filter system to a position that enables the guard to be easily removed.
3. Remove the metal guard by pushing it up, twisting clockwise, and pulling down. The automatic drain has a drainpipe that runs through the guard so just slide the guard down and off.
4. Unscrew the plastic bowl and set aside.
5. Unscrew the back cap and slide the micron filter off.
6. Replace the micron filter with a new micron filter, and screw the back cap and plastic bowl back on (the micron element can either be replaced or washed with naphtha cleaner). Slide the guard over the drainpipe and push it back on. Twist the assembly back into place.

0.5 MICRON CO₂ FILTER

The gas filter, located just before the CO₂ outlet, is a 0.5-micron filter and is designed to remove particle contamination in the CO₂ vapor flow. To change the element, unscrew the 1-1/8" hex cap, pull the element out, replace it with a new one, and then screw the cap back on tightly.

MAINTENANCE

The Air Driven Gas Booster incorporates many different parts that require o-rings and require maintenance or replacement periodically. The frequency of this is determined by many variables such as air moisture content, contamination, cycle rates, and overall duty cycle of individual applications. Common symptoms indicating the need for maintenance are slow, erratic cycling or air/vapor leakage. O-rings should be maintained regularly and replaced if needed.

DISASSEMBLY OF THE AIR DRIVEN GAS BOOSTER SG-VPB-100

This unit has many parts that can be easily lost and that should be kept clean. Before disassembling, make sure you have a clean workspace. Wash your hands and keep them clean throughout the whole inspection especially after working with any part of the air section or with any lubricants. The gas section should be kept very clean and should never be lubricated. When reassembling, do not force anything that seems not to want to go on (take it off and check the o-rings and other fittings and make sure they are flush with their seats). Also, remember to replace all of the o-rings, whether new or the original ones.

REMOVING THE CYCLING SPOOL VALVE (DRAWING #80217 & #80627)

1. Loosen and remove all piping that connects the exhaust system.
2. Loosen the outer 1-3/8" hex nut until the retainer can be removed by hand (make sure to use the proper sized wrench so as not to scratch the retainer). Inspect the o-rings on the inside diameter of the retainer for damage and replace as needed.
3. Pull the spool valve out. Inspect the 7 or 8 o-rings (depending on the design), and replace those that show wear.
4. The valve can be wiped clean for handling but should be re-lubricated once the inspection is completely finished (save re-lubrication for last to avoid getting lubricant on any other parts).
5. In the unlikely case that the sleeve must be removed, use the sleeve extracting tool to hook the sleeve and slowly pull it out (the tool can be special ordered).
6. There are 4 o-rings on the sleeve that rarely need replacing. When reinserting the sleeve make sure that bumper (HII P/N 80069-1) at the bottom of the orifice is properly seated. Orient the sleeve in the correct direction and push the sleeve all the way in. Use the retainer if necessary to insure that the sleeve is fully inserted.
7. When reassembling the spool valve, do not over tighten the hex nut, just get it snug (it's best if you just use a socket without the handle and your hand to hand tighten it).

REPAIRING THE GAS SECTION (DRAWING #80628)

1. Loosen the four 11/16" nuts on the end cap (head) and twist the tie rod with the nut to remove them both together (if the tie rod is stuck, lock two nuts on the end of it and twist the inner nut).
2. Pull the end cap off the end of the cooling sleeve and pull the sleeve off. There is an o-ring on the inside diameter of the sleeve that rarely needs replacing. The end cap has a 100-134-E90 o-ring that should be replaced and a Teflon 134 backup ring that should be removed and kept for reuse.
3. For safe keeping, remove the o-ring that is on the inside diameter of the stainless steel barrel and pull the barrel off.
4. Straighten and remove the cotter pin. Discard it then lightly tap the specialized nut loose and set it aside (do not reuse the cotter pin, instead always replace with a new one – VTS P/N: 040-1400X13SS).
5. The gas piston should slide off. Replace the parts in the order that they are removed; large washer, 100-133-E90 o-ring, seal, bearing, and then the piston itself (the 100-133-E90 o-ring and the 100-014-E90 o-ring on the inside diameter of the piston should always be replaced).
6. Slide the barrel over the piston and push down (the piston comes in contact with the gas and should be thoroughly cleaned).
7. To reassemble the gas section, first put the piston back together (lay the retainer plate (HII P/N 80291-7) on the table and put the assembled piston on top). Insert the piston into the barrel, and push it in about an inch.
8. Put the 80100-134 (HII P/N) backup ring and the 100-134-E90 in the groove on the adapter.
9. Slide the barrel with the piston onto the rod and push it until it is flush (if it is not flush or not going on easily, take the barrel off and inspect the o-ring and backup ring on the adapter).
10. Slide the 100-014-E90 o-ring onto the rod and into the piston and push it in until it is snug against the piston.
11. Slide the retainer plate (HII P/N 80291-7) onto the rod and up against the piston.
12. Screw the specialized nut (HII P/N 80293-7) onto the rod until it is snug with the retainer plate (center the retainer plate so it is not resting on any part of the barrel).
13. Tap the nut until it is tight and the grooves line up with the hole for the cotter pin.
14. Push a fitted stainless steel cotter pin through the hole, tap it in gently, and bend the ends over as much as possible. Use wire cutters to remove any excess on the cotter pin.
15. Slide the original o-ring (if still in good shape) back onto the barrel and slide the cooling sleeve back on (it should fit snugly against the adapter just like the barrel).
16. Pop the end cap back on and screw the studs and bolts back on (the bolts should have a torque of 30 ft-lbs.).

REPAIRING THE AIR SECTION (DRAWING #80832 & #80627)

1. First remove the four 3/4" nuts on the air cap (the 4 large tie rods should slide out after you have loosened the four 3/4" nuts on the opposite side).
2. Slowly pull the cap off along with the barrel (air section casing) separating the cap and barrel from the diaphragm in the center (the pilot tube and the flow tubes will come off as well).
3. Looking into the barrel, you will see a C-clip that retains the seal (there is a clip on each side and two on the diaphragm. If the seal needs to be replaced, this clip must be removed).
4. Once this clip is removed, remember the order of the parts; clip, bearing rod, o-ring, and the seal rod.

5. To reassemble the air section, follow the instructions but in the reverse order (make sure that the pilot tube and the flow tubes are pushed back into the appropriate holes).

REPAIRING END CAPS AND CHECK VALVES (DRAWING #80287)

1. The end caps should be marked or noted before removing (IN is on the side of the spool valve fitting).
2. If possible, before removing the gas section, loosen the IN and OUT fittings (check valves) on either end of end cap for easier removal.
3. Once the fitting is taken off the IN side, care should be taken that the small parts are not lost. The parts come out in the following order; ball, small spring, ring, cage, and then the large spring (the OUT side is in the opposite order of the IN side).
4. Once these pieces have been set aside, remove the o-ring on the fitting and replace the o-ring (do not reuse).
5. Look into the fitting where the ball rests and remove the white Teflon seat (on the OUT side, the ball does not rest on the fitting so the seat will be on the inside of the end cap).
6. Remove the o-ring from the OUT fitting and replace, keep the seats.
7. All of the stainless steel pieces should be thoroughly cleaned.
8. If reassembled properly, you should be able to take a clean tool, like the blunt end of a dental pick, and push the ball on the IN side inward but you should not be able to push the OUT ball in.
9. To reassemble the IN side of the end cap, place the fitting on the table pointing downward and replace the pieces in the proper order; Teflon seat (push in all the way), ball, small spring, ring, cage, and then the large spring.
10. Place the end cap carefully over the fitting, screw them together hand tight and leave it standing on the table.
11. Insert the Teflon seat all the way in and then place the OUT fitting on the table and reassemble in the following order; large spring, cage, ring, small spring, and the ball.
12. Screw the fitting onto the end cap hand tight.
13. Once the end cap is on the unit, the fittings can be fully tightened.

Trouble Shooting

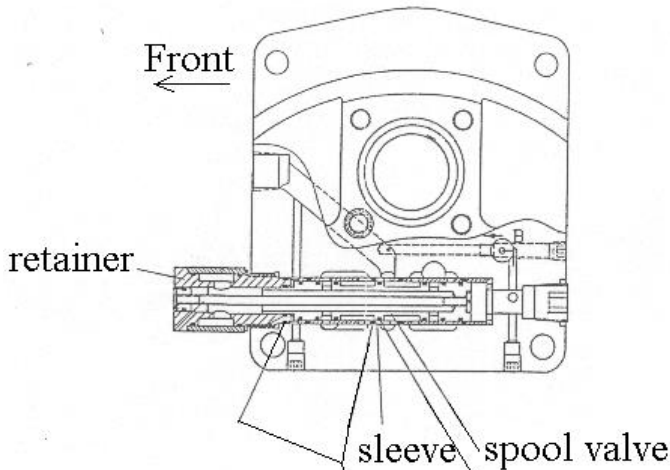
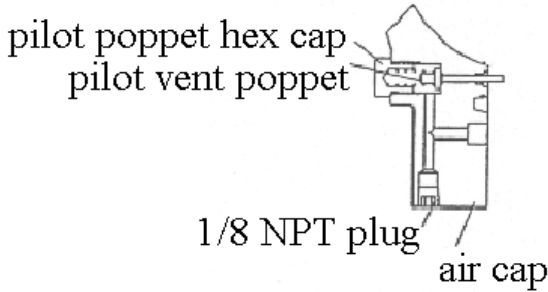
Prior to attempting to trouble shoot any problems with the Gas Booster System always check the following:

1. Check the inlet vapor supply pressure. Make sure there is adequate pressure to actuate the inlet pilot cutoff valve.
2. Check the air drive pressure and volume.
3. Check the pilot pressure.

Caution

The Air Drive section components are lightly greased. The gas section is not lubricated and should not be. When repairing use clean hands and make sure all parts are thoroughly clean. If grease gets into the gas section, it will contaminate all gas sent through it. Also, never reuse cotter pins after they have been removed. Always replace with new pins of the right length.

Symptom	Possible Cause	Suggested Remedy
<p>1. Unit will not cycle after gas pressure is equalized (no sound).</p>	<p>A) The drive is shut off. B) Spool valve is stuck due to friction of swollen O-rings due to chemical carryover from shop compressor oil. C) Unlikely, but possible: Poppet valves may be short or springs may be broken.</p>	<p>A) Open drive valve. B) Disconnect exhaust tube from fitting. Unscrew retainer, which should be hand-tight; then remove spool and inspect the 8 O-rings. If swollen, they will be longer (not fatter) and droop down off the spool. Replace with seal kit. Apply light grease. Reassemble. CAUTION: Retainer should only be snugly fit C) Remove hex caps. Inspect springs and poppets. Replace as needed. When replacing the poppet, it should easily slide in if put in straight.</p>

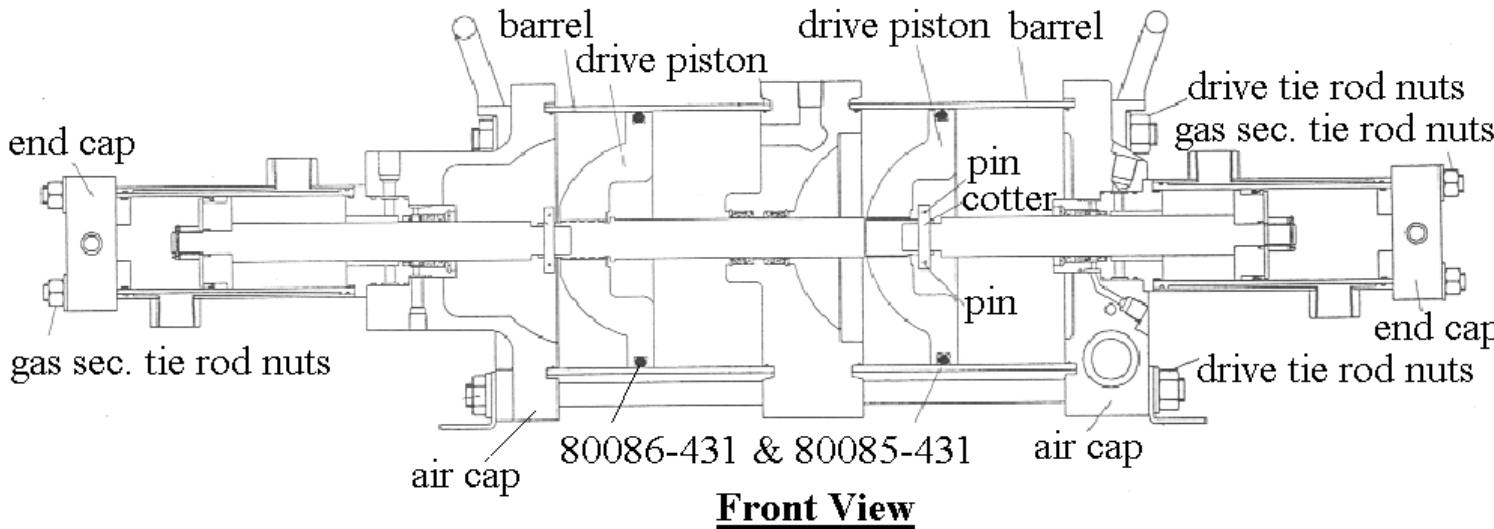


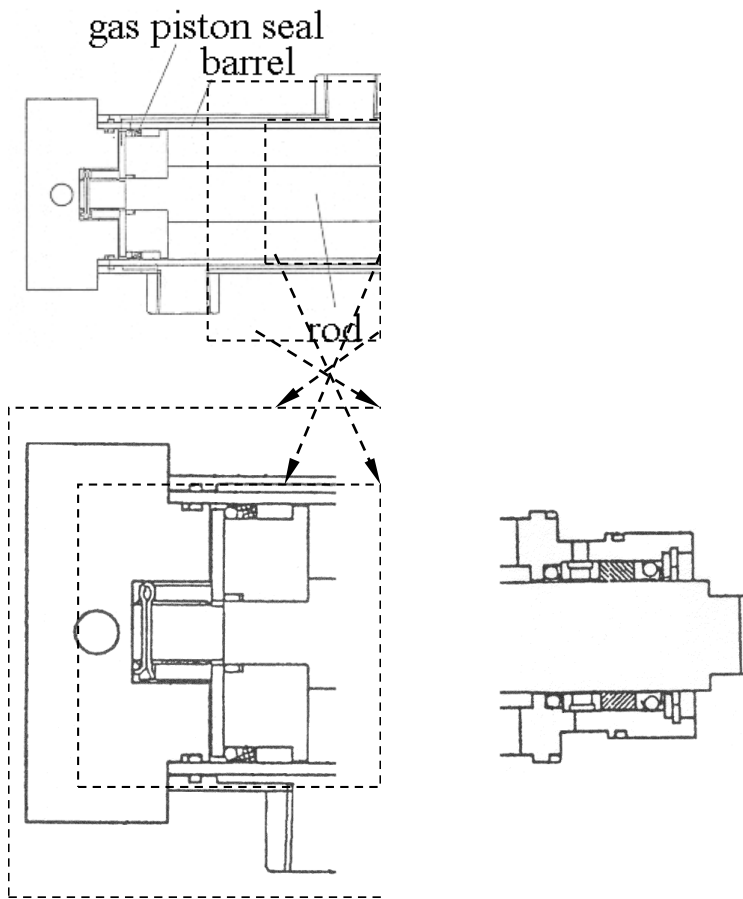
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<p>2. Unit will not cycle and air bleeds out exhaust muffler.</p>	<p>A) Insufficient internal air pilot volume due to long, small air drive line. B) Spool valve stuck in center position due to friction of swollen or dry O-rings (see 1-B above).</p>	<p>A) Increase size of air drive line. B) See 1-B above.</p>
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3. Unit cycles but bleeds air out exhaust muffler at stall or at shut off of external pilot.	A) Drive piston O-ring is damaged. Refer to the figure on the next page	A) Remove drive tie rod nuts, pull the air caps apart. Inspect the O-rings. If damaged, install new o-ring. Lightly re-grease before re-assembly. Review integrity of air drive filtration.
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Symptom	Possible Cause	Suggested Remedy
4. Unit stops and air bleeds out pilot vent passage in air cap.	A) Drive air leaking into large pilot chamber on right end of spool valve and pilot vent poppet cannot dissipate it.	A) Remove retainer Ref. 1-B above, and valve and replace the 8 th (far right) O-ring. Grease. Reinstall valve and retainer and test.



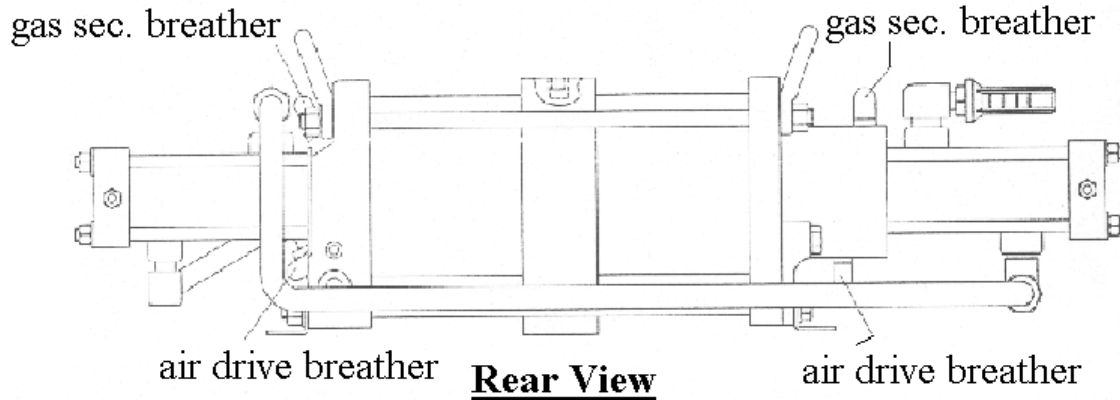


Symptom	Possible Cause	Suggested Remedy
5. Audible air bleeds out of the 1/8 NPT breathers at stall or pilot air shut off.	A) Gas piston seal has been worn. See figures on page directly before this page.	A) Remove eight gas section tie rod nuts and end caps. To remove the studs, twist with the nuts still on. If they are stuck, lock a nut onto the end along with the original nut and twist the original nut with your hand. Push gas

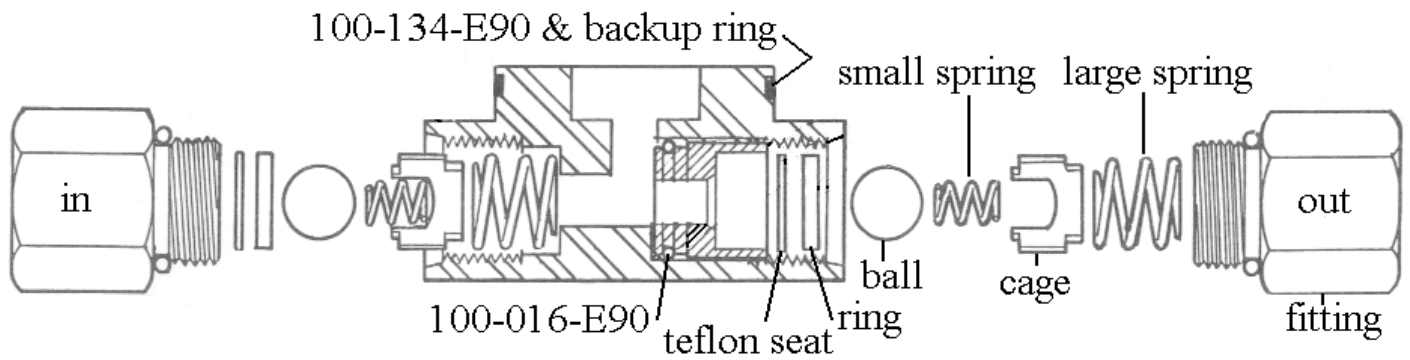
		section rod past seal. Pull off the cooling cylinder and the barrel. Remove seal retainers. Reassemble with new seal. Review air source filtration. If the seal has been worn for a while, the rods should be inspected for scratches and replaced if damaged.
6. Unit cycles but output performance is questionable. Audible gas leakage from breathers, when unit is stopped with gas supply on.	A) Worn gas piston seal or scored barrel, due to contaminated gas source.	A) Disassemble per 5-A above. Inspect and replace all worn parts. Review gas source filtration and/or source of contaminates.

CAUTION

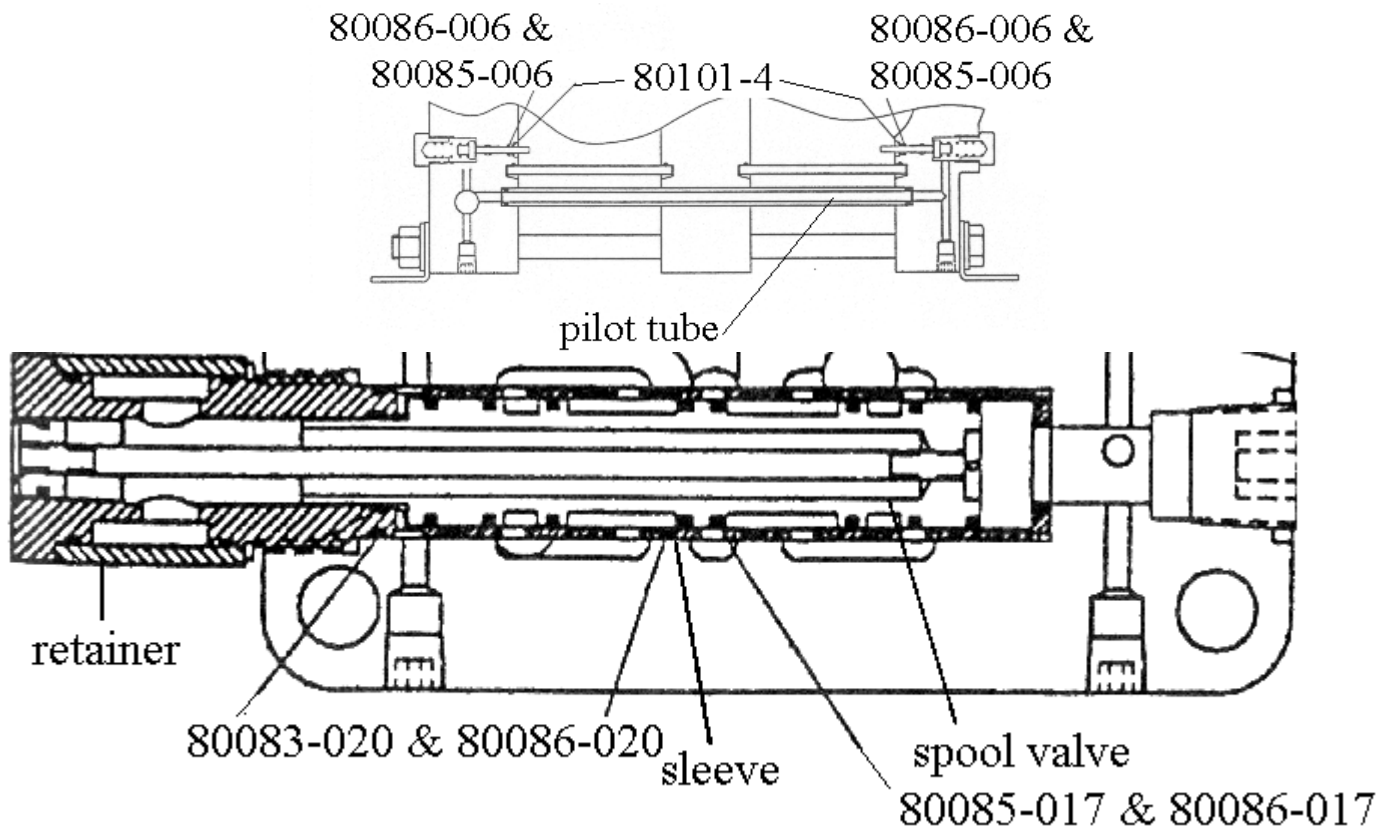
Gas piston seals & supporting parts must be confined inside gas barrel before tightening piston nut and installing cotter pin.



6a. Questionable output performance, yet not audible leakage through gas breather.	A) Check valves hanging up due to failed springs or contamination. Use figure at the top of the next page	A) Remove interconnecting gas inlet and outlet tubing. If under performing, inspect all parts. Make sure to mark which side is the inlet and which is the outlet before disassembling. Loosen the fitting on both ends carefully to make sure no parts are lost. Inspect the ball and springs. Clean and/or replace as needed. Reassemble. O-rings should never need replacing except if they are damaged during inspection
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Symptom	Possible Cause	Suggested Remedy
7. Unit false cycles (short strokes).	<p>A) Pilot air venting prematurely due to damage or contamination of pilot vent poppet in air cap; or external pilot air leaks from static O-rings sealing the pilot tube, or the pilot poppet hex cap in air cap or leakage at threaded plugs 1/2 NPT or 1/8 NPT.</p> <p>B) Pilot valve stem seal assembly with retaining ring has vibrated loose resulting in non-concentric valve action.</p>	<p>A) Inspect pilot vent poppet, spring and seat in air cap. Replace if damaged. Check pilot tube ends and hex cap in end cap with soap solution for external leaks. Replace static seal O-rings if soap bubbles are detected. Check NPT plugs with soap solution. Tighten or re-tape if leaking.</p> <p>B) Disassemble drive cylinders and look for loose rods and brackets and replace. To insure concentricity, use pilot valve as a centering tool and, by tapping with a light hammer, a tool to evenly deflect the legs of the retainer.</p>



WARRANTY INFORMATION

Products manufactured by Va-Tran Systems are warranted free of original defects in material and workmanship for a period of one year from date of purchase or lease. This warranty does not include o-rings, seals, wear parts, or failures caused by lack of proper maintenance, incompatible fluids, or foreign contaminants. Products believed to be defective may be returned upon written approval by Va-Tran Systems, freight prepaid for repair or replacement.

Any modification to any Va-Tran product by the customer is done at the customer's sole risk and responsibility. Va-Tran disclaims any claims, demands, or causes of action for damage or personal injuries from the modification and or use of such a modified product.

Va-Tran Systems' obligation with respect to its products shall be limited, and in no event shall Va-Tran be liable for any loss or damage of whatever kind or nature, or any other expense which may arise in connection with or as a result of such products being used. If repair is necessary, it is required that you obtain an RA, returned authorization, number from Va-Tran Systems, Inc.; address, phone number, and Internet address are at the end of these instructions.

Feel free to call Va-Tran Systems if you have problems. Part of the advantage you gain by purchasing this system from Va-Tran Systems Inc. includes Factory Technical Assistance. Va-Tran Systems has a fully trained and experienced support staff that can help with your questions. Also, Va-Tran Systems has the experience and capabilities to design customized components and specialized systems, and, we can fabricate nearly anything that you may need for the proper application of this equipment.

LIST OF SPARE AND EXPENDABLE PARTS

Replacement parts can be ordered through Va-Tran Systems Inc. and should not be ordered through other suppliers. Va-Tran Systems Inc. accepts no liability for replacement parts ordered through unauthorized sources. Please call 1-800-DRY ICE 1 (1-800-379-4231) to order spare and replacement parts.

Part Number	Description
975-SK07-CO2	Seal Kit – Gas Section (2 required, 1 per end)
975-SK5GA	Seal Kit - Air Drive 5in
975-SK5GA-2	Seal Kit – Double Air Drive
925-2214	CO2 gas booster 100#/hr 14:1
HII-80839-100	Lap fit cycling spool assembly 5G
030-5106-E0.5	Filter element .5 micron

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