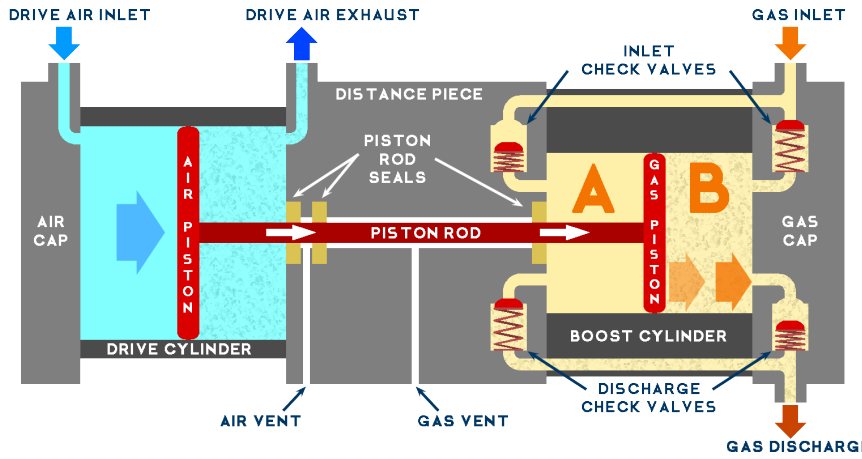
BOOSTER OPERATION

The piston in the drive cylinder is attached to the piston in the boost cylinder. As the drive piston reciprocates, it compresses the gas in the boost cylinder. The controls which cause the drive cylinder to reciprocate are described on the following page entitled, "Drive Air System Operation".

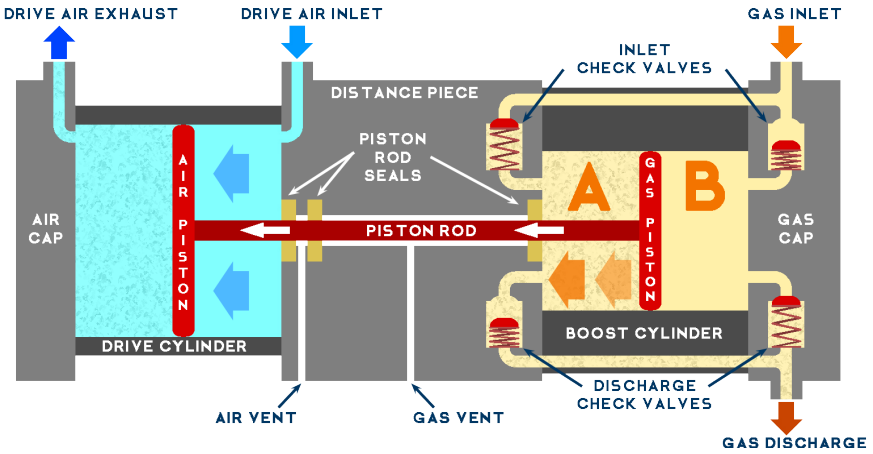
The boost cylinder is double-acting, i.e., it pulls gas in on one side while pumping it out on the other. The maximum pressure boost is equal to the drive piston area divided by the boost piston area multiplied by the pressure feeding the drive cylinder. At this maximum boost pressure, the forces in the booster are balanced and the booster stalls. For example, a 102 mm diameter drive piston and 86 mm diameter boost piston with a 0.5 MPa air supply can attain a maximum boost pressure of 0.7MPa. If the gas supply pressure is 10 MPa, the maximum discharge pressure would be 10.7 MPa and the booster would stall. When the discharge pressure drops below 10.7 Mpa, the booster will start pumping.

Inlet check valves for chambers "A" and "B" and discharge check valves for chambers "A" and "B" are mounted inside the end cap of the boost cylinder. An internal manifold connects the two inlet check valves and an internal manifold connects the two discharge check valves. There is one inlet and one discharge gas connection. External tubing connects chamber "A" to the check valves in the end flange.



The pistons are traveling to the right and compressing the gas in chamber "B" while pulling gas into chamber "A".

The pistons are traveling to the left and compressing the gas in chamber"A" while pulling gas into chamber "B".



The distance piece is designed to ensure that the gas in the boost cylinder is isolated from the air in the drive cylinder. There are piston rod seals at each end of the distance piece, and the distance between the rod seals is greater than the stroke length of the booster. Consequently, the section of piston rod which penetrates the drive cylinder never penetrates the boost cylinder and vice versa.

There is a dual rod seal for the drive air side. Drive air which leaks past the first rod seal vents through a breather to atmosphere. The second seal prevents this air from mixing with gas that leaks past the rod seal on the gas cylinder side. Any gas which leaks past the gas side rod seal will flow out of the gas vent. Connect this vent port to a flare or vent system.

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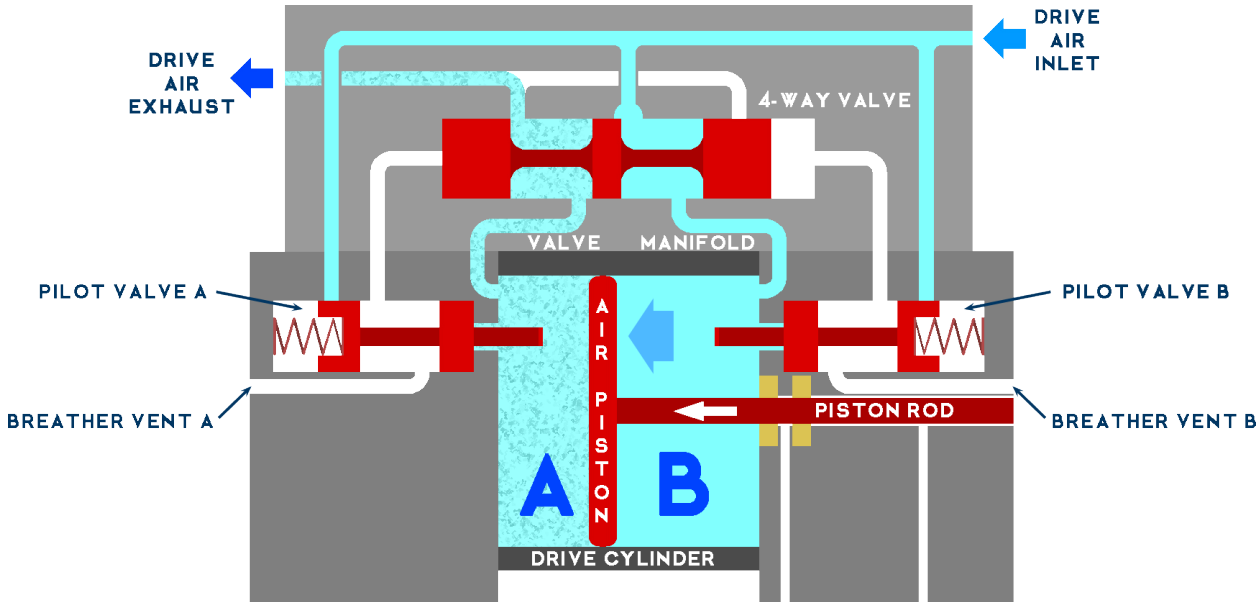
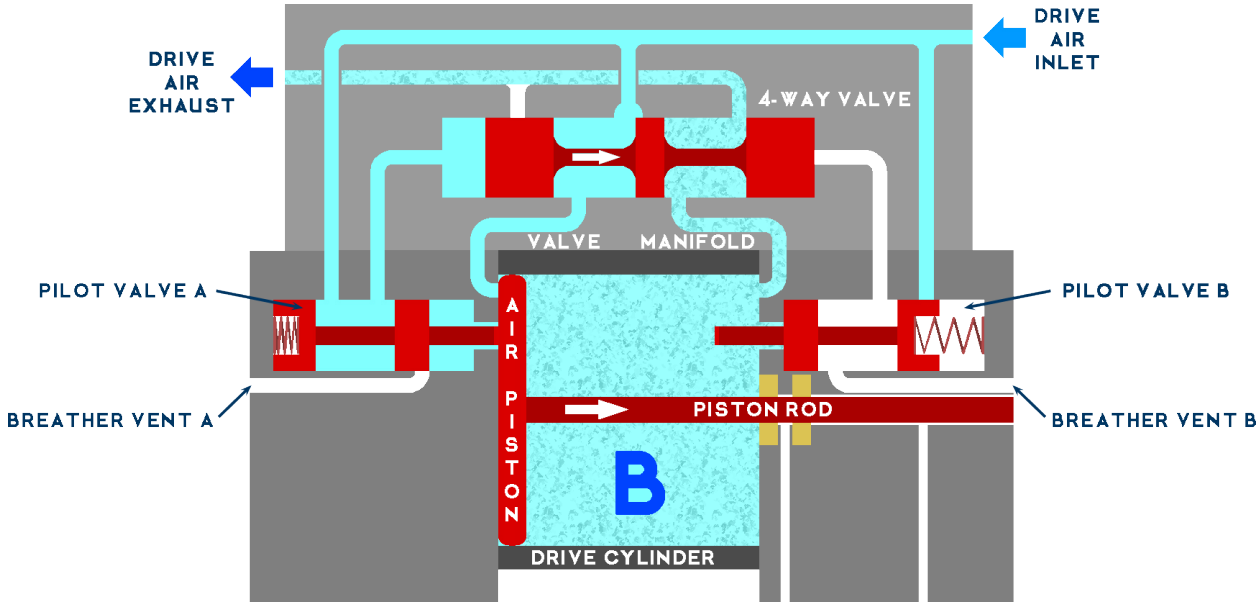
DRIVE AIR SYSTEM OPERATION

The sketch below shows the 4-way valve extended to the left. This causes drive air to fill drive cylinder chamber “B” and opens chamber “A” to exhaust. The air piston is driven to the left. The drive air supply also feeds pilot valve “A” and pilot valve “B”. Both of these valves are closed, and the pilot ports at the end of the 4-way valve are open to atmosphere through breather vent “A” and breather vent “B”. All of the piping connections shown in the sketch are machined into in the valve manifold and cylinder end caps. There is no external tubing.



In the sketch below, the air piston has reached the end of its stroke and opened pilot valve “A”. This closes breather vent “A” and sends pilot air to the left pilot port on the 4-way valve. The 4-way valve shifts to the right, opens chamber “B” to exhaust and supplies drive air to chamber “A”. The air piston moves to the right. When the piston moves off the end cap a spring returns pilot valve “A” to its normal position which closes off the air supply and vents the pilot air from the 4 way valve. This process is repeated on the right end of the drive cylinder which causes the air piston to reciprocate automatically.



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