Product Instruction P99-3

Bailey Booster Unit

Pt. No. 5316500-☐

INDEX

The Booster Unit is a pneumatic transmitting device which, operating in conjunction with a nozzle vane assembly, produces an air loading pressure which is proportional to a measured variable Normally, the loading pressure is transmitted to a control unit or an indicator

Dimensions of the Booster Unit are given in Figure 1 The Unit is usually a component part of a measuring and transmitting instrument, and is mounted integrally with this instrument

Bailey

WARNING

DO NOT INSTALL MAINTAIN OR OPERATE THIS EQUIPMENT WITHOUT READING UNDERSTANDING AND FOLLOWING PROPER Bailey Babcock & Wilcox INSTRUCTIONS AND MANUALS OTHERWISE INJURY OR DAMAGE MAY RESULT

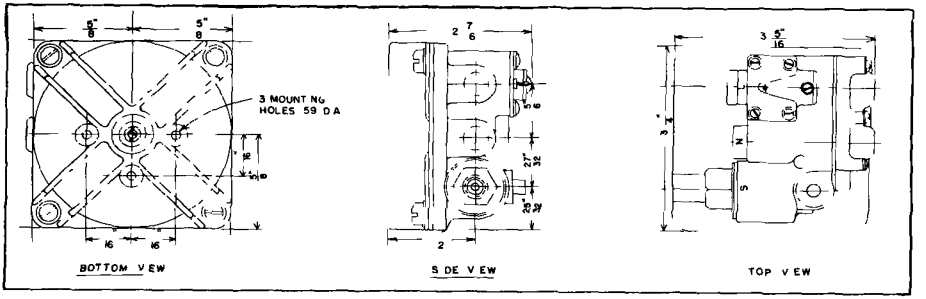


FIGURE 1 Mounting and Case Dimensions

OPERATION

A *schematic operating diagram of the Booster* unit in a pneumatic Transmitter unit is shown in Figure 2.

Supply air enters the Booster bellows through a pressure reducing orifice The air, at a reduced pressure, positions the bellows and, at the same time, enters chamber 1 The air then escapes from chamber 1 through the nozzle, at a rate depending on how close the vane is to the outlet tip of the nozzle The rate of air flow from the nozzle determines the magnitude of the pressure in the Booster bellows

Supply air goes directly to chamber 2 and, through the hollow arm of the U-beam, to the inlet valve in chamber 3

The U-beam pivots at the diaphragms which seal *chambers 1 and 3 from chamber 2* The *open end* of the U-beam is moved up and down by expan*sion and contraction of the Booster bellows* Motion of the U-beam opens and closes the inlet-*exhaust valve, thereby regulating the air pressure* in chamber 3 The air pressure in chamber 3 is the output pressure of the Booster Unit

Operation of the inlet-exhaust valve is shown in Figure 3. The valve is spring loaded downward. Downward motion of the U-beam end closes the exhaust valve and opens the inlet valve (Sketch A) Upward motion of the U-beam end closes the inlet valve and opens the exhaust valve (Sketch B).

The nozzle and vane are both movable with respect to each other The vane is positioned by linkage from a measuring instrument so that the vane position is proportional to the magnitude of the measured variable. At balance, a definite dis*tance relationship exists between the nozzle and* vane. This distance relationship maintains the pressure in the Booster bellows at a value such that the bellows holds the U-beam in an approxi*mately horizontal position. In this position, the* inlet valve and the exhaust valve are closed.

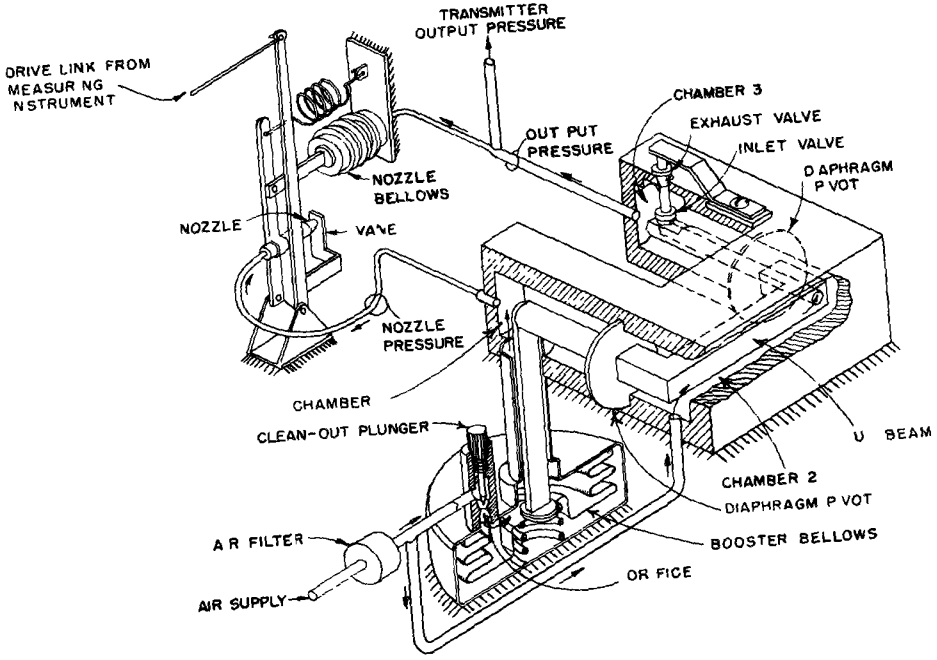
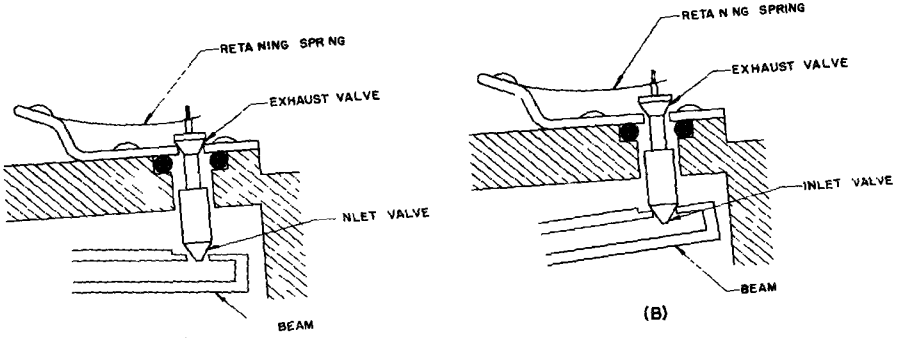


FIGURE 2 Operat ng Diagram of the Booster Un t



F GURE 3 Operat on of Inlet Exhaust Valve

When the measured variable increases, the vane is pulled closer to the nozzle tip The air flow from the nozzle is retarded, causing the Booster bellows pressure to increase The resulting expansion of the bellows pulls the U-beam ends downward, opening the inlet valve to chamber 3 Supply air from chamber 2 enters chamber 3 through the inlet valve, increasing the pressure in chamber 3.

Chamber 3 pressure is applied to the nozzle bellows. As the pressure increases, the nozzle bellows expands, moving the nozzle away from the vane When the chamber 3 pressure to the nozzle bellows becomes great enough to move the nozzle to its "at-balance" distance from the vane, the rate of air flow from nozzle and, consequently, the pressure in the Booster bellows, return to their "at-balance" values The U-beam returns to its horizontal position and the inlet and exhaust valves in chamber 3 close, maintaining the Booster Unit output pressure at the new increased value.

A decrease in the measured variable reverses the operation of the instrument as described above. The output pressure decreases through the exhaust valve and then is maintained at the new decreased value.

ROUTINE MAINTENANCE

For satisfactory operation, the air supply to the Booster Unit must be kept free of dirt, oil, and moisture.

All pressure connections must be kept air tight.

Periodically inspect nozzle tip and vane for deposits of oil, soot, dust, etc. If necessary, clean with a common solvent such as carbon tetrachloride.

To replace filter, disconnect the supply air tubing, remove filter cap, O-ring, and filter spring (Figure 5). Remove and replace filter assembly Be sure that new filter assembly is installed with open end facing inward Reassemble parts in reverse to disassembly and reconnect tubing

Periodically press down orifice clean-out plunger to insure that orifice remains open and clean.

CORRECTIVE MAINTENANCE

If the Booster Unit is not operating correctly, make the following checks and adjustments:

1. Check that the adjustable vane end is in its correct position. The vane end, which is held in place near the bottom of the vane by a brass nut, is in its proper vertical position if the nozzle tip is opposite its center (thinnest section) when the mid-range value of input is applied to the transmitter. Apply a mid-range input to the transmitter and adjust vane end position, if necessary.

2. Make sure vane is parallel to plane of nozzle tip. With Booster Unit at balance·

   a. Press lightly with pointed instrument against vane, as shown in Figure 4, at four or more points around nozzle tip (above, below, and on either side).

   b If pressure at any of these points produces

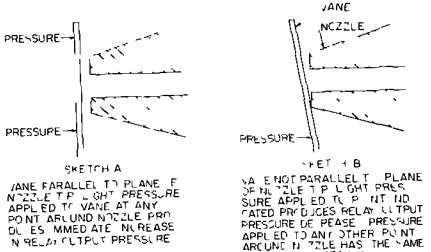


FIGURE 4 Vane and Nozzle Alignment

effect shown and described in Sketch B of Figure 4, either vane is not parallel to plane of nozzle tip or there is a burr on nozzle tip

   c. Bend vane slightly to correct.

d. If step 2c does not produce desired results, rub fine emery cloth across nozzle tip to remove possible burr.

3. Check the operation of the Booster Unit itself as follows.

a. Block flow of air from nozzle tip. Booster Unit output pressure should increase immediately to full supply pressure.

b. Pull vane away from nozzle far enough to allow unrestricted flow of air from nozzle. Booster Unit output pressure should decrease immediately to zero.

c. For faulty operation with increase in input pressure, the following are the most probable causes.

(1) Supply air not passing through filter—Replace filter (see "Routine Maintenance" above) and observe operation.

(2) Blocked supply air passage to Chamber 2—Remove U-beam cover (opposite pressure ports) and make sure cover gasket is not blocking passage from supply pressure connection.

(3) Exhaust valve not properly seated Check visually. If necessary, replace exhaust valve or seat. Make sure exhaust seat is aligned with inlet seat, and that valve retaining pin is centered in valve.

(4) Leak in Booster bellows—Remove and inspect bellows. Replace if necessary.

d For faulty operation with decrease in input pressure, the following are the most probable causes.

(1) Blocked line from booster unit to nozzle—Remove and clean line.

(2) Inlet valve improperly seated Remove exhaust seat and valve and inspect inlet seat and valve for evidence of improper seating. If necessary, replace the valve or U-beam assembly.

(3) Leak in either diaphragm pivot Remove U-beam assembly and inspect diaphragms. If necessary, replace U-beam assembly.

4. If Booster bellows or bellows spring has been replaced, check calibration of Booster Unit as follows:

a. Install sensitive pressure gage (to measure accurately 2.0 or 3.5 psig) in line from Booster Unit to nozzle.

b. Extend from nozzle a short length of rubber tubing with adjustable pinch clamp to control flow of air from nozzle.

c Adjust pinch clamp to obtain 3.5 psig + 0.1 psi on gage in line to nozzle (2.0 psig + 0.1 psi for units with 3-15 psig output range).

d. Booster Unit output pressure should be approximately 15 psig (or 9 psig if range is 3-15 psig). If it is not, adjustment is made by means of two concentric adjustment screws in center of lower housing.

e. Turn outer adjustment screw clockwise to decrease or counterclockwise to increase output pressure.

f. With nozzle back pressure at 3.5 (or 2.0) psig and Booster Unit output pressure at 15 (or 9) psig, turn inner adjustment screw clockwise until Booster Unit output pressure begins to decrease. Then turn inner screw two turns counterclockwise.

REPLACEMENT PARTS

SPARE PARTS KITS

The Spare Parts Kit shown in Figure 5 should be carried in stock. Specify the Spare Parts Kit part number to order a complete kit.

The following additional parts are optional, recommended for installations in which there are several similar instruments or in cases where a more complete stock of replacement parts is desired.

	*1 Complete Assy
5316500 1	Booster Unit (5 25 or 3 27 psi)
5316500 2	Booster Unit (3 15 psi)

*NOTE When ordering, please be sure to indicate the specific unit required as determined by your particular installation.

ORDERING INDIVIDUAL PARTS

Figure 5 is the Parts Drawing of the Booster unit Normally, this drawing will apply to the Booster furnished However, there may be individual differences in specific units because of

a design changes made since the printing of this Instruction Section, or

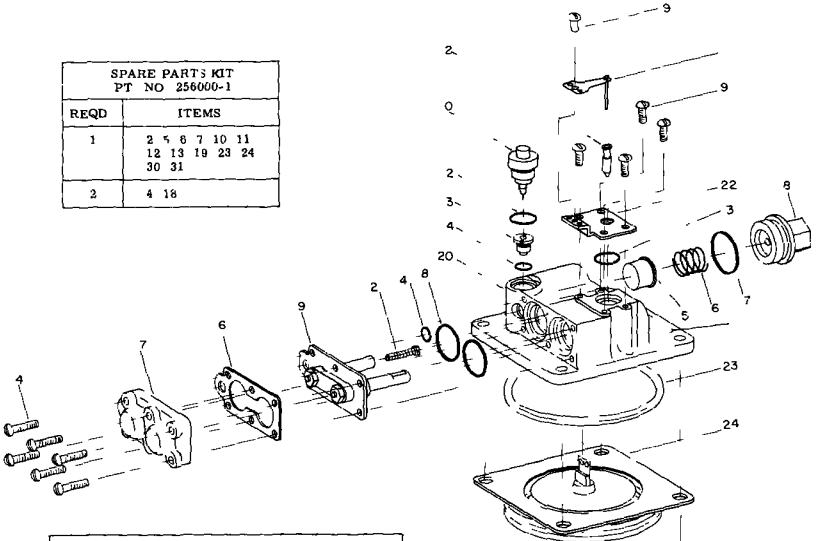
b special design of the Transmitter to make it suitable for a specific application

Therefore, when ordering parts, assure the receipt of correct replacements by specifying on the order

1 Complete identification including the nomenclature, part number, and serial number of the assembly

2 Parts Drawing number on which each part is illustrated

SPARE PARTS KIT PT NO 256000-1	
REQD	ITEMS
1	2 5 6 7 10 11 12 13 19 23 24 30 31
2	4 18



ITEM	PART NO	NAME
1	SEE NOTE	CODE LABEL
2	5311428 11	O RING
3	5316464 1	ORIFICE ASSY
4	5311428 2	O RING 2 REQD
5	68368 1	FILTER ASSY
6	5311427 1	FILTER SPRING
7	5311428 1	O RING
8	5316501 1	FILTER CAP
9	3 48 x 3 16	PAN HD STN STL SEMS EXT 5 REQD
10	5316478 1	ORIFICE CLEANOUT
11	5316497 1	VALVE RETAINING SPRING
12	5316339 1	VALVE
13	5311428 17	O RING
14	6 32 x 1 2	PAN HD STN STL SEMS EXT 6 REQD
16	5316336 1	COVER GASKET
17	5316338 1	COVER
18	5311428 19	O RING 2 REQD
19	5316335 1	DIAPHRAGM & ROD ASSY
20	5316340 1	RELAY HOUSING
21	4 40 x 1 2	PAN HD STN STL SEMS EXT
22	5316461 1	UPPER VALVE SEAT
23	5311428 18	O RING
24	5316467 1	BELLOWS ASSY
25	5316337 1	LOWER HOUSING ASSY
26	5316491 1	BELLOWS STOP PLATE
27	5316489 1	STOP SCREW
28	5316490-1	SPRING STOP
29	5316487 1	ADJ SCREW
30	5316488 1	NYLON INSERT
31	5316492 1	SPRING
32	1 4 20x7 16	PAN HD STN STL SEMS EXT 4 REQD
33	1961086 1	PT NO LABEL BOOSTER UNIT 5316500 1
	1961086 2	PT NO LABEL BOOSTER UNIT 5316500 2

NOTE WHEN ORDERING PARTS SPECIFY NUMBER ON CODE LABEL (ITEM 1)

FIGURE 5 Parts Drawing P99 56, Booster Unit, Part No 5316500 □

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