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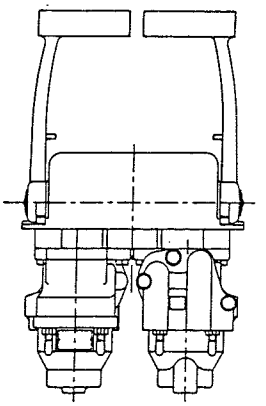

THD-2-FM CONTROLAIR® VALVE

PART NO.'S P27121-0101 & P27121-0109

SERVICE INFORMATION

DESCRIPTION

The THD-2-FM CONTROLAIR Valve, designed for marine service, is a handle operated two engine pressure control and directional control valve. It contains two PILOTAIR Valves, which are arranged to furnish inlet air pressure to two directional control lines and a pressure regulating portion to furnish graduated pressure to a third control line.

The selection between the two directional control lines depends upon handle movement to either side of "Neutral" position. The pressure in the graduated control line is proportional to the position of the handle in either quadrant.

The L-shaped handles are designed so that both units can be operated by one hand. Both handles are equipped with an adjustable friction brake to hold the handles in any selected position in the travel arc.

WARNINGS - INSTALLATION AND MOUNTING

The user of these devices must conform to all applicable electrical, mechanical, piping and other codes in the installation, operation or repair of these devices.

INSTALLATION! Do not attempt to install, operate or repair these devices without proper training in the technique of working on pneumatic systems and devices, unless under trained supervision.

Compressed air systems contain high levels of stored energy. Do not attempt to connect, disconnect or repair these products when a system is under pressure. Always exhaust the pressure from an air system before performing any service work. Failure to do so can result in serious personal injury.

MOUNTING! Devices should be mounted and positioned in such a manner that they cannot be accidently operated.

TECHNICAL DATA

Maximum Inlet Pressure=200 psi
Outlet Pressure=(according to model)
Ambient Temperature= -40° F (-40° C) to 160° F (71° C)
Medium=Compressed air
Port Size=1/4" NPT

INSTALLATION

The THD-2-FM CONTROLAIR Valve is designed for panel mounting. The valve may be installed and removed from the top. See Figure 4 for panel opening and thickness dimensions. All piping connections are made to removable pipe brackets. Piping connections need not be broken to remove the valve for service. Loosen bolts to remove the CONTROLAIR Valve.

The supply ports have strainers in them and will protect the internal valving from large particles of foreign material in the lines, but it is recommended that a standard 10 micron air line filter be installed in the piping to the IN ports (Ref. no. 2, Figure 2.) on pipe brackets of the THD-2-FM CONTROLAIR Valve.

MAINTENANCE

Maintenance periods should be scheduled in accordance with frequency of use and the working environment of the THD-2-FM CONTROLAIR Valve. No special tools are required to maintain the THD-2-FM CONTROLAIR Valve.

One complete CONTROLAIR Valve should be kept in stock for each four valves in service. During the maintenance period, replace a complete valve with the standby unit. This will reduce operational time loss and afford inspection and replacement of worn parts at a more opportune time and location.

Notice that the operating portions of the valve can be removed without disturbing the pipe connections. Remove the valves from the pipe brackets by loosening bolts (ref. 4) and lift the valve free.

Completely disassemble the CONTROLAIR Valve. Wash all metal parts in a non-flammable solvent and all rubber parts with soap and water. Rinse each part thoroughly and blow dry with a low pressure air jet. Arrange the parts on a clean white surface in the order of the exploded view.

Examine each part carefully. Flex the diaphragm and packing rings. If cracked or worn, replace them. Replace all parts that may not provide satisfactory service until the next scheduled maintenance period.

As reassembly proceeds, lubricate individual parts by using No. 107 Lubriplate on metal-to-metal surfaces and No. 55 Pneumatic Grease (Dow Corning) on all rubber seals except Ref. no. 37. Equivalent greases to those recommended can be used.

Store the reconditioned CONTROLAIR Valve in a moisture-proof bag.

TABLE 1. THD-2-FM PARTS LIST

REF.	QTY.	DESCRIPTION	PART NO.
1	2	Bracket, Pipe	66812-6
2	2	Strainer, Port	P66849
3	2	Gaskets, Port	P66823
4	6	Screw, 5/16 x 2-1/4	P49902-0048
5	2	Body, Complete	P51112-0002
7*	2	Valve, Side	P55474-0002
15*	4	Ring, Retainer	P49704
16*	4	Washer	P50830
17*	4	Ring, Snap	P49882-0059
18*	2	Dog, Cam	P52835
19	2	Pin, Dog	P51856
20	2	Lever, Right	P58979-0002
21	4	Roller	P51530
22	2	Lever, Left	P58078-0002
23	4	Screw, 1/4-28 x 1/2-Lever	P49590
24	4	Pin, 3/16 Lever-Right, Left	P50856
25	2	Key	P27828
26	2	Key	P49881-0013
27	2	Pin, Lever	P50686-0007
28	4	Pin, 1/16 x 1/2	P49913-0001
29*	2	Spring, Exhaust Valve	P54653
30	2	Spring, Diaphragm	(see Table 2)
31	2	Seat, Spring	52347
32	2	Housing, Spring CP	P66488-0002
33	8	Nut, 5/16-18	P49901-0001
34*	2	Valve, Inlet & Exhaust (incl. #35)	54536
35*	4	Ring, 3/4 OD	P49708-0113
36	2	Follower, Diaphragm	P60303
37*	2	Diaphragm	P5102-0001
38	2	Nut, 9/16-18	P49901-0031
39*	2	Ring, 11/16 "O"	P49708-0015
40	2	Screw, Spline Hex Adj.	P66209
42*	2	Seat, Exh. Valve	P55484
43	1	Housing, Cam CP	P27125-0001
44	2	Latch, Body	P50509
45	2	Latch, Cam	P50520
46	2	Spring, Latch	521116
47	2	Ring, Retaining	P49857-0019
48	2	Spring	850537
49	2	Washer, No. 12	P49804-0054
50	2	Nut, 10-32	P49923-0008
51	2	Shoe & Holder Ass'y	P50654
52	4	Handle, Right & Left	P27128
56	2	Screw, 1/4-20	P49908-0009
57	2	Washer, 1/4	P49880-0001
59	4	Washer, 5/16	P49911-0002
60	4	Nut, 5/16-18	P49901-0001
61	2	Cam	P63422-0001
62	2	Shaft, Cam	P27126
63	2	Ring, Retaining	P49208
64	2	Pin, Brake	P50524
65	2	Drum, Brake	P63464
67	2	Washer	P63465
68	2	Screw, 1/4-20	P49609-0014

Please see Figure 2 for Reference numbers.

***Repair Kit, Major (CP)–One (1): P64894-0002 includes P57135 kit plus 2 of P57094-0001 kits.**
This kit repairs one (1) control portion; 2 kits are required to repair both portions.

Major repair kit for one Side Valve: P57094-0001 (4 required for complete valve)

Minor side valve repair kit: P55474-0002 (4 req'd for complete valve)

Repair Kit for one control portion:P57136 (2 req'd for complete valve)

TABLE 2. VALVE IDENTITY SCHEDULE

Complete Part Number	Pressure Range	Control Spring	Cam Housing (complete)	Valve Portion-Complete Less Bracket & Screws
P27121-0101 (Chrome Grip)	10-65 PSI	P55442	P27125-0001	P55586-0001
P27121-0109 (Chrome Grip)	30-70 PSI	P64822	P27125-0001	P55586-0016

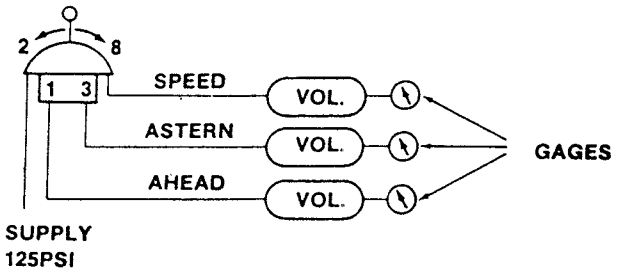

Figure 1. Adjustment Schematic per valve half.

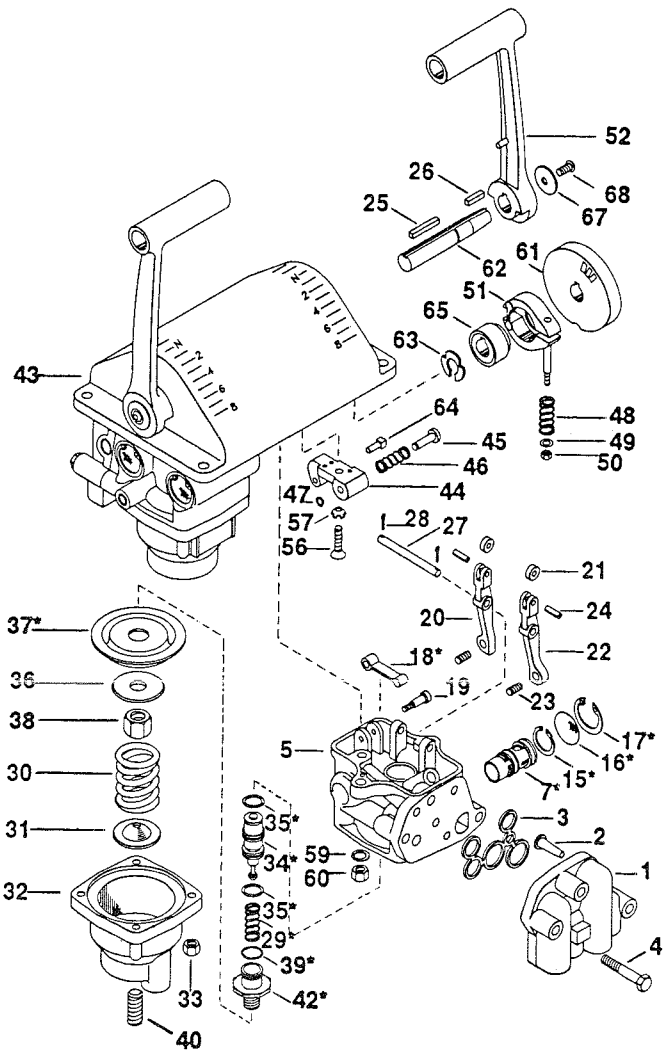

Figure 2. Exploded View

ADJUSTMENTS

Four adjustments can be made to the THD-2-FM CONTROLAIR Valve. Adjusting screw (40) changes the maximum and minimum pressure settings, set screw (23) varies the pick up points of valve levers (20 and 22), nut (50) alters the force to move the handle, and cam dog pin (19) aligns the cam dog to the cam. Use the adjustment set-up illustrated in Figure 1.

PILOT VALVE LEVER ADJUSTMENT

Remove valve protector (16 & 17). Move the handle (52) back and forth on both sides of "Neutral" position, observing the action of levers (20 and 22). The corresponding pilot valve should be fully open after the handle moves through the first 15° travel arc. If the pilot valve levers need adjusting, place the handle in a maximum increasing pressure position. With a 3/32" Allen wrench, turn screw (23) of the activated lever (either 20 or 22) out, just far enough to crack the exhaust valve. The gauge (port 1 or port 3) will show a drop in pressure. From this point turn the screw in a full three (3) turns. This will open the inlet valve of the pilot valve to its maximum capacity.

Move the handle to the extreme position of the opposite quadrant and repeat the adjustment for the other pilot valve lever.

PRESSURE SETTING ADJUSTMENT

Adjusting screw (40) varies the minimum and maximum pressure setting a like amount without changing the range of pressure. Turning the adjusting screw in raises the maximum and minimum pressure (port 8), turning it out decreases the maximum and minimum pressure.

Place the CONTROLAIR Valve handle (52) in the maximum increasing pressure position and turn the adjusting screw (40) in or out until the desired maximum pressure is seen on the air gauge from port 8.

FRICTION BRAKE ADJUSTMENT

The handle force of the THD-2-FM CONTROLAIR Valve can be varied by adjusting the friction nut (50). This adjustment increases or decreases the manual force required to move or hold the handle in any desired position in the handle quadrant.

CAM DOG ADJUSTMENT

Move device handle to Full Travel in one direction. Observe gauge in port 8 and note the pressure. Place the handle in the opposite position, turn the eccentric cam dog pin (19) to position the cam dog until the pressure is halfway between the pressure from port 8 and the maximum pressure range per valve schedule (Table 2). Repeat pressure setting adjustment.

OPERATION

Refer to the diagrammatic view (Figure 3). With the handle in "Neutral" position, ports 1 and 3 are open to atmosphere through their respective pilot valve and port 8 is at minimum pressure.

The handle operates a concentric cam. The peripheral surface of the larger section is contoured to provide minute positioning increments to the pressure control portion. The OUT port of the pressure control portion is port 8. The side cam surface moves the right and left pilot levers alternately to operate the on-off pilot valves. The OUT ports for the pilot valves are 1 and 3.

Movement of the handle in the first 15° of the handle quadrant opens the inlet valve of the control portion (with preload setting). Graduated pressure flows out of port 8; the activated pilot valve lever closes the exhaust of the directional pilot valve and opens the inlet valve of one of the pilot valves to pass full supply pressure to port 1 or 3, depending upon the quadrant the handle is in. Movement of the handle beyond 15° increases the pressure at port 8. As the handle is advanced toward the maximum pressure position, the pressure at port 8 increases proportionally and the pressure at port 1 or 3 remains at full supply pressure.

The THD-2-FM CONTROLAIR Valve will automatically compensate for downstream pressure changes at port 8. The air pressure changes can be caused by line leakage, temperature changes, or load thrust. If air pressure at port 8 increases over that called for by handle position, the diaphragm (37) in the control portion will deflect downward, moving the exhaust valve seat (42) away from the inlet and exhaust valve unit (34) and vent the excess pressure. If the pressure drops below that called for by handle position, the control spring (30) will force the diaphragm (37) upward. The exhaust valve seat (42) will move the inlet and exhaust valve unit (34) from its seat, opening the IN port 2 to the OUT port 8 to restore the pressure called for.

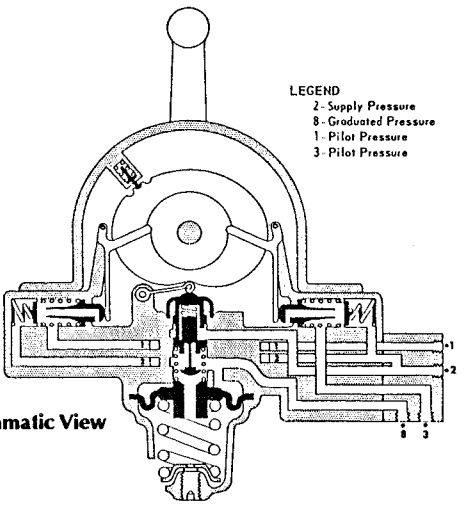

Figure 3. Diagrammatic View

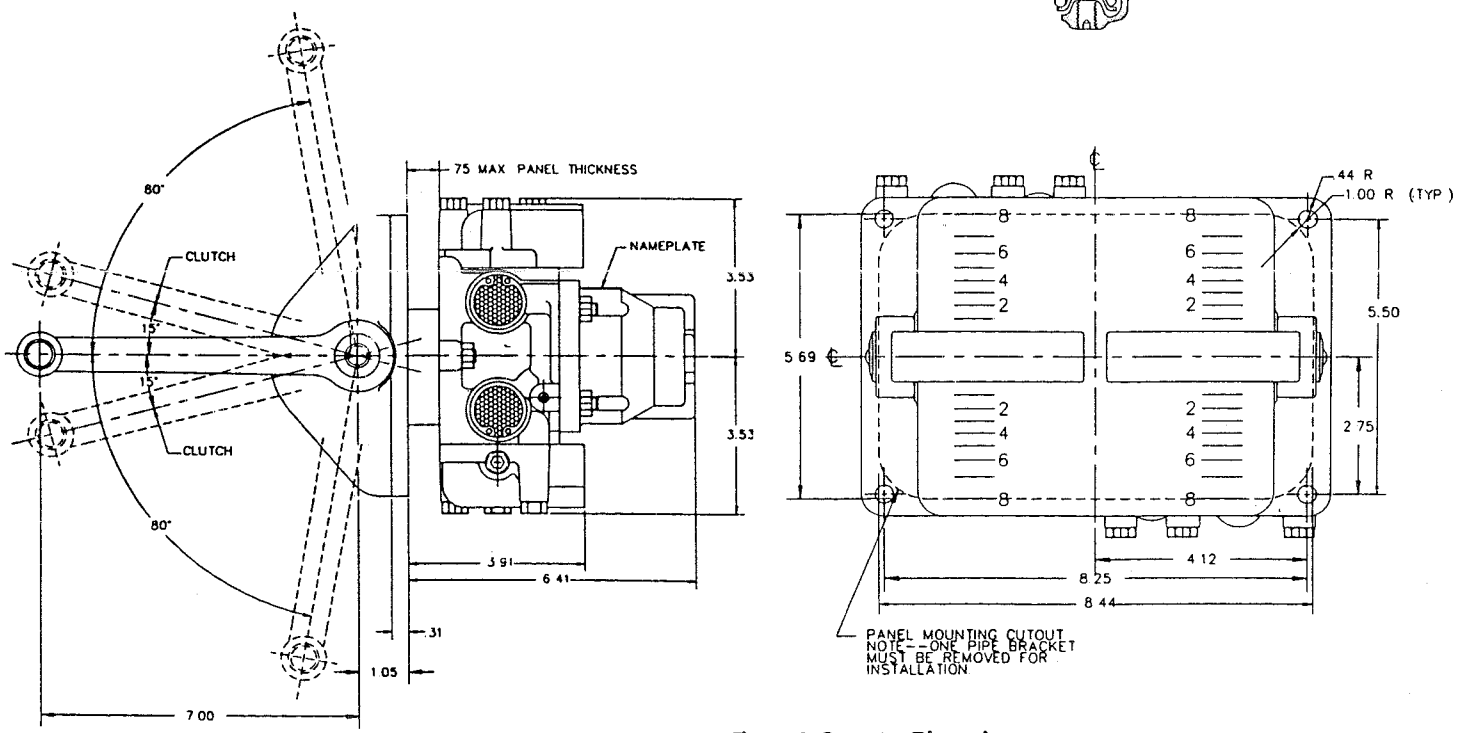

Figure 4. Operator Dimensions

Printed in U.S.A.
APR 1992

NOTICE TO PRODUCT USERS

1. WARNING: FLUID MEDIA
Bosch Rexroth pneumatic devices are designed and tested for use with filtered, clean, dry, chemical free air at pressures and temperatures within the specified limits of the device. For use with media other than air or for human life support systems, Bosch Rexroth must be consulted. Hydraulic cylinders are designed for operation with filtered, clean, petroleum based hydraulic fluid; operation using fire-resistant or other special types of fluids may require special packing and seals. Consult the factory.

2. WARNING: MATERIAL COMPATIBILITY
Damage to product seals or other parts caused by the use of noncompatible lubricants, oil additives or synthetic lubricants in the air system compressor or line lubrication devices voids Bosch Rexroth's warranty and can result in product failure or other malfunction. See lubrication recommendations below.

AIR LINE LUBRICANTS! In service higher than 18 cycles per minute or with continuous flow of air through the device, an air line lubricator is recommended.* (Do not use line lubrication with vacuum products.) However, the lubricator must be maintained since the oil will wash out the grease, and lack of lubrication will greatly shorten the life expectancy. The oils used in the lubricator must be compatible with the elastomers in the device. The elastomers are normally BUNA-N, NEOPRENE, VITON, SILICONE and HYTREL. Bosch Rexroth recommends the use of only petroleum based oils without synthetic additives, and with an aniline point between 180° F and 210° F.

COMPRESSOR LUBRICANTS! All compressors (with the exception of special "oil free" units) pass oil mist or vapor from the internal crankcase lubricating system through to the compressed air. Since even small amounts of non-compatible lubricants can cause severe seal deterioration (which could result in component and system failure) special care should be taken in selecting compatible compressor lubricants. It is recommended that users review the National Fluid Power Association "Recommended Guide Lines For Use Of Synthetic Lubricants In Pneumatic Fluid Power Systems" (NFPA T1.9.2-1978).

3. WARNING: INSTALLATION AND MOUNTING
The user of these devices must conform to all applicable electrical, mechanical, piping and other codes in the installation, operation or repair of these devices.

INSTALLATION ! Do not attempt to install, operate or repair these devices without proper training in the technique of working on pneumatic or hydraulic systems and devices, unless under trained supervision. Compressed air and hydraulic systems contain high levels of stored energy. Do not attempt to connect, disconnect or repair these products when a system is under pressure. Always exhaust or drain the pressure from a system before performing any service work. Failure to do so can result in serious personal injury.

MOUNTING! Devices should be mounted and positioned in such a manner that they cannot be accidentally operated.

4. WARNING: APPLICATION AND USE OF PRODUCTS
The possibility does exist for any device or accessory to fail to operate properly through misuse, wear or malfunction. The user must consider these possibilities and should provide appropriate safe guards in the application or system design to prevent personal injury or property damage in the event of a malfunction.

5. WARNING: CONVERSION, MAINTENANCE AND REPAIR
When a device is disassembled for conversion to a different configuration, maintenance or repair, the device must be tested for leakage and proper operation after being reassembled and prior to installation.

MAINTENANCE AND REPAIR! Maintenance periods should be scheduled in accordance with frequency of use and working conditions. All Bosch Rexroth products should provide a minimum of 1,000,000 cycles of maintenance free service when used and lubricated as recommended. However, these products should be visually inspected for defects and given an "in system" operating performance and leakage test once a year. Where devices require a major repair as a result of the one million cycles, one year, or routine inspection, the device must be disassembled, cleaned, inspected, parts replaced as required, rebuilt and tested for leakage and proper operation prior to installation. See individual catalogs for specific cycle life estimates.

6. PRODUCT CHANGES
Product changes including specifications, features, designs and availability are subject to change at any time without notice. For critical dimensions or specifications, contact factory.

*Many Bosch Rexroth pneumatic valves and cylinders can operate with or without air line lubrication; see individual sales catalogs for details.

LIMITATIONS OF WARRANTIES & REMEDIES

Bosch Rexroth warrants its products sold by it to be free from defects in material and workmanship to the following:

For twelve months after shipment Bosch Rexroth will repair or replace (F.O.B. our works), at its option, any equipment which under normal conditions of use and service proves to be defective in material or workmanship at no charge to the purchaser. No charge will be made for labor with respect to defects covered by this Warranty, provided that the work is done by Bosch Rexroth or any of its authorized service facilities. However, this Warranty does not cover expenses incurred in the removal and reinstallation of any product, nor any downtime incurred, whether or not proved defective.

All repairs and replacement parts provided under this Warranty policy will assume the identity, for warranty purposes, of the part replaced, and the warranty on such replacement parts will expire when the warranty on the original part would have expired. Claims must be submitted within thirty days of the failure or be subject to rejection.

This Warranty is not transferable beyond the first using purchaser. Specifically, excluded from this Warranty are failures caused by misuse, neglect, abuse, improper operation or filtration, extreme temperatures, or unauthorized service or parts. This Warranty also excludes the use of lubricants, fluids or air line additives that are not compatible with seals or diaphragms used in the products. This Warranty sets out the purchaser's exclusive remedies with respect to products covered by it, whether for negligence or otherwise. Neither, Bosch Rexroth nor any of its affiliates will be liable for consequential or incidental damages or other losses or expenses incurred by reason of the use or sale of such products. Our liability (except as to title) arising out of the sale, use or operation of any product or parts, whether on warranty, contract or negligence (including claims for consequential or incidental damage) shall not in any event exceed the cost of replacing the defective products and, upon expiration of the warranted period as herein provided, all such liability is terminated. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHETHER FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE. No attempt to alter, amend or extend this Warranty shall be effective unless authorized in writing by an officer of Bosch Rexroth Corporation.

Bosch Rexroth reserves the right to discontinue manufacture of any product, or change product materials, design or specifications without notice.

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Printed in the United States
SM-1200.40