



LESLIE
CONTROLS, INC.

A division of CIRCOR International, Inc.

12501 Telecom Drive, Tampa, FL 33637

**Installation, Operating
and Maintenance
Instructions**

**20/3.5.1
Rev. 1**

**PILOT CONTROLERS
REPLACING UPPER DIAPHRAGMS – TYPE
DDD(UDDD)**

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INTRODUCTION

This Installation, Operation, and Maintenance Manual is intended to be as complete and up to date as possible. It covers installation, operation, and maintenance procedures for Leslie Controls, Inc. Pilot Controllers Type DDD (UDDD). Leslie reserves right to update this manual and other product information concerning installation, operation, and/or maintenance, at any time and without obligation to notify product owners of such changes.

Leslie is not responsible for injury to personnel or product damage due to improper installation, operation, and/or maintenance Leslie Controls, Inc. Pilot Controllers Type DDD (UDDD). All installation, operation, and maintenance procedures should only be performed by trained/certified personnel. All personnel performing these procedures should completely and carefully read and understand all supplied materials before attempting procedures. All personnel should pay strict attention to all Notes, Cautions, and Warnings that appear within procedures detailed in this manual.

Leslie welcomes user input as to suggestions for product or manual improvement.

Contact Information

For information concerning warranties, or for questions pertaining to installation, Operation or maintenance of LESLIE products, contact:

LESLIE CONTROLS INC.
12501 Telecom Drive
Tampa, FL 33637

USA Phone: (813) 978-1000
USA Fax: (813) 978-0984
www.LESLIECONTROLS.com

To order replacement parts, contact LESLIE CONTROLS at address listed above, or call toll free:

USA/Canada/Caribbean Phone: (800) 323-8366

Note: Please include model and serial number of unit for which parts are being ordered. If ordering by phone, please have this information readily available.

GENERAL NOTES AND WARNINGS

Notes:

If questions are not answered by this manual, or if specific installation, operation, and/or maintenance procedures are not clearly understood, contact Leslie Controls, Inc. for clarification before proceeding.

If unit is damaged during installation, operation, or maintenance, complete following steps:

1. Turn off and lock out pneumatic supply to unit in an approved manner.
2. Turn off all incoming valves.
3. Contact in-house maintenance personnel or Leslie Controls, Inc. for instructions.

Note: Throughout this manual, warnings will be denoted by BOXES

CAUTION!

Piping system must be adequately designed and supported to prevent extraordinary loads to pressure equipment.

It is strongly recommended that this document be reviewed before attempting any installation, operation, or maintenance procedures. Use Instruction 20/0.5.1 for General Installation, Operation and Maintenance Data.

MAINTENANCE

DISMANTLING SUPERSTRUCTURE

(See Fig. 1 & 2)

1. Shut off air and steam flow (impulse) to the pilot controller. Disconnect air and control lines at diaphragm head.
2. Remove cover screw (64) and cover (63). Disassemble extension pin complete (86) from stem (24). Do not disturb adjusting pin (36) setting.
3. Take care to back needle valve out as far as possible to be sure tip will not protrude beyond diaphragm cover. Loosen and remove nuts (5) and bolts (4). Lift off diaphragm cover (1) with assembled needle valve. Disassemble signal chamber (9) and "O" ring (62) from assembly moving it over top diaphragm (7).
4. Take out yoke screws (20) and lift balance of assembly out of yoke (27). Hold assembly rigidly on locknut (3). Loosen stem nut (23) and remove stem nut, stem

complete (24) and yielding spring (22) from connector bolt nut (19). Insert hex setscrew wrench in setscrew (18) and remove setscrew.

5. Remove connector bolt nut (19) from connector bolt (2) and lift out diaphragm washer complete (16), diaphragm ring (17), diaphragm small (15). Remove diaphragm base (14), diaphragm seal spacer (13), lower diaphragm (7), diaphragm disc (6) and vent chamber (10). Reverse balance of assembly and hold rigidly on hex of connector bolt (2). Loosen locknut (3) and remove from connector bolt along with diaphragm disc (6), upper diaphragm (7), diaphragm spacer (8), center diaphragm (7), diaphragm disc (11) and “O” ring (62).

CLEANING REPLACING PARTS

Clean all part thoroughly. Make sure part in vent chamber and base are clear. Remove needle valve complete from diaphragm cover and clean valve seating faces on valve stem and in diaphragm cover.

Clean worn or damaged parts including “O” rings (59) and (61). Lubricate “O” rings with approved “O” ring lubrication. Reassemble needle valve to diaphragm cover (1).

NOTE!

Handle Needle Valve carefully so that it will not be marred or damaged in any way.

REASSEMBLING SUPERSTRUCTURE

1. Hold connector bolt (2) rigidly on hex with recess upward. Insert “O” ring (12) in groove. Place large diaphragm disc (11) and one diaphragm (7) on connector bolt. Place diaphragm spacer (8) on diaphragm (7) with large end of diaphragm spacer against diaphragm. Place one diaphragm (7) and a diaphragm disc (6) on diaphragm spacer (8). Screw locknut (3) on connector bolt (2) and tighten down against diaphragm disc (6). (See torque table)
2. Reverse assembly and hold rigidly on locknut (3). Position vent chamber (10) on center diaphragm (7) with recessed face toward diaphragm. Place other diaphragm disc (6) over connector bolt and on hex. Follow with lower diaphragm (7) and diaphragm seal spacer (13) with wide end of spacer on diaphragm. Position diaphragm base (14) and lower diaphragm (7) with large recessed face toward diaphragm base to its original position. Line up bolt holes.

3. Place diaphragm small (15) in recess in base (14) and position diaphragm ring (17) on diaphragm. Slide diaphragm washer complete (16) over connector bolt (2) making sure that key enters slot in connector bolt. Screw connector bolt nut (19) on connector bolt and tighten down against diaphragm washer complete (16). Insert setscrew (18) in connector bolt nut and tighten down firmly against connector bolt (2). (See torque table) Place yielding spring (22) in connector bolt. Assemble stem nut (23) and stem complete (24) with stem head on threaded end of nut. Insert threaded end of stem nut in connector bolt at the same time pushing down on stem complete (24) to compress yielding spring (22). Tighten stem nut against connector bolt.
4. Reverse assembly and hold rigidly on hex of connector bolt nut (19). Carefully bend diaphragm (7) upward over diaphragm disc (6). Position signal chamber (9) on center diaphragm. Press down upper diaphragm (7) into recessed face of signal chamber. Line up pope connection in diaphragm base. Place “O” ring (62) in its recess in signal chamber. Position diaphragm cover (1) on upper diaphragm (7), with needle valve above “O” ring in signal chamber. Insert bolts (4), attach nuts (5) and tighten finger tight.
5. Replace assembly on yoke (27) with stem downward through adjusting sleeve (26) making sure that diaphragm ring (17) and diaphragm small (15) are in proper position between diaphragm base and yoke. Insert screws (20) through yoke (27) and into base (14). (See torque table)

NOTE!

When screws are tightened, a small gap will remain between the diaphragm base and the yoke. Do not attempt to tighten screws more than the recommended torque to remove this gap.

6. Tighten diaphragm cover bolts (4). (See torque table) Reconnect extension pin stem clamp complete (35) to stem complete (24).
7. Reconnect signal and control lines. Readjust as shown under Operation

NOTE!

Normally, stem adjustment mentioned in Instruction 20/0.5.1 is unnecessary unless adjusting pin has been disturbed during assembly.

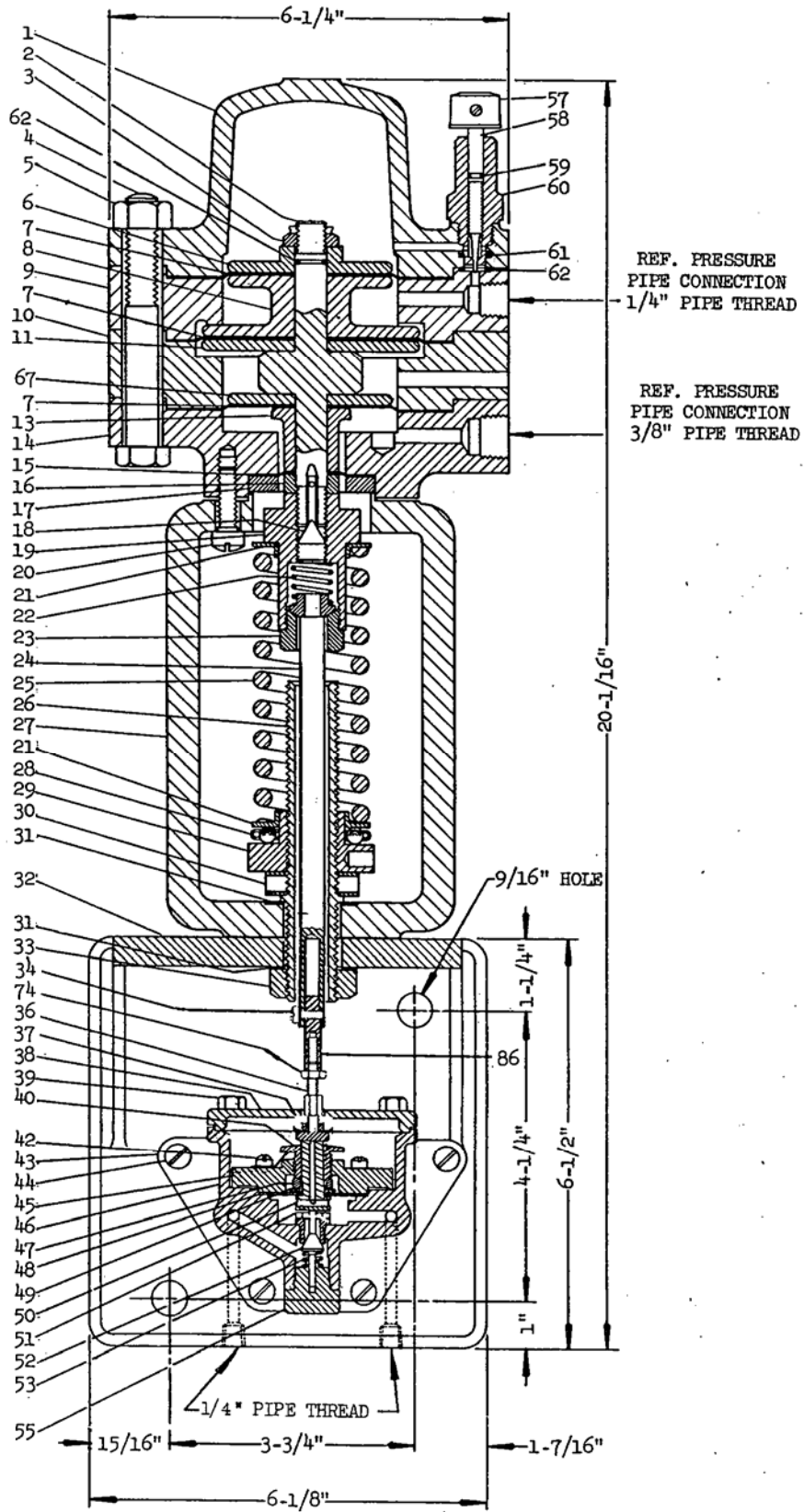


Figure 1 - Parts List

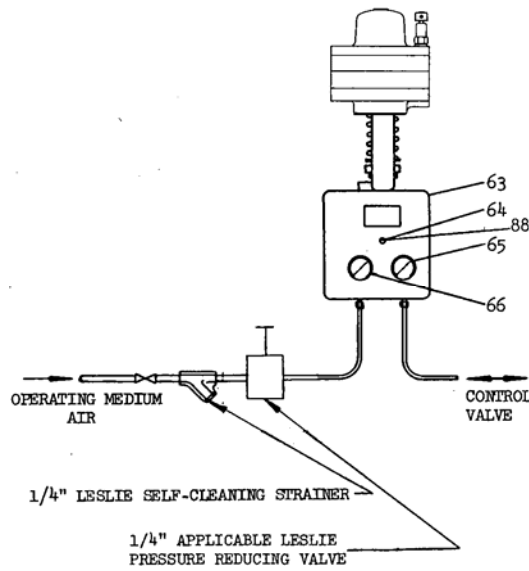


Figure 2 - Cover View

ITEM NO.	TORQUE (Ft-lbs)	ITEM NO.	TORQUE (Ft-lbs)
3	8.9	33	30
5	8.9	34	2
19	3	74	3
20	3	39	10
23	30	42	3
69	50	44	4
60	10	37	3

TABLE 1 – TORQUE VALUES

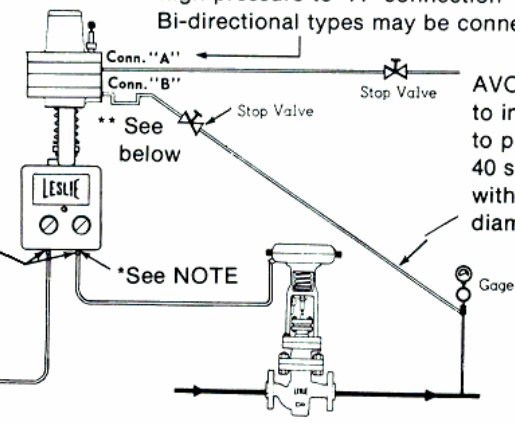
AIR LINES - Use 5/16" (1/4" I.D.) pie or tubing. Use non-corrosive pipe and fittings.

Where used as Uni-Directional Type - always connect high pressure to "A" connection — low pressure to "B". Bi-directional types may be connected either way.

Connect outlet of air reducing valve to inlet of Pilot Controller (immediately under gage marked "Operating Supply"). Connect outlet of Pilot Controller (immediately under gage marked "Control Valve" to diaphragm connection of Control Valve or to relay or positioner if one is in use.

AVOID LOOPS IN CONTROL PIPES to insure true pressure signal to pilot diaphragm. Use 1/2" 40 schedule pipe or tubing with equivalent internal diameter.

Operating Medium Clean Air. Set Reducing Valve to supply 20-22* psig to pilot.
1/4" strainer and Pressure Reducing Valve.



*See NOTE

*Normal Pressure — may be increased to 30 psig if necessary.
**Dip in impulse line at steam connection to protect diaphragms.

Typical Installation — Type DDD and UDDD Pilot Controllers

Figure 3 - General Application

TROUBLESHOOTING

The diaphragm (Fig 1) and needle valve construction in the "head" permits modification of the incoming pneumatic signal (applied to the upper connection) from another controller, transmitter or signal source. This signal creates a downward force, which is variable on both a time and pressure basis. Under stable system conditions and equilibrium this signal is felt by the large diaphragm as well as both sides of the upper small diaphragm. The force developed is a function of the large diaphragm area only (since the upper small diaphragm is cancelled), and is opposed by the pressure (controlled signal) under the lower small diaphragm.

The ratio of diaphragm areas (large (8) vs. lower small (67) diaphragm) determines the pressure ratio that is controlled. The diaphragm assembly is spring loaded with a single spring (25) (type DDD), for adjusting the pressure differential between the pneumatic signal and controlled signal.

When a change in incoming pneumatic signal occurs, it is immediately felt by the large diaphragm as well as the

underside of the upper small diaphragm. The change in connection "A" pressure on the top side the upper small diaphragm is slowed down by the needle valve (57), therefore a temporary pressure differential exists across this diaphragm, which temporarily reduces the effectiveness of the large diaphragm. Balancing of the upper small diaphragm depends upon the amount and rate of signal change and needle valve setting.

PROBLEM	POSSIBLE CAUSE
No control	Stop valve closed No supply air Break in impulse line
Lower diaphragm requires frequent replacement	No dip in impulse line at steam connection super heated steam
Control to slow	Adjust needle valve (57)
Control to fast	Adjust needle valve (57)



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It is solely responsibility of system designer and user to select products and materials suitable for their specific application requirements and to ensure proper installation, operation and maintenance of these products. Assistance shall be afforded with selection of materials based on technical information supplied to Leslie Controls Inc.; however, system designer and user retain final responsibility. Designer should consider applicable Codes, material compatibility, product ratings and application details in selection and application. Improper selection, application or use of products described herein can cause personal injury or property damage. If designer or user intends to use product for an application or use other than originally specified, he must reconfirm that selection is suitable for new operating conditions. Life expectancy for this product defaults to the warranty period of the sales contract.