Hays Cleveland
Div. of UniControl Inc.

Series F -04632-00-A01/A02/A05/A06/A07
Hydraulic Position Regulator
(Direct Actuation Type)
Instruction Manual
F-04632-1-692

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This instruction manual applies only to Hydraulic Position Regulator models that are **DIRECT ACTUATED.** Included are the following model options (complete code descriptions are listed on Page iv):

a. Model F-04632-00-A01
b. Model F-04632-00-A02
c. Model F-04632-00-A05
d. Model F-04632-00-A06
e. Model F-04632-00-A07

For Hydraulic Position Regulator models that are **DIAPHRAGM ACTUATED,** please refer to Instruction Manual EF-04632-2. It includes these following model options:

f. Model F-04632-00-A03
g. Model F-04632-00-A04

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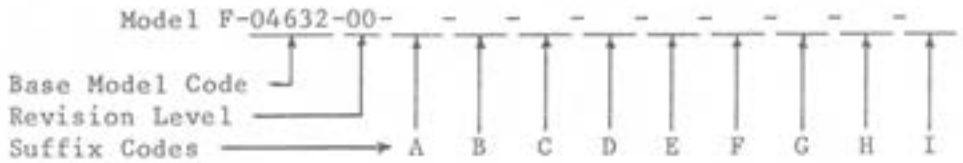
REFERENCE DRAWINGS PAGE

MODEL CODE: Hydraulic Position Regulator, F-04632-00

Complete Model Code:



SUFFIX CODES & MODEL NUMBER DESCRIPTIONS

Hydraulic Position Regulator ..... Model F-04632-00-

Suffix A (Base Unit) ..... -(A__)

-(A01) Small case, small pilot valve,
direct actuation,
horizontal or vertical motion (H771932).

-(A02) Large case, large pilot valve,
direct actuation,
horizontal or vertical motion (H769210).

-(A03) Small case, small pilot valve,
diaphragm actuation,
horizontal or vertical motion (H772212).

-(A04) Large case, large pilot valve,
diaphragm actuation,
horizontal or vertical motion (H772213).

-(A05) Large case, large pilot valve,
direct actuation, reduction gears,
vertical return motion only (H772811).

-(A06) Small case, small pilot valve,
direct actuation, reduction gears,
vertical return motion only (H772812).

-(A07) Small case, large pilot valve,
direct actuation, reduction gears,
vertical return motion only (H772813).

Suffix B (Stroke) ..... -(B__)

[-A01-A03 only]
-(B01) 2.5 to 7.0 inches
-(B02) 07.1 to 12.0 inches
-(B03) 12.1 to 18.0 inches
[-A02-A04 only]
-(B04) 7.1 to 12.0 inches
-(B05) 12.1 to 18.0 inches
-(B06) 18.1 to 24.0 inches
-(B07) 24.1 to 30.0 inches
-(B08) 30.1 to 36.0 inches
[-A05 only]
-(BZ1) 00.0 to 36.0 inches
-(B09) 36.1 to 72.0 inches
[-A06-A07 only]
-(BZ2) 00.0 to 25.0 inches
-(B10) 25.1 TO 48.0 inches

ACTUAL DIMENSIONS

STROKE:_____ inches

"L" Dim:_____ inches

Suffix C (Loading Diaphragm) ..... -(C__)

[-A01-A03-A06-A07 only]
-(C01) 0- 5 PSIG, without limit stops
-(C02) 0- 5 PSIG, with limit stops
-(C03) 3-15 PSIG, without limit stops
-(C04) 3-15 PSIG, with limit stops
-(C05) 0-30 PSIG, without limit stops
[-A02-A04-A05 only]
-(C06) 0- 5 PSIG, without limit stops
-(C07) 0- 5 PSIG, with limit stops
-(C08) 3-15 PSIG, without limit stops
-(C09) 3-15 PSIG, with limit stops
-(C10) 0-30 PSIG, without limit stops

Input signal is ____ PSIG (closed slide valve),
to ____ PSIG (open slide valve).
Eg., Forward 3-15 or reverse acting 15-3 PSIG.

Suffix D (Feedback) ..... -(D__)

[-A01-A02-A03-A04 only]

	left		right	
	bot	top	bot	top
-(DZ1) Horizontal				
-(DZ2) Vertical				

(also check one of below selections)

___ Right side, extends right to open slide valve.
___ Right side, retracts left to open slide valve.
___ Left side, extends left to open slide valve.
___ Left side, retracts right to open slide valve.

Suffix E (Pilot Valve) ..... -(E__)

[-A01-A06 only]
-(E01) 30- 74 PSIG
-(E02) 75-149 PSIG
-(E03) 150-250 PSIG
[-A02-A05-A07 only]
-(E04) 75-149 PSIG
-(E05) 150-250 PSIG
[-A03 only]
-(E06) to 90 $INCH^3$
-(E07) to 180 $INCH^3$
-(E08) to 350 $INCH^3$
-(E09) to 700 $INCH^3$

OPERATION PRESSURE

_____ PSIG

CYLINDER DISPLACEMENT

_____ $INCH^3$

Suffix F (Position Transmitter) ..... -(F__)

[-A01-A03, Horizontal Feedback only]
-(F01) Pneumatic transmitter w/ air supply.
[-A02-A04, Horizontal Feedback only]
-(F02) Pneumatic transmitter w/ air supply.

Output signal is ____ PSIG (closed slide valve),
to ____ PSIG (open slide valve).
Eg., Forward 3-15 or reverse acting 15-3 PSIG

Suffix G (Positioning Cam) ..... -(G__)

-(GZ1) Blank cam

-(GZ2) Factory cut cam: ___ linear ___ sq.root
___ square

-(GZ3) Special
Factory Cut Cam: _____

Suffix H (Dust Boot & Return Arm Linkage) ..... -(H__)

[-A01-A03 only]

-(H01) For "L"=15-18 inches. Typical use with -B01.

-(H02) For "L"=18-21 inches. Typical use with -B02.

-(H03) For "L"=21-24 inches. Typical use with -B03.

[-A02-A04 only]

-(H04) For "L"=21-24 inches. Typical use with -B04.

-(H05) For "L"=24-27 inches. Typical use with -B05.

-(H06) For "L"=27-30 inches. Typical use with -B06.

-(H07) For "L"=30-33 inches. Typical use with -B07.

-(H08) For "L"=33-36 inches. Typical use with -B08.

Suffix I (Pipe Cap) ..... -(I__)

[-A05-A06-A07 only]

-(I01) Return motion down

-(I02) Return motion up

REGULATOR

The Model F-04632 Hydraulic Position Regulator consists of a cast iron case upon which are mounted a loading diaphragm assembly, an oil pilot valve assembly and a return motion assembly.

Such a regulator is illustrated by Figure 1. There may be certain variations in the arrangement of the return motion to accommodate a vertical or horizontal position of the power relay cylinder.

Regardless of the arrangement or size of parts, the principle of operation is the same for this type of positioner.

APPLICATION

The Hydraulic Positioner Series 72-5 or S-72-5L is used to regulate the position of an hydraulic piston operated slide valve. An air loading pressure received either from a controller or a manual air loading station is used to control the action of the regulator and hence determine the position of the slide valve.

The attached curve, Figure 72-2, illustrates the relationship between the air pressure applied to the loading diaphragm and the power piston position or valve stroke.

The port areas of the pilot valve of each positioner are designed to accommodate the different sizes of cylinders to provide the required operating speed. Drawing D-771932 shows the construction of the Series 72-5 Position Regulator. These units are used for smaller size power cylinders. The larger size power cylinders are provided with a Series 72-5L Positioner and the construction of this unit is shown on Drawing D-769210.

INSTALLATION

The Position Regulator is shipped packed in a case as a complete unit. Some of the parts are bound with wire to prevent breakage. The wire should be removed after the positioner is completely mounted.

Purchaser's Inspection

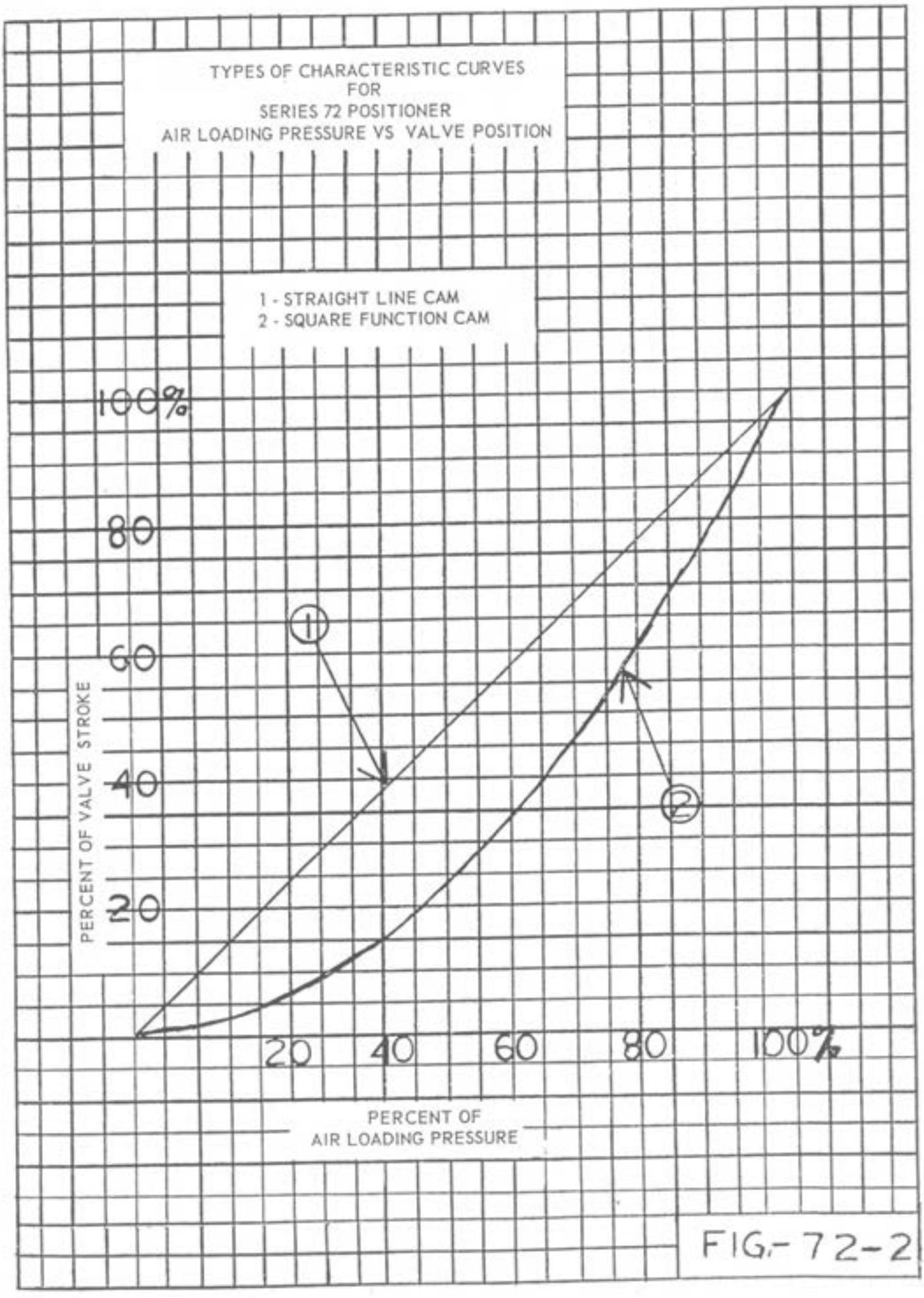
After unpacking the instrument, check the packing list to make sure that all items listed are present. Report any missing items to Hays Republic Division immediately. If there is damage due to improper handling, notify the transportation firm. Any damage claims concerning items shipped F.O.B. the factory should be negotiated with the carrier responsible. In such cases it is advisable to retain packing and carton for the claim adjustor's inspection. If shipping blocks tie down certain components, do not remove them until the instrument is securely mounted.

LOCATION

The Positioner is mounted as an integral part of the power cylinder slide valve, Figure 3.

LINKAGE

The linkage connection should be made up with reamed holes without any lost motion, and each pin should be held in place by two cotter pins.


TYPES OF CHARACTERISTIC CURVES
FOR
SERIES 72 POSITIONER
AIR LOADING PRESSURE VS VALVE POSITION
1 - STRAIGHT LINE CAM
2 - SQUARE FUNCTION CAM
100%
80
60
40
20
PERCENT OF VALVE STROKE
1
2
20
40
60
80
100%
PERCENT OF
AIR LOADING PRESSURE
FIG.- 72-2

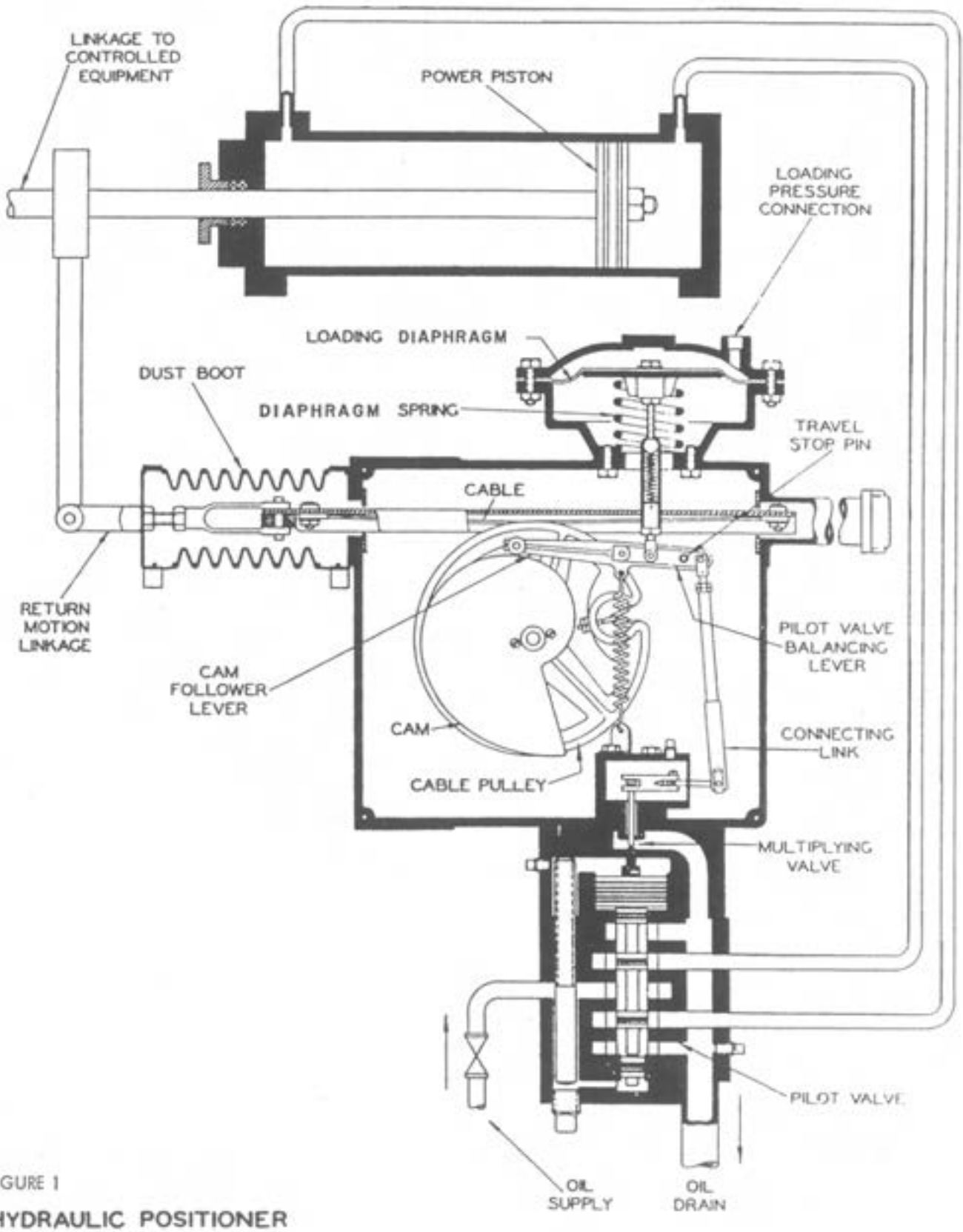


FIGURE 1

HYDRAULIC POSITIONER

SERIES 72 AND 72L

HYDRAULIC POWER SUPPLY

The power necessary to actuate the power piston of the slide valve is furnished by oil at 250 psi gage. The size of the bleed off valves in the unit are designed for this pressure and any marked deviations in this pressure requires a suitable change in the bleed valve orifice. Changes of plus or minus 25 psi will not affect the operation.

The size of the oil supply and drain connections is determined by the size of the power cylinder. These are generally either 1/2-inch of 1 inch standard pipe thread as shown on drawing D-771932. Since the discharge from the pilot valve is by gravity, a vertical drop of at least 18 inches must be provided in order to keep the back pressure at a minimum. These units will not operate at a back pressure. If it is not possible to have this amount of drop, a pipe larger than normal should be provided to serve as a reservoir for sudden changes in movements of the pilot valve. The horizontal run must have a pitch of 1/4 inch to the foot.

LOADING PRESSURE PIPING

Copper tubing, 5/16 inch O.D. is recommended for the air loading control line to the diaphragm of the Positioner. If copper tubing is not available, steel tubing or standard 1/8 inch iron pipe may be used. Install a shutoff cock in the loading line and adjacent to the air sending controller. All joints on this line must be tight, check such lines for leaks before putting the equipment into service.

OPERATION

The Series 72-5 Positioner is an oil operated regulating device of the positioning type. It transforms loading air pressure impulses as received from a controller of the flow control, level control, hand control or other type of master control device, and converts this air pressure into a definite position of a power piston. In this particular case, its purpose is to position a slide valve. Its action is controlled manually or automatically from a remote control panel.

The air loading pressure is usually from 2 to 14 psi gage. At 2 psi loading pressure the valve is closed and at 14 psi pressure the valve is wide open. The intermediate positions of the slide valve are determined by the shape of the cam in the Positioner. Figure 1 illustrates the principal features of the Positioner.

CYCLE OF OPERATION

With zero pressure on the loading diaphragm the power piston is at the end of its stroke. Application of pressure on the loading diaphragm causes it to move downward against the pressure of the diaphragm spring. The pilot valve balancing lever is pinned at its left end to the cam follower lever. Since this pivot point is held stationary at the beginning of the cycle, the right-hand end of the balancing lever is moved downward. This moves the pilot valve connecting link and results in a movement of the multiplying valve which produces a movement of the pilot valve. The pilot valve is connected to a supply of oil under pressure. When the valve is moved from its neutral or mid-position, the pressure is increased on one end of the power piston and decreased on the opposite end. This produces a movement of the power piston. As shown in the diagram, the power piston will move from right to left and produce a counterclockwise

rotation of the circular cable pulley which holds the cam plate. The cam roller is held against the edge of the cam by a spring, and therefore, follows the shape of the cam so that the cam lever turns on its supporting shaft to reset the pilot valve to neutral. A decrease in pressure on the loading diaphragm causes a reversal of all the movements described above.

The cam may be shaped to produce any desired relation between loading pressure and power piston position.

Each Positioner is furnished with a "straight line" cam when it leaves the factory. Such a cam will produce equal slide valve movements for equal changes in loading pressure.

However, after the Positioner has been installed it may be found that a different relation of valve position to loading pressure will provide much better regulation.

In other words, the most desirable characteristic for the Positioner would be that which will produce equal change in flow for equal changes in loading pressure.

The above two types of characteristics are indicated by the curves on Figure 72-2.

DIRECTION OF MOTION

The direction of motion of the power cylinder of the slide valve with respect to an increase in the air loading pressure on the loading diaphragm is set at the factory in accordance with contract requirements for each Positioner. However, should occasion require, each unit may be easily changed to reverse this direction of motion of the power cylinder of the slide valve. It is only necessary to reverse the connection to the power cylinder from the pilot valve of the Positioner and reverse the return motion cam. When making this change care should be taken before turning on the oil supply to the Positioner by checking the relation of the return motion as otherwise damage to the pulley may result.

PILOT VALVE CONSTRUCTION

The construction of the pilot valve consists principally of two main castings. These are the valve port body and the valve body cap.

The pilot valve port body is fitted with a sleeve and a stem. The stem is moved downward by means of the large piston in the upper section of the cap, and is moved upward by means of a small balancing piston on the bottom of the stem. These are selected for the operating pressures provided by the purchaser.

The small piston and its sleeve may readily be removed and changed to accommodate different pressures should it be desirable to change from the 250 psi gage to some other pressure. Normally, the upper or large piston has a pressure of approximately 25 psi gage. This pressure varies with the position of the diaphragm and the position of the bleed valve, but is of this general magnitude when the inlet supply pressure is 250 psi gage.

The pilot valve body cap contains the piston which butts against the pilot valve stem. The upper side of the piston is connected to the oil supply pressure reduced through a suitable throttling orifice. The orifice and strainer are placed just ahead of this multiplying valve piston. The lower side of the piston is connected to the drain. The piston has a tubular extension on the upper end which is connected to the chamber above the piston by means of a hole at the base of the tube. This tubular

extension in conjunction with the multiplying valve rod assembly serves as a valve for controlling the pressure on the top of the piston. The multiplying valve rod passes through the rod guide which, because of the close fit, also serves as a seal to prevent the leakage of oil. Since there is no packing on the valve rod it is essential that the oil return to the reservoir be entirely by gravity.

The limiting orifice is of the threaded rod construction in order to provide a relatively large size hole or passage and, at the same time, provide the pressure reduction from 250 psi gage down to a reasonable operating pressure on the piston. This threaded rod is provided with a cap hole to provide easy removal for cleaning.

PRINCIPLE OF VALVE OPERATION

The control diaphragm is connected through suitable linkage to a multiplying valve controlling the escapement of oil from the upper side of the pilot valve piston. Changes in the pressure on the top of this piston cause the piston to move either upward or downward, and with it the pilot valve itself. This causes the main power cylinder of the slide valve to move, and through the return motion and cam arrangement, the mechanism is restored to a neutral position. The amount of travel of the cylinder being determined by the characteristics of the cam shape.

The pilot valve is forced in an upward direction by the small balancing piston on the lower end of the pilot valve stem. By this combination of equipment, small changes in air loading pressure are multiplied by means of this multiplying valve design to appreciable forces to actually move the pilot valve, and thus control the position of the main slide valve.

The unit is in balance when the pressure on the pilot valve piston multiplied by the area of the piston is equal to the pressure of the balancing piston multiplied by its area.

INSTALLATION PIPING

It is definitely recommended that the connection of the oil hydraulic piston be of copper tubing. Experience with welding has indicated that the beads and other foreign matter incidental to construction affects the successful operation of this control equipment and, based on past experience, copper tubing has been found to be the most desirable material. Secondly, it is very important that the oil for the system be thoroughly clean and free from all foreign material as this will pass through the small port and the limiting orifice and tend to clog the mechanism.

We recommend that kerosene be run through the system for 48 hours, at least. If possible, it is desirable to remove the limiting orifice plug and also the pilot valve stem in order to assure a full flow through the Positioner.

It is definitely recommended that an oil filter of the Cuno Type, or equal, be provided to assure cleanliness of the hydraulic oil. One of these units should be installed adjacent to each valve positioner. The type of oil should be selected in accordance with the lowest temperatures expected at the plant site, and the viscosity of the oil should be low, approaching water or kerosene.

CAUTION

In the event that the hydraulic oil system is also used in conjunction with gas hydraulic systems, it is important that no gas be libe-

rated in the regulating devices as hunting may follow. By properly connecting this oil system to any oil storage tank system soild liquids can be made available to the hydraulic positioners. In other words, any oil being returned to a storage tank which is maintained under pressure by means of a gas, such as refinery gas, should enter the tank below the liquid level and be withdrawn from the tank below this same level in order to prevent absorption of the gas by the oil. Should this occur, foam would result in the top of the multiplying valve when the oil is reduced to atmospheric pressure.

PLACING POSITIONER IN SERVICE

1. Check over the Positioner to see that no parts have been damaged or become loose in shipment or installation.

2. Check the actual travel of both the power piston and the controlled mechanism. It is important that the valve shall not act as the stop, but that the strike of the piston should be set to limit the travel. The travel of the piston is then determined by the Positioner.

DIRECTION OF TRAVEL

The direction of travel of the piston should also be checked by increasing the air loading pressure to determine the proper action.

PILOT VALVE SETTING

The neutral position of the pilot valve with respect to the cam follower lever is determined by the length of the pilot valve connecting link. It is necessary that the pilot valve be in neutral or mid-position when the cam lever and pilot valve balancing lever coincide. To insure that the two levers are in the correct position, a hollow centering pin is provided. This pin is placed over the pilot valve travel stop pin, and holds the cam lever and balance lever rigid while the link of the pilot valve connecting link is being adjusted to obtain a neutral position. With the oil supply to the Positioner turned on, adjust the pilot valve connecting link until the power piston will remain in approximately mid-position. This adjustment should be made with zero loading pressure on the loading diaphragm.

MAINTENANCE

A well maintained Regulator means trouble-free performance. Whenever maintenance work is done on a Position Regulator, care must be taken that all lock nuts, holding screws and cotter pins are properly tightened and fastened.

Always replace the housing cover upon completion of any work or adjustment on the regulator.

A regular maintenance inspection of the Positioner should be made at least once or twice a year, depending on type of service and location.

1. All pin joints should be oiled and replaced if worn.

2. Remove the restriction screw from the pilot valve housing and clean same if necessary.

3. Treat the leather loading diaphragm with Neat's foot oil. If made of rubber, replace when necessary.

METHOD OF PRODUCING THE CAM SHAPE

The Series 72-5 Positioner is a position type regulating device. That is, for a given master pressure on the loading diaphragm the power piston will move to a definite position. The relation of loading pressure to piston position is fixed by the shape of the cam plate. In order to determine the shape of the cam, proceed as follows:

First, determine the desired relationship between the master loading pressure to be put on the loading diaphragm and the position of the power piston.

Make up a chart which will indicate the desired power piston position for each inch of mercury loading pressure from zero to maximum. This relationship may or may not be a straight line; depending on the characteristic of the valve or damper which the power piston is arranged to operate.

A U-shaped cam marker is furnished with each Positioner for use in determing the shape of the cam. Loosen the set screw and replace the cam roller with the cam marker. The U-shape of the marker permits it to fit over the circular cam blank and to assume different positions for the various loading pressure to be put on the loading diaphragm.

Place the centering pin Part Number H-758996 over the pilot valve stop to hold the pilot valve in a neutral position.

Disconnect the cam follower spring.

The first position to be marked on the cam blank will be with zero loading pressure on the diaphragm and the piston fully closed. With a fine pencil or steel scriber mark a semicircle on the cam blank around the end of the U-shape marker. This indicates the position which the cam roller will take on the finished cam.

The next position would be that which would correspond to one inch of mercury loading pressure. Move the piston by hand to the position indicated on the chart for one inch of mercury loading pressure and lock the piston in position. Apply an inch of loading pressure to the diaphragm. Mark a semicircle on the cam blank as above. Continue this procedure for each inch of mercury loading pressure up to the maximum.

The points so marked on the cam blank indicate the shape of the required cam. Draw a smooth continuous curve through the end point of the various semicircles and cut the cam, blank to this contour.

After the cam has been cut to shape, it may be installed and the Positioner placed in service.

POSITION INDICATING RELAY

Some of the units are provided with a remote position indicating relay. This device is described following.

Function

The position indicating relay illustrated by Drawing D-769552 is designed to translate the rotation of a wheel into a static air pressure which may be used on a calibrated pres-

sure gage to indicate the degree of rotation.

This device is frequently applied to a Positioners, Models F-04632 and F-04633 when it is desired to have a remote indication of the position of the power piston controller by the positioner.

Principle of Operation - Reference Drawing D-769552.

A uniform motion Cam Item (38) modified slightly to compensate for the characteristic of the bellows is mounted on the position sheave. As the Cam rotates, a roller on the follower Arm, Item (28) is maintained in contact with it by a spring. The Bleed Valve Lever, Item (27) is contacted by the Spring Lever, Item (32) on the Cam Follower Lever so that as the Follower Lever moves, it in turn moves the Bleed Valve Lever causing the Valve to be opened more or less. The resultant air pressure change moves the bellows practically simultaneously, keeping it in step with the Cam follower movement. Since the pressure has a fixed relation to the amount ot compression of the bellows, it naturally follows that this pressure can be used as an indication of the bellows position and a gage to which the pressure is applied can be calibrated in terms of the cylinder position. This pressure varies from three (3) to fifteen (15) pounds for full travel.

INSTALLATION

The relay is arranged with 1/4 inch pipe thread for both the air supply and the connection to the receiving gage. The connection to the receiver should preferably be of tubing with flared fittings to avoid leaks. The size should not be larger than 1/4 inch I.D. and of non-corrosive material. The air supply line may be of any size, but should be non-corrosive any supplied with a filter and reducing valve.

The pressure maintained by the regulating valve should be 20 pounds.

TO PUT RELAY IN OPERATION

Turn on the air supply and place the positioner at the zero position. The air pressure should be two (2) pounds.

(a) If the pressure is less than two (2) pounds check for a leak in the transmission line. This is most readily accomplished by checking for the maximum pressure of 17 pounds at full travel. If 17 pounds is obtainable, it is evident that no leak exists and the zero setting is incorrect.

(b) Check the zero setting by first seeing that the roller on Follower Lever is directly on the zero mark on the Cam. If this is not the case, the cylinder is not completely at the end of its stroke or the length of return motion linkage to the positioner is improperly adjusted.

(c) With the roller on zero it is possible that either Spring Lever, Item (32) or Spring Adjuster, Item (17) has been disturbed. It is more likely to be the Spring Lever. Therefore, it is advisable to adjust the Spring Lever rather than the Spring.

MAINTENANCE AND CALIBRATION

There will be very little maintenance of the relay, provided the air is kept clean.

1. Keep all connections tight to avoid leak-

age.

2. Clean the Orifice Screw, Item (47) with a fine wire, if necessary. The Screw is readily removable to accomplish this.
3. Since the jet has a considerable larger hole, it can be cleaned with a camels hair brush and gasoline, if the lever, Item (27) is pulled away from contact with the jet.

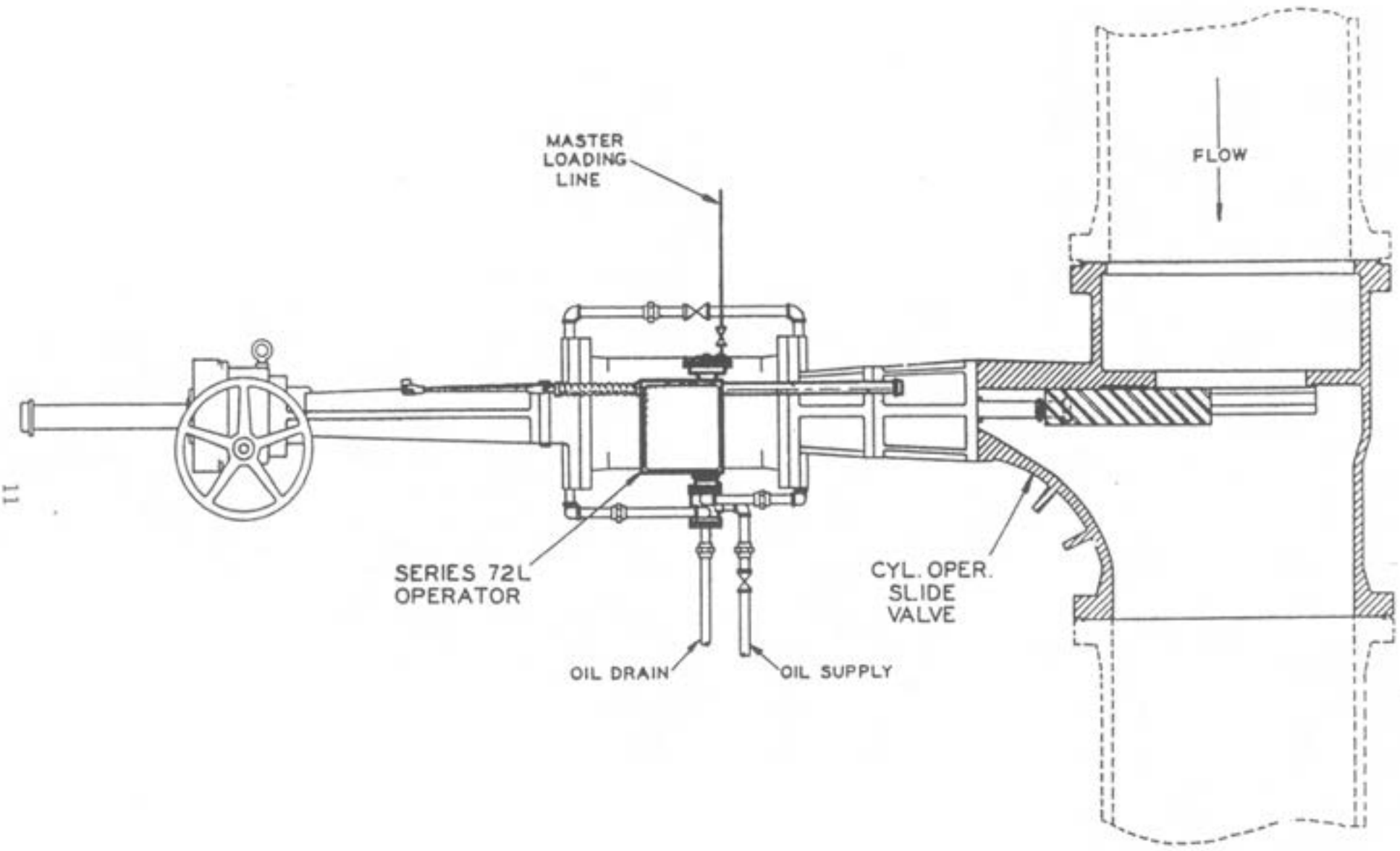
CALIBRATION

With air supply regulated at 20 pounds, it must be possible to obtain the full range of 3 to 15 pounds without the lever, Item (27) actually coming in contact with the jet. To test this out, rotate the cam to full stroke position. Then push Item (27), with the force of the bellows so that Lever, Item (7), Drawing B-755284 will break contact with Spring Item (32) and permit it to seat on the jet. If more than 16 pounds can actually be obtained, it is evident that at 15 pounds, the lever is "floating" and could not be touching the nozzle.

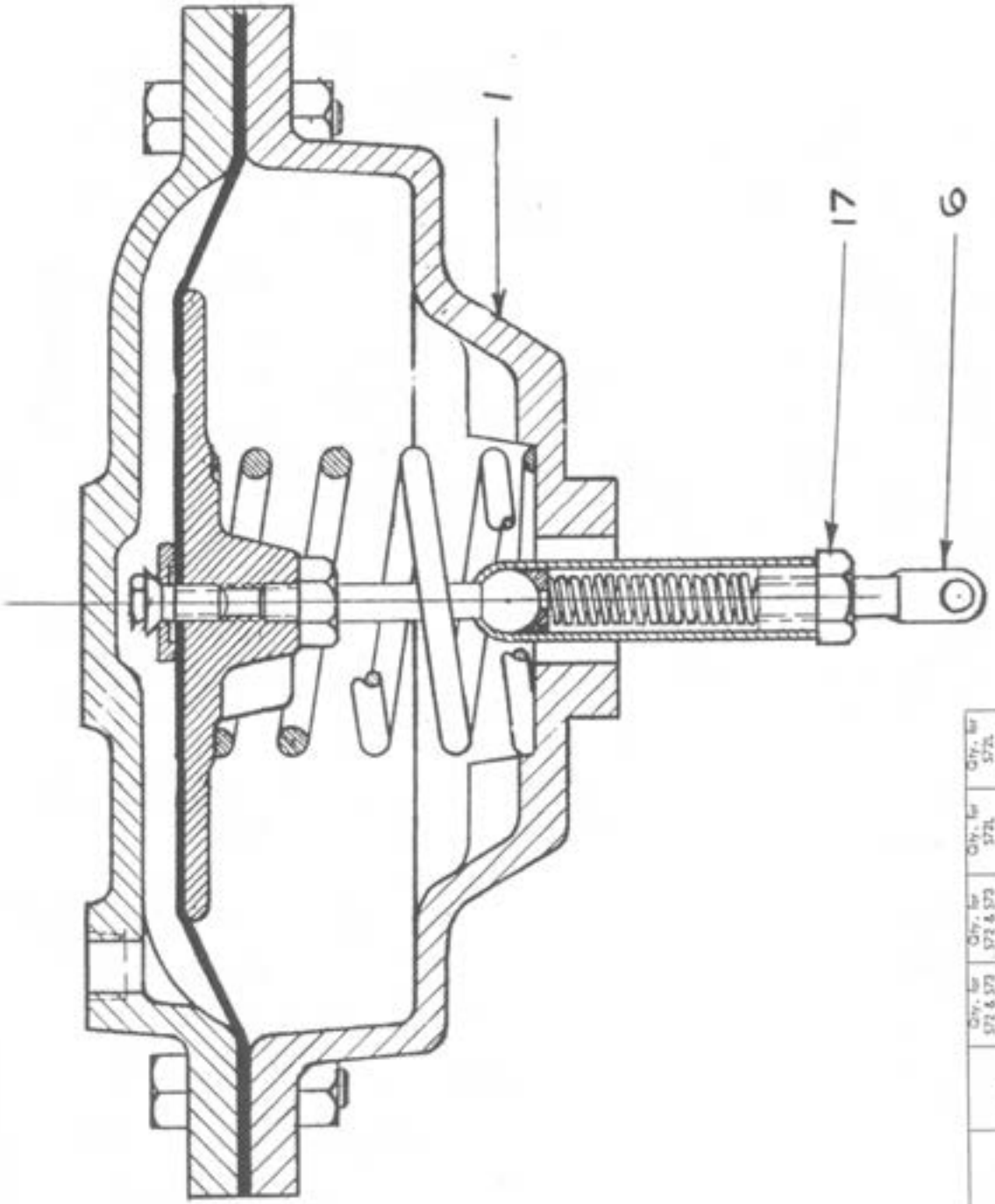
If more than 15 pounds are not obtained, the lever, Item (27) is not parallel to the surface of the jet.

DO NOT draw sand paper between the Lever and Jet, because the thickness of the paper will not make them parallel.

When the pressures are obtainable, check the results at zero, 50% of full stroke position. If the results do not come up to 3, 9 or 15 pounds, the trouble is probably due to improper adjustment of the Spring Adjuster, Item (17). At three (3) pounds starting mark on the cam output should be three (3) pounds at full stroke fifteen (15) pounds. If not at three (3) pounds output, turn Fine Adjusting Screw, Item (40) so that output gauge reads three (3) pounds output. Check at maximum for fifteen (15) pounds output. Check for air leaks at all connections. Reshaping the cam can, of course, be resorted to in order to obtain the desired results. To duplicate results with a given cam shape the above described procedure must, however, be followed. As much as 1 1/2 pounds change in results are obtainable with improper adjustment of the spring.



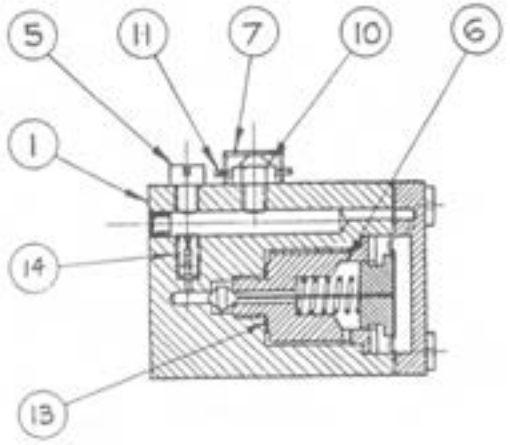
S-72L OPERATOR MOUNTED ON VALVE

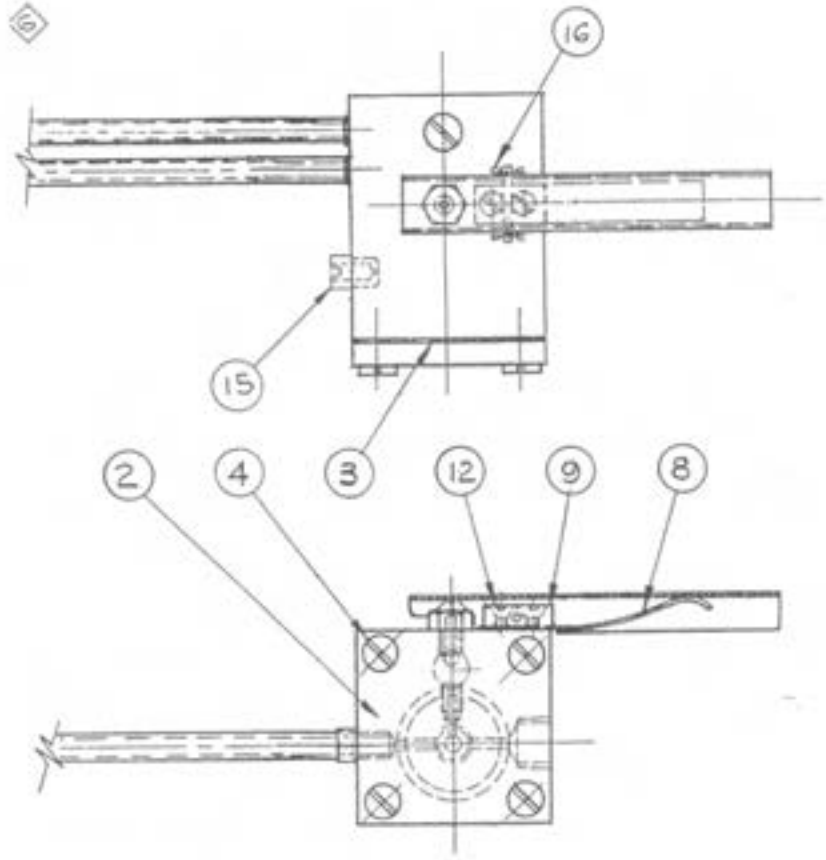


Item	Description	Part Number	Qty. for 572 & 573 3/4" 753471	Qty. for 572 & 573 1 1/4" 753472	Qty. for 572L 1 1/4" 761804	Qty. for 572L 3/4" 761805
1	Loading Diaphragm 1 1/4"	H-710382	0	1	1	0
	Loading Diaphragm 3/4"	H-710381	1	0	0	1
6	Diaphragm Link Adjustment	H-753925	1	1	0	0
	Diaphragm Link Adjustment	H-753924	0	0	1	1
17	Hexagon Head Jam Nut 1/4-20	H-801382	1	1	1	1

PARTS LIST
Drawing B-755284

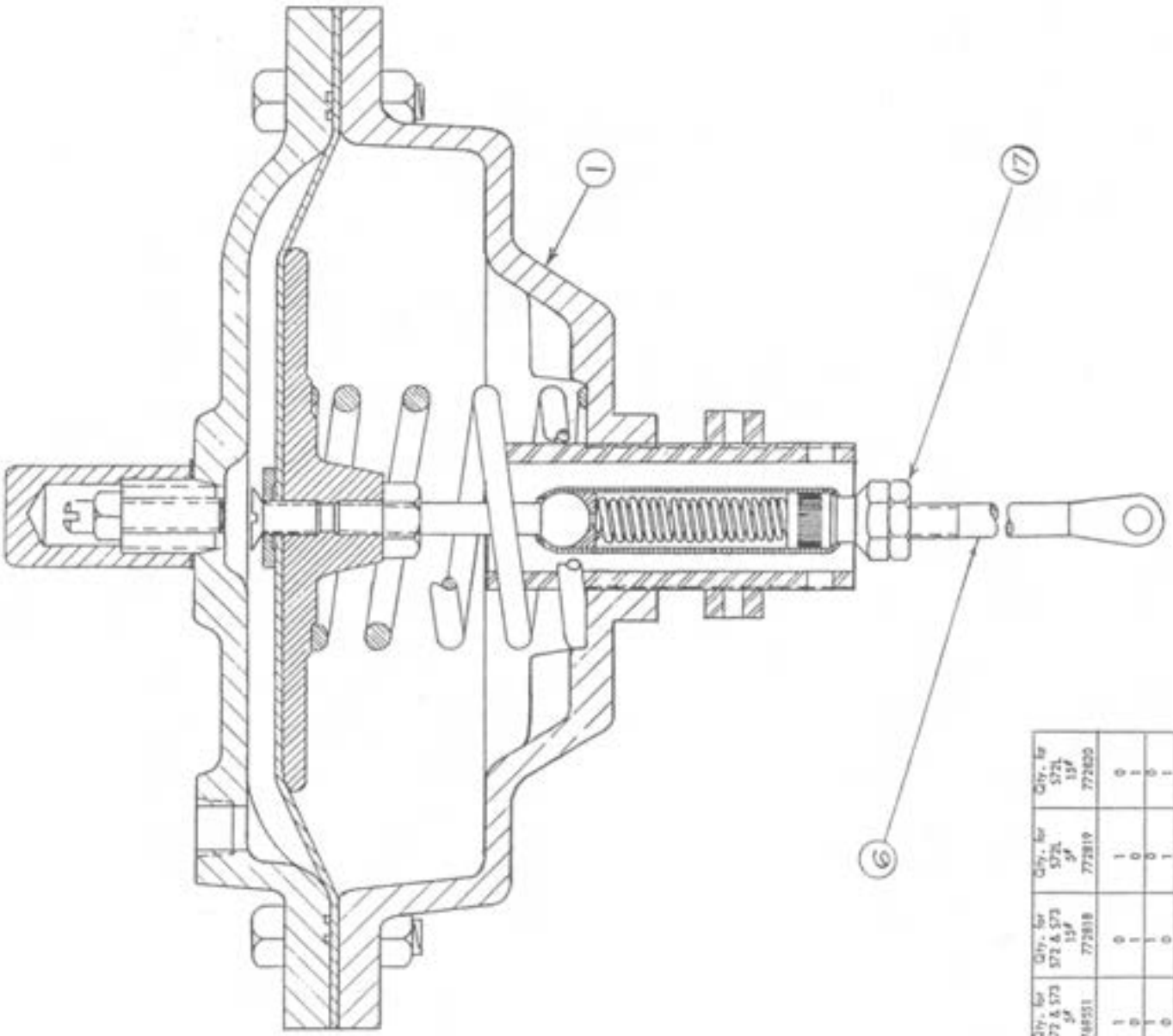
Item	Description	Part Number
1	Valve Body Assembly	H-755282
2	Diaphragm Chamber	H-755283
3	Diaphragm Valve	H-755642
4	Fil. Head Machine Screw #10-32 x 3/8" Lg.	H-803442
5	Fil. Head Machine Screw #10-32 x 1/4" Lg.	1032-8478
6	Valve Seat Assembly	H-755781
7	Baffle	H-757842
8	Baffle Spring	H-758157
9	Baffle Pivot	H-754839
10	Valve Jet	H-755690
11	Cotter Pin with Cotter	H-764449
12	Flat Head Machine Screw #4-40 x 3/8" Lg.	H-816119
13	Valve Spacer	H-758483
14	Orifice Screw	H-755720
15	Orifice Screw Brass	H-755686
16	Cotter Pin	H-860051



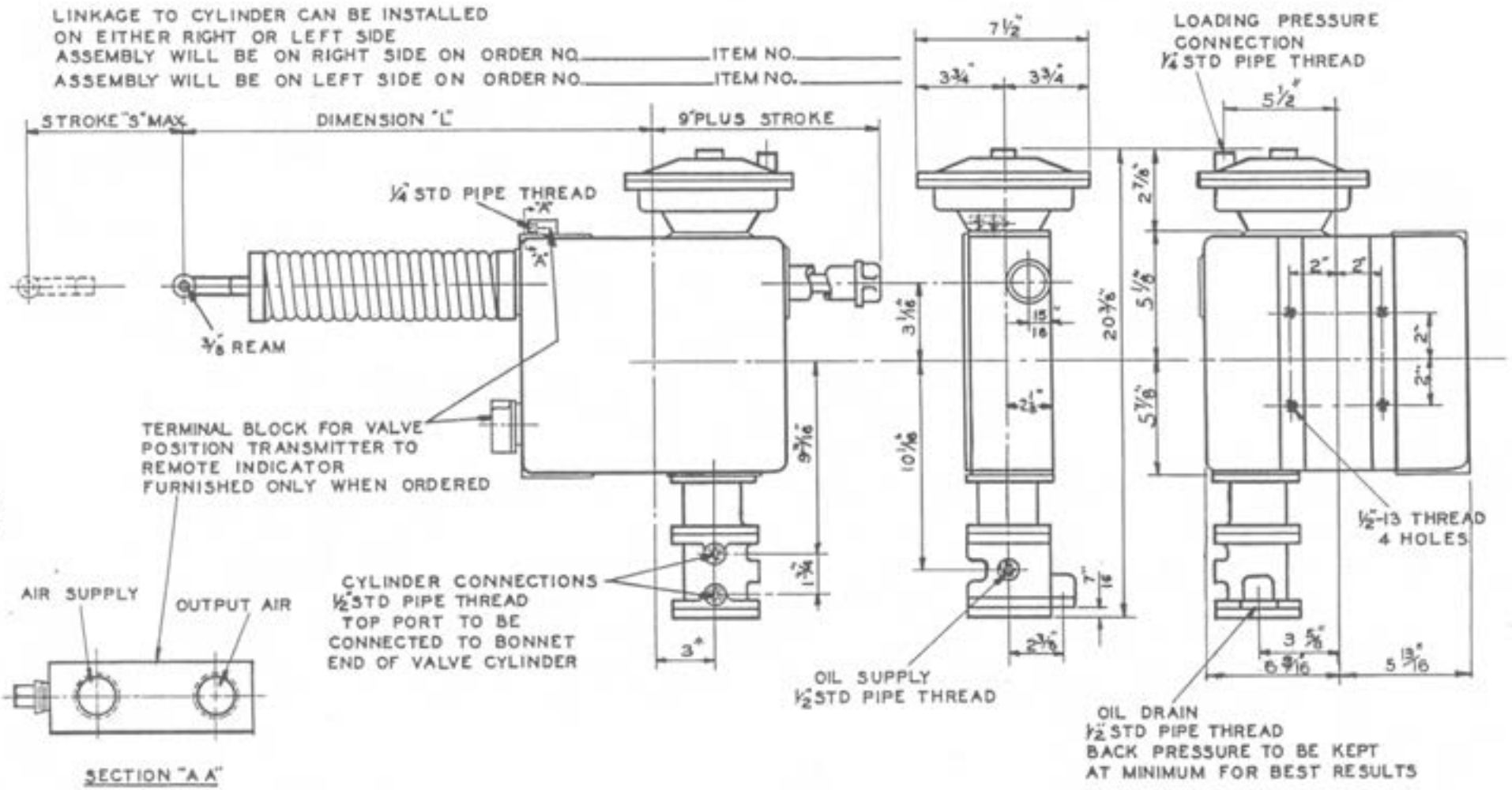


ASSEMBLY PROCEDURE

OMITTING SPACER (13) INSERT VALVE SEAT ASSEMBLY (6) AND SCREW DOWN FIRMLY TO MAKE SEATING SURFACE. REMOVE VALVE SEAT ASSEMBLY AND INSERT SPACER (13). DIAPHRAGM BUTTON SHOULD BE FLUSH WITH BODY ± 1/64. INSERT NOZZLE (9) AND ASSEMBLE BAFFLE. DRAW FINE SAND PAPER BETWEEN THEM WITH ABRASIVE SIDE TOWARD NOZZLE.

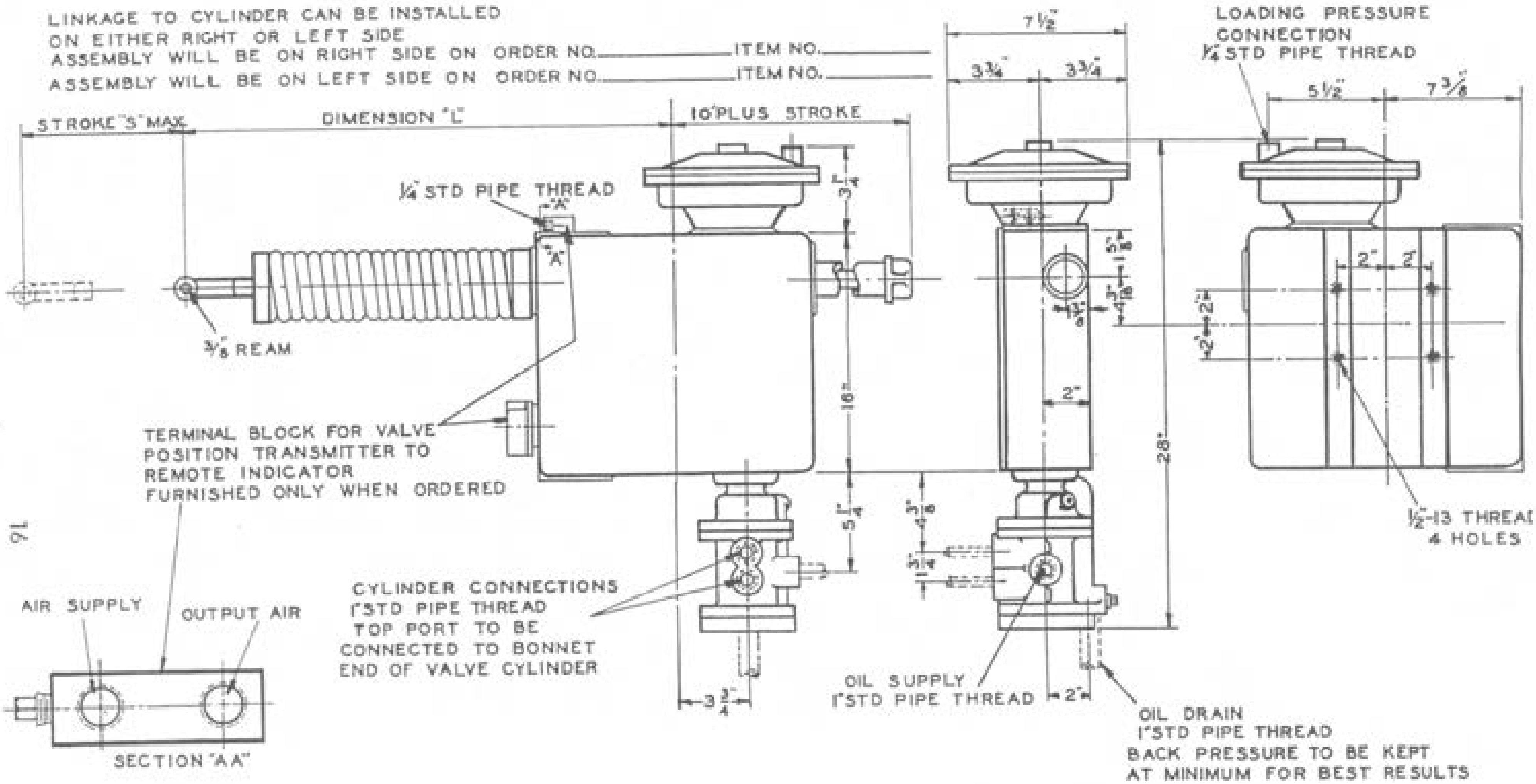


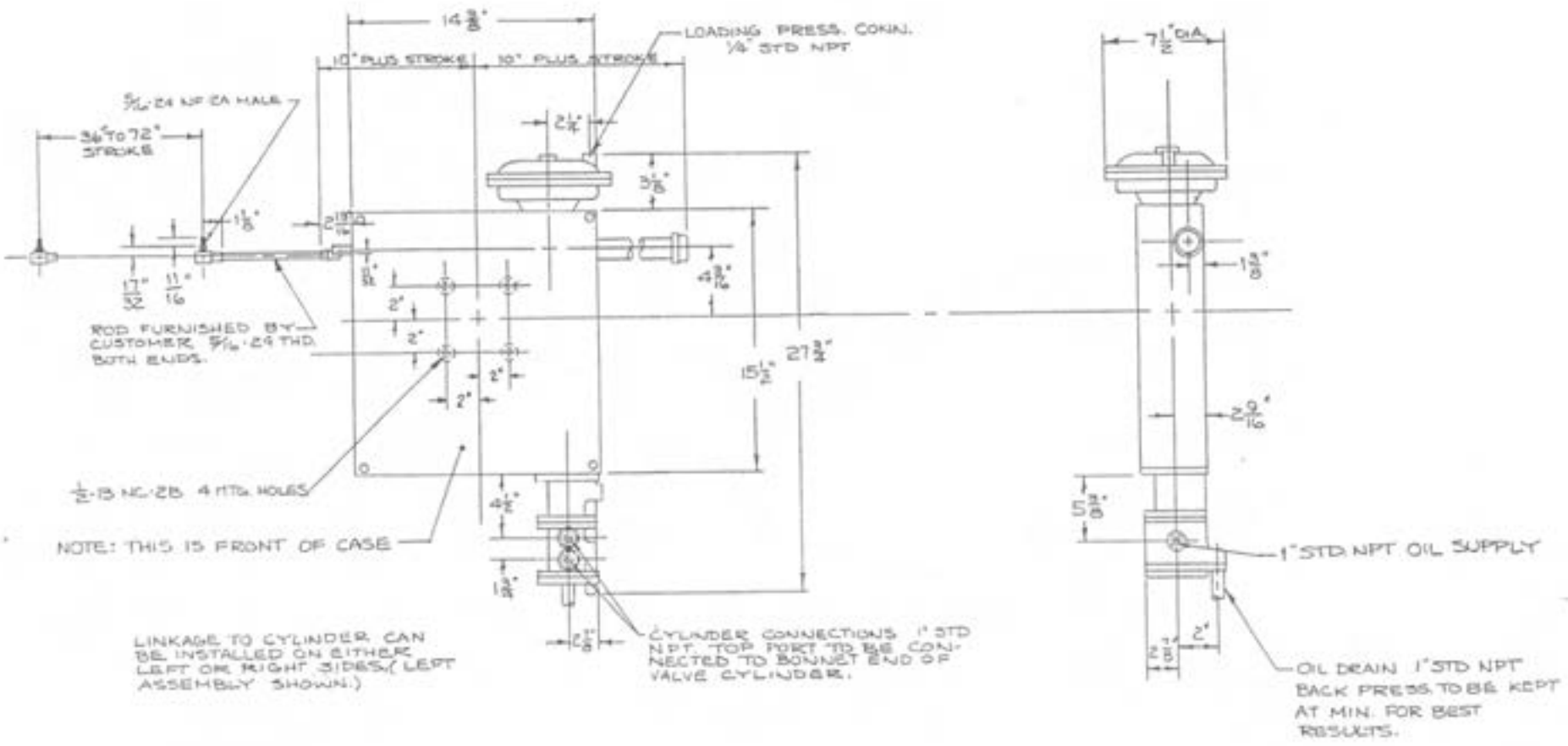
Item	Description	Part Number	Qty. for 572 & 573 5# 748551	Qty. for 572 & 573 15# 773818	Qty. for 572L 5# 773819	Qty. for 572L 15# 773820
1	Diaphragm Loading 5# Diaphragm Loading 15#	H-710279 H-710280	1 0	0 1	1 0	0 1
4	1/4" Adjuster Link Adjuster	H-753975 H-753976	1 0	1 0	0 1	0 1
17	Jam Nut 1/4-28	H-801082	1	1	1	1

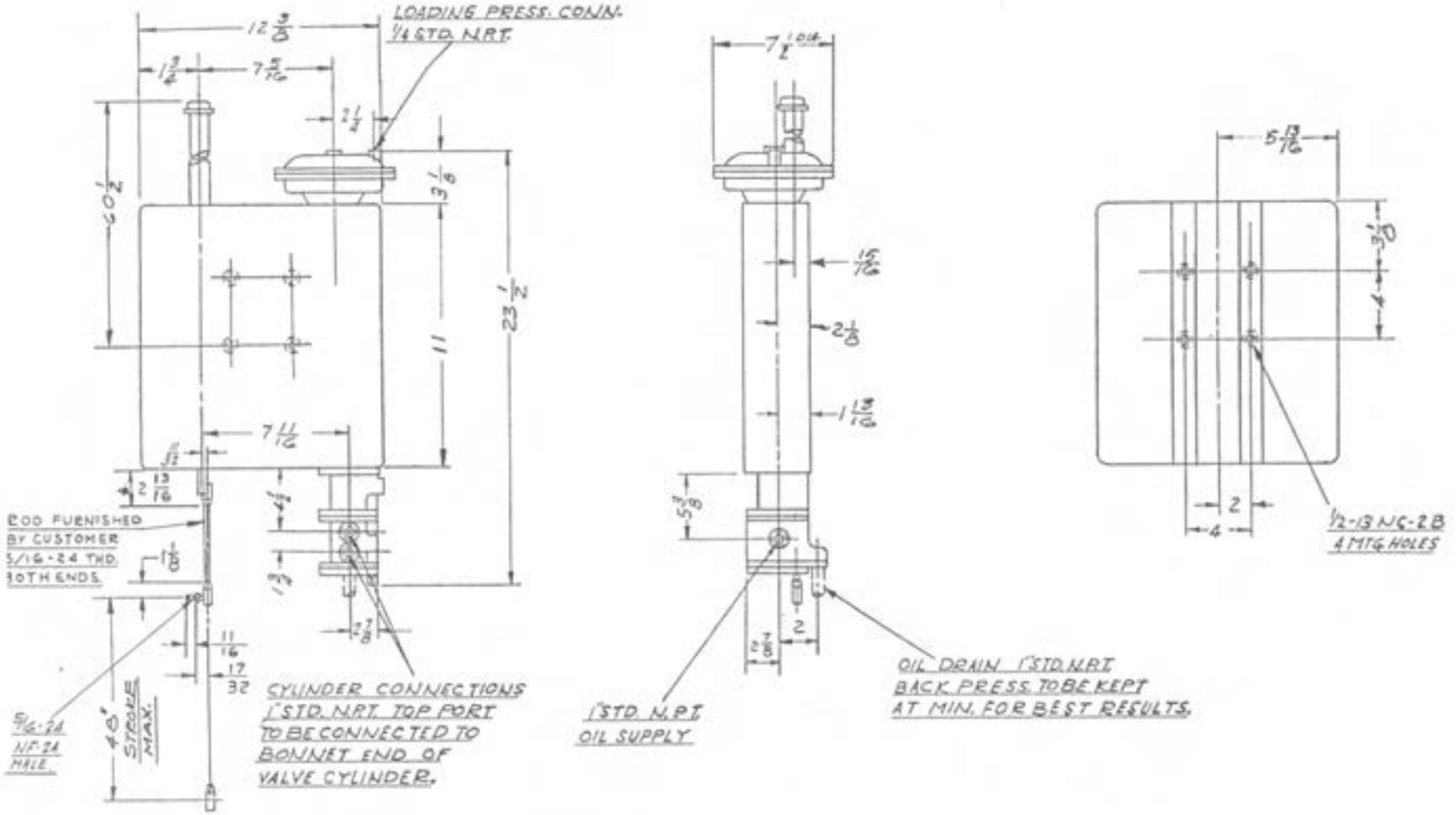


LINKAGE NO.	"S" MAX	"L"
3	18"	21" TO 24"
2	12"	18" TO 21"
1	7"	15" TO 18"

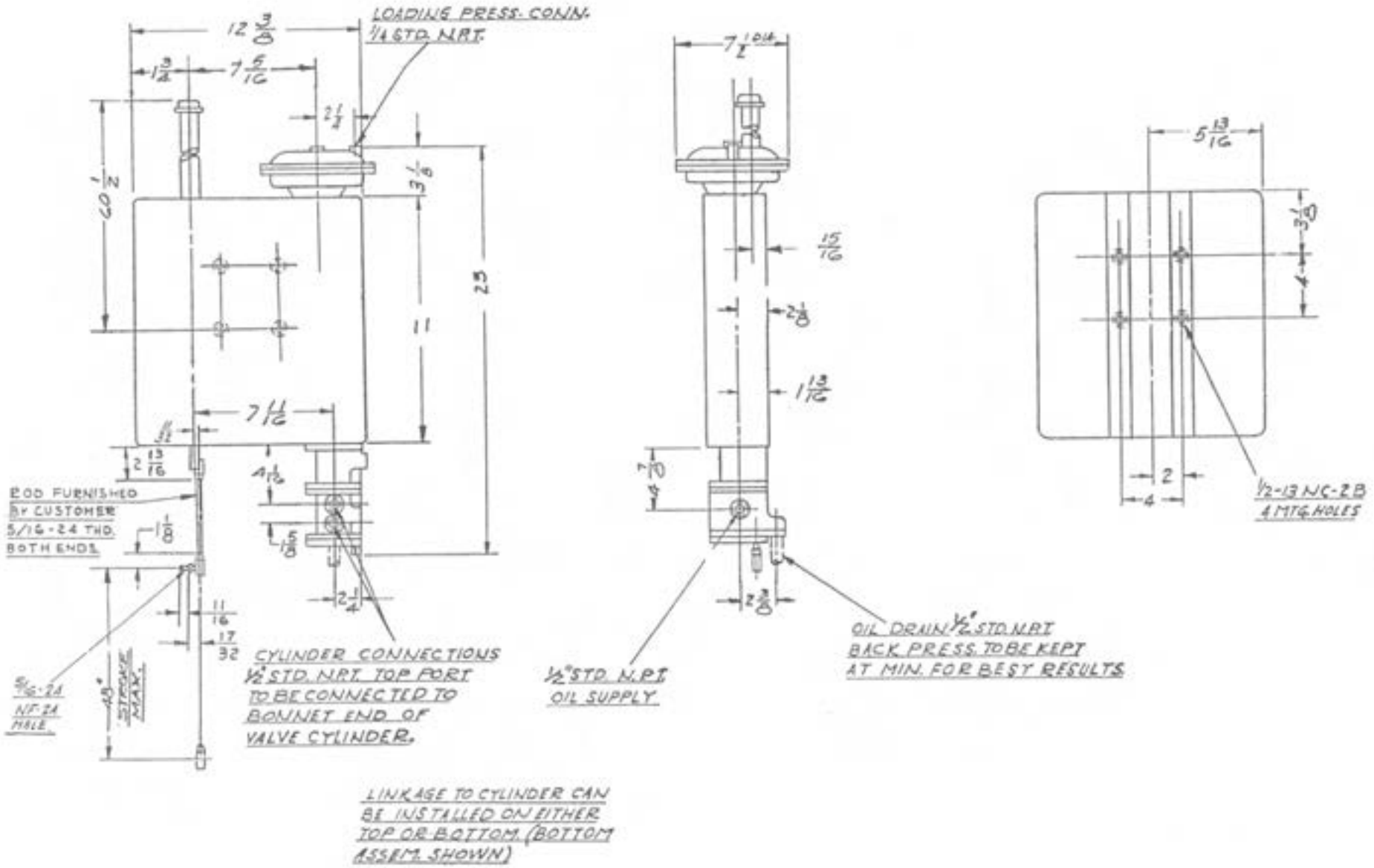
TABLE OF DIMENSIONS


LINKAGE TO CYLINDER CAN BE INSTALLED
ON EITHER RIGHT OR LEFT SIDE
ASSEMBLY WILL BE ON RIGHT SIDE ON ORDER NO.______ITEM NO.______
ASSEMBLY WILL BE ON LEFT SIDE ON ORDER NO.______ITEM NO.______
STROKE "S" MAX
DIMENSION "L"
10" PLUS STROKE
1/4" STD PIPE THREAD
"A"
"A"
3/8" REAM
TERMINAL BLOCK FOR VALVE
POSITION TRANSMITTER TO
REMOTE INDICATOR
FURNISHED ONLY WHEN ORDERED
AIR SUPPLY
OUTPUT AIR
SECTION "AA"
CYLINDER CONNECTIONS
1" STD PIPE THREAD
TOP PORT TO BE
CONNECTED TO BONNET
END OF VALVE CYLINDER
16"
7 1/2"
3 3/4"
3 3/4"
2"
28"
2"
OIL SUPPLY
1" STD PIPE THREAD
OIL DRAIN
1" STD PIPE THREAD
BACK PRESSURE TO BE KEPT
AT MINIMUM FOR BEST RESULTS
LOADING PRESSURE
CONNECTION
1/4" STD PIPE THREAD
5 1/2"
7 3/8"
2"
2"
1/2"-13 THREAD
4 HOLES


14 3/8"
10" PLUS STROKE
10" PLUS STROKE
LOADING PRESS. CONN. 1/4" STD NPT
5/16-24 NF-2A MALE
36" TO 72" STROKE
2 1/4"
3 1/8"
1 1/8"
2 1/8"
17/32"
11/16"
4 3/16"
2"
2"
2"
2"
ROD FURNISHED BY CUSTOMER 5/16-24 THD. BOTH ENDS.
15 1/2"
27 3/4"
1/2-13 NC-2B 4 MTG. HOLES
NOTE: THIS IS FRONT OF CASE
4 1/2"
1 3/4"
2 1/8"
CYLINDER CONNECTIONS 1" STD N.P.T. TOP PORT TO BE CONNECTED TO BONNET END OF VALVE CYLINDER.
LINKAGE TO CYLINDER CAN BE INSTALLED ON EITHER LEFT OR RIGHT SIDES. (LEFT ASSEMBLY SHOWN.)
7 1/2" DIA.
1 3/8"
2 9/16"
5 3/8"
1" STD. NPT OIL SUPPLY
2"
2 1/8"
OIL DRAIN 1" STD NPT BACK PRESS. TO BE KEPT AT MIN. FOR BEST RESULTS.



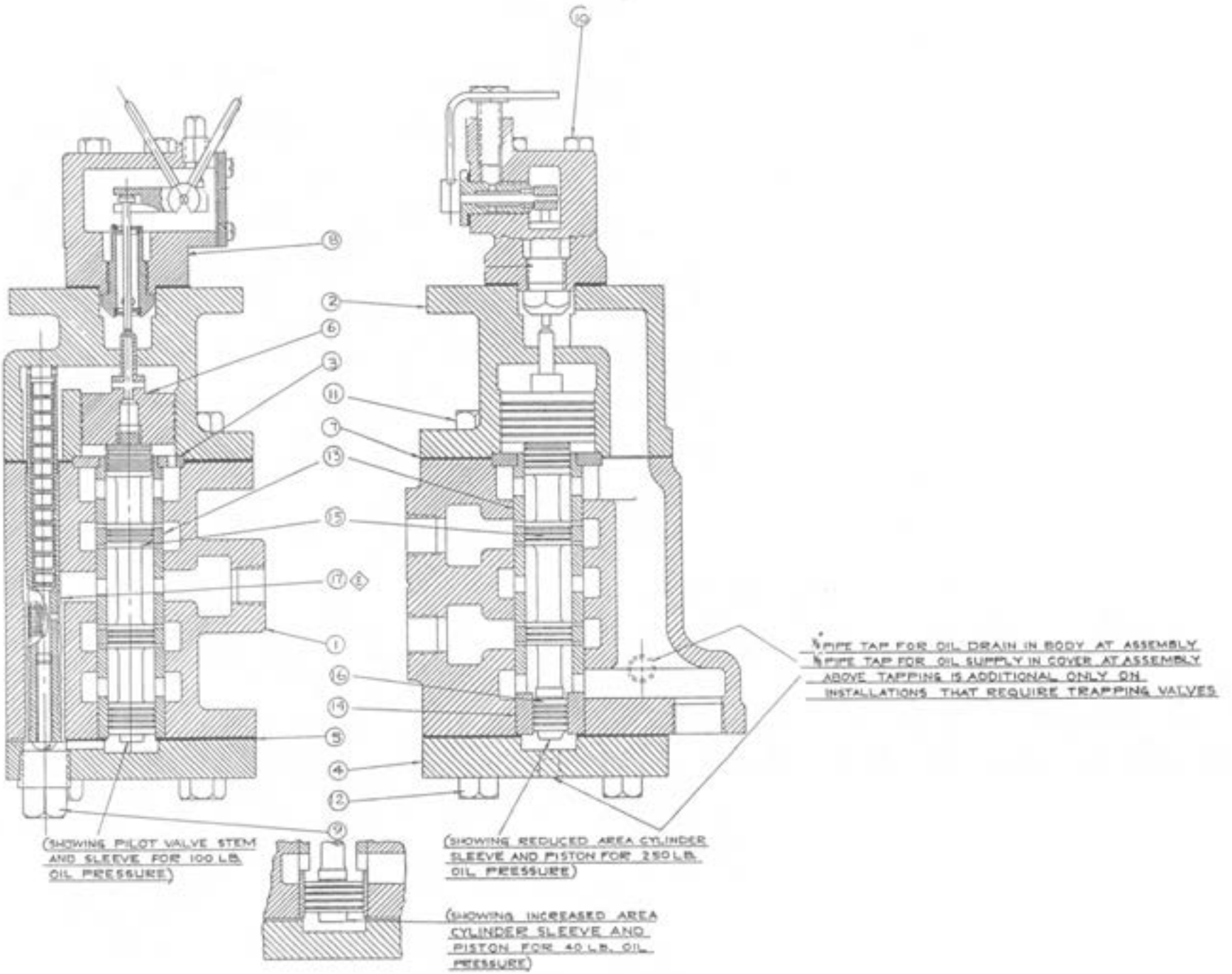
LINKAGE TO CYLINDER CAN BE INSTALLED ON EITHER TOP OR BOTTOM. (BOTTOM ASSEM. SHOWN)



LINKAGE TO CYLINDER CAN BE INSTALLED ON EITHER TOP OR BOTTOM. (BOTTOM ASSEM. SHOWN)

PARTS LIST
Drawing C-758994

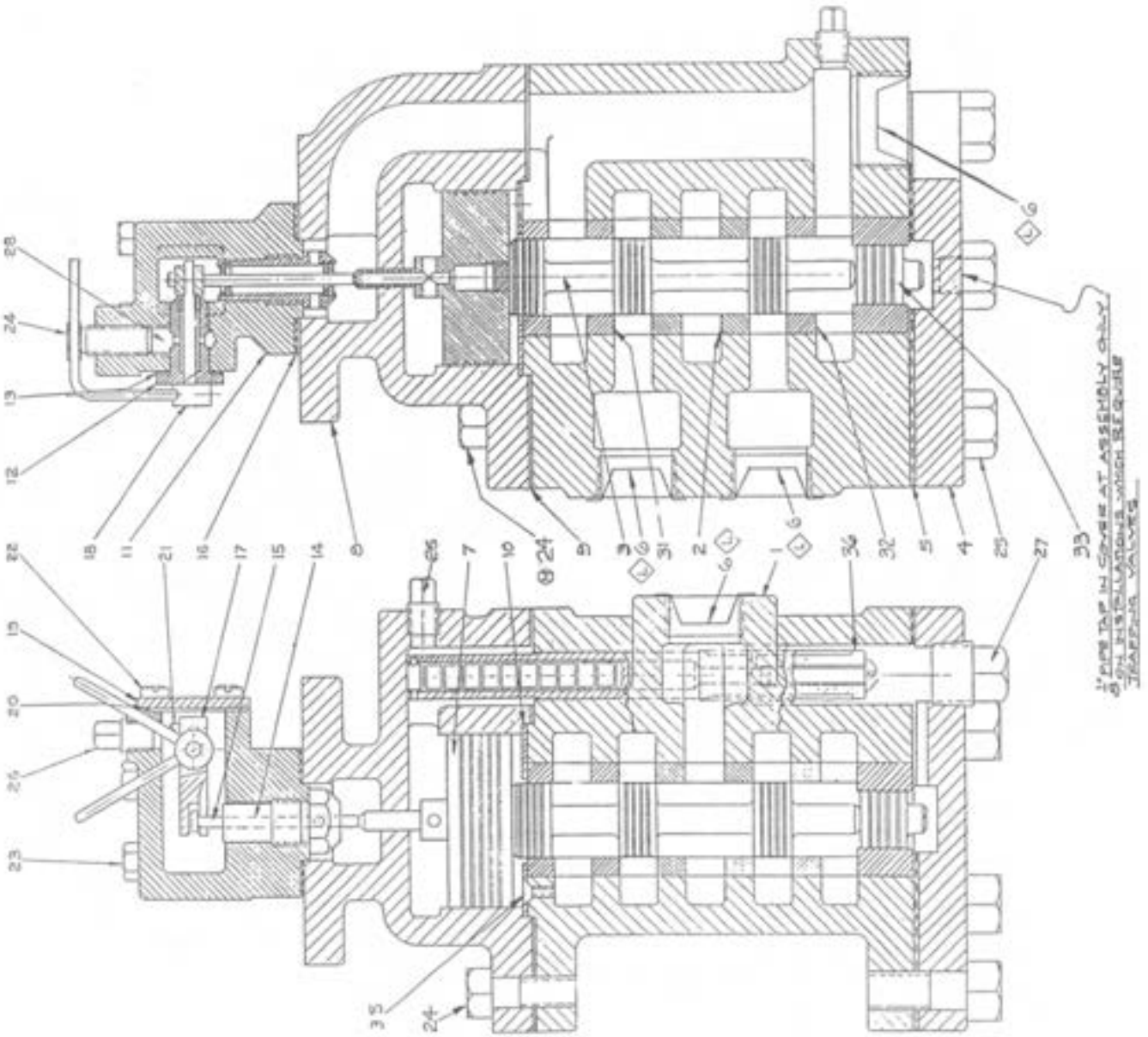
Item	Description	Part Number	-E01 Qty. for 30 - 74 PSI H-758994	-E02 Qty. for 75 - 149 PSI H-771937	-E03 Qty. for 150 - 250 PSI H-771938
1	Pilot Valve Port Body	H-758976	1	1	1
2	Pilot Valve Cylinder Body	H-758978	1	1	1
3	Port Sleeve Retainer	H-755431	1	1	1
4	Pilot Valve Cover	H-758980	1	1	1
5	Cover Gasket	H-757255	1	1	1
6	Amplifier Piston	H-758953	1	1	1
7	Cylinder Gasket	H-757254	1	1	1
8	Seal Assembly	H-758995	1	1	1
9	Steel Pipe Plug 1/2"	H-756277	1	1	1
10	Hexagon Head Bolt 1/4-20 x 2 1/2	H-866093	4	4	4
11	Hexagon Head Bolt 3/8-16 x 1	H-848569	4	4	4
12	Hexagon Head Bolt 3/8-16 x 1 1/4	H-866094	4	4	4
13	Port Sleeve - 125 Cu. In.	H-758930	1	-	-
	Port Sleeve - 180 Cu. In.	H-758927	-	1	-
	Port Sleeve - 250 Cu. In.	H-763348	-	-	1
14	Cylinder Sleeve	H-771933	1	-	-
	Cylinder Sleeve	H-758932	-	-	1
15	Port Stem	H-758956	1	-	1
	Port Stem	H-758952	-	1	-
16	Cylinder Piston	H-758957	1	-	-
	Cylinder Piston	H-758954	-	-	1
17	~~Restricting~~ Orifice Assembly 3 CUP	H-755716	1	-	-
	Orifice Assembly 7 CUP	H-772387	-	1	-
	Orifice Assembly 19 CUP	H-772388	-	-	1


(9)
(8)
(2)
(6)
(3)
(11)
(7)
(13)
(15)
(17) (2)
(1)
(16)
(14)
(5)
(4)
(12)
(9)
(SHOWING PILOT VALVE STEM AND SLEEVE FOR 100 LB. OIL PRESSURE)
(SHOWING REDUCED AREA CYLINDER SLEEVE AND PISTON FOR 250 LB. OIL PRESSURE)
(SHOWING INCREASED AREA CYLINDER SLEEVE AND PISTON FOR 40 LB. OIL PRESSURE)
* PIPE TAP FOR OIL DRAIN IN BODY AT ASSEMBLY
* PIPE TAP FOR OIL SUPPLY IN COVER AT ASSEMBLY
ABOVE TAPPING IS ADDITIONAL ONLY ON INSTALLATIONS THAT REQUIRE TRAPPING VALVES

PARTS LIST
Drawing D-768697

-E04 -E05

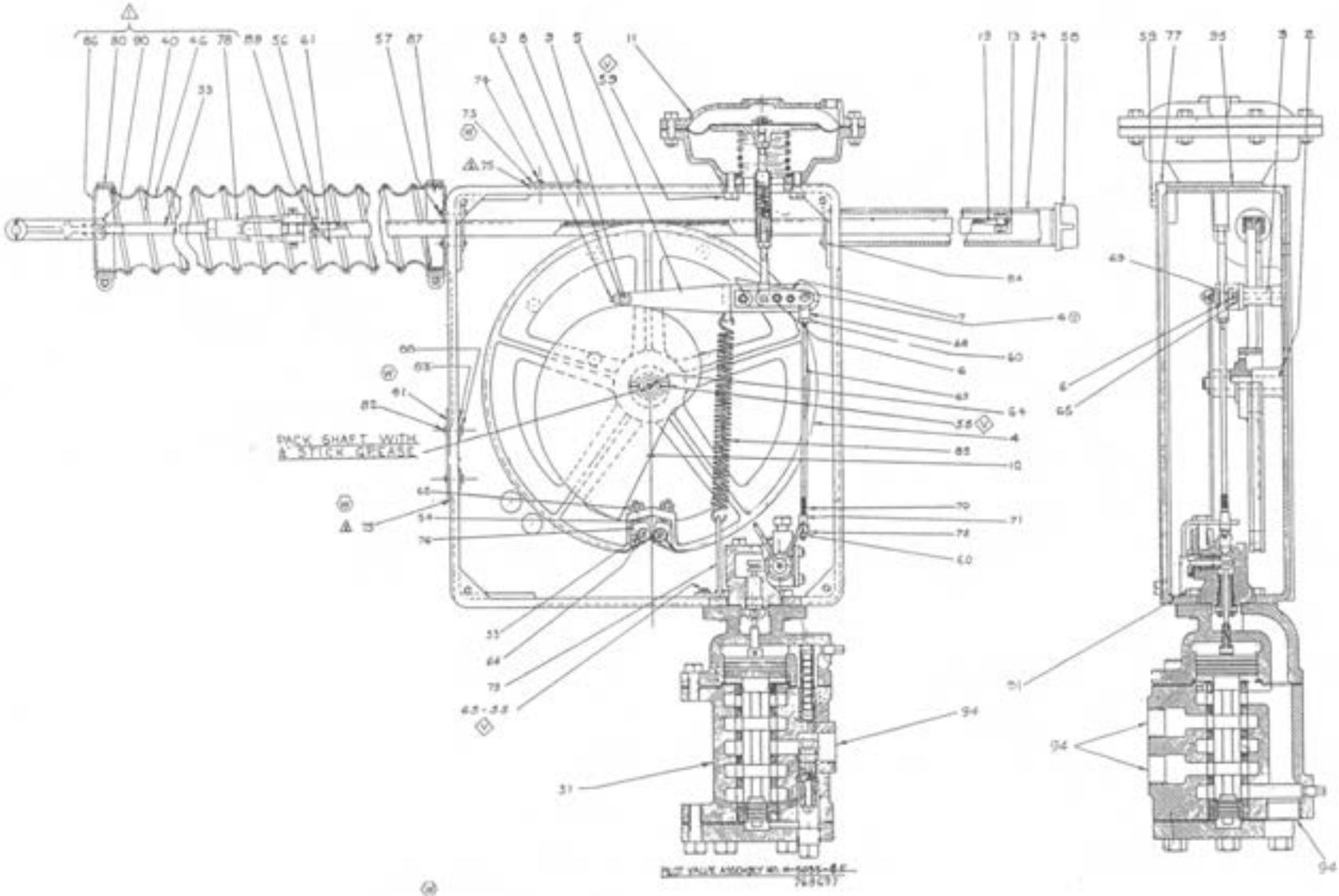
Item	Description	Part Number	Qty. for 75 - 150 H-768697	Qty. for 150 - 250 H-771408
1	Pilot Valve Port Body	H-758965	1	1
2	Pilot Valve Center Sleeve Sec.	H-768992	1	1
3	Pilot Valve Stem	H-758951	1	1
4	Pilot Valve Cover	H-758970	1	1
5	Gasket Cover	H-757252	1	1
6	Protective Closure	H-817978	4	4
7	Amplifier Piston	H-758948	1	1
8	Cylinder Body	H-758968	1	1
9	Gasket Cylinder	H-757253	1	1
10	Port Sleeve Retainer	H-755428	1	1
11	Body Seal	H-758971	1	1
12	Grease Soil Bearing	H-755776	1	1
13	Closed Type Gasket	H-848261	1	1
14	Stem Guide Assembly	H-765658	1	1
15	Multiplying Valve Stem	H-755779	1	1
16	Gasket Body Seal	H-757256	1	1
17	Multiplying Valve Lever	H-758947	1	1
18	Multiplying Valve Op. Lever	H-757697	1	1
19	Seal Body Cover	H-753730	1	1
20	Gasket Cover Seal	H-757248	1	1
21	Machine Screw 6-32 x 3/8	1032-355	1	1
22	Machine Screw 10-32 x 3/8	1032-488	4	4
23	Hexagon Bolt 1/4-20 x 2 1/2	1032-541	4	4
24	Hexagon Bolt 3/8-16 x 1"	H-848569	6	6
25	Hexagon Bolt 1/2-13 x 1 1/4	1032-601	6	6
26	Pipe Plug 1/8"	H-007743	2	2
27	Pipe Plug 1/2"	H-054235	1	1
28	Lubricant	H-866300	A/R (1)	A/R (1)
31	Upper Sleeve Section	H-758928	1	1
32	Lower Sleeve Section	H-758929	0	1
	Lower Sleeve Section	H-758933	1	0
33	Stem Pressure Piston	H-758955	0	1
	Stem Pressure Piston	H-758957	1	0
35	Machine Screw FT 10-32	1032-469	4	4
36	Orifice Assembly 7cup	H-772387	1	0
	Orifice Assembly 19cup	H-772388	0	1


1" PIPE TAP IN CYLINDER AT ASSEMBLY ONLY
FOR INSTALLATIONS WHICH REQUIRE
TRAPPING VALVES

PARTS LIST
Drawing D-769210

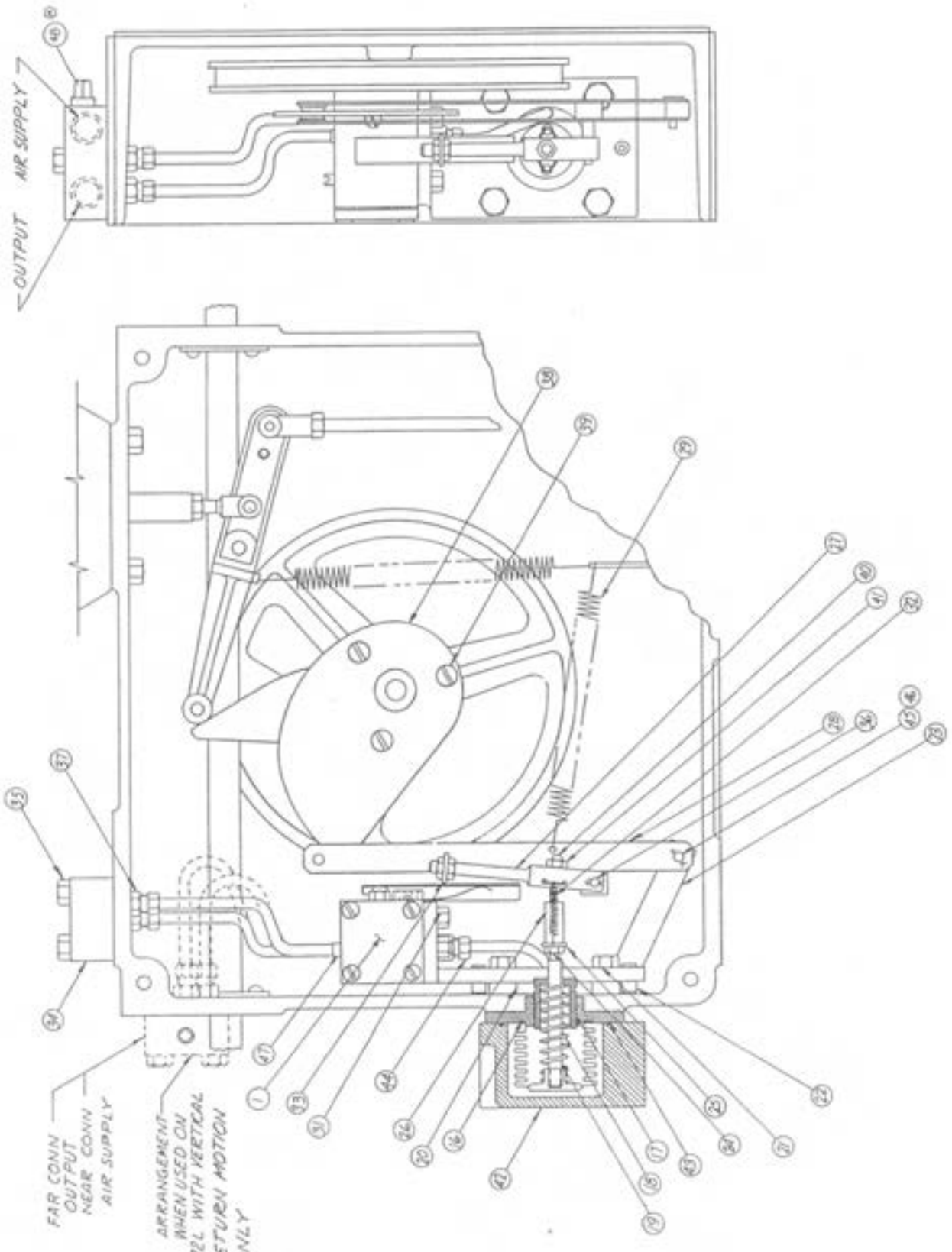
Item	Description	Part Number
2	Pulley Shaft	H-755626
3	Pivot Stud	H-758756
4	Pulley	H-755828
5	Cam Follower Level	H-755822
6	Self Locking Nut	H-838115
7	Pilot Valve Balancing Lever	H-755801
8	Cam Roller	H-752982
9	Cam Roller Shaft	H-755595
10	Cam Blank	H-755429
11	Loading Diaphragm Ass H772819 Sel (1) 5#	H-753471
	Loading Diaphragm Ass H772820 Grp 1, 15#	H-753472
13	Slider Channel 12"	H-755857
	Slider Channel 18"	H-755858
	Slider Channel 24" Sel (1) Grp 2	H-755859
	Slider Channel 30"	H-755860
	Slider Channel 36"	H-755861
19	Return Motion Cable 12"	H-755852
	Return Motion Cable 18"	H-755853
	Return Motion Cable 24" Sel (1) Grp 3	H-755854
	Return Motion Cable 30"	H-755855
	Return Motion Cable 36"	H-762918
24	Protecting Tube 12"	H-755634
	Protecting Tube 18"	H-755635
	Protecting Tube 24" Sel (1) Grp 4	H-755636
	Protecting Tube 30"	H-762635
	Protecting Tube 36"	H-762636
31	Pilot Valve 75-150 PSIG LARGE	H-768697
	Pilot Valve 150-250 PSIG Sel (1) Grp 5	H-771408
33	Clevis Rod 8 1/2"	H-755629
	Clevis Rod 11 1/2"	H-755630
	Clevis Rod 14 1/2" Sel (1) Grp 6	H-755631
	Clevis Rod 23 1/2"	H-755632
	Clevis Rod 17 1/2"	H-762631
	Clevis Rod 29 1/2"	H-762632
40	Dust Boot Spring 12"	H-758079
	Dust Boot Spring 18"	H-758080
	Dust Boot Spring 24" Sel (1) Grp 7	H-758081
	Dust Boot Spring 30"	H-758082
	Dust Boot Spring 36"	H-758083
46	Dust Boot 12"	H-755880
	Dust Boot 18"	H-755881
	Dust Boot 24" Sel (1) Grp 8	H-755882
	Dust Boot 30"	H-755883
	Dust Boot 36"	H-755884

Item	Description	Part Number
53	Machine Screw 8-32 x 1/4	H-809941
54	Set Screw 8-32 x 1"	H-809949
55	Machine Screw 10-32 x 3/8	H-809975
56	Machine Screw 1/4-20 x 5/8	H-816108
57	Machine Screw 8-32 x 1/4	H-809953
58	Pipe Cap Fitting	H-854735
59	Hexagon Bolt 5/16-18 x 3/4	H-827869
60	Hexagon Nut 10-32	H-808588
61	Regular Nut 1/4-20	H-801682
62	Regular Nut 8-32	H-801665
63	Set Screw 8-32 x 5/16	H-828463
64	Set Screw 1/4-20 x 1/4	H-828469
65	Flat Washer #10	H-802141
66	Cable Clamp Washer	H-758312
67	Connector Rod	H-756546
68	Connecting Rod Adjuster	H-753915
69	Pilot Valve Link Secur. Plate	H-757882
70	Link Connector Spring	H-758090
71	M. V. Linkage End	H-757883
72	Clamping Washer	H-758311
73	Top Cover	H-710143
74	Screw 5/16-18	1032-565R
75	Black RTV	1170-020N
76	Cable Clamp	H-758623
77	Positioning Regulator Cover	H-755667
78	Female Clevis	H-753414
79	Cam Follower Spring Anchor	H-755430
80	Hose Clamp	H-824265
81	Side Cover	H-710144
82	Screw	1032-546R
83	Flat Washer 1/4 x 11/16 O.D.	1036-135R
84	Channel Seal Plate	H-755426
85	Cam Follower Spring	H-758119
86	Dust Boot End	H-755875
87	Dust Boot End	H-755876
88	Hexagon Nut 1/4-20	1034-149R
89	Flat Washer 1/4	H-765093
90	Regular Nut 3/8-16	H-801698
91	Hexagon Bolt 3/8-16 x 5/8	H-848566
92	Indicating Relay	H-772551
93	Shipping Kit	H-772156
94	Protective Closure 1" NPT	H-866751
95	Positioning Regulator Case	H-754652
	Positioning Regulator Case Sel (1) Grp 9	H-772519


PACK SHAFT WITH A STICK GREASE
PILOT VALVE ASSEMBLY NO. H-64955-6 E
APPLY SMALL BEAD OF RTV AROUND OUTSIDE OF HOLES SO WHEN COVER IS ATTACHED IT BECOMES WEATHER-TIGHT
SHIPPING PREPARATION PROCEDURES:
A. REMOVE PRE-ASSEMBLED COMPONENTS FOR SHIPMENT BY DISCONNECTING CLEVIS PIN OF ITEM 78 AND ITEM 80 STRAP NEAR CASE ASSY. REASSEMBLE CLEVIS PIN WITH COTTER KEY IN SLIDER CHANNEL FOR SHIPMENT.
B. DRAIN ALL FLUID FROM VALVE AND PLUG OPENINGS WITH PROTECTIVE CAPS/PLUGS.

PARTS LIST
Drawing D-769552

Item	Description	Part Number	-F02 Qty. for S-72L H772551	-F01 Qty. for S-72, S-73 H 769552
1	Control Valve Assembly	H-755284	1	1
16	Bellows Assembly	H-755280	1	1
17	Spring Adjuster	H-755590	1	1
18	Pressure Spring	H-758000	1	1
19	Bellows Stem	H-755639	1	1
20	Chamber Spacer	H-758482	4	4
21	Machine Screw 1/4-20 x 1 1/4	1032-536R	4	4
22	Set Screw 1/4-20 x 3/4	1032-821R	2	2
23	Mounting Bracket	H-754665	1	1
24	Full Nu 10-32	H-834623	3	3
25	Anchor Plate	H-755436	1	1
26	Connecting Nut Assembly	H-757622	1	1
27	Valve Lever Assembly	H-755818	1	1
28	Follower Lever	H-755819	1	1
29	Spring	H-758119	1	1
31	Cap Screw 1/4-20 x 1/2	1032-531R	2	2
32	Lever Spring	H-758089	2	2
33	Slider Ring	H-754071	1	1
34	Terminal Block	H-756709	1	1
35	Machine Screw 5/16-18 x 1	1032-569R	2	2
36	Brass Cotter Pin 1/32 x 3/8	H-866233	1	1
37	Connector	H-854758	2	2
38	Blank Cam, small	H-755437	0	1
	Blank Cam, large	H-755451	1	0
39	Machine Screw 10-32 x 3/8	1032-488R	2	2
40	Pivot Screw	H-750440	1	1
41	Lock Nut	H-750438	1	1
42	Bellows Chamber	H-755255	1	1
43	"O" Ring .070 1 7/8 x 2	H-854521	1	1
44	Connector	H-854757	1	1
45	Shoulder Pin	H-757161	1	1
46	Brass Cotter Pin 1/16 x 1/2	H-860073	1	1
47	Orifice Screw	H-755686	1	1
48	Pipe Plug 1/4" NPT	H-854582	1	1

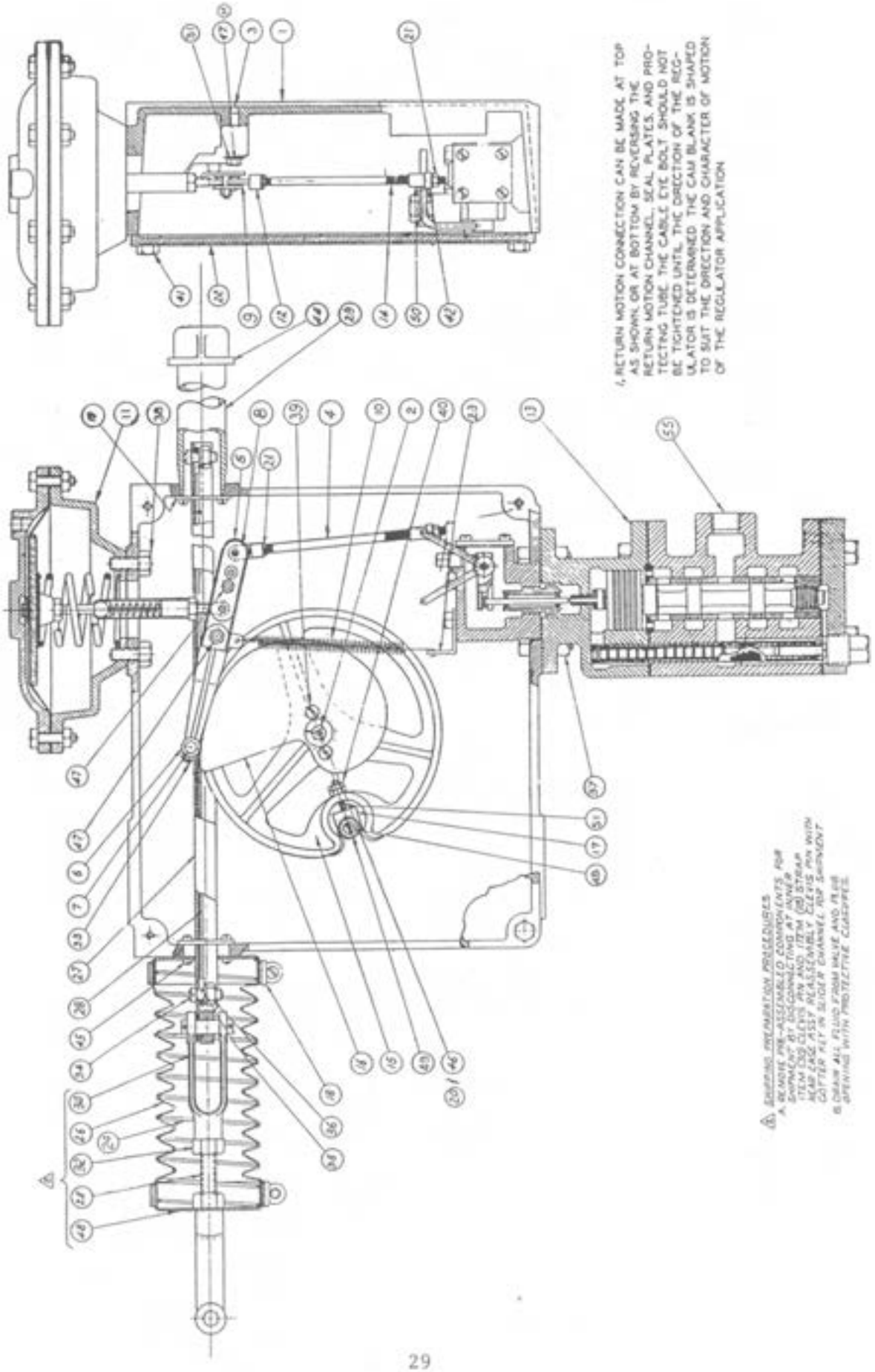

OUTPUT AIR SUPPLY
FAR CONN OUTPUT
NEAR CONN AIR SUPPLY
ARRANGEMENT WHEN USED ON 72L WITH VERTICAL RETURN MOTION ONLY

PARTS LIST
Drawing D-771932

Item	Description	Part Number
1	Positioning Regulator Case	H-769862
2	Pulley Shaft	H-755594
3	Pivot Stud	H-758755
4	Connector Rod	H-756545
5	Cam Follower Lever Assembly	H-755802
6	Cam Roller	H-752982
7	Cam Roller Shaft	H-755595
8	Pilot Valve Balancing Assembly	H-755801
9	Pilot Valve Linkage Securing Plate	H-757882
10	Cam Follower Spring	H-758119
11	Loading Diaphragm Ass. 5 PSIG - H710279 Sel (1) Gr. (1) . 15 PSIG - H710280	~~H-758471~~ ~~H-752472~~
12	Connecting Rod End	H-753915
13	S-72 Pilot Valve Ass (Sel (1) 758994, 771937, 771938	~~758994~~
14	Link Connector Spring	H-758090
15	Pulley	H-755824
16	Cam Blank	H-755419
17	Cable Clamp	H-758623
18	Hose Clamp	H-824265
19	Channel Seal Plate	H-755426
20	Lubricant 5/16" Dia.	H-866300
21	Hexagon Nut #10-32	H-808588
22	Positioning Regulator Cover	H-755660
23	Spring Anchor Bracket	H-758225
30	clevis w/out pin	H-753414

Item	Description	Part Number
31	Washer #10	H-802141
32	Hexagon Nut 3/8" -16	H-812625
33	Cup Point Headless Set Screw #10-32 x 1/4" lg	H-816177
34	Round Head Screw 1/4" -20 x 5/8" lg.	H-816108
35	Wrought Iron Washers	H-765093
36	Hexagon Nut 1/4" -20	H-808589
37	Hexagon Head Bolt & Nuts 3/8" -16 x 1" lg.	H-828026
38	Hexagon Head Bolt 5/16 -18 x 3/4" lg.	H-827869
39	Round Head Screw #10-32 x 3/8" lg.	H-809975
40	Hexagon Nut #8-32	H-801665
41	Hexagon Head Bolt 1/4" -20 x 1/2" lg.	H-827755
42	Clamping Washer	H-758311
43	Cable Clamp Washer	H-758312
44	Iron Pipe Cap	H-854735
45	Pan Head Screw #8-32 x 1/4" lg.	H-809941
46	Cup Point Headless Set Screw 1/4" -20 x 1/4"	H-828469
47	Hexagon Elastic Stop Nut #10-32	H-838115
48	Dust Boot End Plate Dust Boot End Plate	H-755875 H-755876
49	Washer #8-32	H-828065
50	M. V. Linkage End	H-757883
51	Allen Head Cup Point Set Screw #8-32 x 1" lg.	H-866426
52	Hexagon Nut 3/8 -16	H-812625
54	Shipping Kit	H-772156
55	Protective Closure - 1/2 NPT ⚠1	H-866753

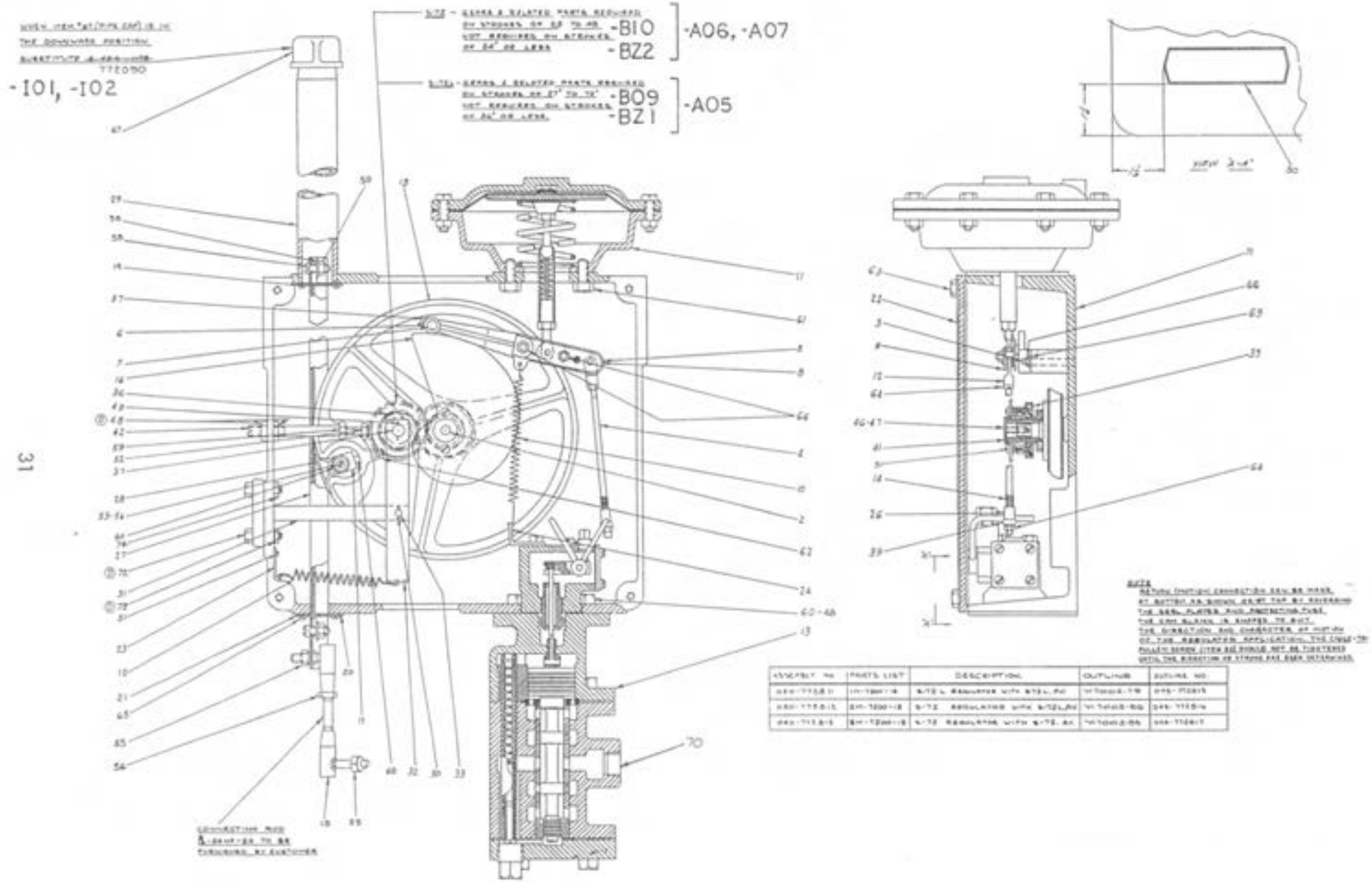
Item	Description		ITEM 1 MAXIMUM STROKE 7"	ITEM 2 MAXIMUM STROKE 12"	ITEM 3 MAXIMUM STROKE 18"
24	Boot Spring	Sel (1) Gr 2	H-758078	H-758079	H-758080
25	Clevis Rod	Sel (1) Gr 3	H-755628	H-755629	H-755630
26	Dust Cover Boot	Sel (1) Gr 4	H-755879	H-755880	H-755881
27	Slider Channel	Sel (1) Gr 5	H-755856	H-755857	H-755858
28	Slider Cable	Sel (1) Gr 6	H-755862	H-755863	H-755864
29	Protecting Tube	Sel (1) Gr 7	H-755633	H-755634	H-755635


1. RETURN MOTION CONNECTION CAN BE MADE AT TOP AS SHOWN, OR AT BOTTOM BY REVERSING THE RETURN MOTION CHANNEL, SEAL PLATES, AND PROTECTING TUBE. THE CABLE EYE BOLT SHOULD NOT BE TIGHTENED UNTIL THE DIRECTION OF THE REGULATOR IS DETERMINED. THE CAM BLANK IS SHAPED TO SUIT THE DIRECTION AND CHARACTER OF MOTION OF THE REGULATOR APPLICATION

PARTS LIST
Drawing D-772811/13

Item	Description	Part Number	Qty. for H 772811 -A05	Qty. for H 772812 -A06	Qty. for H 772813 -A07
2	Pulley Shaft	H-755626	1	0	0
	Pulley Shaft	H-755594	0	1	1
3	Pivot Stud	H-758756	1	0	0
	Pivot Stud	H-758755	0	1	1
4	Connector Rod	H-756546	1	0	0
	Connector Rod	H-756545	0	1	1
5	Cam Follower Assembly	H-755822	1	0	0
	Cam Follower Assembly	H-755802	0	1	1
6	Cam Follower Roller	H-752982	1	1	1
7	Cam Follower Shaft	H-755595	1	1	1
8	Pilot Valve Lever Assembly	H-755801	1	1	1
9	Pilot Valve Securing Plate	H-757882	1	1	1
10	Cam Follower Spring	H-758119	2	2	2
11	Loading Diaphragm Without Limit Stops 5#	H-753471	Sel (1)	Sel (1)	Sel (1)
	Loading Diaphragm Without Limit Stops 15#	H-753472	↑	↑	↑
	Loading Diaphragm Without Limit Stops 5#	H-761834			
	Loading Diaphragm Without Limit Stops 15#	H-761835			
	Loading Diaphragm With Limit Stops 5#	H-769551			
	Loading Diaphragm With Limit Stops 15#	H-772818			
	Loading Diaphragm With Limit Stops 5#	H-772819	↓	↓	↓
	Loading Diaphragm With Limit Stops 15#	H-772820	Grp (1)	Grp (1)	Grp (1)
12	Rod Connector	H-753915	1	1	1
	Pilot Valve L 75 - 150 PSI	H-768697	Sel (1)		Sel (1)
	Pilot Valve L 150 - 250 PSI	H-771408	Grp (2)		Grp (2)
	Pilot Valve S 30 - 74 PSI	H-758994		Sel (1)	
	Pilot Valve S 75 - 149 PSI	H-771937			
	Pilot Valve S 150 - 250 PSI	H-771938		Grp (2)	
14	Connecting Link Spring	H-758090	1	1	1
15	Pulley	H-771329	1	0	0
	Pulley	H-755830	0	1	1
16	Blank Cam	H-771328	1	0	0
	Blank Cam	H-755453	0	1	1
17	Cable Clamp	H-758623	1	1	1
18	Ball Joint	H-854444	2	2	2
19	Channel Seal Plate	H-755426	1	1	1
20	Inner Seal Plate	H-755420	1	1	1
21	Outer Seal Plate	H-755421	1	1	1
22	Cover	H-755667	1	0	0
	Cover	H-755660	0	1	1
23	Spring Anchor	H-758233	1	2	2
24	Spring Anchor	H-755430	1	0	0
26	End Linkage	H-757883	1	1	1
27	Slider Channel	H-771331	1	1	1
28	Return Motion Cable	H-771330	1	1	1
29	Protecting Tube	H-771333	1	1	1
30	Trade Mark Emblem	H-095060	1	1	1
31	Gear Post Assembly	H-771334	1	0	0
	Gear Post Assembly	H-756547	0	1	1
32	Gear Support Lever	H-757702	1	1	1

Item	Description	Part Number	Qty. for H 772811 -A05	Qty. for H 772812 -A06	Qty. for H 772813 -A07
33	Pin	H-757157	1	1	1
35	Collar Assembly	H-769313	1	0	0
	Collar Assembly	H-771262	0	1	1
36	Gear Assembly	H-771265	1	1	1
37	Pin	H-757156	1	1	1
38	Washer	H-765093	2	2	2
39	Clamping Washer	H-758311	1	1	1
40	Cable Clamp Washer	H-758312	1	1	1
41	Washer	H-752398	1	1	1
42	Stop Rod	H-758635	1	1	1
46	Nordstrom #357 Lubricant	H-866300	AR	AR	AR
47	Set Screw 1/4-20 x 1/4	H-828469	1	1	1
48	Hexagon Nut 3/16 -16	H-812625	2	1	5
49	Cotter Pin 3/32 Dia x 3/4	H-834653	1	1	1
50	Cotter Pin 1/16 Dia x 1/2	H-860073	1	1	1
51	Pan Head Screw 8-32 x 3/8	H-809943	3	4	4
52	Hexagon Head Bolt 1/4-20 x 2 1/2	H-848531	1	0	0
	Hexagon Head Bolt 1/4-20 x 1	H-821856	0	1	1
53	Pan Head Screw 8-32 x 1/4	H-809941	1	1	1
54	Flat Washer No. 8	H-802137	1	1	1
55	Hexagon Nut 5/16-24	H-802291	2	2	2
56	Jam Nut 5/16-24	H-802289	1	1	1
57	Set Screw 8-32 x 5/16	H-828463	1	0	0
	Set Screw 10-32 x 1/4	H-818597	0	1	1
58	Pan Head Screw 1/4-20 x 5/8	H-816108	2	2	2
59	Hexagon Nut 1/4-20	H-803589	3	3	3
60	Hexagon Head Bolt 3/8-16 x 1 1/4	H-824501	4	4	0
	Hexagon Head Bolt 3/8-16 x 1 3/4	H-848567	0	0	4
61	Hexagon Head Bolt 5/16-18 x 3/4	H-848549	2	4	4
62	Hexagon Nut 8-32	H-802248	2	2	2
63	Hexagon Head Bolt 5/16-18 x 1/2	H-825148	4	0	0
	Hexagon Head Bolt 1/4-20 x 1/2	H-816335	0	4	4
64	Hexagon Nut	H-808588	2	2	2
65	Pan Head Screw 8-32 x 1/2	H-809945	6	6	6
66	Clinch Nut 10-32	H-829294	3	3	3
67	Pipe Cap	H-854735	Sel (1)	Sel (1)	Sel (1)
	Pipe Cap - with hole	H-772090	Gp (3)	Gp (3)	Gp (3)
68	Set Screw 8-32 x 1	H-866426	1	1	1
69	Flat Washer No. 10	H-802141	1	1	1
70	Protective Closure - 1" NPT	H-866751	4	4	0
	Protective Closure - 1/2 NPT	H-866753	0	0	4
71	Large Case	H-772814	1	0	0
	Large Case	H-772873	AO(1) GR(4)	0	0
	Small Case	H-772089	0	1	1
72	Hexagon Bolt 5/16-18 x 1	182-14H	2	0	0
73	Lock Washer 5/16	215-17	2	0	0
74	Hexagon Nut 5/16-18	192-14H	2	0	0
	Shipping Kit	H-772156	1	1	1



ASSEMBLY No.	PARTS LIST	DESCRIPTION	OUTLINE	OUTLINE NO.

CUSTOMER SERVICE INFORMATION

Contacts

Hays Cleveland Sales Office

1903 South Congress Avenue

Boynton Beach FL 33426

Telephone: 561.734.9400

Fax: 561.734.8060

email: **salescombustion@unicontrolinc.com**

Hays Cleveland Customer Service Department

1111 Brookpark Road

Cleveland OH 44109

Telephone: 216.398.4414

Fax: 216.398.8556

email: **customerservice@unicontrolinc.com**

Visit us on the WEB!

http://www.hayscleveland.com

Repairs

Damaged or defective units may be returned to the factory for repair. However, factory authorization must be obtained before shipping whether warranty or non-warranty service is required, and all units must be shipped prepaid.
A letter of transmittal that includes the following information should accompany the returned instrument:

1. Location, type of service, and length of time in service of the unit.

2. Description of the faulty operation of the device and the circumstances of the failure.

3. Name and telephone number of the person to contact if there are questions about the unit.
4. Indicate whether warranty or non-warranty service is requested.
5. Attach Purchase Order for all out-of-warranty repairs.
6. Complete shipping instructions for the return of the repaired instrument.
7. Original purchase order number and date of purchase.
8. Return Goods Authorization number provided by the factory when you called.

Clearly label the shipping container:

RETURN FOR REPAIR

Model _____

RG # _____

Ship prepaid to:

HAYS CLEVELAND

1111 Brookpark Road

Cleveland OH 44109-5869

216-398-4414

Please follow this procedure. It expedites handling of the returned item, and avoids unnecessary additional charges for inspection and testing to determine the problem before repairing it.

Service

A **Maintenance and Service Contract** can ensure trouble-free, economical operation of **Hays Cleveland** equipment for many years. One-time on-site service by a factory-trained service engineer can also be provided as needed. Contact Hays Cleveland for information on these service options.

Standard Terms and Conditions of Sale

TERMS OF SALE: 1% discount if paid in ten (10) days, net amount due and payable in thirty (30) days.

AGREEMENT OF SALE: Acceptance by Seller of any order placed for goods whether submitted on Buyer's purchase order form or on seller's Sales Order Acknowledgment form, shall be subject to Seller's Standard Terms and Conditions of Sale and is conditioned upon the Buyer's acceptance of these Standard Terms and Conditions.

TERMS OF CONTRACT: Any terms or conditions of the buyer's order which are inconsistent with these terms and conditions shall not be binding on the Seller and shall not be considered applicable to the sale or shipment of goods or materials. Unless buyer shall notify Seller in writing to the contrary within ten (10) days after the mailing of the Sales Contract by Seller, acceptance of the terms and conditions hereof by Buyer shall be indicated and, in the absence of such notification, the sale and shipment by Seller of the goods and materials covered hereby shall be conclusively deemed to be subject to the terms and conditions hereof.

PRICES: All prices and specifications and applicable discounts are subject to change without notice. Sales contracts which call for delivery in the future will be billed at prices in effect at the time of shipment. Shipping weights shown are approximate and subject to change without notice.

SHIPMENT AND PAYMENTS: All prices contained on the Sales Contract are F.O.B. factory in Cleveland, Ohio. No freight is allowed on any shipments. Shipments and deliveries shall at all times be subject to the approval of Seller's Credit Department, and at any time seller may require payment in advance or satisfactory security or guarantee that invoices will be promptly paid when due. If buyer fails to comply with any terms of payment, seller, in addition to its other rights and remedies, but not in limitation thereof, reserves the right to withhold further deliveries or terminate the Agreement, and any unpaid amount thereon shall become due immediately. Terms of payment shall be as set forth on the Sales Contract.

DELAYS AND DEFAULTS: Delays or defaults in delivery by Seller of the goods and materials covered by the Sales Contract shall be excused so far as the same is caused by fire, strikes, accident, governmental regulation, or any delays unavoidable or beyond reasonable control of Seller. In no event shall Seller be liable for any consequential, special, or contingent damages on account of any default or delay in delivery.

NONCANCELLATION: Orders are not subject to suspension, reduction, or cancellation, except on terms that will indemnify Seller against loss.

SPECIFICATIONS: Seller relies on specifications and other data furnished by the Buyer, an architect, contractor, or consulting engineer in all phases of the work covered by the Sales Contract. Seller shall be responsible to check quantities only. Alterations to or changes in specifications, approval of samples, changes in delivery instructions and all other instructions must be submitted in writing to Seller.

In the event Seller performs design or engineering work at the request of Buyer, an architect, contractor, consulting engineer, or representative in any phase of the work covered by the Sales Contract, Seller shall not be responsible for any damages claimed by Buyer as a result of alleged errors or defects in such design or engineering work.

WARRANTY AND LIMITATION OF LIABILITY: Seller warrants that the goods supplied by it have been manufactured in accordance with its standard manufacturing practices and conform to the contract or catalog description set forth in the order. Seller further warrants that the goods supplied by it are fit for the ordinary purpose or purposes specified in its catalog for which such goods are used when installed in accordance with Seller's recommended installation procedures. Except as stated herein, Seller makes no express warranty with respect to goods supplied by it and Seller makes no warranty that the goods are fit for any particular purpose.

When the use of materials not manufactured by Seller is suggested by Seller's recommended installation procedures or otherwise, Seller makes no express warranty with respect to such materials nor that such materials are merchantable or fit for any particular purpose.

Seller will, at its sole option, credit, repair or replace, any goods supplied by it which its examination shall disclose to its satisfaction are defective in workmanship or material and are returned to it within one year from the date of shipment and any claim not made within this period shall conclusively be deemed waived by Buyer. Credit, repair or replacement will be preconditioned upon examination of the goods by Seller, and, if requested by Seller, return of the goods to Seller at its direction and expense. No goods are to be returned to Seller without its written consent. Seller shall not be liable for any expense incurred by Buyer in order to remedy any defect in its goods. Seller shall not be liable for any consequential, special, or contingent damage or expense, arising directly or indirectly from any defect in its goods or from the use of any defective goods. The remedies set forth herein shall constitute the exclusive remedies available to Buyer and are in lieu of all other remedies.

CLAIMS: Claims for shortage of goods or for mistakes or errors in billing must be presented within forty-five (45) days from the date of shipment of goods and must state the packing slip number and container number applicable to the claim. Any claim not so presented will be conclusively deemed waived.

TAXES: Any federal taxes or other government charges on the sale, shipment, or installation of the goods or equipment covered by the Sales Contract shall be added to the price and paid by Buyer, or, in lieu thereof, the Buyer shall furnish the Seller with tax-exemption certificates acceptable to the taxing authority. The procedure also applies to duty and other similar charges on export sales. Seller is not responsible for sales and/or use tax in any state other than Ohio. The purchase made under this Sales Contract must be exempt or paid directly by Buyer. If Seller is required to pay any such tax, there shall be added to the prices quoted herein all such state and local taxes. Buyer agrees to reimburse and save Seller harmless from all such state and local taxes, including interest and penalties thereon, which may at any time be payable to any state or local government unit with respect to the sale of any goods or materials covered by the Sales Contract.

CORRECTIONS: Typographical or clerical errors contained in the Sales Contract, including prices, are subject to correction by the Seller.

FAIR LABOR STANDARDS: All goods covered by the Sales Contract have been produced in conformity with all applicable provisions of the Fair Labor Standards Act of 1938 as amended.

RENEGOTIATION: Unless advised by Buyer in writing, Seller assumes that Buyer's order and the Sales Contract are not renegotiable under the Renegotiation Act of 1951.

APPLICABLE LAW: All questions arising out of the Sales Contract, which shall be deemed an Ohio contract, shall be governed by the laws of the state of Ohio.

EXCLUSIVE TERMS: The Sales Contract shall constitute the complete contract between the parties, and no one has authority to depart from the terms and conditions set forth therein, nor to make any representations or arrangements other than those printed thereon whether in the execution or in the performance of the Sales Contract, unless the same are written on the face of the Sales Contract or are given in writing with it or in pursuance of it, and are fully approved in writing by an officer or authorized employee of the Seller.

LIMITATION FOR SUITS: Any controversy or claim arising out of or relating to this Sales Contract or the breach thereof, must be commenced within one (1) year after the cause of action accrued.

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Hays Cleveland
Div. of UniControl Inc.
1111 Brookpark Road
Cleveland OH 44109