



Instruction Manual

Types 546, 546S and 546ST Electro-Pneumatic Transducers

Form 1783, February 1977

INTRODUCTION

Scope of Manual

This instruction manual pertains only to the installation, operation, and maintenance of the Types 546, 546S, 546ST and Type 82 relay. Refer to the Type 67FR instruction manual for regulator maintenance information.

Purpose

Fisher Type 546, 546S, and 546ST signal transducers receive a milliampere direct current input signal and transmit a proportional pneumatic output pressure. A typical application is in electronic control loops where the final control element, generally a control valve, is pneumatically operated. The input signal, output pressure range, and electrical classification of each transducer is indicated on the name plate attached to the cover.

The Types 546S and 546ST are models which are approved as being intrinsically safe when used with certain systems. The approved systems are listed in table 2.

PRINCIPLE OF OPERATION

Refer to the schematic drawing in figure 2. Assume that the transducer is directly acting. An increase in the dc milliampere signal to the coil increases the magnetic field around the coil. This field increases the magnetic strength in the armature and the magnetic attraction across the air gap between the armature and the pole pieces.

The pole pieces are already polarized by the permanent magnet. The magnetic polarity is as shown in the schematic. The magnetic attraction will therefore be downward at the

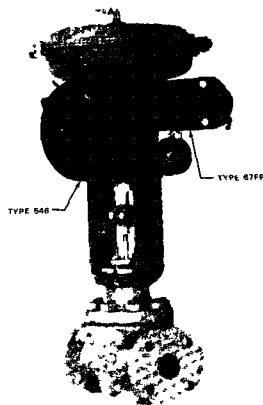


Figure 1 Type 546 Transducer Mounted on Fisher Type 657 Pneumatic Diaphragm Actuator

nozzle end and upward at the feedback bellows end, resulting in a torque that rotates the armature about the fixed torsion rod to cover the nozzle. The resulting restriction produces an increased pressure in the nozzle, in the upper chamber of the relay, and in the feedback bellows. The relay responds to the increase in nozzle pressure to increase the output pressure to the control valve, the normal output load. The increased pressure in the feedback bellows creates a force which acts on the armature to move it back to an equilibrium position. In this way, the new nozzle pressure is compared to the input current by the force balance principle.

Types 546, 546S & 546ST

Table 1 Specifications

<p>INPUT SIGNALS*</p>	<p>Type 546 ■ 1 to 5 mA dc, ■ 4 to 20 mA dc, ■ 10 to 50 mA dc, ■ 1 to 9 Vdc, or ■ Two way sp t range us ng any ha f c f one of the standard nput s gna spans Types 546S and 546ST ■ 4 to 20 mA dc or ■ Two way sp t range us ng any ha f c f the 16 mA dc span</p>	<p>SUPPLY PRESSURE*</p>	<p>Recommended 5 ps higher than upper range mt of output s gna Maximum 50 ps g</p>
<p>INTERNAL RESISTANCE OF TORQUE MOTOR</p>	<p>1 to 5 mA dc Input S gnal ■ 2500 ± 120 ohms (s andard) or ■ 12,000 ± 50 ohms (temperature compen sated c rcu t) 4 to 20 mA dc Input Signal 176 ± 10 ohms 10 to 50 mA dc Input Signa 90 ± 10 ohms 1 to 9 Vdc Input Signal 1300 ± 50 ohms (temperature compen sated c rcu t)</p>	<p>MAXIMUM STEADY-STATE AIR CONSUMPTION*</p>	<p>20 psig Supply 0 35 scfm 35 psig Supply 0 50 scfm</p>
<p>OUTPUT SIGNALS*</p>	<p>Ranges * ■ 3 to 15 ps g, ■ 6 to 20 ps g, or ■ 3 to 27 ps g Action Type 546 s fe d revers b e between ■ d rect and ■ reverse (Types 546S and 546ST ava ab e w h e ther d rect or reverse act on, but cannot be reversed n the fe d)</p>	<p>MAXIMUM SUPPLY AIR DEMAND</p>	<p>20 psig Supply 8 0 scfm 35 psig Supply 11 5 scfm</p>
<p>PERFORMANCE†</p>		<p>Reference Accuracy * ±0 75% of output s gna span Independent Linearity * ±0 50% of output s gna span Open Loop Gain * 26 Frequency Response * Ga n s attenuated 3 dB at 20 Hz w th Type 546 output s gna p ped to a typ ca nstrumt be ows w th 12 nches of 1/4 nch tub ng</p>	
<p>OPERATIVE AMBIENT TEMPERATURE</p>		<p>40 to +150°F</p>	
<p>ELECTRICAL CLASSIFICATION</p>		<p>See tab e 2</p>	
<p>APPROXIMATE WEIGHT</p>		<p>9 pounds (transducer on y)</p>	

*Type 546S and 546ST are SAMA S and S PMC 20 973
 †E. E. Spence, Inc. 13300 N. 10th St., Redmond, WA 98073. Type 546 is a 4 to 20 mA dc input signal
 ‡70 psig (500 kPa) or more and a 5 liter Type 657 diaphragm actuator at an ambient temperature of 75 °F

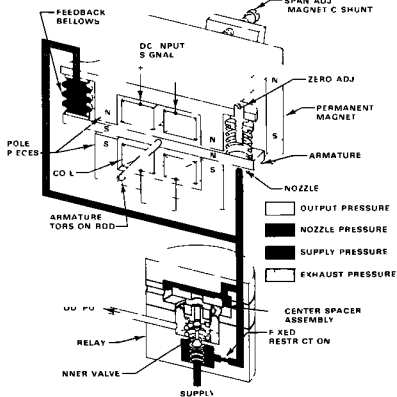


Figure 2 Type 546 Transducer Schematic

The relay operates in this manner. The nozzle pressure acts on the large top diaphragm to force the center spacer assembly (mounted between the two diaphragms) downward against the inner valve, closing the exhaust port and opening the supply port. Supply air then flows through the open port to the output load. The output pressure continues to increase until the relay diaphragm assembly is pushed back by the force of the pressure acting on the small diaphragm to its original position and the inner valve is closed again.

When a decreased input signal is received, the magnetic attraction across the air gap is reduced. The armature rotates to uncover the nozzle and decrease the pressure in the nozzle, relay and feedback bellows. The relay diaphragm assembly moves upward and the exhaust port opens to bleed the output pressure to atmosphere. The output decreases until the diaphragm assembly is forced back to its original position and the exhaust port is closed again. The reduced pressure in the feedback bellows diminishes the force to return the armature to the equilibrium position.

Reverse acting transducers operate in a similar manner except that when the dc input signal increases, the output pressure from the relay decreases. Conversely, a decreased input signal increases the output pressure.

Types 546, 546S & 546ST

Table 2 Electrical Classifications

Type Number	Electrical Classification	Division I Hazardous Locations	Approved Systems (if applicable)																
Units Manufactured in Merish town owa																			
546S	CSA Listed as Exposed Proof	Class Group D																	
		Class Groups C and D	Fisher Type AC301 intrinsic Safety Barrier with or without Type 43M or 44M meters																
	CSA Listed as intrinsic safety Safe	Class Groups C and D	Tay or zener barriers rated 30 V or less 120 ohms or more, with or without Type 43M meter Dwg 23A3881																
		Class Groups B C and D	Tay or zener barriers rated 30 V or less, 300 ohms or more with or without Type 43M meter (Dwg 23A3881)																
	FM Listed as intrinsic safety Safe	Class Groups A B C and D	Fisher Type AC303 intrinsic Safety Barrier with or without Type 43M or 44M meter with per instruction form 4828 and Dwg 31A8820																
		Class Group D	Leeds and Northrup* System Dwg D 883 1 and D 883 2)																
		Class Groups C and D	Fischer and Porter* ESL System 24																
		Class Groups B C and D	Tay or intrinsic safety barrier 1245931 1245932 124S1254 or 124S1264 Fisher Dwg 22A3640, Tay or Dwg SL 92900 30 instruction 17B207 and 1B 17E209)																
		Class Groups B C and D	Tay or intrinsic safety barriers 124S1134 124S1144 Fisher Dwg 22A3640 Tay or Dwg SL 92900 30 instruction B 17E209)																
		Class Groups A B C and D	Brsto* Metatron c 2000 control loop configuration control loops 1 through 6 instruction SS B299) Leeds and Northrup* connect on to be made through a non hazardous area part number 316569 or 316747 direct on book 177849																
BASEEFA Listed as intrinsic safety Safe	Group B	A pair of BASEEFA Certified EX a C 28 v 1300 ohm shunt zener diode barriers of ke polarity or a BASEEFA Certified EX a C Dua 28 v 1300 ohm shunt zener diode barrier each half of ke polarity safe area apparatus unspecified except that t must not be supplied from nor contain a source of potential with respect to earth in excess of 250 v to RMS or 250 v to DC under both normal and abnormal working conditions permissible interconnecting cable (Fisher Dwg 13A9814 or 13A9815)																	
	Group C temperature class T4	Any BASEEFA EX a C 28 v 1300 ohm shunt zener diode barrier safe area apparatus unspecified except that t must not be supplied from nor contain a source of potential with respect to earth in excess of 250 v to RMS or 250 v to DC under both normal and abnormal working conditions permissible interconnecting cable																	
546ST	CSA Listed as intrinsic safety Safe	Class Groups B C and D	Foxboro Co Ltd Spec 200 with or without Type 43M or 44M meter																
		Class Groups C and D	Bay Meter* Type 766800 AAAX1 instruction 4576K16 00A2																
	UL Listed as intrinsic safety Safe	Class Groups B C and D	Beckman* instruction 015 082291 Fisher Type AC303 intrinsic Safety Barrier with or without Type 43M meter instruction 14544 4828																
Units Manufactured in Woodstock Ontario Canada																			
546 and 546S	CSA Listed as Exposed Proof	Class Group D																	
546S	CSA Listed as intrinsic safety Safe	Class Groups C and D	Bay Meter* Type 766800 AAAX1 (instruction 4576K16 00ZA Fisher Type AC301 intrinsic Safety Barrier may be used singly or in pairs (sp range application) with or without approved meters																
		Class Groups B C and D	Tay or intrinsic safety barriers 1245931, 1245932 124S1254 or 124S1264 Tay or instruction SL 92900 30 or Fisher Dwg 22A3640																
		Class Groups B C and D	Tay or intrinsic safety barriers 124S1134 or 124S1144 (Tay or instruction SL 92900 30 or Fisher Dwg 22A3640																
		Class Groups A B C and D	Fisher Type AC303 intrinsic Safety Barriers																
546ST	CSA Listed as intrinsic safety Safe	Class Groups B C and D	Foxboro Co Ltd Spec 200 may be used singly or in pairs sp range applications with or without approved meters																
Definition received by manufacturer company * Please note the additional conditions for BASEEFA certification 1. Installation must conform to the approved drawing number and the BASEEFA test as per Conditions issue 4 date Sep 1975 2. The capacitance and inductance of inductance to resistance L/R ratio of the cable connected to the transducer shall not exceed																			
		<table border="1"> <thead> <tr> <th>Group</th> <th>Capacitance pF</th> <th>Inductance mH</th> <th>or L/R ratio mH/OHM</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>0.13</td> <td>4.2</td> <td>55</td> </tr> <tr> <td>B</td> <td>0.15</td> <td>2.0</td> <td>60</td> </tr> <tr> <td>A</td> <td>0</td> <td>35.0</td> <td>470</td> </tr> </tbody> </table>	Group	Capacitance pF	Inductance mH	or L/R ratio mH/OHM	C	0.13	4.2	55	B	0.15	2.0	60	A	0	35.0	470	
Group	Capacitance pF	Inductance mH	or L/R ratio mH/OHM																
C	0.13	4.2	55																
B	0.15	2.0	60																
A	0	35.0	470																
3. An enclosed cable is used the screen must be earthed grounded in the safe area and also earthed from flame and earth ground in the flameless area																			

Types 546, 546S & 546ST

INSTALLATION

WARNING

The Type 546 transducer, like most other devices of this type, leaks to atmosphere if a combustible, toxic, or otherwise hazardous gas is used as the supply source. Check the transducer in a well-ventilated area. Accumulated gas may create an explosion hazard or a potentially poisonous condition with the possibility of personal injury or equipment damage.

Mounting

When a control valve is ordered and it is specified that a Type 546 be mounted on the actuator, the factory mounted transducer will be connected to the actuator with the necessary tubing and adjusted for the conditions specified on the order.

If the transducer is purchased separately for mounting on a control valve or a ready-to-serve, all the necessary mounting parts will be furnished. This includes the output tubing and the appropriate bracket for bolting the unit to an actuator boss or a tapped hose or for fastening it to the diaphragm casing.

If preferred mounting parts can be supplied for mounting the transducer on a 2 inch diameter pipe stand, a flat surface or a bulkhead. No output tubing will be supplied for these remote mounting methods unless a specific length and size is ordered. The recommended tubing size is 3/8 inch outside diameter. The length between the transducer output and the final control element should be as short as possible to minimize its effect on control stability.

Pneumatic Connections

The Type 546 transducer is normally furnished with a Type 67FR filter regulator mounted on the transducer case. A pressure gauge on the regulator shows the supply pressure to the transducer.

Note

The supply source must be clean, dry, non-corrosive air or gas at an unforging pressure at least 5 psi higher than the upper limit of the transducer output pressure range. This means that for an output pressure range of 3 to 15 psi the supply pressure should be at least 20 psi, for

a 6 to 30 psi range, the supply pressure should be at least 35 psi. The supply to the Type 67FR regulator should not be more than 250 psi at a maximum temperature of 150°F.

1. Connect the nearest supply source to the 1/4 inch NPT. Do not connect on the filter regulator (if furnished) or to the 1/4 inch NPT SUPPLY connection on the transducer case (if regulators are not furnished).

2. Run 3/8 inch O.D. tubing from the 1/4 inch NPT OUTPUT opening in the transducer case to the input connection on the pneumatic actuator or valve positioner. This connection will be made at the factory if the unit is shipped mounted on an actuator as shown in figure 1.

Electrical Connections

The electrical connections are made in the transducer case. A 1/2 inch NPT conduit connection is provided in the bottom of the case. Use a suitable conduit seal for hazardous locations. The wires that carry the milliampere signal from the controller are connected to the terminal strip (key 53, figure 6). The terminal strip is marked + and - to indicate the positive and negative terminals. For a direct acting unit (i.e., increasing current produces an increasing output pressure), connect the positive wire from the controller to the positive terminal of the transducer and the negative wire to the negative terminal. For a reverse acting unit (i.e., increasing current produces a decreasing output pressure), connect the positive wire from the controller to the negative terminal and the negative wire to the positive terminal. Typical circuit drawings are shown in figure 3.

Note

An anti-seize compound should be used on the case cover threads (marked AS in figure 5) to prevent the threads from galling.

ADJUSTMENTS

Assuming the filter regulator has been adjusted to provide the proper supply pressure to the transducer, there are two adjustments incorporated into the Type 546. They are the zero adjustment and the span adjustment (figure 4). The zero adjustment is used to set the output pressure so that it corresponds to the proper value of the input signal. For example, if the output range is 3 to 15 psi and the input range is 1 to 5 mA dc and the unit is direct acting, the zero adjustment would be used to set the output pressure at 3 psi when the input signal is 1 mA. The span adjustment is used to set the span of the output pressure so that full output pressure change results from a full change in the

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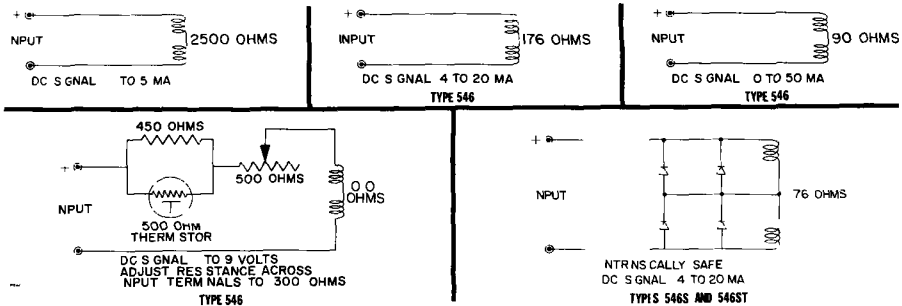


Figure 3 Typical Circuit Drawings

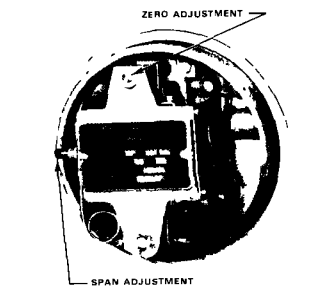


Figure 4 Zero and Span Adjustments (Cover Removed)

input signal. For example, if the conditions were as stated in the previous example, the span adjustment would be used to make the output pressure change 12 ps when the input signal is changed from 1 to 5 mA.

The span adjustment will affect the zero, therefore any span adjustment should be followed by an adjustment to the zero. Provide a suitable gauge to measure pressure.

Zero Adjustment

The zero adjustment is accomplished by changing the length and force of a spring which acts directly on the armature opposite the nozzle. Turning the adjusting screw clockwise as indicated by the arrow will compress the spring and increase the output pressure for a given input signal.

Span Adjustment

The span adjustment is accomplished by positioning a piece of magnetic material toward or away from the permanent

magnet to shunt away or add to the magnetic flux in the armature air gap. Thus, the amount of torque produced in the armature will vary according to the adjusting screw clockwise will pull the magnetic material away from the magnet and increase the span. An adjustment in which an adjustment must be made to increase the span.

The span adjustment is only a vernier type and is not designed to create a very large change in output pressure over its full range of adjustment. Normally, however, the adjustment range will be sufficient to set the transducer properly.

If it is not sufficient, refer to the Span Adjustment Adjustment section under Troubleshooting.

PRECAUTIONS

There are several precautions to be observed when working on the Type 546 transducer. It is known that either the torque motor or relay needs to be replaced for any reason, please replace the entire transducer.

1. The torque motor assembly which consists of permanent magnets, pole pieces, top and bottom pole pieces, etc., should never be disassembled because the even if they are in the magnets will decrease, and will not return upon reassembly. Consequently, you will be unable to obtain proper span. So, if it is known that the torque motor (and/or relay) are faulty, replace the entire transducer with a new one and return the faulty unit to the factory for repair. Figure 6 shows the torque motor and associated parts. Those key numbers that are shaded indicate the parts that should not be disassembled from the torque motor.

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Table 3 Feedback Bellows Output Pressure Range, PSI

TYPE OF OPERATOR	INPUT SIGNAL DC	BELLOWS SIZE		
		Fu	Half	Quarter
Fu Range	1 5 mA	3 15	6 30	
	4 20 mA			
	13 53 mA			
Tw Way Switch Range	1 5 mA			3 15
	4 20 mA			
	13 53 mA		3 5	6 30

Temperature: 0 to 125 °F (0 to 50 °C)

2 Some parts in the Type 82 relay (figure 7) require very careful factory adjustment. For this reason do not remove the six screws (key 76, not shown) which hold relay body, casing spacer, and casing (keys 60, 61, and 62) together. Shaded key numbers indicate those parts that should not be disassembled from the relay assembly.

3 When working on or calibrating the Type 546 transducer, be careful not to adjust on a steel work bench as this will affect the magnetic properties and prohibit correct adjustments.

OPERATIONAL CHANGES

To Change Output Pressure Range

If it is ever required to change the output pressure range from 3 to 15 ps to 6 to 30 ps or vice versa, the feedback bellows (key 57, figure 6) must be changed. To do this, proceed as follows:

- 1 Loosen the locknut (key 31)
- 2 Remove the bellows screw (key 56)
- 3 Pull bellows assembly out. The armature is spotted to allow removal of the bellows.
- 4 Inspect O-ring (key 36). Replace, if necessary.
- 5 Choose proper bellows as outlined in table 3. Install new bellows assembly. Make sure that the O-ring is in place.
- 6 Install bellows screw and tighten. Be sure bellows is not skewed in any direction. Tighten locknut.
- 7 Reset the span and zero adjustments.

To Reverse the Action

No special parts are required to reverse the action of the Type 546 transducer. The direction of armature rotation with a change in input current is dependent upon the direction of the current flow. Therefore, by simply reversing the input leads to the transducer, the opposite action can be obtained. Whenever the action is changed, it is necessary to rezero the transducer as outlined in the section on Adjustments.

Note

The Type 546S or 546ST cannot be reversed in the field because the protective diodes across the coil will effectively short the reverse input current signal. Do not attempt to reverse a Type 546S or 546ST. There is no danger, but the unit will not operate.

Split Range Operation

Type 546 transducers are suitable for two way split range operation where the milliampere output signal of a single controller is split between two transducers electrically connected in series. Each transducer receives half of the signal and transmits a full output pressure range of 3 to 15 ps or 6 to 30 ps to the control valve. Since the Type 546 operates on only one half of the normal input span, it is necessary to change the feedback bellows to compensate for the shorter span. Refer to the section on To Change Output Pressure Range, and change the bellows as described there. The tabulation of available bellows indicates what bellows will be required for your conditions. Please note that simply interchanging bellows in the Type 546 cannot provide a three way split range. Reset the span and zero adjustments to the split range values.

TROUBLESHOOTING

The first step in a troubleshooting is to locate the source of the difficulty. Improper supply pressure and mechanical defects in air and electric connections should be apparent upon visual examination. The following points may serve as a guide in locating any trouble that might occur.

Electrical

- 1 Check the controller output. Make sure that it is reaching the transducer.
- 2 Check the electrical signal. It should be the same as the range stamped on the nameplate.

adjustment assembly (key 55, figure 6) at the flexure pivot end. The alignment procedure is as follows. Refer to figure 6.

- 1 Disconnect the external lead wires from the terminal mounted bracket assembly (key 53).
- 2 Shut off the supply pressure.
- 3 Loosen four machine screws (key 9, figure 5) that hold the torque motor assembly to the case. Remove **entire** torque motor assembly from case.
- 4 Loosen the two flexure pivot screws (figure 6) that hold the flexure pivot to the torque motor assembly base.
- 5 Slide span adjustment assembly in or out as required. Sliding in toward the base decreases the span, sliding it out away from the base increases the span.
- 6 Tighten flexure pivot screws. Replace torque motor assembly and tighten screws (key 9, figure 5). Make sure that O-ring (key 37) is in place. Connect external lead wires and open air supply.
- 7 Make final adjustment of span with the span adjustment screw (key 24).

Miscellaneous Alignment

Feedback Bellows and Zero Spring

Erratic operation can be caused by a skewed feedback bellows (key 57, figure 6) or zero spring (key 17, figure 6). The bellows and zero spring must be straight, but they are difficult to straighten without taking the torque motor apart. Since the torque motor should never be disassembled in the field, return the **entire** transducer to the factory for repair.

Torque Motor Frame

Through shock of rough handling, the top of the torque motor can become twisted with respect to the frame. If you notice this, send the **entire** transducer back to the factory for repairs.

Armature Travel Stop

The armature travel stop (key 52, figure 6) must be in place to prevent over stressing the armature torsion rod due to over travel. The clearance between the armature and travel stop should be 0.015 inch.

Two screws at the base of the travel stop can be loosened if an adjustment is necessary.

Coils

The coil assembly (key 42, figure 6) consists of a plastic bobbin wound with wire. The coils do not attach to the armature itself and therefore, they must not touch the armature or armature movement will be restricted. If this problem exists, send the transducer back to the factory for repairs.

MAINTENANCE

Maintenance of the Type 546 transducer consists of mounted relay disassembly and replacement of the feedback bellows. Do not attempt any repairs of the torque motor assembly.

Relay

As noted in the Precautions section, relay disassembly is limited primarily to removal of the inner valve and restriction on plug assembly. A new relay (figure 7) should be ordered if repair would require separating the relay body (key 60), casing spacer (key 61), and relay casing (key 62).

- 1 The relay can be removed without disrupting the transducer mounting. Referring to figure 7, loosen the two mounting screws (key 68) and remove the relay from the transducer. Be careful that the four O-rings are not lost.
- 2 Remove two screws (key 77) that hold the inner valve spring seat (key 64), and inner valve (key 63) in place. Take these parts out.
- 3 Unscrew the restriction on plug orifice assembly (key 67).
- 4 Inspect O-rings (keys 73, 72, 74, and 75), the inner valve, and other parts for wear or damage. Note that the inner valve seat is an insert in the body. If this part is bad, replace the relay and torque motor.
- 5 After checking and clearing the fixed restrictions (0.017 inch diameter) in the restriction on assembly and in the relay body, make sure that the O-ring (key 75) is good and in place. Then replace the restriction on assembly into the relay.
- 6 Replace the inner valve and inner valve spring. Secure them in place with the spring seat and two screws.
- 7 Make sure all O-rings (keys 72, 73, and 74) are good and in place then fasten the relay to the transducer case.

Feedback Bellows

Instructions for replacing the feedback bellows are found in the To Change Output Pressure Range section, page 6.

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SERIAL NUMBER

refer to this serial number when communicating with your Fisher representative about this equipment and when ordering spare parts. Also, please include the complete even character part numbers from the following parts list when ordering spare parts.

A serial number is assigned to each transducer and this is stamped on the nameplate attached to the cover. A way

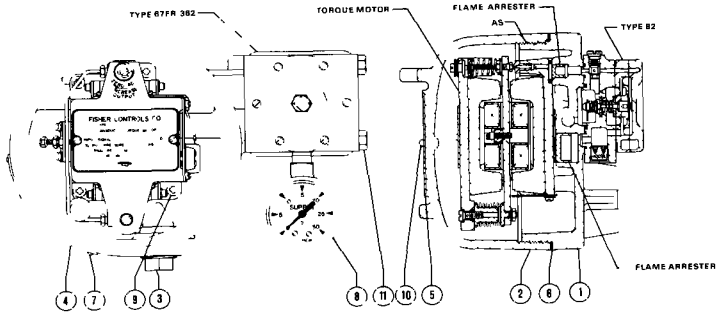


Figure 5 Type 546 Transducer

PARTS LIST

In the torque motor assembly drawing (figure 6) and the relay assembly drawing (figure 7), there are many shaded key numbers. The shading indicates that these parts should not be disassembled and that they are not available as individual items. Consequently, there are not part numbers shown for these parts in the list below.

Type 546, 546S & 546ST Transducers (figure 5)

Key	Description	Part Number	Key	Description	Part Number
9	Mach ne Screw brass Cd p (4 req d)	1P4265 14022	31	Hex Nut brass Cd p 2 req d	1N1073 18992
10	Screw steel 2 req d use w th integra mounted f ter regu ator on y	1C9419 28982	32	Washer	
11	Cap Screw steel 2 req d use w th integra mounted f ter regu ator on y	1C3988 24052	33	Washer brass Cd p	1P4253 15052
12*	O R n g n r t r e use w th integra mounted f ter regu ator on y	1E5914 06992	34	Washer	
13	P p e N p p e steel use w th n p p e mounted f ter regu ator on y	1C8789 26232	35	Washer	
14	Screw		36*	O R n g n r t r e	1D6875 06992
15	Adjust ng Screw		37*	O R n g n r t r e	1C7822 06992
16	Spr ng Seat		38	E R n g	
17	Spr ng Zero Adjustment		39	Cab e C amp Armature	
18	Baffle		40	Co S upport	
19	Noz e		41	Co As y	
20	Hook Up W re Ass y		42		
21	Hook Up W re Ass y		48	Magne	
22	Hook Up W re not shown		49	Po e P ece	
23	Nameplate		50	Top Po e P ece P ate	
24	Screw	1P4251 38992	51	Bottom Po e P ece P ate	
25	Mach ne Screw		52	Trave Stop	
26	Cap Screw		53	Term n s Mount ng Bracket Ass y	
27	Cap Screw		55	Span Adjustment Ass y	
28	Mach ne Screw		56	Be ow Srew Brass Cd p	1D3976 14022
29	Hex Nut steel	1A3303 28982	57*	Be ow Ass y Fu S ze 27/32 O D	1U3958 000A2
30	Hex Nut steel			Ha f S ze 1/2 O D	1U3975 000A2
				Quar t S ze 3/8" O D	1R6521 000A2
			58	Tub ng Ass y Brass copper	1P4242 000A2
1	Transducer Case Ass y	1P4210 000A2			
2	Case Cover a um num	3P4213 000A2			
3	P p e Pug cast ron	1A3619 19012			
4	Tagg ng P ate opt ona SST	1R4851 38992			
5	Nameplate a um num	1P4263 11032			
6*	O R n g n r t r e	1D4448 06992			
7	Dr ve Srew steel p 2 req d	1A3092 28982			
8	Gauge use w th f ter regu ator on y integra mounted regu ator				
	0 30 PS	1R4730 99012			
	0 60 PS	1R4731 99012			
	N p p e mounted regu ator				
	0 30 PS	1C2211 99012			
	0 60 PS	1C3566 99012			

Recommened sp e p a t

Fisher is manufactured by Fisher Controls Company, 2775 Highway 101, Houston, Texas 77061. For more information, contact Fisher Controls Company, P.O. Box 100, Houston, Texas 77061.

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3 Check the resistance of the transducer circuit to see that it coincides with the value stamped on the nameplate.

4 Check terminal tags for proper connections. If reverse action is being obtained, simply reverse the input leads and rezero the transducer (except on Type 546S or 546ST).

Pneumatic

1 Check adjustments for proper settings.

2 Check supply pressure. Make sure that it is at least 5 psig higher than the upper limit of the output pressure range.

3 Check the Type 67FR filter regulator for an accumulation of moisture in the dripwell. Drain off through petcock. Clean filter element, if necessary.

4 Make sure that there are no sharp bends in the copper capillary feedback tubing because they will restrict the opening and the pressure feedback to the bellows will be too slow. The transducer will cycle.

5 The nozzle is large enough (0.070 inch diameter) to minimize clogging. **Do not attempt to remove the nozzle for cleaning** because this cannot be done without disassembling the torque motor. However, if the nozzle is clogged, remove the entire torque motor assembly from the case by removing four screws (key 9, figure 5). Then run a wire through the nozzle from the underside of the assembly.

6 Check the flame arresters (figure 5) to see if they need cleaning. To do this, the entire torque motor assembly as shown in figure 6 has to be removed from the case. If flame arresters are dirty, clean by blowing them out with air pressure.

7 Check the torque motor assembly for metal chips in the air gap between the armature and the pole pieces. Chips in the air gap will limit armature travel and reduce the flux across the air gap which will shorten the span and cause erratic operation. Blow out any chips with low pressure air.

8 Perform a manual check on the operation of the transducer as follows. Hook up a suitable pressure gauge to measure the output pressure.

8.1 Force the baffle (key 18, figure 6) against the nozzle. The output pressure should build up to approximately the supply pressure. If it does not, check for a leak in the pneumatic system or a burr on the nozzle lip. If the nozzle is faulty, replace entire Type 546 with a new one.

8.2 Force baffle away from the nozzle. The output pressure should drop off to less than 0.5 psi. If it does not, the small flame arrester in the nozzle path probably needs cleaning. See item 6 above.

9 For a release test, check the Type 82 relay. The relay can be taken off the transducer easily by loosening the two screws (key 88, figure 7) that hold it to the case. Check the inner valve for leaks, cuts, or damage. Remove and inspect the 0.017 inch diameter primary restriction (key 67, figure 7) to see that it is not clogged. Check for leaks at casing joints by using a soap suds solution. Check the flow of air out the vent opening. With the supply air on, there will always be a slight flow of air out the vent. Excessive amount of air escaping indicates that the diaphragms are ruptured. Since the relay sections should not be separated and it must be matched to a torque motor, order both a torque motor and relay.

Input—Output Linearity

For proper operation and satisfactory linearity between the input signal and output pressure, the armature (key 40, figure 6) must be centered between the faces of the pole pieces (key 49, figure 6). The armature is centered and aligned at the factory but rough handling or unauthorized tampering with the transducer may move the armature off center.

For a check on the linearity of the transducer, hook up an accurate test pressure gauge to measure the output pressure, and an accurate test manometer to measure the input signal. Vary the input signal over the full range and observe and note the output pressure. Plot a calibration curve of input versus output and determine the linearity. If it is beyond acceptable limits, align the armature as described below.

The baffle screw (key 18, figure 6) can be adjusted to position on the armature. Loosen the locknut and then turn the baffle screw slightly. Turning out of the armature will move the armature away from the nozzle. Sight the armature alignment by eye to see that it is centered between pole piece faces. Be careful when loosening or tightening the baffle screw locknut so that the coils of the zero adjustment spring (key 17, figure 6) are not stretched by the wrench.

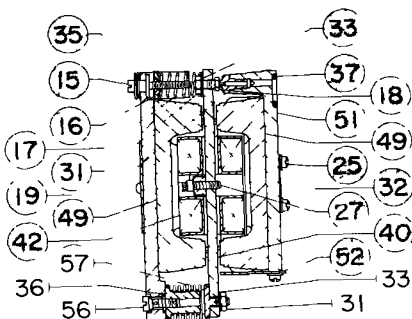
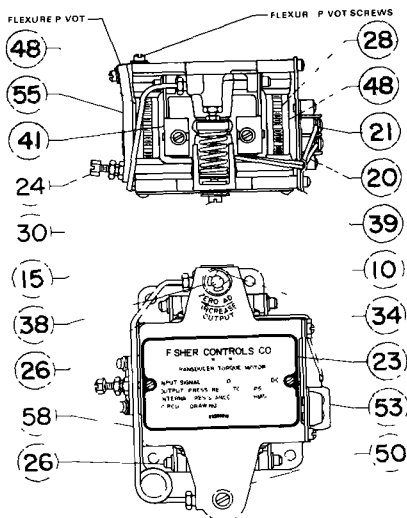
CAUTION

Never loosen a four cap screws (key 26, figure 6) at the same time. Realignment once this is done will most likely require factory equipment and skill. It may be possible to loosen two screws on one side only and move the entire support assembly (key 41, figure 6) to improve alignment, but this is not recommended.

Span Adjustment Alignment

If it is impossible to set the required span, additional span adjustment can be obtained by shifting the entire span

Types 546, 546S & 546ST



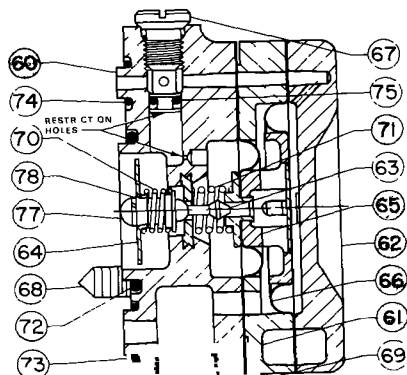
NOTE SHADED KEY NUMBERS INDICATE PARTS THAT SHOULD NOT BE DISASSEMBLED FROM THE TORQUE MOTOR

Figure 6 Torque Motor Assembly

Key Description Part Number

Type 82 Relay (figure 7)

Key	Description	Part Number
	Type 82 relay entire assembly	AP4203 X00B2
60	Relay Body aluminum/brass	
61	Casing Spacer aluminum	
62	Relay Casing aluminum	
63	Inner Valve brass	1P4195 14012
64	Spring Seat brass	1P4196 15102
65	Lower Diaphragm Assembly	
66	Upper Diaphragm nut	
67	Restriction Assembly	1U8160 000A2
68	Relay Mounting Screw steel (2 required)	1P4203 24102
69	Screen Monotone	0L0783 43062
70	Spring SST	1P4204 37022
71	Spring Relay steel (2 required)	1P4206 06992
72*	O Ring nut	1P4207 06992
73*	O Ring nut (2 required)	1D6875 06992
74*	O Ring nut	1D1346 06992
75*	O Ring nut	1D1346 06992
76	Machined Screw steel (6 required, not shown)	
77	Machined Screw steel (2 required)	1A5120 28982
78	Lockwasher steel (2 required)	1H2671 28982



NOTE SHADED KEY NUMBERS INDICATE PARTS THAT SHOULD NOT BE DISASSEMBLED FROM THE RELAY

Figure 7 Type 82 Relay

Recommended spare part
*Trademarks of International Nickel Co.



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