

COMPLIANCE PLAN CAPITAL ITEMS

REACTOR VALVE LIMIT SWITCH REPLACEMENT

ABERDEEN CHEMICAL PLANT

September 9, 1985

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I. Purpose and Process Description

The purpose of this design is to provide the valves on the reactors with accurate indication in the control room of the valve position. The existing limit switches do not provide this accuracy, since they are operated by the position of the actuator and not the actual valve stem. This type of operation does not take into account the possibility of shearing between the valve stem and actuator, which has occurred here in the plant. This poses a potentially hazardous situation for a VCM release.

This design will provide each of the designated valves on the reactors with a new limit switch that operates on the position of the valve stem. These new limit switches will provide accurate indication in the control room and eliminate the hazard of a valve being open when it's actuator position is showing closed.

A total of 70 valves will be equipped with this new type of limit switch. These limit switches will be mounted on the bracket between the valve and the actuator. Drawings of several different types of valves with the new limit switches are attached. Table I lists the valve location and manufacturer. Table II lists the different types of valves, quantity of each and actuator type.

TABLE I

<u>Reactor</u>	<u>Valve Location</u>	<u>Size</u>	<u>Manufacturer</u>
745			
+	Chem Wash Rtrn.	6"	Jamesbury (Ball)
	Hot H ₂ O Charge	6"	TuFlne (Plug) 150
700	Sewer	6"	Jamesbury (Ball)
	Dump	6"	Jamesbury (Ball)
	Evacuation	8"	TuFlne (Plug) 150
	Recovery	6"	TuFlne (Plug) 150
	Vent	4"	TuFlne (Plug) 300
600			
+	Chem Wash Rtrn.	6"	KTM E0106 (Ball)
500	Hot H ₂ O Charge	6"	TuFlne (Plug) 150
	Sewer	6"	TuFlne (Plug) 150
	Dump	6"	WKM 6FB112 (Ball)
	Evacuation	6"	TuFlne (Plug) 150
	Recovery	6"	TuFlne (Plug) 150
600	Vent	3"	WKM (Ball) 3RB100
500	Vent	3"	TuFlne (Plug) 300
400	Chem Wash Rtrn.	6"	WKM (Ball) 6FB123
	Hot H ₂ O Charge	6"	Module 310C
	Sewer	6"	TuFlne (Plug) 150
	Dump	6"	Durco (Plug) 6411
	Evacuation	6"	WKM (Ball) 310
	Recovery	6"	TuFlne (Plug) 150
	Vent	3"	TuFlne (Plug) 150
			WKM (Ball) 3RB100
			310C
300	Chem Wash Return	6"	KTM (Ball) E0106
	Hot H ₂ O Charge	6"	TuFlne (Plug) 150
	Sewer	6"	TuFlne (Plug) 150
	Dump	6"	WKM (Ball) 6FB112
			310 B

<u>Reactor</u>	<u>Valve Location</u>	<u>Size</u>	<u>Manufacturer</u>
	Evacuation	6"	TuFlne (Plug) 150
	Recovery	6"	TuFlne (Plug) 150
	Vent	3"	TuFlne (Plug) 300
744			
743			
742	Chem Wash Rtrn.	6"	WKM (Ball) 6F-B130 310B
+741	Hot H ₂ O Charge	6"	WKM (Ball) 6X4-B102
	Sewer	6"	WKM (Ball) 6X4-B102
	Dump	6"	WKM (Ball) 6F-B112 310B
	Evacuation	6"	TuFilne (Plug) 150
	Recovery	6"	TuFlne (Plug) 150
	Vent	3"	WKM (Ball) 3KB150

TABLE II

Manufacturer	Size	Fig.No.	Quantity	Actuator Type		Bettis		Bettis		Jamesbury		Hills	
				CB725	721C	CB520	CB525	731C	722C	T3126B-SR4	ST1200-C	ST2400C	Mc- Ma- Canna try R1503 1250
1.TuFlne (P)	6"	067(150)	27	14	5	1	1	-	-	-	6	-	-
2.TuFlne (P)	8"	067 (150)	2	-	-	-	-	-	2	-	-	-	-
3.TuFlne (P)	4"	0367(300)	2	-	-	2	-	-	-	-	-	-	-
4.TuFlne (P)	3"	0367(300)	2	-	-	-	-	-	-	-	-	2	-
5.Jamesbury(B)	6"	6300-1-36QMT	6	-	-	-	-	6	-	-	-	-	-
6.WKM (B)	6"	6F-B112 310B	8	-	4	-	-	-	-	-	1	-	-
7.WKM (B)	6"	6X4-B102 310	8	8	-	-	-	-	-	-	-	-	-
8.WKM (B)	6"	6F-B130 310B	4	-	-	-	-	-	4	-	-	-	-
9.WKM (B)	3"	3KB150 310	4	-	-	4	-	-	-	-	-	-	-
10.WKM (B)	3"	3RB100 310	2	-	-	-	-	-	-	-	-	2	-
11.WKM (B)	6"	6F B123 310C	1	-	-	-	-	-	1	-	-	-	-
12.Durco (P)	6"	G 411	1	-	-	-	-	-	-	1	-	-	1
13.KTM (B)	6"	ED106	3	-	-	-	-	3	-	-	-	-	-
TOTAL			70										

COMPLIANCE PLAN CAPITAL ITEMSREACTOR VALVE LIMIT SWITCH REPLACEMENTABERDEEN CHEMICAL PLANTIII. Instrument Specification

<u>Item</u>	<u>Description</u>
PLS-101 through 170	Promimity Limit Switches



Conoco Inc.
Engineering Center
Ponca City, Oklahoma
SPECIFICATION SHEET

SPECIFICATION SHEET

PROJECT NO. _____

A/E NO. _____

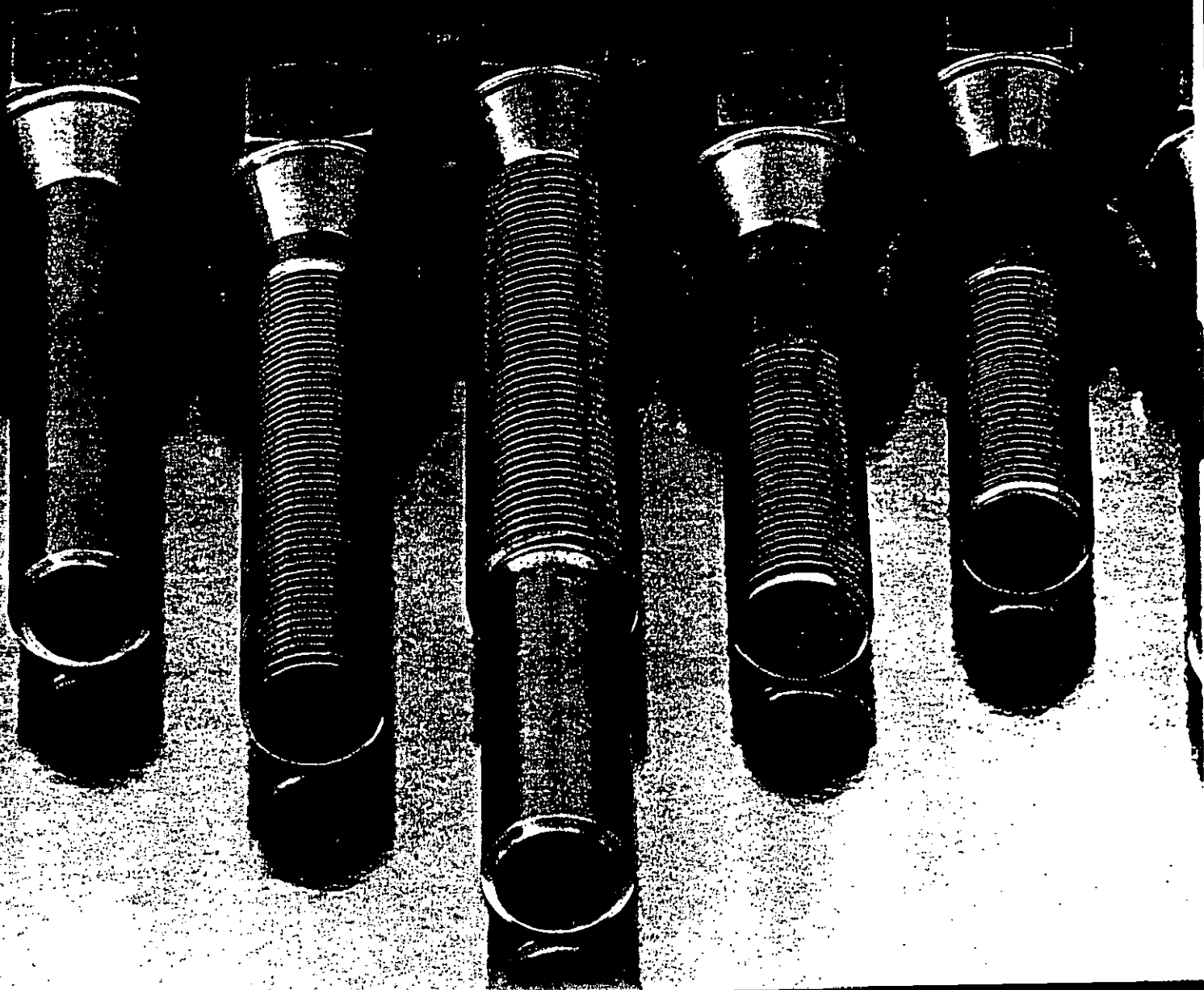
DATE 7-31-85 (MO) NO. _____MADE BY EGJ (MO) NO. _____APP'D BY JRM (MO) NO. _____PLANT Aberdeen Chemical PROJECT Reactor Valve Limit Indication Rpt.ITEM NO
SERVICEPLS - 101 thru 170 Proximity Limit SwitchesQuantity: 70Service: Valve IndicationLocation: On bracket between valve and actuatorManufacturer: GO or company approved equalModel: 713774

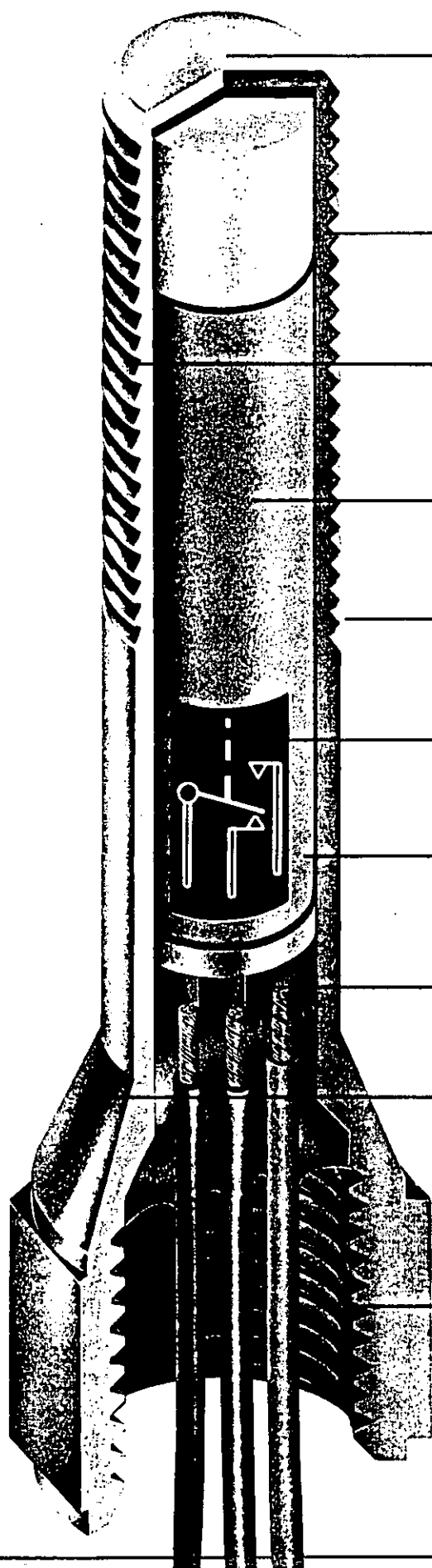
Description: 1/2 NPT conduit outlet with 18"
potted, 3 wire leads, type 300 stainless
steel housing with 1/2 - 18 NF x 2.813" threads.

GO[®]

Series 70 Switch

A Rugged and Dependable Line of Totally Enclosed Proximity Limit Switches
from General Equipment & Manufacturing Company, Inc.





End Cap: .050" Stainless Steel (304) End Cap, available with thicker End Caps for higher pressure.

Pressure Options: Normally the standard 5/8" diameter will withstand 2000 PSI. Larger cases with thicker walls and front End Caps will allow the switch to function at much higher pressures (up to 10,000 PSI). Certification available as factory option.

Case: 300 Series Stainless Steel case, plain or threaded body (5/8-18 NF). Different body lengths available, SEE options on MODELS AVAILABLE.

Magnets: Made with a high energy product magnet. An excellent coercive force which converts into grams of Contact Pressure for reliable operation. Meets MMPA Specifications.

External Threads: Machines to meet SAE 5/8-18 UNF Specifications. Units available with or without threads.

Contacts: Type Silver, Cadmium Oxide, resists welding and is some of the most widely used Contact Material in the industry. Sized to withstand approved ratings. Hermetically Sealed Contact Chamber.

Bearing: Consists of a finely ground Stainless Steel Pin and durable plastic housing. Sized to withstand a wide temperature range. Resists seizing and gives millions of free operations.

Potting: Terminal cavity filled with epoxy resin compound for sealing and mechanical support of wire/cable connections.

Body Tube: Made of Free Mechanical Stainless Steel. Resists most all harsh environments and withstands high working pressures. Impervious to water, oils and gases.

Internal Threads: 1/2-14 NPT. complies with CSA requirements for Explosion Proof Applications. Wire or cable leads available to meet Customer's Specifications.

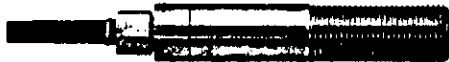
When time, accuracy, and dependability count . . . you can count on the 70 Series GO® Switch. Maintenance free; engineered for precision, performance and reliability.

The standard 70 Series GO® Proximity Limit Switch has been designed and built to rugged specifications for use in most industrial and environmental applications. Each switch is totally enclosed, hermetically sealed and capable of operating in hostile environments.

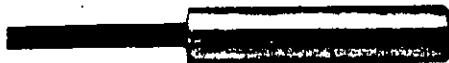
The standard stainless steel housing is impervious to oils, caustic acids, water laden areas and most

atmospheric conditions, with a broad operating temperature range. (See specification) Many different models of the switch are available for your design needs. (See ordering information for specifications, detail and options.)

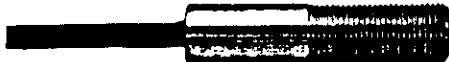
Standard Models



Model 713360
No conduit connection, 18" 3 conductor cable with water resistant squeeze connection, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



Model 713420
No conduit outlet, 18" potted, 3 conductor cable, type 300 stainless steel housing; no threads.



Model 713460
No conduit outlet, 18" potted, 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



Model 713520
1/2 NPT conduit outlet, 18" 3 conductor cable, type 300 stainless steel housing, no threads.



Model 713560
1/2 NPT conduit outlet with 18" 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



Model 713570
1/2 NPT conduit outlet, 18" 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 2.813" threads with 2 lock nuts.



Model 713660
No conduit outlet, 18" potted, 3 wire leads, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



Model 713720
1/2 NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing, no threads.

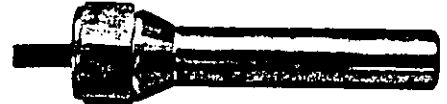


Model 713760
1/2 NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



Model 713770
1/2 NPT conduit outlet, 18" potted 3 wire leads, type 300 stainless steel housing with 1/2-18 NF x 2.813" threads with 2 lock nuts.

Hazardous Location approved models for Class I, Division 1, All Groups



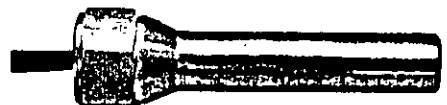
Model 713524
1/2 NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing, no threads.



Model 713564
1/2 NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



Model 713574
1/2 NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 2.813" threads with 2 lock nuts.



Model 713724
1/2 NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing, no threads.



Model 713764
1/2 NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



Model 713774
1/2 NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with 1/2-18 NF x 2.813" threads.



Approved switches are in compliance with current bulletins 1243, 1273 and 1308.

These switches are U/L and CSA approved for industrial control, general purpose use. See hazardous location approved models in Column 3, this page.

TOLERANCES Unless otherwise specified
 Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, XX $\pm .01"$, XXX $\pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within T.I.R.

NO.	REVISION	DATE	BY	APPD.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Switch Activator	V126411-1943
2	2	Mounting Bracket	V126411-1944
3	4	1/4-20 x 1/2 Hex Hd. Screw	
4	4	1/4 L.W.	
5	2	5/8 Shakeproof L.W.	
6	4	5/8 F.W. (1-5/16" O.D.)	

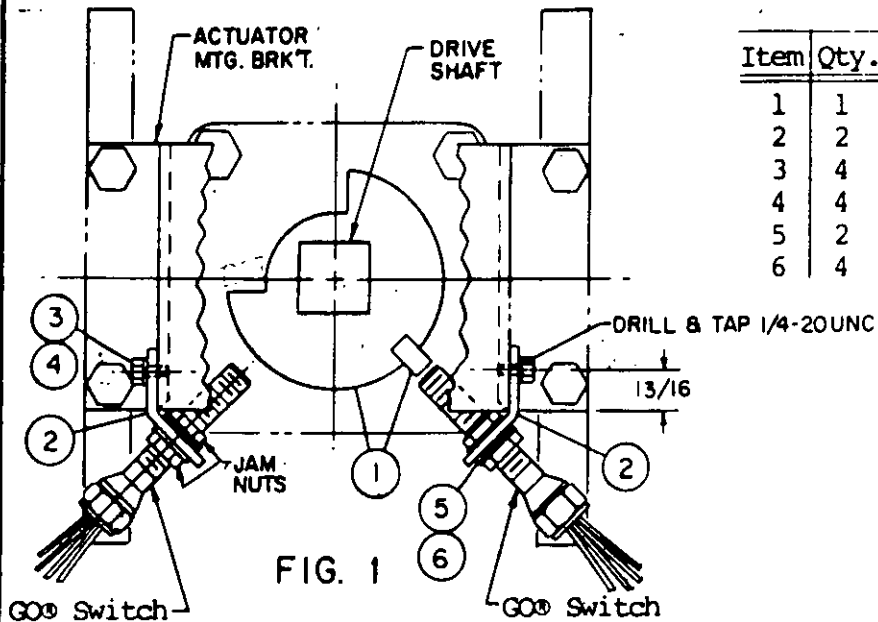


FIG. 1

INSTALLATION INSTRUCTIONS

1. Disassemble Actuator and Coupling from Valve and remove existing pointer.
2. Slide Switch Activator (item 1) onto drive shaft.
3. Drill and Tap Actuator Mtg. Brk't. for 1/4-20UNC screws and attach Mounting Bracket (item 2) with items 3 & 4.
4. Mount GOO Switches in Mounting Bracket (item 2) with two jam nuts supplied with switch and washers items 5 & 6.
5. Adjust Switches in slots on Mounting BRacket (item 2) to sense Switch Activator (item 1) in full open and full closed positions.

Note: 1. GOO Switches are not included in V.I.P. (Valve Indication Package) and should be ordered separately.

2. Use Model 713774 GOO Switches.

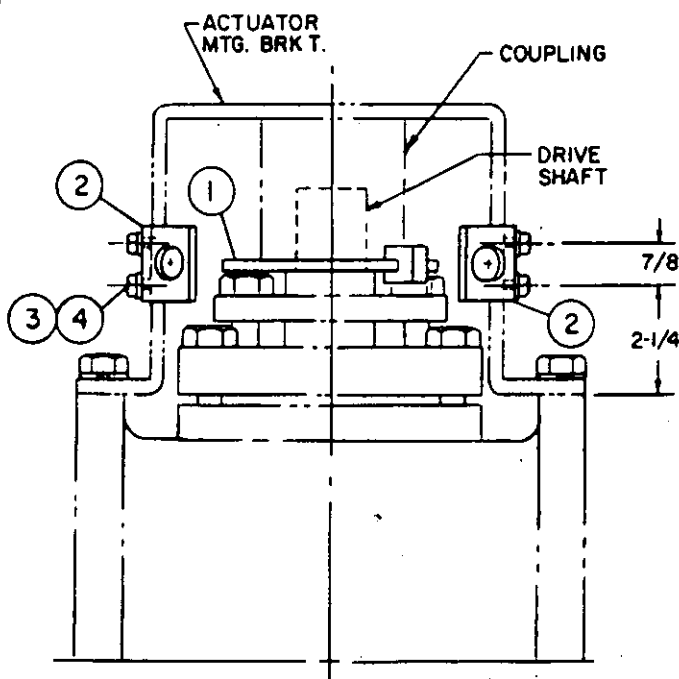


FIG. 2

Tag # 769 BVC

DWN. BY
RON S.

DATE
9-28-83

CHK. BY

APPD.

70 SERIES GOO SWITCH V.I.P.
 ON DURCO 6" 150# G411 Valve
 WITH BETTIS ACTUATOR
 FOR CONOCO

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 3300 FERN VALLEY ROAD
 P.O. BOX 37290
 LOUISVILLE, KENTUCKY, USA, 40233
 (502) 988-2388, TWX 510-635-2788

GO
SYSTEMS

DWG. NO.

V126411-1942

REV.

NOTICE: Drawing contains confidential & proprietary material and is loaned upon agreement that it will not be used in any way detrimental to the interests of General Equipment & Mfg. Co., Inc.

TOLERANCES Unless otherwise specified
 Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, $.XX \pm .01"$, $.XXX \pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within T.I.R.

NO.	REVISION	DATE	BY	APPO.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Switch Activator	V907310-1951
2	1	Mounting Bracket	V907310-1952
3	1	Set Screw #12-24 x 1/4	
4	4	1/4-20 x 1/2 Hex Hd. Screw	
5	4	1/4- L.W.	
6	2	5/8 Ext. Tooth L.W.	
7	2	5/8 F.W.	

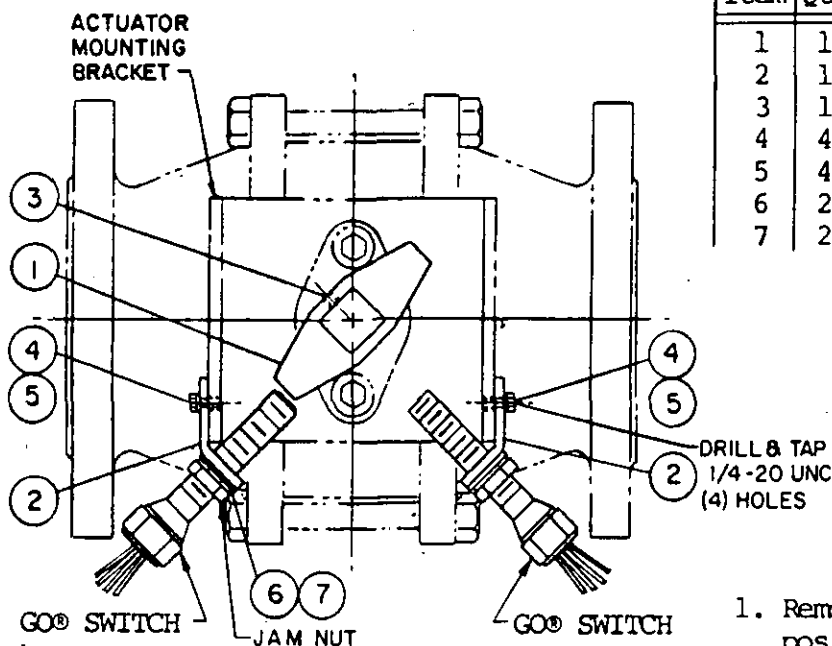


FIG. 1

INSTALLATION INSTRUCTIONS

1. Remove Actuator, Coupling and Existing position indication plate.
2. Slide Switch Activator (item 1) onto drive shaft and secure with set screw (item 3).
3. Assemble GO® Switches to Mounting Bracket (item 2) with Jam Nuts supplied with switches and washers items 6 & 7.
4. Place Switch mounted on bracket on sides of Actuator mounting bracket and align switch with Activator (item 1) then match drill Actuator mounting bracket with holes in Mounting Bracket (item 2). Secure with items 4 & 5.
5. Switches should sense Switch Activator when Valve is in full open and full closed positions.

NOTE: GO® Switches are not included in V.I.P. (Valve Indication Package) and should be ordered as a Separate item.

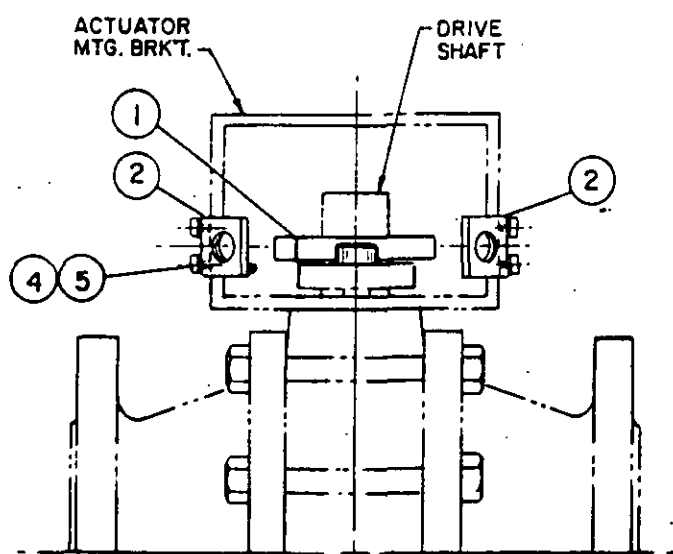


FIG. 2

Tag # CV 755

DWN. BY RON S.	DATE 10-5-83
CHK. BY	
APPO.	
NOTICE: Drawing contains confidential & proprietary material and is furnished upon condition that it will not be used in any way detrimental to the interest of General Equipment & Mfg. Co., Inc.	

70 SERIES GO® SWITCH V.I.P.
 ON
 W-K-M 310 BALL VALVE 4"
 FOR
 CONOCO

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 3300 FERN VALLEY ROAD
 P.O. BOX 37290
 LOUISVILLE, KENTUCKY, USA, 40233
 (502) 968-2306, TWX 810-636-2786

GO
SYSTEMS

DWG. NO. V 907310-1950	REV.
---------------------------	------

Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, $.XX \pm .01"$, $.XXX \pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within T.I.R.

NO.	REVISION	DATE	BY	APPD.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Switch Activator	V907310-1955
2	1	Mounting Bracket	V907310-1954
3	1	Set Screw #12-24 x 1/4	
4	4	1/4-20 x 1/2 Hex Hd. Screw	
5	4	1/4- L.W.	
6	2	5/8 Ext. Tooth L.W.	
7	2	5/8 F.W.	

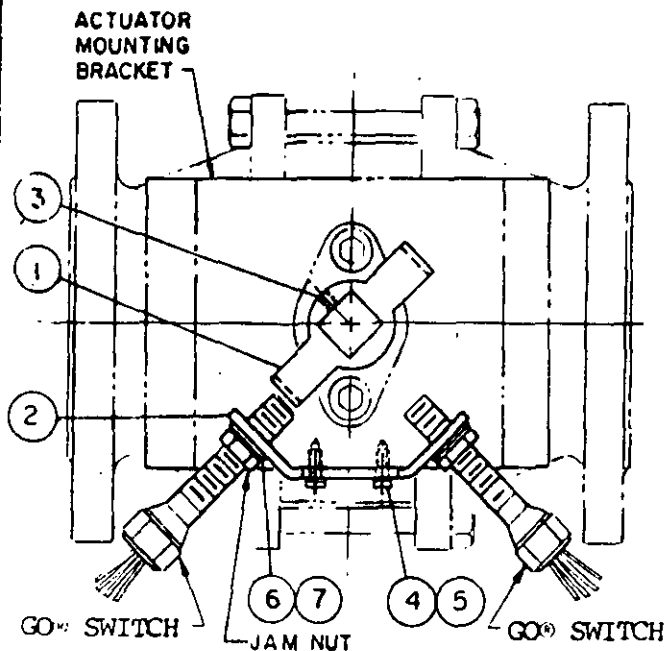


FIG. 1

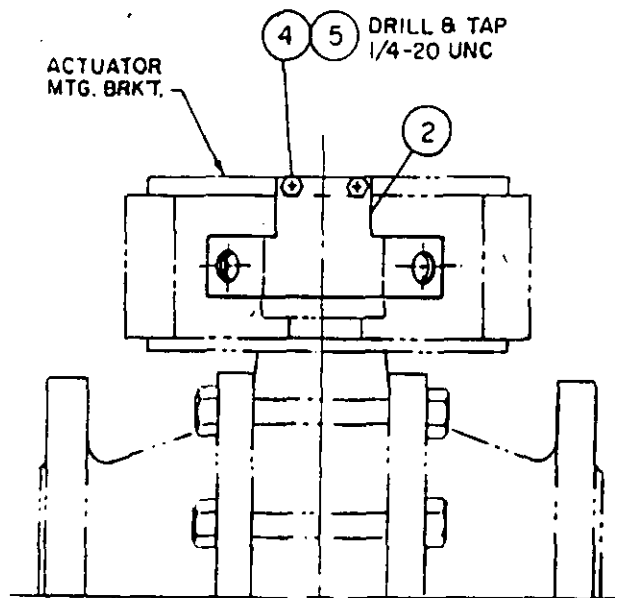


FIG. 2

INSTALLATION INSTRUCTIONS

1. Remove Actuator, Coupling and Existing position indication plate.
2. Slide Switch Activator (item 1) onto drive shaft and secure with set screw (item 3).
3. Place Mounting Bracket (item 2) onto Actuator Mtg. Brk't. and mark position of two holes. Drill and tap for 1/4-20 UNC holes. Secure Mounting Bracket (item 2) with items 4 & 5.
4. Screw GO® Switches into Mounting Brk't. (item 2) till Gap between end of switch & Switch Activator (item 1) is approx. 1/16". Secure with Jam Nuts that are included with Switches and with washers (items 6 & 7).
5. Switches should sense Switch Activator when Valve is in full open and full closed positions.

NOTE: GO® Switches are not included in V.I.P. (Valve Indication Package) and should be ordered as a Separate item.

Tag # CV 758 & CV 760

OWN. BY	DATE
RON S.	10-
CHK. BY	
APPD.	
NOTICE: Drawing contains confidential & proprietary material and is furnished upon condition that it will not be used in any way detrimental to the interest of General Equipment & Mfg. Co., Inc.	

70 SERIES GO® SWITCH V.I.P.
 ON
 W-K-M 310 BALL VALVE 6"
 FOR
 CONOCO

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 3300 FERN VALLEY ROAD
 P.O. BOX 37290
 LOUISVILLE, KENTUCKY, USA, 40233
 (502) 968-2386, TWX 810-535-2786

GO.
SYSTEMS

DWG. NO.
 V 907310-1953

REV.

TOLERANCES Unless otherwise specified
 Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, $XX \pm .01"$, $XXX \pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within T.I.R.

NO.	REVISION	DATE	BY	APPD.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Switch Activator V402800-1948	
2	1	Mounting plate V402800-1949	
3	3	#10-24 x 1/2 Rd. Hd. Screw	
4	3	#10 Ext. Tooth L.W.	

INSTALLATION INSTRUCTIONS

1. With Valve Actuator removed slide Switch Activator (item 1) onto drive shaft as shown in figure 1.
2. To Mount Mounting Bracket (item 2) match drill and tap for three #10-24 UNC screws and attach item 2 to Actuator mounting bracket with items 4 & 5.
3. Screw GO Switches into threaded holes on Mounting Bracket (item 2) and secure with jam nuts included with switches.
4. Adjust Switches to sense triangular bars on Switch Activator when Valve is in full open or full closed positions.

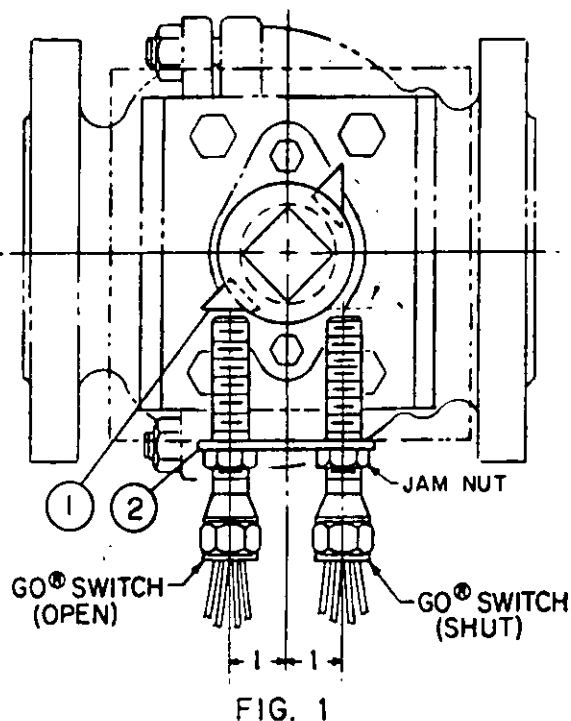


FIG. 1

MATCH DRILL FOR THREE
 10-24 UNC-2B THREADED
 HOLES

ACTUATOR
 MTG. BRKT.

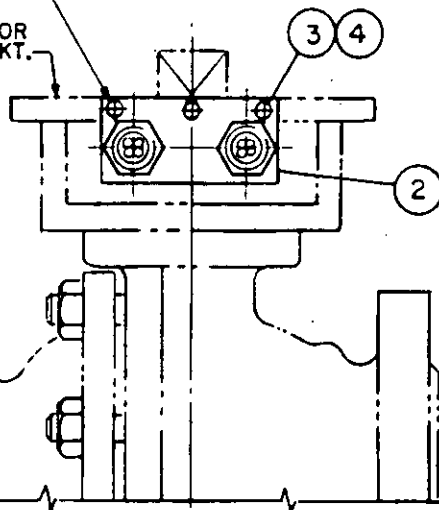


FIG. 2

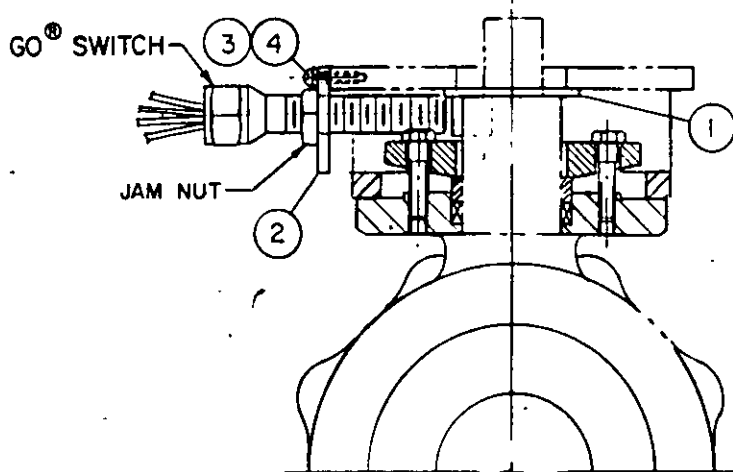


FIG. 3

DWN. BY
 RON S.

DATE
 10-3-83

CHK. BY

APPD.

70 SERIES GO® SWITCH V.I.P.
 ON KTM 6" VALVE E0800
 WITH JAMESBURY ACTUATOR
 FOR CONOCO

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 3300 FERN VALLEY ROAD
 P.O. BOX 37290
 LOUISVILLE, KENTUCKY, USA, 40233
 (502) 969-2386, TWX 810-535-2786

GO.
SYSTEMS

DWG. NO.

V402800-1947

REV.

NOTICE: Drawing contains confidential & proprietary material and is furnished upon condition that it will not be used in any way detrimental to the interest of General Equipment & Manufacturing Co., Inc.

Tag # CV 340 D 600

TOLERANCES Unless otherwise specified
 Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, $.XX \pm .01"$, $.XXX \pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within T.I.R.

NO.

REVISION

DATE

BY

APPD.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Mounting Bracket	V782067-1935
2	1	Switch Activator	V782067-1936
3	1	Rollpin 1/8 x 1/2" long	
4	1	1/4-20 x 5/8 Flat Hd. Screw	
5	4	1/4-20 x 3/4 Hex Hd. Screw	
6	4	1/4 L.W.	
7	2	5/8 Ext. Tooth L.W.	
8	4	5/8 F.W. (1-5/16 O.D.)	

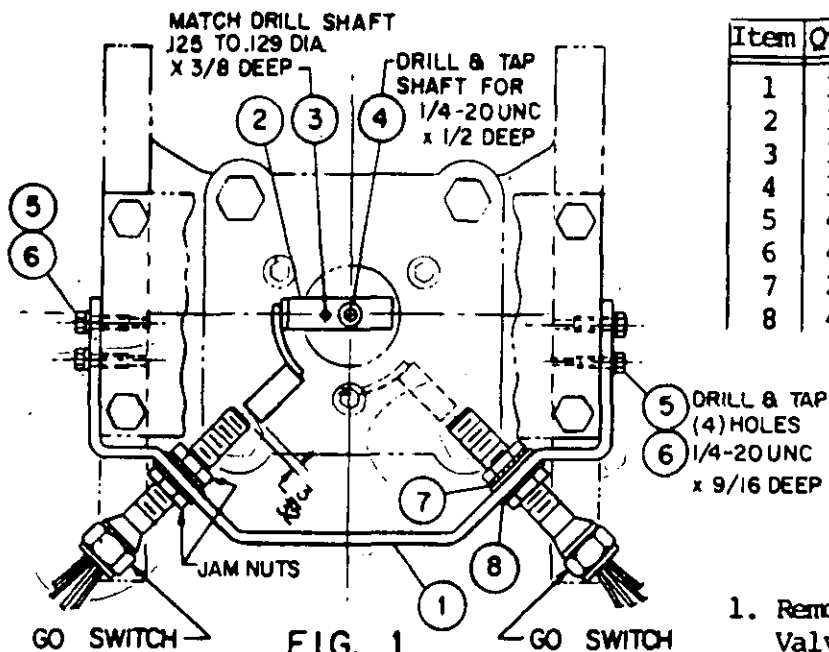


FIG. 1

INSTALLATION INSTRUCTIONS

1. Remove Valve Actuator and Coupling from Valve.
2. Machine notch in coupling to 7/8" depth as indicated in view A-A.
3. Drill & tap top of shaft for 1/4-20 UNC x 1/2" deep hole.
4. Place Switch Activator (item 2) on shaft and secure with flat head screw (item 4). Then orient Switch Activator as shown in figure 1. Match drill shaft with hole in Switch Activator and drive roll-pin (item 3) into hole to prevent rotation.
5. Fit Mounting Bracket (item 1) to sides of Actuator mounting plate support and mark location of four mounting holes, drill and tap four 1/4-20 UNC x 9/16 dp. Then secure Mounting bracket (item 1) with items 5 & 6.
6. Insert GO Switches into slots on Mtg. Bracket (item 1) and secure with two jam nuts that come with switches and washers items 7 & 8.
7. Adjust Switches to sense Activator (item 2) in full open and full closed positions.

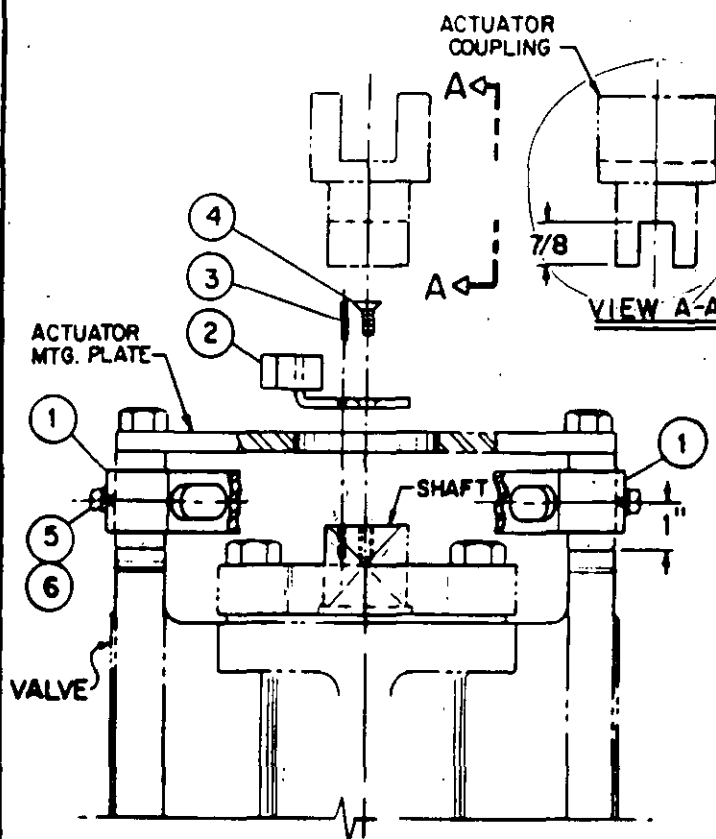


FIG. 2

DWN. BY RON S.	DATE 9-12-83
CHK. BY	
APPD.	

70 SERIES GO® SWITCH V.I.P.
 ON TUPLINE 067 6" PLUG VALVE
 VALVE SHAFT
 INDICATION

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 2820 FERN VALLEY ROAD
 P.O. BOX 37289
 LOUISVILLE, KENTUCKY, USA 40233
 (502) 682-6288, TWX 510-625-8788

GO
 SYSTEMS

DWG. NO.

V782067-1934

REV.

NOTES: Drawing contains
 dimensional & primary material
 and is limited to the conditions
 that it will not be used in any way
 contrary to the intent of