COMPLIANCE PLAN CAPITAL ITEMS

REACTOR VALVE LIMIT SWITCH REPLACEMENT

ABERDEEN CHEMICAL PLANT

October 25, 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

Reactor	Valve Location	Size	Manufacturer
745 + 700	Chem Wash Rtrn.	6"	Jamesbury (Ball)
	Hot H_2O Charge	6"	TuFline (Plug) 150
	Sewer	6"	Jamesbury (Ball)
	Dump	6"	Jamesbury (Ball)
	Evacuation	8"	TuFline (Plug) 150
	Recovery	6"	TuFline (Plug) 150
	Vent	4"	TuFline (Plug) 300
600 + 500	Chem Wash Rtrn.	6"	KTM E0106 (Ball)
	Hot H_2O Charge	6"	TuFline (Plug) 150
	Sewer	6"	TuFline (Plug) 150
	Dump	6"	WKM 6FB112 (Ball)
	Evacuation	6"	TuFline (Plug) 150
	Recovery	6"	TuFline (Plug) 150
600	Vent	3"	WKM (Ball) 3RB100
500	Vent	3"	TuFline (Plug) 300
400	Chem Wash Rtrn.	6"	WKM (Ball) 6FB123 Module 310C
	Hot H_2O Charge	6"	TuFline (Plug) 150
	Sewer	6"	Durco (Plug) 6411
	Dump	6"	WKM (Ball) 310
	Evacuation	6"	TuFline (Plug) 150
	Recovery	6"	TuFline (Plug) 150
	Vent	3"	WKM (Ball) 3RB100 310C
300	Chem Wash Return	6"	KTM (Ball) E0106
	Hot H_2O Charge	6"	TuFline (Plug) 150
	Sewer	6"	TuFline (Plug) 150
	Dump	6"	WKM (Ball) 6FB112 310 B

Reactor	Valve Location	Size	Manufacturer
	Evacuation	6"	TuFline (Plug) 150
	Recovery	6"	TuFline (Plug) 150
	Vent	3"	TuFline (Plug) 300
744			
743			
742	Chem Wash Rtrn.	6"	WKM (Ball) 6F-B130 310B
+741	Hot H_2O 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"	TuFline (Plug) 150
	Vent	3"	WKM (Ball) 3KB150

TABLE II

Manufacturer	Size	Fig.No.	Quantity	Actuator Type										
				Bettis				Bettis			Jamesbury		Hills Mc-Canna	Ma-try
				CB725	721C	CB520	CB525	731C	722C	T3126B-SR4	ST1200-C	ST2400C	R1503	1250
1.TuFline (P)	6"	067(150)	27	14	5	1	1	-	-	-	6	-	-	-
2.TuFline (P)	8"	067 (150)	2	-	-	-	-	-	2	-	-	-	-	-
3.TuFline (P)	4"	0367(300)	2	-	-	2	-	-	-	-	-	-	-	-
4.TuFline (P)	3"	0367(300)	2	-	-	-	-	-	-	-	-	-	2	-
5.Jamesbury(B)	6"	6300-1-360MT	6	-	-	-	-	6	-	-	-	-	-	-
6.WKM (B)	6"	6F-B112 310B	8	-	4	-	-	-	-	-	1	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"	E0106	3	-	-	-	-	3	-	-	-	-	-	-
		TOTAL	70											

COMPLIANCE PLAN CAPITAL ITEMS

REACTOR VALVE LIMIT SWITCH REPLACEMENT

ABERDEEN CHEMICAL PLANT

III. Instrument Specification

Item	Description
PLS-101 through 170	Proximity Limit Switches

CONOCO

Conoco Inc.
Engineering Center
Ponca City, Oklahoma
SPECIFICATION SHEET

SPECIFICATION SHEET
PROJECT NO
A F E NO
DATE 7-31-85 (NO) NO
MADE BY EGJ REQ NO
APPD BY VFM PO NO

PLANT Aberdeen Chemical PROJECT Reactor Valve Limit Switch Rplmt.

ITEM NO
SERVICE PLS-101 thru 170 Proximity Limit Switches

Quantity: 70

Service: Valve Indication

Location: On bracket between valve and actuator

Manufacturer: GO or company approved equal

Model: 713774

Description: ½NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with 5/8-18 NF x 2.813" threads.

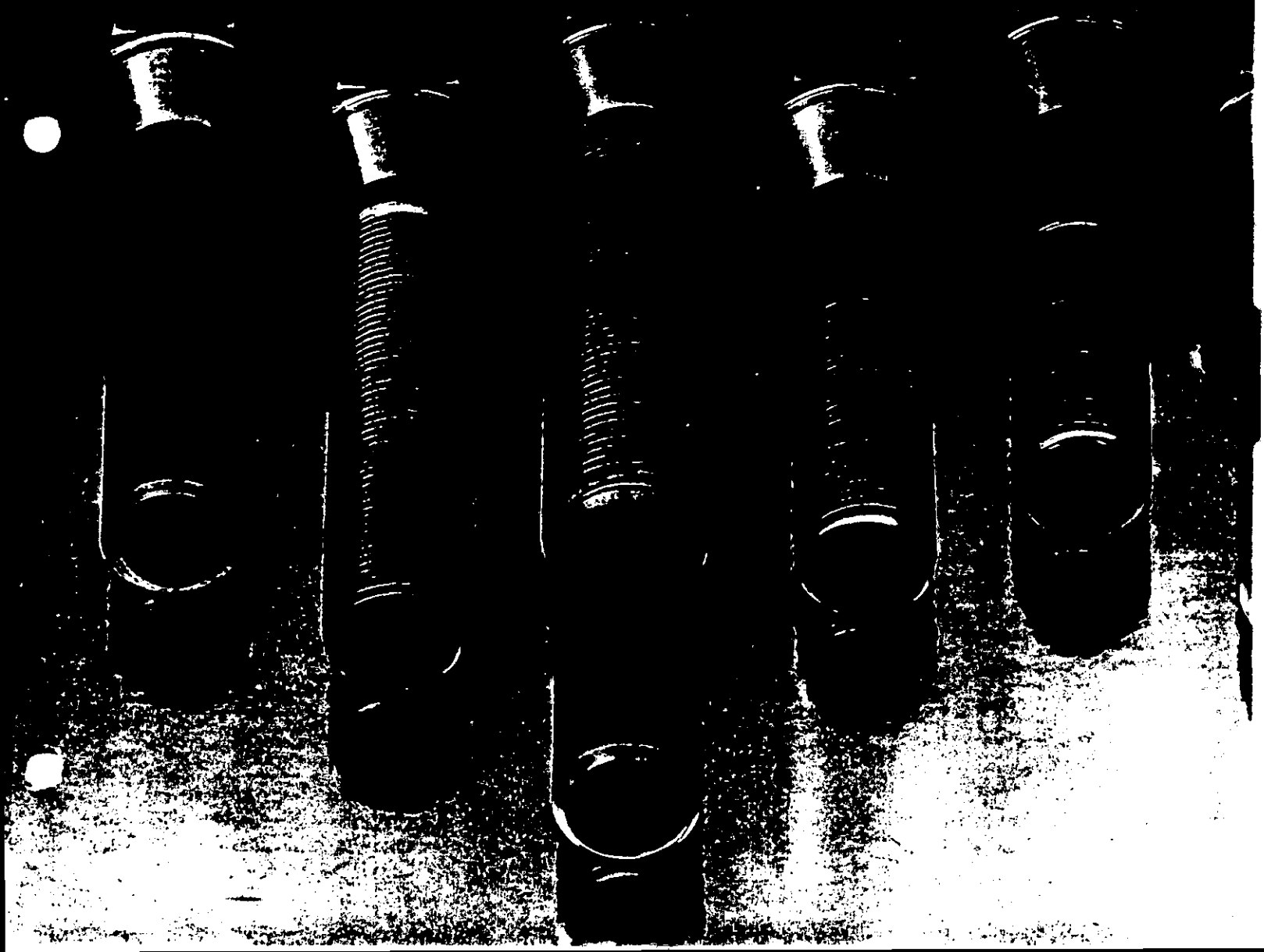
4441-S

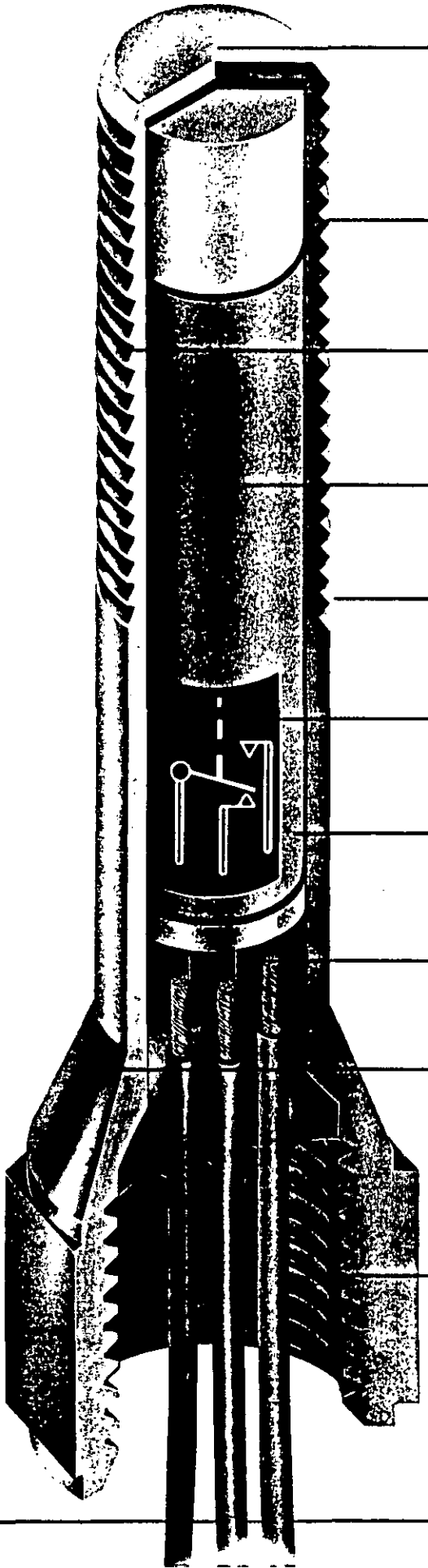
SHEET ____ OF ____ REV ____

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 ⅝-18 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 ⅝-18 NF x 1.5" threads with 2 lock nuts.

Model 713520
½ NPT conduit outlet, 18" 3 conductor cable, type 300 stainless steel housing, no threads.

Model 713560
½ NPT conduit outlet with 18" 3 conductor cable, type 300 stainless steel housing with ⅝-18 NF x 1.5" threads with 2 lock nuts.

Model 713570
½ NPT conduit outlet, 18" 3 conductor cable, type 300 stainless steel housing with ⅝-18 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 ⅝-18 NF x 1.5" threads with 2 lock nuts.

Model 713720
½ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing, no threads.

Model 713760
½ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with ⅝-18 NF x 1.5" threads with 2 lock nuts.

Model 713770
½ NPT conduit outlet, 18" potted 3 wire leads, type 300 stainless steel housing with ⅝-18 NF x 2.813" threads with 2 lock nuts.

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

Model 713524
½ NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing, no threads.

Model 713564
½ NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing with ⅝-18 NF x 1.5" threads with 2 lock nuts.

Model 713574
½ NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing with ⅝-18 NF x 2.813" threads with 2 lock nuts.

Model 713724
½ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing, no threads.

Model 713764
½ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with ⅝-18 NF x 1.5" threads with 2 lock nuts.

Model 713774
½ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with ⅝-18 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: ± 1°, Fractions: ± 1/32", .XX ±.01", .XXX ±.005"
Surfaces must be Concentric, Parallel, Flat & Square
(as applicable) to each other within _____ T.I.R.

NO.	REVISION	DATE	BY	APPD.

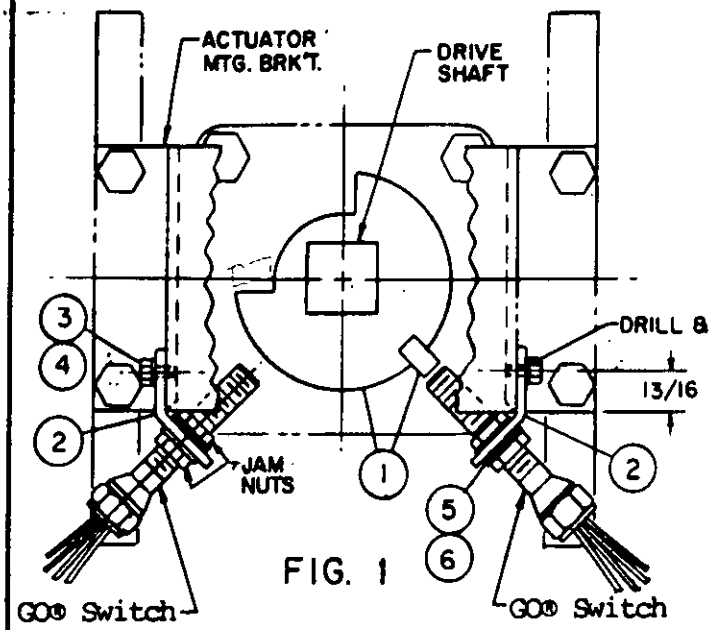


FIG. 1

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.)	

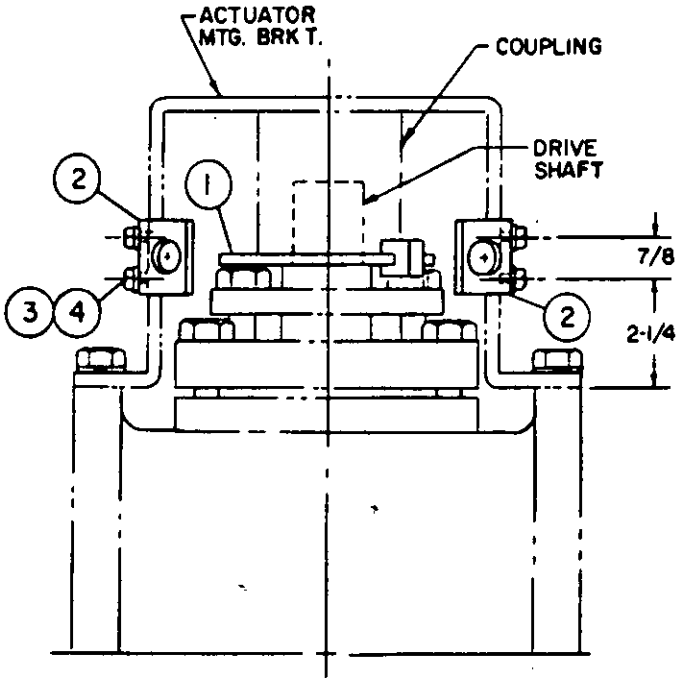


FIG. 2

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 GO® 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. GO® Switches are not included in V.I.P. (Valve Indication Package) and should be ordered separately.
2. Use Model 713774 GO® Switches.

Tag # 769 BVC

DWN. BY	DATE
RON S.	9-28-83
CHK. BY	
APPD.	

70 SERIES GO® 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 37280
LOUISVILLE, KENTUCKY, USA, 40233
(502) 969-2366, TWX 810-535-2786

GO SYSTEMS

DWG. NO. V126411-1942

REV.

TOLERANCES Unless otherwise specified
Angles: ± 1°, Fractions: ± 1/32", .XX ±.01", .XXX ±.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	V907310-1951
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.	

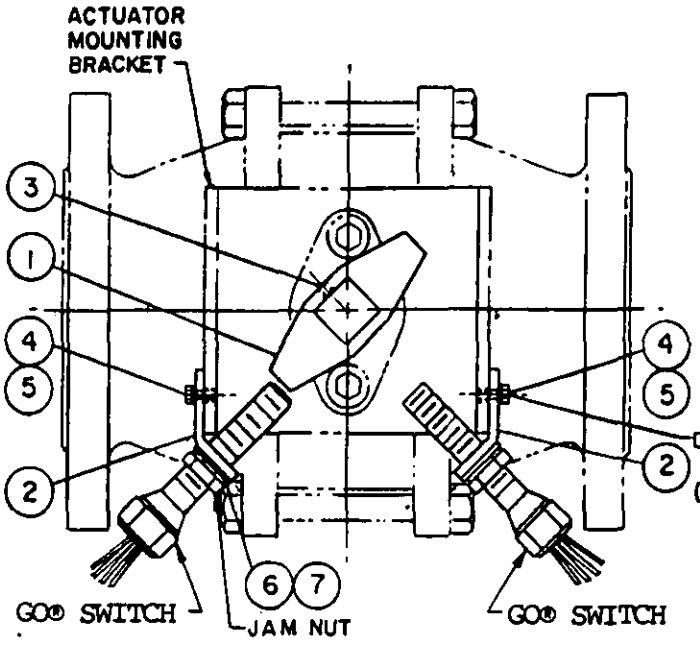


FIG. 1

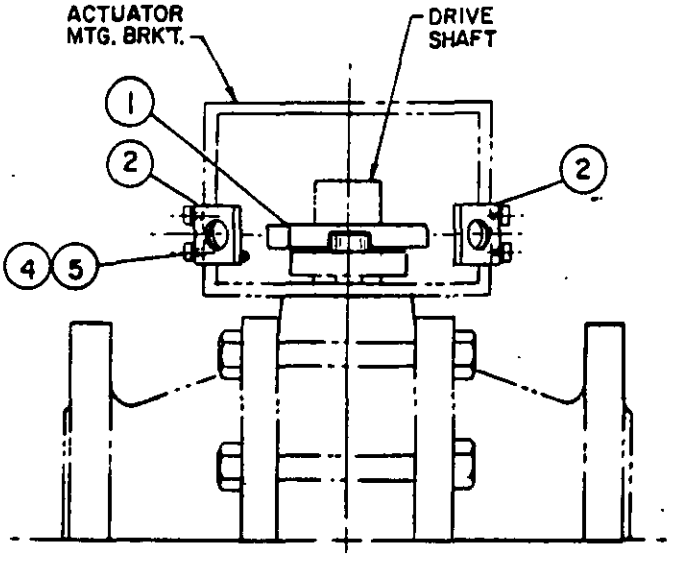


FIG. 2

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. 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.

Tag # CV755

DWN. BY	DATE
RON S.	10-5-83
CHK. BY	
APPD.	

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) 969-2366, TWX 810-436-2799

GO SYSTEMS

DWG. NO. V 907310-1950

REV.

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

NO.	REVISION	DATE	BY	APPD.

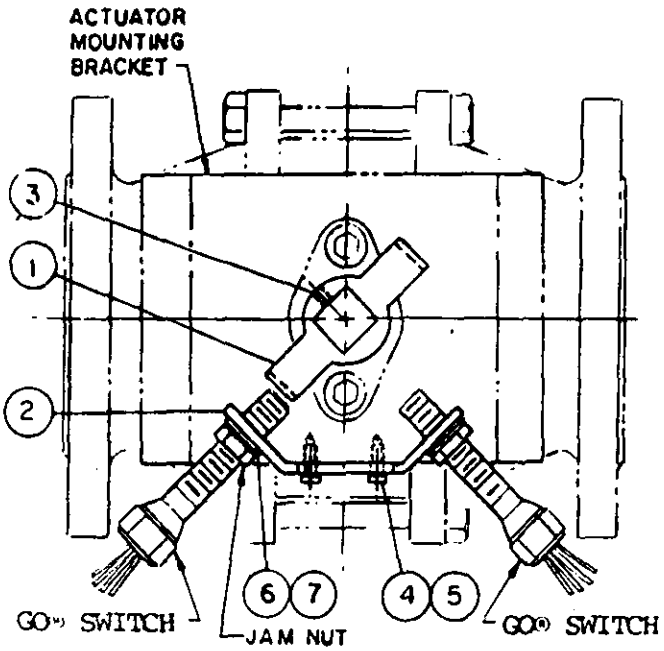


FIG. 1

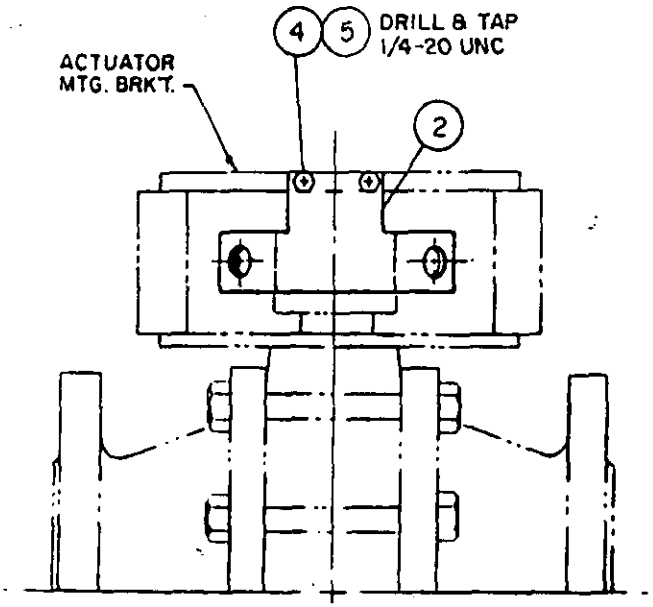


FIG. 2

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.	

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) (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

DWN. BY RON S.	DATE 10-
CHK. BY	
APPD.	

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) 969-2366, TWX 810-535-2766

GO SYSTEMS

DWG. NO.	REV.
V 907310-1953	

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

NO.	REVISION	DATE	BY	APPD.

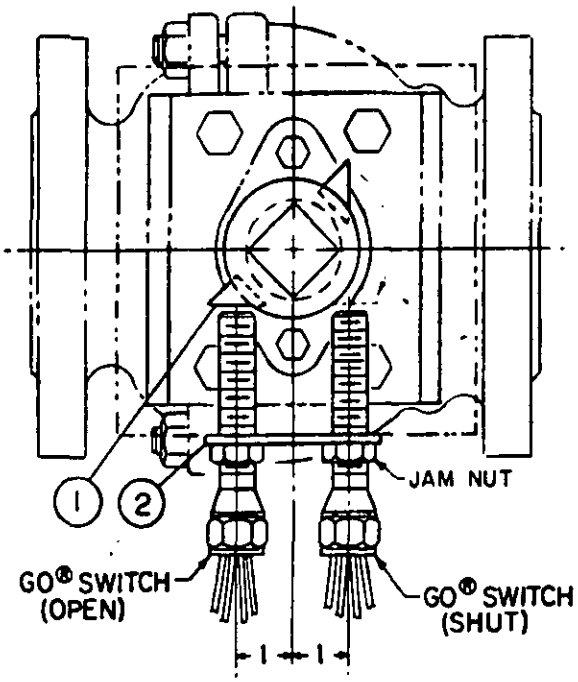


FIG. 1

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.

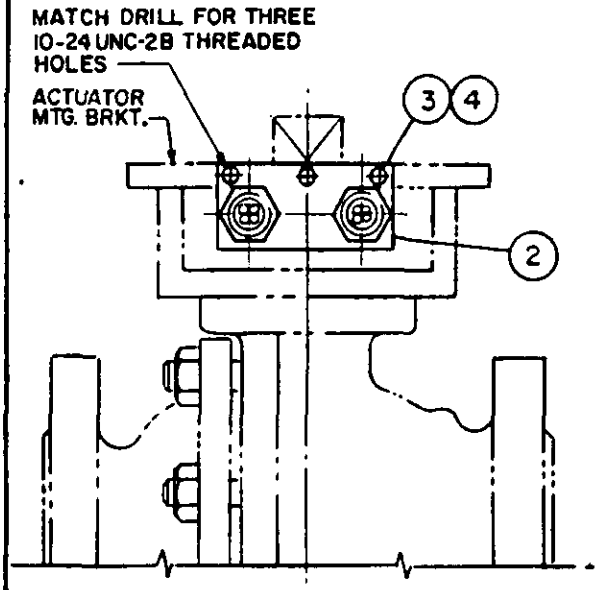


FIG. 2

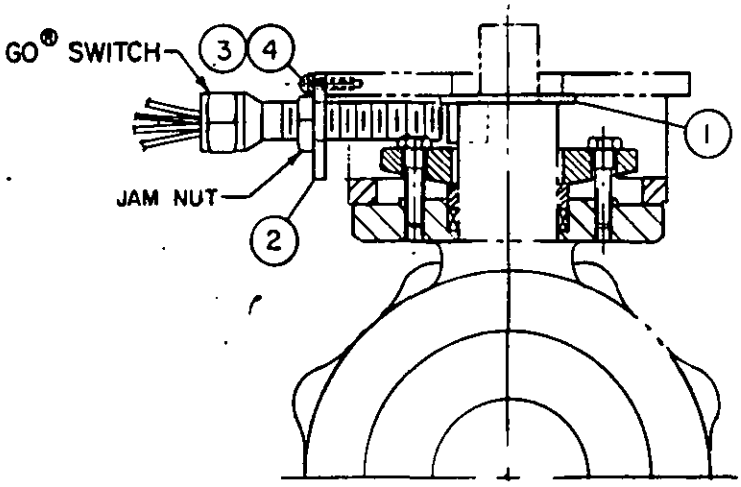


FIG. 3

Tag # CV 340 D600

DWN. BY RON S.	DATE 10-3-83
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 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) 969-2366, TWX 810-535-2796

GO SYSTEMS

DWG. NO. V402800-1947 REV.

TOLERANCES Unless otherwise specified
Angles: ± 1°, Fractions: ± 1/32", .XX ±.01", .XXX ±.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.)	

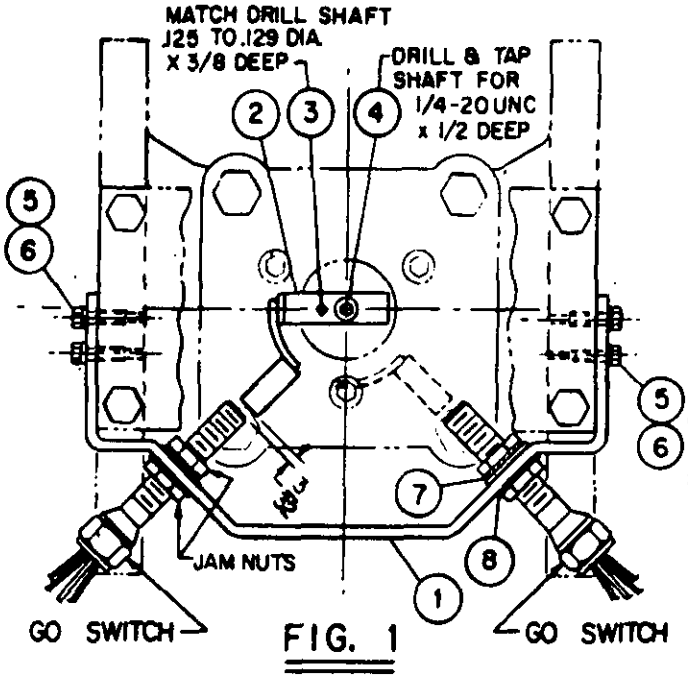


FIG. 1

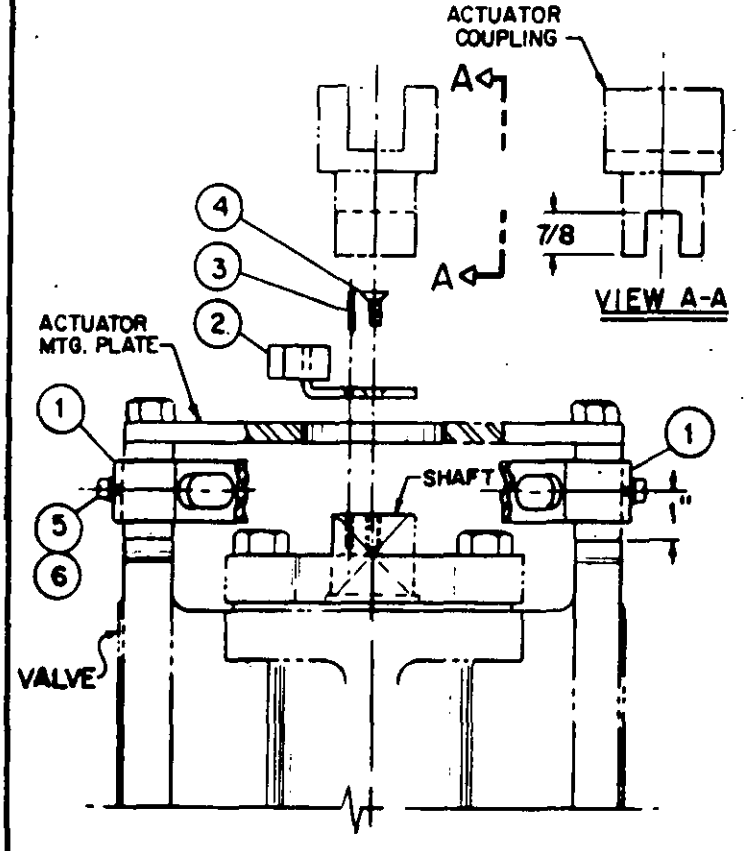


FIG. 2

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 1/4-20UNC 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 mounnting holes, drill and tap four 1/4-20UNC 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.

LC FSM

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

70 SERIES GO® SWITCH V.I.P.
ON TUFLINE 067 6" PLUG VALVE
VALVE SHAFT 150#
INDICATION

GENERAL EQUIPMENT & MANUFACTURING CO., INC.
3800 FERN VALLEY ROAD
P.O. BOX 37200
LOUISVILLE, KENTUCKY, USA, 40213
(502) 969-8000, TWX 810-535-5700
GO SYSTEMS

DWG. NO. V782067-1934 REV.

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

NO.	REVISION	DATE	BY	APPD.

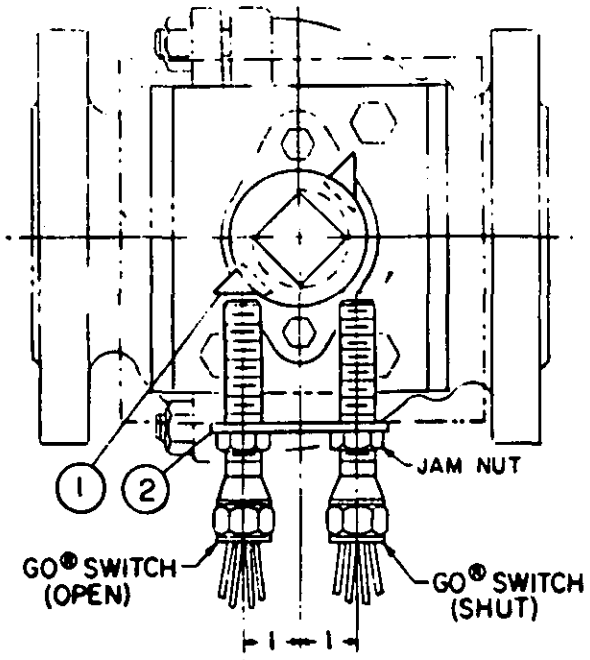


FIG. 1

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. Attach Mounting Plate 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.

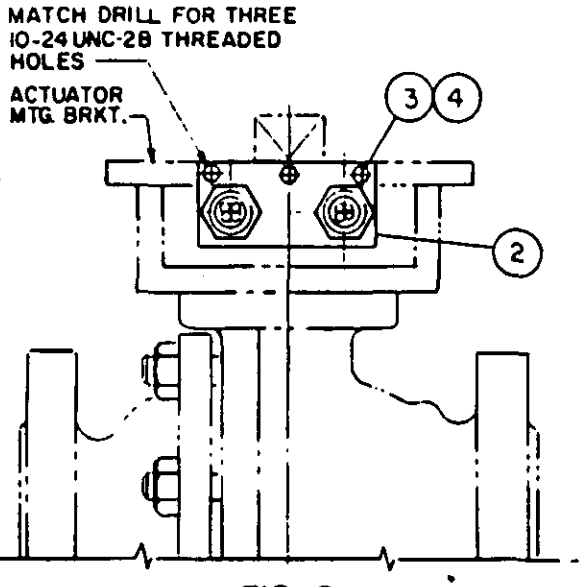


FIG. 2

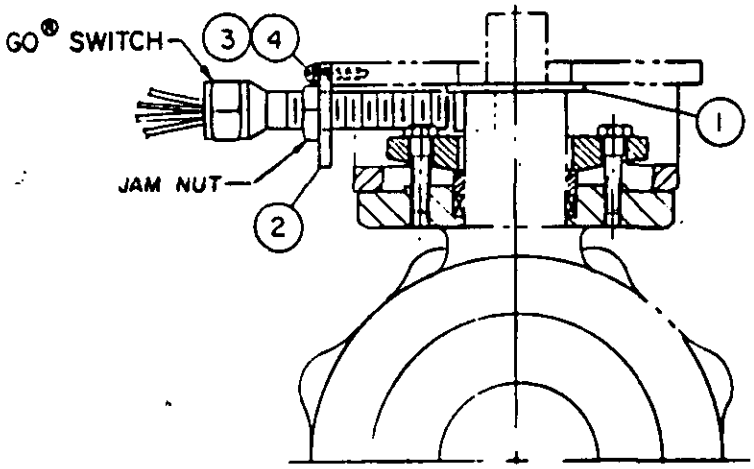


FIG. 3

DWN. BY	DATE
RON S.	10-3-85
CHK. BY	
APPD.	

70 SERIES GO® SWITCH V.I.P.
ON 6600 JAMASBURY VALVE
WITH BETTIS ACTUATOR
FOR VISTA POLYMER

GENERAL EQUIPMENT
& MANUFACTURING CO., INC.
3300 FERN VALLEY ROAD
P.O. BOX 37290
LOUISVILLE, KENTUCKY, USA, 40233
(502) 969-2386, TWX 810-535-2788

GO SYSTEMS

DWG. NO.	REV.
V402800-1947B	