

2.1.1

To: D. W. Hollis

From: F. G. Jeanson
Date: December 17, 1985

Interoffice
Communication

Subject: LIMIT SWITCH REPLACEMENT - CLASS "A" PROCESS DESIGN

VIST

Attached is the Class "A" Process Design to replace the limit switches on valves in VCM service. These new limit switches will indicate the position of the valve stem, instead of the position of the actuator, providing each valve with more reliable indication in the control room. This design will provide limit switches for the VCM charge valves, the evacuation/recovery valve and the main dump valve on each reactor, also included in this design are the valves on the charge systems. Limit switches will be replaced on a total of 47 valves.

Limit switches for the remaining valves on the reactors (Chem Wash, Hot Water Charge, Sewer, Dump, Recovery, Evacuation and Vent) will be provided for in the compliance plan.

A trial limit switch, that is the same model as the limit switches specified in this design, was installed in the plant in the third quarter of 1984. This limit switch has operated trouble free for approximately one year.

By copy of this design to REP a definitive estimate is requested. If there are any questions or comments please refer them to me.

F. G. Jeanson

F. G. Jeanson
Process Engineer

gmp

c: JF, JWW, CRS, CWT, RAF, REP(2), VEM, VLT, AHS

*Chem wash / recovery
Supply valves to
the reactors were
added.*

REACTOR VALVE LIMIT SWITCH REPLACEMENT

ABERDEEN CHEMICAL PLANT

December 10, 1985

Work By: Frank G. Jeanson
Frank G. Jeanson
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REACTOR VALVE LIMIT SWITCH REPLACEMENT

ABERDEEN CHEMICAL PLANT

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LIMIT SWITCH REPLACEMENT

ABERDEEN CHEMICAL PLANT

I. Purpose and Process Description

The purpose of this design is to provide the valves in VCM service with reliable indication of the valve position in the control room. The existing limit switches do not provide this reliability, since they are operated by the position of the actuator and not the position of the valve. This type of operation does not account for the possibility of shearing the coupling between the valve stem and actuator, which poses a potentially hazardous situation for a VCM release.

This design will provide each of the designated valves on the reactors and charge system 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 acutator position is showing closed.

A total of 47 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. The valves which will be equipped with the new limit switches are listed in Table I.

TABLE I

<u>Reactor</u>	<u>Valve Location</u>	<u>Size</u>	<u>Manufacturer</u>
745	VCM Charge	6"	TuFline (Plug) 300
+	VCM Charge	6"	TuFline (Plug) 300
700	Main Dump	8"	Jamesbury (Ball) 300
	Evac./Rec.	8"	TuFline (Plug) 300
600	VCM Charge	6"	TuFline (Plug) 300
+	VCM Charge	6"	TuFline (Plug) 300
500	Main Dump	8"	KTM (Ball)
	Eva./Rec.	6"	TuFline (Plug) 300
400	VCM Charge	6"	TuFline (Plug) 150
	VCM Charge	6"	TuFline (Plug) 150
	Main Dump	8"	Jamesbury (Ball) 300
	Evac./Rec.	6"	Jamesbury (Ball) 300
300	VCM Charge	6"	TuFline (Plug) 150
	VCM Charge	6"	TuFline (Plug) 150
	Main Dump	8"	WKM (Ball) 300
	Evac./Rec.	6"	TuFline (Plug) 300
744	VCM Charge	6"	Durco (Plug) 6411
743	VCM Charge	6"	TuFline (Plug) 150
742	Main Dump	8"	WKM (Ball) 300
741	Evac./Rec.	6"	WKM (Ball) 6RB122

Charge System

New Module Charge Pumps

Suction	8"	WKM (Ball) 8RB10 310
Discharge	6"	WKM (Ball) 6RB102
	6"	WKM (Ball) 6RB102

Old Module Charge Pumps

Suction	8"	TuFline (Plug) 150
	8"	TuFline (Plug) 150
Discharge	6"	Durco (Plug) Fig 0431
	6"	TuFline (Plug) 150

Total Valves = 47

REACTOR VALVE LIMIT SWITCH REPLACEMENT

ABERDEEN CHEMICAL PLANT

III. Instrument Specification

<u>Item</u>	<u>Description</u>
PLS-101 through 147	Proximity Limit Switches



Conoco Inc.
Engineering Center
Ponca City, Oklahoma
SPECIFICATION SHEET

SPECIFICATION SHEET

PROJECT NO. _____

A F E NO. _____

DATE 7-31-85 (IND) NO. _____

MADE BY EGJ (IND) NO. _____

APPROVED BY JRM (IND) NO. _____

PLANT Aberdeen Chemical PROJECT Reactor Valve Limit Switch R-plant

ITEM NO
SERVICE

PLS-101 thru 147 Proximity Limit Switches

Quantity: 47 sets (There are two limit switches per set)

Service: Valve Indication

Location: On bracket between valve and actuator

Manufacturer: GO or company approved equal

Model: 713774

Description: 1/2 NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with 5/8-18 NF x 2.813" threads.

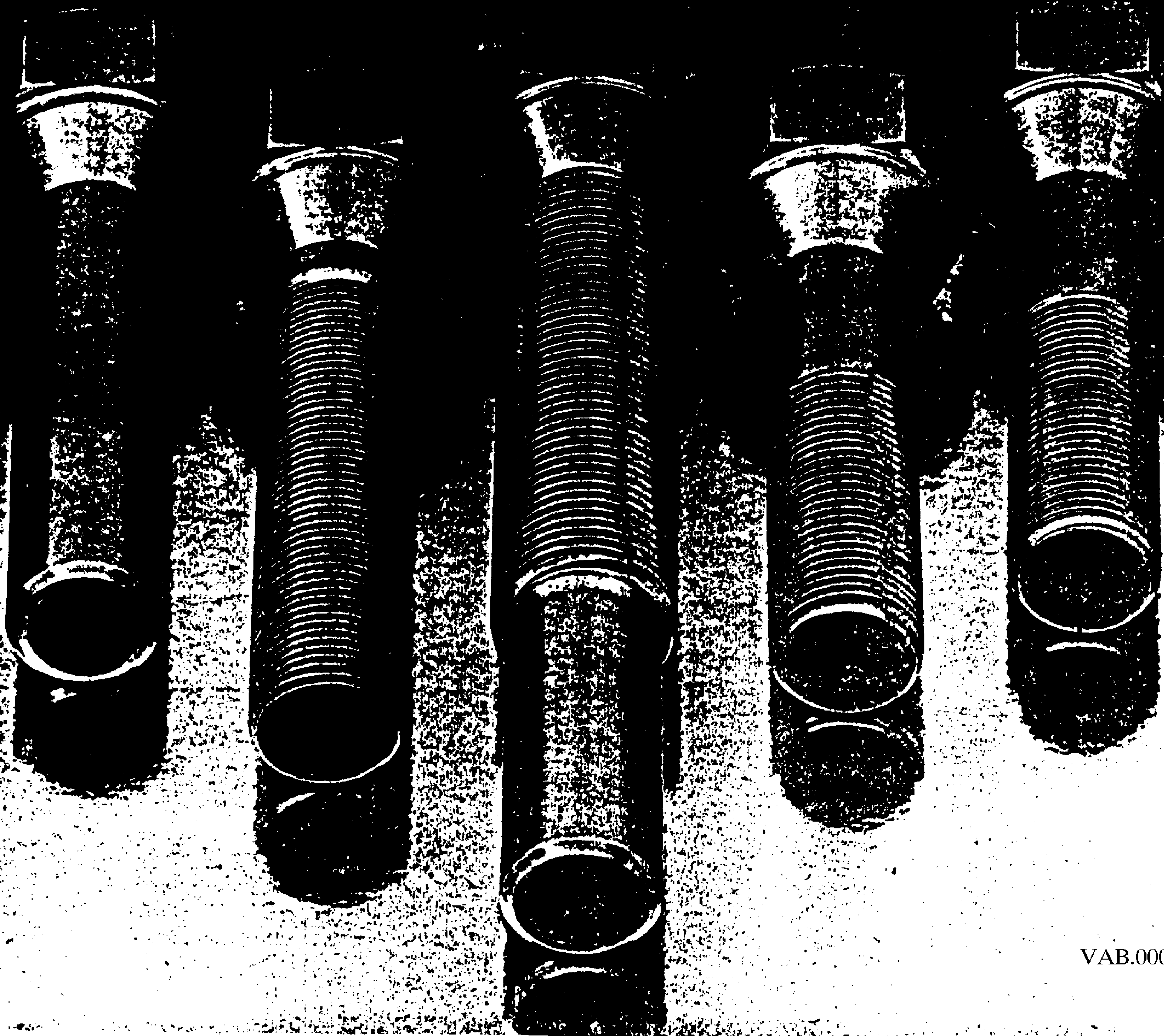
VAB.0001098912

SHEET _____ OF _____ REV _____

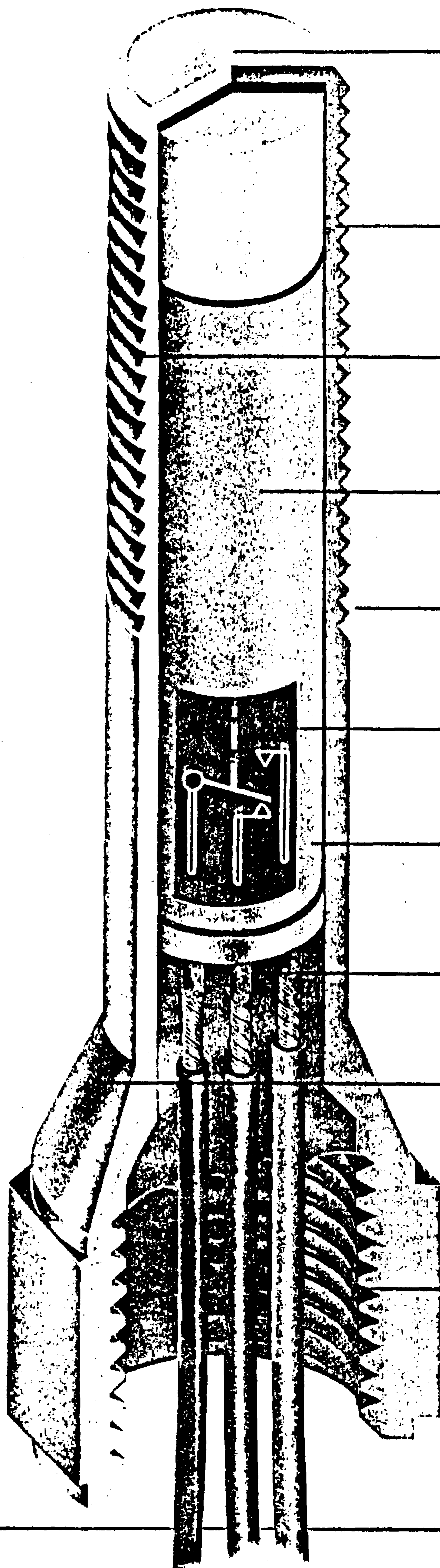
GO

Series 70 Switch

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



VAB.0001098913



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.

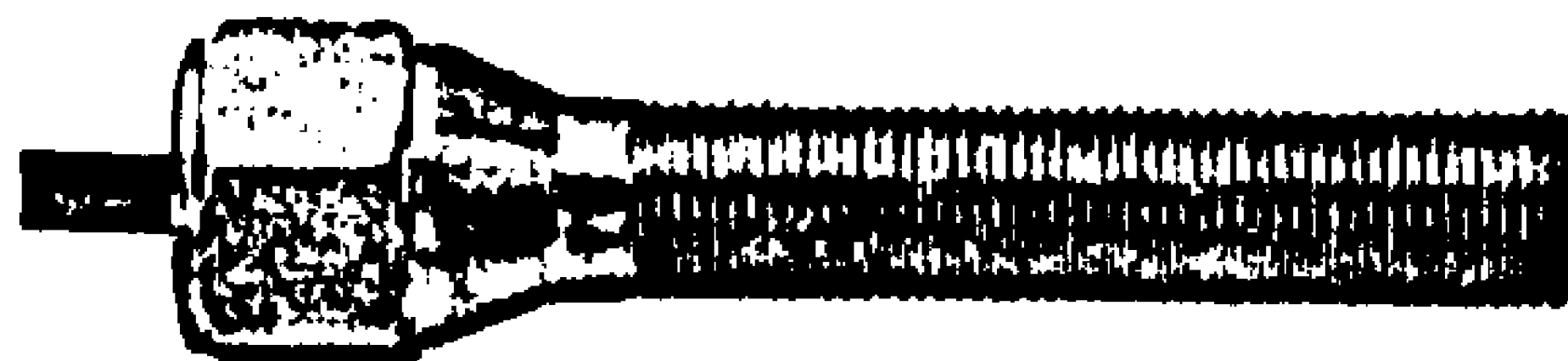
The standard stainless steel housing is impervious to oils, caustic acids, water laden areas and most

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.)

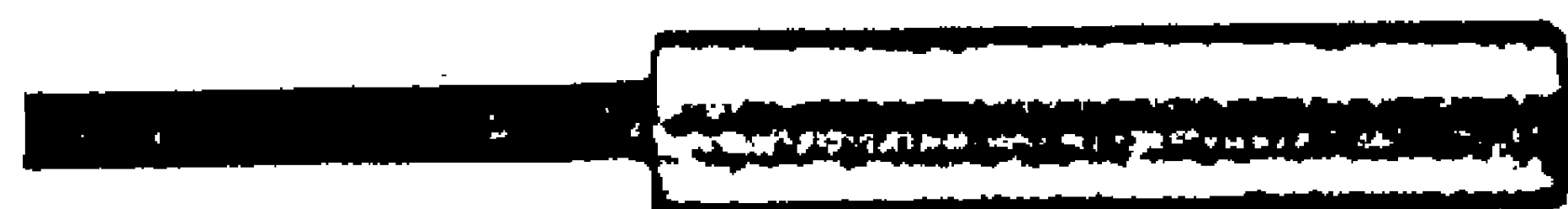
Standard Models



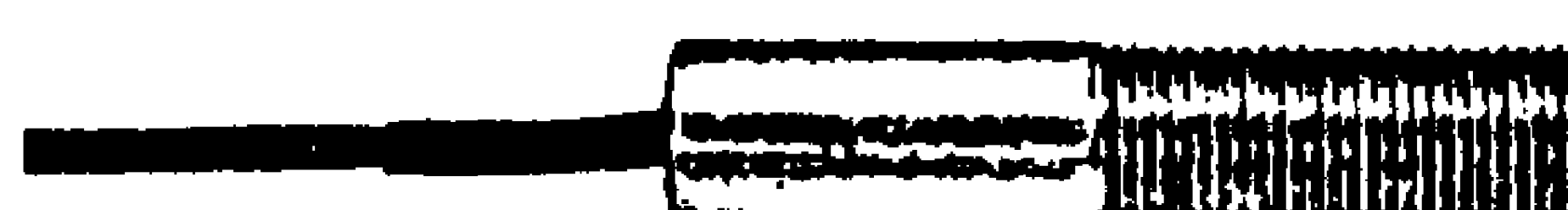
Model 713360
No conduit connection, 18" 3 conductor cable with water resistant squeeze connection, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



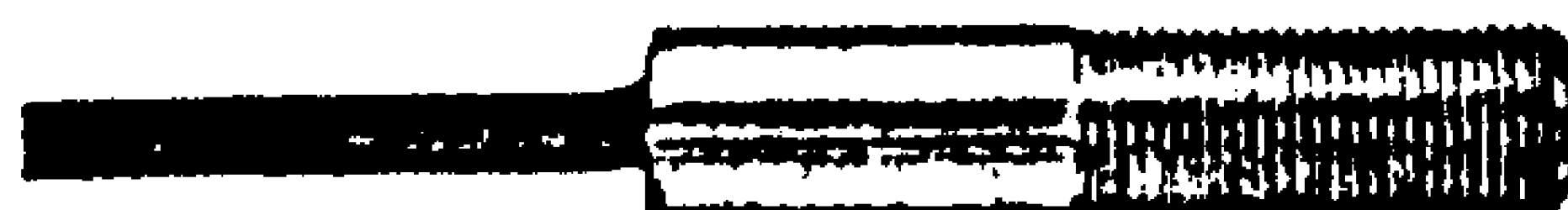
Model 713570
1/2 NPT conduit outlet, 18" 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 2.813" threads with 2 lock nuts.



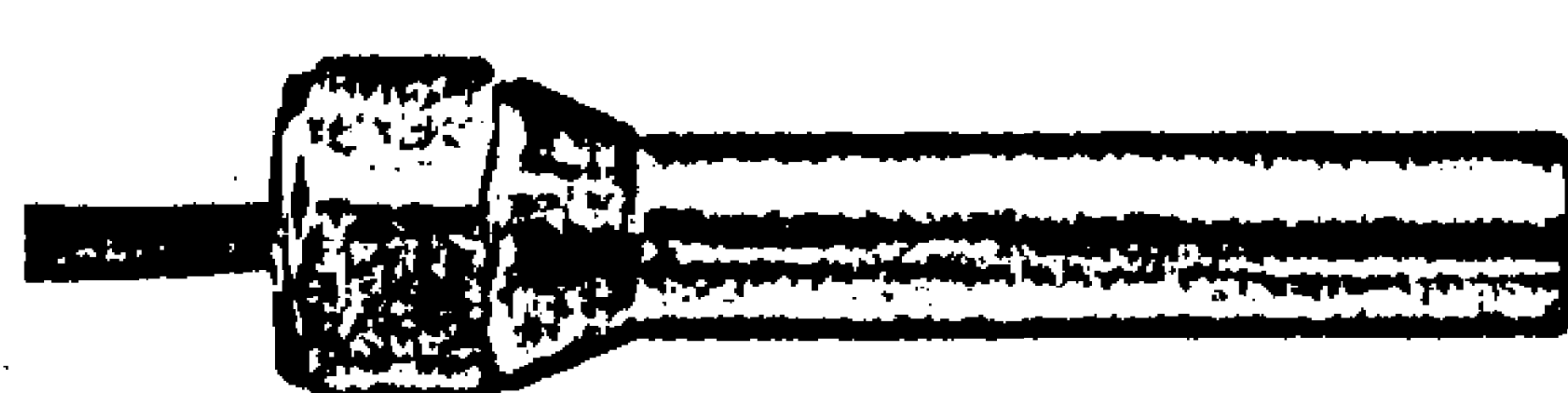
Model 713420
No conduit outlet, 18" potted, 3 conductor cable, type 300 stainless steel housing; no threads.



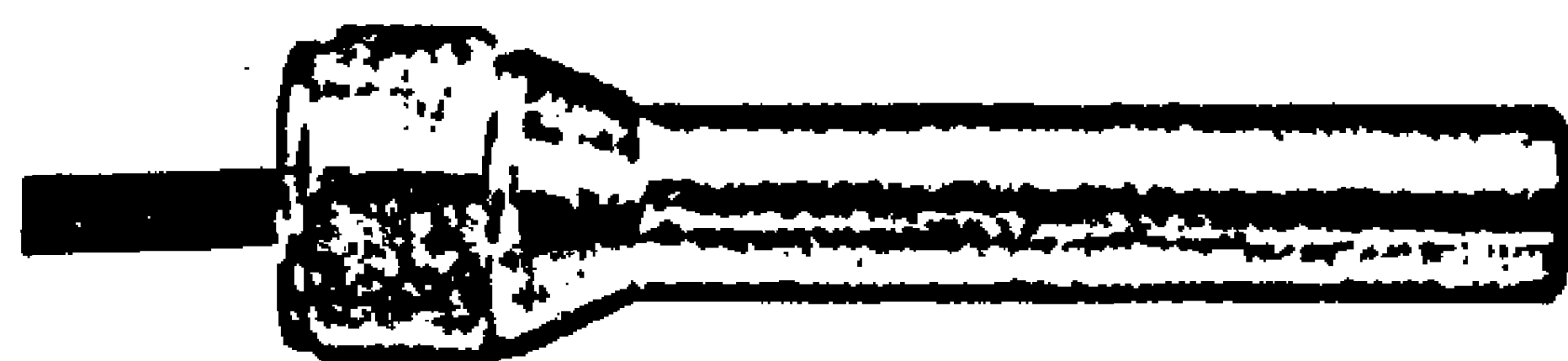
Model 713660
No conduit outlet, 18" potted, 3 wire leads, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



Model 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.



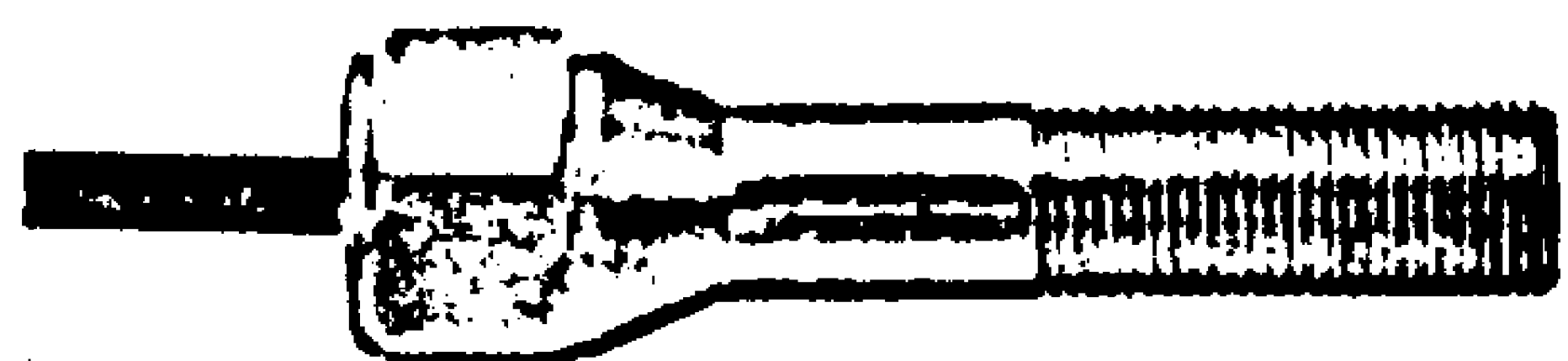
Model 713720
1/2 NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing, no threads.



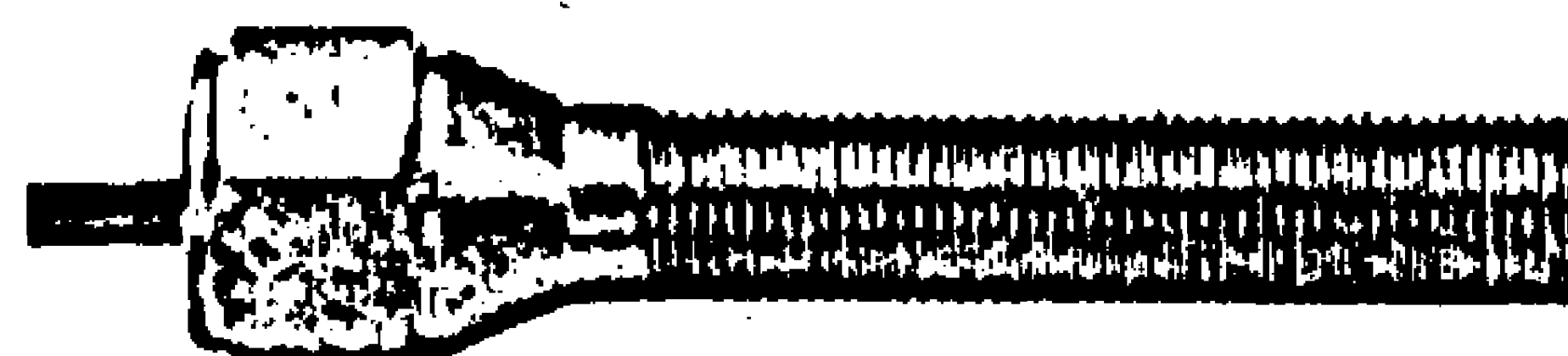
Model 713520
1/2 NPT conduit outlet, 18" 3 conductor cable, type 300 stainless steel housing, no threads.



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.

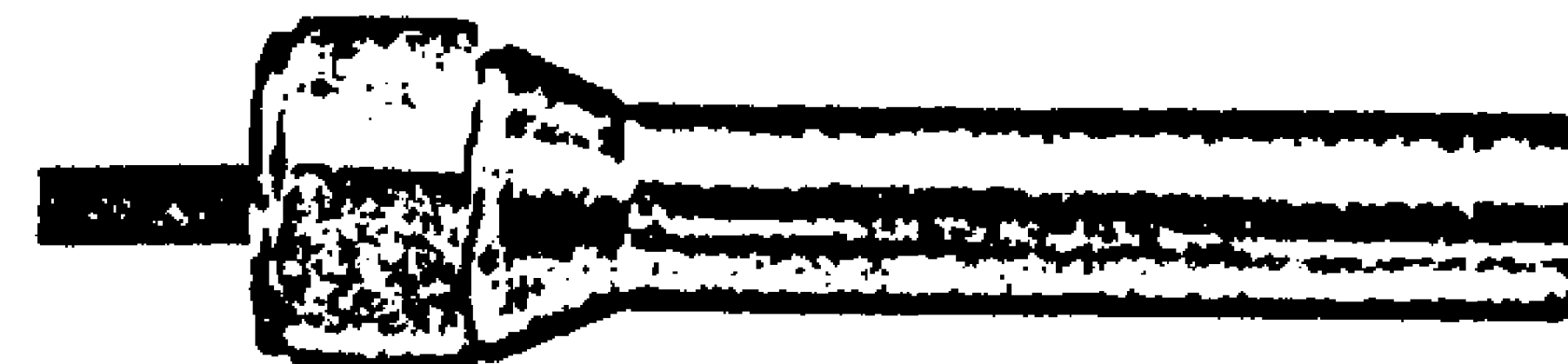


Model 713560
1/2 NPT conduit outlet with 18" 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.

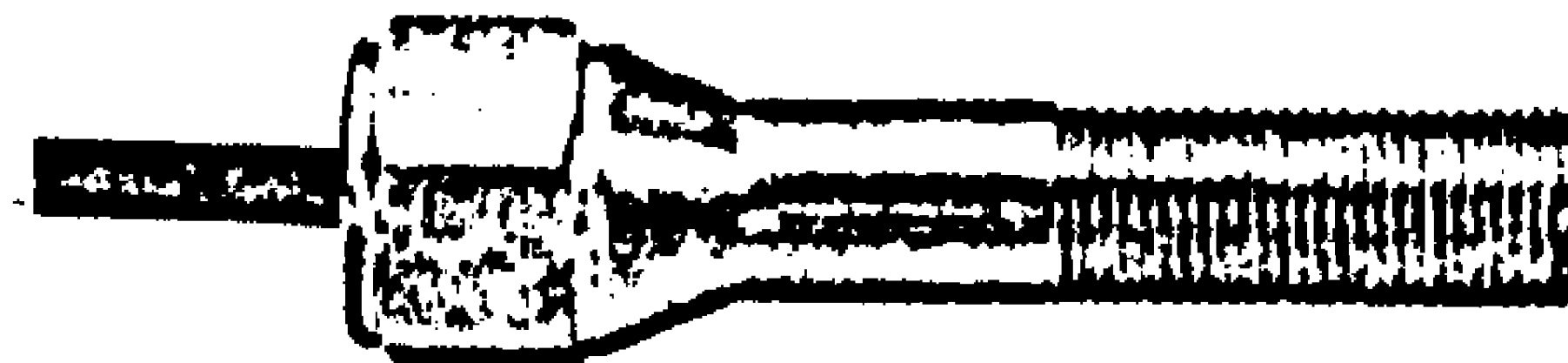


Model 713770
1/2 NPT conduit outlet, 18" potted 3 wire leads, type 300 stainless steel housing with 1/2-18 NF x 2.813" threads with 2 lock nuts.

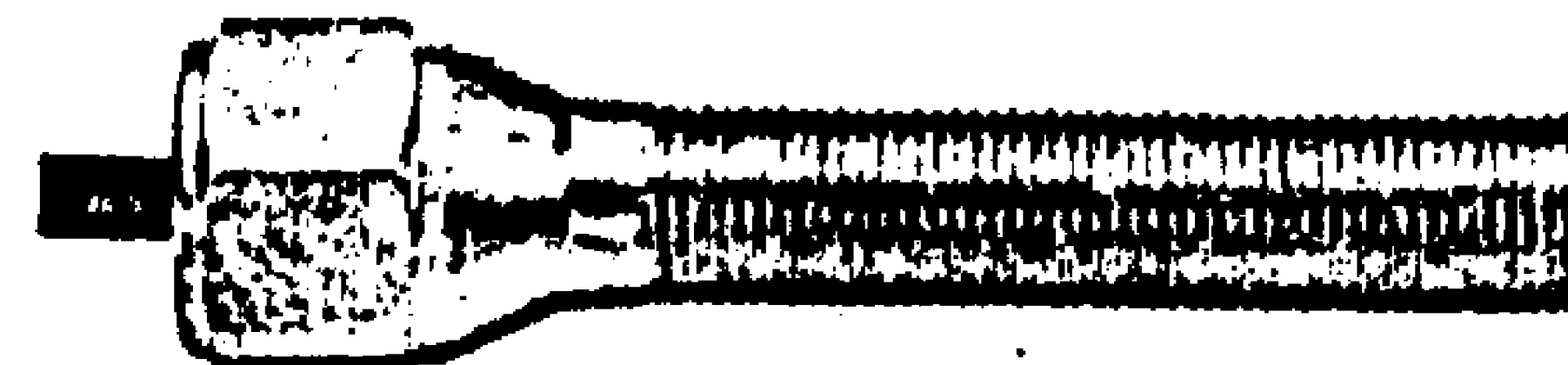
Hazardous Location approved models for Class I, Division 1, All Groups



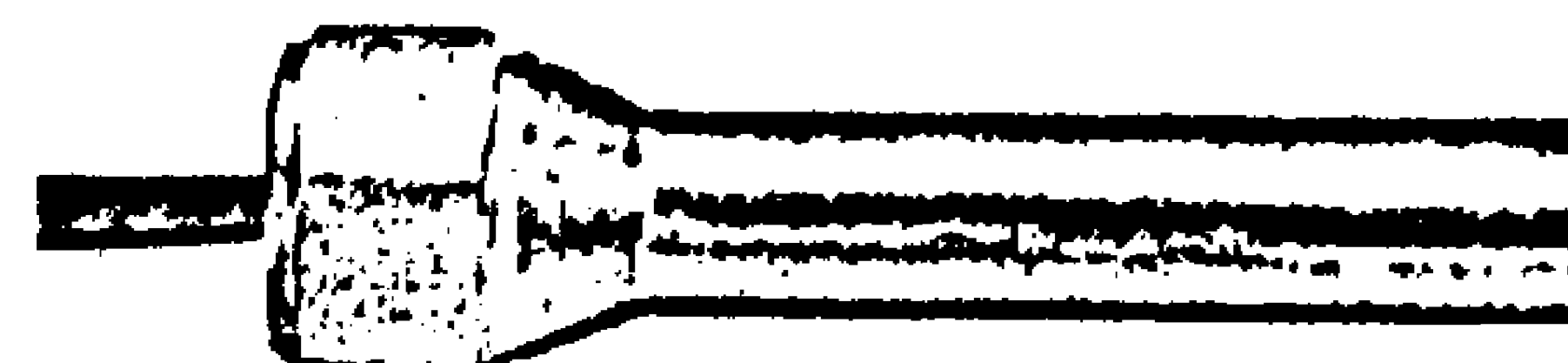
Model 713524
1/2 NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing, no threads.



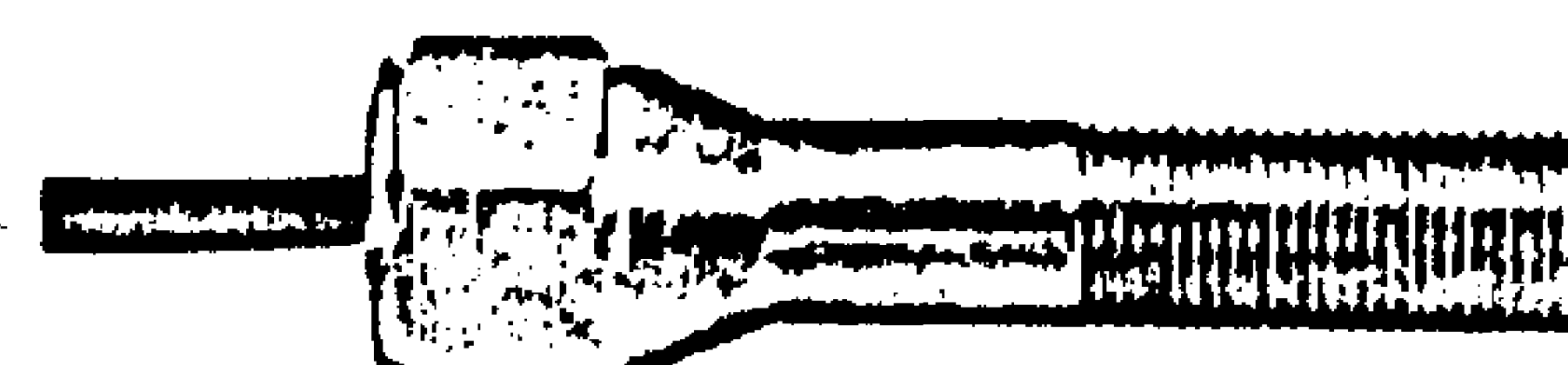
Model 713564
1/2 NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 1.5" threads with 2 lock nuts.



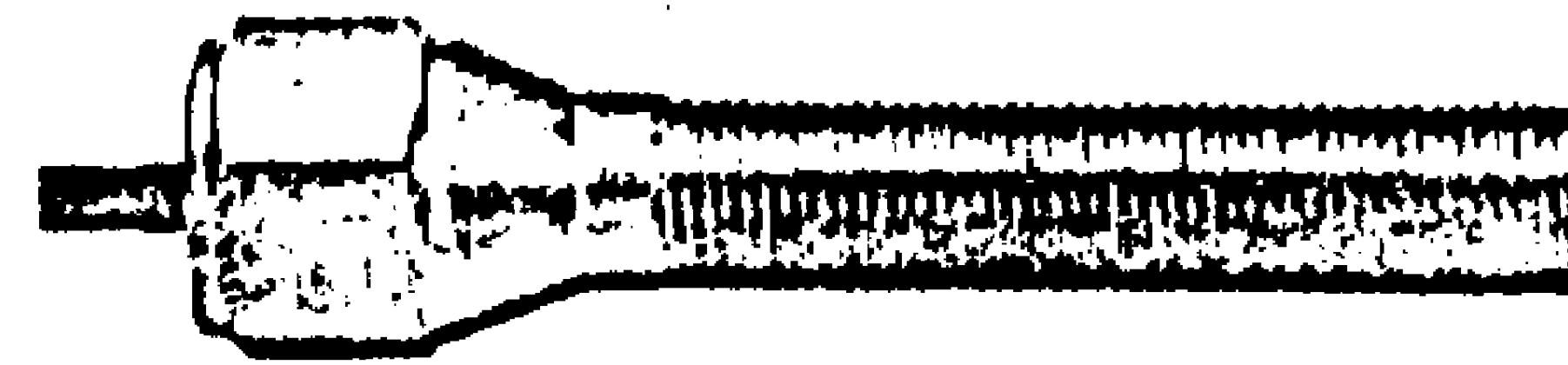
Model 713574
1/2 NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing with 1/2-18 NF x 2.813" threads with 2 lock nuts.



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.

VAP 0001098915

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.)	

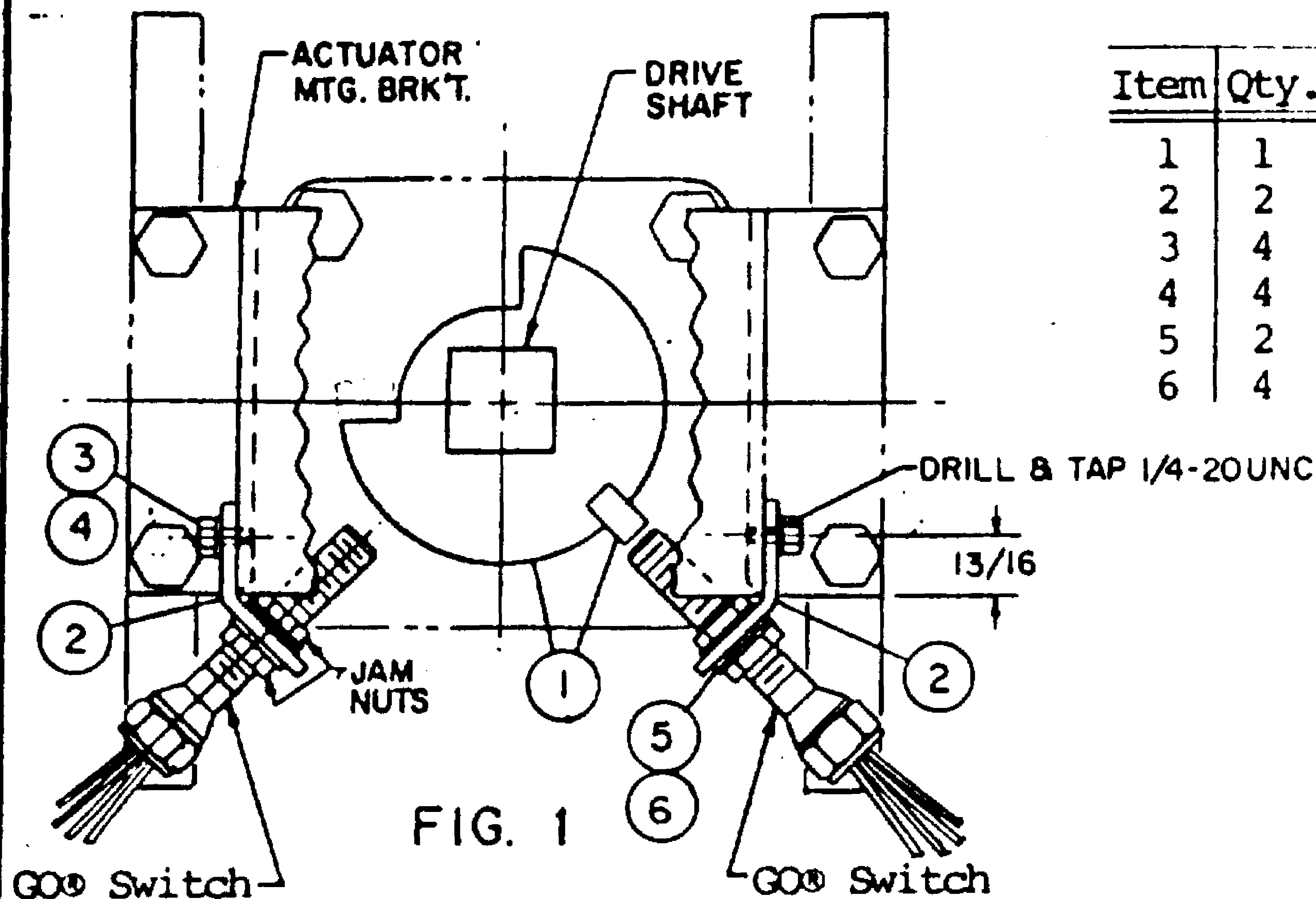


FIG. 1

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 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.

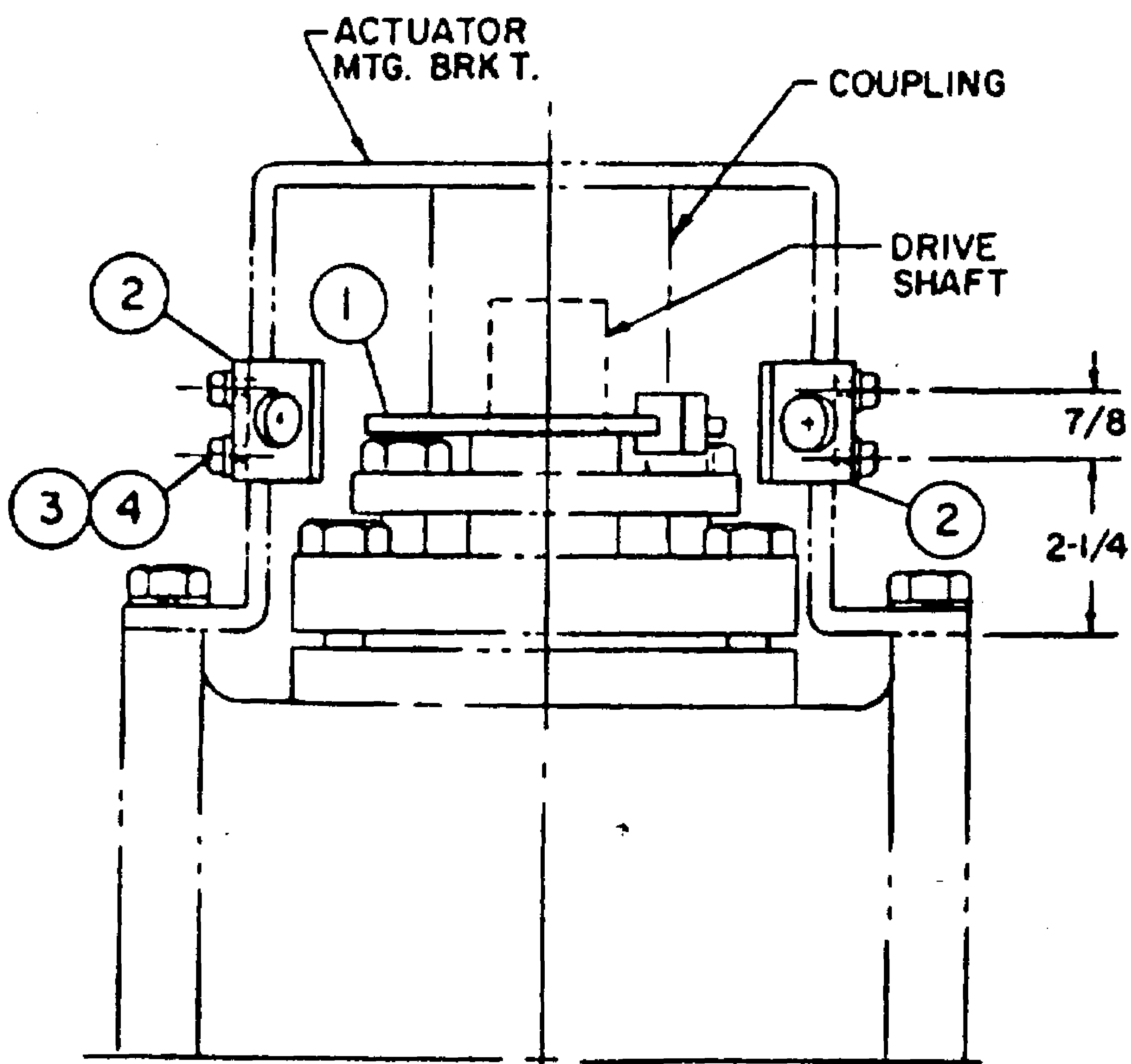


FIG. 2

Tag # 769 BVC

DWN. BY RON S.	DATE 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 37290
 LOUISVILLE, KENTUCKY, USA, 40233
 (502) 800-2386, TWX 810-636-2786

GO.
SYSTEMS

DWG. NO. V126411-1942	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 & Mfg. Co., Inc.

98916

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	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.	

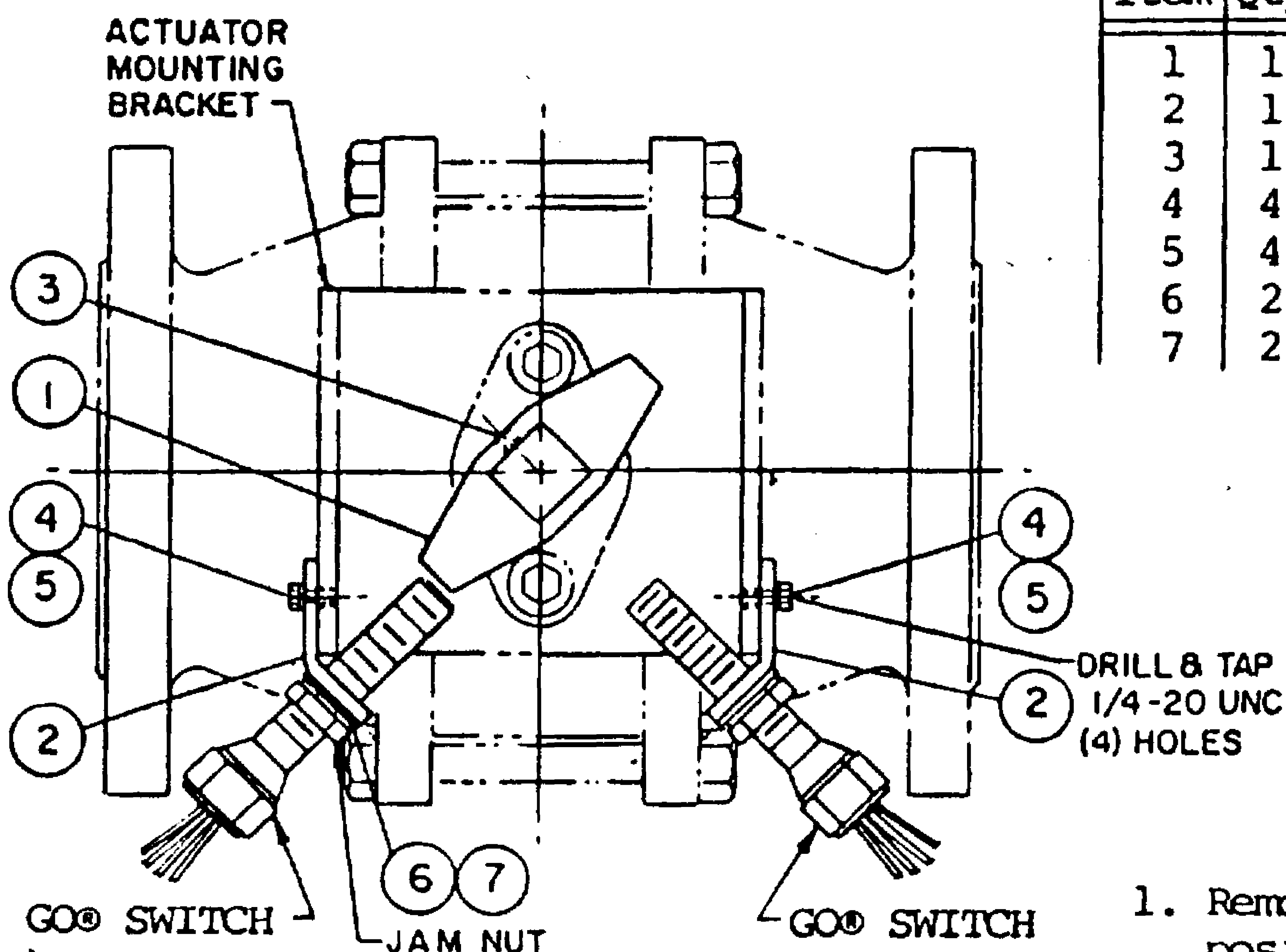


FIG. 1

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.

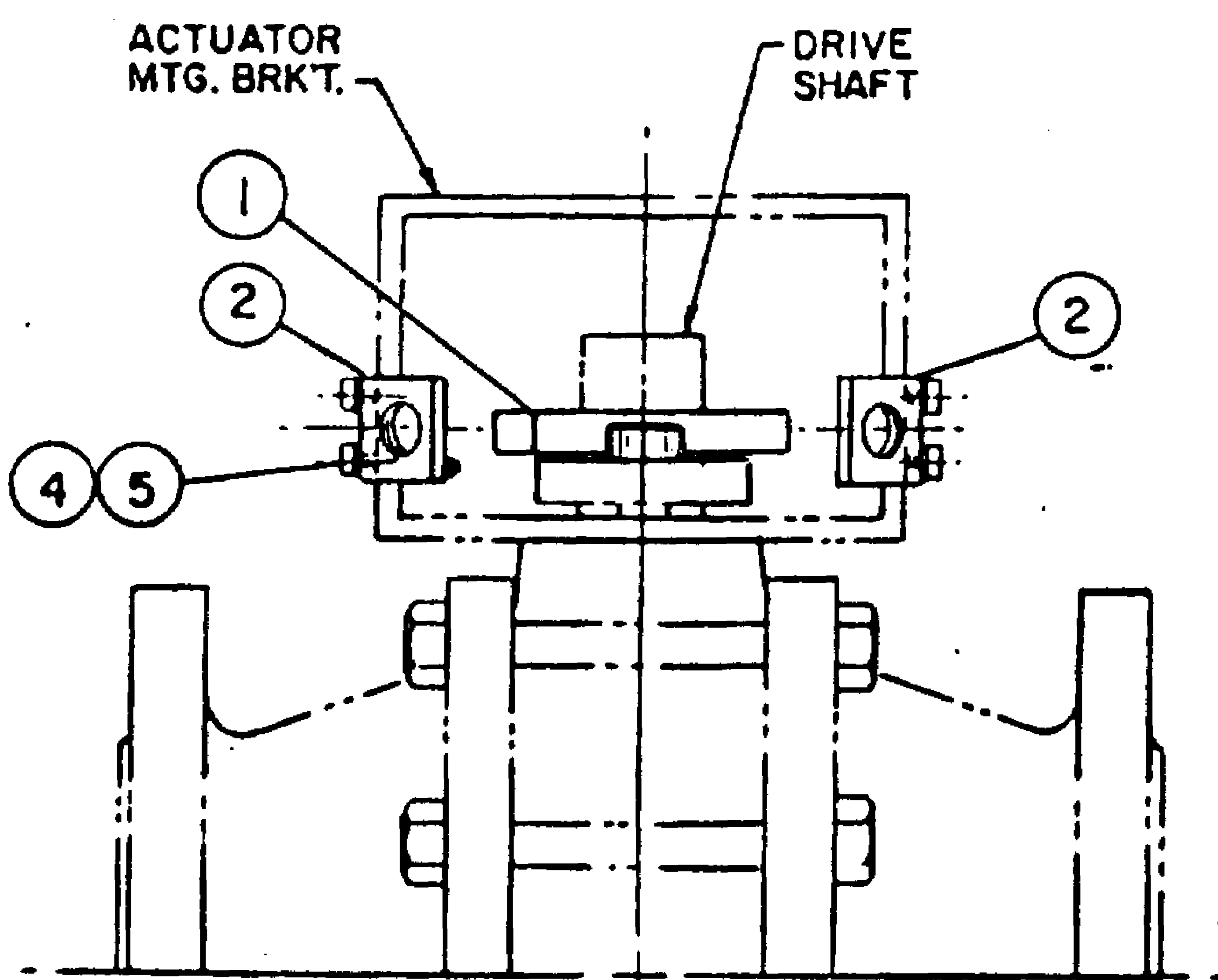


FIG. 2

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 37280
 LOUISVILLE, KENTUCKY, USA, 40233
 (502) 969-2388, TWX 810-636-2788

GO.
SYSTEMS

DWG. NO.	REV.
V 907310-1950	

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.

098917

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 TIR.

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.	

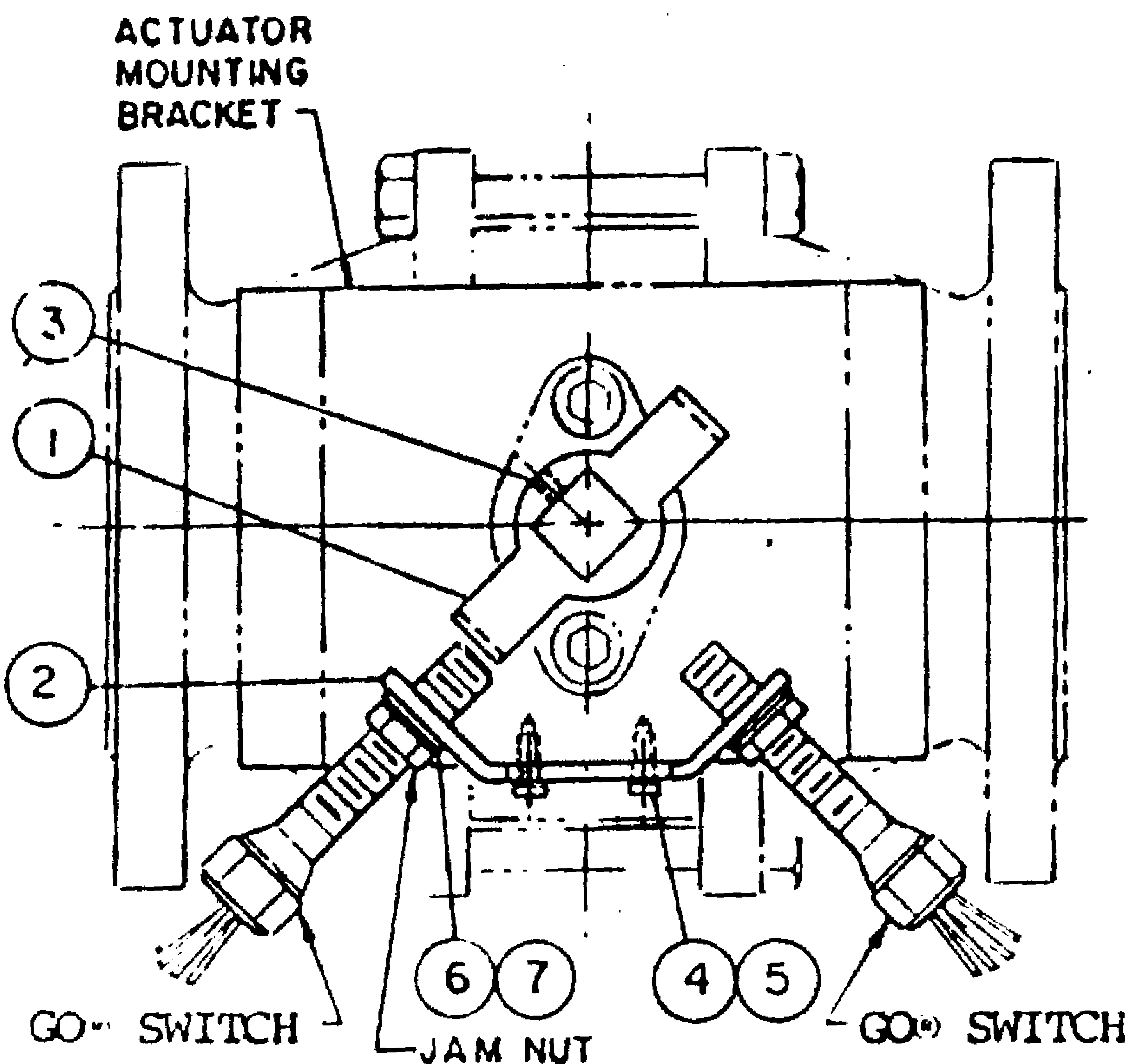


FIG. 1

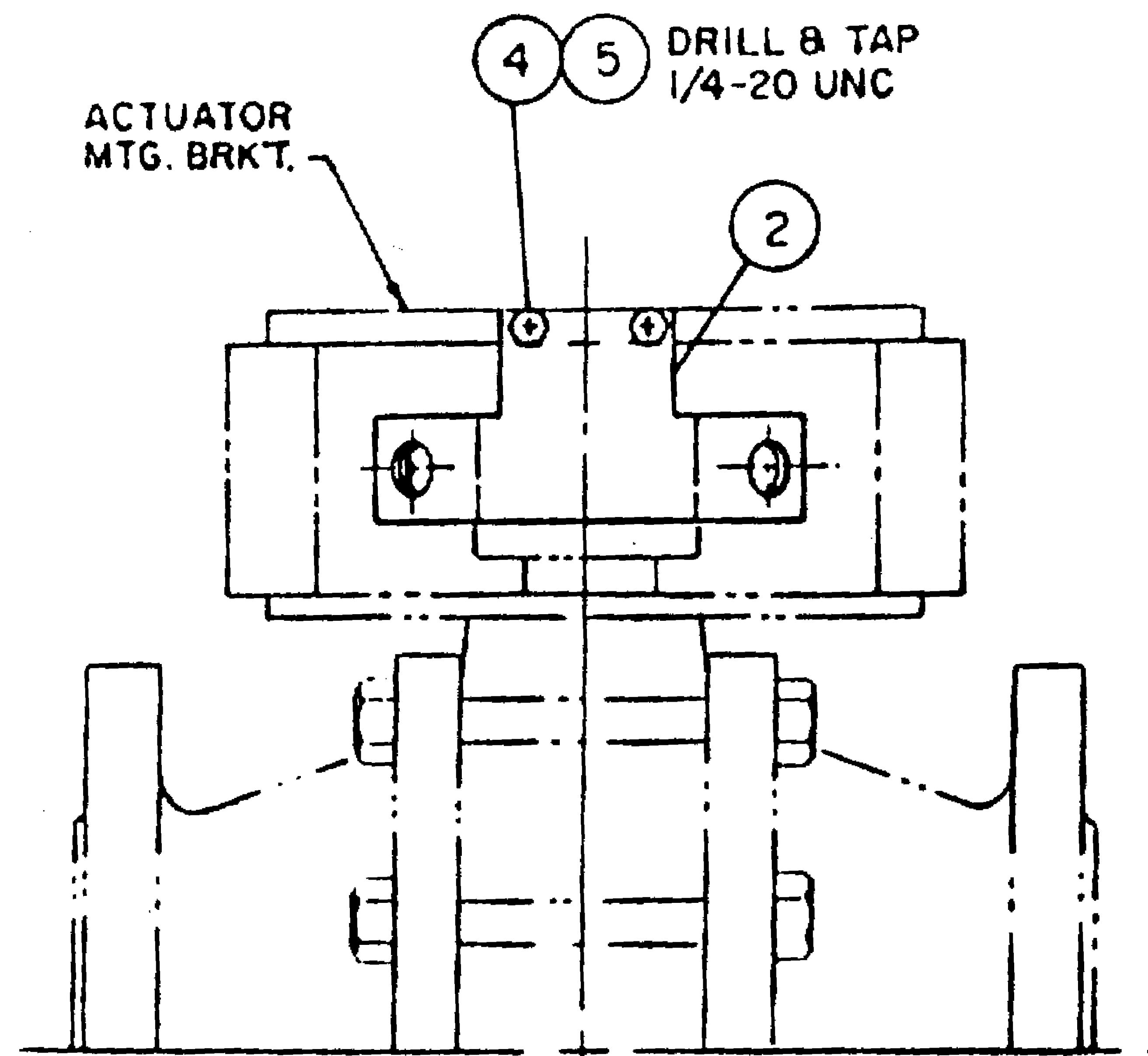


FIG. 2

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) (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 RON S.	DATE 10-	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 37200 LOUISVILLE, KENTUCKY, USA, 40233 (502) 969-2386, TWX 810-535-2786	GO SYSTEMS VAB.000109801
CHK. BY				
APPD.				
NOTICE: Showing details confidential & proprietary material and is furnished upon agreement that it will not be used in any way detrimental to the interest of General Equipment & Mfg. Co., Inc.			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.

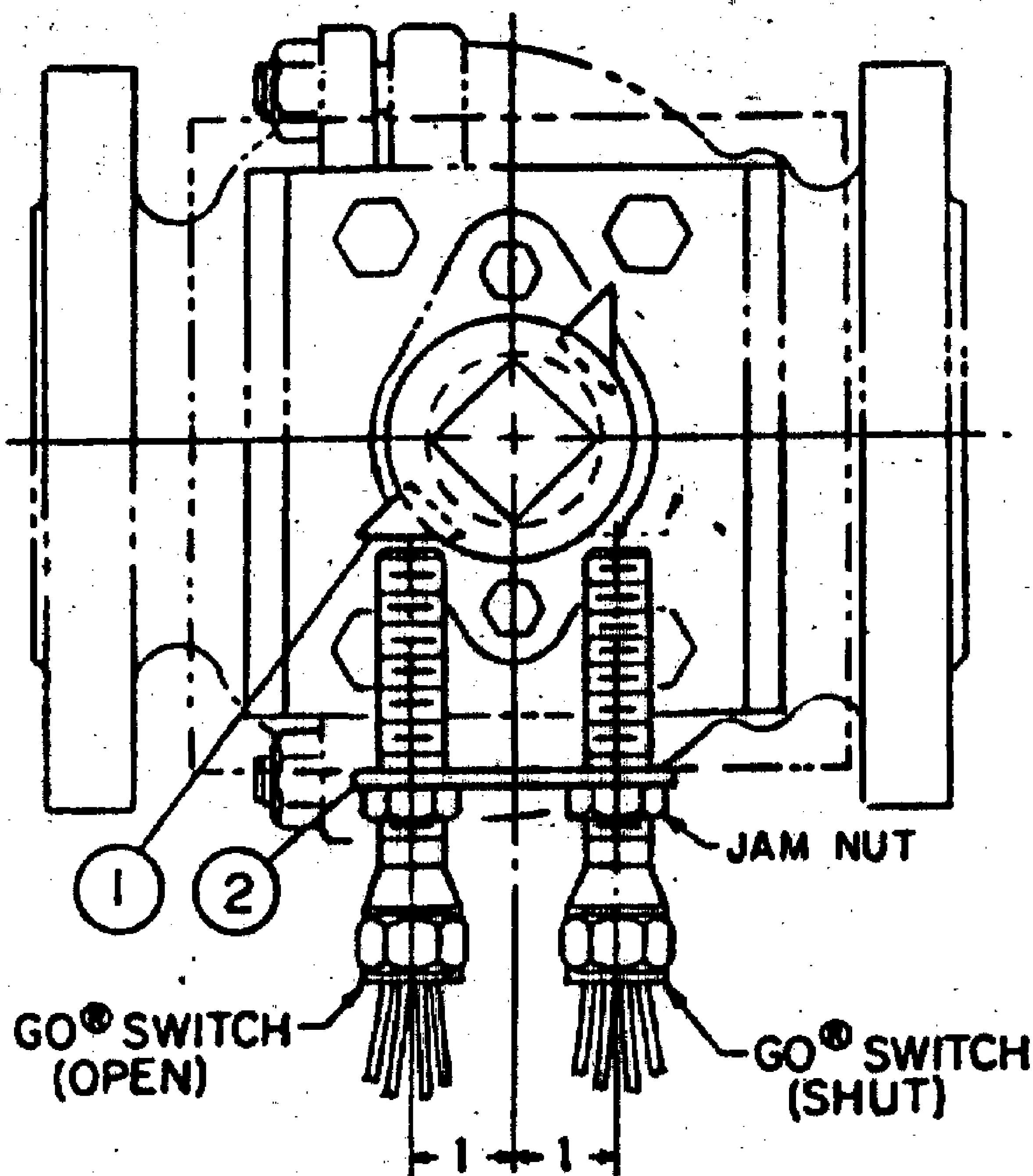


FIG. 1

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

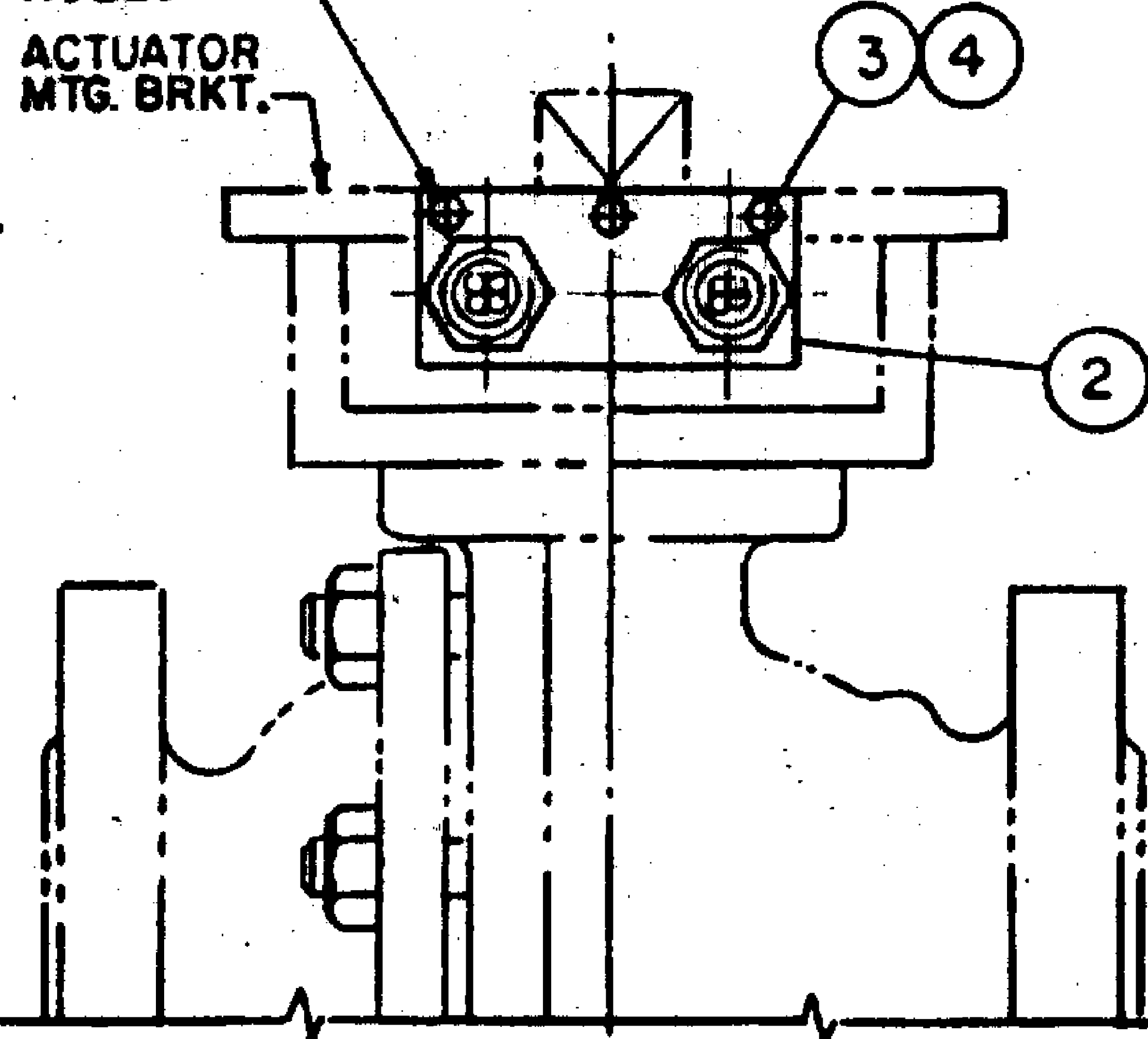


FIG. 2

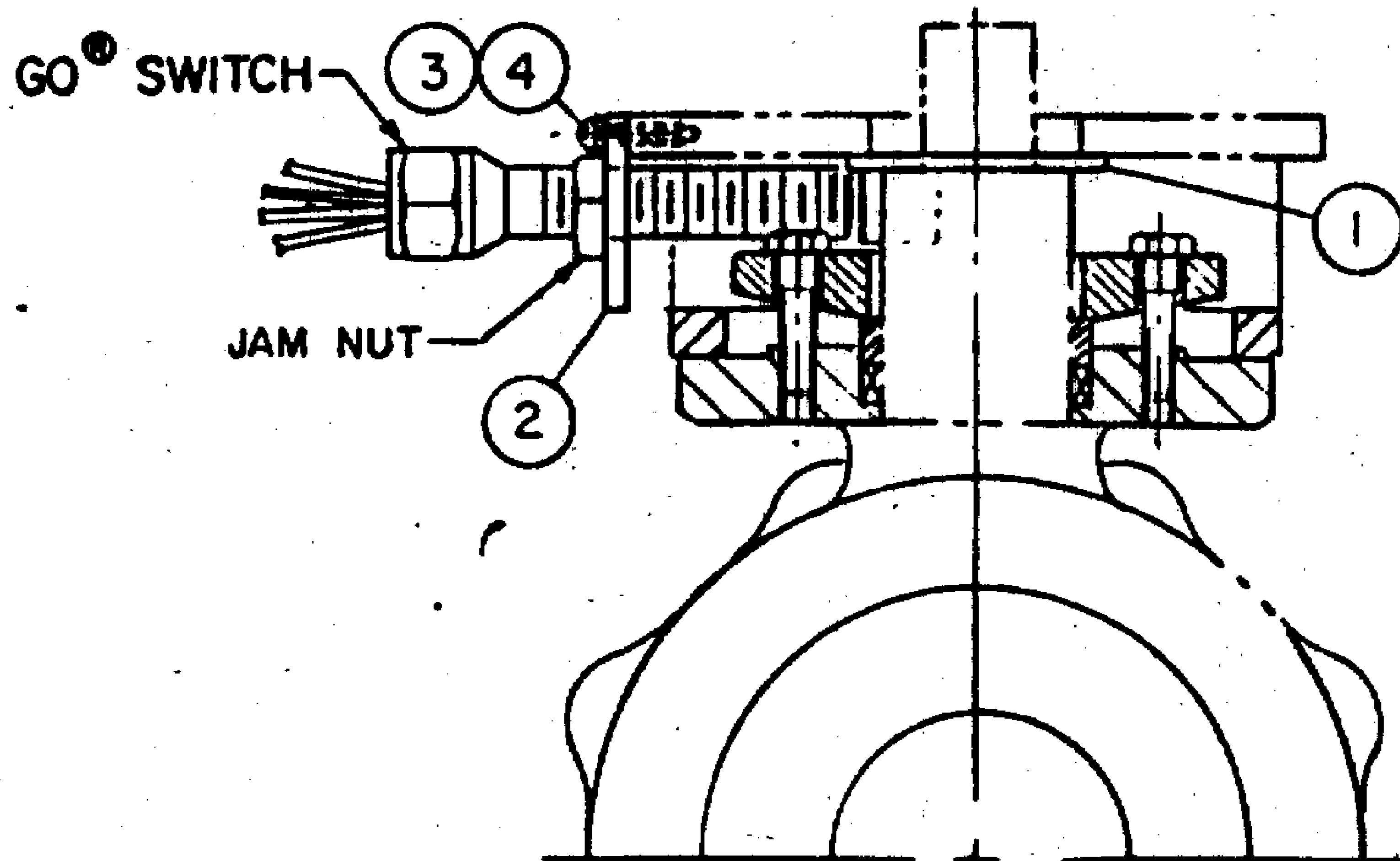


FIG. 3

DWN. BY
 RON S.
 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) 969-2386, TWX 810-635-2786

GO.
SYSTEMS

DWG. NO.
 V402800-1947

VAB.000 REV. 19

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 $1/8 \times 1/2"$ long	
4	1	$1/4-20 \times 5/8$ Flat Hd. Screw	
5	4	$1/4-20 \times 3/4$ 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.)	

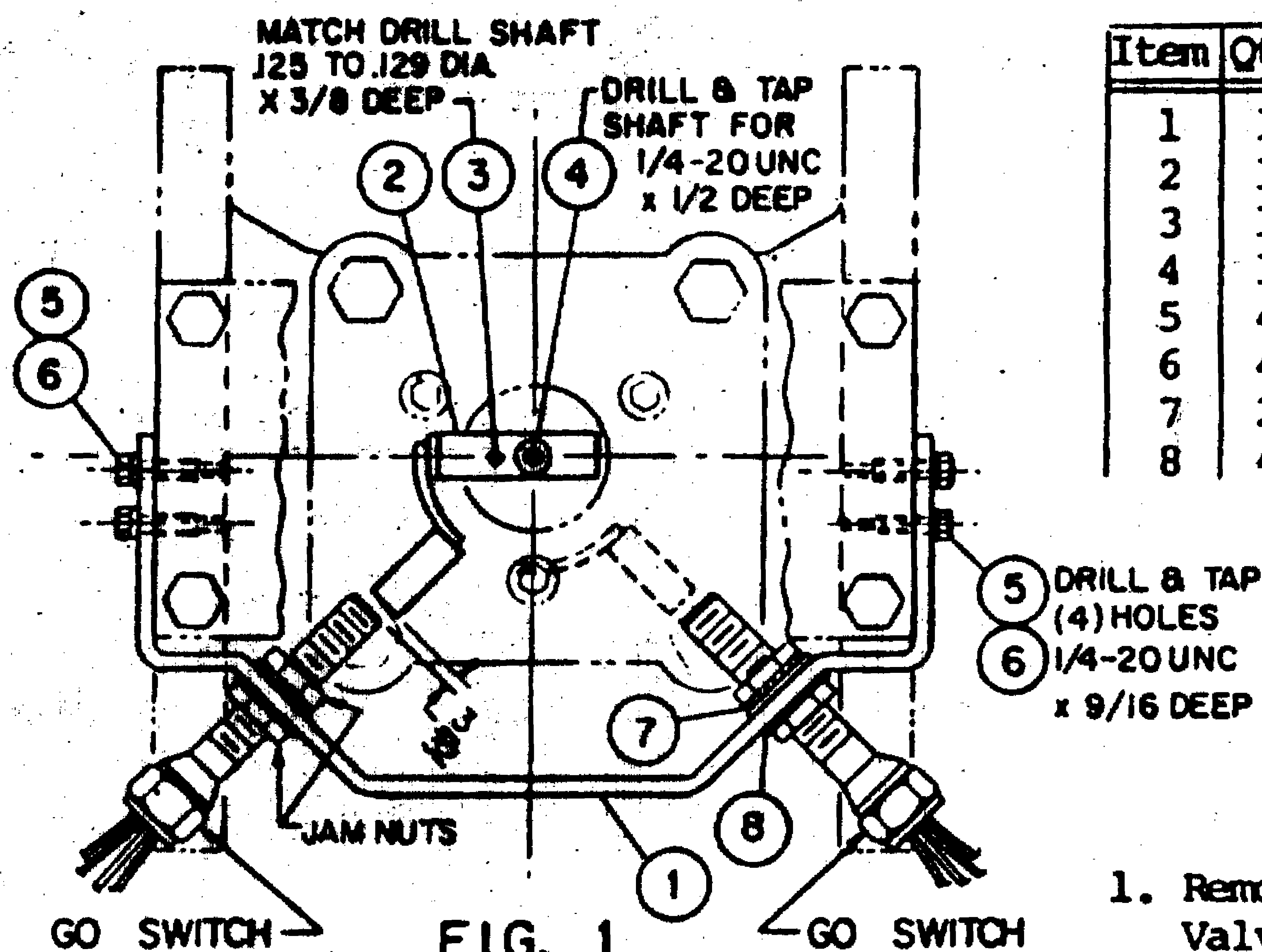


FIG. 1

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 $1/4-20UNC \times 1/2"$ 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 rollpin (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 $1/4-20UNC \times 9/16$ 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.

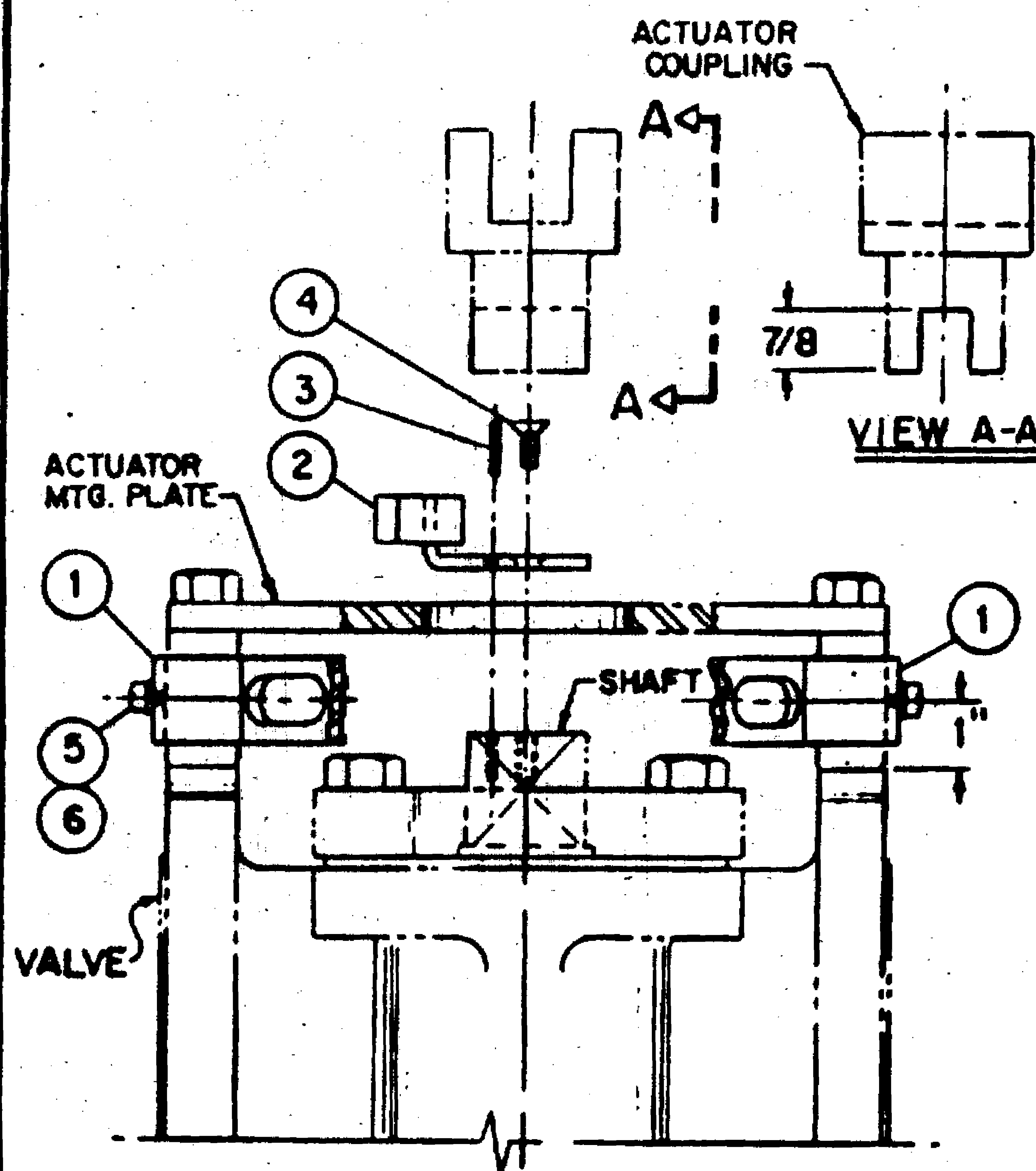


FIG. 2

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

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

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 3800 FERN VALLEY ROAD
 P.O. BOX 37288
 LOUISVILLE, KENTUCKY, USA 40238
 (502) 699-6388, TWX 810-636-8788

GO
 SYSTEMS

DWG. NO.
 V782067-1934

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.

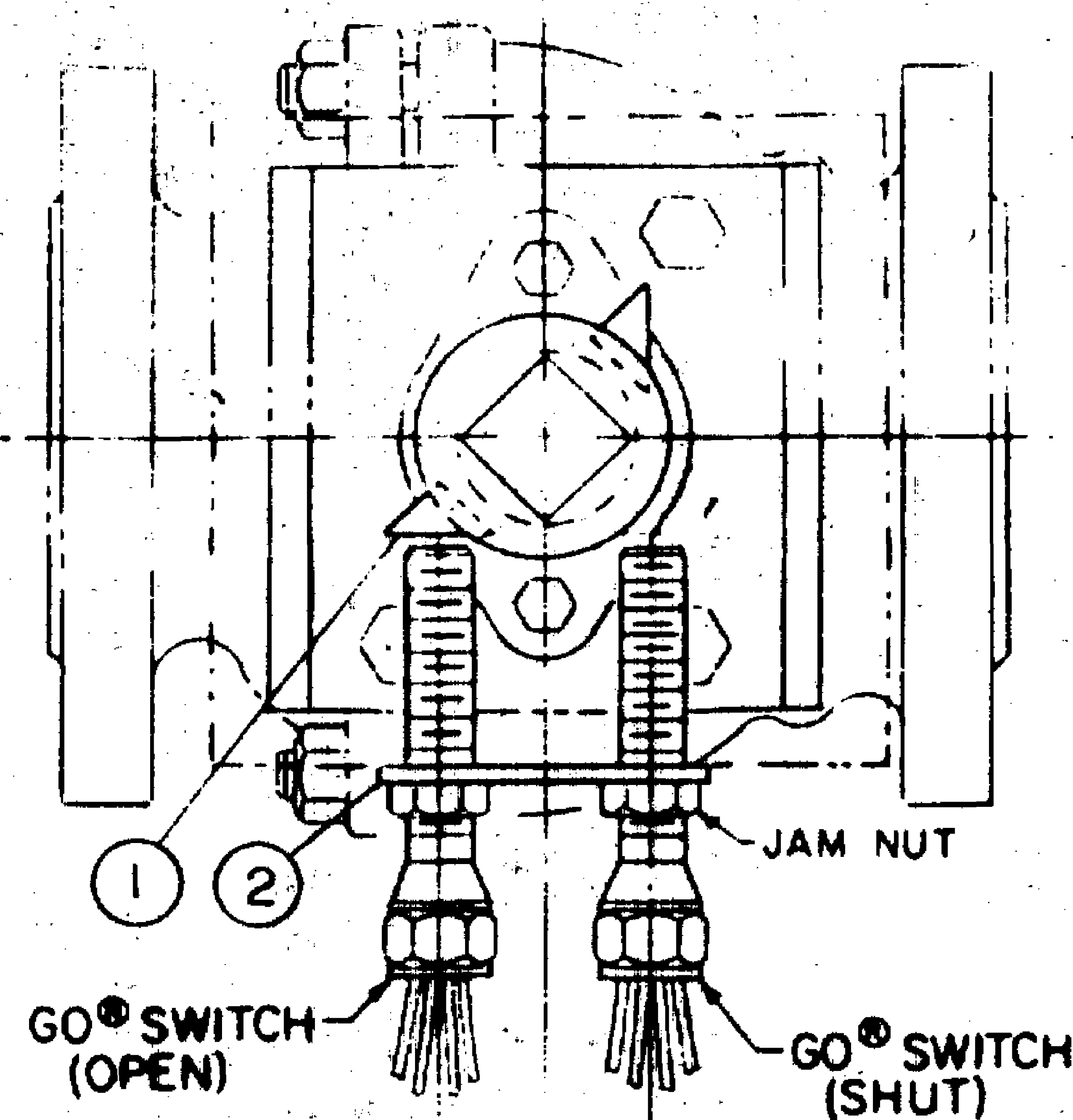


FIG. 1

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

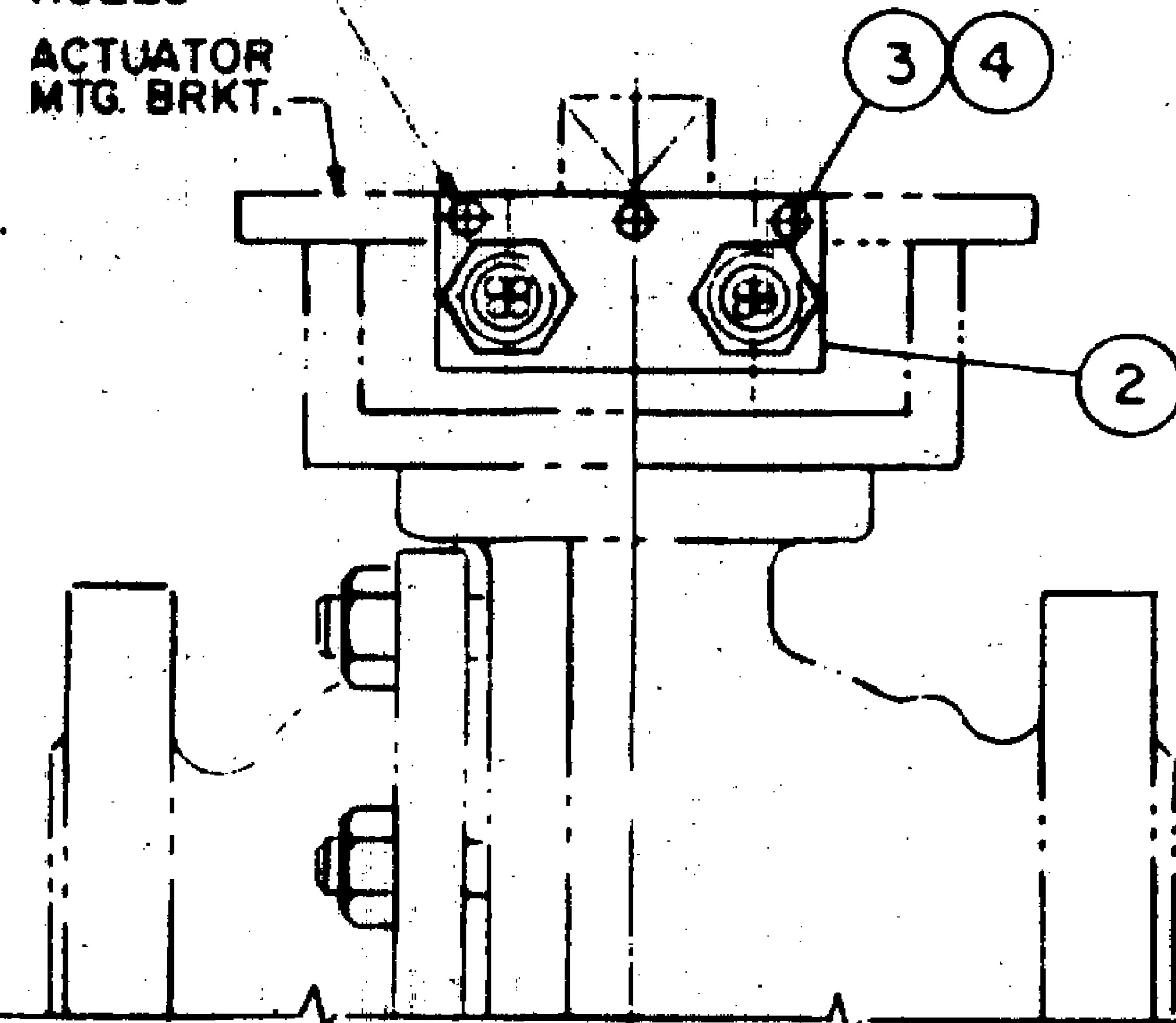


FIG. 2

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.

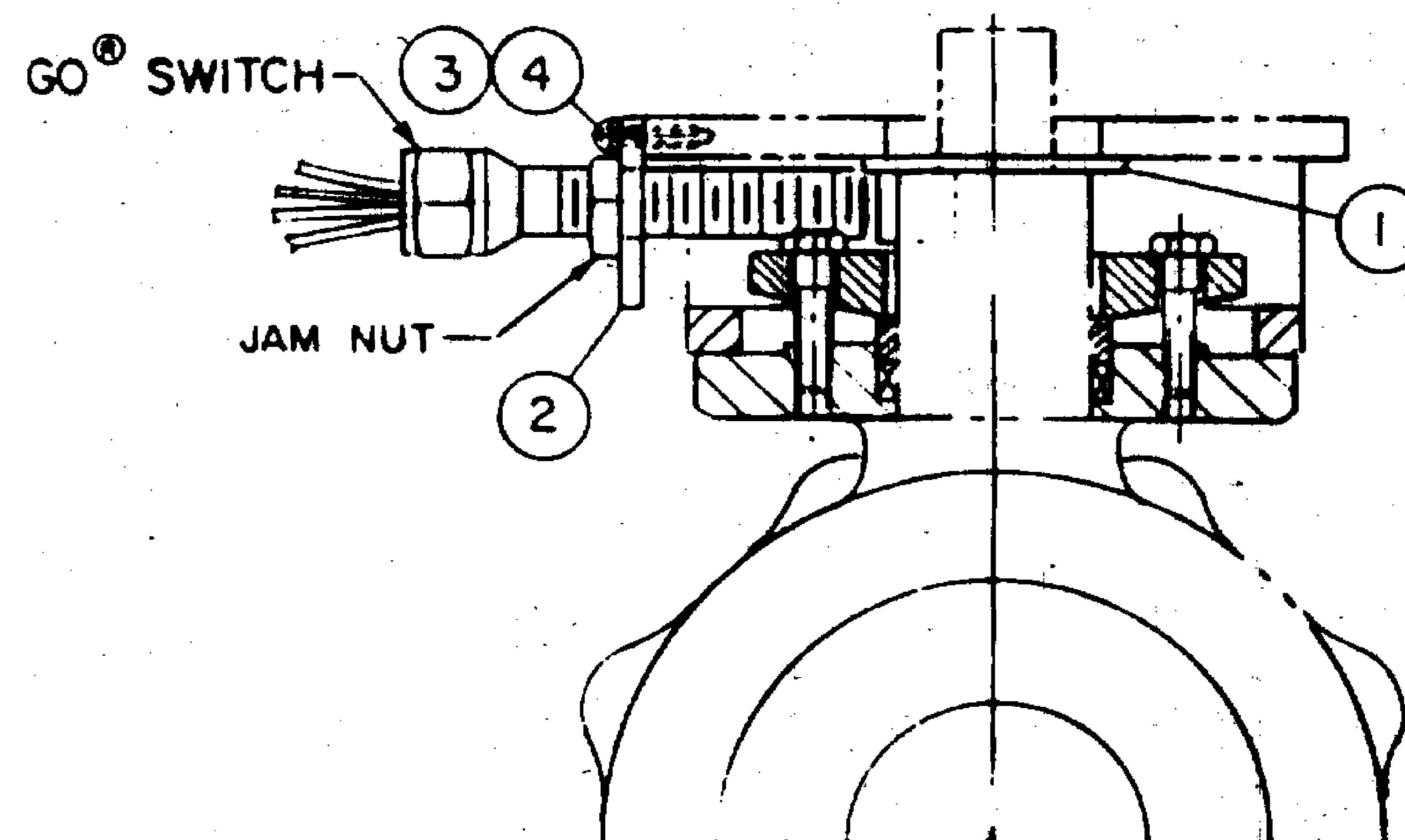


FIG. 3

DWN. BY RON S.	DATE 10-3-85
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 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) 968-2386, TWX 810-636-2788

GO
SYSTEMS

DWG. NO.
V402800-1947 B

REV.

VAB.0001098921