



7170 Jog Lever

**Owner's Operation, Installation &
Maintenance Manual**



NOTES:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

RECORD DATA BEFORE INSTALLATION FOR FUTURE REFERENCE

Model #:	
Serial #:	
Date of Purchase:	
Date of Installation:	

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1 INTRODUCTION

1.1 CONTACT

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This document is intended to clearly present comprehensive product data and provide technical information to assist the end user in design applications. Kobelt reserves the right, without notice, to change the design, or construction, of any products and to discontinue or limit distribution of any products. Kobelt also reserves the right to change, or update, without notice, any technical information contained within this document.

Kobelt recommends that customers visit our website to check for updates to this Manual. Once a product has been selected for use, it should be tested by the user to ensure proper function in all possible applications. For further instructions, please contact our distributors or visit our website.

1.2 SAFETY

1.2.1 Safety Alerts

Throughout this manual, the following symbols, and their accompanying explanation, are used to alert the user to special instructions concerning a service or operation that may be hazardous if performed incorrectly or carelessly. The associated risk levels are stated below.

 DANGER	This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	This symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	This symbol informs the reader of events not related to personal injury but which there is a risk of damage to property or equipment.
SAFETY INSTRUCTIONS	This symbol informs the reader of safety-related instructions or procedures.

1.2.2 Notice to Installer

Disregarding the following safety measures can result in an accident causing severe injury to personnel and damage to material assets.

- Only use the product as directed in this manual.
- Never put the product into service if there is evidence of visible damage.
- Never put the product into service before fully completing installation and commissioning.
- Do not carry out any modifications to the product.
- Only use authentic Kobelt spare parts.
- Observe all local regulations, directives and laws during the installation of this product.
- All installation, commissioning, and maintenance work must only be conducted by qualified personnel. (For the purpose of this manual, qualified personnel are persons who are familiar with the assembly, installation, commissioning, and operation of the product and who have the qualifications necessary for their occupation.)
- Observe all specifications in this manual. If these guidelines are not followed and damage occurs, the warranty will be voided.

1.2.3 Product Hazards



Disconnect Power: Turn off power at distribution panel before beginning installation to protect installer from electrical hazards.



Voltage and Current Compatibility: Confirm that the power source is compatible with the maximum voltage and current ratings of is product variant. Failure to do so could result in damage or fire.

2 PRODUCT DESCRIPTION

The Kobelt 7170 Jog Lever is used for input jog control to electronic and power hydraulic steering systems. The operator can maneuver the vessel by simply jogging the lever port or starboard to activate its internal micro switches. The Jog Lever can be used for steering applications, other marine applications, or industrial installations.

The 7170 is designed for indoor and outdoor installation with a robust die cast bronze and stainless steel construction to provide a long service life in a harsh marine environment.

The 7170 is available in a combination of black and chrome, all black, or all polished chrome to suit your appearance preference and offers cable configurations either from the top or bottom to accommodate a range of connection types and direction to match your application.

2.1 TECHNICAL DATA

Table 1: 7170 Technical Data

MODEL		7170					
KOBELT PART #		7170-A1	7170-A2	7170-B1	7170-B2	7170-C1	7171-C2
ELECTRICAL CONTACTS		1 Form A, NO (Normally Open) (per direction)					
MAXIMUM VOLTAGE		250 VAC / 24 VDC					
MAXIMUM CURRENT ¹	12 VDC	6A					
	24 VDC	5A					
	250 VAC	6A					
HANDLE TRAVEL		14° (per direction)					
OPERATING FORCE		3 lb·f [13 N]					
PRODUCT FINISH		Black Body and Chrome Hub		All Black		All Chrome	
GLAND EXIT LOCATION		Top/ Above Dash	Back/ Thru Dash	Top/ Above Dash	Back/ Thru Dash	Top/ Above Dash	Back/ Thru Dash
OPERATING TEMPERATURE		-13°F ... 158°F [-25°C ... 70°C]					
PRODUCT WEIGHT		2.1 lbs [0.95kg]					

Notes:

- 1) Maximum reported current is an inductive load. Current is per switch contact.

2.2 SERIAL NUMBER LOCATION

Jog levers are serialized at the factory. The serial number can be found in the location shown in Figure 1. Prior to installing the jog lever, it is recommended to write the serial number on the table provided on page 2 of this manual. Serial number and model numbers will be required for after purchase support.

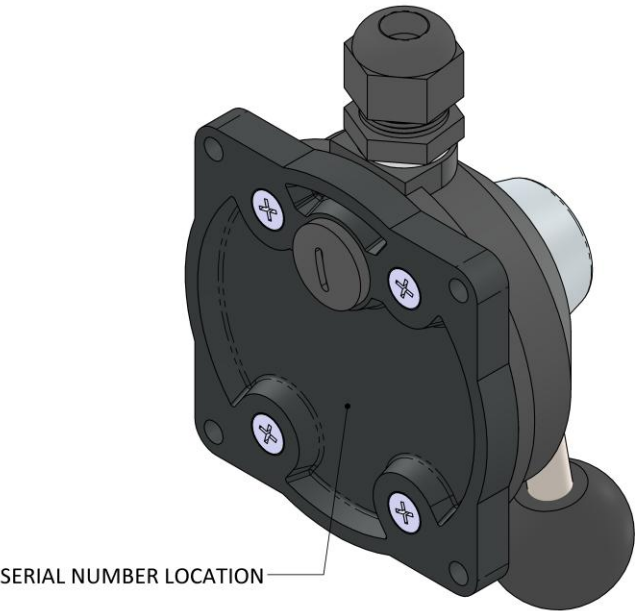


Figure 1: 7170 Jog Serial Number location

3 INSTALLATION

3.1 MECHANICAL

Ideally, the jog lever should be mounted in a central location at each station on-board the vessel to control steering operation.

- Within 6 feet [1.8 m] of electrical junction box.
- Placed on horizontal or angled dash surface.
- Placed as to protect external electrical cable from damage.

The Jog Lever is equipped with (4) four clearance holes for #10 (or M5) screws or bolts through the top surface for direct mounting to the dash. Ensure the unit is securely fastened to a suitable surface.

3.2 ELECTRICAL

The Jog Lever has a 6 foot [1.8 m] long 3C/18 AWG cable for external connection. Connect it to an electrical junction box of the electronic or power hydraulic steering system interface.

The product’s 3C/18 electrical cable contains the following wires and related functions:

Table 2: 7170 Wire Connections

7170				
Wire #	Wire Name	Colour	Gauge	Function
1	SWA-NO	Black	18AWG	Connects to COM when Switch A is activated.
2	SWB-NO	White	18AWG	Connects to COM when Switch B is activated.
3	COM	Green	18AWG	COM connection.

The cable penetration location is shown in Figure 2 and the internal wire connections are shown in Figure 3.

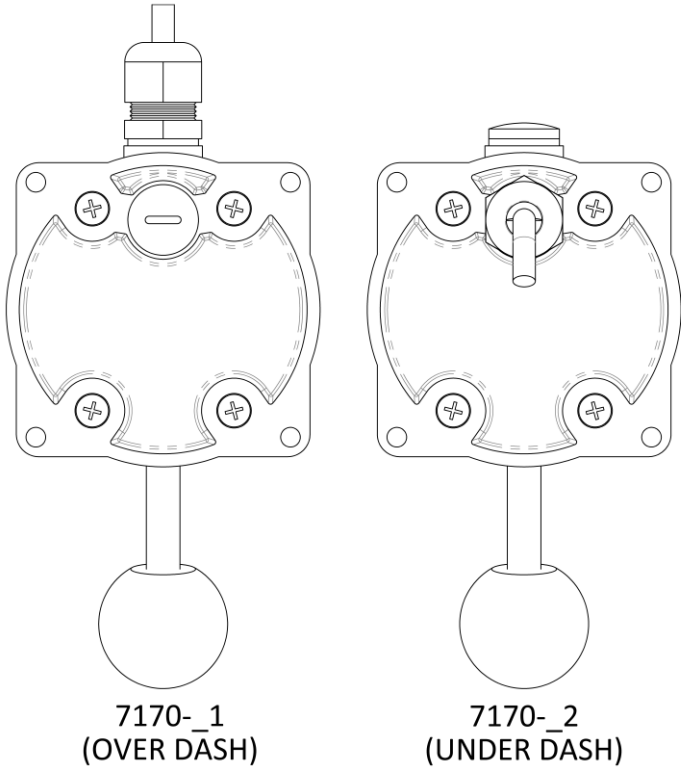


Figure 2: 7170 Cable Penetration Location

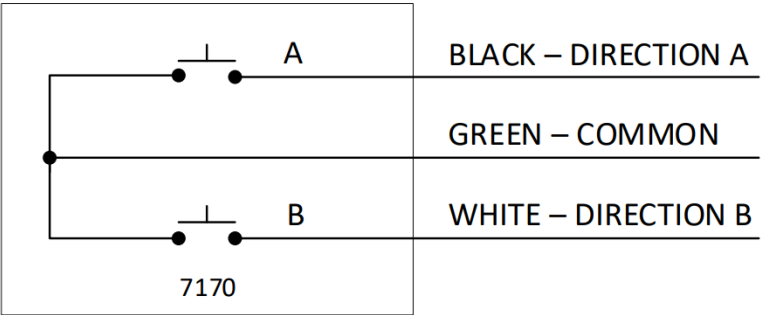


Figure 3: 7170 Internal Wiring Diagram

The operating direction of the switches in relation to the Jog Lever handle is shown in Figure 4.

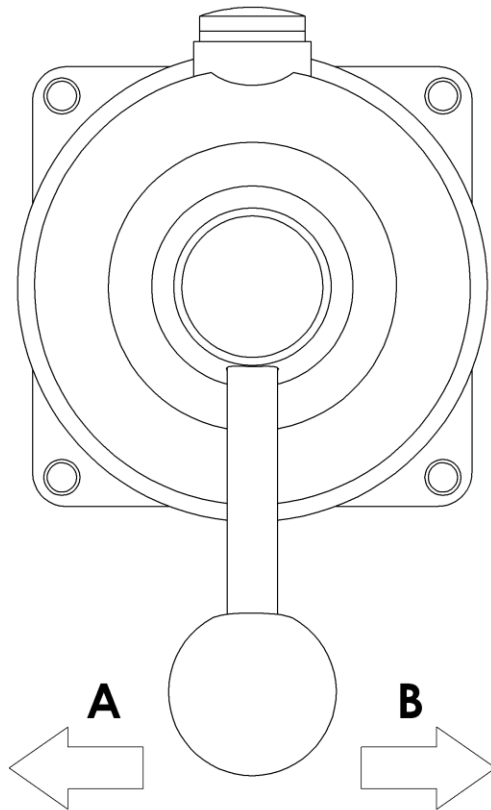


Figure 4: 7170 Switch Direction Diagram



WARNING

Do not operate the Jog Lever if the internal spring has broken. Unexpected operation could result.

3.2.1 Contact Protective Circuit

The joystick switch contacts shall not exceed the rated current as specified in the technical data ([Section 2.1](#)), including AC or DC inductive ratings, under any operating condition.

Where the controlled load or coil current exceeds the joystick switch contact rating, the switch shall interface through an interposing relay. Direct switching of such loads by joystick switches is not permitted.

For inductive loads within the switch rating, appropriate suppression shall be applied to minimize contact arcing and electromagnetic interference.

- **DC Coil Loads**
For DC coils, a flyback diode or a DIN connector with protection diodes or varistors shall be installed across the coil terminals. The diode should be selected such that:
 - Reverse voltage rating $\geq 10 \times$ coil supply voltage
 - Forward current rating $\geq$ coil operating current

Below is recommended for typical 12 VDC and 24 VDC relay coil applications.

Table 3: DC Coil Suppression Methods and Approved Models

Suppression Category	Approved Model
Flyback diode (General Purpose)	1N4007
Flyback diode (Alternative Rating)	1N4006
Valve connector cable with integrated suppression	Phoenix Contact (1443103) Phoenix Contact (1400588) Murrelektronik (7000-18021-6160500) Murrelektronik (7000-18021-2160500) Hirschmann (GAN22LU-S24-6091000)

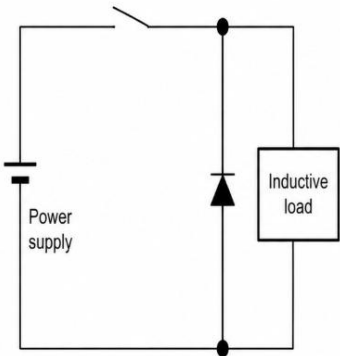


Figure 5: Protection by Diode Method

- **AC Coil Loads**
For AC coils, an RC snubber shall be installed across the coil terminals. Typical starting values:
 - Capacitor: 0.5 μ F to 1 μ F per 1 A of switching current (AC-rated, non-polarized, minimum voltage rating suitable for supply voltage, typically 200–300 V class), adjusted based on load characteristics and verified during commissioning
 - Resistor: 0.5 Ω to 1 Ω per 1 V of switching voltage, selected according to load voltage and current, and optimized during commissioning for effective arc suppression

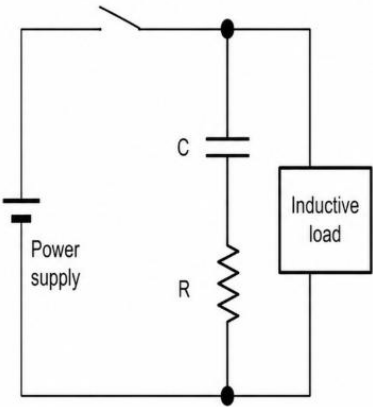


Figure 6: Protection by RC circuit Method

4 COMMISSIONING

4.1 ELECTRICAL CHECK



CAUTION

Ensure that the rear cover is installed and secured before powering on the 7170.

Confirm that the electrical connection to the 7170 have been made and correspond to the requirements of your system.

4.2 FUNCTIONAL TEST



CAUTION

The Functional Test should be carried out while the vessel is still at dock and before it is taken out to sea after installation has been completed.

A complete functional test should be performed on the system that the Jog Lever has been installed within before entering operational use.

5 OPERATION

The Kobelt 7170 Jog Lever contains a pair of contact switches, one for each direction of travel. The Jog Lever also contains a centering spring that forces the lever back to centre when pressure is not being applied by the operator.

The Jog Lever can be operated either Port or Starboard (Left or Right) to command motion in the system it is controlling. The Jog Lever has three positions of operation as shown below.

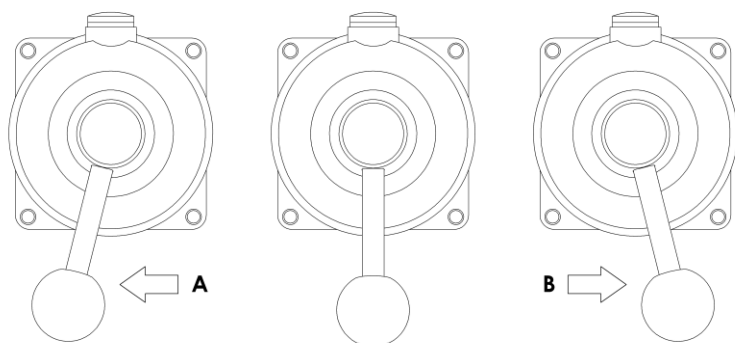


Figure 7: 7170 Positions of Operation, LEFT - CENTRE - RIGHT

6 MAINTENANCE

6.1 PREVENTATIVE MAINTENANCE

- Quarterly (4 times per year)
 - Visually inspect wire and cable insulation for splits or damage.
 - Ensure there is no visible corrosion on the unit.
- Every 2 years
 - Confirm cable glands are secured to cables.
 - Replace seals.
 - Replace tension spring.
 - Replace Cortec foam tape.

6.2 RECOMMENDED SPARE PARTS AND KITS

As a minimum, Kobelt recommends that a spare 7170 Repair Kit (for appropriate generation of unit) be kept on-hand.

If you have a generation 2 unit (see Appendix E:), a retrofit kit is required to mount the new, more robust spring found in the 7170 Repair Kit. Retrofit kits include one repair kit, so all parts can be replaced/installed at once.

Table 4: Available Kits

ITEM	KOBELT PART #	Contents
7170 REPAIR KIT FOR GEN 3 UNITS	7170-RK	Seals, tension spring, Cortec tape.
7170 RETROFIT KIT FOR GEN 2 UNITS	7170-RF	7170-RK (seals, tension spring), replacement arms (2x), spacer, bushing.
7170 MICROSWTICH RETROFIT KIT	7170-RF-01	Microswitches, brackets, mounting hardware.
7170 CAM RETROFIT KIT FOR GEN 2-4	7170-RF-02	Cam, cam shaft, shaft spring pin.
7170 REPAIR KIT FOR GEN 1 UNITS	7170-RK-1	Seals, torsion spring.
7170 MICROSWITCH REPAIR KIT	7170-RK-2	Microswitches(2X), electrical cable.

When purchasing spare parts refer to Appendix B: Parts List at the back of this manual for Kobelt component Part Numbers.

NOTICE

It is recommended that any required service work on a Kobelt unit be performed by a factory authorized service representative. Please contact the nearest Kobelt authorized distributor for assistance.

**WARNING**

Only use spare parts and kits for your generation of unit. Using incompatible parts can lead to device failure and potential loss of control. Appendix E: provides information to determine what generation your unit is.

7 TROUBLESHOOTING

If you encounter problems with the operation of your product, please refer to the trouble-shooting suggestions before contacting Kobelco for assistance. If the steps below do not resolve your issue, please reach out either Kobelco directly or our Dealers in your area.

Table 5: Common Solutions

Problem (Issue encountered)	Cause (What it means)	Corrective Action (What to do)
Jog lever action is reversed.	Wiring is backwards.	1. Swap the Switch A and Switch B output wires to their respective system connections.
Jog lever does not move rudder at all.	Wiring is wrong.	1. Check wiring. 2. Refer to system design drawing for proper wiring.
	The rest of the system isn't hooked up correctly.	1. Check system wiring. 2. Confirm wiring to Jog Lever.
	Broken switch or contact.	1. Use a multi-meter to monitor the resistance of the wiring between switch contacts. 2. Check for normal operation of each switch by measuring the connection while jogging the lever. 3. Check both Switch A and Switch B directions. Replace any damaged switches.

8 REVISION HISTORY

Document Revision	Release Date	ECN	Author	Revision Summary
K	2026-03-17	01421	GG	- Added section 2.2: Serial Number location. - Section 6: Added Cortec foam strip replacement as part of the 2-year maintenance routine. - Appendix C: Added instructions to install Cortec foam strips as part of repair kit installation. - Appendix F: Added instruction to install Cortec foam strips as part of retrofit/microswitch repair kit installation. - Added section 3.2.1: Contact Protective Circuit.
J	2025-11-25	01340	GG	- Appendix F: 7170-RF-01 Installation: - Correct microswitch repair kit part number in Table 6. Was 7170-RK-01.
H	2025-10-29	01340	GG	- Added Appendix G: 7170-RF-02 Cam replacement - Appendix E: Add specification to differentiate between a Gen 1-4 cam and a Gen 5 cam. - Technical specifications, updated switch current specifications.
G	09/04/2025	01162	GG	- Section 6.2: Added microswitch repair kit 7170-RK-2 - Appendix B; Changed microswitch screw, was 1012-3208 - Appendix B; Added washer to microswitch screws, 1023-0102 - Appendix F: Updated microswitch installation instructions to reflect microswitches coming pre-soldered to cable in repair kit.
F	14/11/2024	00724	GG	- Updated Appendix A: Installation dimensions to specify handle travel. - Updated section 2.1 Technical data; Operating force was 1.8lbf.

9 WARRANTY

Kobelt Manufacturing Co. Ltd. ("Kobelt") warrants the Products and Parts manufactured by Kobelt to be free from defects in workmanship or material and that said products are designed mechanically and functionally to perform to specifications.

This warranty is effective providing:

- The equipment is used within the intended operating conditions and in accordance with Kobelt recommendations
- The equipment is installed according to equipment diagrams, specifications and recommendations which Kobelt has provided

This warranty becomes invalid if the factory supplied serial number has been removed or altered on the product. This warranty does not cover cosmetic damage or damage caused by an act of God, accident, misuse, abuse, negligence or modification of any part of the product. This warranty does not cover damage due to improper operation or maintenance, connection to inappropriate equipment or attempted repair by anyone other than an authorized Kobelt representative.

Upon identification of a potential issue or defect with a Kobelt Product or Part, the Warranty Applicant ("Applicant") must immediately contact Kobelt and describe the issue in writing, by letter, fax, email or other electronic conveyance. Kobelt will then assess the cause of the defect and determine warranty applicability and appropriate remediation.

If any part is found to be defective, Kobelt will replace said part FOB the Kobelt factory provided that any such defective part is returned by the Buyer with freight and applicable forwarding charges prepaid by the Buyer. Kobelt's sole obligation to the Applicant will be to repair or replace the defective part with same or similar product, to a maximum value of the list price of the product or part. The Kobelt warranty does not cover labour charges, travel or any other associated expenses.

All Products and Parts manufactured by Kobelt, are subject to a warranty against manufacturer's defects in materials or workmanship for a period of two (2) years from the date of purchase.

Kobelt will be responsible for all Products or Parts sold by Kobelt but manufactured by 3rd party manufacturing companies. However, these products and parts are subject to applicable 3rd party warranties and may not be the same as the Kobelt warranty.

10 APPENDIX A: INSTALLATION DIMENSIONS

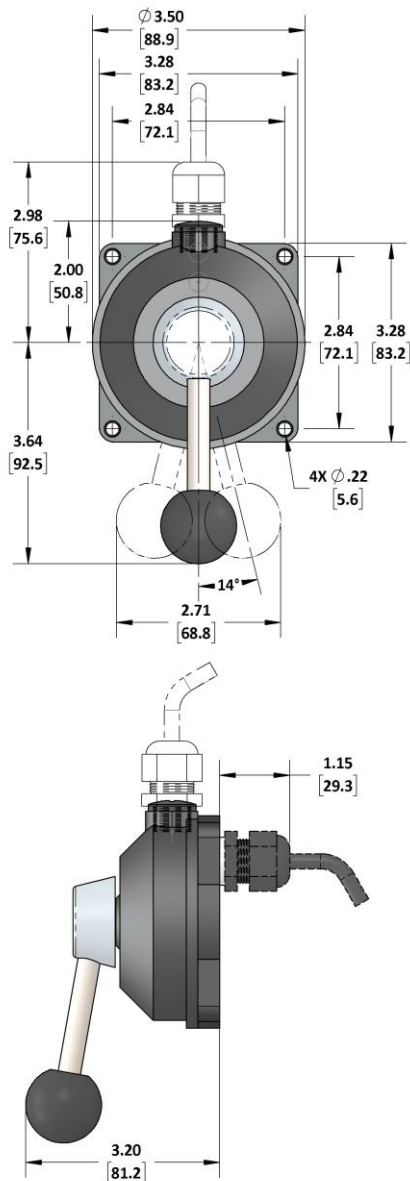


Figure 8: 7170 Installation Dimensions

11 APPENDIX B: PARTS LIST

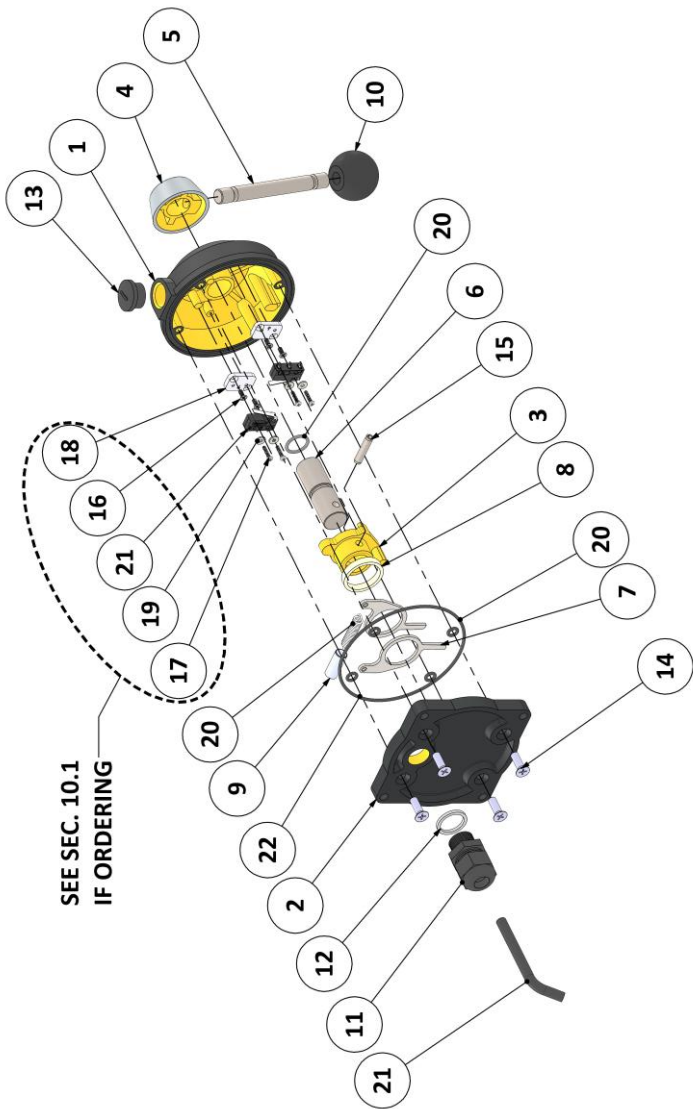


Figure 9: 7170 Parts Diagram, 7170-A2

Table 6: 7170 Parts List

Model Number:			7170			
Part Number:			7170-A_	7170-B_	7170-C_	
ITEM	QTY	DESCRIPTION	PART NUMBER			Notes (Sec 11.1)
1	1	JOG LEVER HOUSING	7170-0001B	7170-0001B	7170-0001-CHROME	-
2	1	JOG LEVER COVER	7170-0002B	7170-0002B	7170-0002-CHROME	-
3	1	CAM	7170-0003			-
4	1	HUB	7170-0004-K	7170-0004B	7170-0004-K	-
5	1	HANDLE SHAFT	7170-0005			-
6	1	SHAFT	7170-0006			-
7	2	BRACKET, SPRING ARM	7170-0007			-
8	1	SPACER, JOG LEVER	7170-0009			-
9	1	BUSHING, SLEEVE, 7MM ID, G300 PLASTIC	7170-0010			-
10	1	HANDLE KNOB, SPHERICAL, BLACK	2030-0001			-
11	1	CABLE GLAND; M16 X 1.5, .197-.394 CABLE, PA6, BLACK	6001-0248			-
12	1	WASHER, SEALING, M16, POLYETHYLENE	6001-0248-W-M16			-
13	1	PLUG, CABLE GLAND, M16 X 1.5, BLACK	6001-0311			-
14	4	SCREW, FLAT HD PHL, 10-24 X 5/8, 18-8	1009-0810			-
15	1	SPRING PIN; 3/16 DIA X 7/8 LG, AISI 420	1024-0814			-
16	4	SCREW, FLAT HD, PHP DR, 3-48 X 1/4, 18-8	1009-0304			*1
17	4	SCREW, PAN HD, PHP DR, M2-0.4 X 10, 18-8	1012-3210			*1
18	2	BRACKET, MICROSWITCH	7170-0011			*1
19	4	WASHER; FLAT; #2 X ¼ OD; 18-8	1023-0102			*1
20	1	SPRING KIT (SEALS AND SPRING) FOR 7170 GEN 3	7170-RK			-
21	1	REPAIR KIT; MICROSWITCHES	7170-RK-2			*1, 2

11.1 PARTS LIST NOTES:

1. Contained in Microswitch retrofit kit: 7170-RF-01. See section 14.2.5 to determine if a retrofit kit is required or can purchase standalone part.
2. Refer to Appendix F for microswitch installation directions.

12 APPENDIX C: 7170-RK REPAIR KIT INSTALLATION

NOTICE

It is recommended that any required service work on a Kobelt unit be performed by a factory authorized service representative. Please contact the nearest Kobelt authorized distributor for assistance.



WARNING

If your Jog Lever is a previous generation unit (see Appendix E:), installing the repair kit (new spring) can lead to device failure and potential loss of control.

Steps for replacement of spring and seals:

1. Loosen cable gland.
2. Remove housing screws and cover plate.
3. Unthread handle shaft from shaft hub and remove shaft hub.
4. Remove spring arms (with spring and spring bushing attached).
5. Remove shaft assembly (be careful not to lose spacer).
6. Remove and replace small housing O-rings (4x). Refer to Figure 11.
7. Remove and replace large housing O-ring.
8. Remove and replace shaft O-ring.
9. Disconnect spring from spring arms.
10. Slide bushing onto new spring and re-attach to spring arms.
11. Remove the old Cortec Foam tape strips and prepare surface for new foam strip. Use rubbing alcohol to remove any adhesive residue.
12. Reassemble unit as shown in Figure 10.
 - a. Use Loctite 242 or 243 on handle shaft threads and housing screw threads.
 - b. Install the new Cortec foam tape strips. Cut the foam strips to fit in the space shown in Figure 12 and remove the adhesive backing. Firmly press into the locations shown in Figure 12. Ensure the tape is positioned such that it does not interfere with movement of the jog lever components.
 - c. Ensure shaft has sufficient assembly grease (add more if necessary).
 - d. Refer to Figure 13 for spring arm orientation/order.

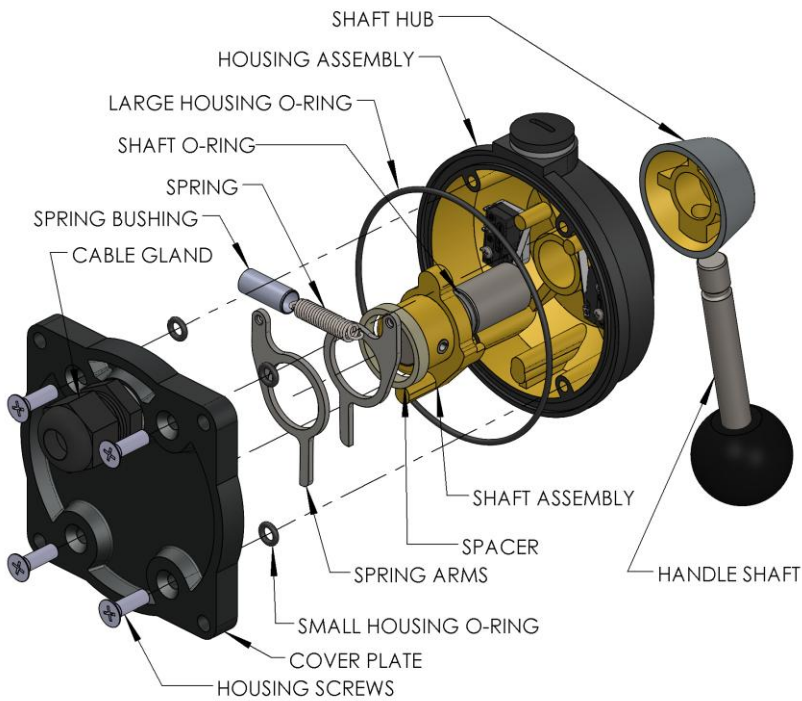


Figure 10: 7170 Parts Diagram for Maintenance

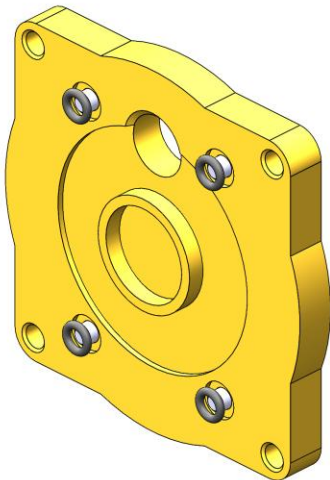


Figure 11: 7170 Maintenance Small Housing O-Rings Close-up

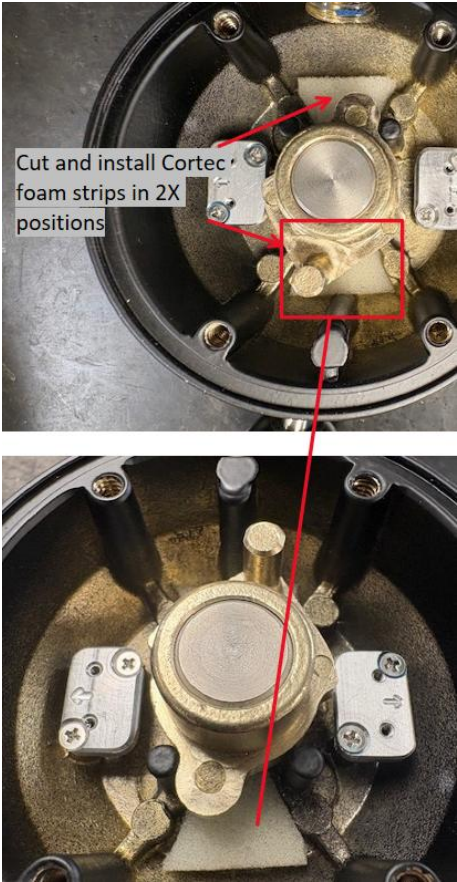


Figure 12: Installation of Cortec Foam Tape Strips

13 APPENDIX D: 7170-RF SPRING ARM REPLACEMENT

NOTICE

It is recommended that any required service work on a Kobelt unit be performed by a factory authorized service representative. Please contact the nearest Kobelt authorized distributor for assistance.

WARNING

If your Jog Lever originally used a torsion spring (Generation 1 as per Appendix E:), it is not compatible with the spring arms/tension spring setup

Steps for replacement of spring and seals:

1. Complete Steps 1-5 of outlined in Appendix C: 7170-RK Repair Kit Installation.
2. Discard old spring arms and spring.
3. Slide bushing onto new spring.
4. Attach spring (with bushing) to spring arms.
5. Slide spacer onto shaft assembly (before spring arms).
6. Reassemble unit as per Step 11 of Appendix C: 7170-RK Repair Kit Installation.

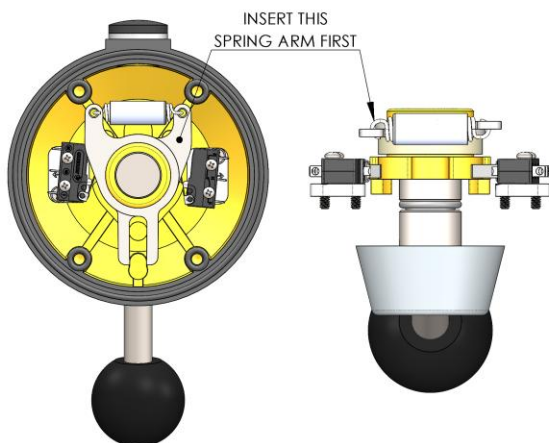


Figure 13: 7170 Spring Arm Order

14 APPENDIX E: SUMMARY AND DETERMINATION OF JOG LEVER GENERATION

NOTICE

For all critical applications, Kobelt recommends replacing older generation units (Gen 1 and Gen 2) with a new unit (Generation 5).

The 7170 Jog Lever has been through several design updates since its introduction in the 1980s. This appendix will help you determine which generation of product you have and what Kobelt recommends for continued maintenance and repairs.

14.1 RECOMMENDATIONS FOR MAINTENANCE AND SUPERSEDED COMPONENT REPLACEMENT

14.1.1 Generation 1

1st generation units are incompatible with the new tension spring designs. To maintain these 1st generation units, purchase and install Kobelt PN 7170-RK-1 to periodically replace the torsion spring and seals.

WARNING

Using the spring arms and tension springs designed for 2nd and 3rd generation units or attempting to install a retrofit kit PN (7170-RF) in a 1st generation unit can lead to unit failures and loss of control.

14.1.2 Generation 2

2nd generation units can be upgraded to be equivalent to a Generation 3 unit by installing a retrofit kit (PN 7170-RF). See Appendix D: 7170-RF Spring Arm Replacement for instructions. Once a retrofit kit has been installed, the unit can now be considered a 3rd generation unit.

WARNING

Using the spring found in repair kits (PN 7170-RK) with the generation 2 spring arms can lead to unit failures and loss of control. Install a retrofit kit (PN 7170-RF) to upgrade to 3rd generation parts.

14.1.3 Generation 3

3rd generation units can be maintained by purchasing and installing repair kits (Kobelt PN 7170-RK) to periodically replace the spring and seals as a preventative maintenance measure.

14.1.4 Generation 4

Jog lever Generations 1-3 utilized a plunger style micro switch, Kobelt PN 6001-0104. This microswitch was phased out and replaced with a lever style microswitch, Kobelt PN 6001-0112, in mid 2023. Older generation jog levers can use the new microswitch, but require a retrofit kit, PN 7170-RF-01. This retrofit kit contains all the necessary components, including the new microswitch, to replace a single, generation 1-3 style microswitch.

For instructions on how to replace the old-style micro switch with a newer one, refer to section 15.

Once both microswitches in the jog unit have been retrofitted with Kobelt PN 7170-RF-01, the unit becomes a Generation 4 jog lever. Determination of what microswitch the unit has can be done as described in section 14.2.5.

There is no change to the spring or seals in Generation 4, and the repair and maintenance details of generation 3 can be followed.

14.1.5 Generation 5

On generation 5 jog levers, the stop width on the 7170-0003 Cam was increased to reduce the stroke of the jog lever. The Generation 5 cam is designed to work with a Generation 4 microswitches. If a jog unit is being upgraded to a Generation 5 cam, it should also be upgraded to Generation 4 microswitches if it does not already have them.

Follow the instructions in [Appendix G](#) for the installation procedure of the Generation 5 retrofit kit.

14.2 SUMMARY OF JOG LEVER GENERATIONS

Key Features	Section	Generation 1	Generation 2	Generation 3	Generation 4	Generation 5
Spring Type	14.2.1	Torsion	Extension	Extension	Extension	Extension
Spring Arms	14.2.2	None	Brass/Straight	Stainless/Horn	Stainless/Horn	Stainless/Horn
Cam Diameter	14.2.3	0.81in (20.7mm)	0.87in (22.1mm)	0.87in (22.1mm)	0.870in (22.1mm)	0.870in (22.1mm)
Cam stop width		0.19in (4.8mm)	0.19in (4.8mm)	0.19in (4.8mm)	0.19in (4.8mm)	0.38in (9.6mm)
Housing	14.2.4	No stop posts	Stop posts	Stop posts	Stop posts	Stop posts
Microswitch	14.2.5	6001-0104	6001-0104	6001-0104	6001-0112	6001-0112
Dates	-	Up to late 2000s	Late 2000s - 2019	2019- mid 2023	Mid 2023 – Late 2024	Late 2024 onwards

14.2.1 Spring Determination

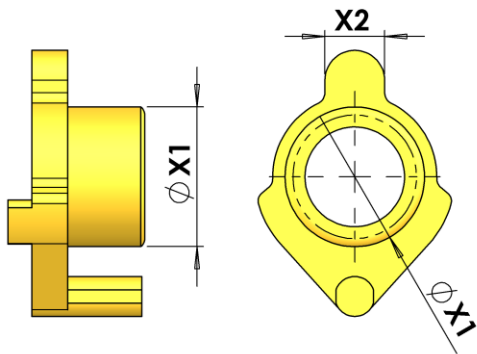
Key Features	Generation 1	Generation 2	Generation 3
Picture			
Shape	Torsion	Tension	Tension with taper at ends
Coils	3	10	21

14.2.2 Spring Arm Determination

Key Features	Generation 1	Generation 2	Generation 3&4
Picture	No Arms		
Shape	N/A	Tangent/Straight Ears	Bull Horn Ear
Material	N/A	Brass*	Stainless Steel

*some arms produced in late 2018 were stainless steel (see far right in gen 2 picture)

14.2.3 Cam Diameter Measurement



Feature	Dimension	Gen 1	Gen 2 -4	Gen 5
Cam hub diameter	X1	0.813in (20.7mm)	0.870in (22.1mm)	0.870in (22.1mm)
Cam stop width	X2	0.19in (4.8mm)	0.19in (4.8mm)	0.38 (9.6mm)

14.2.4 Housing Determination



Generation 1	Generation 2 -4
No posts	Posts present

14.2.5 Microswitch determination and replacement ordering

Key Features	Generation 1-3	Generation 4
Microswitch part number	6001-0104	6001-0112
Picture		
Replacement part number	Retrofit kit, 7170-RF-01.	Microswitch repair kit, 7170-RK-2

15 APPENDIX F: 7170-RF-01/ 7170-RK-2 MICROSWITCH INSTALLATION

 WARNING	Disconnect Power: Turn off power at distribution panel and lockout before performing cam retrofit.
 WARNING	Replacing microswitches should be done by Kobelt factory authorized service representatives. Failure to do so could result improper installation and failure of the microswitch.
NOTICE	Please read through and review steps 1-16 and all figures in section 16 before starting the removal of the old microswitch and installation of the new microswitch.

Appendix F can be followed for replacing existing generation 4 microswitches and retrofitting generation 4 microswitches into jogs that previously had generation 1-3 microswitches.

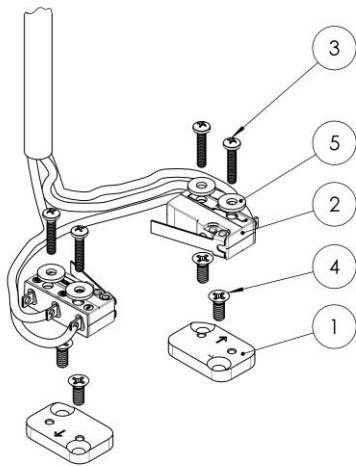


Figure 14: Microswitch retrofit kit, 7170-RF-01.

Table 7: Bill of materials for Microswitch retrofit kit, 7170-RF-01

7170-RF-01 BOM			
Item	Qty	Part Number	Description
1	2	7170-0011	BRACKET, MICROSWITCH
2	1	7170-RK-2	REPAIR KIT; MICROSWITCHES
3	4	1012-3210	SCREW, PAN HD, PHP DR, M2-0.4 X 10, 18-8
4	4	1009-0304	SCREW, FLAT HD, PHP DR, 3-48 X ¼, 18-8
5	4	1023-0102	WASHER; FLAT; #2 X ¾ OD; 18-8

1. Note connection of all wires going to the old microswitches prior to disconnecting. It will be imperative to ensure the wires go to the same side as before so that the jog lever will move the vessel in the same direction as prior to the retrofit.
2. Remove and discard the old microswitches and wires.
3. Replace the Cortec foam tape strips located on the bottom face of the jog housing. The Cortec foam strips are included in the repair kit, 7170-RK-2. Refer to Figure 12 for placement and positioning of the foam tape strips. Ensure that the foam tape strips are positioned such that they do not interfere with movement of jog components.
4. Refer to Figure 15 and note the engraved arrow on the microswitch bracket ① is facing outwards on both sides of jog lever.
5. Apply Loctite 243(Blue) to X2 Flat head screws ④.
6. Install bracket ① with screws ④ into the jog unit housing, 7170-0001, ensuring the engraved arrow is correctly orientated.
7. Thread the microswitch cable through the inside of the jog and out of the cable gland, leaving some slack for positioning the switches inside of the jog.
8. Refer to Figure 15 and note the orientation of the microswitch ② for the side of the jog unit that the microswitch is being replaced on.
9. Place the microswitch ② on top of the bracket ① orientating the microswitch so the actuation lever is as shown in Figure 15. Ensure the wires are pointed towards the cable gland.

IMPORTANT: Do not bend the soldered wire terminals on the microswitches when installing the microswitches.

10. Apply Loctite 243(Blue) to X2 pan head screws ③.
11. Use X2 screws ③ and washers ⑤ and snug tighten to secure the microswitch ② the microswitch for positioning.

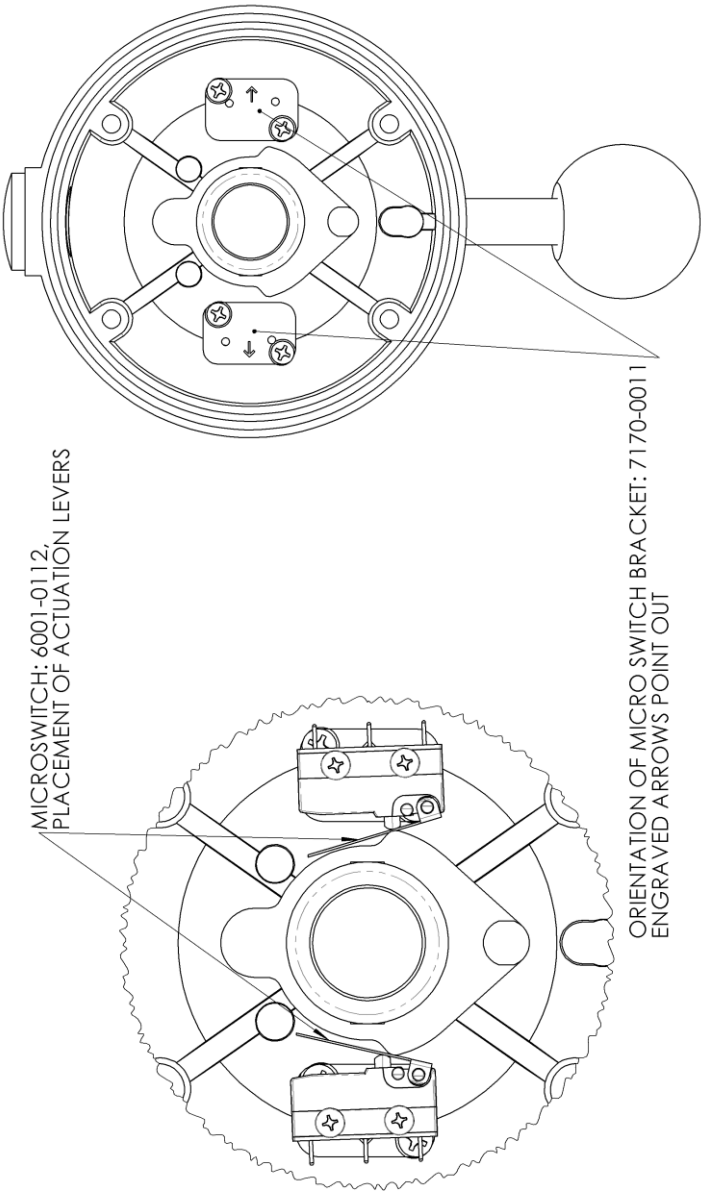


Figure 15: Placement of microswitch and microswitch mounting bracket within the housing.

12. Check correct operation of the switch by rotating the jog lever through its full travel, ensure:

1. The actuation lever of microswitch ② is clear of any obstructions through its range of motion.
2. The microswitch ② lever is depressed enough to actuate the switch contacts when the jog lever is pushed.

This can be done by checking for continuity across the Normally Open(N.O) terminal 4 and the Common(C) terminal 1. See Figure 17 for clarity on terminals being checked. When the switch is depressed, terminal 1 and 4 should have continuity.

3. The microswitch ② lever is not over actuated:

Refer to Figure 16 the microswitch lever should not be pushed past the horizontal position relative to the microswitch housing.

4. The microswitch ② lever is raised enough to open the switch contacts when the jog is in its rest position.

This can be done by checking for an open circuit(no continuity) across the Normally Open and Common terminals. When the jog lever is in its rest position, there should be no continuity across terminal 1 and 4.

Adjust the microswitch position until conditions 'a', 'b', 'c' and 'd' are met.

13. Tighten the microswitch screws ③ to 0.85 lbs.in [0.1Nm] to secure the microswitch.

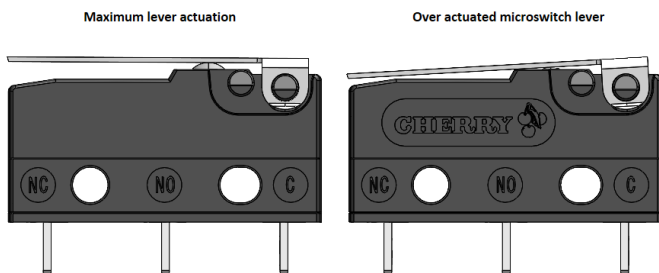


Figure 16: Maximum and over actuated microswitch lever

14. Route the wires in the correct location:

For over dash jogs(7170-X1) refer to the routing shown in Figure 17 and Figure 18.

For under dash jogs(7170-X2) refer to the routing shown in Figure 19

Ensure that wires are clear of moving parts such as the cam, spring arms and spring as identified in Figure 18.

15. Use X2 plastic cable ties to secure the routed wires together in the positions indicated in Figure 17.
16. Refer to section 4 for recommissioning the jog unit.

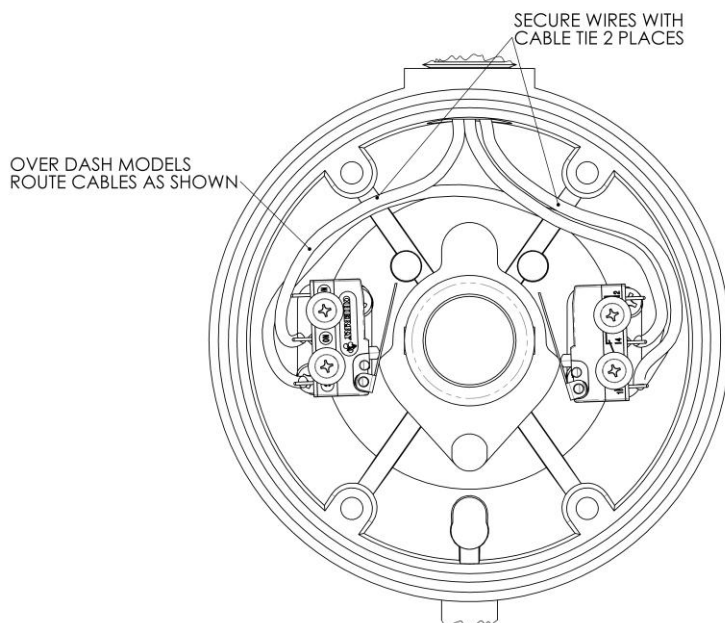


Figure 17: Microswitch wire routing, 7170-A1 shown.

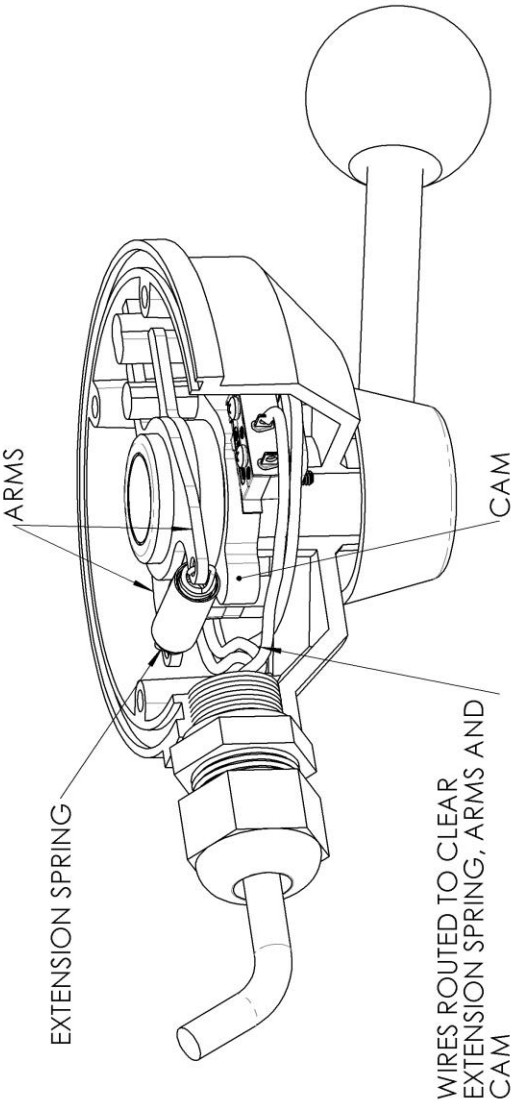


Figure 18: Wire routing showing particular parts to ensure adequate clearance, 7170-A1 shown.

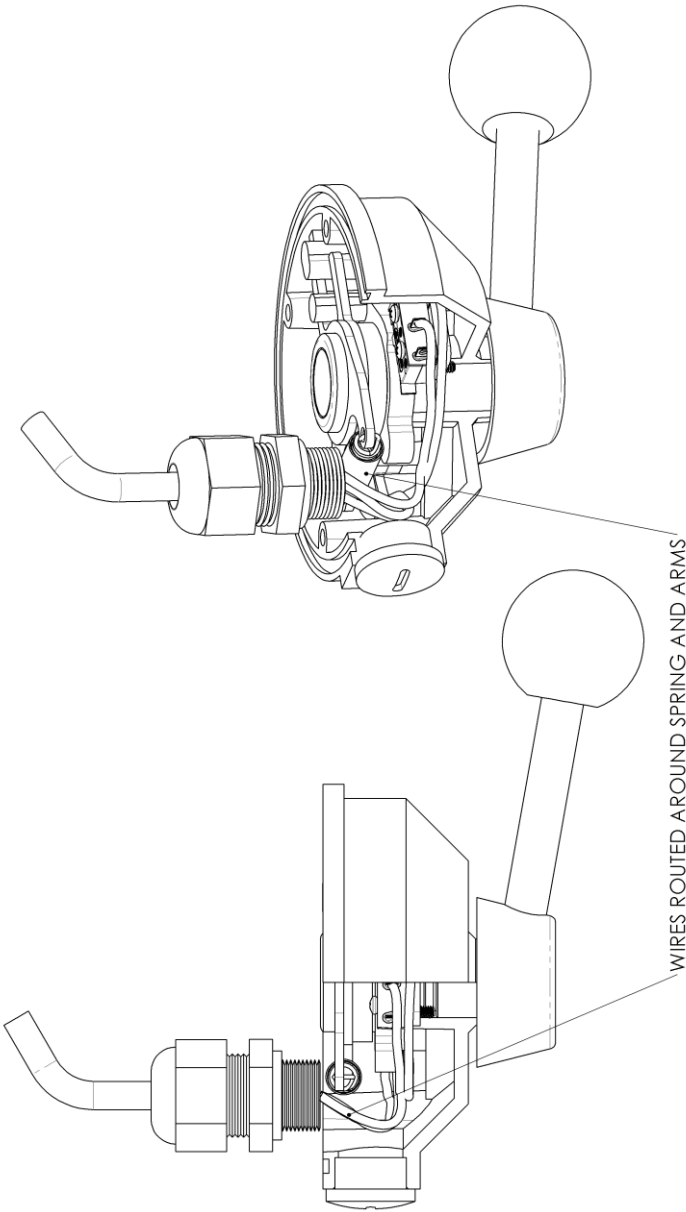


Figure 19: Wire routing for under dash jog levers, 7170-A2 is shown

16 APPENDIX G: 7170-RF-02 CAM REPLACEMENT

Appendix G gives the directions for replacing a generation 2-4 cam with a generation 5 cam. Review Table 8 - Table 10 for the required tools, spare parts and technical specifications to perform a cam retrofit.

Performing a cam retrofit requires significant disassembly of jog units. Personnel performing the retrofit should be qualified Kobelt service representatives. Jog units can also be sent to the factory to have the retrofit performed. Contact the factory for more information.

**WARNING**

7170-RF-02 installation requires significant dis-assembly of the jog lever. Installation should only be performed by technically qualified Kobelt service representatives.

Table 8: Tools required for 7170-RF-02 cam retrofit

Tool/Consumable	Application
No.2 Phillips drive screwdriver	Jog cover plate removal
Loctite 243	Fastener retention
Torque screw driver, 19 lbs-in capacity	Cover screw installation
Vise grips	Handle shaft removal
Brass shim stock (.002-.005")	Handle shaft removal
NGLI No.2 Lithium grease	Cam shaft lubrication
White silicon assembly grease	Oring lubrication/retention

Table 9: 7170-RF-02 Installation recommended spare parts

Part Number	Description	Qty	Recommended/Required
7170-RF-02	Cam retrofit kit	1	Required
7170-RK	Spring kit	1	Required
7170-RF-01	Microswitch retrofit kit	1	Required*

*Only required if microswitches are generation 1-3. See [Appendix E](#) for more information.

Table 10: Technical specifications, 7170-RF-02 installation

Specification	Value
Cover plate screw torque	19 lbs-in [2.1 Nm]

The 7170-RF-02 retrofit kit comes with the components shown in Figure 20 listed in Table 11. Please ensure you have all the components listed before diss-assembling the jog unit.

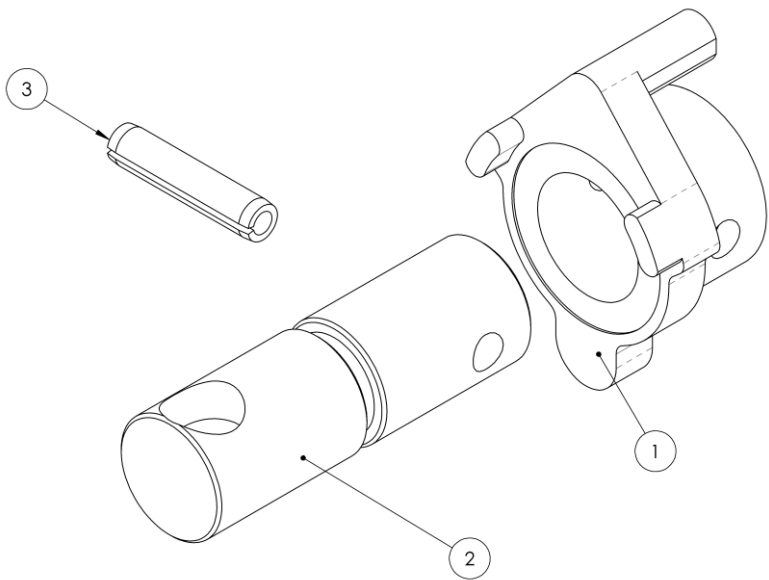


Figure 20: 7170-RF-02 Cam Retrofit kit

Table 11: 7170-RF-02 BOM

7170-RF-02 BOM			
Item	Qty	Part Number	Description
1	1	7170-0003	Cam
2	1	7170-0006	Shaft
3	1	1024-0814	Spring pin; 3/16 Dia x 7/8 LG; AISI 420



Disconnect Power: Turn off power at distribution panel and lockout before performing cam retrofit.

NOTICE

Please read through all steps in the 7170-RF-02 installation instructions before commencing with the retrofit.

To perform installation of the 7170-RF-02 follow the below instructions and figures:

1. Remove the jog lever from the dash or mounting bezel.
2. [Under dash mount only] Loosen the cable gland so that the cover plate can be slid down the cable as shown in Figure 21.
3. Loosen and set aside the 4X cover plate screws.
4. Remove the cover plate, and body O-rings. For under dash mount models, the dash plate will need to be slid along the jog lever electrical cable as shown in Figure 21.

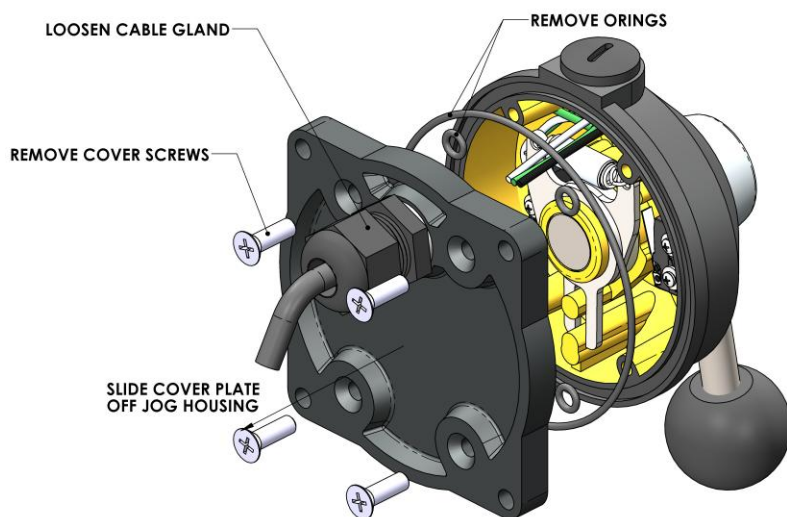


Figure 21: Removal of the cover plate and O-rings

5. Remove the two spring arms and spring together off of the cam hub as shown in Figure 22. The spring arms will need to be pulled together or else they will bind on the cam hub.
6. Remove the spacer from the cam hub.

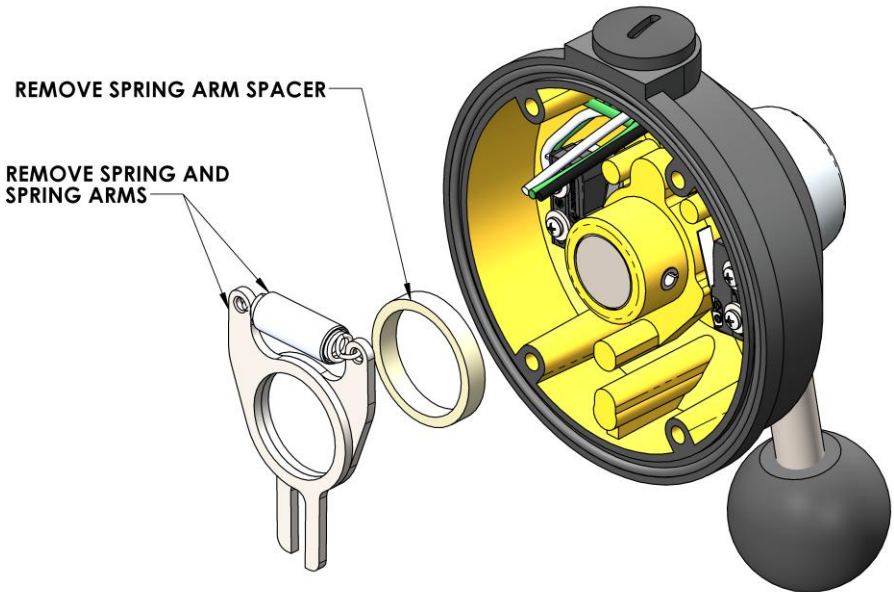


Figure 22: Removal of the spring arms and spring

7. Wrap the handle shaft in brass shim stock to protect the shaft from damage
8. Use a pair of vise grips and grip the handle shaft ensuring the brass shim stock is between the vise grip jaws and the shaft
9. Turn the shaft counter clockwise to loosen and remove the handle shaft from the jog assembly as shown in Figure 23.

NOTE: The handle shaft is installed with blue Loctite. It will require some force to break the threads free from the Loctite to loosen and un-thread the handle shaft from the hub.

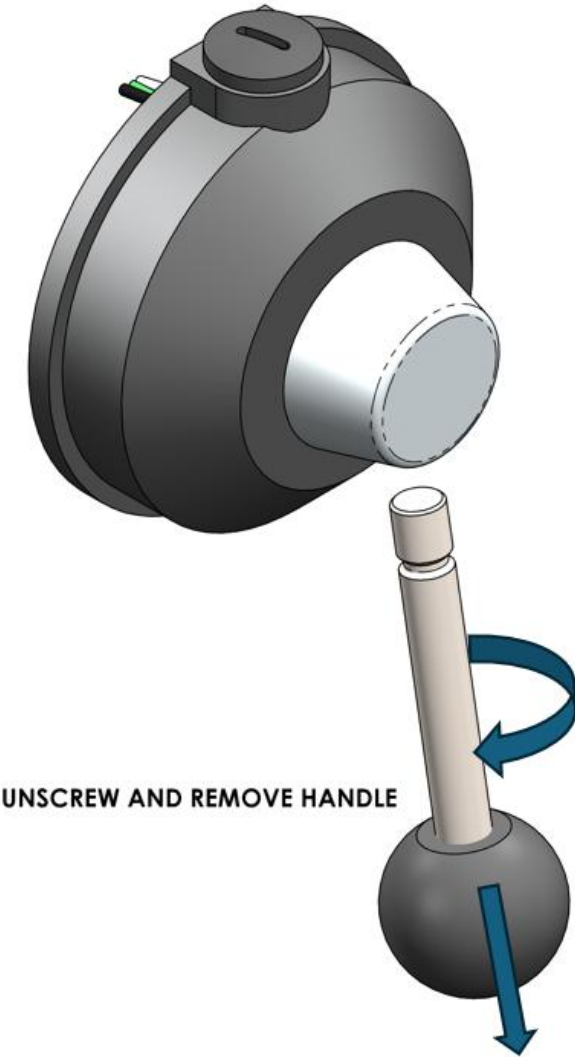
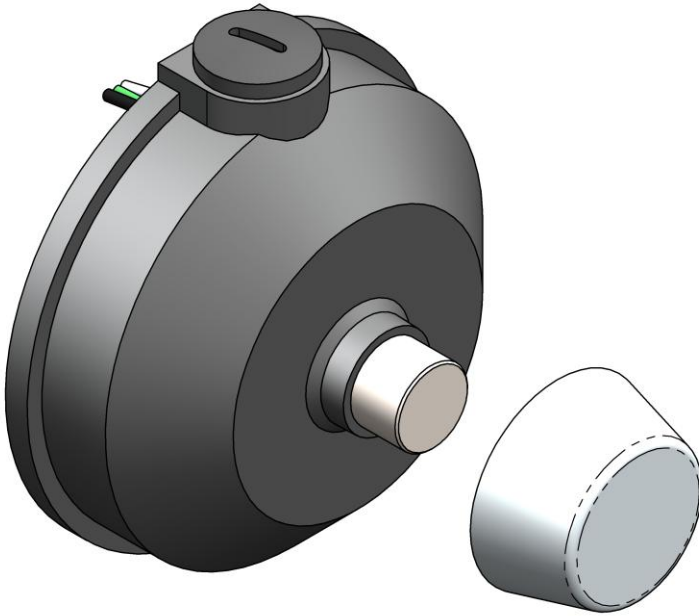


Figure 23: Removing jog handle

10. Remove the handle hub from the jog as shown in Figure 24. It should just slide off of the main shaft, though debris and corrosion increase the force required to remove it from the jog housing.



REMOVE HANDLE HUB

Figure 24: Handle hub removal

11. Slide the cam and shaft sub-assembly out from the jog unit as shown in Figure 25. Be careful that the microswitch levers do not get pulled and damaged when pulling the cam sub-assembly out of the jog.

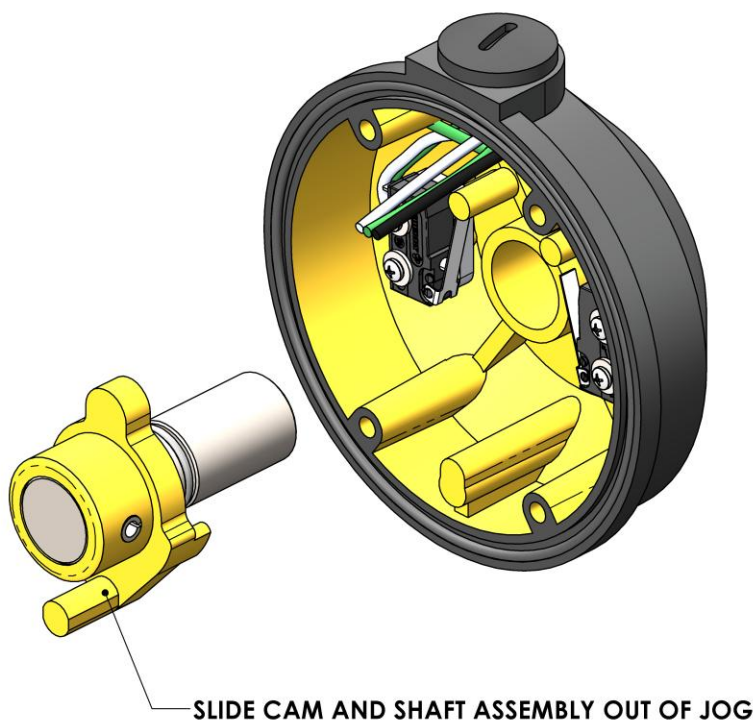


Figure 25: Removing cam assembly from the jog housing

12. Discard the old cam sub-assembly, O-rings and extension spring.
13. Clean old grease from the shaft bore on the jog lever housing.
14. Obtain the new shaft O-ring and install onto the new cam shaft.
15. Apply a light coat of grease to the cam shaft bore and cam shaft. Refer to Table 10 for the recommended grease to use.
16. Slide the new cam shaft assembly into the jog housing. Ensure the microswitch levers are pushed back and clear the cam when installing as shown in Figure 26.

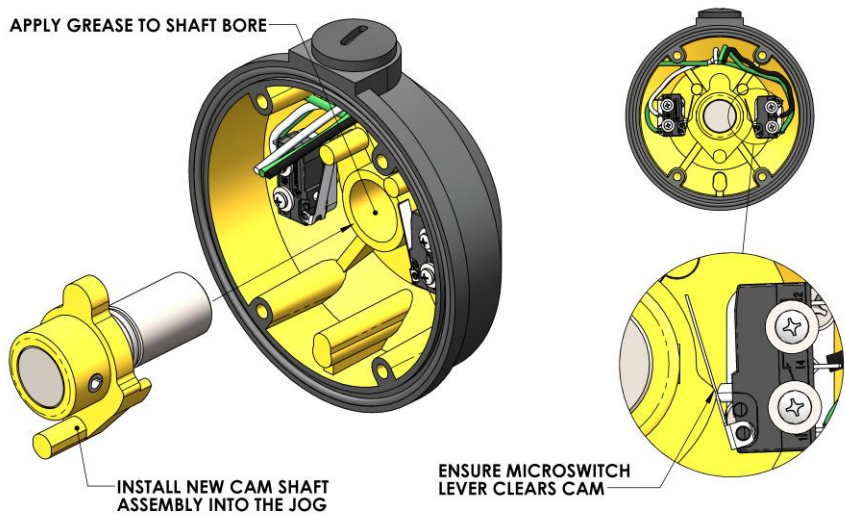


Figure 26: Installing new cam assembly back into jog housing.

17. Apply a Loctite 243 to the threads of the handle shaft as shown in Figure 27.
18. Place the handle hub over the end of the cam shaft ensuring the hole on the on hub lines up with the hole on the cam shaft as shown in Figure 27.
19. Screw the handle shaft into the hub. Screw the handle in far enough to retrain the hub onto the cam shaft. **DO NOT** tighten the handle fully in this step.

**LINE UP HOLE ON
HUB AND SHAFT**

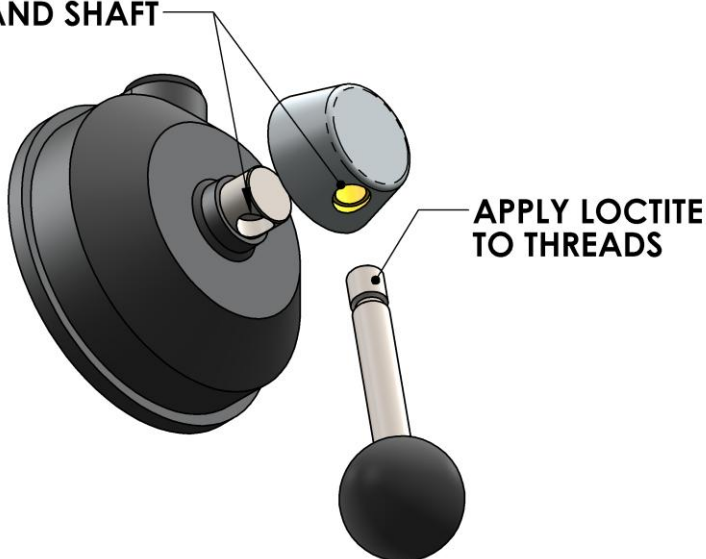


Figure 27: Re-installing handle hub and handle

20. Put light pressure on the cam shaft and the handle hub pushing the two together to remove any axial play on the cam shaft assembly as shown in Figure 28.
21. Using the vise grips and brass shim stock as done in step 8, tighten the handle shaft secure onto the hub pushing the handle hub and cam shaft together at the same time as shown in Figure 28.

If the threads of the handle shaft are exposed, it is possible the threaded hole on the hub and hole on the shaft were not aligned properly. The handle shaft should be removed and steps 18 - 21 should be repeated.

22. Check for axial play on the installed cam shaft assembly. There should be little axial movement.
23. If a 7170-RF-01 microswitch kit is being installed, it should be installed at this step. Refer to [Appendix F](#) for installation instruction.
24. Move the jog lever back and forth and check for free rotation of the cam assembly. The microswitches should toggle smoothly. If any of the microswitches do not actuate ('Click'), the microswitch position may need to be adjusted for the new cam. Refer to [Appendix F](#) for directions on adjusting the microswitch positions.

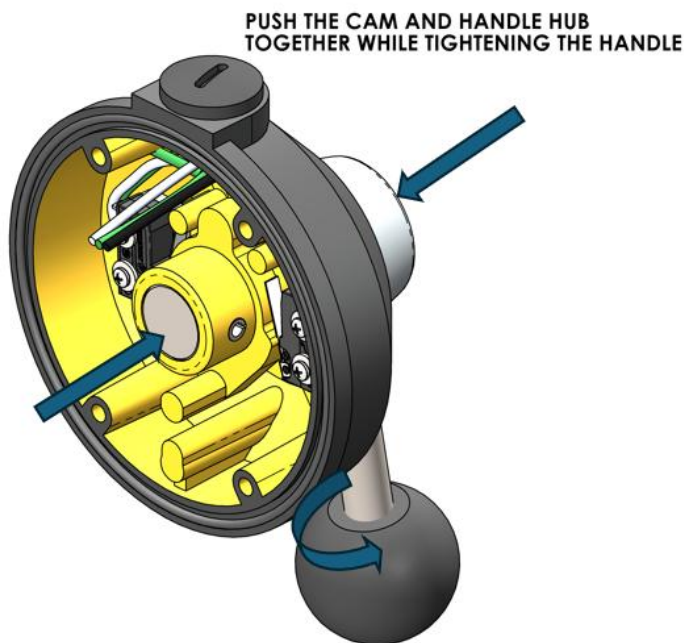


Figure 28: Installing cam assembly into jog

25. Inspect the spring arms for wear as shown in Figure 29. If the spring retention hole show signs of wear such as indentations where the spring makes contact, the arms should be replaced.

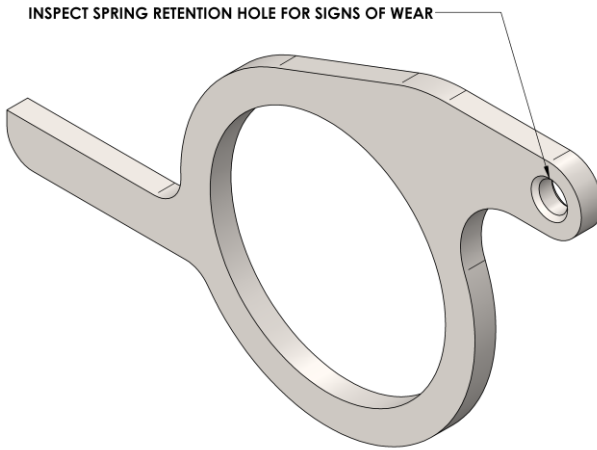


Figure 29: Inspect Spring retention hole for wear on spring arms.

26. Apply a light coat of grease to the cam hub. Refer to Table 10 for the recommended grease to use.
27. Prepare the new spring for use. Apply a light coat of grease to spring body and spring arm retention holes as shown in Figure 30.
28. Apply a light coat of grease to the sliding surfaces and bores of the spring arms as shown in Figure 30.

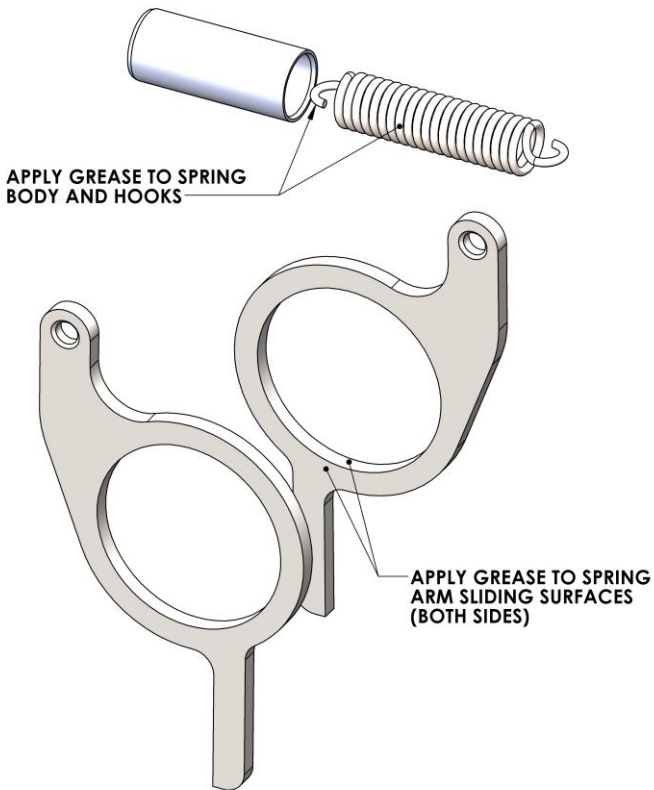


Figure 30: Apply grease to spring arm sliding surfaces, spring body, and spring hooks

29. Place the Sleeve bushing over the spring and put the spring hooks into the spring arm retention holes as shown in Figure 31.
30. Ensure all the components are arranged and oriented as shown in Figure 31.

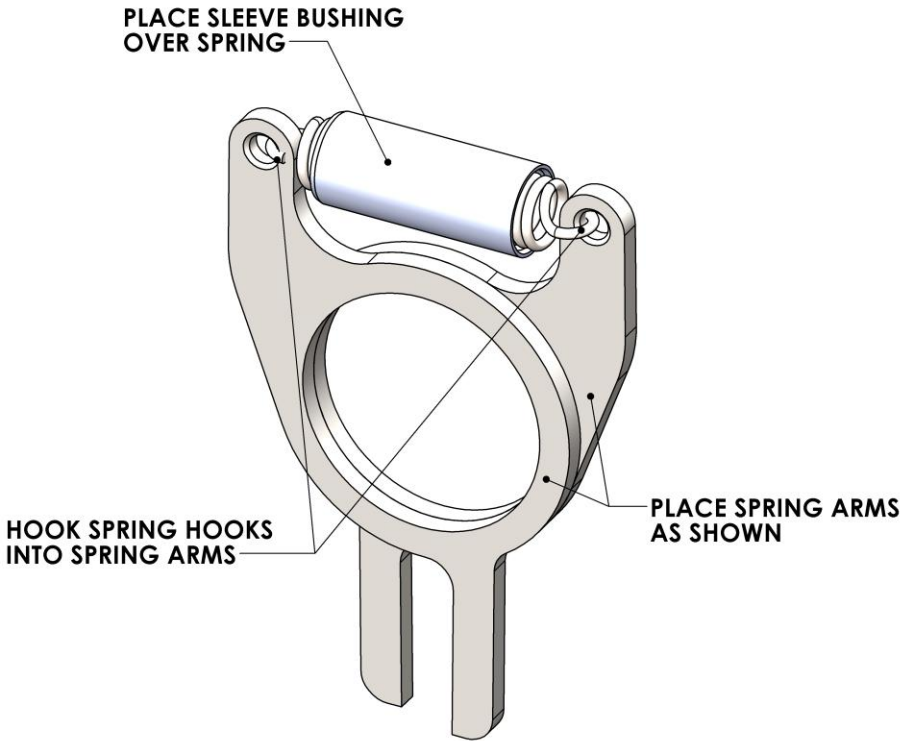


Figure 31: Arranging Spring and spring arm for replacement on new cam

31. Place the cam spacer onto the hub of the cam.
32. Keeping the spring and spring arms arranged as shown in Figure 32, carefully slide the spring arms down the hub of the hubs.
33. When the spring arms stop levers get to the stop post on the housing and cam, they will need to be pushed past it as shown in Figure 32. Ensure the spring arms are pushed all the way down. Double check everything is positioned as shown in Figure 32.



Figure 32: Installing spring assembly into jog housing.

34. Move the jog lever back and forth and check:
- The cam/spring assembly freely moves back and forth.
 - The spring smoothly pulls the lever back to neutral position when the lever is released.
 - The microswitches smoothly are actuated by the cam.

35. If any of the checks in step 34 are not achieved, review the installation procedure. Ensure that all the components have been placed correctly, and oriented in the right direction. If microswitches are not actuated by the new cam, they may need to be repositioned. Refer to [Appendix F](#) for directions on adjusting the microswitch positions.
36. Apply white silicon based assembly grease to the 5X cover O-rings, this will aid in keeping the O-rings in place when installing.
37. Place the 4X 3/16" ID O-rings into the counterbores on the cover as shown in Figure 33.
38. Place the 3-1/4" ID O-ring into the gland on the housing as shown in Figure 33.

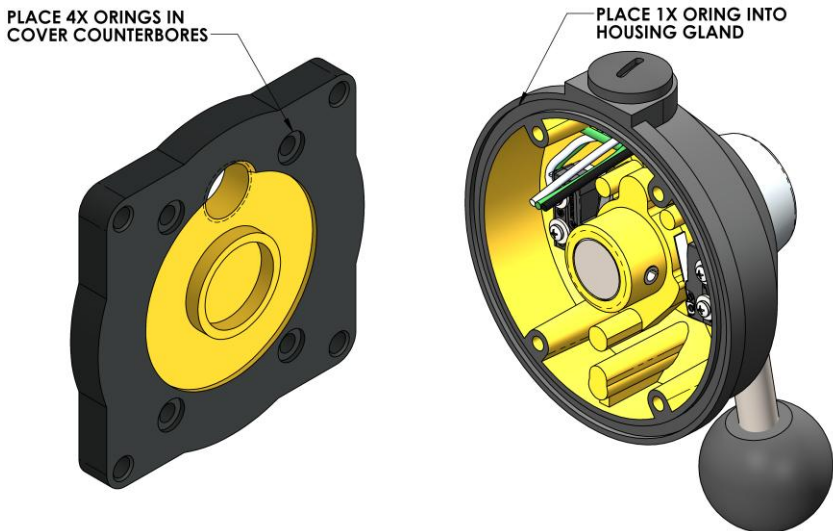


Figure 33: Oring placement on cover and housing

39. Slide the cover back onto the housing positioning as shown in Figure 34.
40. Apply Loctite 243 to the 4X cover screws and tighten to specification given in Table 10.
41. Re-tighten the cable gland. For under dash models, ensure the cable is pushed into the housing when tightening the gland as shown in Figure 34.

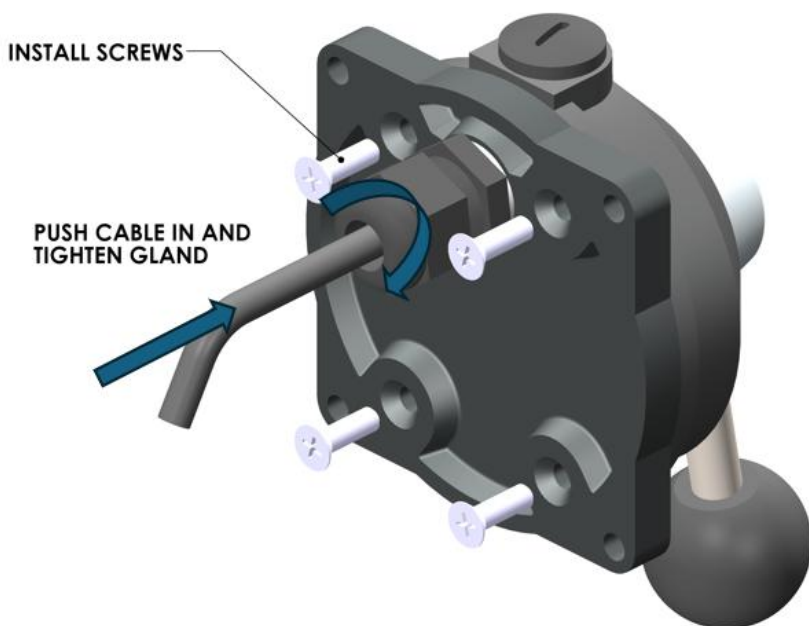


Figure 34: Replacing cover

42. Mount the jog back onto the dash.
43. Perform a commissioning check as described in section 4 before putting the jog into service.

17 APPENDIX H: INSTALLATION CUT-OUT TEMPLATE

NOTICE

Scale may not be exactly 1:1 due to PDF and printer scaling. Verify primary dimension with a ruler after printing and before using to cut.

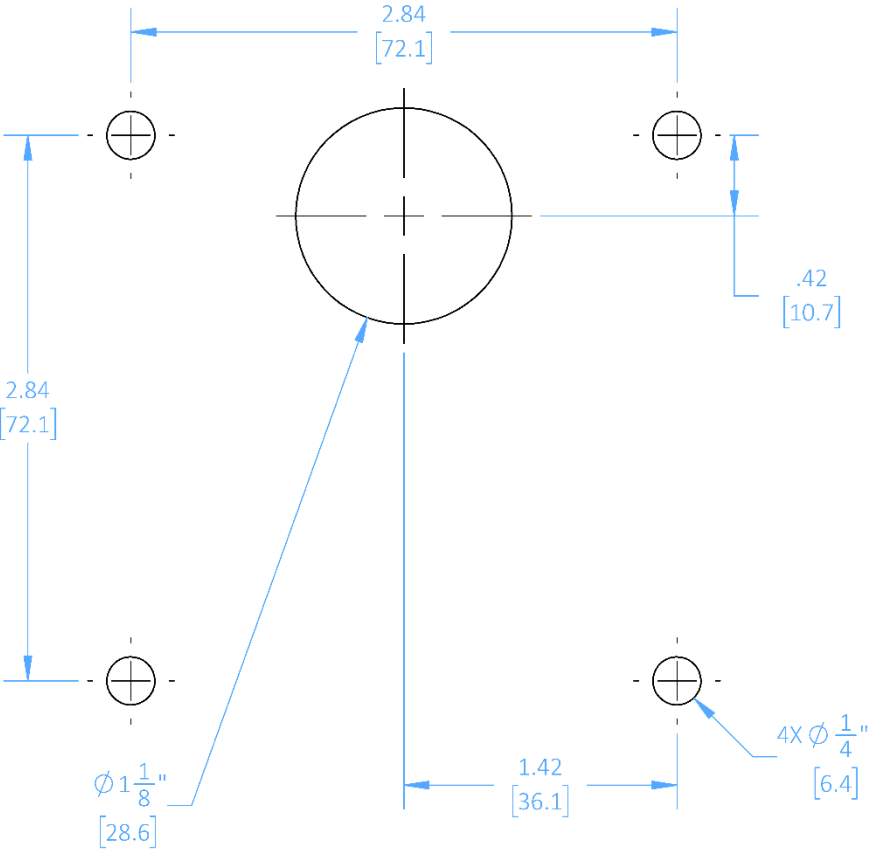


Figure 35: Installation Cut-out Template

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