



**Service and maintenance
procedure
LF70**

Doc. no./Rev.:

AP1803

Rev: D

TABLE OF CONTENTS:

1.0 PURPOSE

2.0 NOTE

3.0 RESPONSIBILITY

4.0 PROCEDURE

Revision History				Prepared by	Approved by
Rev	Date	Change	Sign	28.10.2011 Kjettil Robertsen	31.10.2011 Svein Hersvik
B	16.02.2012	Minor adjustments	VH		
C	06.03.2012	End stop added	VH		
D	26.06.2012	Motor added	VH		

1 PURPOSE.

When repairs below the panel plate are needed, a general recommendation from Lilaas/the manufacturer is to replace the lever unit with a new one, and return the old to supplier/manufacturer for maintenance. Manufacturer's warranty is cancelled when sealed screws are turned.

Nevertheless, the objective of this procedure is to describe some maintenance work that may be performed on LF70 (Lilaas azimuth control levers) by skilled service engineers.

2. NOTE

This description covers many different levers, but there are lots of differences which will be too extensive to describe here. Study photos and illustrations and compare details with the actual lever. **Soldering temperature must not exceed supplier's recommendation/generally max 350° C max 3 seconds on potmeter terminals.** Screws must be locked with Loctite 222 on threads.

3. RESPONSIBILITY

The service engineer is responsible for applying this procedure.

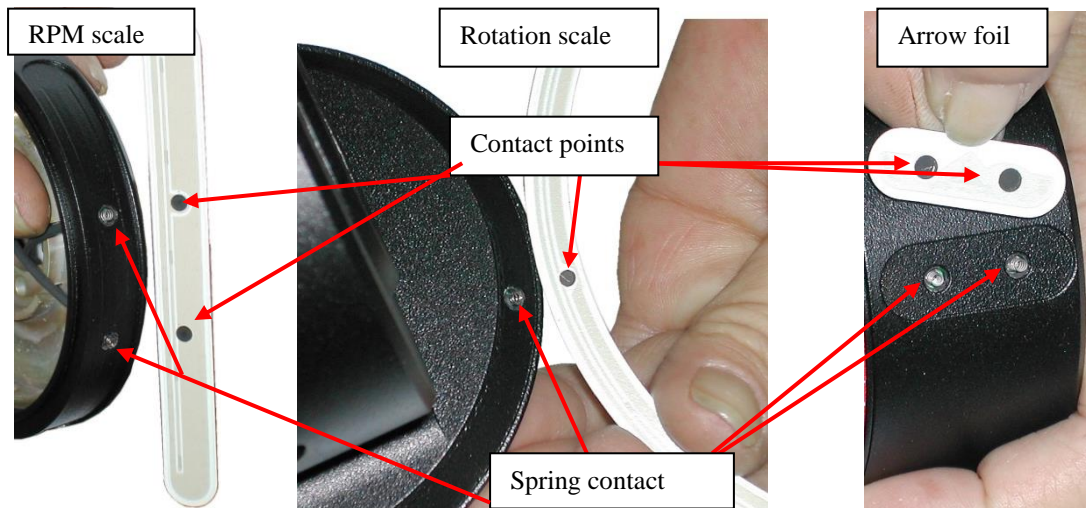
4. PROCEDURES (next pages)

REPLACE SCALES

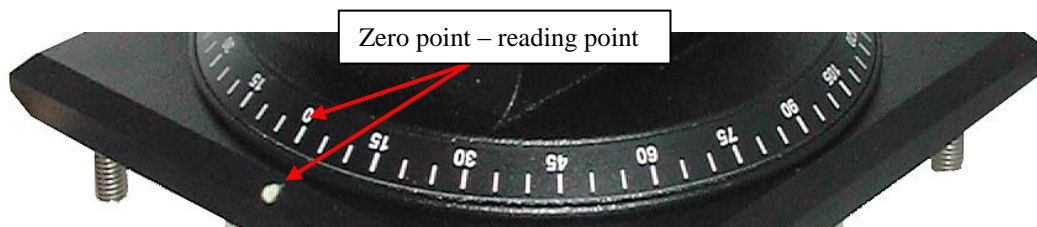
Remove old scale. Be aware the small plastic tube/ring placed between the contact spring and its metal surroundings. It may follow the old scale and must be replaced.



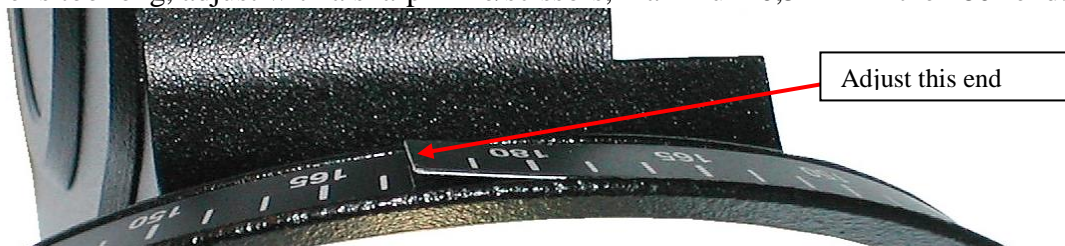
Make sure that the glue area is clean. Use technical alcohol or equivalent. Remove paper protection from new scales. Check scale direction. When mounting the scales, assure that the contact points on the scales hit the spring contact on the control lever.



Then fasten the scale to the lever with high pressure from your finger. Press out air bubbles. When changing the rotation scale, be assure to place the zero point on the white reading point of the panel plate.



If the scale is too long, adjust with a sharp knife/scissors, maximum 0,5 mm in the 180°-end.



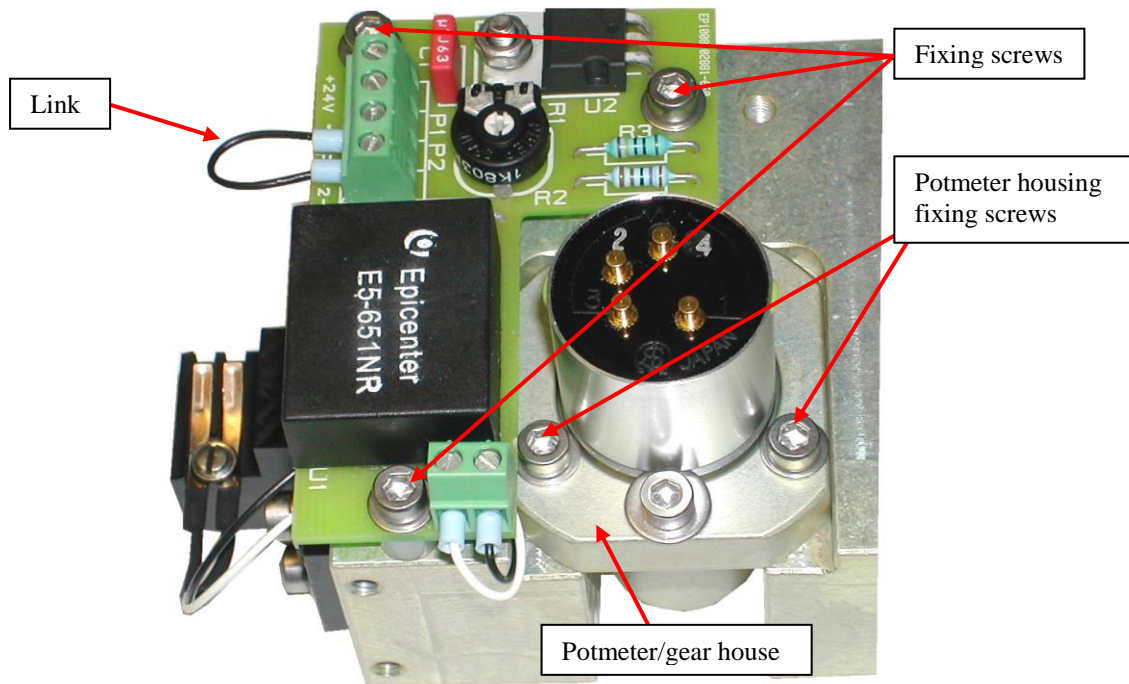
Test the scale lights.

Control lever may be sealed waterproof by a string of glue around the edge, between the scales and the metal edge. The glue string must be in one continuous string without ends. Glue area must be clean, and the glue must suit the conditions the lever is situated in.

REPLACE LIGHT DRIVER PCB

The light driver card is located beside the RPM potmeter.

Disconnect all cables except the link. Loosen fixing screws. Notice the spacers. Replace the PCB with a new one. Reconnect cables.

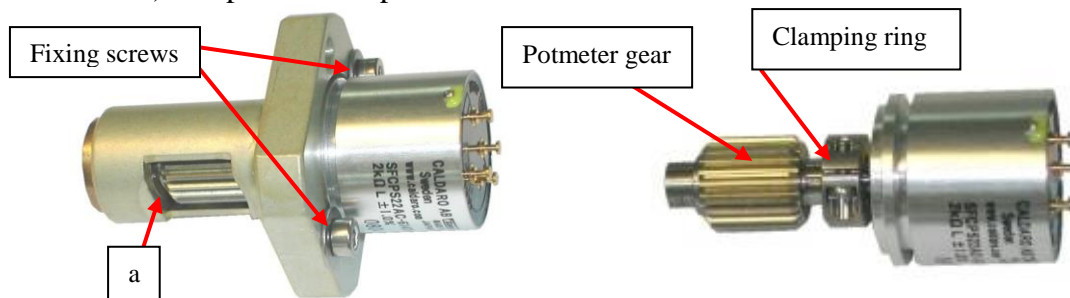


REPLACE POTMETERS

RPM POTMETER

Disconnect potmeter electrically (different levers/potmeters - different cabling).

Loosen potmeter/gear house fixing screws (shown above). Loosen potmeter fixing screws (shown below) and pull out the potmeter.



Loosen screws on potmeter gear and clamping ring and replace the potmeter with the new one. Adjust gear position by moving the clamping ring on the potmeter axle. The gear must move freely, see the space marked a above. Fix potmeter in housing with two fixing screws and washers after adjusting potmeter roughly.

Slide the potmeter unit into the lever and fix it with two screws and washers. Connect wires.

Note: Soldering temperature must not exceed supplier's recommendation/350° C max 3 seconds on potmeter terminals.

Control and adjust RPM potentiometer

Use multimeter to test potentiometer resistance. Measure between pin 1 (black) and pin 3 (green), multimeter set to Ω . Measured resistance must be according to text on potmeter, $\pm 10\%$ is acceptable. On multigang potmeter, each gang must be measured.

Center adjustment RPM potentiometer

Set RPM/thrust lever in center position.

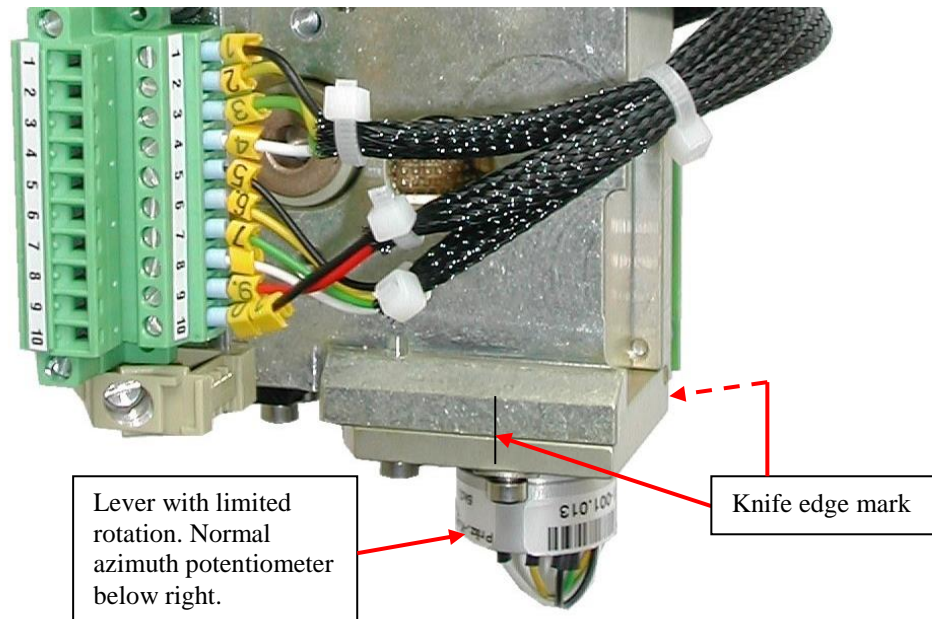
Use multimeter with **5V power supply**, set on V DC. Link multimeter \leftrightarrow potentiometer as follows:

5V DC		\leftrightarrow	Pin 3
Multimeter +		\leftrightarrow	Pin 2
Multimeter (Gnd)		\leftrightarrow	Pin 1

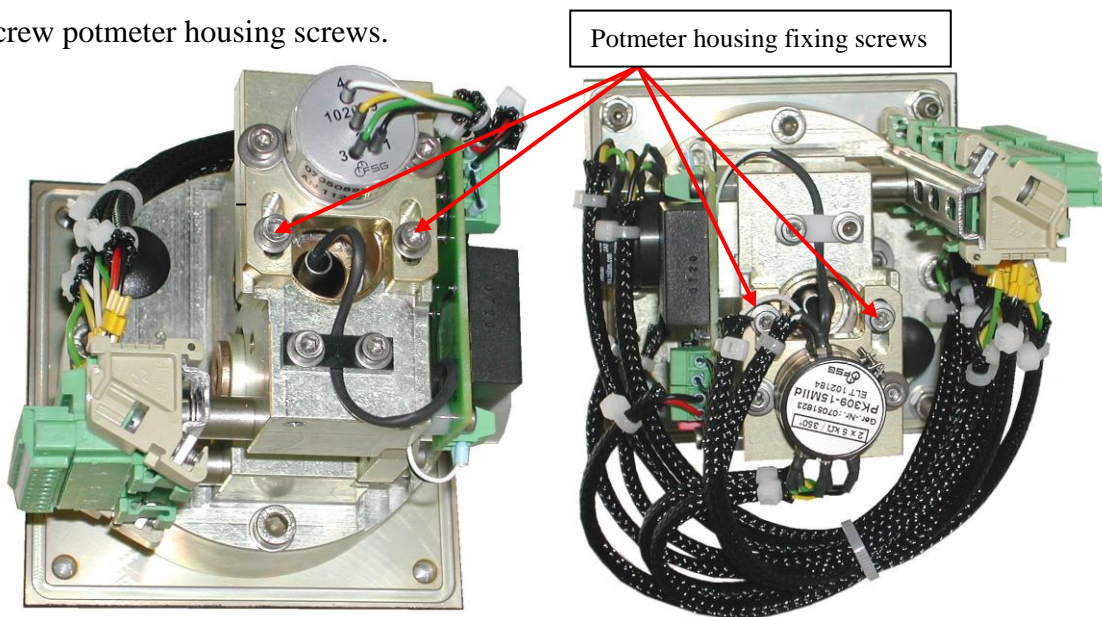
- Adjust potentiometer to 2,5 V, tolerance 0,025V.
- Move lever slowly to *max (forward)*. Verify that the voltage increases gradually to ca 4 V, max 4,9 V.
- Return lever slowly to *Zero*. Verify that the voltage decreases gradually to 2,5V, tolerance 0,025V.
- Move lever slowly to *min (backwards)*. Verify that the voltage decreases gradually to ca. 0,3V, min 0,100V.
- On multi gang potmeter, zero and deflection on each gang must be tested.
- Move lever slowly back and forth to check smooth movement without gear jaggging. Lever movement and detent point must right, not hardy or loose.

AZIMUTH POTMETER

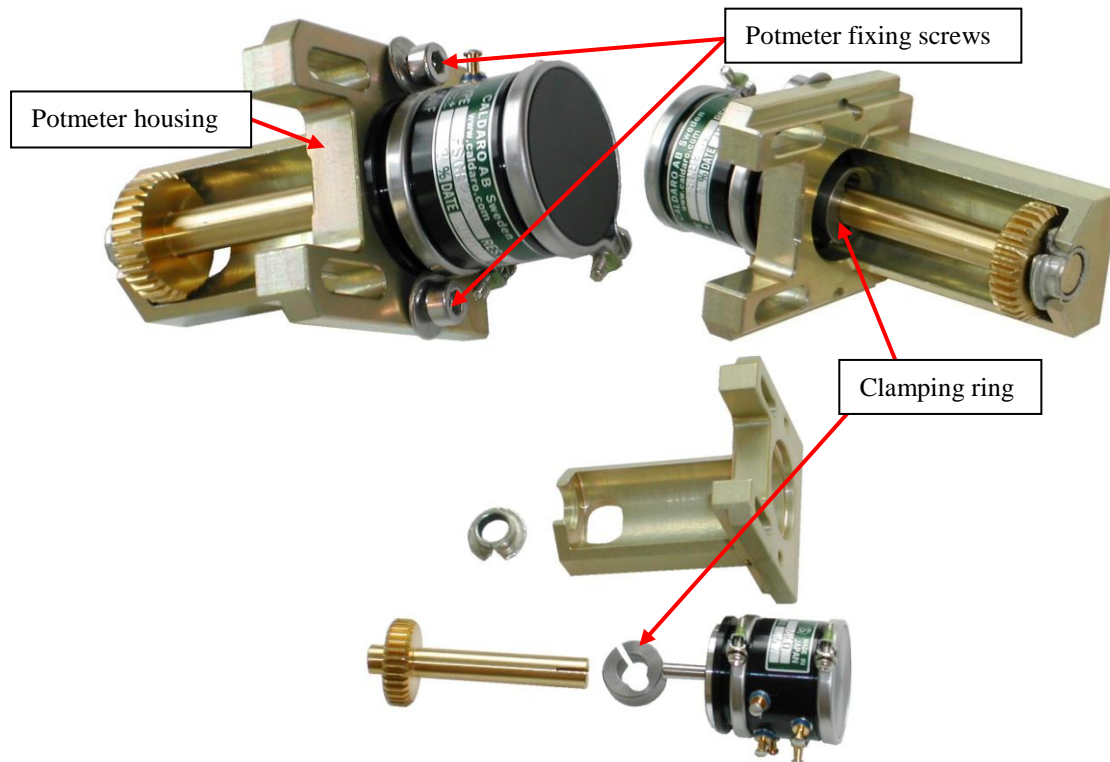
Disconnect potmeter (different levers/potmeters - different cabling). Make a knife edge mark as shown below, on two opposite sides, before loosening screws. This to make sure that housing is placed exactly on the same place after replacing potmeter.



Unscrew potmeter housing screws.



Unscrew potmeter fixing screws and pull out potmeter unit. Loosen clamping ring from potmeter axle. Replace the potmeter. Reassemble the unit, slide it into the lever and fix it with two screws and washers, after adjusting potmeter roughly. Reconnect the potmeter wires.



Control and adjust azimuth potmeter

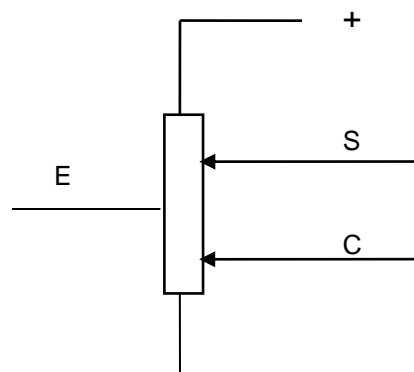
Center adjustment:

Set rotation to "0"

Use multimeter with **5V power supply**, set on V DC. Link multimeter ↔ potentiometer as follows:

5V DC		↔	+
Multimeter +		↔	S (sine)
Multimeter (Gnd)		↔	-
Multimeter +		↔	C (cosine)

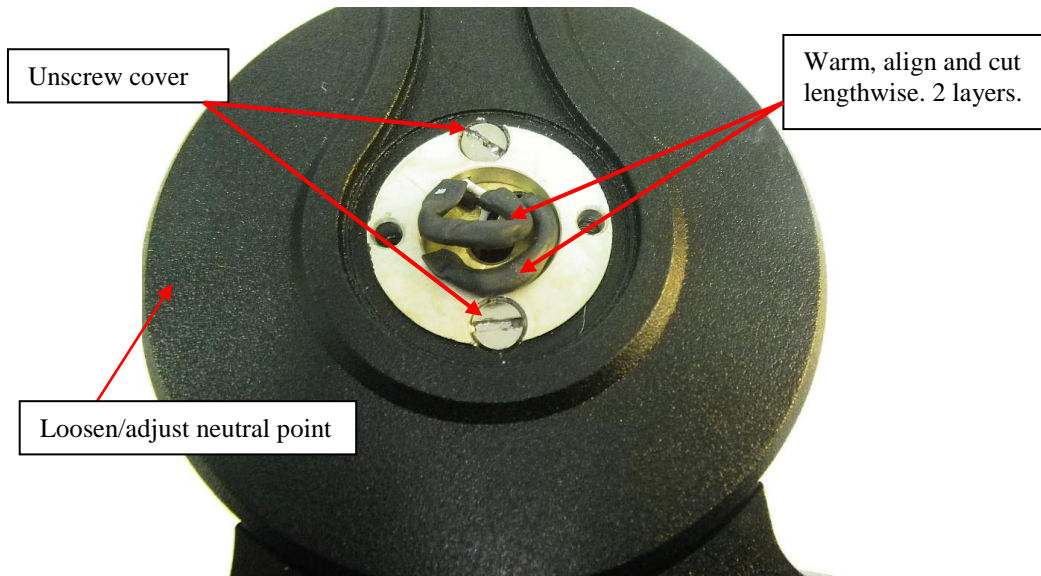
Adjust potentiometer to max voltage on S-pin. Then 2,5 V, tolerance 0,044 V on C-pin (cosine).



After fixing potmeter, seal screws.

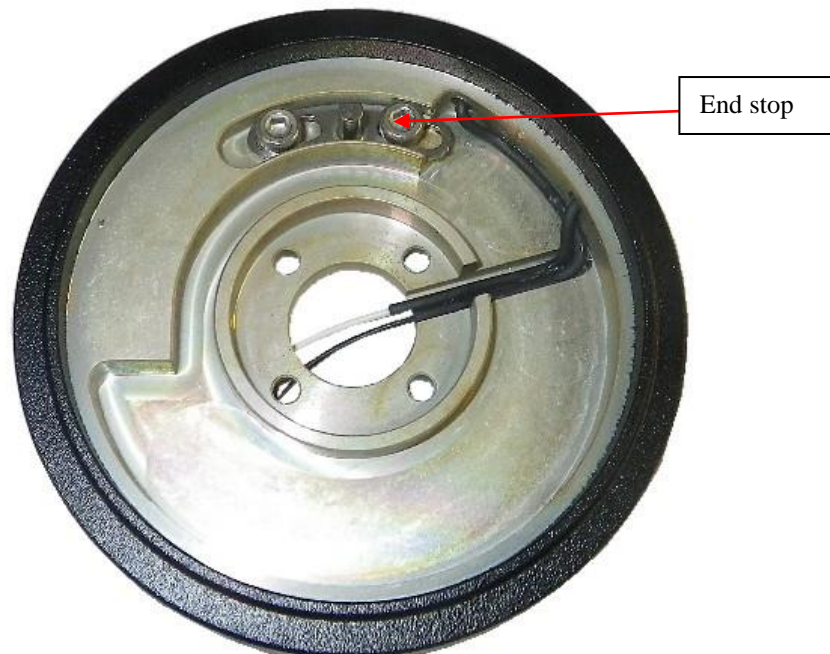
REPLACE END STOP

Dismount handle (pozydrive screw). Be aware o-ring. Warm and align shrinkable tubes. Use scalper/knife and cut them lengthwise. Remove them. Repeat procedure on next layer shrinkable tubes.



A sleeve is used to splice these two wires. The sleeve is removed by squeezing it open. Pull gently off. If this is not possible it can be cut off, but make sure the wires are long enough to be joined later.

Loosen the zero adjustment screw on the side of the cover before you dismount it.

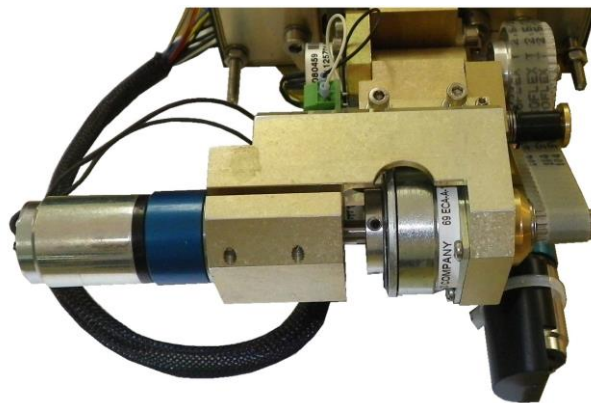
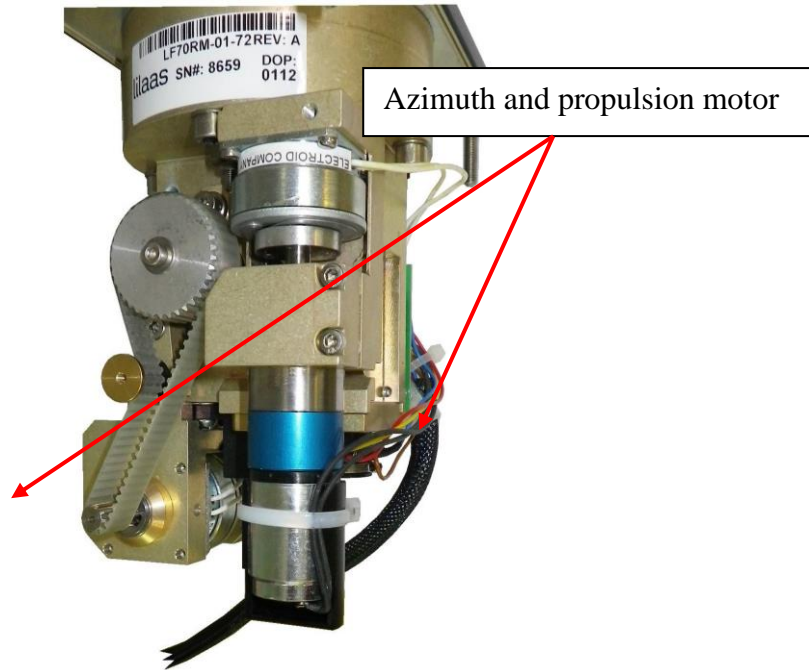


Note end stop position before dismounting it. (To avoid later adjustment) Install the new end stop in the same location as the old.

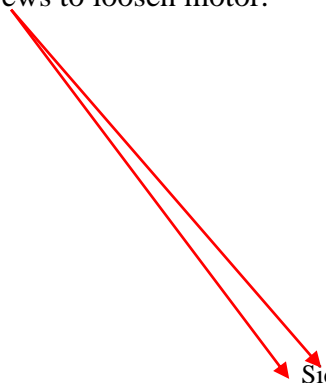
Install the side cover. Splice wires with two layers of shrink tubing over the joints.

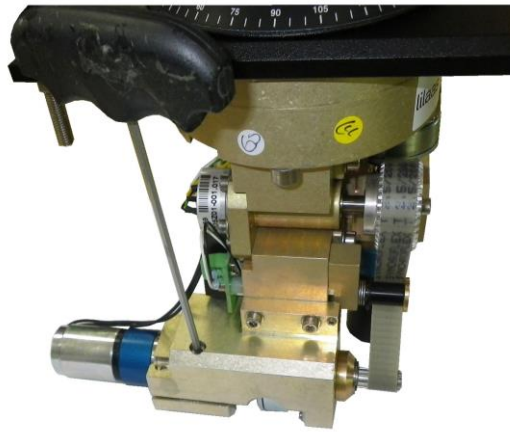
Readjust neutral point

REPLACE MOTOR ON MOTORIZED LF70

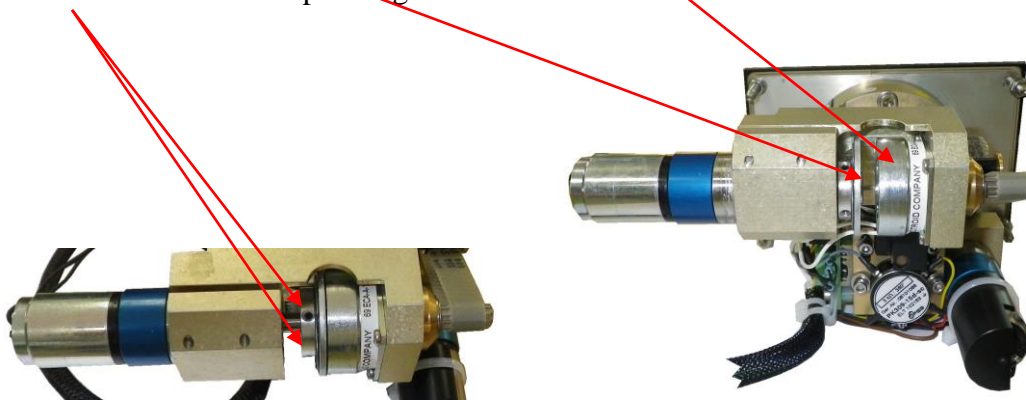


Disconnect motor wires.
Loosen bracket screws to loosen motor.

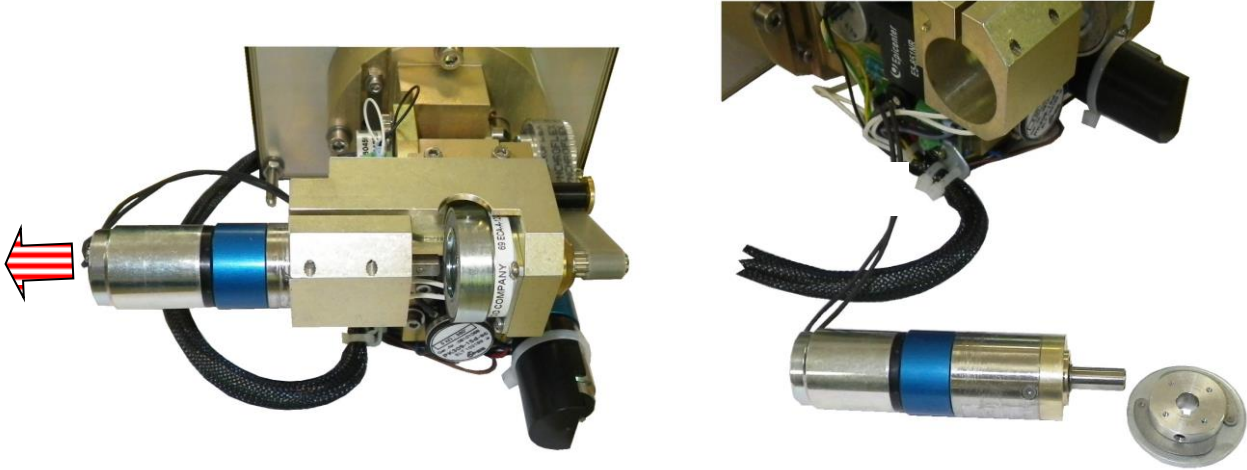




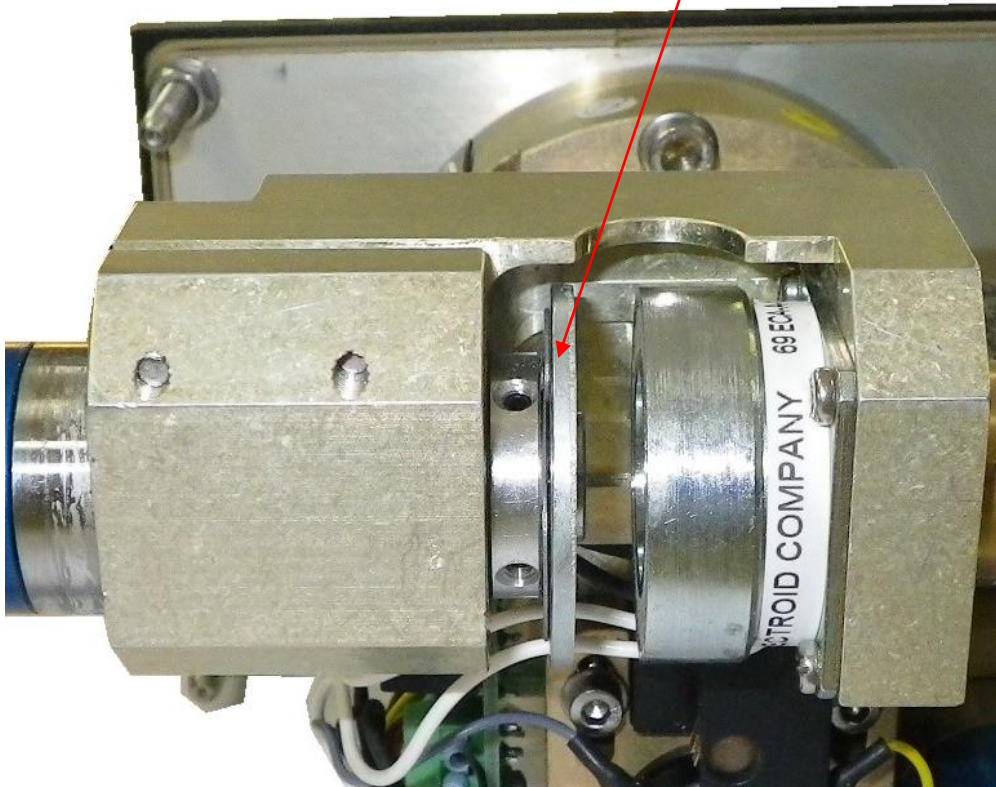
Uncsrew 2 set screws to split magnet disc from the clutch.



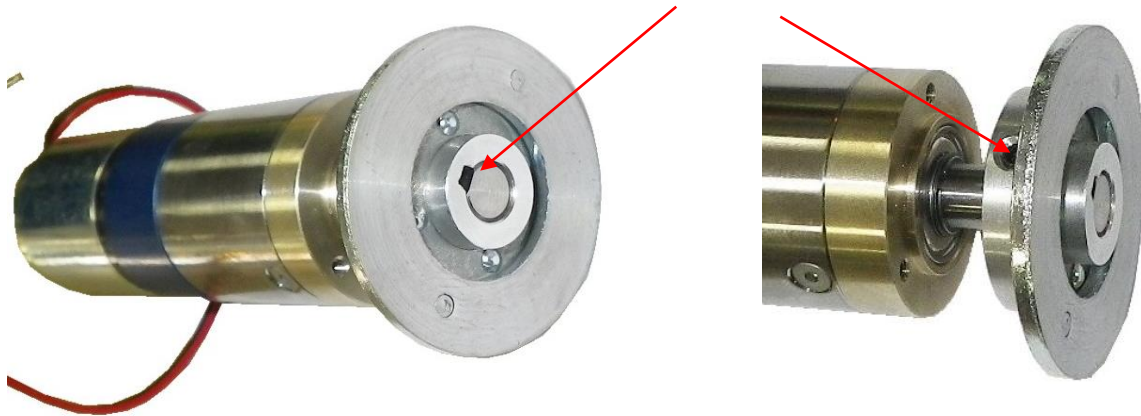
Pull motor out of motor bracket.



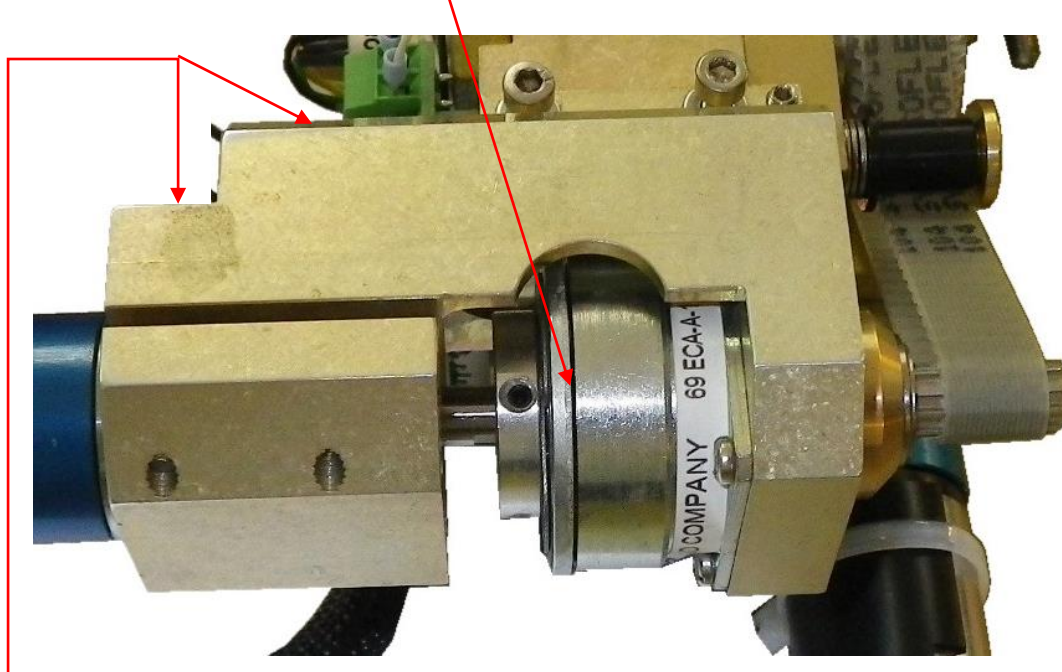
Push a new motor into the bracket, and thread magnet disc on the motor axle.



Important: To fix set screws, the notch in the disc must align with the flat area on the axle. Axle and disc position is illustrated below. The axle must not penetrate the disc completely.



Adjust motor against the clutch, as close as possible without touching it.



Tighten fixing screws on the motor bracket.
Connect wires.

**Adjustments, Lilaas LF70 azimuth control levers, standard design.
Handle and other details may vary from this principle drawing.**

