



MOTOCRANE
ULTRA

DEADLOCK
SERVICE KIT

⚠️ WARNING

To minimize risk of serious injury, death or damage, before using the MotoCrane Deadlock Service Kit, all drivers and operators must read this Operation Manual and all on-product labels.

All practices and procedures stated herein are required for the proper and safe operation of the Deadlock Service Kit.

If there are any questions, please contact MotoCrane Support at support@motocrane.com.

Keep this Operation Manual near your Deadlock Service Kit for future reference.

Safety Signal Words

This manual and the safety labels attached to this equipment utilize signal words that signify safety hazards with different levels of severity. The words are preceded by a triangle signifying that these are safety related. Below are the words used and the definitions for these words:

- **⚠️ WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury or damage
- **⚠️ CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or damage
- **NOTICE** is used to address practices not related to physical injury

The terms IMPORTANT and NOTE are also used to describe ideas for better and more efficient use of Deadlock Service Kit.

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Before using the Deadlock Service Kit

Do the following before using Deadlock Service Kit for the first time.

1. Read this Operation Manual
2. Use the ULTRA Troubleshooting Guide for determining service procedure.
3. Recommended: Attend MotoCrane Academy Technician Training + Certification.

*****PLEASE NOTE THAT EACH DEADLOCK SERVICE KIT HAS BEEN TAILORED FOR YOUR ULTRA UNIT TO MATCH YOUR FIRMWARE AND FEATURES*****

IMPORTANT PRODUCT AND SAFETY INSTRUCTIONS

Safety

MotoCrane Deadlock Service Kit is not a toy and can cause serious injury, death or damage if not used properly. You must exercise caution during use of the Deadlock Service Kit to ensure a safe filming environment for everyone. This Operation Manual describes safe operation and should be read in conjunction with the online training videos or additional in-person training.

IMPORTANT: Restricted Use Statement

Deadlock Service Kit must only be used by trained individuals 18 years of age or older. Do not exceed system ratings for Deadlock Service Kit as set forth in this Operation Manual.

Do not modify or adjust your Deadlock Service Kit modules. Each Deadlock Service Kit has been calibrated before it is shipped to you. No modification or adjustment to the Deadlock Service Kit are allowed without the express written approval of MotoCrane, LLC.

Disclaimer and Limitations of Liability

You agree that you are responsible for your own conduct and any content created while using the Deadlock Service Kit, and for any consequences thereof. You agree to use this product only for purposes that are proper and in accordance with local laws, regulations or other legal requirements.

You also agree:

1. Any part of this disclaimer is subject to change without prior notice. Refer to www.motocrane.com/support for the latest version.
2. MotoCrane, LLC reserves the right of final interpretation of this disclaimer.
3. MotoCrane, LLC has no control over the use, setup, assembly, modification or misuse of Deadlock Service Kit, and therefore no liability shall be assumed or accepted by MotoCrane, LLC for any resulting damage, death, or injury incurred

directly or indirectly from the use of the Deadlock Service Kit. By the act of use, setup or assembly, the user accepts all resulting liability.

Limited Warranty

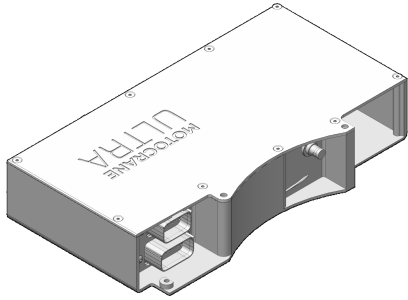
Deadlock Service Kit has a limited manufacturer's warranty on parts and assembly. See the Terms and Conditions of Sale for your Deadlock Service Kit for a complete description of this limited warranty. This Limited Warranty is incorporated by reference into this Operation Manual.

Intellectual Property

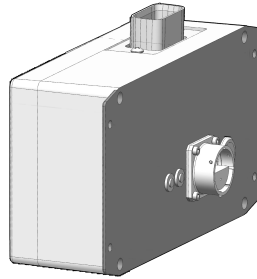
MotoCrane™, Deadlock Service Kit, and  **MOTOCRANE** are trademarks of MotoCrane, LLC. You may not use the trademarks of MotoCrane, LLC without express written permission. All rights reserved.

Parts of Deadlock Service Kit

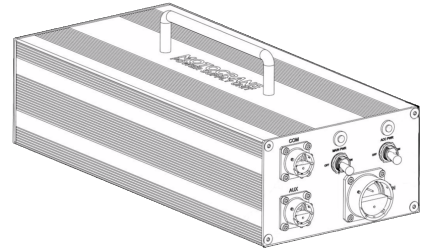
x1 Base Driver Unit (BDU)



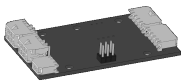
x1 Lift Driver Unit (LDU)



x1 Power Supply Unit (PSU)



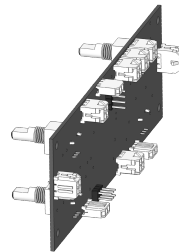
x1 Swing Encoder Board



x1 Lift Encoder Board



x1 Controller Board



x1 Joystick



x1 5-Piece Spare Cable Set

10ft COM

12ft MAIN

1.5ft MAIN

10ft PWR Input

SB50 leads



2pcs Isolator Hydraulic Dampers



Tools included:

- Metric Hex Key Set
- 6mm Ball-nose T-handle (for * Turret bolt)
- 6mm stubby L-key (for * Turret bolt)
- Flat-blade screwdriver (can be useful for removing connectors)
- Small flat-blade screwdriver (for removing Controller knobs)
- Adjustable wrench (for LDU nuts)
- Plastic wrench (for Pot nuts)
- Blue Threadlocker
- Zip ties

Using the Deadlock Service Kit

The Deadlock Service Kit contains the components/modules required for performing various service procedures on your MotoCrane ULTRA. In addition to this manual, you've also received the ULTRA Troubleshooting Guide, which should first be used for diagnosis and determining which service procedure should be performed based on symptoms of failure/malfunction. In the following section, each service procedure is explained in detail.

Service Procedures

- BDU Replacement
- LDU Replacement
- Swing Encoder Board Replacement
- Lift Encoder Board Replacement
- Joystick Replacement
- Controller Board Replacement

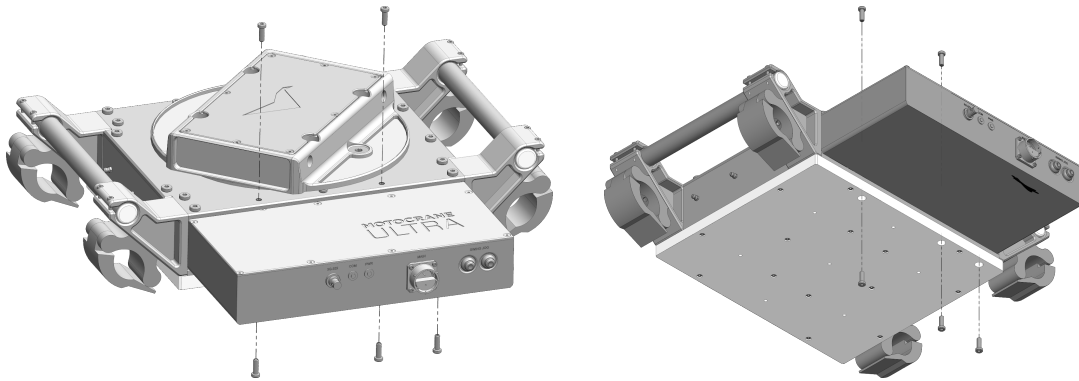
Service Procedure: BDU Replacement

Time Required: 20 minutes

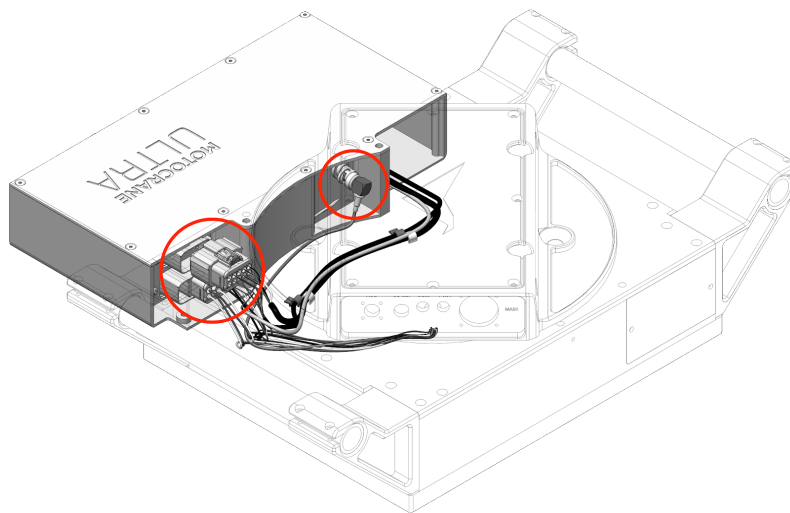
Tools Required: 4mm Hex Driver

Summary: The Base Driver Unit, or BDU, contains all associated driver components for the Swing, namely the Swing Motor Controller board. It also contains 3G-SDI pass through, and transfers PWR + COM through the to ULTRA turret for the Lift Axis. Failure of the BDU usually results in the Swing axis becoming inoperable.

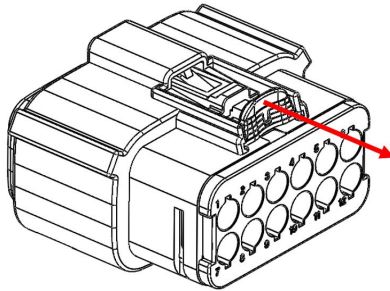
Step 1) Remove the 5 M6 fasteners securing the BDU



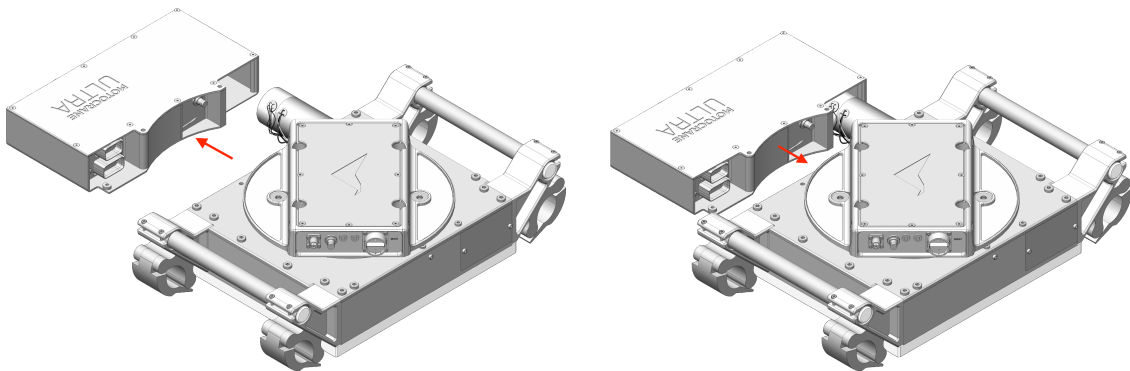
Step 2) Pull the BDU 3-4 inches away from the ULTRA Base, Remove the BNC connector, Motor Connector, and Slip Ring connector. Be careful not to damage any wires during removal of the connectors.



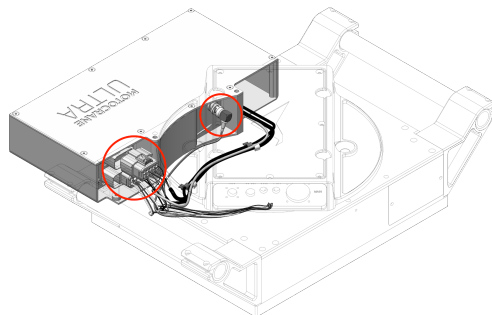
NOTE: Motor and Slip Ring Connectors have a white locking tab, which needs to be pulled back before removal is possible.



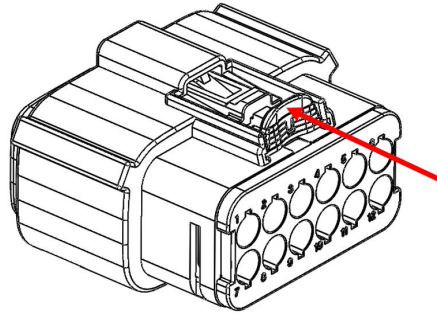
Step 3) Remove the BDU completely, and replace with new unit



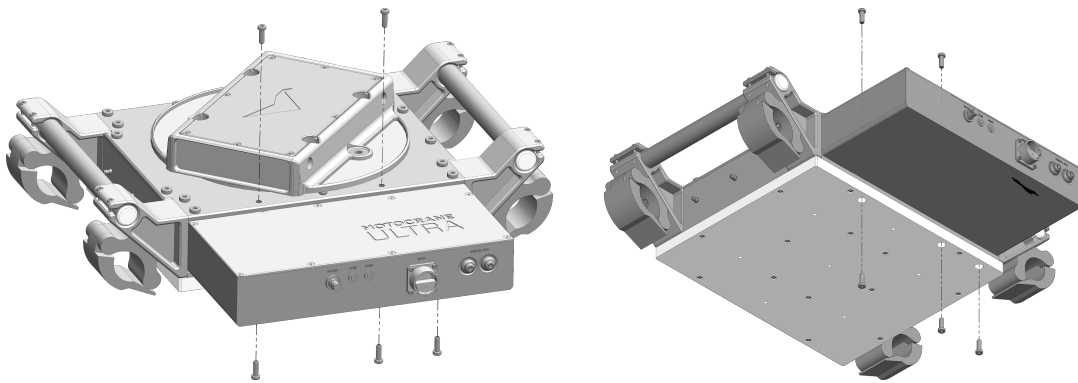
Step 4) Re-connect the BNC connector, Motor Connector, and Slip Ring connector. Be careful not to damage any wires during removal of the connectors.



NOTE: Motor and Slip Ring Connectors have a white locking tab, which should be pushed back in after the connector is reinstalled.



Step 5) Push the BDU into the ULTRA Base, and replace the 5 M6 fasteners after adding a small amount of Loctite to the fasteners.



Service Procedure: LDU Replacement

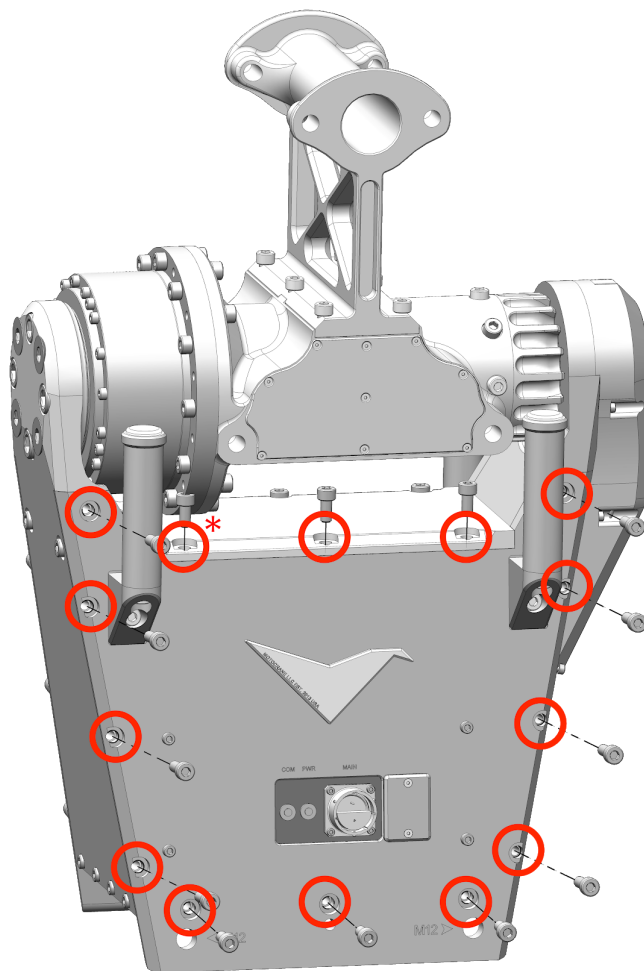
Time Required: 20 minutes

Tools Required: 4mm and 6mm Hex Driver, 10mm Socket or Wrench, Torque Wrench

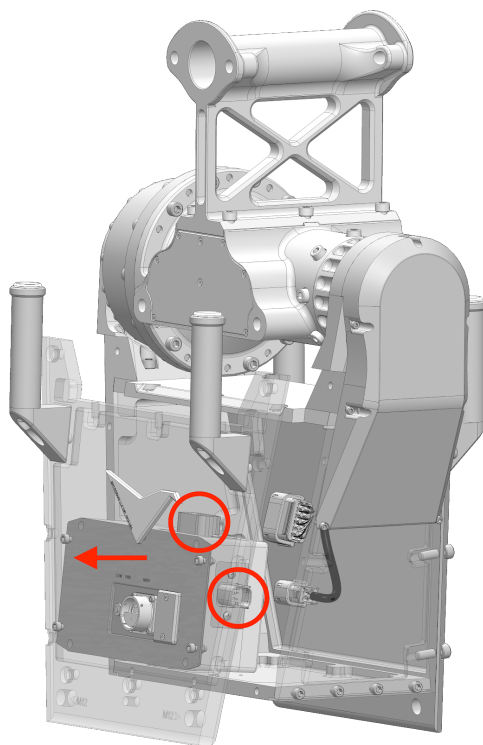
Summary: The Lift Driver Unit, or LDU, contains all associated driver components for the Lift axis, namely the Lift Motor Controller Board (Central). It also contains an Emergency Lift-axis Brake Deactivation switch. Failure of this module usually results in the Lift axis becoming inoperable.

Step 1) Remove the 14x M8 fasteners securing the Rear Turret plate to the Turret.

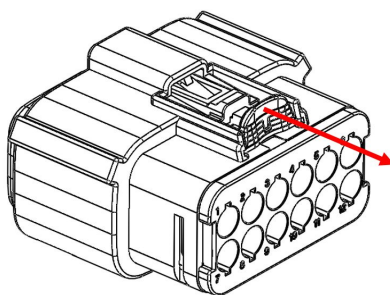
***Remove with ball-nose T-handle or Torque Wrench**



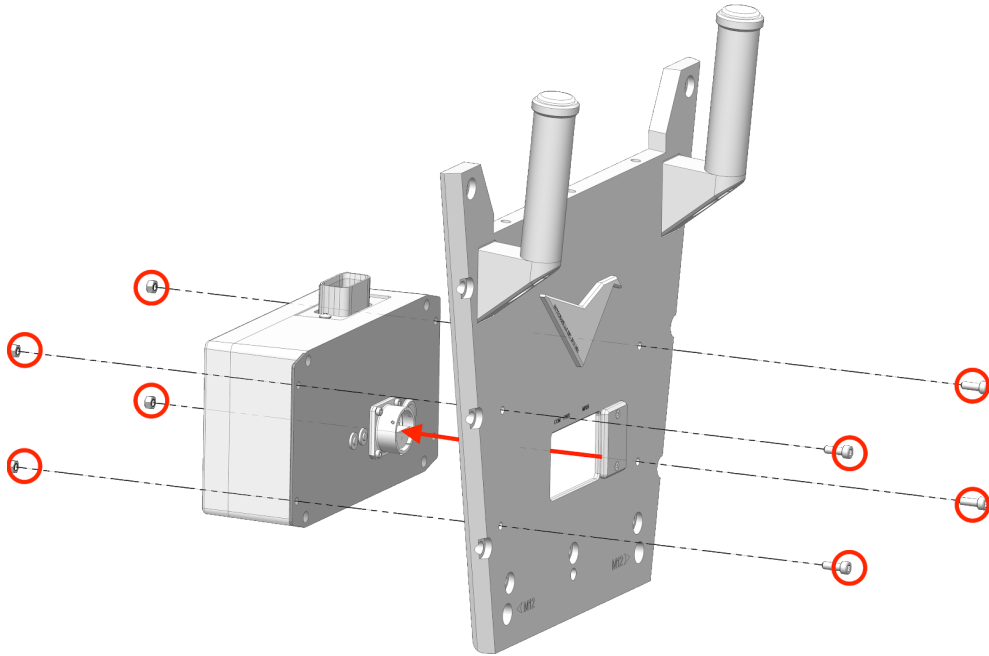
Step 2) Carefully pull the Rear Turret Plate away from the Turret, and disconnect the cables from the LDU.



NOTE: These connectors have a white locking tab, which needs to be pulled back before removal is possible.

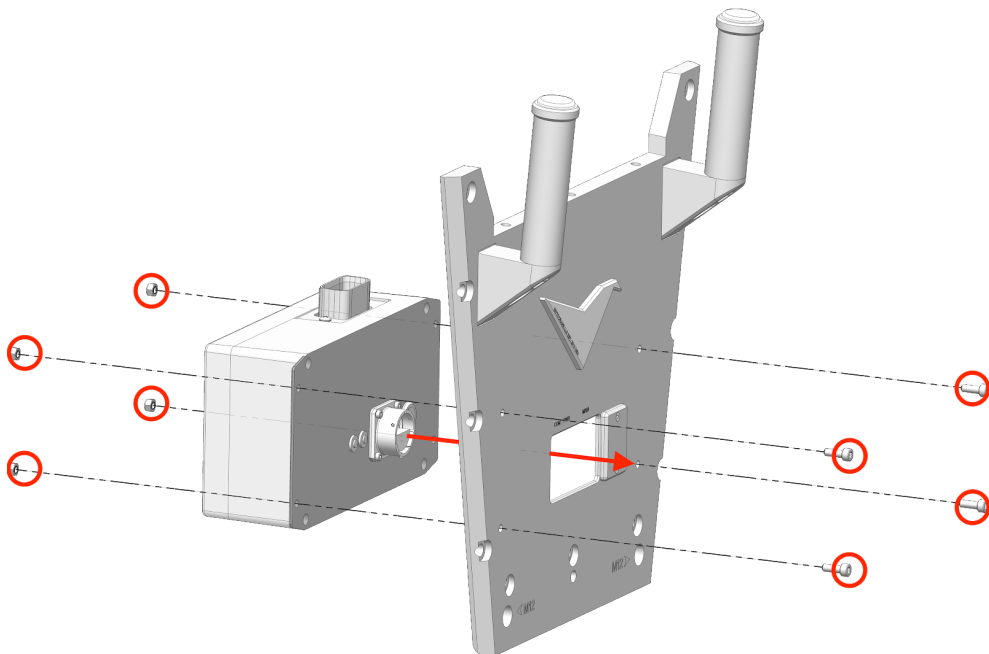


Step 3) Remove the 4x M6 fasteners securing the LDU to the Rear Turret Plate, using a wrench on the interior nuts to keep them from spinning freely.

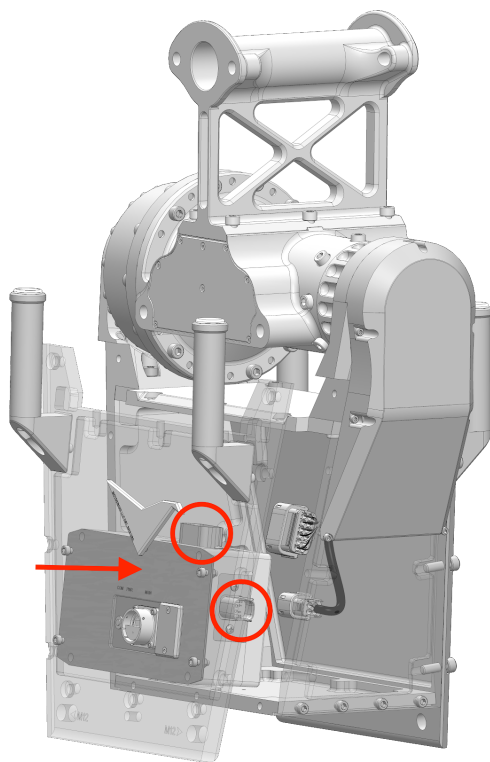


NOTE: If replacing LDU Board, complete "LDU Remove & Replace" in [Appendix A](#)

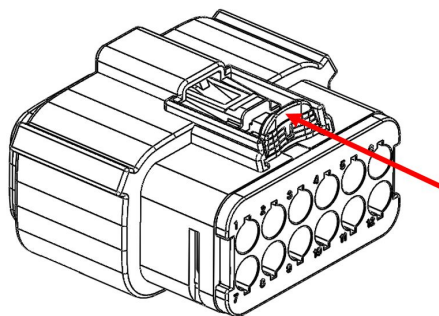
Step 4) Replace the LDU and secure to the Rear Turret Plate using the previously removed fasteners.



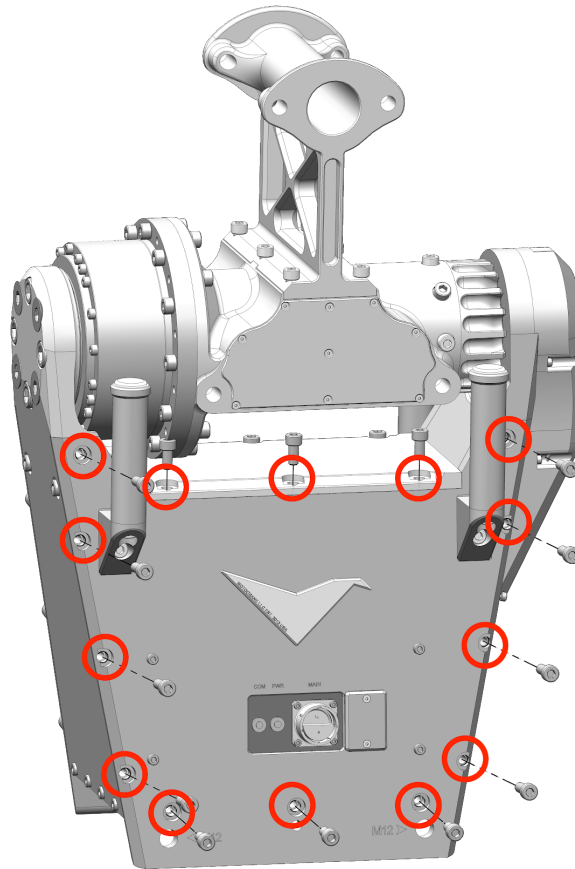
Step 5) Bring the Rear Turret plate close the Turret, and re-connect the two cables to the LDU.



NOTE: Connectors have a white locking tab, which should be pushed back in after the connector is reinstalled.



Step 6) Apply blue threadlocker, and *loosely* install the previously removed 14x M8 fasteners securing the Rear Turret Plate to the Turret. After the all 14x M8 fasteners have been threaded, torque each down to 22Nm.



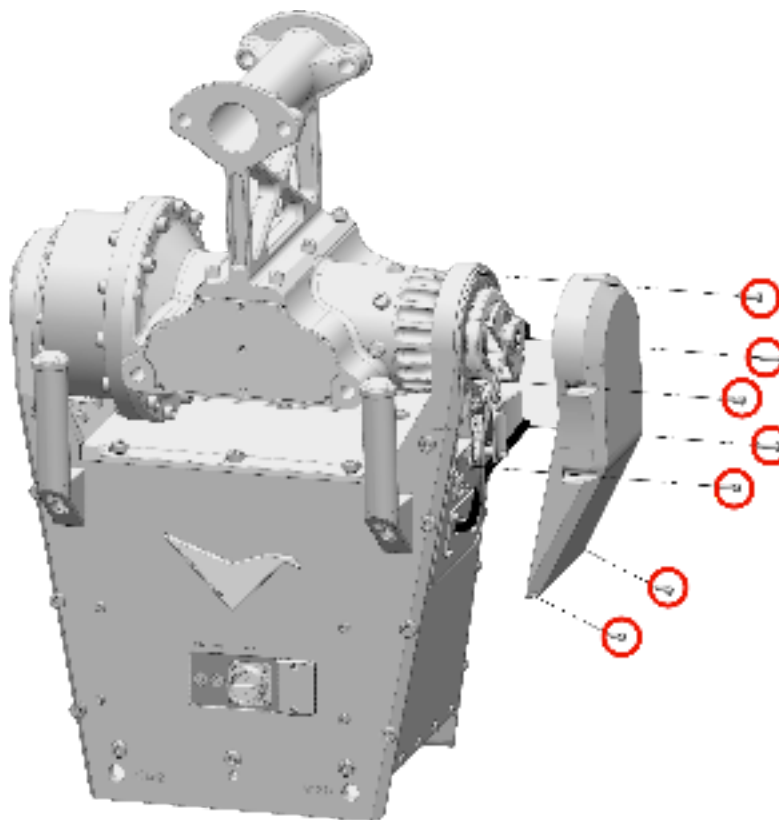
Service Procedure: Lift Encoder Board Replacement

Time Required: 20 minutes

Tools Required: 4mm Hex Driver

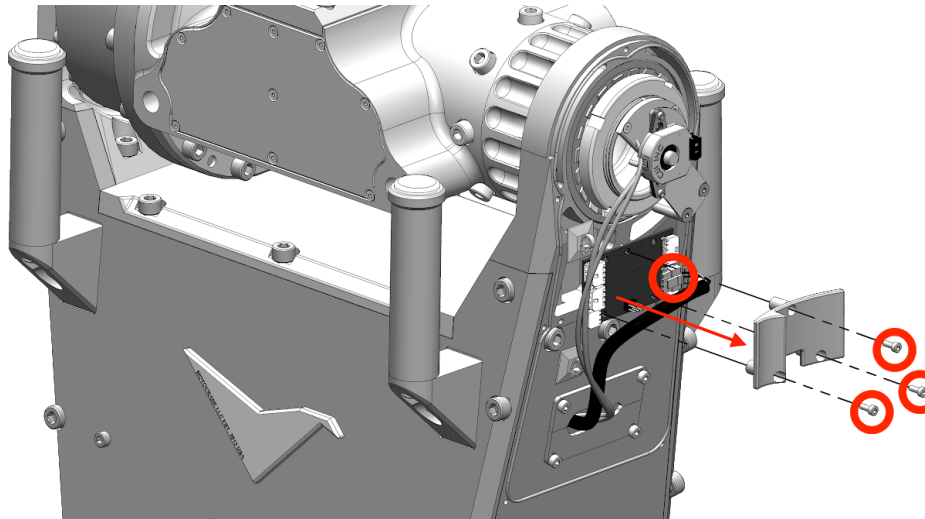
Summary: The Lift Encoder Board is responsible for reading Lift-axis angle/position from the lift-axis absolute encoder. Failure of this module can result in non-functioning Lift-limits.

Step 1) Remove the 7x M4 fasteners securing the Lift Encoder Cover, and carefully remove the Lift Encoder Cover from the Turret. Take care to preserve and avoid damage to the o-ring gasket around the cover.

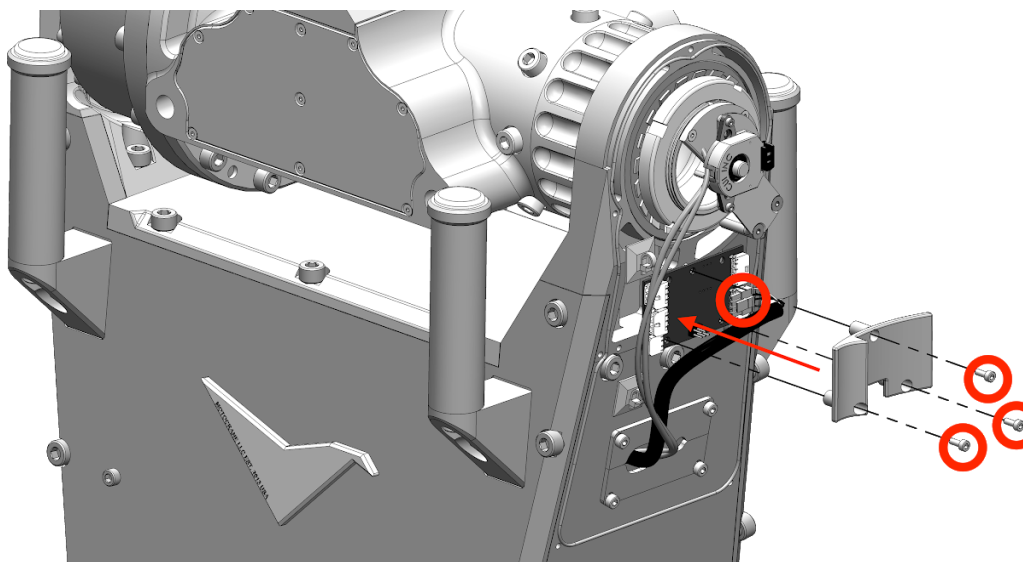


Step 2) Carefully cut the zip tie securing the wires to the Encoder Board Shield, then remove the 3x M4 fasteners securing the Encoder Board Shield

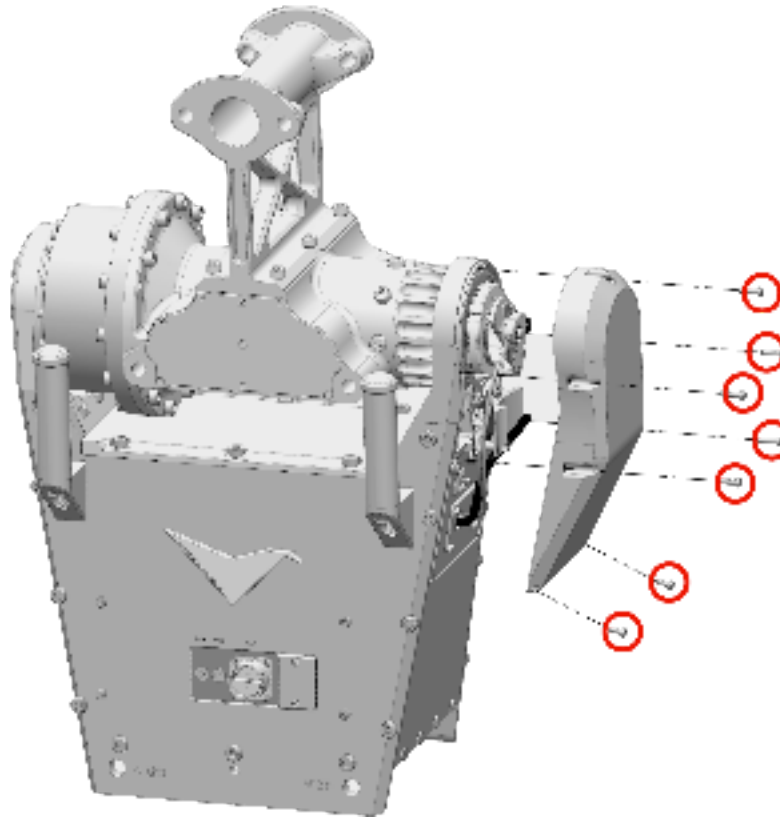
Step 3) Unplug the CAN IN and CUI_1 cables connected to the Lift Encoder Board, and remove the Lift Encoder Board.



Step 5) Plug the CAN IN and CUI_1 cables back in to the new Lift Encoder board, and reinstall the Encoder Board Shield using the previously installed 3x M4 fasteners. Add a small amount of blue Loctite is added before installing the fasteners Re-secure the wires to the Encoder Board Shield using a new zip tie, trimming any excess length.



Step 6) Position the Lift Encoder Cover onto Turret, making sure the gasket is properly seated against the Turret, then re-install the previously removed 7x M4 fasteners. Make sure that a small amount of blue threadlocker is applied to the threads before re-installation.



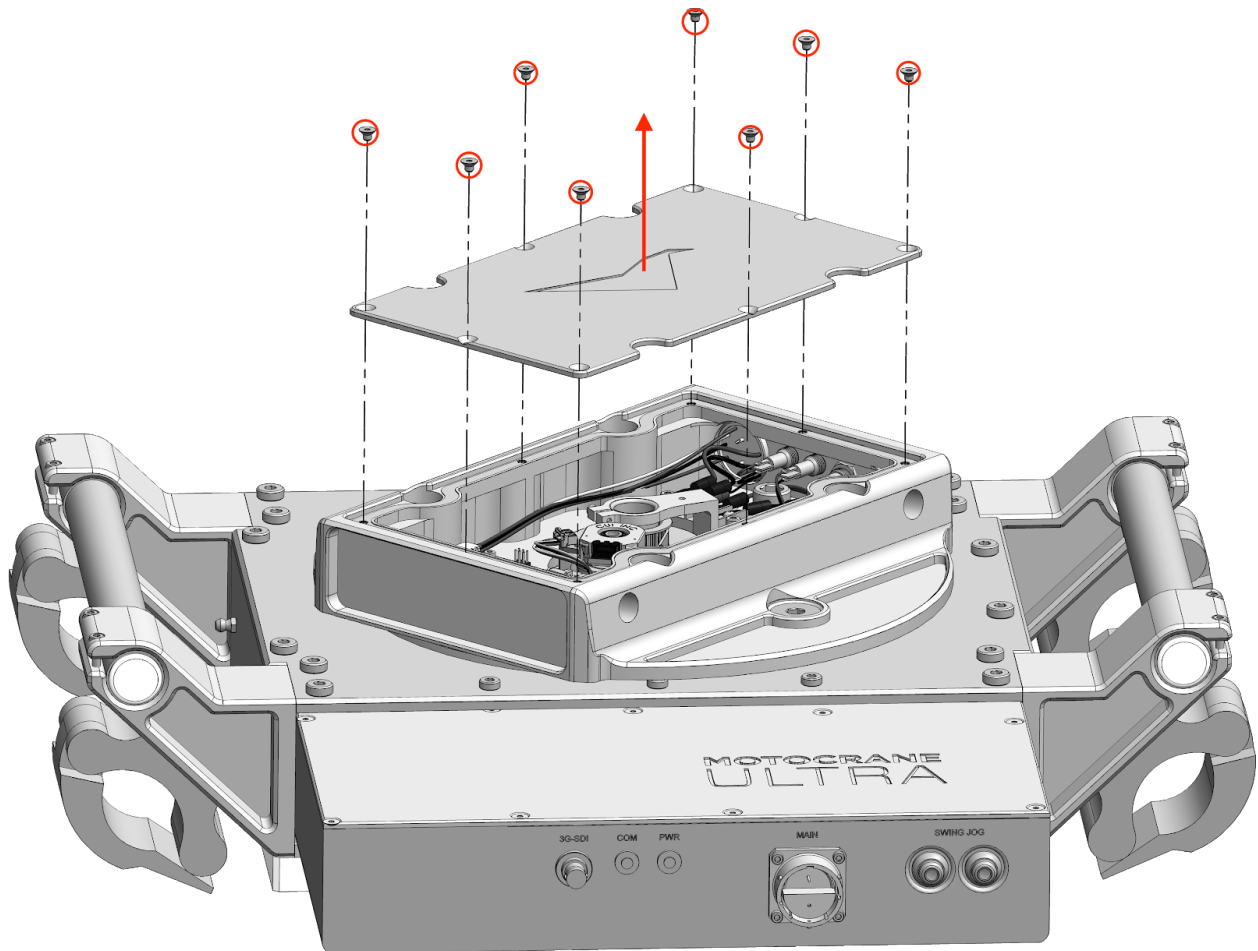
Service Procedure: Swing Encoder Board Replacement

Time Required: 20 minutes

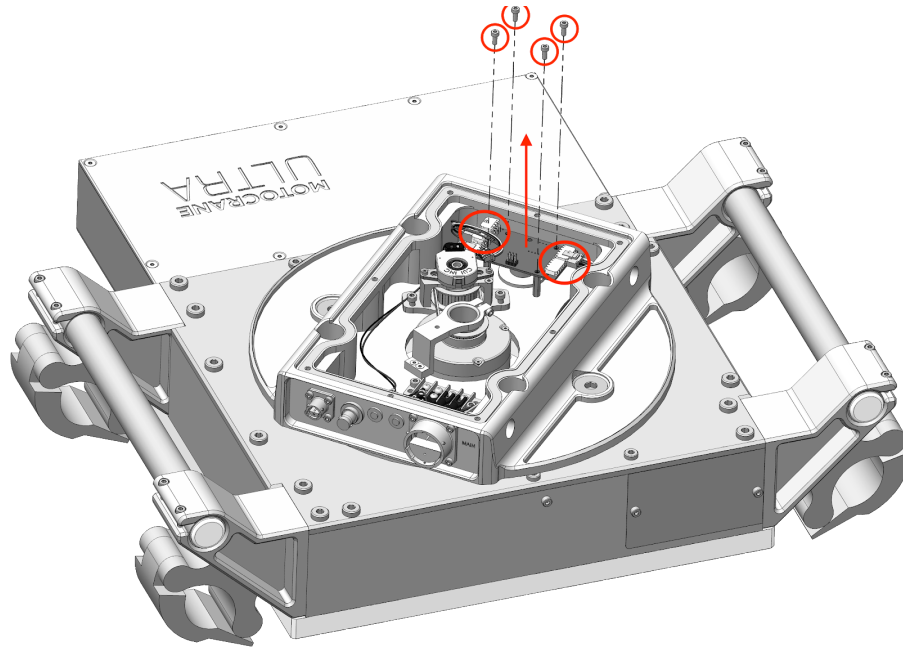
Tools Required: 4mm Hex Driver

Summary: The Swing Encoder Board is responsible for reading Swing-axis angle/position from the swing-axis absolute encoder. Failure of this module can result in non-functioning Swing limits.

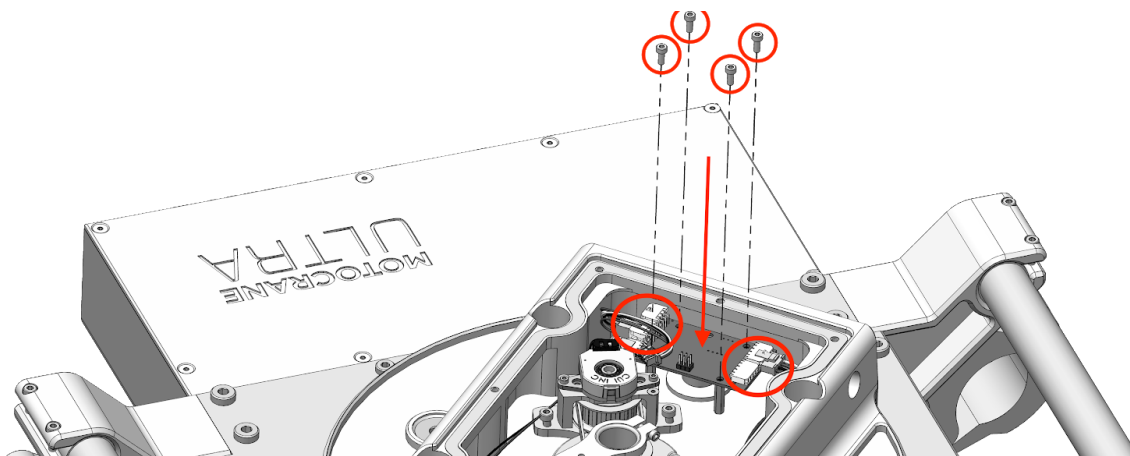
Step 1) Remove the 8x fasteners securing the Pedestal Cover, and remove the Pedestal plate cover, making sure no debris enters the Swing Axis encoder area, especially the belt.



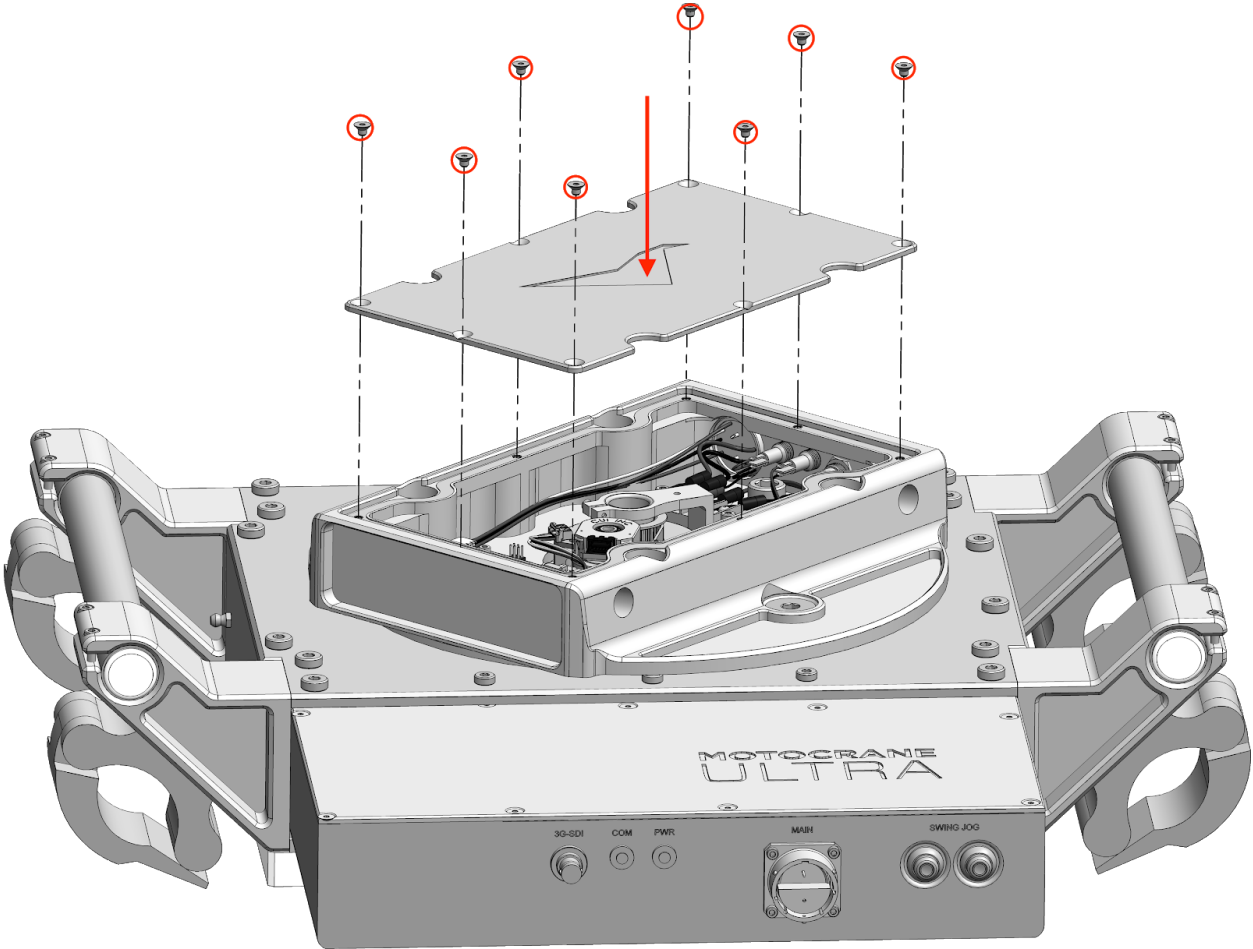
Step 2) Within the Pedestal, opposite the connector bulkhead area, remove the 4x M3 fasteners securing the Swing Encoder Board, and carefully remove the connectors from the Swing Encoder Board, noting where each connector is plugged in. Be careful not to damage any wires.



Step 3) Reconnect the cables to the new Swing Encoder Board, and position it over the 4x brass standoffs, and replace the 4x M3 fasteners. Add a small amount of blue Loctite is added before installing the fasteners. DO NOT OVERTIGHTEN!



Step 4) Place the Pedestal Cover onto the Pedestal, being careful to re-align the gasket within the channel. Secure the Pedestal cover using the previously replaced M4 fasteners, applying a small amount of blue threadlocker to each before installing.



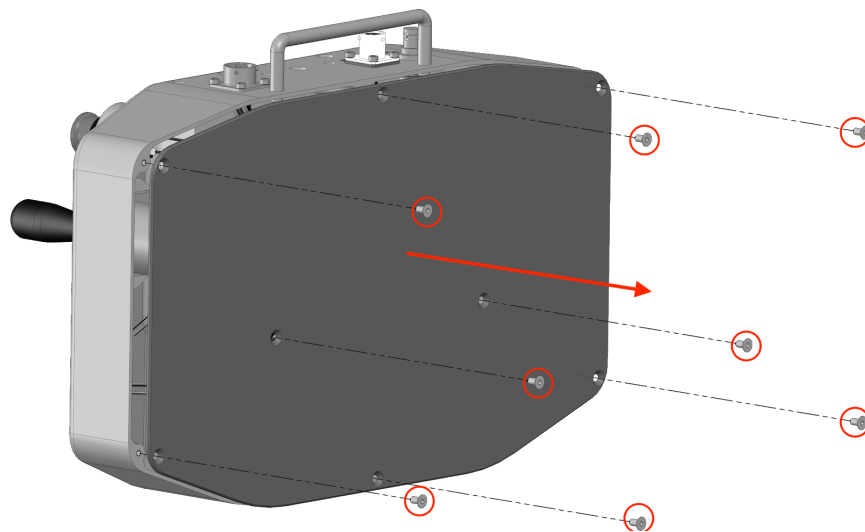
Service Procedure: Joystick Replacement

Time Required: 20 minutes

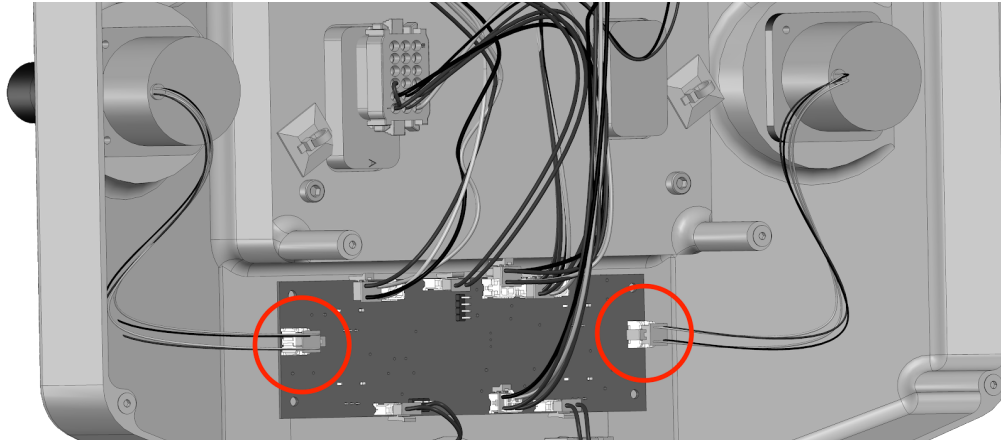
Tools Required: 4mm Hex Driver

Summary: The joysticks are responsible for communicating desired motor command to the Controller board. Failure of either joystick can result in an inoperable Swing or Lift, usually signaled by a Joystick Initialization Failure.

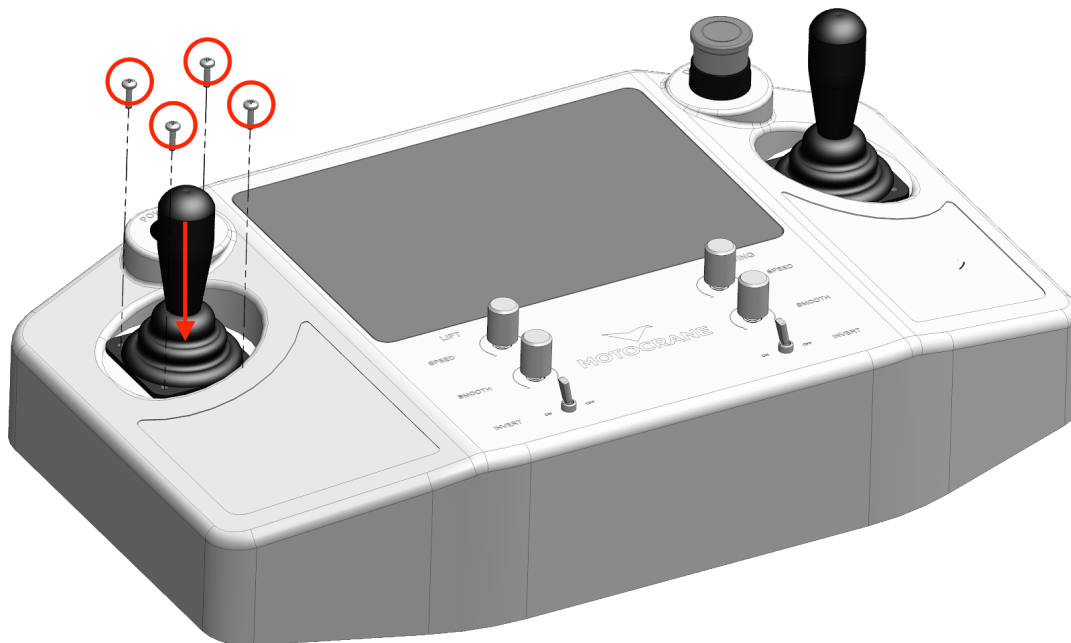
Step 1) Remove the 8x M4 fasteners securing the Controller Back Panel.



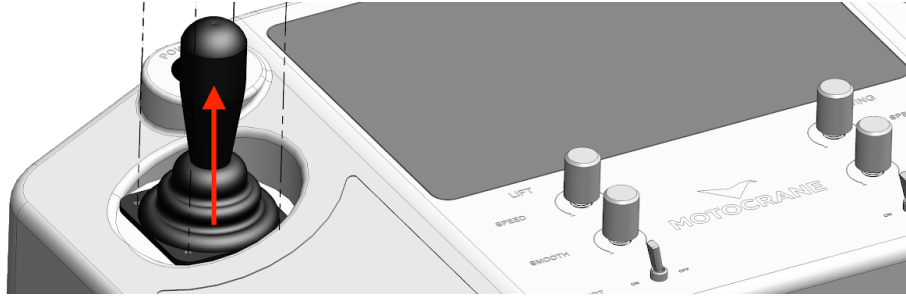
Step 2) Remove the connector of the failed Joystick from the Controller board (ignore the PCB labels)



Step 3) Remove the 4x M4 fasteners from the Joystick mounting plate, and pull the mounting plate over the rubber Joystick boot. Pull the Joystick through the back of the Controller.

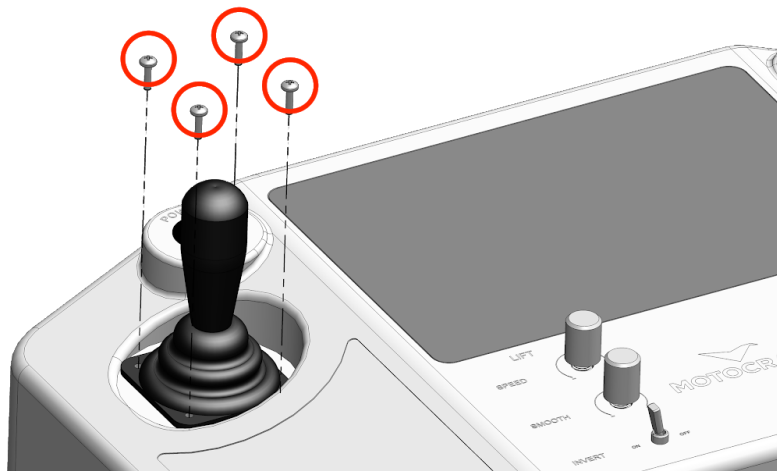


Step 4) Install the new Joystick through the back of the Controller, and slide the mounting plate over the rubber Controller boot.

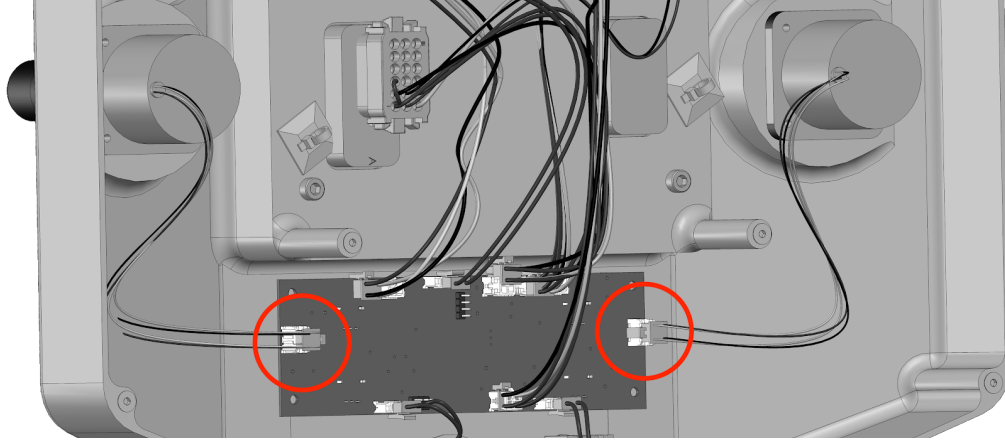


CONFIRM YOUR JOYSTICK IS PROPERLY ALIGNED WITH ITS AXIS.
Lift Joystick should move UP/DOWN, Swing Joystick should move LEFT/RIGHT.

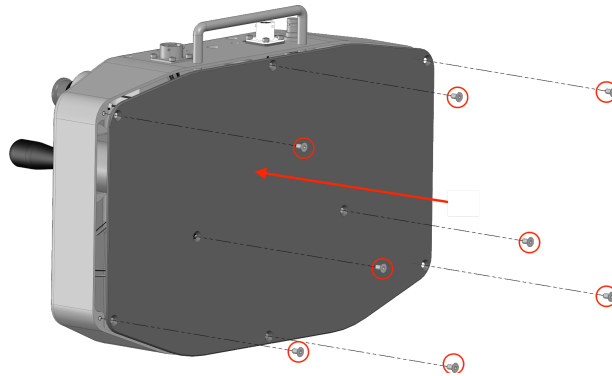
Step 4 cont.) Re-install the 4x M4 fasteners through the mounting plate to secure the Joystick.



Step 8) Re-connect the Joystick connector to the Controller Board.



Step 9) Replace the Controller Back Panel, and re-install the previously removed 8x M4 fasteners after applying a small amount of blue threadlocker to each fastener.



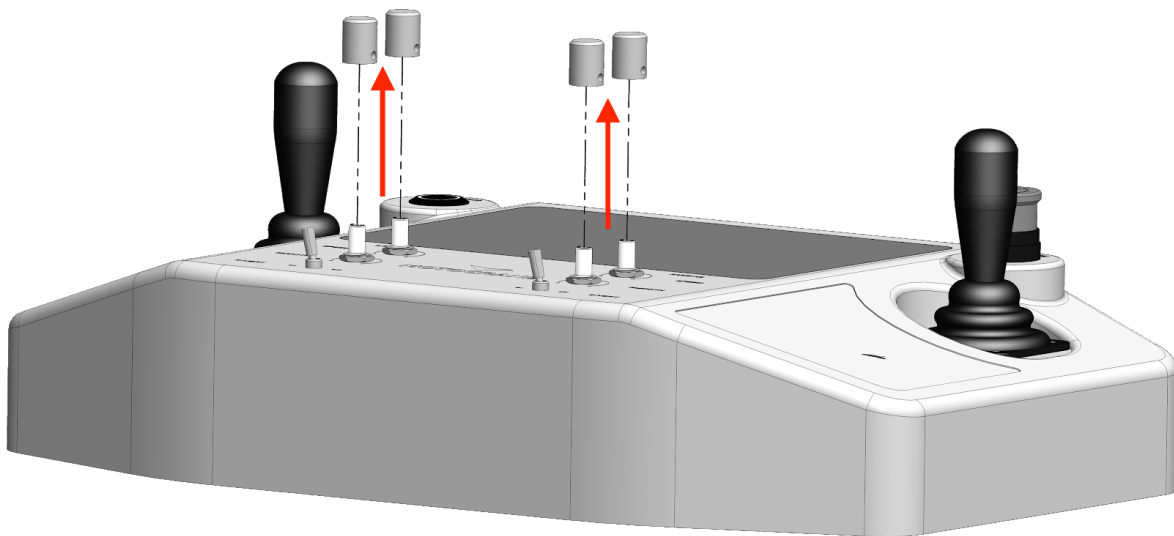
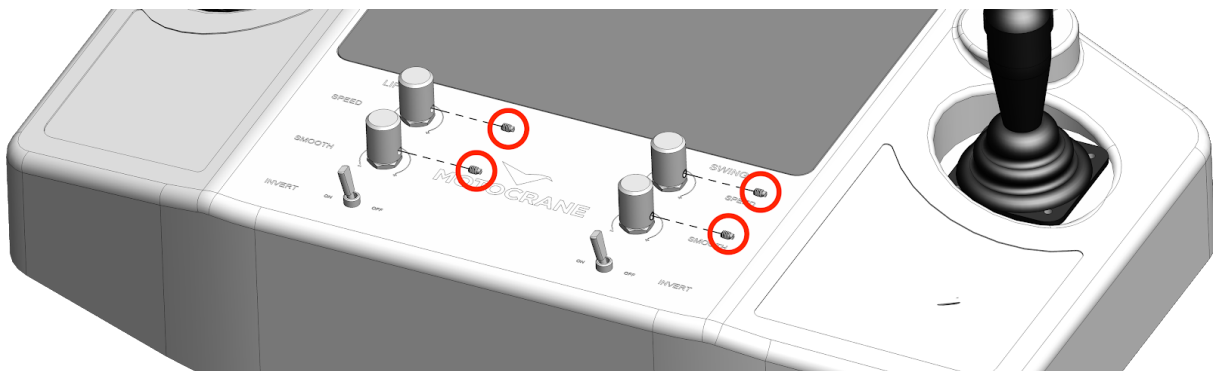
Service Procedure: Controller Board Replacement

Time Required: 20 minutes

Tools Required: 1.5mm Hex Driver, 10m socket, or 10mm wrench or adjustable wrench

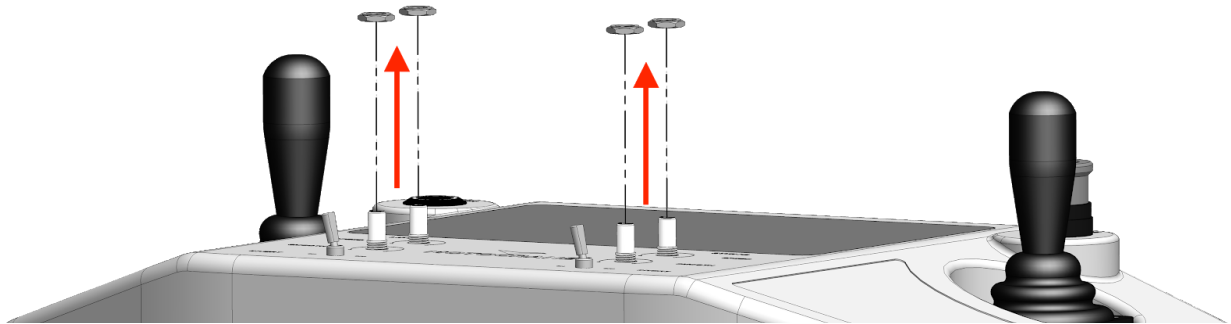
Summary: The Controller Board is responsible for receiving signals from the various interfaces on the Controller like the Joystick and Switches. Failure of this board can lead to an inoperable system and is usually signaled by a 'Controller Heartbeat Timeout' Error.

Step 1) Loosen the small set screws on the Speed and Smoothing knobs of the controller. Once loose they can be removed by pulling straight up.

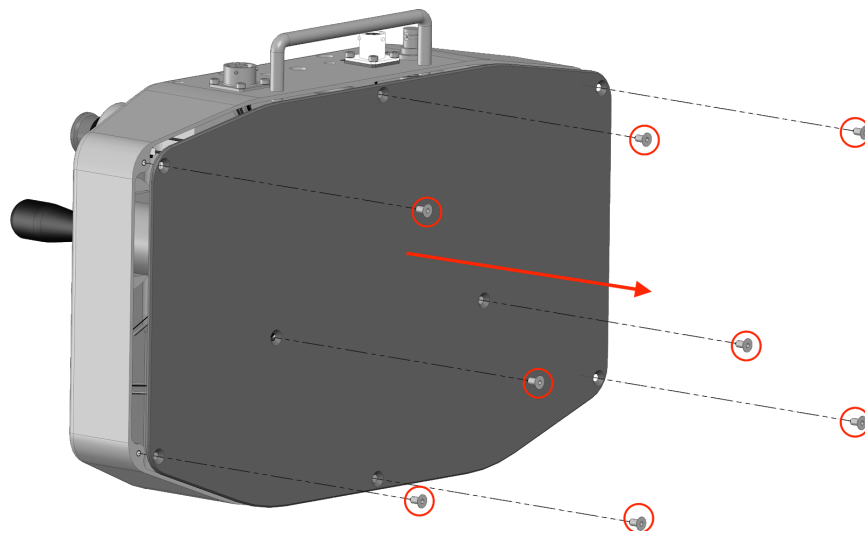


Step 2) Once the knobs are removed, carefully remove the thin nuts securing the Speed, Smooth and Invert switches.

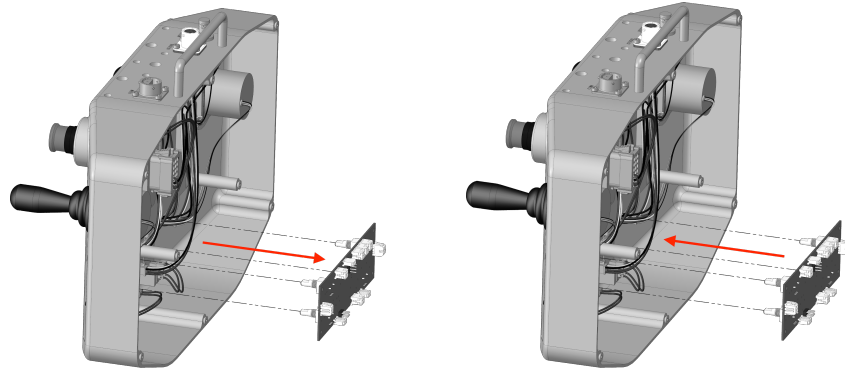
APPLY TAPE OVER TOOLS TO PREVENT SCRATCHING THE CONTROLLER HOUSING



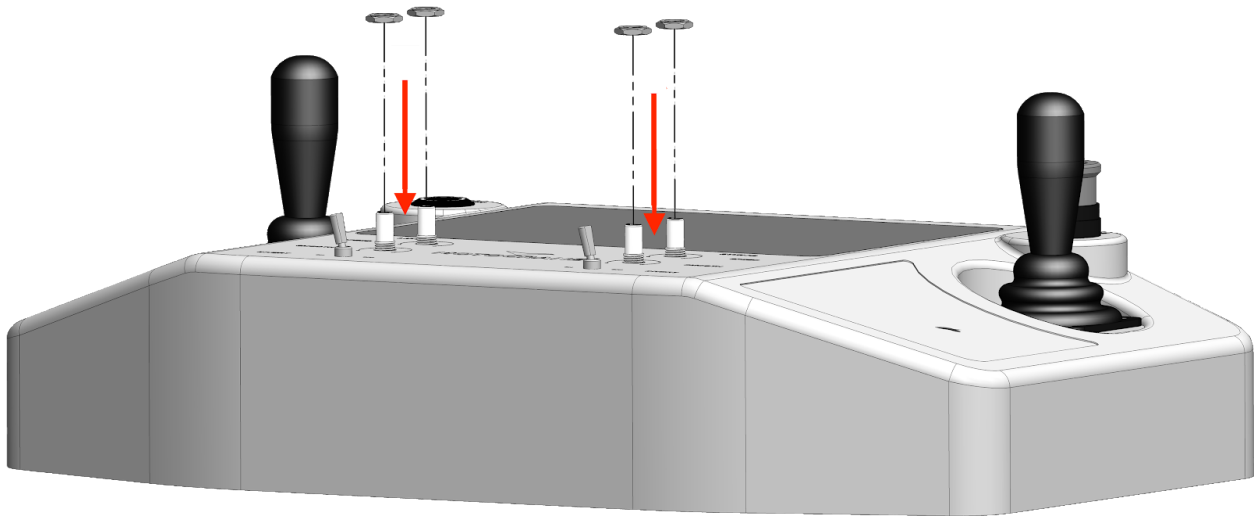
Step 3) Remove the 8x M4 fasteners securing the Controller Back Panel.



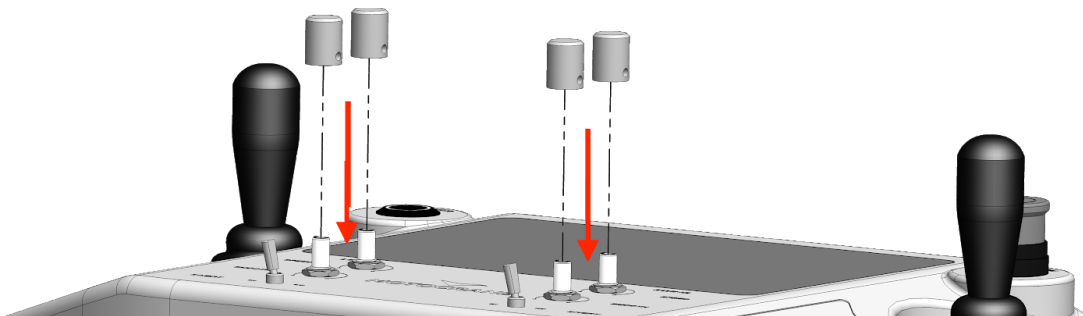
Step 4) Make note of how connectors are plugged into the Controller Board, then remove the connectors. Replace the Controller Board, and re-install the connectors.

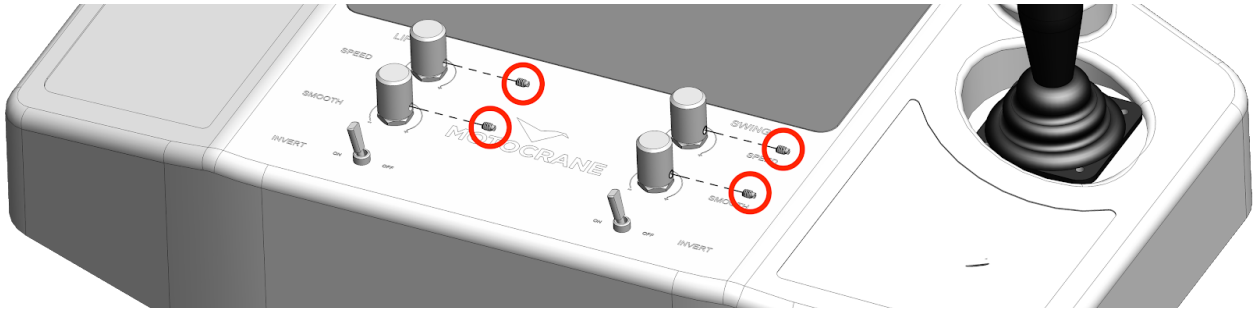


Step 5) With the Controller board re-positioned in its original location, carefully re-install the thin nuts onto the Speed, Smooth and Invert switches.

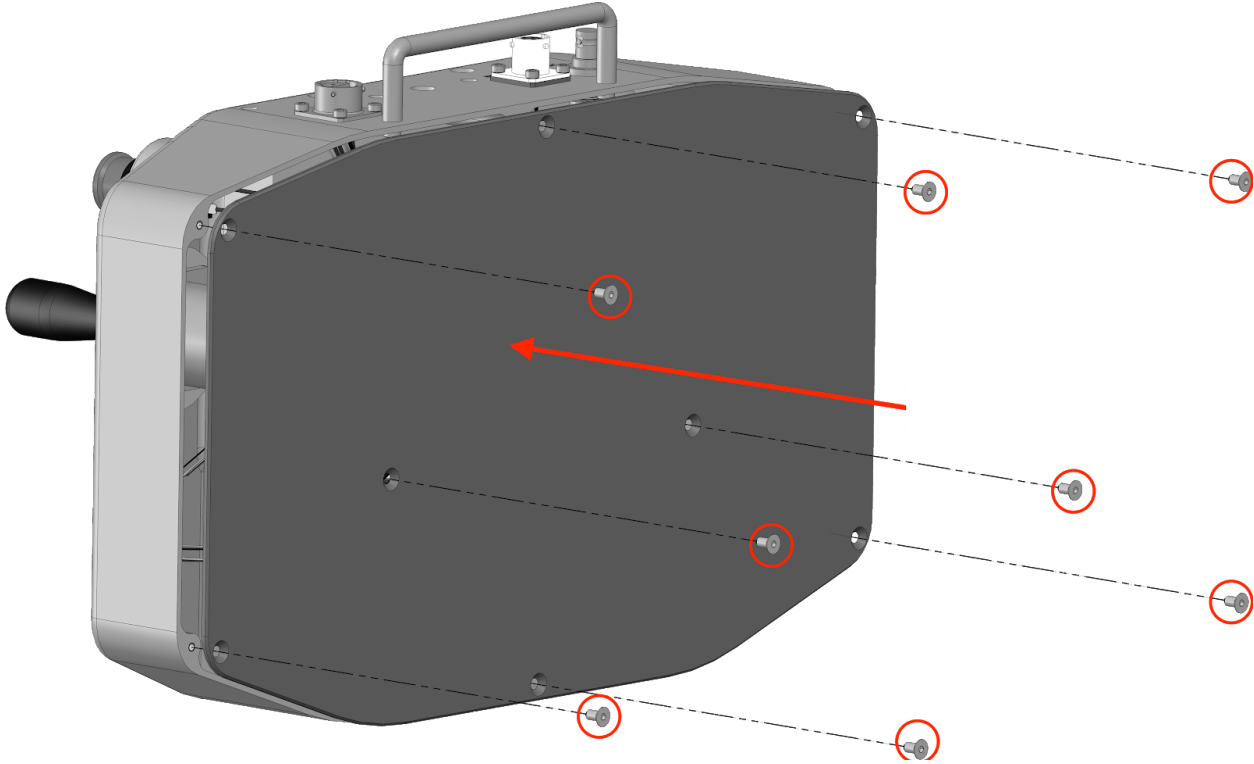


Step 6) Place the Black knobs over the Speed, Smooth adjusters making sure the set screw hole is aligned with the flat spot of the "D" shaft on the adjusters. Then, re-install the set screws to secure the knobs.





Step 7) Replace the Controller Back Panel, and re-install the previously removed 8x M4 fasteners after applying a small amount of blue threadlocker to each fastener.



Known Hazards

⚠ WARNING The following list represents a list of known hazards that exist when using the Deadlock Service Kit. This is not exhaustive, but represents some common hazards to watch out for.

- Damaging of wires during BDU installation. Confirm wires are located within wiring channel before fastening BDU.
- Connectors not properly seated on BDU. Make sure connectors are fully seated.
- Stripping threads on Rear Turret Plate install, make sure all fasteners are loosely threaded before applying torque to any single fastener.
- Over-tightening nuts on Controller Board. Do not apply excess torque to fasten the new Controller Board to the Controller Housing.

Transporting Deadlock Service Kit

The Deadlock Service Kit does not contain any hazardous materials and is safe for transport by air cargo and passenger aircraft.

Troubleshooting

The ULTRA Troubleshooting Guide should be used in conjunction with this manual to identify which service procedure is required for fixing a system failure.

Maintenance

Refer to ULTRA Operation Manual for system maintenance.

Weather & Water

BDU - IP65

LDU - IP65

PSU - Not weather rated

Spare Cables- IP68

Swing and Lift Encoder Boards- Not weather rated

Joystick- Not weather rated.

Appendix A

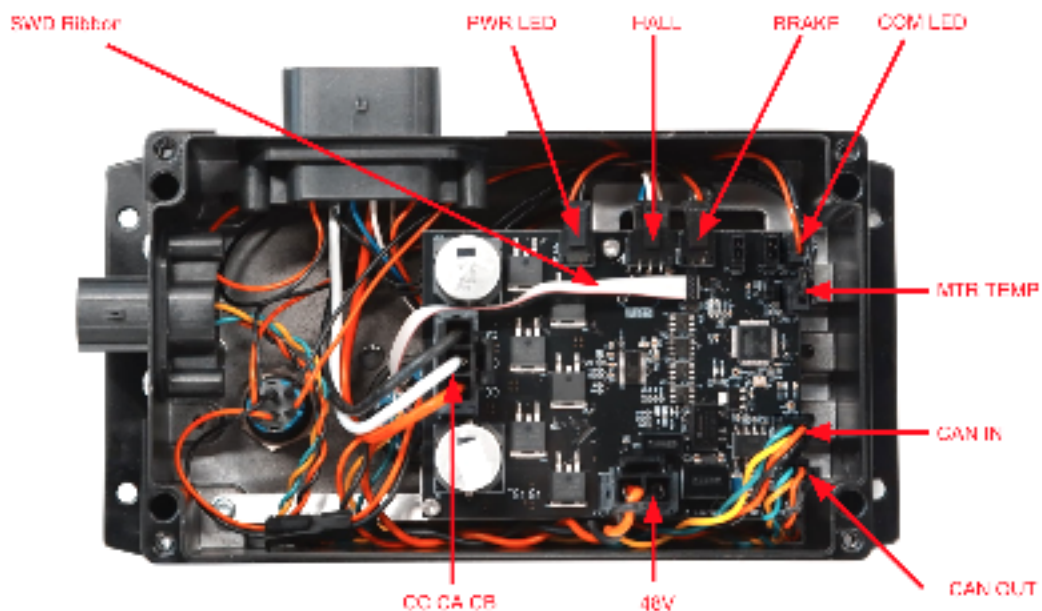
Removal and replacement of LDU Board

In the event that the LDU Board contained within your LDU must be replaced, please follow the procedure below.

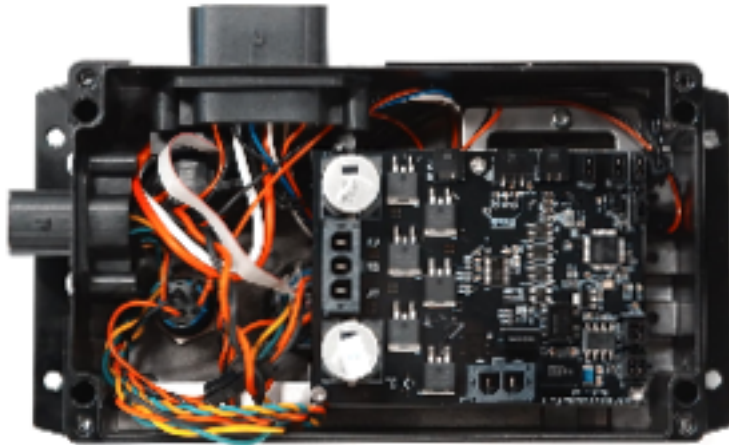
- 1 - Follow pages 12-14 of this DSK Operation Manual, for removal of the Lift Driver Unit (LDU)
- 2 - With the LDU removed from the ULTRA Turret, remove the 4 screws from the LDU cover.



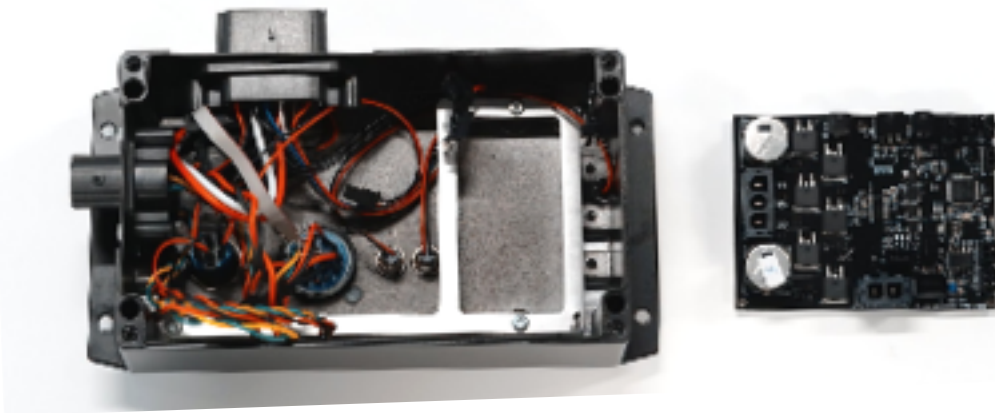
- 3 - Remove the cover, then *LABEL EACH CONNECTOR* as designated below for clarity when installing the new board. Be careful to not pull or snag the wires during labeling.



4 - After each has been properly labeled, carefully remove the connectors from the LDU Board.



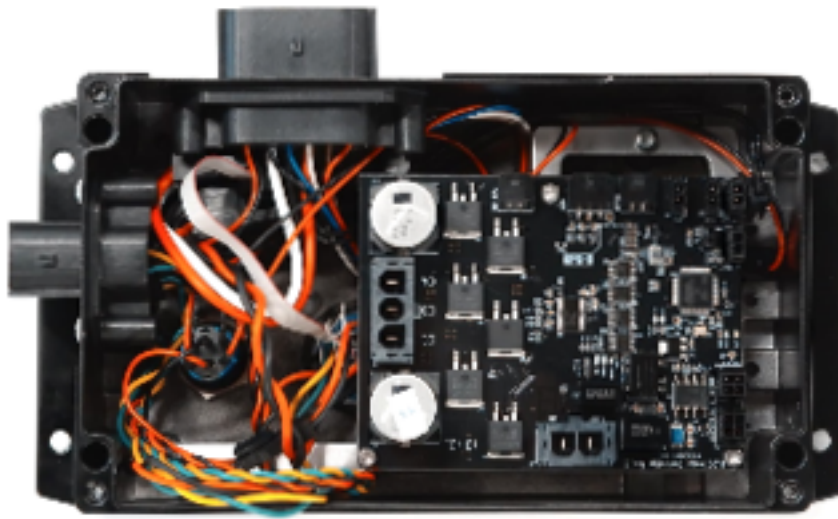
5 - Remove 3x M3 screws (2.5mm hex) and remove LDU Board



6 - Remove conduction plate from old LDU Board and install on new Board.
**NOTE: Remove this carefully and try to avoid damaging the thermal pad.



7 - Place new LDU Board w/ conduction plate into the LDU and install in reverse order of removal steps.



8 - Follow pages 14-16 of this DSK Operation Manual for installation of the LDU back into the ULTRA Turret.

Revision History

Revision	Date	Description
1.0	November, 2019	Initial Release
1.1	November, 2020	Added notes for LDU Board R&R to Appendix A

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