



**MOTOCRANE**  
**ULTRA**  
**XP**

ULTRA XP Operation Manual v1.4  
FEB 2023



## **WARNING**

To minimize risk of serious injury, death or damage, before using MotoCrane ULTRA, 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 ULTRA.

If there are any questions, please contact MotoCrane Support at [support@motocrane.com](mailto:support@motocrane.com).

Keep this Operation Manual near your ULTRA 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 ULTRA.

# Contents

Safety Signal Words	3
Contents	4
Before the First Use	5
<b>IMPORTANT PRODUCT AND SAFETY INSTRUCTIONS</b>	<b>6</b>
Safety	6
IMPORTANT: Restricted Use Statement	6
Disclaimer and Limitations of Liability	7
Limited Warranty	7
Intellectual Property	7
<b>Parts of ULTRA</b>	<b>8</b>
System Overview	9
Modules	10
<b>Setting up ULTRA</b>	<b>17</b>
ULTRA Setup at a Glance	17
Setup Process	18
Motor Vehicle Requirements	18
Suction Speedrail Grid (SSG) Kit Setup	19
ULTRA Base Setup	20
(XP Base Only)	20
ULTRA Turret Setup	20
(XP Base Only)	21
ULTRA Boom + Isolator Setup	22
ULTRA Isolator Tuning	24
MotoCrane Power Supply Unit (PSU) Setup	25
MotoCrane Controller Setup	26
MotoCrane Controller	28
Controller Interface	29
Using ACC PWR, ACC PWR2 and ACC COM	34
ACC PWR, ACC PWR2 and ACC COM specifications	35
Known Hazards	36
Terminology	37
Pre-Flight Checklist	38
Transporting ULTRA	39
<b>Troubleshooting and Maintenance</b>	<b>40</b>
Troubleshooting	40
Maintenance	40
Weather & Water	41
Original ULTRA Base (swing-axis) lubrication	42
Specifications	43
Revision History	45

## Before the First Use

Do the following before using ULTRA for the first time.

1. Read this Operation Manual
2. Read the Warranty in the Terms of Sale
3. Watch the Video Tutorials at <https://motocrane.com/knowledge-base>
4. Recommended: Attend MotoCrane Training for in-person demonstration

# IMPORTANT PRODUCT AND SAFETY INSTRUCTIONS

## Safety

MotoCrane ULTRA is not a toy and can cause serious injury, death or damage if not used properly. You must exercise caution during use of the ULTRA 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

ULTRA is intended to produce world-class imagery with safe and comfortable operating conditions for everyone at or near the filming location.

ULTRA must only be used by trained drivers and operators 18 years of age or older. ULTRA must be properly mounted on an appropriate motor vehicle driven on a closed course with appropriately finished surfaces. In addition, the speed and acceleration of the motor vehicle must not exceed system ratings for ULTRA as set forth in this Operation Manual.

Using ULTRA requires at least two persons - one driver and one operator. In addition, shoots will require a head operator. Drivers and operators must obey and observe all traffic rules and regulations, operate ULTRA in a safe manner, and ensure that all personnel within the vicinity of ULTRA understand and abide by all safety precautions. It is the responsibility of the driver and operator to understand how ULTRA changes a motor vehicle's safety, performance and handling dynamics. Drivers and operators must not be under the influence of alcohol, drugs, or any substance, whether legal or illegal, that may affect the driver's or operator's ability to use ULTRA.

Check weather conditions before using ULTRA. Do not use ULTRA in high winds or harsh weather conditions such as fog, snow, rain, hail, lightning, tornadoes, dust, sand storms, hurricanes, or any other adverse weather condition or storm. Only use ULTRA under safe conditions, and within the weather ratings set forth in this Operation Manual.

Do not modify or adjust ULTRA. ULTRA has been calibrated before it is shipped to you. No modification or adjustment to ULTRA is 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 ULTRA, and for any consequence 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](http://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 ULTRA, 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 ULTRA. By the act of use, setup or assembly, the user accepts all resulting liability.

## Limited Warranty

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

## Intellectual Property

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

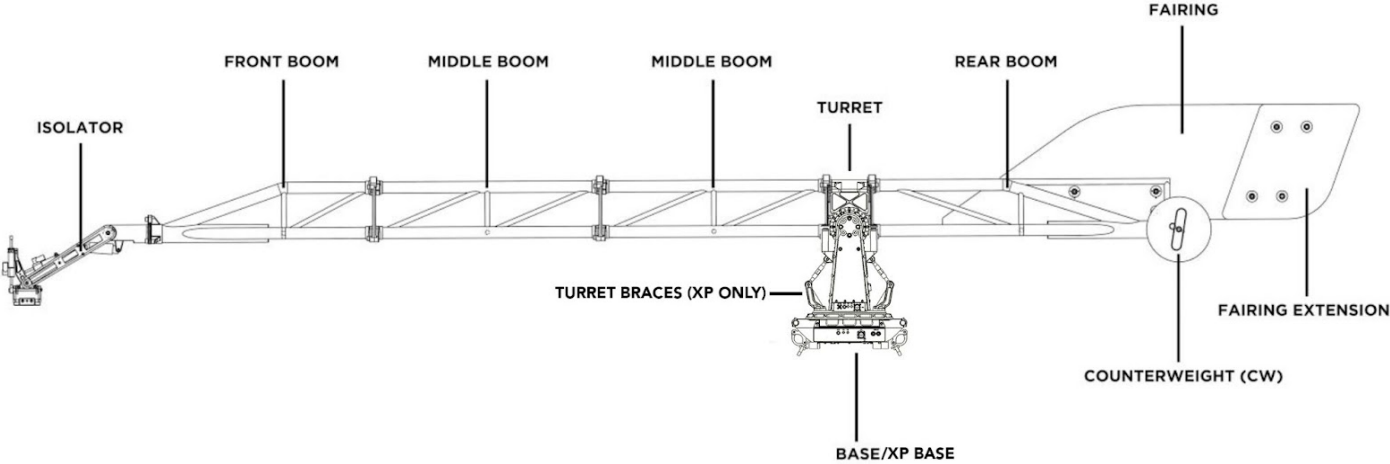
## Parts of ULTRA

- Base/XP Base
- Turret
- Booms
  - Front Boom
  - (2) Middle Booms
  - Rear Boom
- Isolator
- Fairing + Fairing Extension
- Counterweight
- Controller
- Power Supply Unit (PSU)
- Cables:
  - (1) 10' Main Power Input Cable
  - (1) 10' Controller COM Cable
  - (1) 12' PSU to Base Main Power Cable
  - (1) 1.5' Base to Turret Main Power Cable
  - (1) 2' Power Input Flying Leads
- Miscellaneous: Fasteners, safety pins, hex wrench



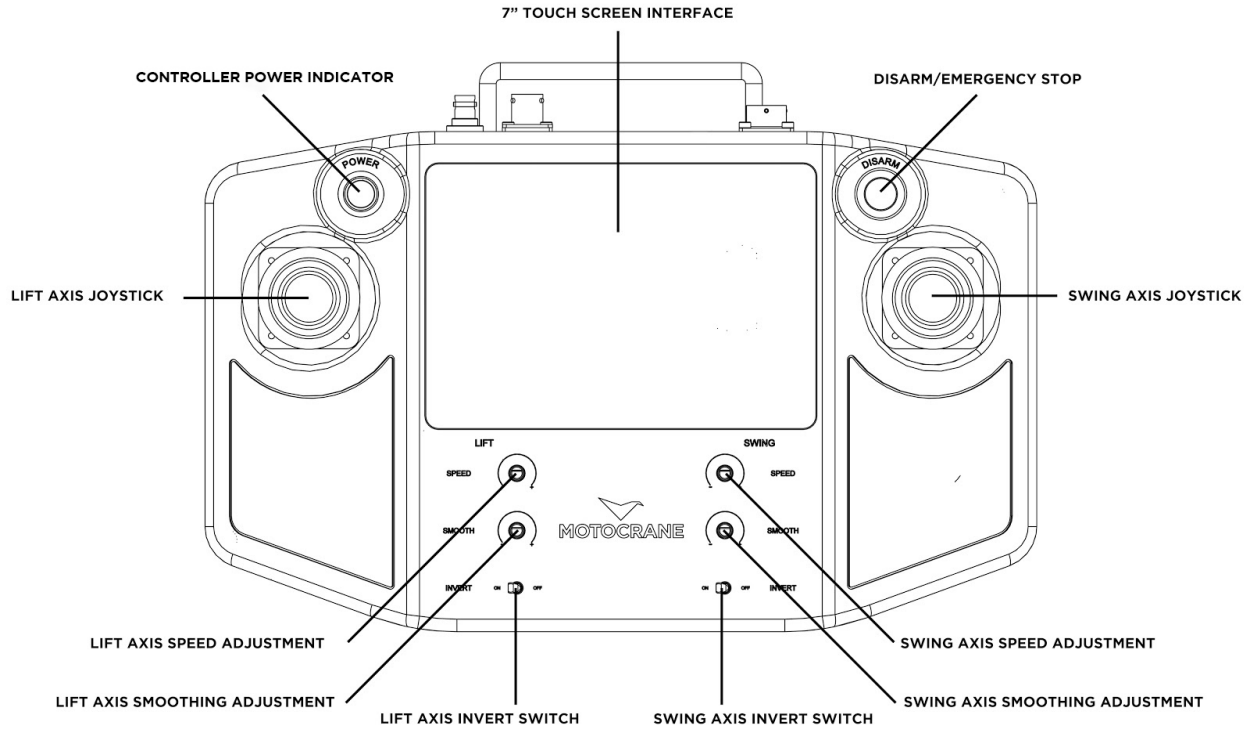
# System Overview

ULTRA/ULTRA XP

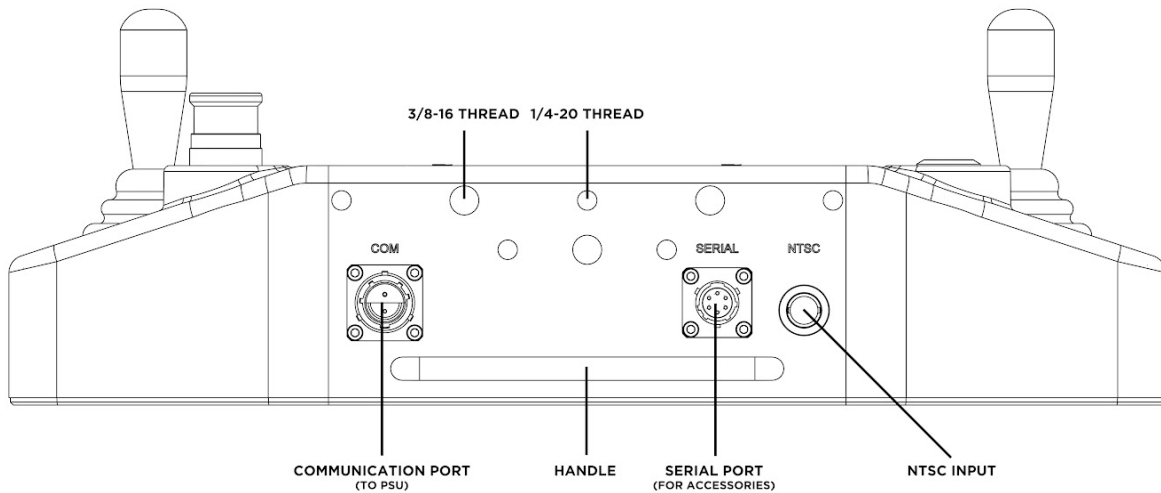


# Modules

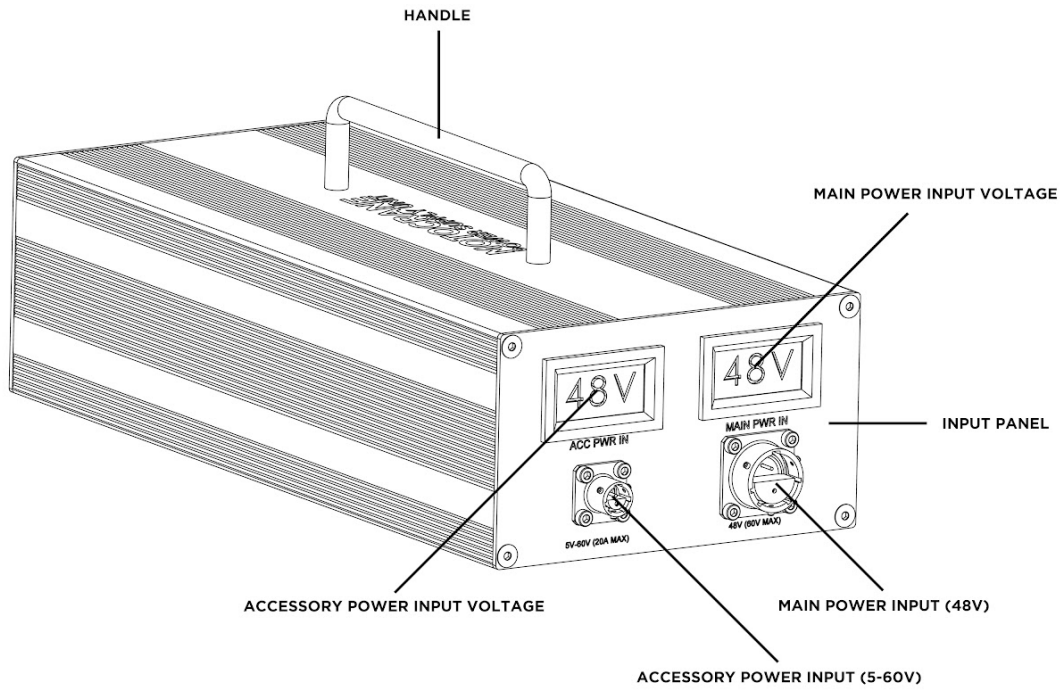
## Controller (front view)



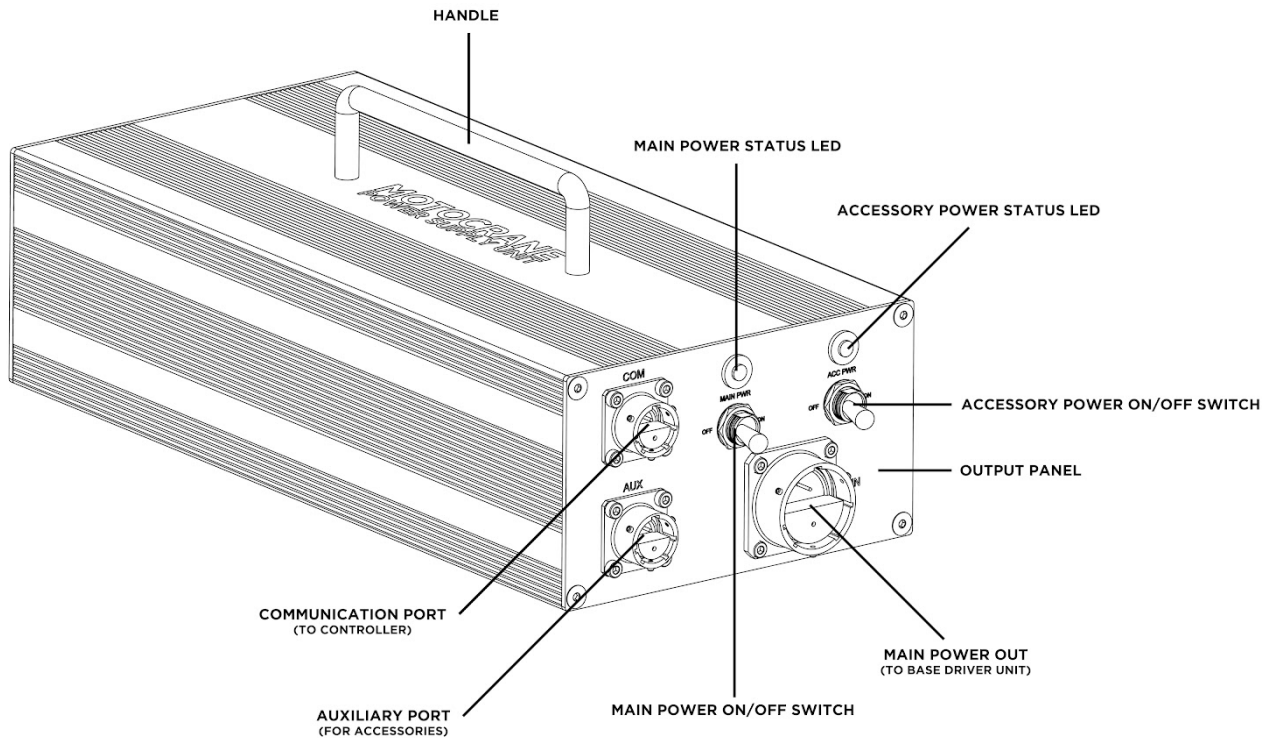
## Controller (top panel)



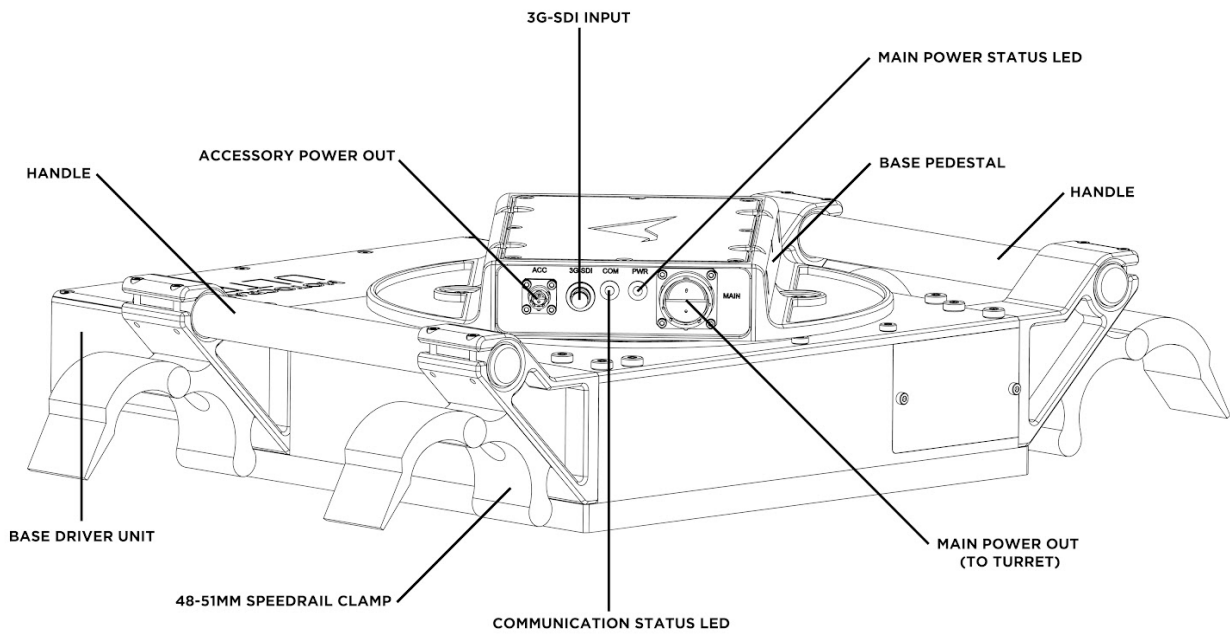
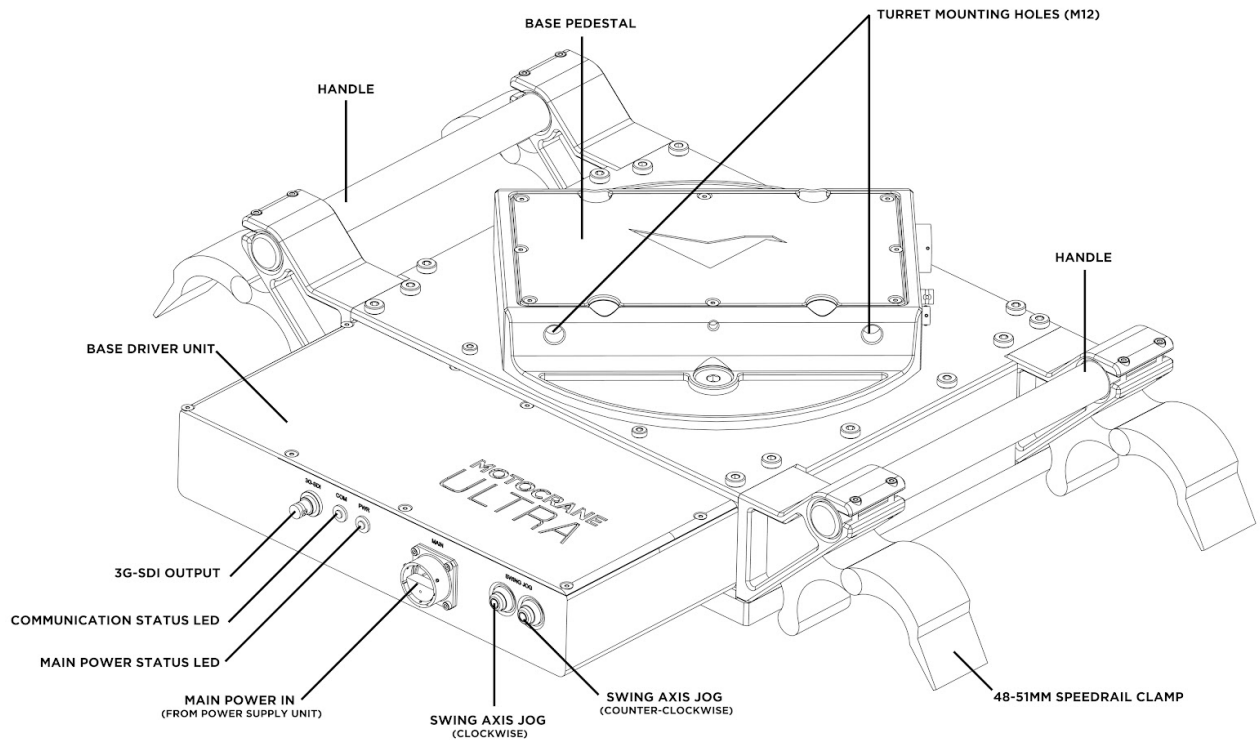
## Power Supply Unit (PSU) Input Side



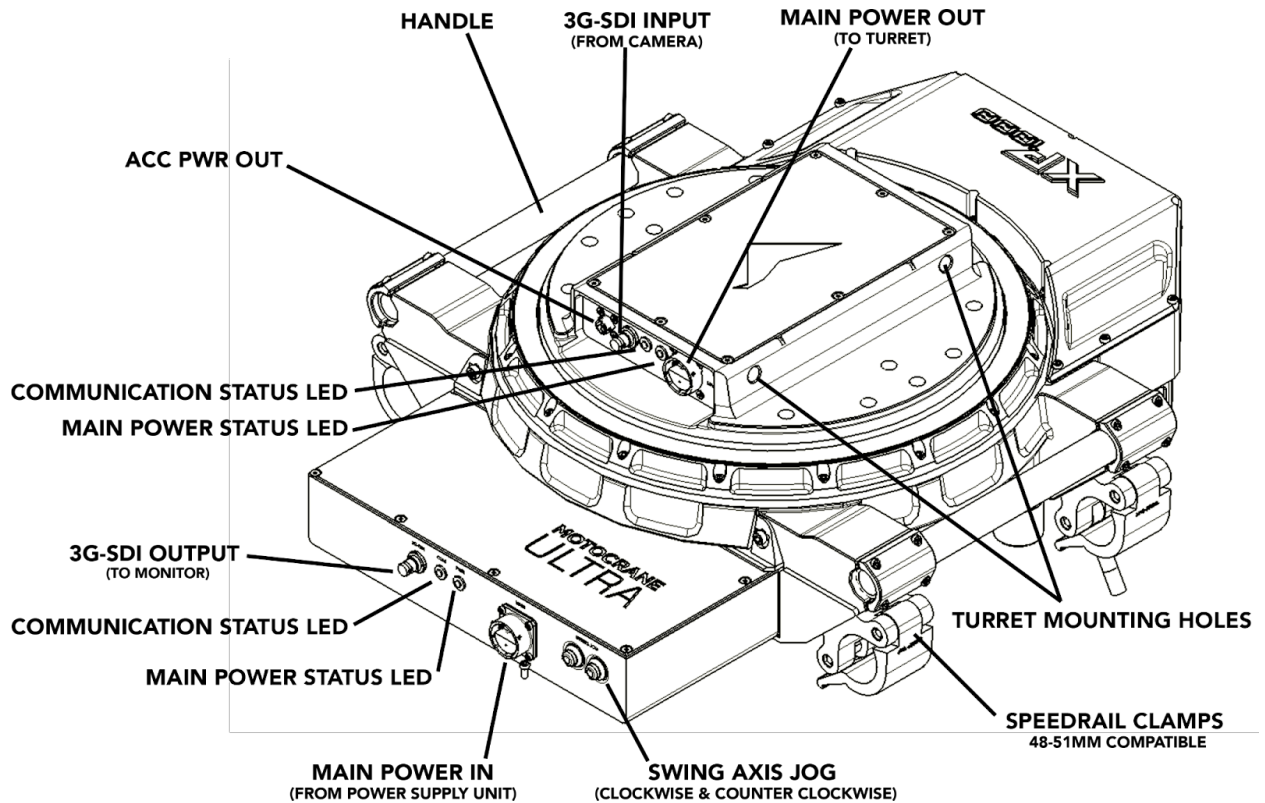
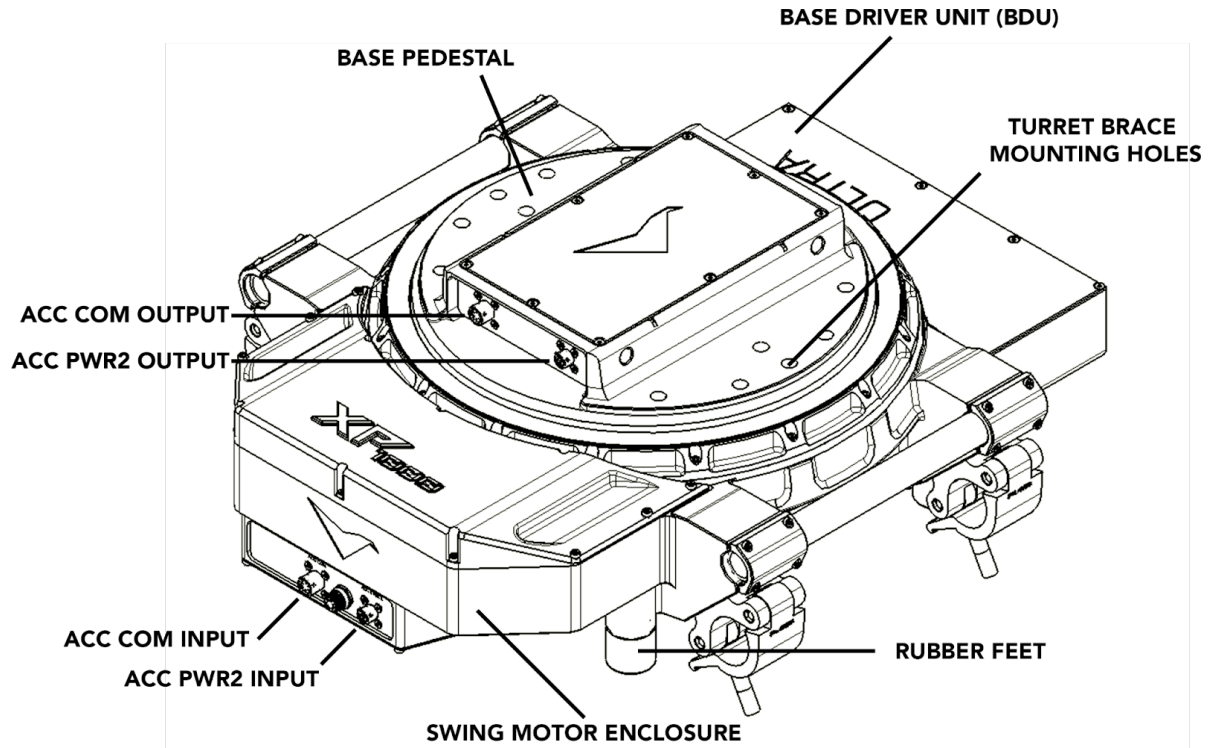
## Power Supply Unit (PSU) Output Side



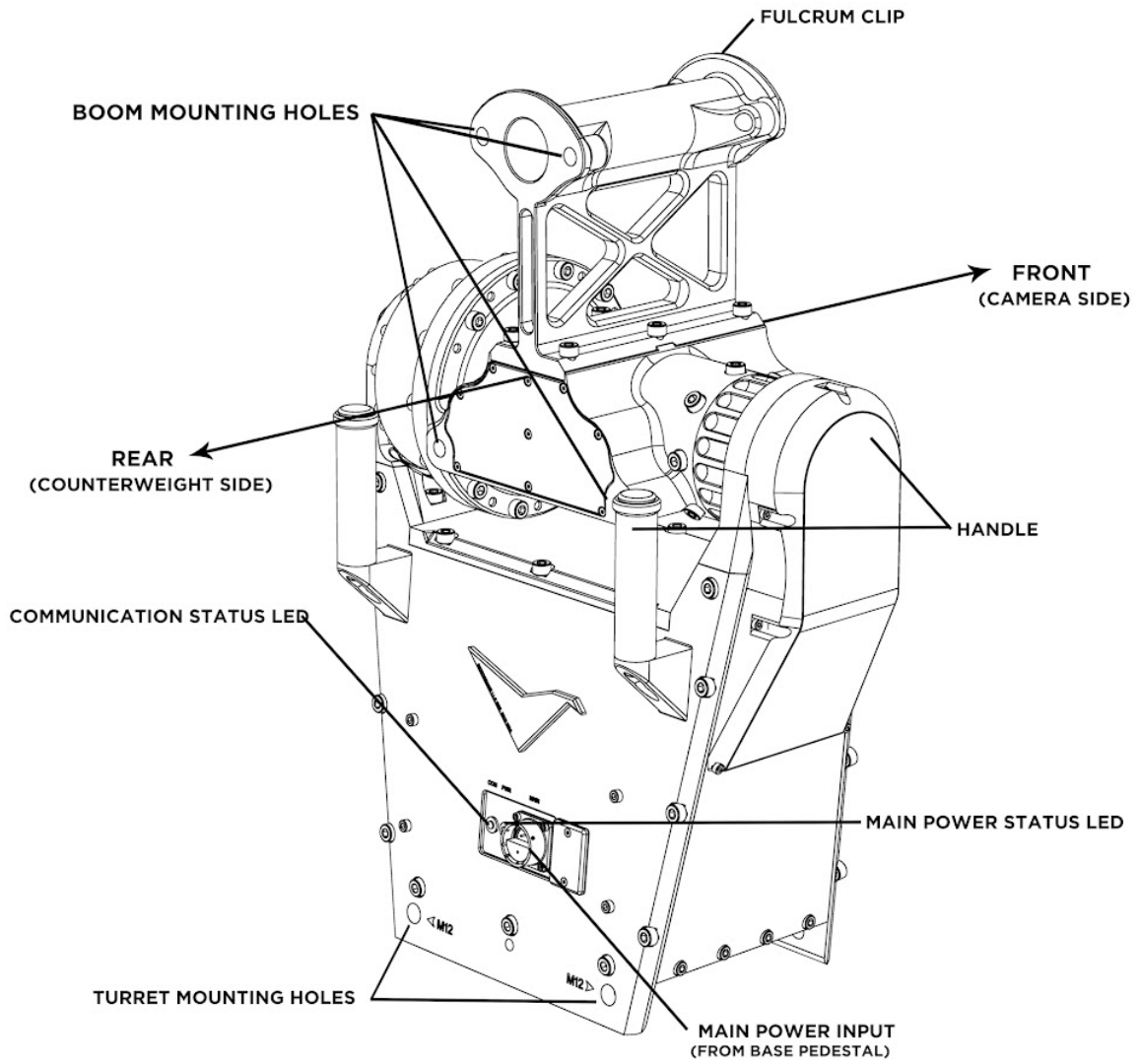
# Original Base



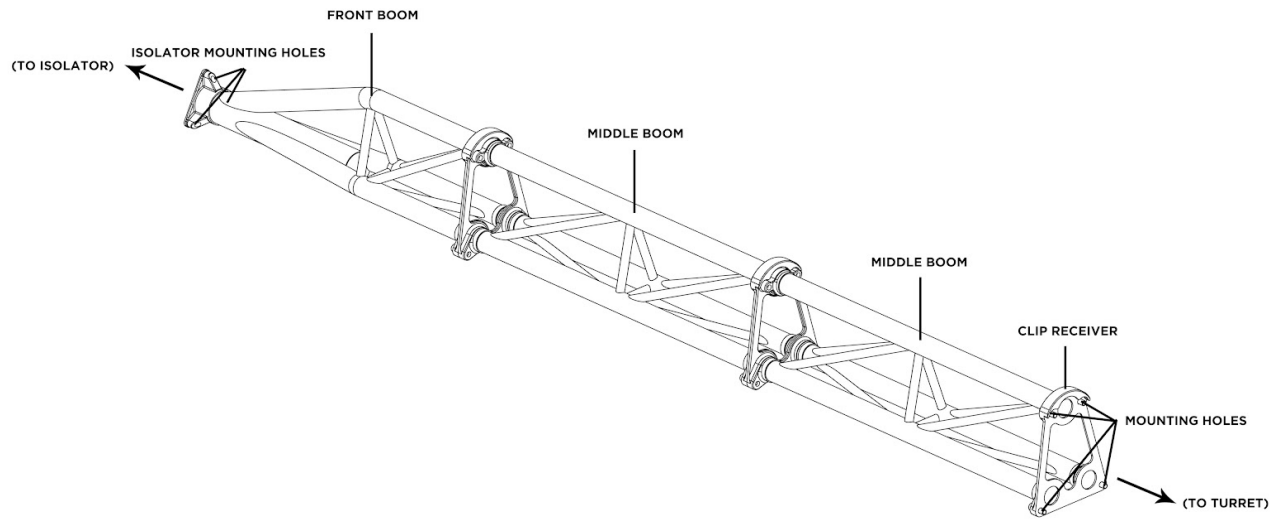
# ULTRA XP Base



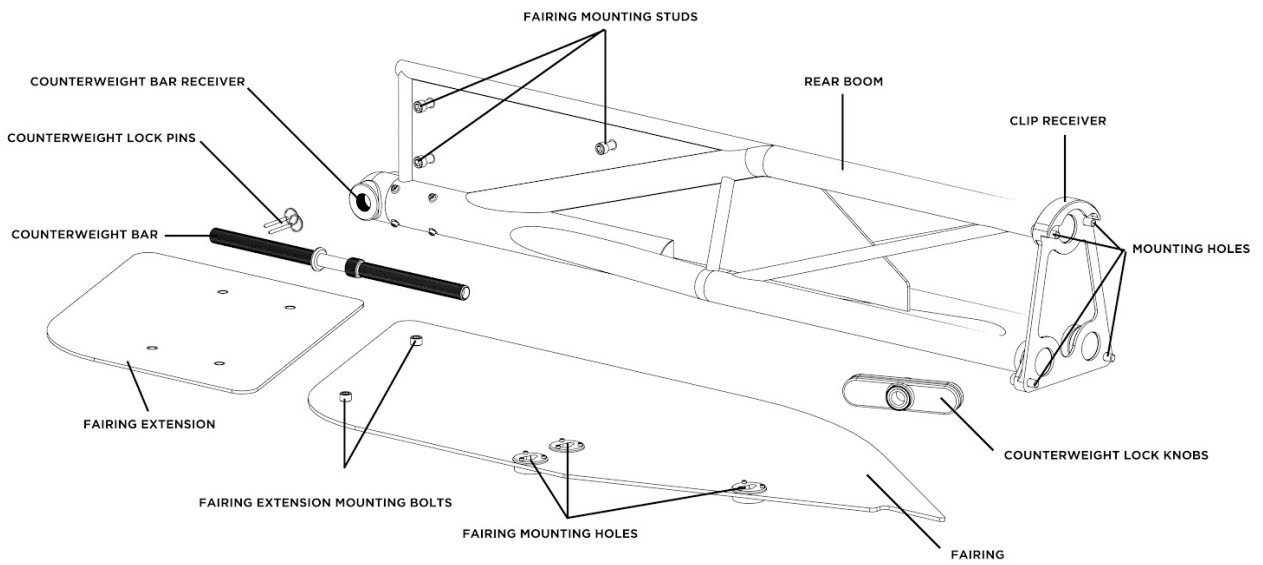
# Turret



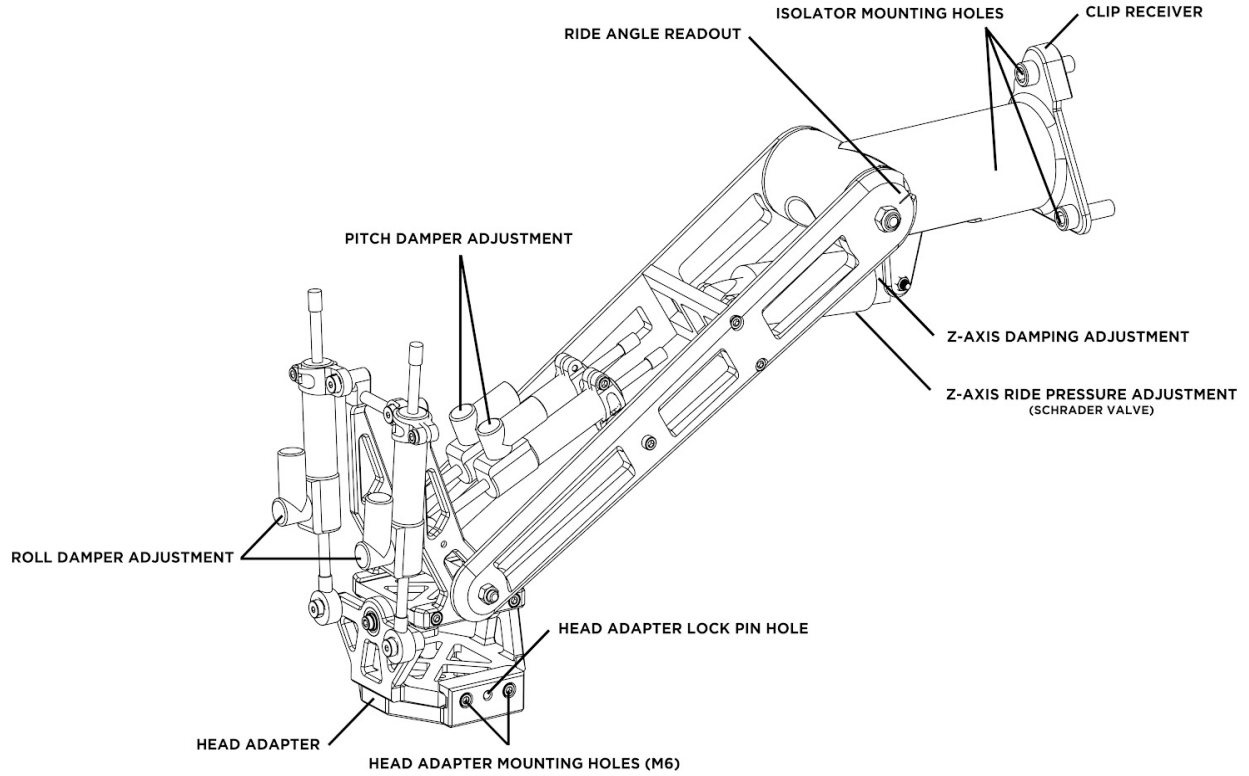
## Front Boom



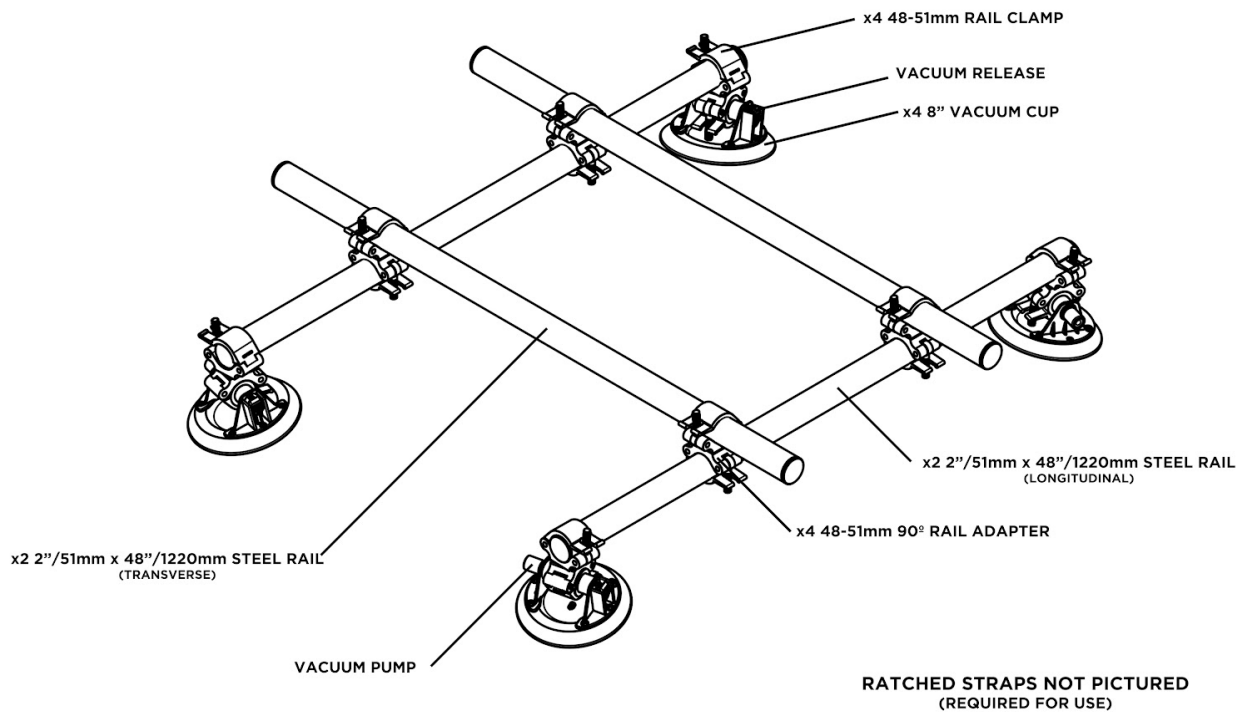
## Rear Boom + Fairing



# Isolator



# Suction Speedrail Grid (SSG) Kit





# Setting up ULTRA

## ULTRA Setup at a Glance

ULTRA comes in modules that are to be set up piece by piece.

1. Via either your custom mount or Suction Speedrail Grid [SSG], provide a Speedrail mount for ULTRA.
2. Place the Base on the Speedrail and torque the Speedrail Clamps.
3. Add the Turret and torque Bolts.
4. Add the Front and Rear Booms, torquing bolts as each section is assembled.
5. Add the Isolator.
6. Add the Fairing and Counterweights to balance the arm.
7. Attach and balance your head and camera rig.
8. Add Counterweights to balance your rig.
9. Adjust the Isolator as desired.
10. Ensure all knobs are tight, safety pins inserted, and safety lanyards connected.
11. Connect system cables, make sure the controller 'DISARM' button is depressed, and turn on PSU.
12. Tune to desired speeds on the Controller before driving.
13. Release the 'DISARM' button to enable arm control via the joysticks.
14. Operate in a safe manner as described in the manual and obey all laws.

**⚠ WARNING**: Failure to follow these instructions and those below can result in serious injury, death or damage.

These instructions are demonstrated in our training videos and found online at [www.motocrane.com/support](http://www.motocrane.com/support). All terminology is referred to in the above diagrams.

## Setup Process

### Motor Vehicle Requirements

ULTRA is designed to work on a motor vehicle that meets the following criteria:

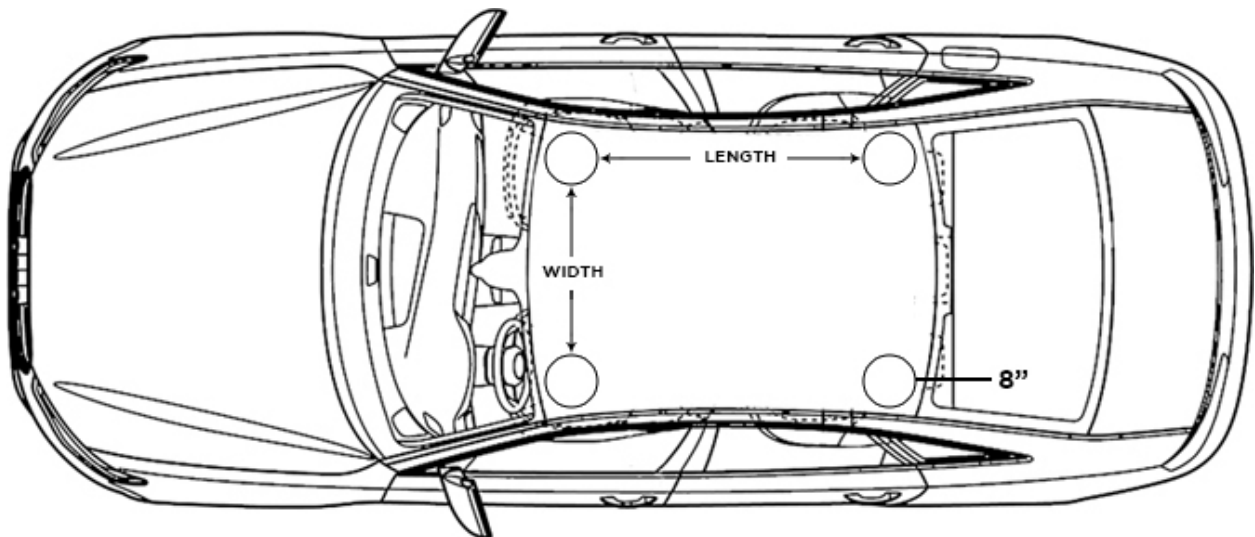
1. Roof constructed of metal or other material suitable for bearing 350 lbs load.
2. If using the Suction Speedrail Grid;
  - a. Roof must be in "like-new" condition with non-porous, glossy surface finish suitable for mounting vacuum cups. Can have no blemishes on paint or exterior finish.

The roof of the car must meet the following minimum dimensions in order to support the smallest configuration of the Base.

Minimum Roof Dimensions:

Minimum Width: 30"

Minimum Length: 45"



### **⚠️ WARNING**

The use of ULTRA on any vehicle not meeting the required criteria may cause serious injury, death or damage. Operator is responsible for ensuring all rigging meets the requirements of the shoot.

## Suction Speedrail Grid (SSG) Kit Setup

1. Position each 9" Cup at the 4 corners of the roof. Rotate cup so that the Speedrail starter clamps are aligned with its longitudinal pair on each side of the vehicle (e.g. Driver's side suction cups should be aligned as a pair, and passenger side suction cups should be aligned as a pair).
2. Loosen the M12 adjustment bolt to rotate the Speedrail starter clamp about the handle axis, once level and aligned with the mating pair, tighten the bolt.
3. Open Speedrail starter clamps and lay 48-51mm (2") Speedrail tube in the clamps running from the front to the back of the vehicle. Measure distance between the rails at the front and rear, and adjust either end to make parallel.
4. Close the Speedrail starter clamps, and tighten the M12 wingnut with adequate torque to safely secure the Speedrail within the clamp.
5. Open the 90° Speedrail adapter clamps, and secure loosely on the Speedrail. To ensure proper fitment of the base, front and rear clamps should be spaced 18" apart from each other at the point that contacts the Speedrail.
6. Confirm 90° adapter clamps are mirrored from Driver's side to Passenger side.
7. Open the top section of the 90° adapter clamps, and lay 48-51mm (2") Speedrail tube in the clamps running from driver's side to passenger side clamps.
8. Confirm the distance between the rails is 18", making adjustments to the 90° adapter clamps fore and aft as needed.
9. Confirm the transverse rails are not too far fore or aft for your application. The load should be evenly distributed between the 9" Cups.
10. Close the top section of the adapter clamp around the Speedrail, and tighten the M12 wing nut with adequate torque to safely secure the Speedrail within the clamp.
11. Extend the adjustable side of the ratchet strap to its full length, and secure the completed Speedrail grid to the roof, making sure to loop around and capture both the longitudinal and transverse rails. The completed strap harness must loop through the cabin of the vehicle.

### **⚠️WARNING**

The SSG is secured in two ways; Vacuum Cups and a Strap Harness. ULTRA should never be operated without fully engaged Vacuum Cups and Strap Harness. Without both, ULTRA can fall off the vehicle. If you see the red lines on the Vacuum Pumps, stop operation and reapply vacuum pressure by pumping until they are no longer visible. A clean, glossy finish and proper mounting is essential to maintaining vacuum pressure.

### **⚠️WARNING**

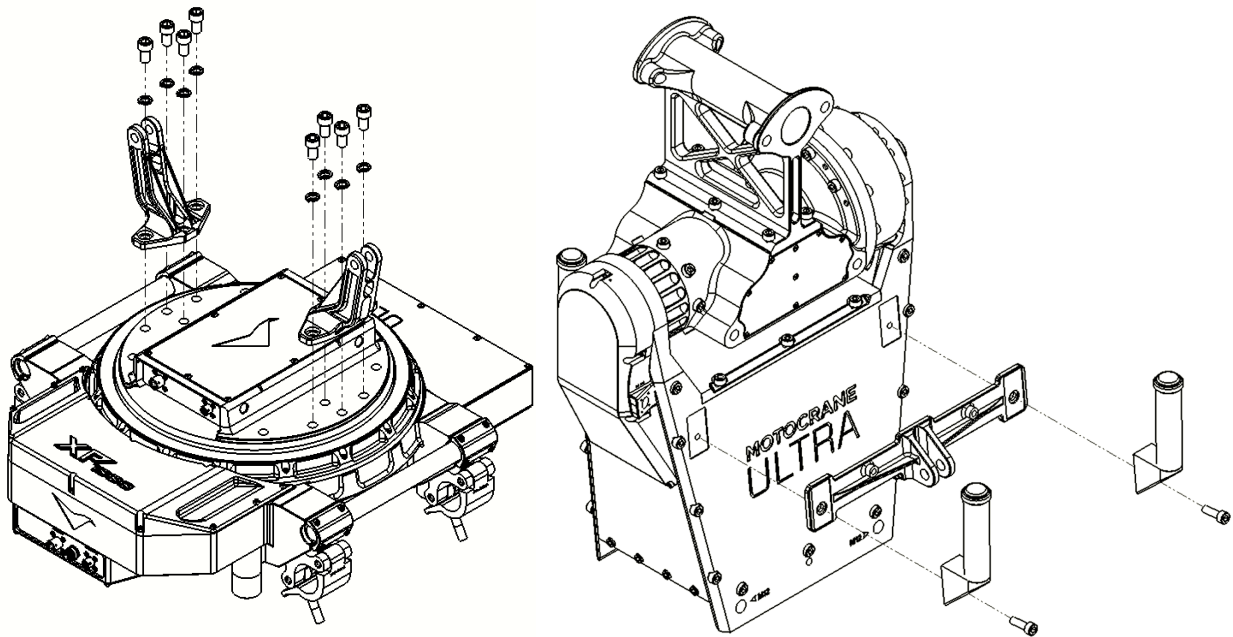
The Speedrail provides the connection from your vehicle to MotoCrane. If not mounted properly, the Base can fall off the vehicle. Do not skip any steps or deviate from the setup order.

## ULTRA Base Setup

1. Prepare the ULTRA Base by opening the 4 Speedrail clamps, and make note which orientation is preferred for the connectors/cables.
2. With a partner, hoist the ULTRA Base onto the Suction Speedrail grid, or equivalent approved rigging.
3. Once safely seated on the rails, slide the ULTRA Base so that the Pedestal is centered side-to-side. *(Alt.- Install Turret, then move to step #4)*
4. Close the Speedrail clamps, and tighten the M12 wingnut with adequate torque to safely secure the Speedrail within the clamp

### *(XP Base Only)*

1. Install the 2x Turret Braces onto the XP Base Pedestal using the supplied 8x M12 fasteners
2. Remove the existing M8 fasteners securing the 4x handles on your ULTRA Turret.
3. Align the 2x Turnbuckle Brackets within the handle recesses on the ULTRA Turret, and install the 4x handles over the Turnbuckle Brackets using the longer, supplied M8 fasteners.



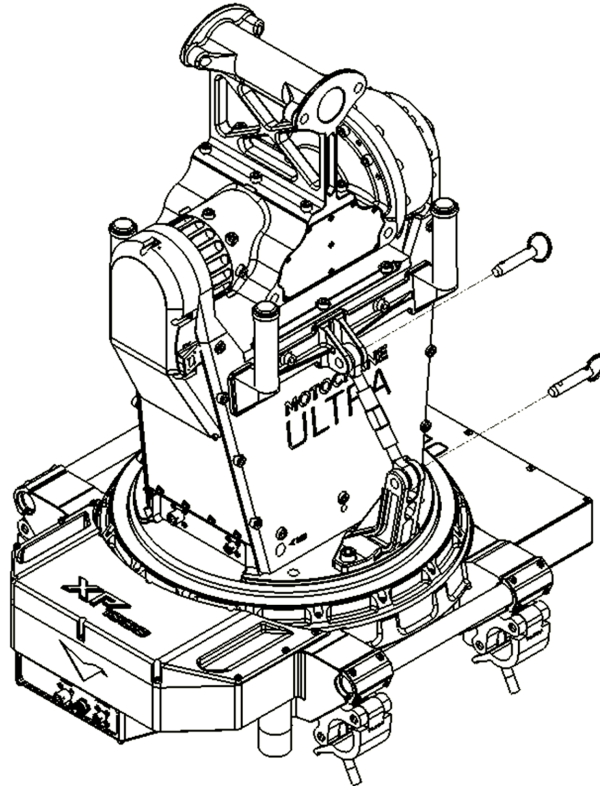
## ULTRA Turret Setup

1. Prepare the Turret by confirming the ULTRA Base Pedestal is oriented properly for installation. *(If Pedestal needs orientation adjustment, you may skip to PSU Setup for delivering power to the base and enabling Swing Jog)*

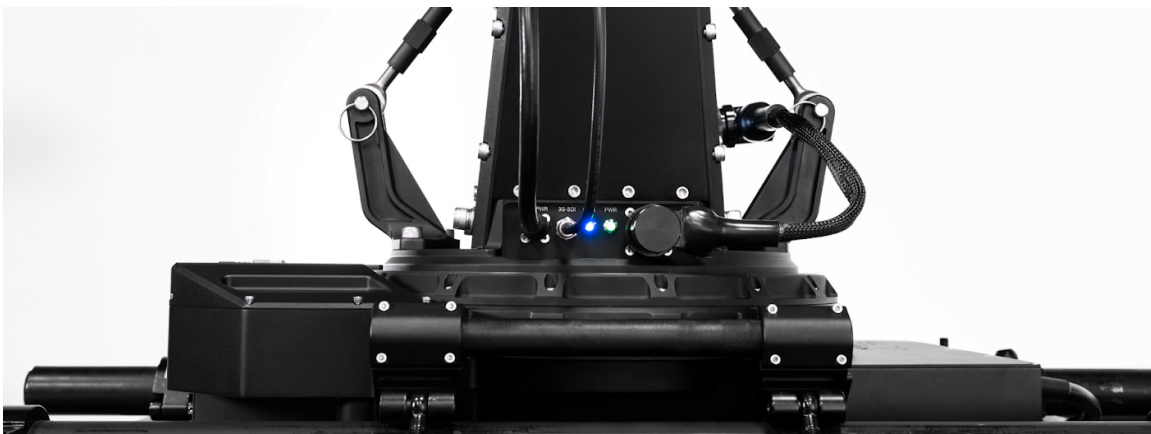
2. With a partner, hoist the Turret onto the ULTRA Base Pedestal.
3. Install the M12 fasteners in the Turret mounting holes, applying appropriate torque to the fasteners.

*(XP Base Only)*

1. Install the Support Turnbuckle by placing both male clevis ends between the Turret Bracket and Turret Brace, turning the turnbuckle body to extend/retract the length as needed, and pushing the Lock Pins into place.



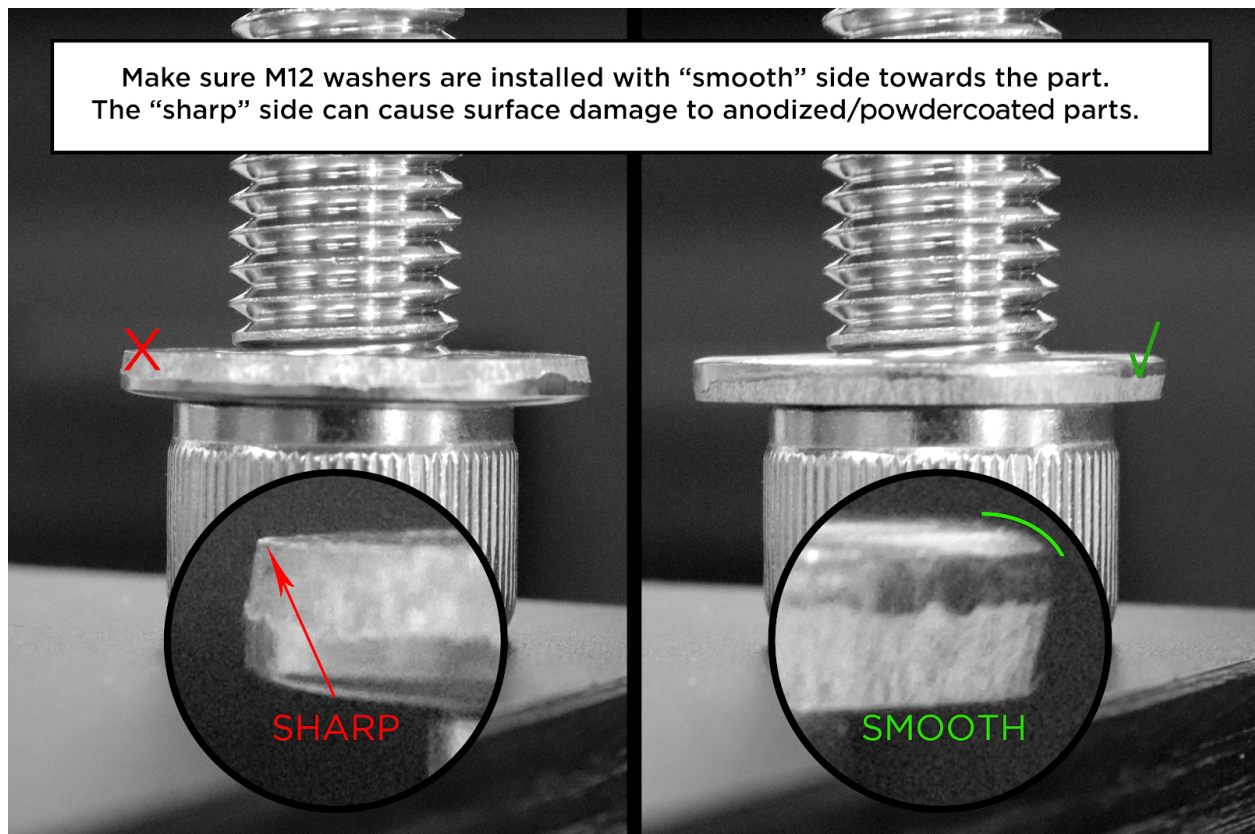
**NOTICE** The Turret can only mount on the Base in one direction. If aligned incorrectly, the cables will not reach from Base to Turret. See illustration below:



## ULTRA Boom + Isolator Setup

1. Prepare for boom installation by noting the front and rear of the Turret.
2. Install the Rear Boom by placing the clip receiver over the fulcrum clip.

**NOTICE** Do not hang on ULTRA. Only apply force on Lock knobs, spanners, and boom tool in a rotational direction. Hanging on ULTRA can cause damage.



**NOTICE** When installing M12 fasteners, be sure that the supplied washers are installed with the “smooth” side towards the part. This will help to preserve the finish on your ULTRA Front, Middle, and Rear boom sections, as well as the Turret.

3. Install the 4x M12 fasteners into the mounting holes with adequate torque to safely secure the Rear Boom to the fulcrum.
4. Install the Threaded Bar by sliding it into the Threaded Bar Receiver, then screwing the Threaded bar into the receiver completely.
5. Prepare to install the Fairing by first loosening the M12 mounting studs so that >35mm is exposed of the mounting stud.
6. Install the fairing over the x3 M12 mounting studs so that the head of the studs are seated firmly within the x3 slots of the fairing.

7. Tighten the mounting studs with adequate torque to safely secure the Fairing
8. Install the Middle Boom to the fulcrum by securing the clip receiver over the fulcrum clip. Install the x4 M12 fasteners into the mounting holes with adequate torque to safely secure the Middle Boom to the fulcrum.
9. Repeat step 8 to install the next section of Middle Boom and the Front Boom
10. Position the Isolator clip receiver over the Front Boom clip and install the x3 M12 fasteners into the mounting holes with adequate torque to safely secure the Isolator to the Front Boom
11. Measure the All-Up Weight (AUW) of the payload then use the chart below to determine how much counterweight (CW) should first be installed before mounting the payload, and if any is needed after. "Payload" includes everything hanging from ULTRA including AVM's like Tranquilizer, stabilized head, camera and accessories. You must weigh for accuracy. "Tallying" of weight often leads to balancing error.

**CAUTION** The Lift axis is equipped with a fail-safe brake. Failure to observe the proper counterweighting method will result in excessive imbalance beyond the max permissible limit, and may cause permanent system damage.

All Up Weight [AUW] vs Counterweight [CW] Chart

Payload AUW	Counterweight Pre-load
Empty/No Payload	40lbs/18kg
20lbs/9kg	90lbs CW/41kg, mount Payload
25lbs/11kg	100lbs/45kg CW, mount Payload
30lbs/14kg	115lbs/52kg CW, mount Payload
35lbs/16kg	125lbs/57kg CW, mount Payload
40lbs/18kg	130lbs/59kg CW, mount Payload, Add 10lbs/4.5kg
45lbs/20kg	130lbs/59kg CW, mount Payload, Add 20lbs/9kg
50lbs/22kg	130lbs/59kg CW, mount Payload, Add 35lbs/16kg
55lbs/25kg	130lbs/59kg CW, mount Payload, Add 45lbs/20kg

*NOTE: Subtract Counterweight Pre-load by 10lb if Fairing Extension is used.*

12. The Fairing Extension provides additional surface area to counterbalance the drag incurred from larger stabilized heads and camera packages. Refer to the following notice to understand when you should install it.

## NOTICE

- Compact heads such as the Ronin 2, MoVi Pro, Intuitive Aerial Newton, etc. do not require the Fairing Extension. Only the Carbon Fiber Fairing should be used.
- For Shotover G1, and Arri SRH-3, install the Fairing Extension in the first (smaller) position.
- For MoVi XL or Flighthead Mini, install the Fairing Extension in the second (larger) position.

13. Based on your payload AUW, pre-load the Rear Boom with the appropriate amount of CW and secure the CW pre-load with the CW Lock Knobs.
14. Remove the x4 M6 Bolts from the Isolator and release the Head Adapter.
15. Install the Head Adapter onto the Payload.

## NOTICE

Stabilized heads require isolation from high frequency vibrations for optimal tuning. Failure to include an AVM will result in poor pan-axis tuning. MoVi XL users are highly encouraged to review our Advanced Applications Guide [AAG] for MoVi XL.

16. Mount the Payload (55lbs MAX) onto the Isolator so that the Head Adapter can be fastened to the Isolator using the x4 M6 Fasteners. Install Safety Pin.
17. If Payload is between 40-55lbs (18-25kg), add the additional CW as instructed by the AUW vs. CW Chart.
18. Once the additional CW has been added, secure both sides of the Threaded Bar with the Counterweight lock knobs and install the Counterweight Lock Pins at the ends of the Threaded Bar.

## ULTRA Isolator Tuning

1. Using the included air pump, increase or decrease the pressure at the rear chamber of the air shock so that the Z-Axis Ride Angle Indicator reads  $\sim 20^\circ$ . *Note: early ULTRA units are equipped with 2 pressure adjustment valves. Do not adjust the front valve pressure (should have 0psi).*
2. Z-Axis damping should be adjusted via the "Fast-Slow" dial on the rear of the air shock. Damping should be "fast" enough to account for sudden terrain jolts, but not at the risk of bottoming out the Isolator.

## CAUTION

Z-Axis damping adjusted too "fast" on rough/off-road terrain can cause the Isolator to bottom out and cause permanent damage.

3. For adjustment of the Pitch and Roll passive damping, manually deflect the stabilized head to  $45^\circ$  and release. If the head swings past the neutral hanging position, the damping should be increased. If the head does not reach the neutral hanging position, the damping should be decreased.



**NOTICE** Dampers should be acclimated to operating temperature before adjustments.

## MotoCrane Power Supply Unit (PSU) Setup

1. Prepare the 48V power source by confirming that it is terminated with the mating Gray Anderson SB50 Connector. **DOUBLE CHECK PROPER POLARITY**
2. With the PSU Main Power Switch in the "Off" position, connect the 48V power source to the Main Power Input on the Input stage of the PSU.
3. If supplying accessory power, connect the accessory power source to the ACC Power Input on the input stage of the PSU.
4. Connect the 10' MotoCrane Controller Cable to the COM port on the PSU, then to the COM port on the MotoCrane Controller. Make sure the Controller has the DISARM/E-Stop engaged (pressed down).
5. Connect the longer 12' Base Power Cable from the MAIN Port on the output stage of the PSU to the MAIN Port on the ULTRA Base.
6. Connect the shorter 16" Turret Power Cable from the MAIN Port on the ULTRA Base Pedestal to the MAIN Port on the Turret. Be sure that the right angle connector is installed on the Pedestal side, while the straight connector is installed on the Turret side.
7. If supplying accessory power, connect the appropriate ACC Power Adapter cable from the ACC Port on the ULTRA Base Pedestal, to the appropriate port on the corresponding product.
8. Connect the 3G-SDI compatible video signal from the camera to the 3G-SDI Port on the ULTRA Base Pedestal. The 3G-SDI video signal should be passed from the ULTRA Base into the interior of the vehicle to a preferred 3G-SDI monitor (not included).
9. The MotoCrane PSU MAIN and ACC Power Switches can now be turned on.

## MotoCrane Controller Setup

1. Make sure the DISARM/E-Stop button is engaged (pressed down) and then turn the PSU Main Power Switch to the "On" position. The controller will power up and boot after ~5 seconds.
2. Press OPERATE from the Home menu, then adjust Speed and Smoothing values to "15" for both Lift and Swing axes. This will ensure slow and controlled arm movement during configuration.
3. To configure Limits for the Lift and/or Swing axes, press SETTINGS from the Home menu, then select "New Limits" from the axis you wish to configure.
4. Confirm that no personnel, including yourself, are within the Swing/Lift radius of ULTRA then release the DISARM/E- Stop button (twist clockwise).
5. Carefully follow the on-screen directions until Limits are configured, then turn Limits to the "ON" position in the SETTINGS Menu.
6. Once Limits are configured, you may proceed to the OPERATE screen for live operation of ULTRA.
7. If desired, additional safeguards in the form of 'Limits Protection' and 'Imbalance Check' can be enabled or disabled (via the SETTINGS page and the SETTINGS+ page, respectively).
  - 'Limits Protection' ensures that even when the boom is slightly imbalanced, due to improper Payload/CW ratios, small corrections will automatically take place to ensure the boom remains within the limits, independent of user input.
  - 'Imbalance Check' monitors the frequency and duration of these small corrections in order to determine if a significant imbalance exists. If so, a warning message will provide information on the appropriate action to take in order to balance the system.

NOTE: We recommend setting Limits at least 6 to 8 inches away from the closest point of contact, as this will ensure safe operation in all conditions. With imbalances or very rough terrain, it is possible that the arm could temporarily be bounced a few inches past the limit before Limits Protection features take action and guide it back safely within the Limit. Limits Protection feature must be turned ON to prevent movement past the Limit by external back-driving forces such as counterweight imbalance or wind resistance.

NOTE: Carefully read through the Operation Manual for complete understanding of all Controller features, menus and submenus. Serious injury and/or death can occur from irresponsible use of ULTRA. Always start with slow, controlled operation of ULTRA before attempting arm moves at speed.

**▲CAUTION** ULTRA will require fine balancing beyond the 10lbs/4.5kg CW increments offered by the AUW vs. CW Chart. We recommend carrying a 5lbs/2kg weight and 2.5lbs/1kg weight to ensure that proper counterweight can be achieved. With the

DISARM/E-Stop released, you can manually back-drive the arm up and down to feel for any imbalance.

If the camera drifts downward during operation, you must increase counterweight.  
If the camera drifts upward during operation, you must decrease counterweight.

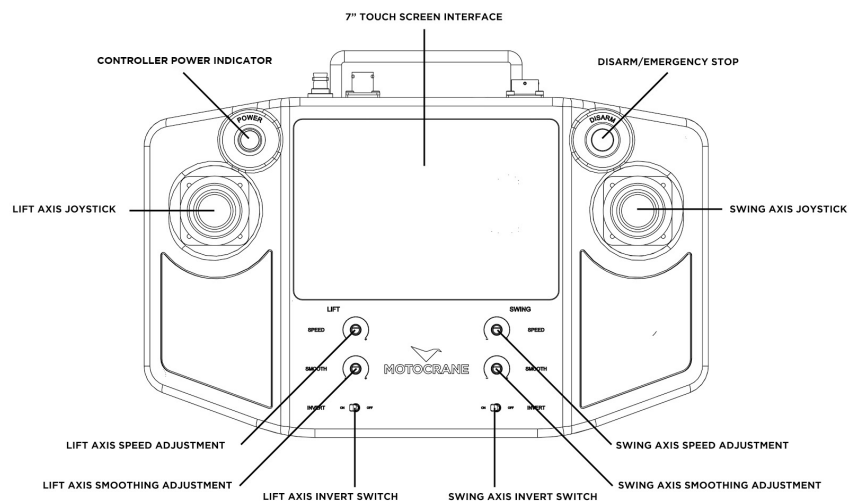
**NOTICE** The Original ULTRA Base/swing axis gearing has nominal backlash of  $.05^\circ$  resulting in 1-2" of play at the ULTRA Isolator. This does not affect smooth start/stop operation or the ability to tune stabilized heads to optimum levels. The ULTRA XP Base powertrain gearing does not have any backlash.

**⚠ WARNING** Do not touch the joysticks on the Controller during boot up. This time is required to calibrate the zero point on the joysticks. Although this startup error should be detected automatically, improper calibration could, in a rare situation, unintentionally set ULTRA in motion.

## MotoCrane Controller

The MotoCrane Extended Controller includes two joysticks for individual Swing and Lift axis control, switches for easy user adjustment, and a 7" touchscreen for configuration, monitoring, and advanced settings. The joysticks apply a command proportional to the degree they are pushed. There are 3 manual parameters which should be tested, and configured before operation.

Before operating MotoCrane, consider the configuration most desirable for your operation/application and take time to get comfortable with the controls. Consider changes in focal length, and how these might affect your changing field of view.



**SPEED** - Adjusts the maximum speed achievable. Turning to "0" disables control.

**SMOOTH** - Adjusts the rate at which rpms are gained and lost.

**INVERT** - Inverts the direction of the controls

Examples:

High Speed, Low Smooth: The axis will feel very reactive and touchy. The axis will eventually achieve fastest rotation quickly, and when released will take very little time to come to a stop.

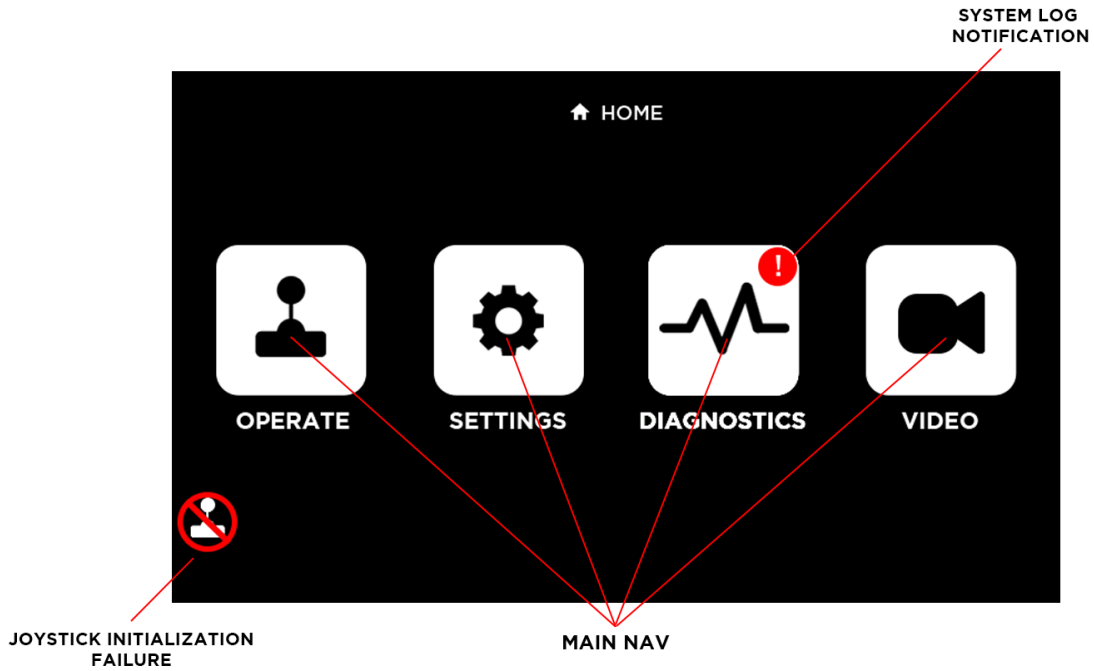
Low Speed, High Smooth: The axis will feel sluggish and dampened. If held, the axis will achieve slow rotation over some time, and when released will stop very smoothly.

**⚠ WARNING** When the DISARM/ EMERGENCY STOP button is engaged (pressed down), all power is cut from the motors, and Lift-axis brake is engaged. ULTRA will not be controllable, which could prevent the operator from moving it into a safe position. It will stop immediately, regardless of the speed or acceleration settings. After releasing this button, it will take a few seconds to regain the ability to move.

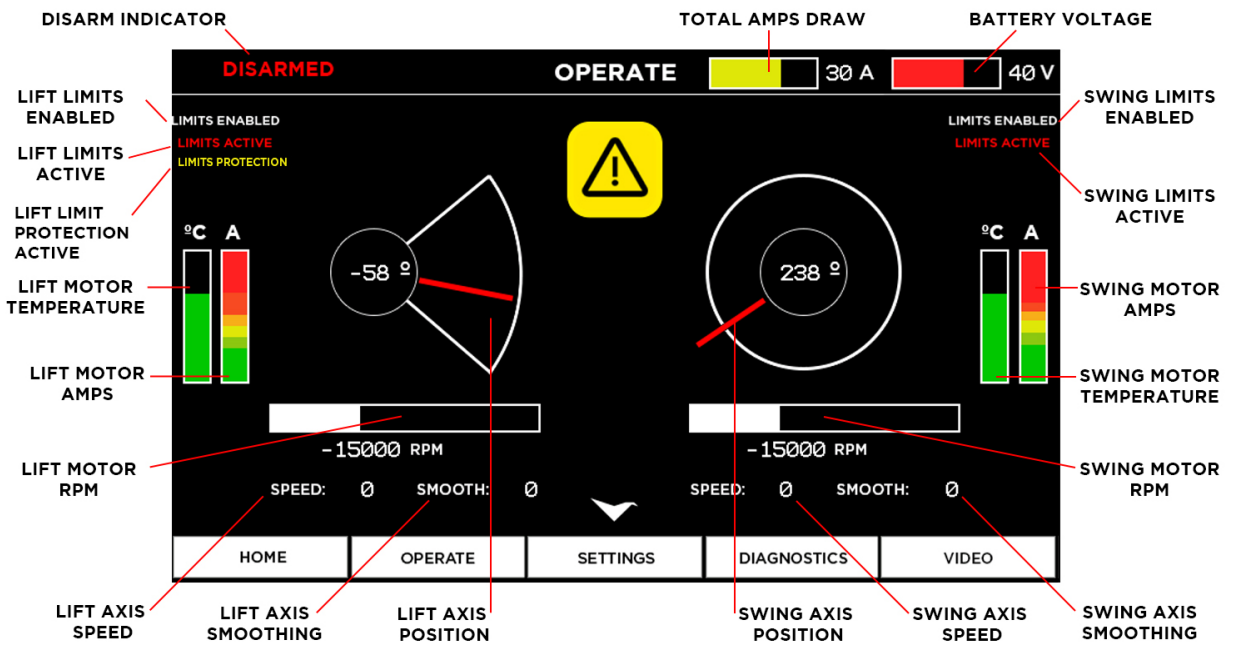
**⚠ WARNING** Do not force the joysticks past their range of motion. This can send erroneous commands causing undesired and potentially hazardous movement.

# Controller Interface

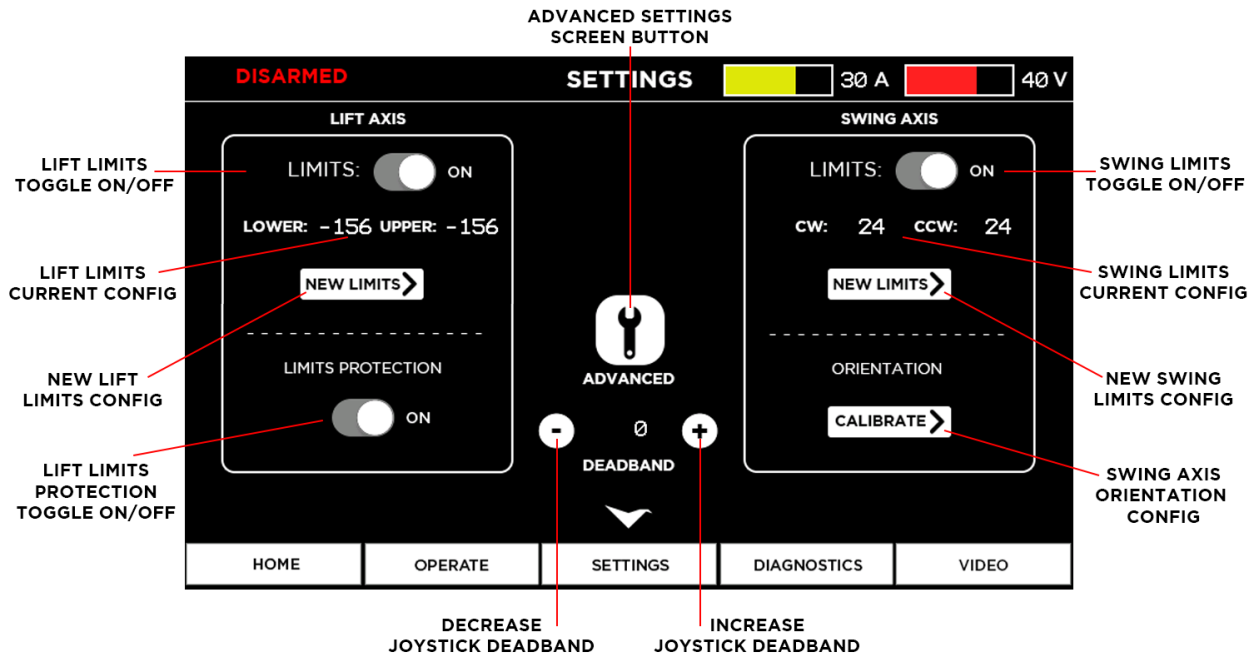
## HOME SCREEN



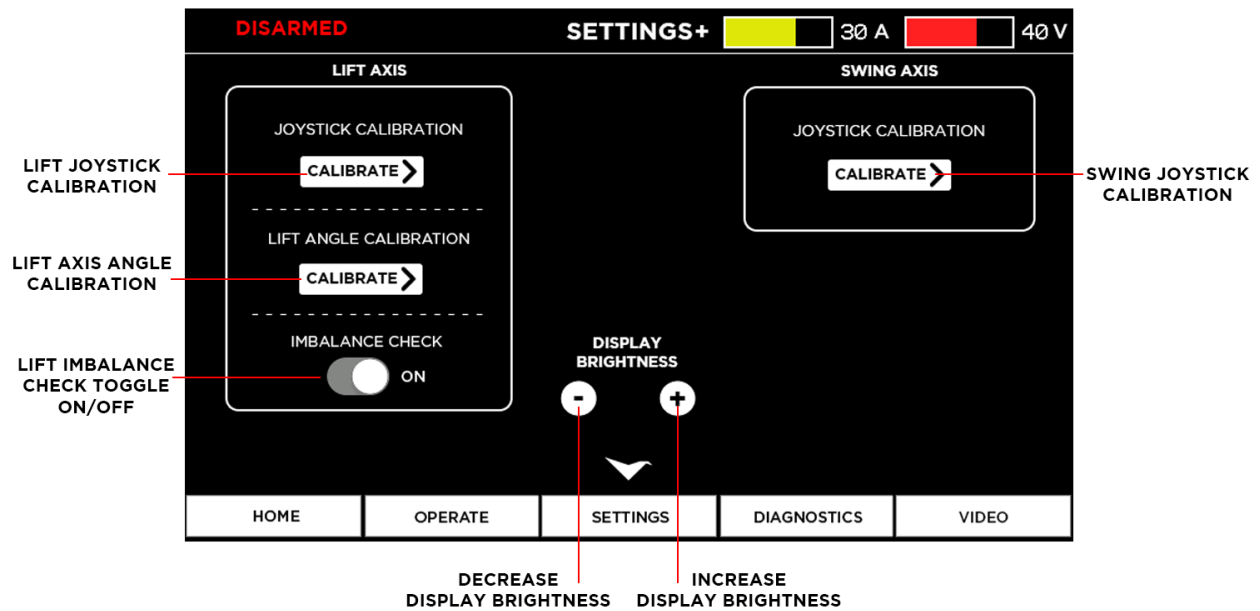
## OPERATE SCREEN



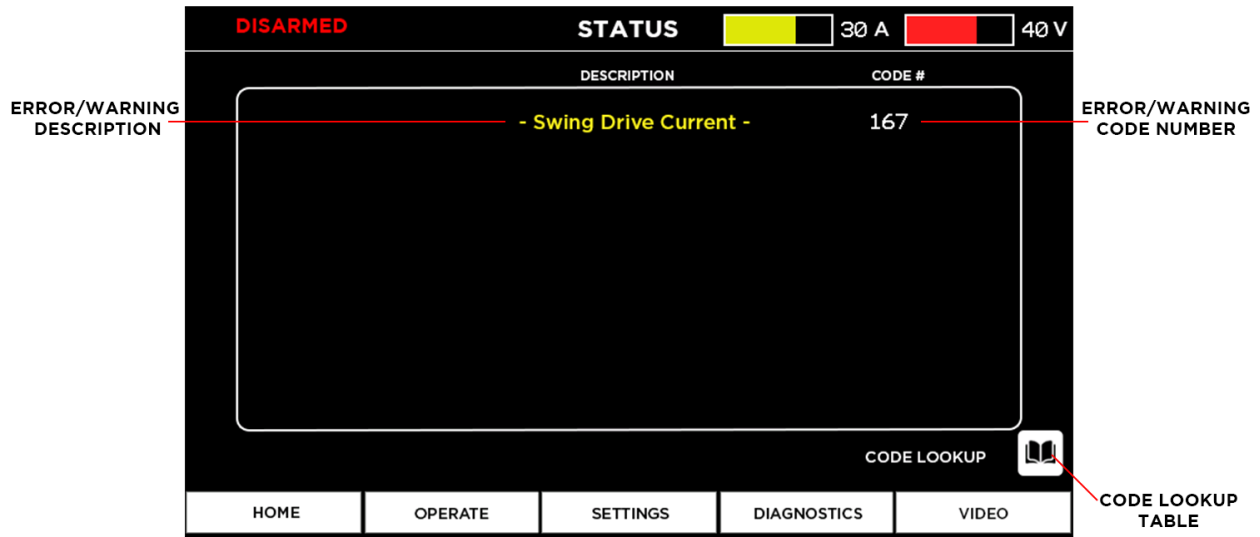
## SETTINGS SCREEN



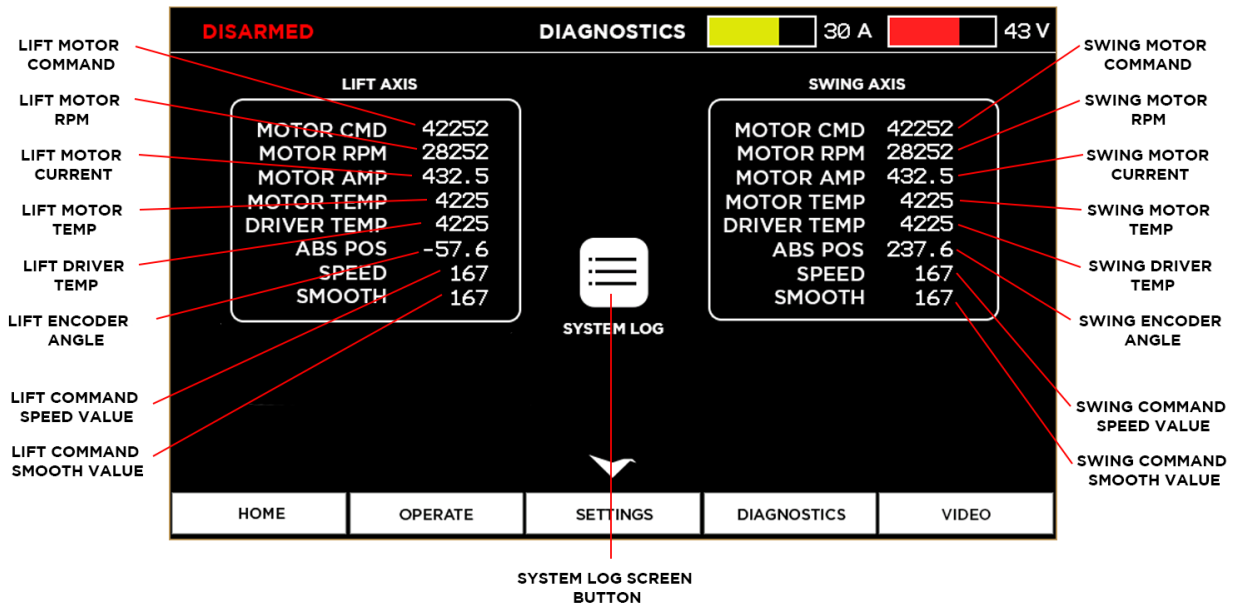
## SETTINGS+ SCREEN



## STATUS SCREEN



## DIAGNOSTICS SCREEN



## SYSTEM LOG SCREEN

**DISARMED** SYSTEM LOG 30 A 40 V

H : MM	DESCRIPTION	CODE #
0 : 38	- Swing Drive Current -	167
3 : 00	- Swing Drive -	0

CLEAR LOG CODE LOOKUP

HOME OPERATE SETTINGS DIAGNOSTICS VIDEO

Callouts: ERROR/WARNING DESCRIPTION, TIME SINCE ERROR/WARNING, ERROR/WARNING CODE NUMBER, CODE LOOKUP TABLE.

## CODE LOOKUP SCREEN

**DISARMED** CODE LOOKUP 30 A 40 V

CODE #	DESCRIPTION	SERVICE
002	Lift Motor Temp Warning	Use caution and watch motor temp
003	Lift Motor Temp Error	Discontinue use until temp is reduced
004	Lift Motor Temp Sensor Failure	Use caution - contact Customer Service
007	Lift Motor Driver Temp Warning	Use caution and watch driver temp
008	Lift Motor Driver Temp Error	Discontinue use until temp is reduced
009	Lift Motor Driver Temp Sensor Failure	Use caution - contact Customer Service
012	Lift Overcurrent Warning	Use caution and observe current and temps
013	Lift Overcurrent Error	Use caution and observe current and temps
014	Lift Current Sensor Failure	Use caution - contact Customer Service
018	Lift Motor Stall	Power cycle and check functionality
020	Lift IMU Warning	Do not subject the system to higher forces
021	Lift IMU Error	Reduce intensity of use to acceptable level
022	Lift IMU Sensor Failure	Contact Customer Service
029	Lift Motor Command Timeout	Power cycle the system to reset
030	Central Heartbeat Timeout	Power cycle the system to reset

For more information and troubleshooting resources, please consult the operation manual

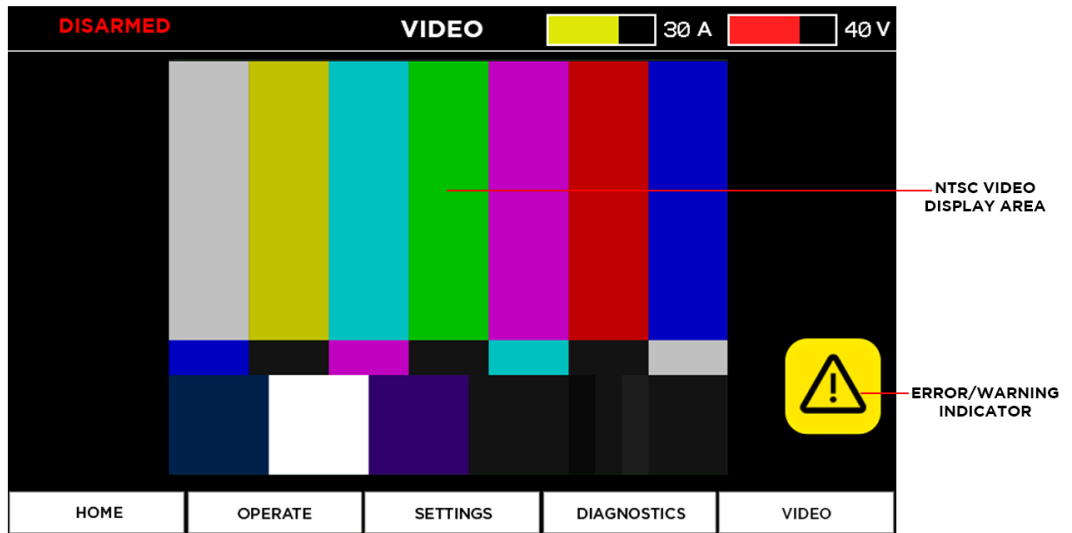
GO TO LOG

HOME OPERATE SETTINGS DIAGNOSTICS VIDEO

Callouts: ERROR/WARNING DESCRIPTION, RECOMMENDED SERVICE PROCEDURE, CODE LOOKUP NUMBER, NEXT PAGE, RETURN TO LOG.



# VIDEO SCREEN

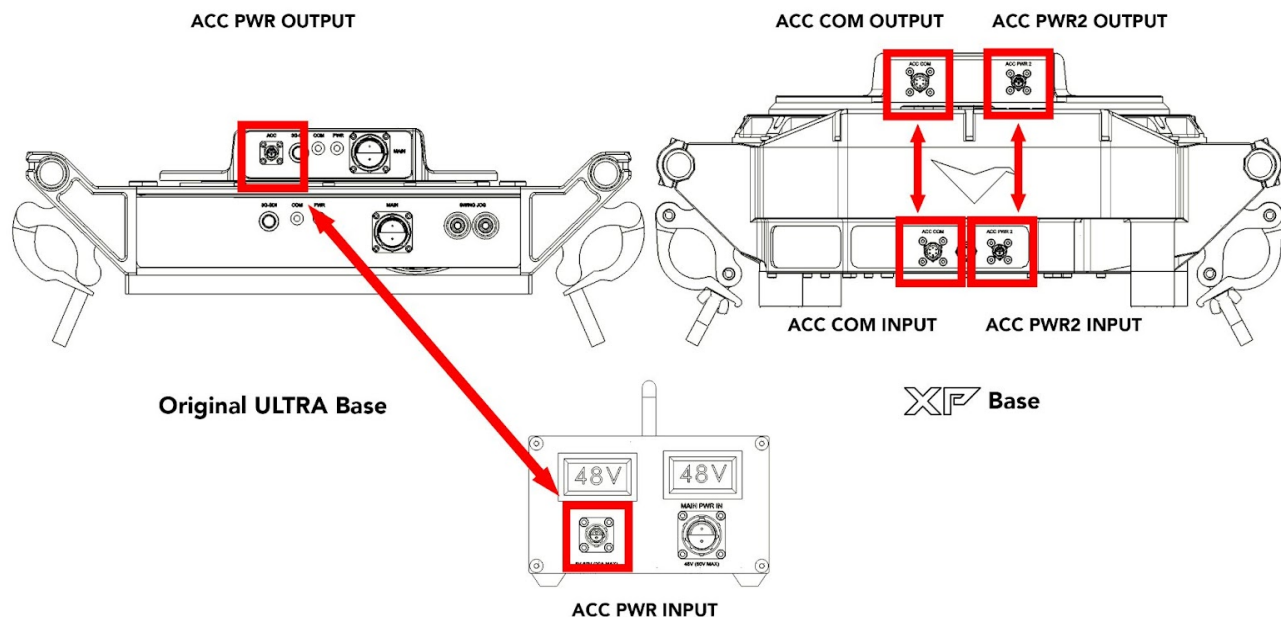


## Using ACC PWR, ACC PWR2 and ACC COM

The ULTRA PSU is equipped with (1) Accessory port for passing power (ACC PWR) through the slip ring integrated in the ULTRA Base, allowing power to be supplied above the Swing axis without tangled cables. A variety of cable sets are available for purchase from MotoCrane for various ecosystems, such as providing 3-pin or 4-pin XLR power from a Block Battery.

*XP Base ONLY: The ULTRA XP Base adds 2 additional Accessory ports (ACC PWR2 and ACC COM) expanding the total number of integrations possible through the XP Base slip ring. This allows 2 different DC voltages (e.g. 12v and 24V) to be passed through the XP Base simultaneously for providing power to a wider range of equipment.*

To use the Accessory ports, start by plugging the cable from the source into the corresponding ACC port (such as the ACC PWR port on the ULTRA PSU). Then, connect the accompanying cables from the same port noted on the ULTRA Base (Such as the ACC PWR port on the ULTRA Base pedestal) to the desired accessory. If using ACC PWR, make sure all cables are plugged in before switching ACC PWR "ON"



Inputs for **ACC PWR** on the ULTRA PSU (bottom) and corresponding outputs on the ULTRA Base (top left)  
Inputs for **ACC COM/ACC PWR2** on the XP Base and corresponding outputs on XP Base Pedestal (top right)

**CAUTION** When using ACC PWR and ACC PWR2 simultaneously, do not confuse what cable set is being used with which ports (e.g. 3-pin and 4-pin XLR Cable Sets). Supplying equipment with the incorrect voltage or reverse polarity may cause permanent equipment failure!

## ACC PWR, ACC PWR2 and ACC COM specifications

ACC PWR has two (2) conductors, rated for passing a single voltage (5-60VDC) at up to 20 amps of continuous current. The ON/OFF switch has an integrated breaker for protecting against over-current events.

ACC PWR2 has two (2) conductors, rated for passing a single voltage (5-60VDC) at up to 20 amps of continuous current, and has no circuit protection/breaker.

ACC COM has six (6) conductors (each rated for 2 amps) and can be used for signal connections such as controlling a stabilized head like the Shotover G1 via hardwired connection, instead of wirelessly.

### ACC PWR / ACC PWR2 Pinout

Connector: Amphenol PT02A-8-4S

Pins A+B = Power +

Pins C+D = Power - (GND)

### ACC COM Pinout- 6 connections, 3 twisted pairs

Connector: Amphenol PT02A-10-6S

Pins A + B = twisted pair

Pins C + D = twisted pair

Pins E + F = twisted pair

For ACC PWR and ACC COM Cable sets, please contact [MotoCrane Sales](#) or visit our [Online Store](#)



## Known Hazards

### **WARNING**

The following list represents a list of known hazards that exist when operating ULTRA. This is not exhaustive, but represents some common hazards to watch out for.

- **Your vehicle.** Set limits and familiarize yourself with the acceleration and deceleration speeds to avoid driving the Booms or Fairing into your vehicle. Both sides (front and rear) can make contact and cause damage.
- **Other vehicles.** Make sure all vehicles on the filming location know where they should be driving to avoid collisions.
- **Fixed objects.** Always know your filming location and plan moves in advance to avoid collisions with things such as signs, bridges, and curbs.
- **Terrain.** ULTRA is designed for moderate off-road use. It is not designed for extreme or airborne conditions. Jumps or shock load conditions produce excess force on the system and can damage the Boom, Isolator, or cause other damage.
- **Speed.** Do not use above rated speed. At the rated speed, wind can be too strong for stable swing movement. Even if traveling below the rated speeds, strong gusts of wind may push the total wind speed above the rated values, preventing the swing axis from moving. Make sure you know how the vehicle and wind speed affect the swing performance.

## Terminology

Clear communication among drivers, operators, and other personnel is essential for safe and high quality production. Below is suggested terminology to allow for clear and efficient communication between operator(s) and driver.

Generally, one ULTRA operator should be in charge of the shoot, but it is up to the driver to receive the request, assess the situation, and only act if it is safe. All operation and movement should be coordinated in advance to prevent unsafe conditions.

### **⚠️WARNING**

Drivers and operators must obey and observe all traffic rules and regulations and operate ULTRA in a safe manner and ensure that all personnel within the vicinity of ULTRA understand and abide by all safety precautions. It is the responsibility of the driver and operator to understand how ULTRA changes a motor vehicle's safety, performance and handling dynamics.

### ULTRA Positioning

- Swing Axis Camera Position
  - "12 o'clock - forward
  - 3 o'clock - vehicle right
  - 6 o'clock - rear
  - 9 o'clock - vehicle left
  - All numbers in between for further specificity
- Lift Axis Camera Position
  - Low
  - Mid
  - High
  - Increments in between for further specificity
- Full position call examples = "Crane at 12, mid" or "Crane at 3, low"

### Tracking Vehicle Position (relative to the subject)

- Position along road
  - Front
  - Along
  - Behind
- Position in lanes
  - Left - tracking car in the lane to the left of the subject
  - Center
  - Right
- Full position call example = "Car to front, left"

## Tracking Vehicle Moves

- "Hold"
- "Drive by, slow" (..medium, fast, etc)
- "Let pass, slow" (..medium, fast, etc)

## Pre-Flight Checklist

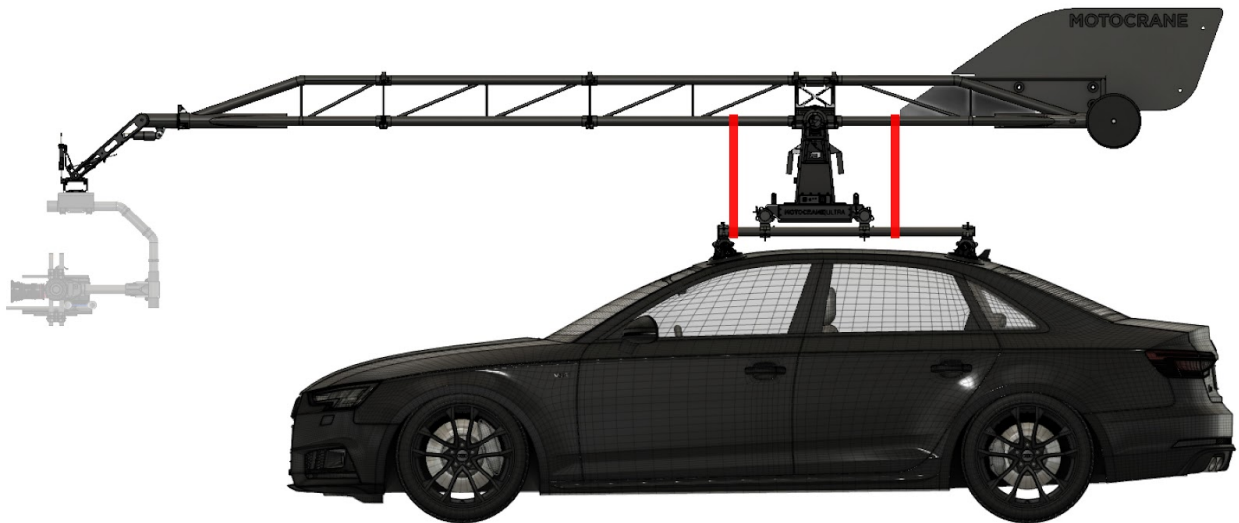
Before taking ULTRA on the road, go through this pre-flight checklist.

- Are all knobs, straps, safety latches, safety pins, and lanyards properly engaged?
- Are all persons at or near the filming location trained and aware of safety hazards?
- Have the driver and operator rehearsed the moves and made an effort to minimize safety hazards?
- Is ULTRA free of damage and performing as expected?

## Transporting ULTRA

Transportation of ULTRA must always be executed in accordance with local laws, regulations, or other legal requirements. We recommend the following steps be observed for safe transportation of ULTRA when the equipment is not being actively used/monitored.

1. Make sure the DISARM/E-Stop button is engaged (pressed down), then remove payload and counterweight, opposite of installation, leaving empty arm and 40lbs/18kg counterweight. *Optional: Payload and counterweight can be retained if they present no risk or danger.*
2. Release the DISARM/E- Stop button (twist clockwise), then move ULTRA to the Home position (level, and aligned longitudinally with the car.)
3. With the DISARM/E-stop button still released, adjust SPEED to "0" for both axes. This is so that any accidental joystick inputs will not cause ULTRA to move during rigging.
4. Secure the Middle and Rear Boom to rigging using two **straps**- 1 in front of, and 1 behind the fulcrum. The straps should be tight, but not overtightened.



5. Engage (pressed down) the DISARM/E-Stop button, which activates the Lift-Axis brake, and cuts power from the motor and motor drivers. You may also turn PSU Main Power switch "OFF" to conserve battery life.

The straps (*illustrated in red*) help to offload the bouncing movements of the arm from the Lift-Axis brake, and prevent any unwanted movement of the arm during transport.

**CAUTION** Attaching straps or manually back-driving the arm while DISARM/E-stop button is engaged (pressed down) may cause damage to the Lift-axis brake.

# Troubleshooting and Maintenance

## Troubleshooting

This section is now a separate, standalone document named ULTRA Troubleshooting Guide. The latest version can be found at [www.motocrane.com/support](http://www.motocrane.com/support).

## Maintenance

ULTRA needs maintenance to keep it running smoothly. This includes cleaning after use and lubricating or replacing moving elements. Please see the table below or contact [support@motocrane.com](mailto:support@motocrane.com) to discuss appropriate maintenance for your use.

Exercise	Frequency	Indicators
Wipe down the entire system with a dry cloth.	After every use.	Prevent surface rust on steel, keep the system clean and functioning smoothly.
Lubricate OUTSIDE swing bearings.  <i>Original ULTRA Base only</i>	As needed.	Unlubricated swing bearing will cause jerky movement. Required grease:  Base Type: Lithium Complex NLGI No: Grade 2 Drop Point: 600 [deg F]



## Weather & Water

Exterior ULTRA modules are weather resistant. The Controller and Power Supply Unit go inside the vehicle and are not weather resistant. After using ULTRA in wet or dusty conditions, wipe all components down with a soft dry cloth. Do not spray any cleaning liquids on or inside components of ULTRA that are not water resistant.

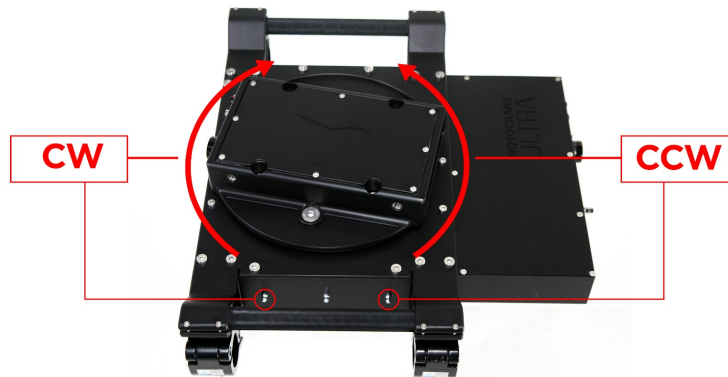
Module	Rating
Base/XP Base	IP-65
Turret	IP-65
Booms, Isolator, Fairing	IP-65
Controller	NOT WATER RESISTANT
Power Supply Unit	NOT WATER RESISTANT

## Original ULTRA Base (swing-axis) lubrication

The gear set housed within the ULTRA Base is lubricated and may require re-lubrication based on frequency and conditions of use. The primary symptom of a unit requiring re-lubrication is sticking during rapid deceleration/stopping of the Swing axis, even with high smoothing values of 95-99.

**CAUTION** Over-lubrication can result in internal seal failure and may cause permanent equipment damage. We recommend contacting [support@motocrane.com](mailto:support@motocrane.com) to confirm that your unit needs re-lubrication before proceeding.

1. Determine which direction your unit is sticking in when stopping (CW or CCW). Units needing lubrication will likely only exhibit symptoms in one direction. If unit is sticking when stopping in both directions, proceed with both procedures.



2. Use either Swing Jog button to slowly turn the Swing Axis and add 1 pump (.5 oz MAX) of compatible grease (listed in the Maintenance section of this manual) to the corresponding grease nipple. This ensures uniform distribution of the grease.
3. If the unit still shows signs of sticking, the main chamber also needs lubrication. Using either Swing Jog button, slowly turn the Swing Axis and add 2 pumps (1 oz MAX) to the center grease nipple.



# Specifications

## ULTRA Modules

- Base/XP Base
- Turret
- Booms
  - Front Boom
  - (2) Middle Booms
  - Rear Boom
- Isolator
- Fairing + Fairing Extension
- Counterweight
- Controller
- Power Supply Unit (PSU)
- Cables:
  - (1) 10' Main Power Input Cable
  - (1) 10' Controller COM Cable
  - (1) 12' PSU to Base Main Power Cable
  - (1) 1.5' Base to Turret Main Power Cable
  - (1) 2' Power Input Flying Leads
- Miscellaneous: Fasteners, safety pins, hex wrench

\*SWING NOTE – There is a finite amount of torque to available to Swing ULTRA 360° around the car. Wind speed, vehicle speed, payload size and desired swing speed are all factors which contribute to what is achievable. The Controller's Touchscreen User Interface is an essential feedback tool for understanding how much power the swing motor can handle. Greater vehicle speeds are achievable, but the swing motor may not achieve a complete rotation at these speeds. Positioning movements, and half-revolution swings are acceptable. Always follow notifications on the Touchscreen User Interface, which include notifications for motor temperature and current.

You must test the system within its ratings and determine what is achievable for your application. If your application demands additional performance, please contact us.

## Mechanical

### Module Weight

Controller: 4lbs

Power Supply Unit: 2lbs

Original ULTRA Base: 67lbs

*ULTRA XP Base: 100lbs*

ULTRA Turret: 62 lbs

All Booms: 45lbs

Fairing: 7lbs

Max Payload: 55 lbs

Certifications: CE, RoHS

## Working Performance

Max Acceleration: 1g lateral, longitudinal

Operating Temp: MIN: -30°F, MAX: 120°F

Suitable applications (SSG ONLY)

Roof: Flat, glossy mounting points (non-fabric, non-glass)

Range of Motion: Unlimited Swing Rotation, 35 deg up, 35 deg down

Top Speed: 360° Swing rotation limited to 70mph wind speed

SEE \*SWING TORQUE NOTE ABOVE

*XP Base only: 360° Swing rotation limited to 100mph wind speed*

Boom Length: 12' reach from center, 16.5' end to end

Max Controlled Speeds: 7.5 sec 360° Swing, <2sec -35 to +35° Lift

*XP Base only: 5.9 sec 360° Swing*

Weather: IP65\* (Can be sprayed with low pressure water from all directions)

*\*Except for Controller and PSU.*

## Electrical

Control: Wired MotoCrane CAN-BUS control via MotoCrane Controller

PSU Main Power Input: 48VDC (45V-60VDC MAX), 50A Peak (3kW PEAK)

PSU Accessory Power Input: 5V-60VDC, 20A MAX

PSU Output: 48V Power, CAN-BUS Signal

Internal System Voltage: 48V

# Revision History

Revision	Date	Description
1.0	01NOV18	Initial Release
1.1	22JAN19	Added details about limits protection and controller LED, updated GUI views and error codes since V1.0
1.2	17APR19	Added details about proper Z-Axis tuning, temperature acclimation of hydraulic dampers Updated illustration of Turret (remove turret lock)
1.3	20JUL19	Illustration and description for use of M12 washers Notes about Payload, AUW Weight in kilograms added to AUW vs CW Chart AAG for MoVI XL payload building Notice added for CW fine tune balancing required Transporting ULTRA added ULTRA Base re-lubrication added
1.4	09FEB23	Peak power consumption added to Electrical specs Added XP Base, ACC PWR, ACC PWR2, ACC COM

MotoCrane Technical Support  
[support@motocrane.com](mailto:support@motocrane.com)

This content is subject to change.

Download the latest version from  
[www.motocrane.com/knowledge-base](http://www.motocrane.com/knowledge-base)

If you have any questions about this document, please contact MotoCrane, LLC by sending an email to [contact@motocrane.com](mailto:contact@motocrane.com).

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