STEADICAM®

Ultra²

Ultra² Quick Start Guide

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Ultra² Quickstart Guide

Version 1

This guide assumes the operator is familiar with the original Ultra features and benefits, as well as general Steadicam principles and practice. We will limit this guide to what's new in the Ultra² sled (and there's still a lot to discuss!).

The original *Ultra Operator's Guide* and the *Ultra Manual* are available online at www.steadicam.com.

Topics:

Camera mounting stage mechanics and adjustment

Stage PCB boards, connectors, switches, and pots

Telescoping post clamps and adjustments

Monitor mounting

Slanted F-bracket

Ultra² gimbal centering (how to use the blue whale!)

Ultra² gimbal remote control

Go-to motors and controls

Frameline generator and voltage display adjustments

Ultra² artificial horizon sensor and adjustments

PowerCube batteries and chargers

28 or 14 volt operation

Pivoting Ultra² battery mount

Sliding accessory plate

Base electronics and the VDA

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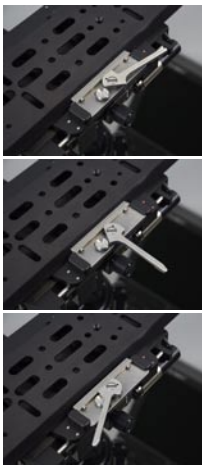
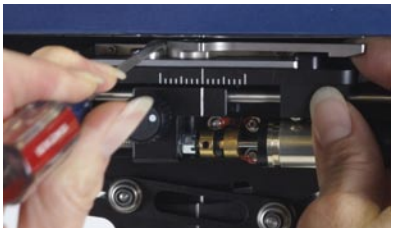
The Stage Mechanics, Adjustments & Connectors

Stage mechanics and adjustments

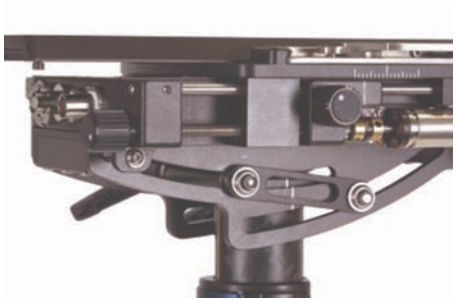
The dovetail clamp lever has three positions: forward and locked, 90º for adjustments, and 60º back for mounting or removing the dovetail plate. A safety button must be pushed to move the lever to the unlocked position; the same button holds the lever fully open, making flips to low mode and back a bit easier. Do not force the lever backwards beyond its stop.



Even with a very wide camera, the clamp lever can always be accessed, but the safety release button might require a thin screwdriver.



The stage is easy to adjust. The knob at the right rear controls fore and aft, and the two knobs on the side control side-to-side movement.



The Ultra^2 motorized stage is position sensing – much like a focus motor system for a lens. One use of this feature is to set the stage to the center of travel, both fore and aft and side to side – great for initial setups.

Pushing the double pole momentary switch on the “nosebox” to the “C” side centers the stage.

Flipping the switch the other way (“L”) sets the stage to a pre-programmed position (more about that later.)

The speed and direction of the motors is set by the switches and thumbwheel pots on the left (port) side of the nosebox. Note that the motor direction switches also have a center-off position, just in case you are in an odd RF environment or you don’t want your stage motors to move. Remember this “function” when a stage motor stops working between takes!

The electronics in the stage and nosebox are on “plug and play” circuit boards, easy to replace if there’s ever a problem. It’s also easy to access to the inside of the stage, add or swap stage motors, adjust the bearings, etc., but that’s beyond the scope of this quickstart guide.

The stage connectors:

At the rear of the stage, left to right (port side to starboard side):

Camera power connector. 3 pin Lemo, +28, +14, and ground.

HDSDI in. This connector has no connection to the distribution amplifiers or DA's. BNC

HD component video in. 6 pin Lemo

Standard definition (PAL/NTSC) composite video in. BNC

At the front (nosebox), left to right:

Power for focus motor receiver/amplifiers. 3 pin Lemo (+28, +14, and ground)

Stubby black antenna (no connection, just thought you'd like to know what it was)

Tally light connector (future functions possible)

Nosebox port side:

Pot to adjust Tally sensor sensitivity

Rotary switch to set remote channel (0-8)

Forward, flanking the stage:

Port side:+12VDC (regulated) and video in. 4 pin HRS.

Starboard side: +14VDC and video out. 4 pin HRS.

Base Connectors, Post Clamps & Low Mode

While we're at it, the base connectors:

Top center: HDSDI, direct connection to HDSDI connector in stage; no connection to the video DA's. BNC. If your video DA fails, you can use this for a direct connection to the monitor.

Top left: RCA video in/out for a video recorder. The small slide switch sets in or out.

Top right: Video out and +14 VDC. 4 pin HRS.

Monitor connector: power, component video, and data line. 8 pin Lemo.

HD component video. 6 pin Lemo

DC Power plug, adjustable +4.5 to +9.5 VDC. Remove plastic cap and use small screwdriver to adjust. Factory set at 7.2 volts.

At the bottom center is the auxiliary 28 and 14 volt, 3 pin Lemo, good for powering gyros or other accessories. The connector can also be used as a power input connector. You can connect an extra battery to help power high amperage, 12 to 14 volt cameras like the Panavision Genesis.

If you are not using the HDSDI and/or the HD component lines, you may use them for other purposes, such as a microphone line down the post or speaker wires up the post. However, only use the red or blue component BNC inputs; the green line shares wiring with the standard composite BNC input and is connected to the video distribution amplifier.

Post clamps

The Ultra²'s post clamps are positive locking. They are either fully open or closed, and they snap shut with a healthy, positive click. Do not force the lever further open.

The clamps are easily adjusted with a small Allen wrench. Adjust the screws with the lever closed – just go slowly. Adjust both screws equally, so the clamp remains parallel to the housing. If the screws are over-tightened, the lever may not open or close.

Monitor mounts

There are two monitor mounts on the Ultra^2, one on post four (the bottom post) and one on post three. The two mounts are identical, and permit a large vertical range of monitor positions. The 2nd monitor mount can be used for securely mounting a gyro, recorder, 2nd monitor, etc.

Removing the monitor mount and flipping to low mode

Always support the monitor. Loosen the Kipp handle, depress the safety button, and slide the monitor bracket straight up or down. To replace, engage the monitor bracket with the dovetail squarely and slide it down until the safety clicks in. Tighten the Kipp handle. The monitor will be square to the post.

Also for low mode: The safety for the slanted F-bracket has been redesigned for simplicity and ease of use, with the safety pin centered on the arm post.

regular operating

There are two positions for the F-bracket, one for regular side operating and one for goofy-foot. Be sure to angle the F-bracket away from you (about 45 degrees forward) when standing in the Missionary position.

goofy foot operating

Gimbal, Remote & Go-To Buttons

The gimbal and the remote

The Ultra^2 gimbal has been completely redesigned with higher-precision, high load bearings. The gimbal body, yoke, and handle are strong and precisely registered to each other. The yoke's new shape and contoured edges extends the range of motion without interference and promotes a better operating grip over a wider range.

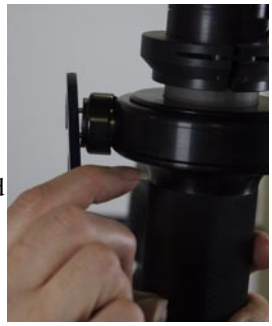
The operator can easily center the gimbal in the field – useful if you've taken apart the gimbal for cleaning, taken a really bad bump, etc.

Here's how:

• Place the gimbal on the docking stud (as you would for normal balancing), give yourself a four second drop time, and aim the camera along a line through the two bearings in the yoke.

• Balance side to side only, then rotate 90 degrees (aim the camera at the docking stud) and balance precisely fore and aft. Do not touch the stage again.

• Rotate the sled 90 degrees, so the camera is again aimed along a line through the two yoke bearings. If it is level, great. If not, use the "blue whale" tool to loosen one of the two end caps 1/10 of a turn or so, and tighten the other one to the same degree.



• If it gets worse, you chose the wrong one to loosen! If it gets better, keep going until it is perfect. Do not rebalance fore and aft with the stage.

A small warning: do not over-tighten the caps against the bearings, as this will cause binding. Just tighten each cap down to touch the bearing. If the bearing starts to bind, just back off one of the two end caps until the gimbal is free again. The blue whale tool also makes it easy to take apart and clean the gimbal if this ever becomes necessary.

Removing the remote

Whenever you want to hand the remote off to your assistant (or charge the remote's battery), unscrew the knurled ring.

The remote is held in place by two sets of pins. The forward set of pins slips into two small holes, and the rear set of pins are captured in a groove in the knurled ring.

When returning the remote to the handle, insert the pins carefully and do not force anything.

If you want, you can remove the pins and just Velcro the remote to the handle. A "half moon" filler plate is supplied with gimbal so that if the remote is removed, the filler can take its place.

CHECK!! The remote's green LED blinks continuously when the battery gets low. To charge the remote, remove it from the gimbal handle. Plug the supplied cable into the remote and the other end into any one of the three 4-pin HRS connectors on the sled.

Leave the sled on as you charge the battery. It takes about XXX(Charge rate is currently approx 20mA which gives us an approximate 5Hr charge time for a dead (nominal 100mAH, 120mAH typical) battery. Can possibly drop this down to 1Hr.) hours to charge a completely discharged remote battery. When the battery is charging, the green LED will be on. When the lithium-ion battery is fully charged, the green light goes off. Battery life can vary depending on how often the transmitter is used and what the storage and operating conditions for the transmitter are.)

The remote control is ergonomically designed, and it rotates to any angle for your comfort, whether you operate normally or goofy-footed. To angle the remote, loosen the small set screw in the curved handle of the gimbal. Orient the remote by screwing the curved handle in or out. If the handle is too far in, you can't easily remove the remote via the blue knurled ring, and you might have to back the handle off one full turn. Loosening the setscrew and unscrewing the handle is also how you access the "tilt" bearings and shaft for cleaning.

"Go-to" Buttons

On the remote control, there are three "go-to" buttons on one side in addition to the four original "trim" buttons (as well as two other "spare" buttons).

The go-to buttons move the stage to specific marks, defined by the operator. One position is usually the nominal balance, and the other two are programmed for some other part of the shot. During the shot, the operator (or an assistant holding the removable remote) pushes a go to button to move the stage precisely to a new trim setting. Pushing the "home" button at any time returns the stage to the nominal trim. No more counting revolutions or so many seconds; the stage moves exactly where you want it to — and back.

In addition to big tilts and Dutch angles, you might set a button to "post perfectly vertical and in dynamic balance," and use another button for the nominal trim for the shot at hand. Or set the three buttons to roughly account for the movement of film in some magazines.

Programming the go-to buttons is a snap. Move the stage to the desired position, either manually or using the traditional trim buttons. Then hold one of the go-to buttons down for three seconds. The green LED will flash twice, and it's set. You can even program any button on the fly, during the shot, if you have the mental reserves...

Note that both fore-aft and side to side positions are programmed via the go-to buttons. Trimming fore and aft may slightly alter your precise side to side balance, or you may want to program in a severe Dutch angle. You can even program two or three buttons for the same trim if you like, so you don't have to think about which button to push!

The positions are stored in non-volatile memory, so changing batteries or turning off the sled does not erase your presets. The center go-to button on remote shares the same preset as the "L" position on the switch on the nose box. The "L" position is programmed exactly like the center go to button on the remote, and the red mode LED on the nosebox will flash to confirm programming.

Holding one of the go-to buttons down for more than six seconds will clear all programming for that button and make it non-operational. The green LED will flash 3 times.

To avoid interference with other systems, 1 of 8 channels can be selected via the rotary switch on starboard side of nose box. The remote and the receiver must be on the same channel. Simultaneously holding down the top 2 go-to buttons for 6 seconds will enter the remote into a channel change mode. The number of LED blinks will correspond to channel selected. Change channels by pressing the fore or aft remote buttons (channel up or down). After the proper channel is selected, the programming mode will time out after 9 seconds and re-flash the selected channel number. Channel 0 corresponds to 8 flashes.

(For operation outside of the USA) To select between US and UK frequency operation, there are two jumpers that must be changed. One jumper is inside the nosebox, the other is inside the remote. They must match for the system to work. The jumpers are set at the factory at the time of shipping. (902 – 928MHz US and 868 to 870MHz UK)

The green "PWR" LED on nose box comes on when the CPU is operational.

FLG, Voltmeter Box & Artificial Horizon

FLG/Voltmeter Box

The box is easily removed for servicing, upgrading, etc.

The frameline generator (FLG) and adjustments:

Superimposing the display on a composite (PAL/NTSC) image.

Adjusting the framelines, position, brightness, and contrast (type??

Volt/amp meter (at rear of base electronics)

When either a 12V or 24V low battery condition is detected the small battery symbol on the backlight voltmeter will flash.

The voltmeter has 4 different viewing modes selected by the pushbutton on the port side. The modes change depending on whether the battery on switch is set to 12 or 24 volts.

For 24V operation:

Mode 1 or “V1” (top LED) will display 24V battery voltage

Mode 2 or “A1” will show the current being drawn from the 24V supply.

Mode 3 or “V2” will show the voltage from the DC-DC converter. (Typically 14.4 to 14.6VDC)

Mode 4 will show what ever is selected on the voltage select switch.

Alternately, Mode 1 can display the low voltage threshold. The low voltage threshold display is selected by switching to the “24T” position. Adjust the voltage via the “24T” pot on the rear of the box. At the factory, this value is set to 29.6 volts, giving you a lot of warning time under most circumstances. If your loads are low, you may want to set the voltage warning lower, but we recommend that you don’t set it lower than 26 volts. For “12 volt” operation, the factory sets the low battery warning at 13.8 volts.

For 12V operation:

Mode 1 or “V1” (top LED) will display 12V battery voltage.

Mode 2 or “A1” will show the current being drawn from the 12V supply.

Mode 3 or “V2” will show the voltage from the front panel accessory voltage supply.

Mode 4 will show what ever is selected on the voltage switch select switch.

Voltage Select Switch (Mode 4):

“ACC. V” = Voltage from front panel accessory connector.

“12T” = low voltage threshold for 12V operation. Set via “12T” pot on rear of box.

“12V” = Voltage from DC-DC converter in 24V mode or directly from battery in 12V mode.

“12A” = Current from DC-DC converter in 24V mode or directly from battery in 12V mode.

The default mode is “12A.”

The Artificial Horizon adjustments, and displays

The Ultra² artificial horizon has three controls – a button and two rotary switches. The button on the top of the electronics base controls the zero offset, direction, type of display, and horizon on/off. The switches are accessible via holes on the port side of the base. One switch controls the "range" of the display and the other the "rate."

The button on top

Pushing the button for less than 1 second will reset the sled level (sets the "zero offset"). Place a small bubble level on a surface parallel to the bottom frame of your camera (usually the dovetail plate works well). Angle and hold the sled until this bubble reads level, then push and release the horizon button quickly. The display should now read "level."

Pressing the button for more than one second but less than three will flip the display direction – useful for going to low mode and back. The center two LED's on display will flash to confirm that a mode change has occurred. Be sure to re-set the zero offset when going to low mode and back.

Pressing the button for three to five seconds will switch LED display from bar graph mode to "night rider" dot mode. Again, the center two LED's on the display will flash to indicate that a mode change has occurred.

Pressing the button for five to thirty seconds turns Horizon system off or on. All LED's will be off.

Pressing button for more than 30 seconds resets everything to default values.

The range switch sets the sensitivity of the display. The smaller the range, the more sensitive the display will be. The default setting is "0" or +/– 5 degrees. We suggest you experiment with settings 1 through 6. The range choices beyond 5 degrees might be useful if one wanted to hold a specific Dutch angle. Setting "F (15)" is the full range of the sensor.

Range Choices

Setting	+/- Degrees
0 (default)	5
1	2
2	2.5
3	3
4	3.5
5	4
6	4.5
7	5
8	5.5
9	6
A (10)	6.5
B (11)	7
C (12)	8
D (13)	9
E (14)	10
F (15)	180

The rate switch sets the integration (or averaging) time. The longer the integration time is, the slower the response of the system. A longer integration time avoids the big, erroneous signals as you accelerate or decelerate. The faster the integration time, the more the indicator will jump around. Experiment and pick the "rate" you like.

There are sixteen positions, from zero to nine, and A through F. The default setting is "0" which equals 5Hz, a good compromise. Position one (.75Hz) has the most integration and slowest response. Position F has the least integration and fastest response. See the chart below:

Rate Choices

Low Pass filter settings (6-Pole IIR filter)

Setting	Hz
0 (default)	5
1	0.75
2	1
3	2
4	3
5	4
6	5
7	6
8	7
9	8
A (10)	10
B (11)	12
C (12)	13
D (13)	16
E (14)	18
F (15)	40

The range switch interacts with the rate switch. Typically, the smaller the range, the less integration you will need. Ranges or rates significantly larger than the default values are not typically used.

Batteries

PowerCube batteries and rotating mount

The PowerCube batteries are 5.7 Ah min, 14.8V. Please read the literature that comes with each battery and charger for details.

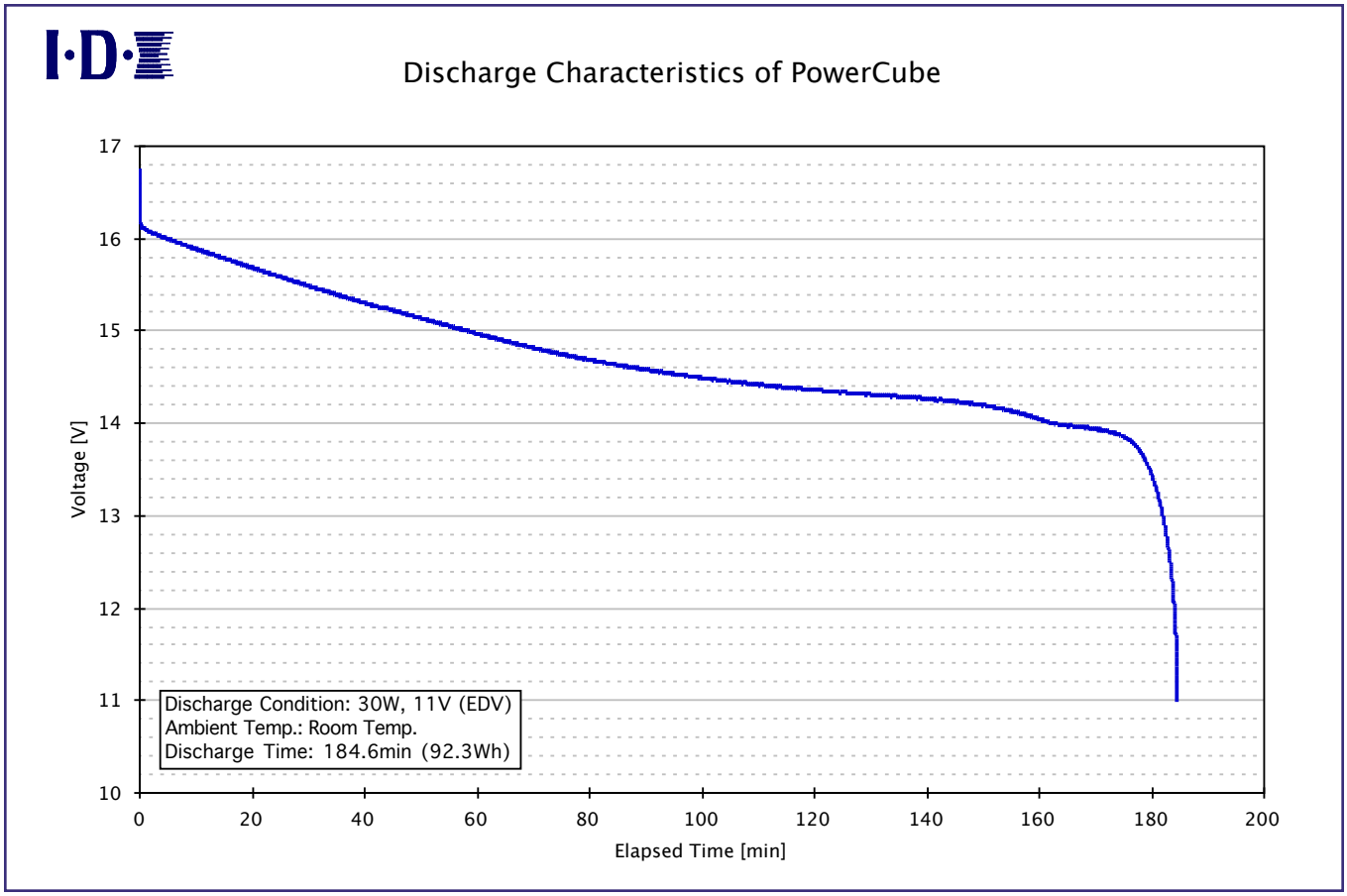
Generally we use the battery in pairs, generating (nominally) 29.6VDC. It's best to use batteries that are roughly equally charged. Both batteries power the 14.4 volt DC to DC converter nestled between the batteries.

The on-off switch has two positions, 12 and 24 volts. In the 12 V position, only the rear battery is connected and the DC-DC converter is disconnected. For a lightweight, 14 volt running rig, you might want to remove the forward battery, and/or use one Endura 7 battery. (Use two 7's for a lightweight 24 volt rig).

The LEDs on the battery mount will blink when the low battery threshold is reached. This feature will only work when FLG/Voltmeter box is installed (see below). The circuit breakers in battery mount are the standard automotive type.

The battery mount pivots approximately 180º to facilitate static and dynamic balancing, and for inertial control. Pivoting the battery all the way down will enable it to get closer to the sled, reducing pan inertia and/or help with balancing heavy cameras. Pan inertia is maximized with the batteries horizontal.

Nestled inside the dovetail base, there's a sliding accessory plate, secured with thumbscrews. You can slide this plate fore or aft to mount a small recorder, transmitter, etc.



As your Lithium-Ion PowerCube™ batteries are used, the voltage drops at a fairly regular rate. However, the sample 30 watt discharge chart shows some interesting information. Hot off the charger, a single battery will read 16.8 volts, but within a minute drops to 16.1 volt when under load. This is normal, and not a cause for concern or an indication of a weak battery.

At the 30 watt discharge rate, the battery voltage drops slowly for about 3 hours from 16.1 volts to the "knee" voltage of 13.8 volts – slightly faster at the upper end, and more slowly as the battery is discharged. When the voltage reaches 13.8 volts, the voltage drops off very quickly to 11 volts (within 5 minutes). The batteries have a self-limiting cut-off of 11 volts.

Based on this discharge curve, we suggest you set the Ultra's battery warning at 13.8 volts if your total load is about 30 watts and 5 minutes is enough warning time.

If you are working with 24 volt film cameras, where the load changes when the camera runs, you might set the battery warning higher, to 28.2 or more volts for the two batteries in series, again depending on the load, how much warning you need, etc. If the voltage drops below 26 volts when the camera is not running, you will not get any appreciable run time with most 35mm, 24 volt film cameras. See page 8 to see how to set the battery warning.

When running electrically noisy, or high current draw cameras or accessories, low voltage indicators may briefly appear. Voltage sag due to the large loads or excessive noise spikes on the power lines may surpass the threshold settings.

Charging your batteries

There is no memory effect with Lithium-Ion batteries, so there is no need to deep discharge your batteries to improve their response. Charging a completely discharged battery (11 volts) to fully charged (at 16.8 volts) with a 3.0 amp charge takes about 2 hours and 40 minutes, but the battery reaches 80% of a full charge (at about 16.5 volts) in just over 90 minutes. The last 20% of the charge cycle takes over an hour.

We suggest that if you have the time, fully charge your batteries. If you are in a hurry, however, charge them only for an hour and a half or less, as an 80% charge of these batteries is still a lot of watt-hours, and typically you are using two of them. Also don't discharge them much below 13.8 volts if possible.

If you have two of the VL-4S chargers, split the batteries equally between the chargers. Although all batteries are charged simultaneously, with one, two, or three batteries on the charger, the charge current is 3.0 amps per battery. When the fourth battery is added to the charger, the charge current for each battery drops to 2.3 amps, which will increase the time it takes to charge each battery.