Steadicam® AXIS™ User Guide

POWERED BY VOLT™

STEADICAM®

LIT-850000 Rev. A

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TIP: *This table of contents is hyperlinked to navigate you through the respective pages. Jump back to this page by clicking on any page number throughout the user guide. Easy.*

Introduction

The Steadicam® Axis™

Thank you for adding a Steadicam Axis system to your toolkit! In a world with hundreds of camera stabilizers, only Steadicam has over 50 years of experience creating the finest, most innovative stabilizers used around the globe. No other type of stabilizer maintains that important direct connection between operator and camera, allowing unmatched artistry, nuance and feeling with every camera move.

Axis offers our third generation of Volt™ electronics with its new pan assist motor to complete all three axes of movement! This is a fully mechanical stabilizer, but with electric motors added to simulate any rig behavior you desire; from slow and inert to quick and whippy. Better yet, you can mix and match the levels of assist on each axis and change them on the fly.

The Axis is a high-performance, lightweight, affordable rig optimized for modern mid-size cinema cameras. Like all Steadicam models before it, Axis is designed to be user-friendly, tool-free and versatile, so the operator can quickly and easily configure the system for each shot.

And like every other production skill set you've built, operating a Steadicam takes training, technique and practice. It doesn't automatically make great shots. But if you put in the time (and better yet take a workshop) the Steadicam Axis will allow you to achieve a new level of cinema quality shots!

Technical specifications:

- Sled weight 10lbs (4.5 kg)
- Total payload* 20lbs (9 kg)
- 3-axis Volt electronic stabilization built in
- 2 discrete HD-SDI video lines top to bottom
- Multiple P-tap and 3-pin 12V power ports

Kit includes:

- Axis sled with Volt gimbal
- High bright (1200nit) SDI/HDMI monitor
- Choice of Gold-mount or V-lock battery mount
- Steadicam A-30 Arm
- Steadicam A-30 Vest
- Axis docking bracket
- Cables** Volt gimbal, BNC video (2), monitor power
- 1/4"-20 threaded balance weights (6)
- Metric Allen wrenches and fasteners

** **Total payload** includes camera, battery, monitor, balance weights and additional accessories. Based on Steadicam A30 arm and vest.*

*** **Camera power cables** not included, see page 38 for optional accessories.*

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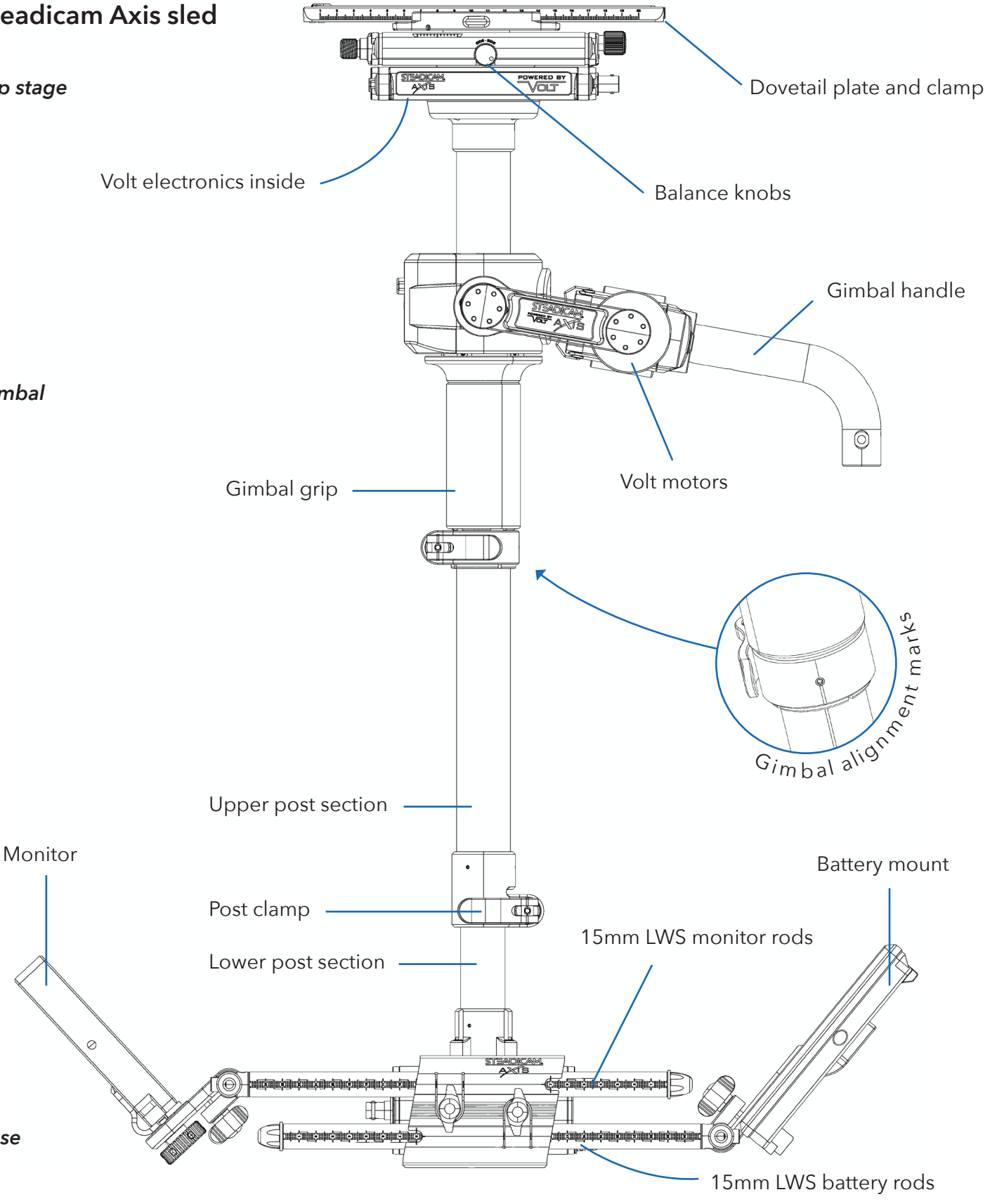
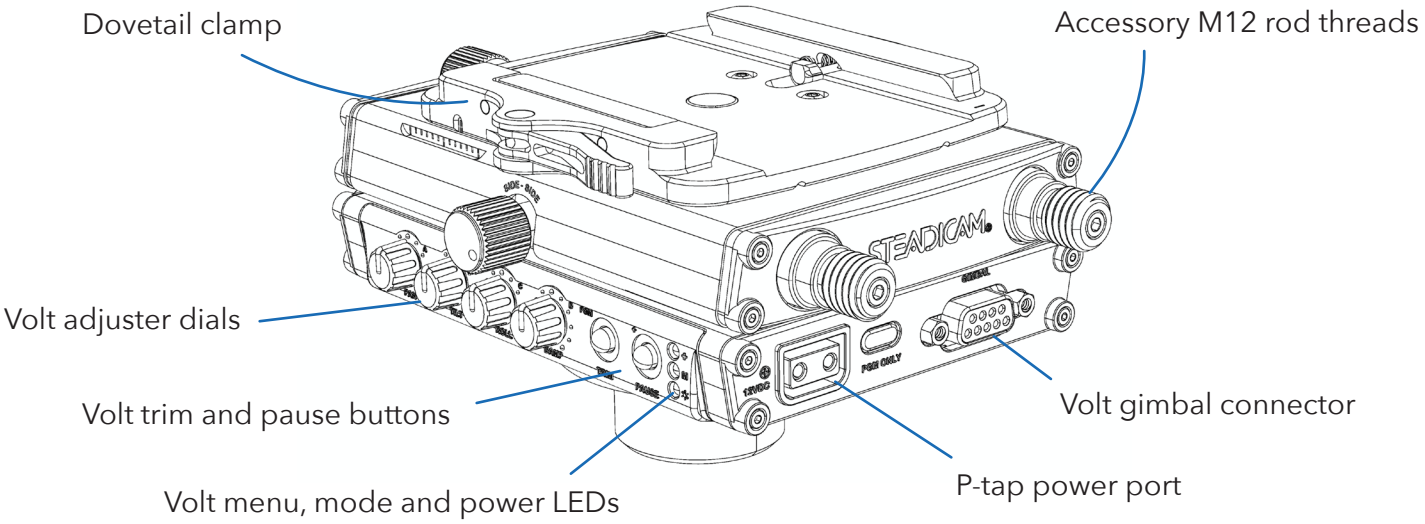
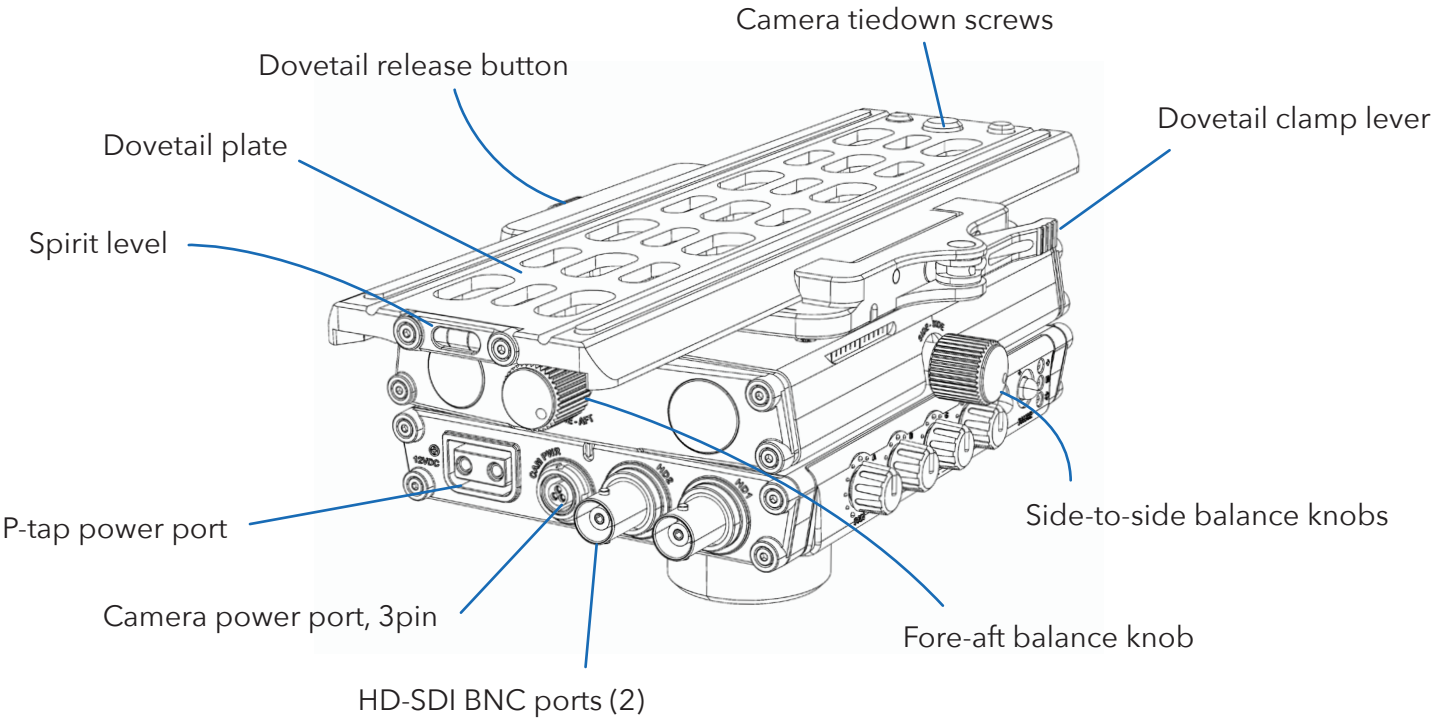
Get to know the Axis components

Steadicam Axis sled



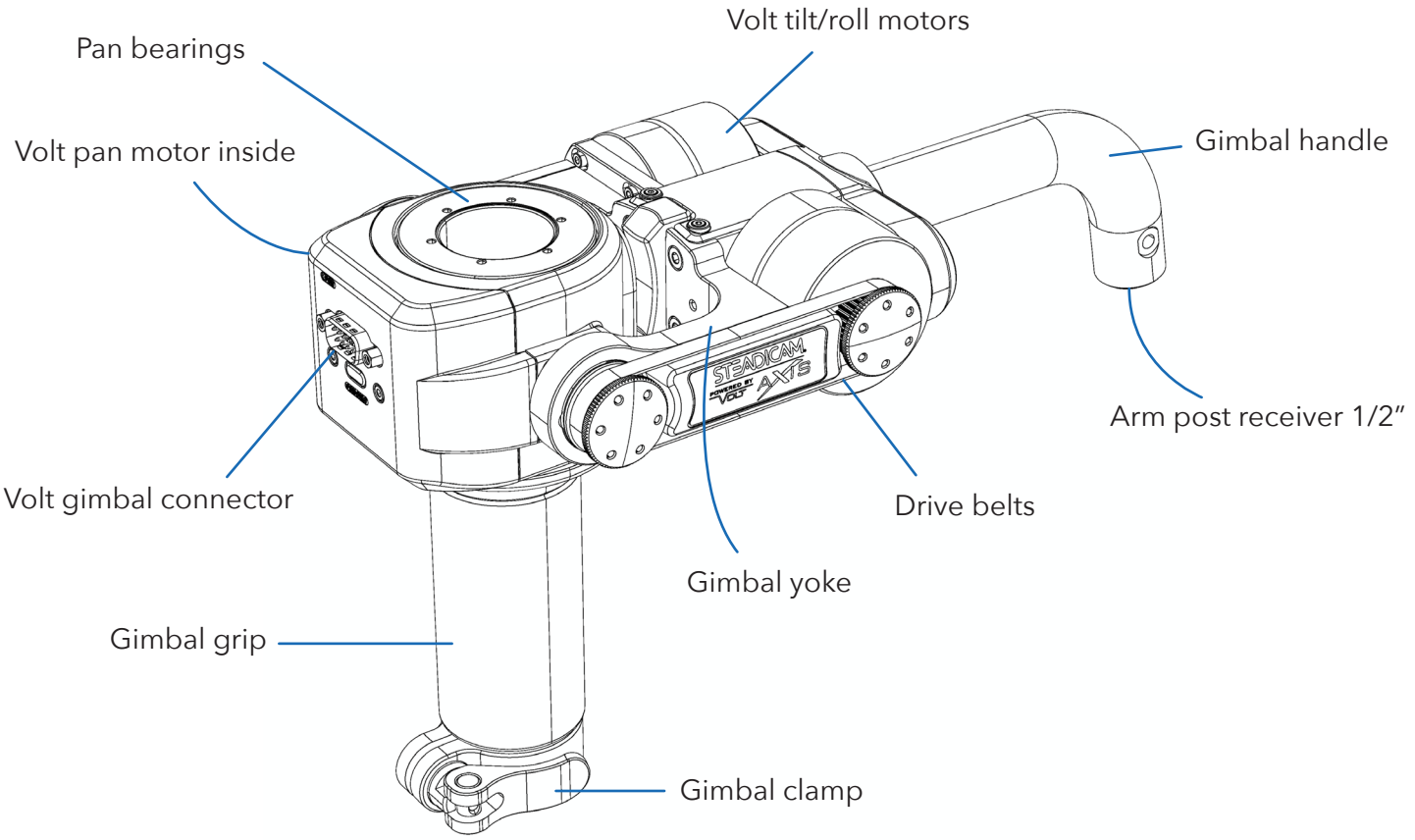
Top Stage components

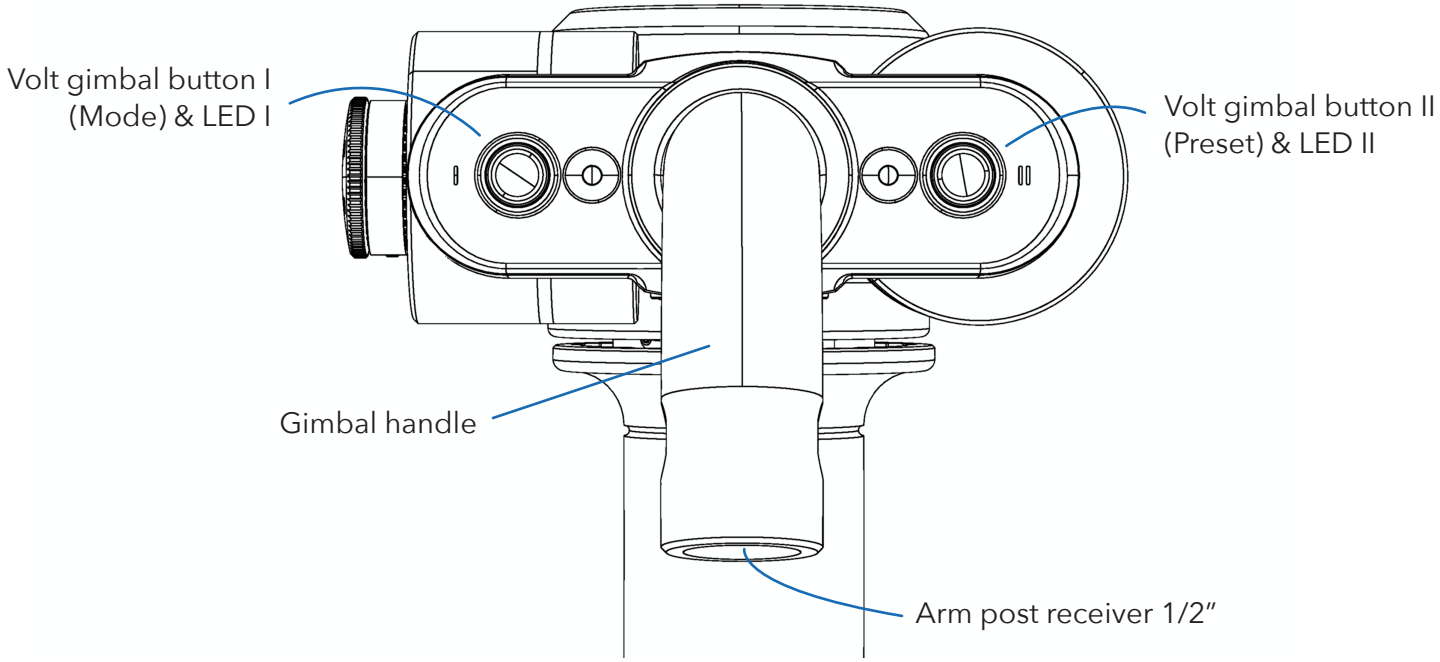




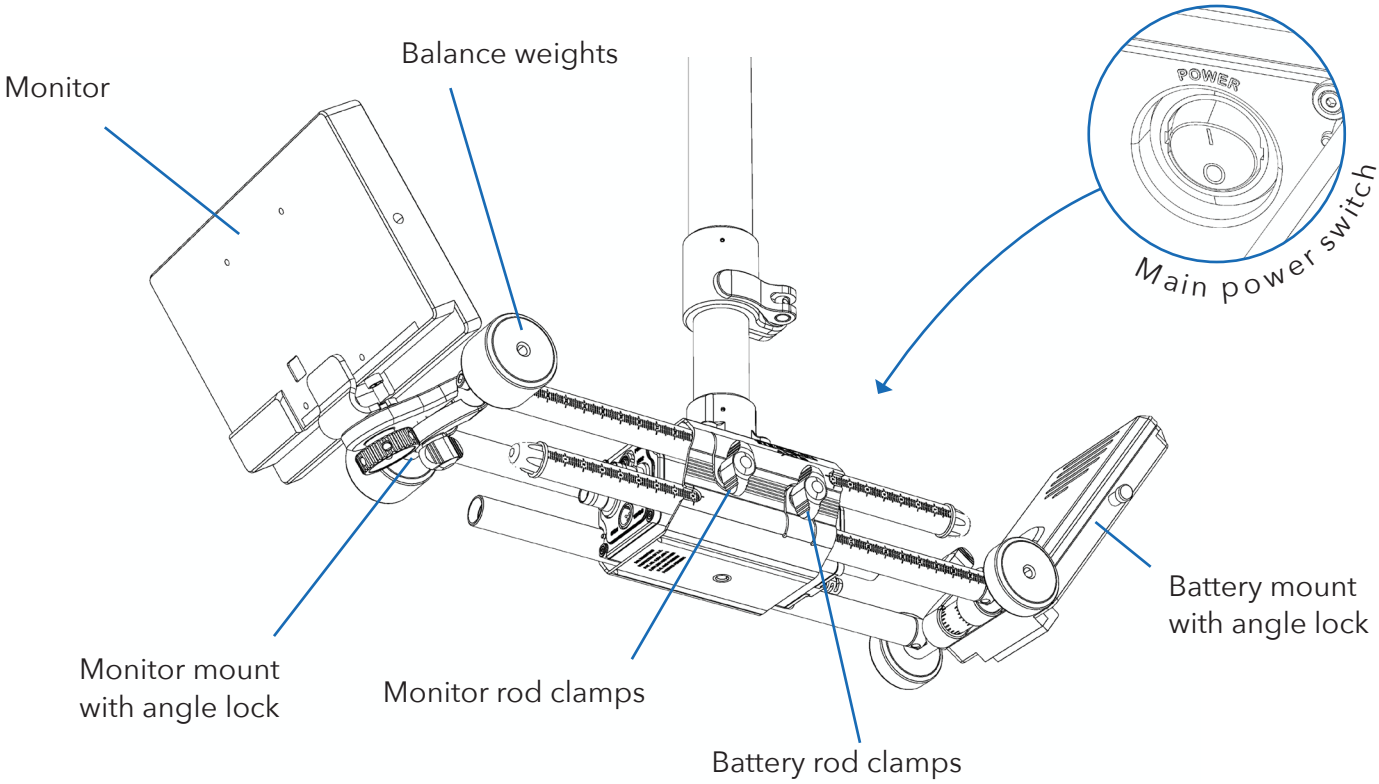
IMPORTANT: *Do not plug anything into either USB-C port (top stage or gimbal), they are for factory programming only. The Volt electronics are not user serviceable except as shown in this guide.*

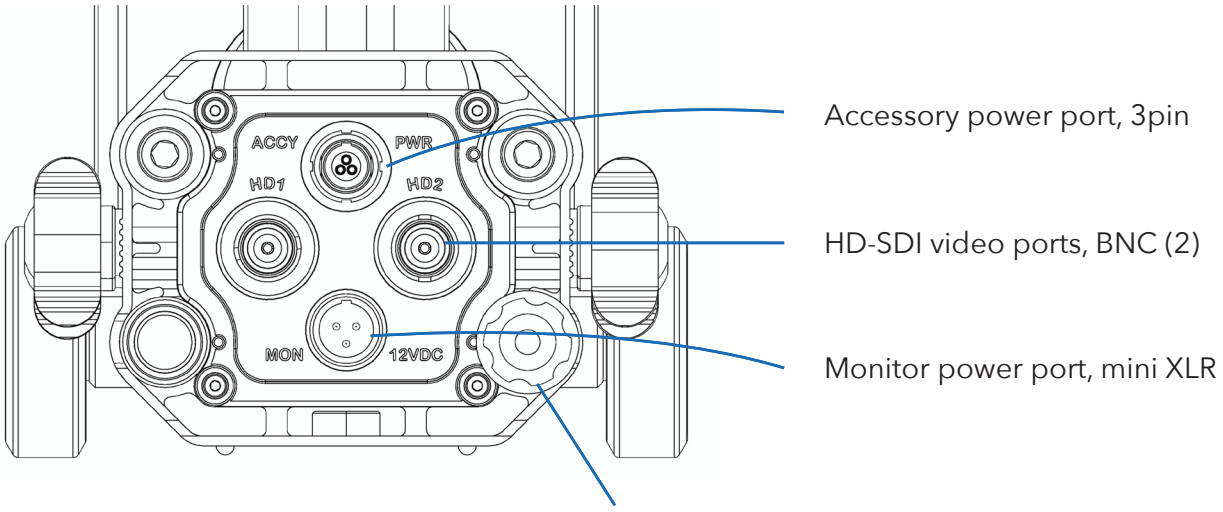
Gimbal components





Base components

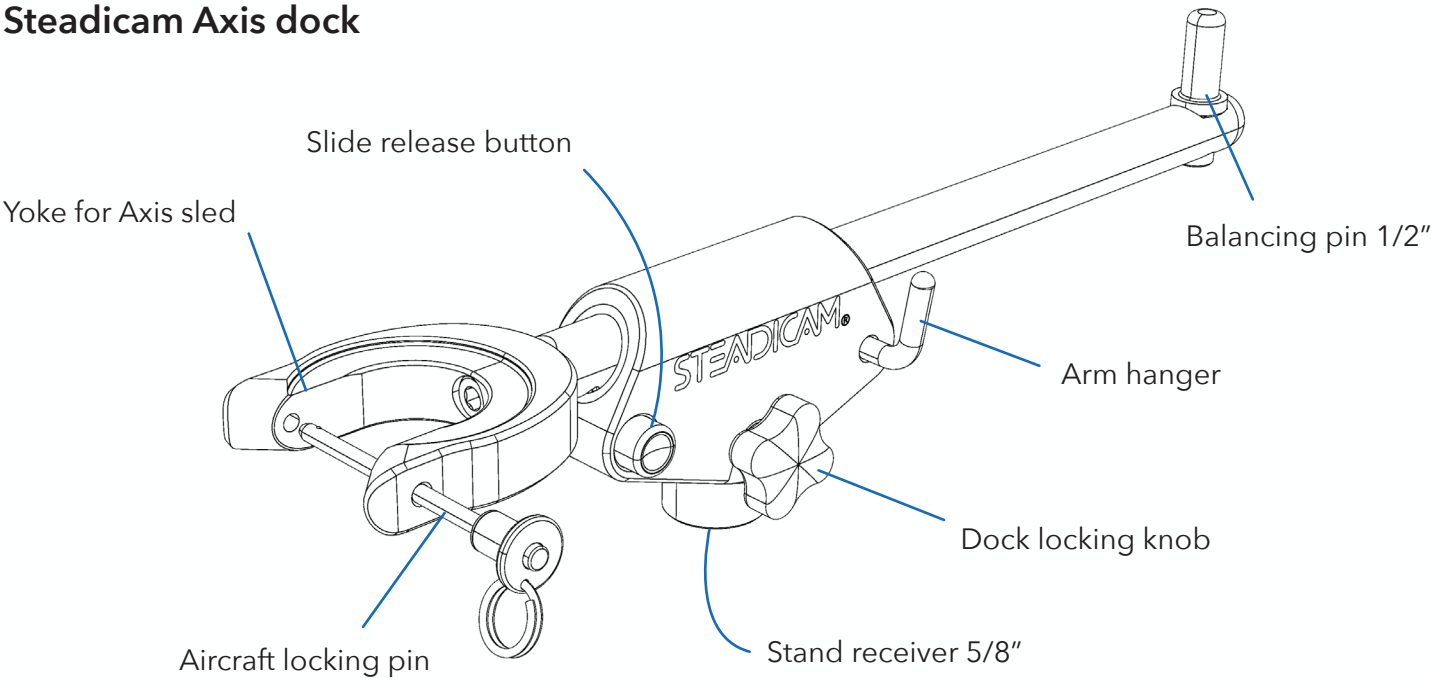




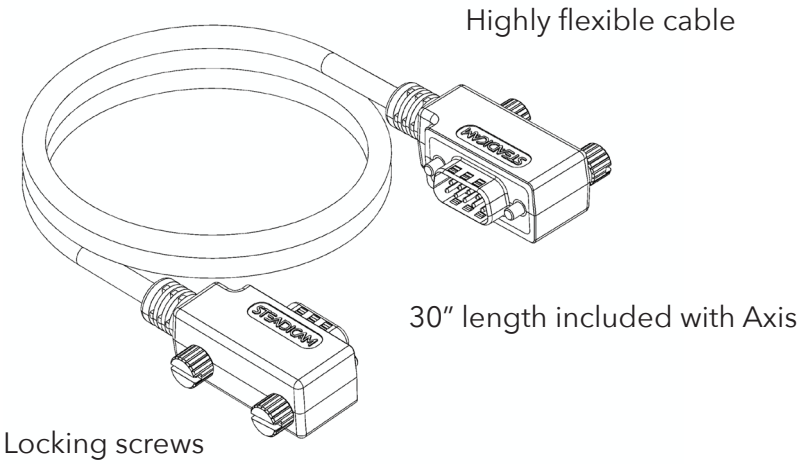
NOTE: *All power ports on Steadicam Axis are unregulated battery voltage, typically around 14V. Both HD video lines are direct connections from top stage to base with no processing.*

Included accessories

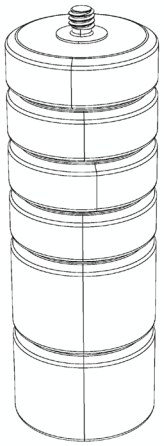
Steadicam Axis dock



Steadicam Axis gimbal cable



Balance weights



1/4 Lb (114g) weights (4)

1/2 Lb (228g) weights (2)

Also included but not shown:

- Your choice of battery mount (Gold mount or V-lock) with required M3 screws
- Monitor power cable; 3pin mini XLR to 5.5mm DC barrel
- Lightweight BNC video cables (2)
- Metric Allen wrenches (2) for sled assembly
- M5 x 20mm screws (4) for monitor mount and battery mount
- Monitor spacer for custom monitor applications pre-installed on monitor lock screw

Steadicam resources

There are so many great opportunities to learn about Steadicam, in addition to this user guide. A Steadicam workshop is definitely the best way to become familiar with all of the techniques, to fully understand each concept, and to improve your speed and flexibility when production throws a curve ball. The Tiffen Steadicam website has a deep well of resources about all available (and many legacy) products. There are also dozens of technical and how-to videos on the Tiffen YouTube page. And don't forget to grab your copy of *The Steadicam Operator's Handbook!*

Here is a brief list with links to help you get started:

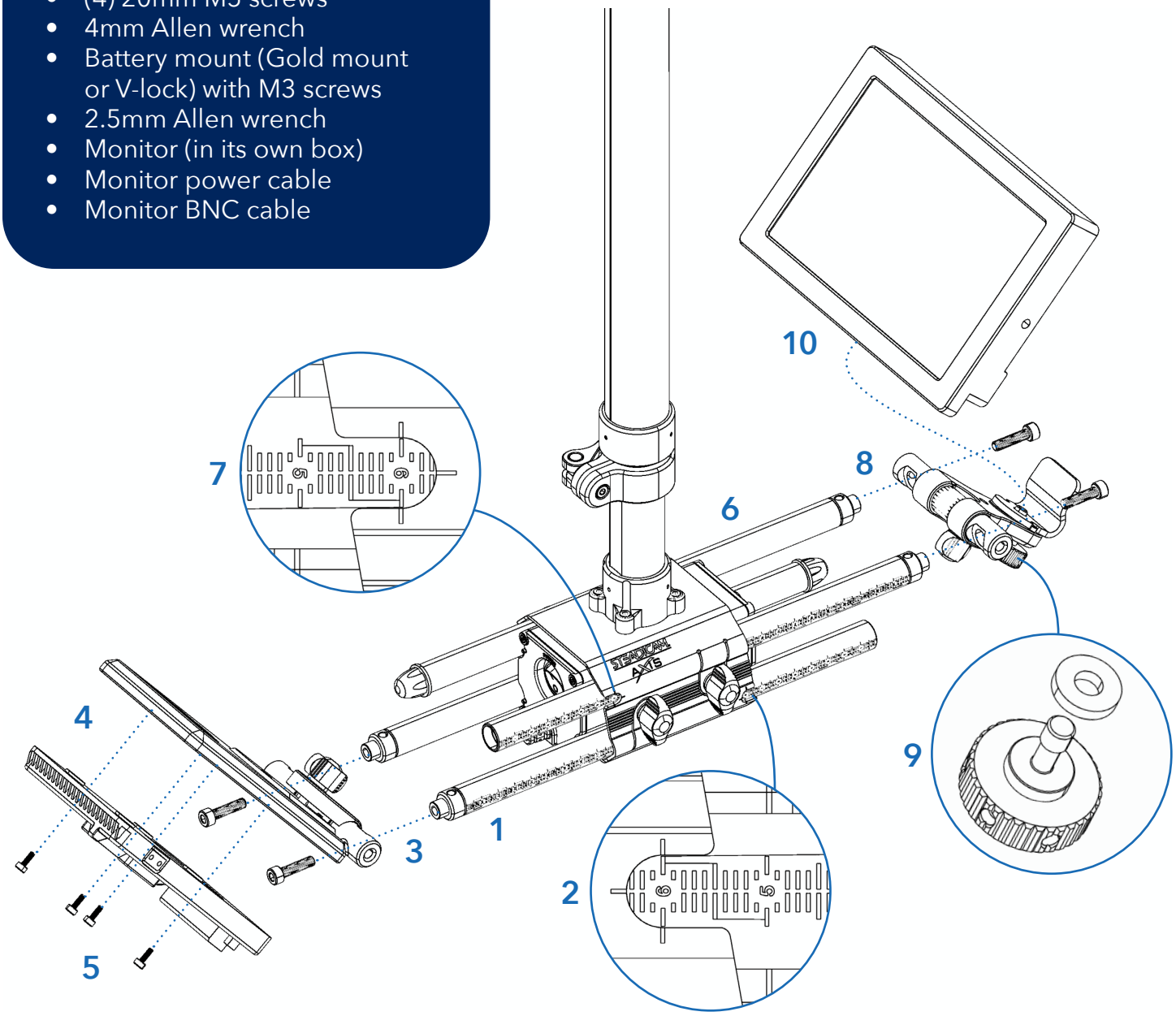
- Steadicam Axis web page: https://tiffen.com/products/steadicam-axis
- Steadicam user guides and manuals: https://tiffen.com/pages/steadicam-manuals-instruction-guides
- Steadicam workshops: https://tiffen.com/pages/flysteadicam
- Tiffen YouTube channel: http://www.youtube.com/@TiffenCompany
- *The Steadicam Operator's Handbook* by Jerry Holway and Laurie Hayball, ISBN# 978-0240823805
- See page 38 for a list of optional Axis accessories with part numbers.

Base assembly

The Axis kit arrives with a few components ready to be assembled before the first use. Gather all the parts, then follow each numbered step on this diagram with corresponding details on the following page.

Parts for base assembly:

- Battery and monitor rods (4)
- (4) 20mm M5 screws
- 4mm Allen wrench
- Battery mount (Gold mount or V-lock) with M3 screws
- 2.5mm Allen wrench
- Monitor (in its own box)
- Monitor power cable
- Monitor BNC cable



NOTE: *The included monitor ships with its own instruction booklet. The monitor offers many useful features such as frame-lines and exposure/focus tools, accessible by menu and function buttons.*

Base assembly

1. Install two rods for the battery, one with a rod stop facing forward, both machined ends facing the rear.

2. Tighten the battery rod clamps with matching rod numbers aligned within the rounded cutout.

3. Attach the battery pivot to the rods with two included M5 x 20mm screws, using the 4mm Allen wrench.

4. Hold the battery plate up to the battery mount, plug in the two pin connectors, and tuck the extra wiring into the battery mount so it doesn't interfere with attaching the plate.

5. For V-lock battery plates, use the included M3 x 8mm screws to fasten the plate onto the battery mount. Gold-mount battery plates use the longer included M3 x15mm screws. Do not over-tighten!

6. Install the two monitor rods, one with a rod stop facing rearward, both machined ends facing forward.

7. Tighten the monitor rod clamps with matching rod numbers aligned within the rounded cutout.

8. Attach the monitor pivot to the rods with two included M5 x 20mm screws, using the 4mm Allen wrench. The monitor pivot may also be inverted so the monitor is above the rods. It's your choice.

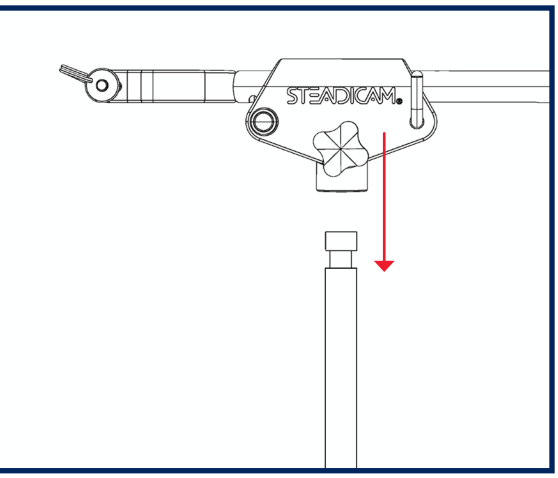
9. To attach the included monitor, first unscrew the 1/4"-20 monitor lock screw and **remove the spacer washer beneath,** then reinstall the screw. Align the monitor with support bracket against the back of the monitor and fasten the monitor to the mount with the lock screw. For aftermarket monitors, leave the spacer washer in place, but remove the support bracket.

10. Connect the monitor power cable from the MON port on the base to the DC IN 12V power INPUT on the monitor. Connect a BNC cable from HD1 on the Axis to the SDI INPUT on the monitor. It's a good idea to loosely wrap the monitor cables around the rods or use a strap to manage the cables.

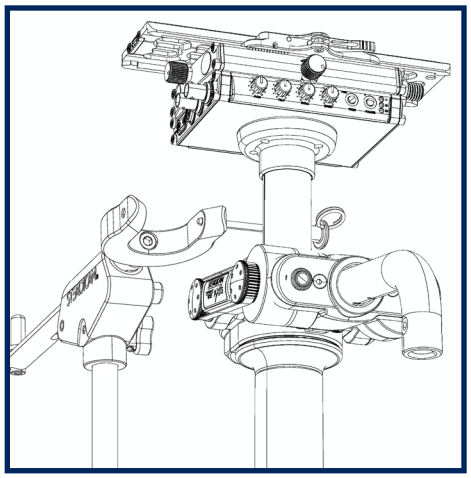
That's it! Your Axis sled is assembled and ready to add a camera and start balancing on the next pages.

Prepare the Axis sled

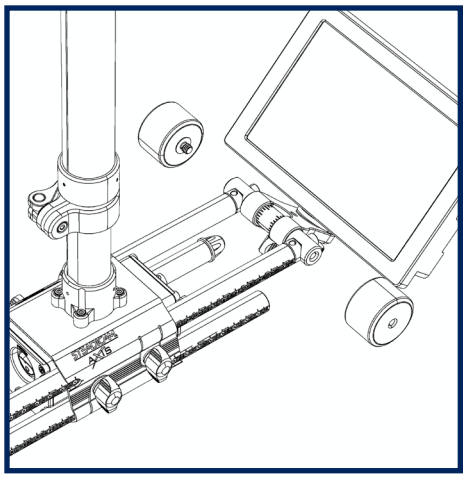
Now let's set up the Axis system! Once your sled is assembled, follow along to get the rig ready for action. You'll need a sturdy stand, along with the Steadicam Axis kit and your camera system of choice.



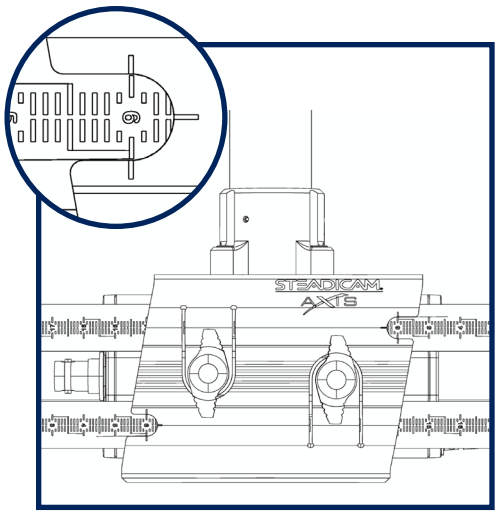
Place the dock onto the stand with a sandbag or three at the base and secure with the knob.



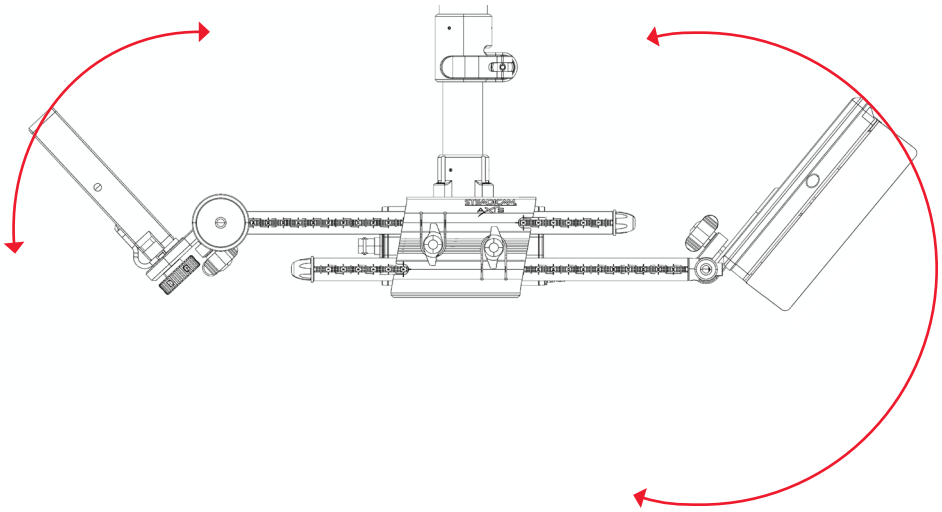
Dock the rig on the ring at the top of the post and secure with the aircraft pin.



Screw the two large balance weights onto the monitor pivot if you're using the included monitor.



Set the monitor and battery rods fore-aft so each have the 6cm mark aligned at the base. Secure both pairs of lock knobs.



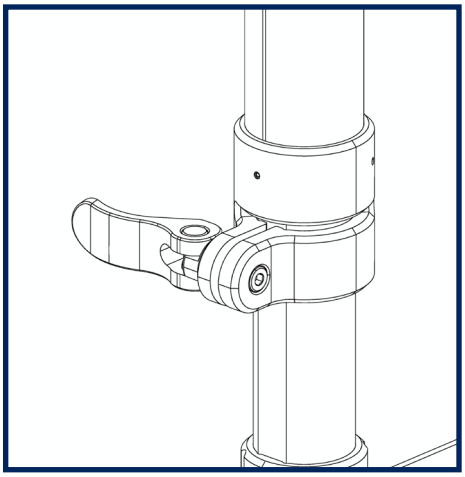
Adjust the angle of the monitor to about 45˚ for best visibility. Depending on conditions, you may wish to have the monitor more horizontal or more vertical.

Add a battery and set the battery angle to your preference; upright for shortest rig, horizontal to move in close to the base, or downward for heavier camera setups.

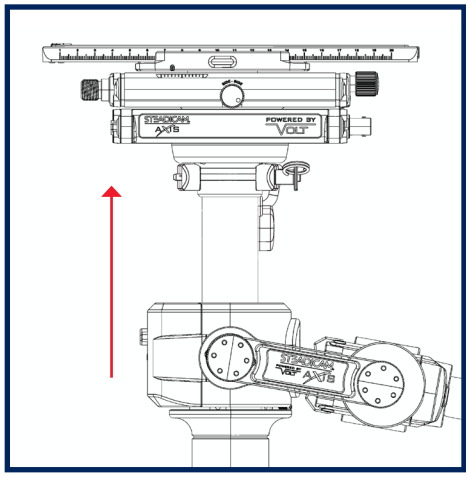
WARNING: *There may be pinch points created between the rig and the dock, under the gimbal, in the arm when loaded and between connected equipment. Work carefully to keep your fingers and toes safe!*

Prepare the Axis sled

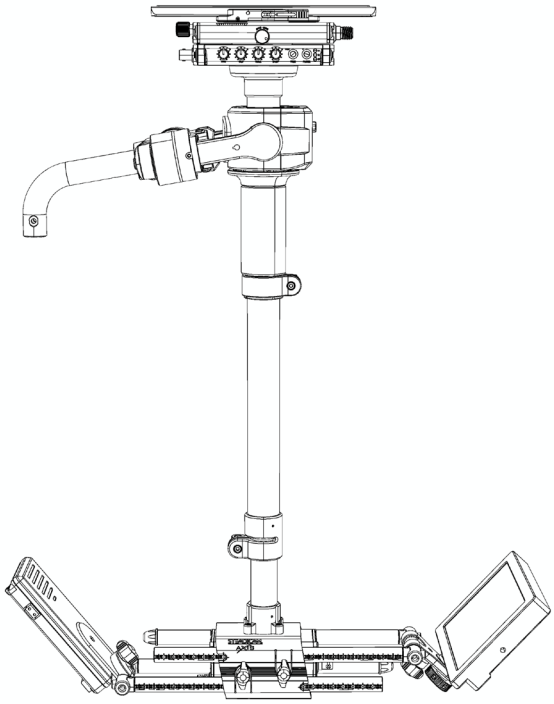
The post and gimbal are adjustable for length and position. For general operating, we prefer having the gimbal close to the top stage and the post as short as possible to keep the rig out of the way. Extending the post and lowering the gimbal is an easy way to add lens height or go lower in low mode.



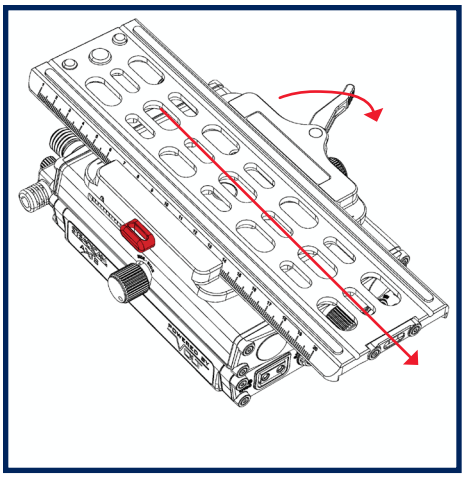
Set the post length so a small amount of lower post is extended. This allows making it shorter if necessary when balancing.



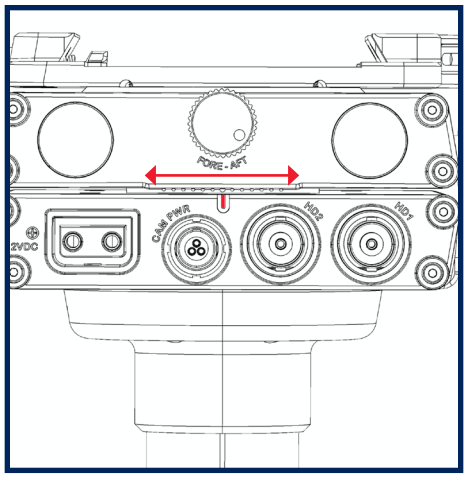
Adjust the gimbal high on the post to start.
Always align the gimbal grip line with the back of the post.



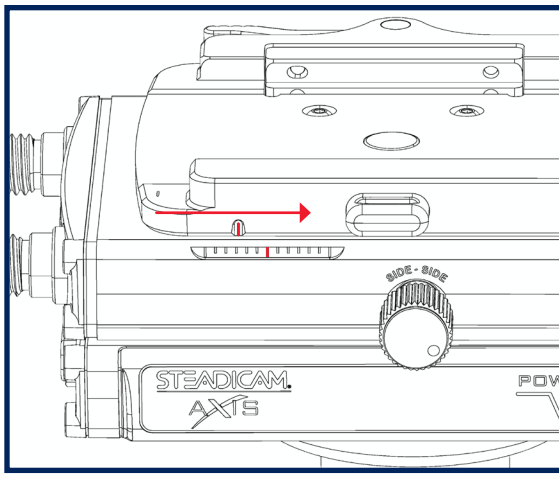
The camera dovetail is secured to the top stage with a lever lock and safety catch. Remove the dovetail so we can attach the camera. While you're setting it up, center the top stage fine balance adjusters, so we have maximum travel in both directions when balancing later.



Open the lever and hold down the release button to slide out the camera dovetail.



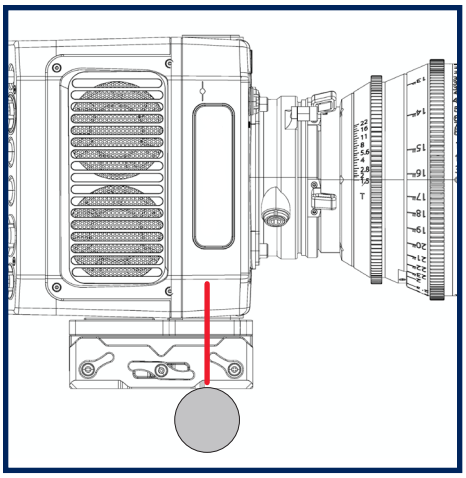
Adjust the side-to-side balance so the clamp plate is centered, using the marks as reference.



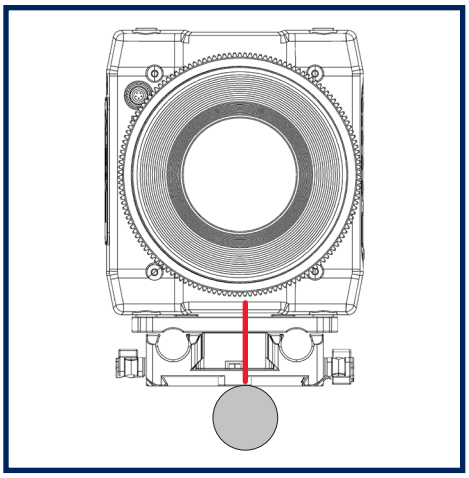
Adjust the fore-aft balance so the clamp plate is centered, using the marks as reference.

Attach the camera

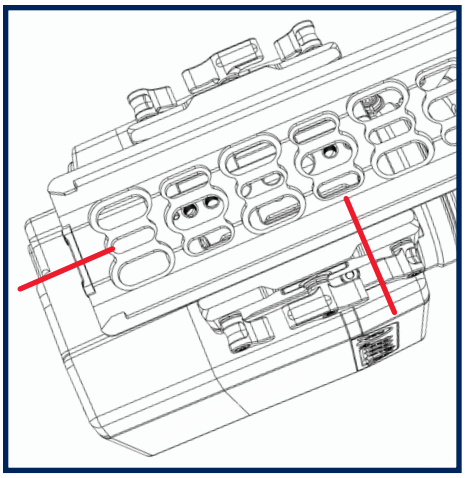
We want to attach the dovetail to the camera so that we have the widest possible range of adjustment, both fore-aft and side-to-side. We start this process by finding the camera's center of gravity (c.g.) or balance point, then properly position the dovetail plate relative to the camera's c.g. Your camera should be fully built with lens, battery, film, and any accessories you need. Heavy cameras with an external power input may utilize an optional cable to pull power from the 3-pin CAM connector on the Axis and eliminate the camera's on-board battery. Lightweight cameras usually benefit from additional weight, like on-board batteries.



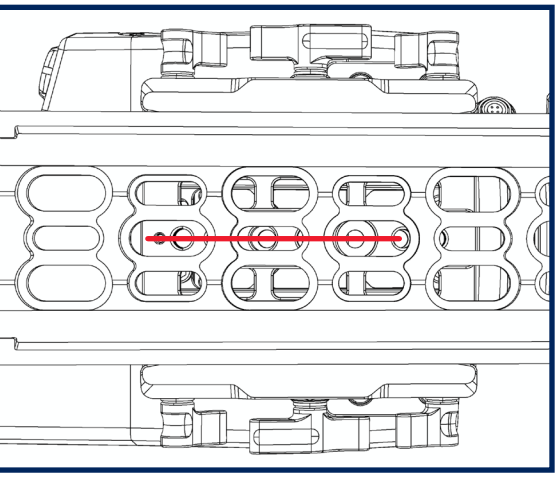
Carefully balance the camera fore-aft on a rod or pencil and mark the balance point with a piece of tape.



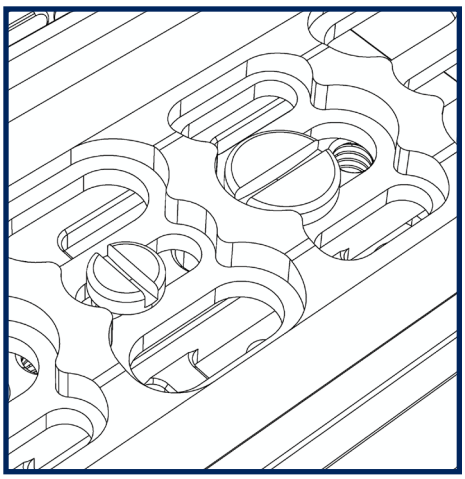
Repeat for side-to-side and mark with another piece of tape.



Place the dovetail against the bottom of the camera and ***center the dovetail*** over your balance marks fore-aft and side-to-side.



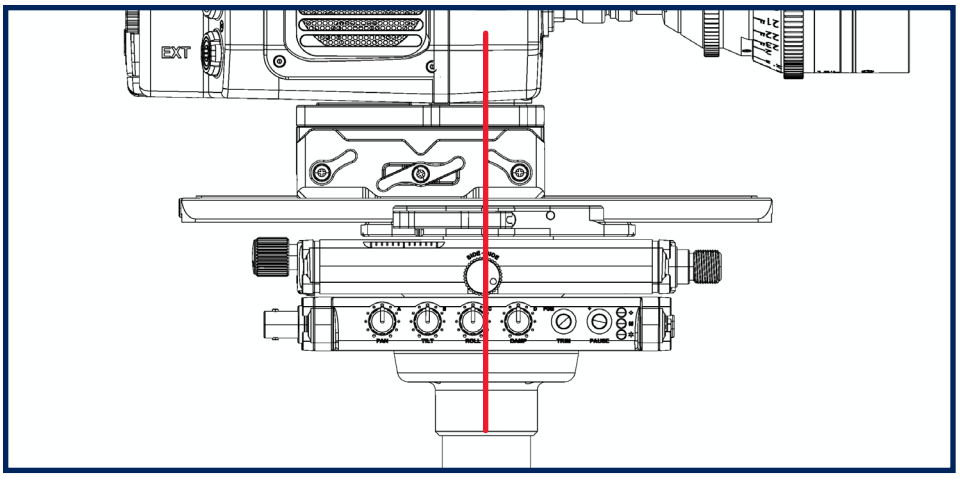
Move the dovetail as little as possible until the camera screw holes are accessible.



Insert two tiedown screws and tighten firmly with a screwdriver.

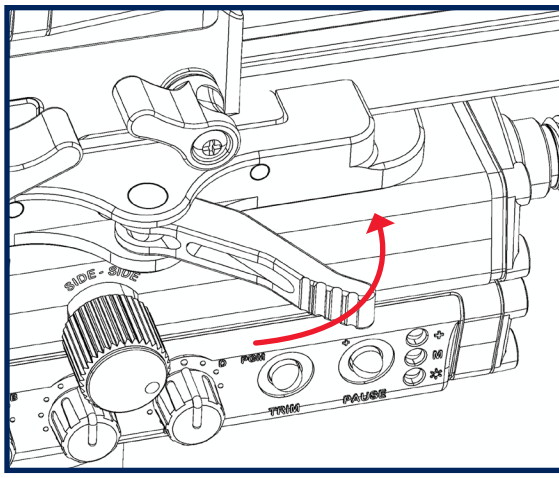
Attach the camera

TIP: *Some camera setups, such as a DSLR with a large lens, may have the fore-aft balance point* ***outside of the camera body.*** *In this case, find the side-to-side balance first, and then mount the dovetail plate to the camera and use the base of the dovetail plate to find (and mark) the fore-aft balance point.*

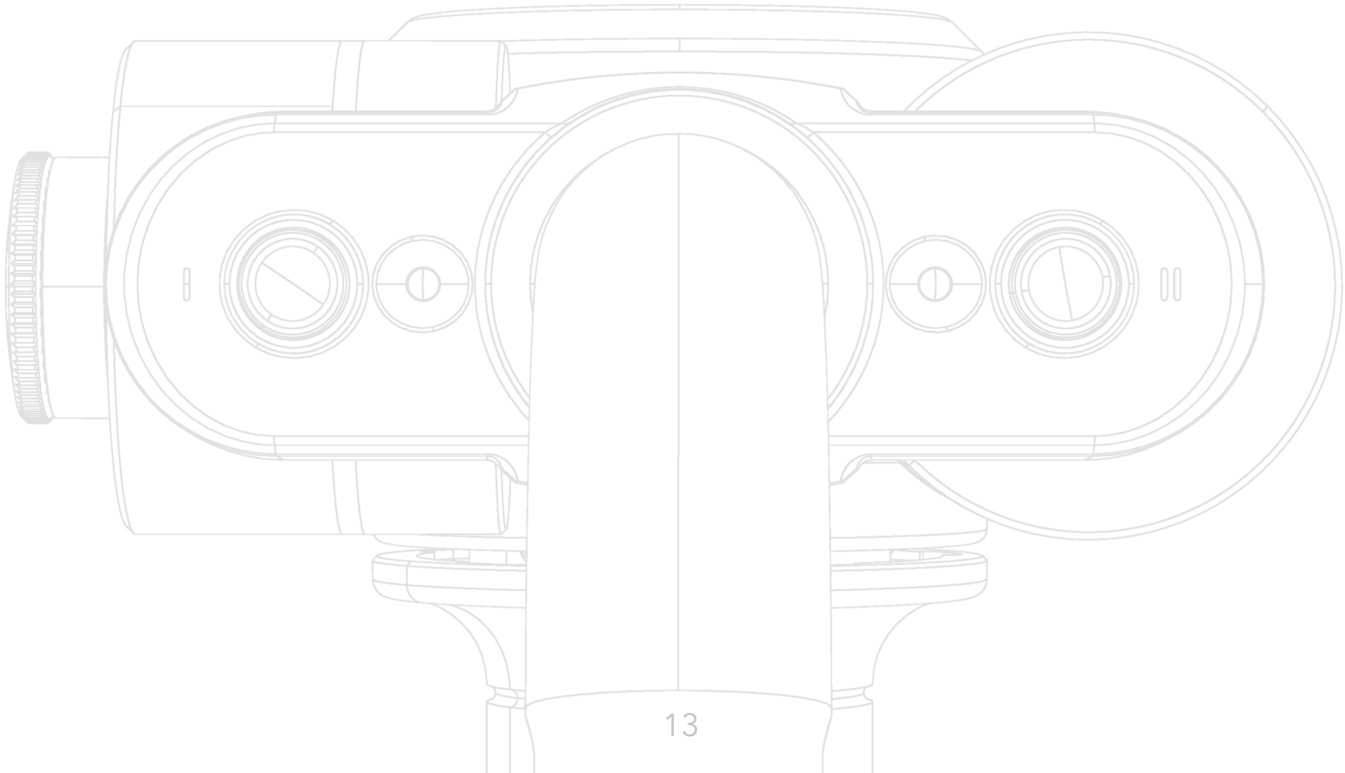


With the dovetail clamp open, slide the camera dovetail into the top stage until you hear the safety catch *click* into place.
The dovetail may be inserted from either front or rear.

Position your fore-aft balance mark ***directly over the centerline*** of the post.



Close the dovetail lever to secure the camera onto the sled.



Balance the Axis system

Precisely balancing a Steadicam takes practice, but because the Volt is assisting in all three axes, it doesn't have to be exact. However, the better you balance your system, the less battery will be used by the Volt for corrections and the Volt motors will have maximum effect, so it is worth your time.

To balance the Steadicam Axis, you will place the sled onto the balance pin of the dock. Make sure your stand is sturdy enough and has adequate ballast so it can't tip over. Better yet, have an assistant secure the stand while you balance. And never walk away from a Steadicam when it's on the balance pin.

Do not install the Volt gimbal cable, and leave the Axis powered OFF during balancing.

Three main steps to balancing the Axis sled:

- First is static balancing where we balance the sled in all three axes (top-to-bottom, fore-aft and side-to-side) so that the sled hangs upright and is slightly bottom heavy. We set the "drop time" to about 2 seconds in order to do the next step.
- Second is dynamic balancing, which, as the name implies, adds movement. For this step, we slowly spin the sled, then adjust the battery and camera positions until the post remains perfectly vertical when spinning. This is a challenging concept for many but is important to get the most out of the Volt.
- The final step is to change the top-to-bottom balance to fully neutral (no drop time at all) so the sled is no longer bottom heavy, giving the Volt motors maximum effect in all axes.

NOTE: *Balancing may require repeating a few steps or even going back to re-position the dovetail plate on the camera. This is normal and is part of the art of operating. The more often you do it, the easier it will be to see what adjustments are required at every step, and the faster you'll become at balancing.*

Balance: static

The first step to balancing the Axis is to achieve static balance. We want the sled to hang with the post vertical and the sled slightly bottom heavy, keeping the camera at the top and the monitor at the bottom. This doesn't have to be perfect, but get the rig balance as close as possible given the time you have.

The following steps are common to balancing most sleds and will be familiar if you've worked with a Steadicam before. Some images show different models, but the techniques are basically the same.

Make sure the dovetail lock is secure so the camera won't move.

With your rig on the balance pin, grab the post with two hands and rotate it horizontal.

With one hand on either side of the gimbal, unlock the gimbal clamp and start sliding the post through the gimbal to find the position where it balances.

NOTE: *If the rig inverts with the gimbal at the top of the post, extending the lower post is one way to move the balance point down to the gimbal. See below.*

Relax your grip a LITTLE while feeling for the balance point, but never let go of the post.

Once you find that balance point, slide the gimbal **about 1/2" (12mm) closer to the top stage.**

Align the gimbal grip mark with the line on the back of the upper post and close the gimbal clamp.

The Axis is adjustable in many ways to balance various cameras sizes:

- Heavier cameras may require adding balance weights at the bottom, rotating the battery lower, lengthening the post, or removing camera accessories.
- Lighter cameras may require adding balance weights at the top, raising the battery, shortening the post or adding a larger camera battery.

WARNING: *Always keep the post horizontal when the gimbal clamp is open. If you don't, and the sled rotates, the post will slide through the gimbal and can damage your equipment or pinch your fingers.*

Balance: static

Now actively set the post vertical, and lighten your grip on the post to observe the rigs behavior.

If the post tilts fore or aft significantly, slide the battery "uphill" on the rods until it's roughly level, and re-tighten.

Set the post vertical again. Use the fore-aft adjuster knob to fine tune the camera position so the post stays in place.

If the camera rolls to one side or the other, use the side-to-side adjuster knobs to move the camera c.g. slightly.

Then re-set the post to vertical to see if it stays.

If the side-to-side adjuster reaches the end of its travel and the roll axis will not remain level, you'll need to remove and re-mount the camera dovetail plate one slot over, re-center the side-to-side adjuster and re-balance.

NOTE: *If the battery mount contacts the monitor rods while balancing, you may need to rotate the battery lower and re-balance, or move the monitor forward to make room.*

Balance: static

Last step for static balance is precisely setting the top-to-bottom balance. The measurement we use is called "drop time" which is a count in seconds for the rig to swing from horizontal through vertical (90˚). The slower the drop time, the less bottom heavy the rig is. We want about a 2 second drop time.

Hold the post horizontal, let the rig go, and count the number of seconds until it passes vertical.

Aim for about 2 seconds.

If it's quicker than 2 seconds, reposition the gimbal about 1/8" (3mm) ***away from the top stage*** to make the sled LESS bottom heavy and re-test.

If it's slower than 2 seconds, reposition the gimbal about 1/8" (3mm) ***closer to the top stage*** to make the sled MORE bottom heavy and re-test.

As you slow the drop time, the sled will become more sensitive and you may need to adjust your side-to-side or fore-aft knobs slightly to get the post to remain vertical.

When you later set the sled to neutral top-to-bottom balance, those balance corrections become even smaller. While powered off, the light cogging of the Volt motors and belt assemblies can make the rig feel odd to a Steadicam operator without Volt experience.

But when the Volt motors are powered on while operating, the rig feels smooth and precise, and all the tiny balance tweaks we used to make with old sleds are now unnecessary!

TIP: *Read more about the art of balancing in The Steadicam Operator's Handbook by Jerry Holway and Laurie Hayball. Refer to the list on page 7 for additional learning resources.*

Balance: dynamic

To give those Volt motors maximum effect and reduce unwanted behaviors while panning or tilting the rig, we take balancing one step further; dynamic balance. For each arrangement of camera, monitor position and post length, there is only ONE combination that balances the sled both statically ***and*** dynamically. When the battery is within about .25in (6mm) of ideal, the sled will pan flat and feel "sweet." The physics behind how connected masses rotate and balance is complicated, but the way we achieve dynamic balance with a Steadicam is actually quite simple; we use trial and error.

Dynamic balancing requires spinning the rig, but do not spin it too fast!

- Confirm your stand is secure or have an assistant hold the other end of the dock.
- Confirm your static balance; a rig out of static balance cannot be dynamically balanced. You want the post perfectly vertical, with a 2 second drop time.
- The Axis gimbal cable will prevent the rig from spinning, and could be damaged, so leave the cable off until after dynamic balancing.

Using a light touch at the top of the gimbal grip, lightly spin the rig, trying not to impart any side-to-side motion.

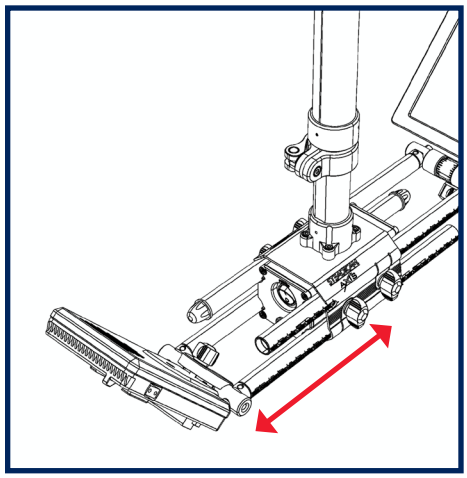
Let it spin two rotations.

Note the results. Does it pan flat or wobble? Is it your spin technique or is the sled out of dynamic balance?

Most likely it'll have a slight wobble, so you'll need to adjust.

While dynamic balancing, **do not move the monitor.** Leave it where it gives you the best viewability.

Instead, slide the battery a little bit in either direction (take note of which direction you choose) and **re-balance statically with the camera fore-aft adjuster.**

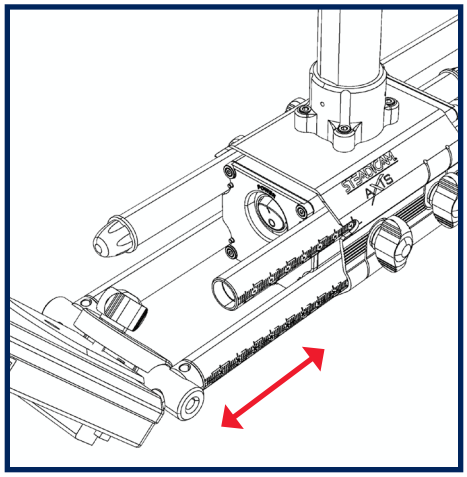


There are only two directions to move the battery: out or in. So you have a 50% chance of choosing the right direction!

Each time you lock the battery in a new position, you then re-balance the sled statically **at the camera**.

Balance: dynamic

Give it another spin to see if it improved or became worse.



You can then choose which direction to move the battery; the same direction again or go back the other way.

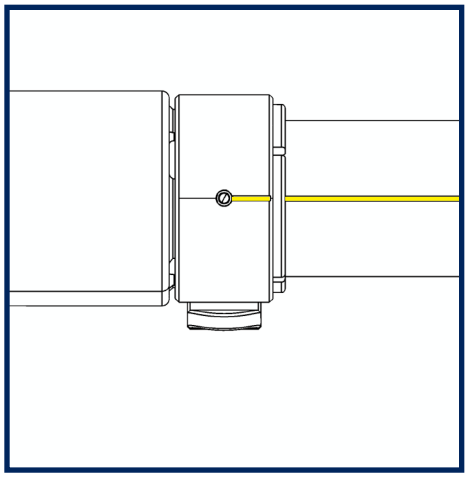
Re-rack, re-balance with the camera, and spin again (and again!) until the sled pans flat.

With static AND dynamic balancing complete, the last step is to make the sled neutral top-to-bottom.

Hold the post horizontal again. With one hand on either side of the gimbal, unlock the gimbal.

Slide the gimbal slightly towards the base until the post balances on the gimbal.

Relax your grip ***a little*** while feeling for the balance point, but never let go of the post when the gimbal is unlocked!

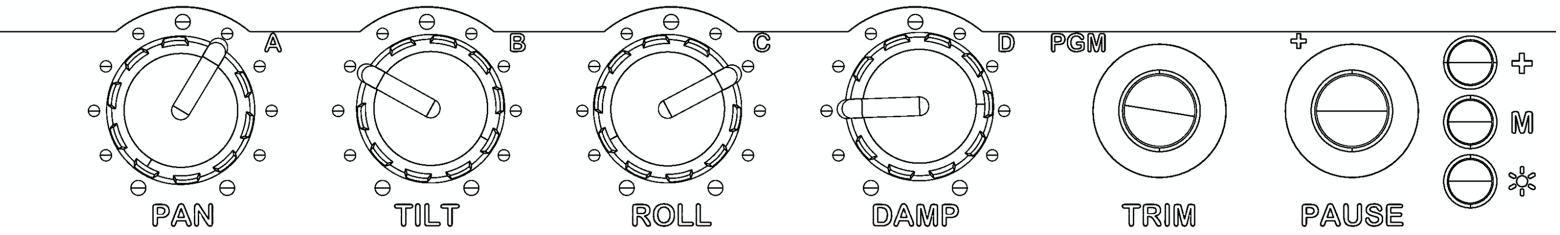


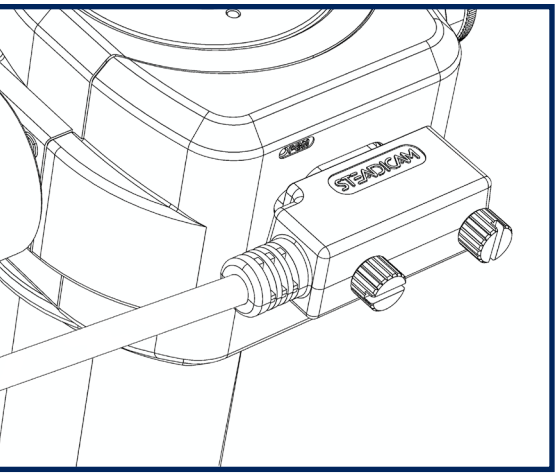
Align the gimbal grip mark with the line on the back of the upper post, **lock the gimbal,** and dock the sled.

That's it. Your Steadicam Axis is now ready for action!

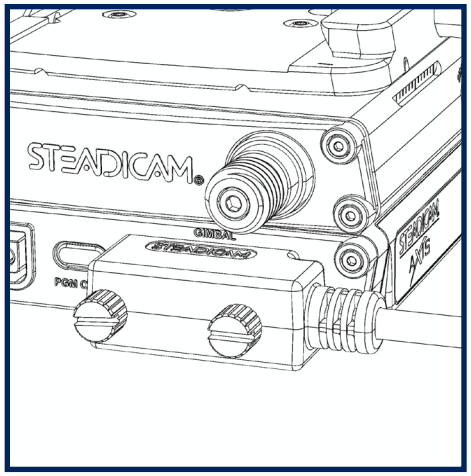
Volt system operating

The integrated Volt electronics are controlled by the dials, buttons and LEDs on the top stage, plus a pair of buttons and LEDs on the gimbal. If you're already familiar with Volt systems, the same parts are there. The same adjustments are there. The same transparent assistance is there. But the Axis has a new pan motor and a number of clever tricks up its sleeve. Follow along closely to get up and running quickly.



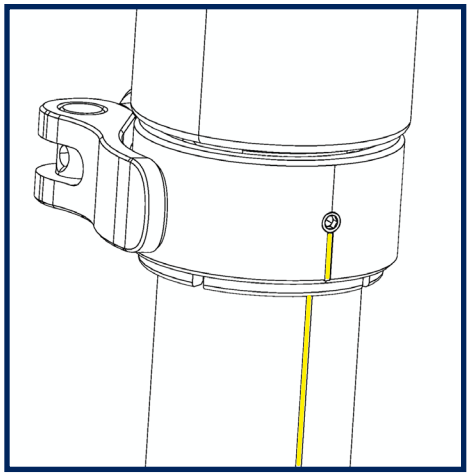


Confirm the Volt cable is plugged in at the gimbal, secured with the thumb screws, and wrap a couple loops around the post on its way up to the top stage.



Confirm the cable is also secured at the top stage with the screws.

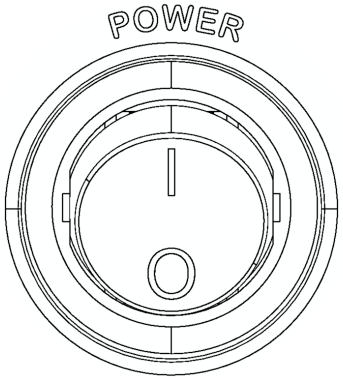
NOTE: *You may wish to re-balance after adding the cable, but it's not critical once the motors are active.*



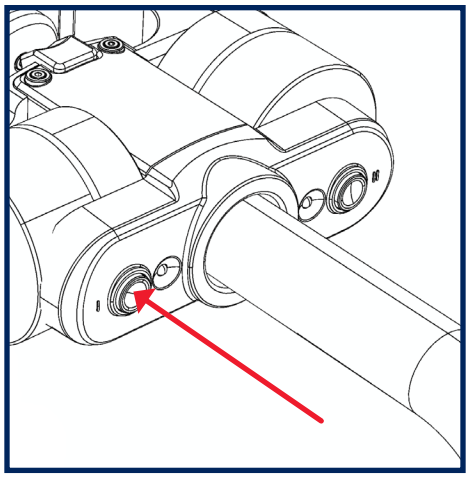
Confirm the gimbal mark is aligned with the etched line along the back of the upper post.

The main power switch controls power to the entire Axis sled, including the Volt.

- When switched ON, the ✶ (power) LED will pulsate with a single-pulse pattern.
- On power up, the Volt ***always*** defaults into Pause mode, so the gimbal motors will not be active. Don't un-pause the Volt until it's on the arm or balance pin.
- The M (mode) LEDs are dark to indicate Pause mode.
- **Turn the four dials** each to zero and then to a strength setting you wish to use.
- The **+** LED may be on or off. This is a gimbal alignment indicator, see page 36.
- **To run the Volt motors, short-press the Pause button**. The mode LEDs will illuminate and the ✶ (power) LED will glow steady indicating the Volt is active.



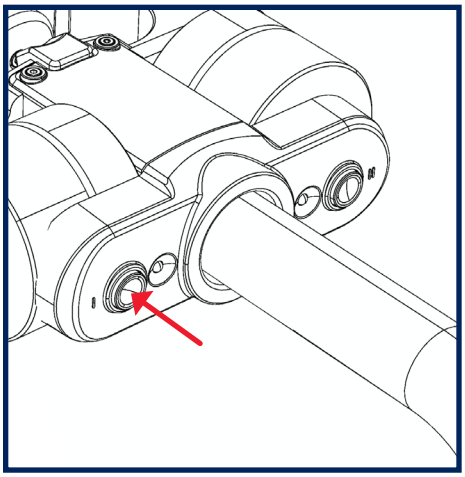
Volt modes



There are two operating modes: Each **2 second press** of the gimbal mode button toggles from normal to friction and back again.

Normal mode simulates a traditionally balanced Steadicam, returning to a trimmed tilt angle. Gimbal shows **solid mode LED.**

Friction mode holds the sled ***tilt***, and requires force to change tilt position, like a tripod fluid head. Gimbal shows **pulsing mode LED.**



Each **momentary** press of the gimbal mode button creates a tilt trim in normal mode. The mode LED will blink once to confirm.

Hold the sled at your desired tilt angle, and quickly press the mode button. The new tilt trim is memorized immediately.

Alternatively, you can use the TRIM button on the top stage to do the same thing.

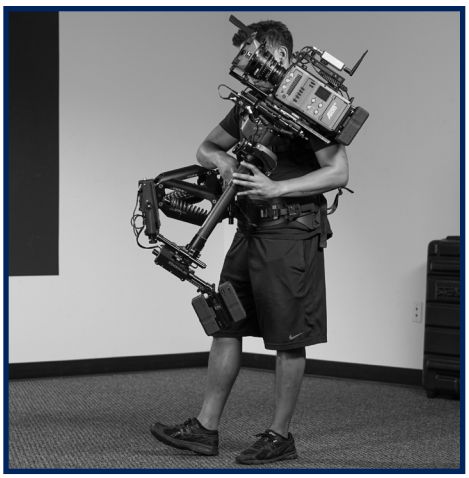
IMPORTANT: *You may swap the gimbal mode and preset buttons for goofy mode, low mode, or your personal preference. See page 34. After power-up and exiting Pause, the mode button on the gimbal will be identified by the illuminated LED beside mode button.*

Volt dials

The four dials on the top stage allow you to customize the strength of the Volt motors in all three axes (pan, tilt and roll) independently. Additionally, the Damping dial controls how the system returns the sled to vertical. Here is a guide to the four knobs primary (Menu-1) functions.

The PAN dial (A) controls the strength of the pan assist motor. Start with low assist and add strength as needed.

The pan axis control also amplifies the inertia and drag aspects of the pan motor as described later.

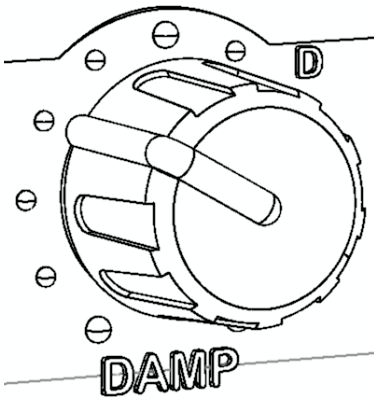


The TILT dial (B) controls the strength of the motors along the tilt axis. This alters behavior in the two modes:

- **In normal mode**, more Tilt strength equates to stronger artificial bottom-heaviness.
- **In friction mode**, more Tilt strength equates to firmer hold at a set post angle, like the drag on a fluid head.

The ROLL dial (C) controls the strength of the motors along the roll axis. Start with low assist and add strength as needed.

This setting helps maintain horizon no matter the tilt trim, tilt mode or orientation of the sled.



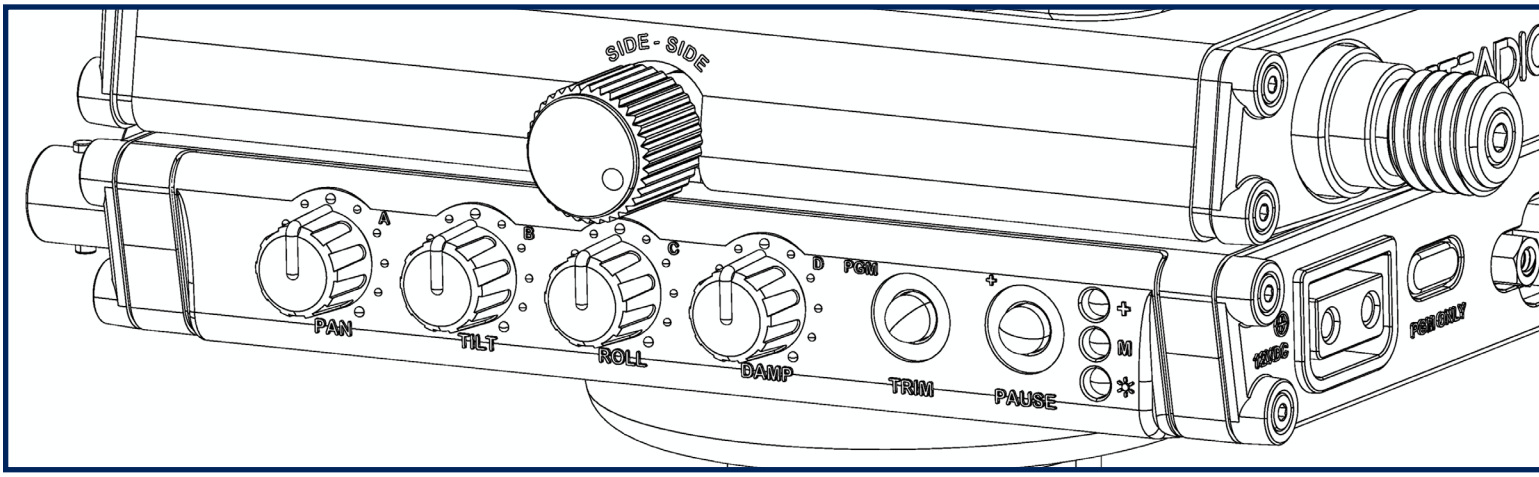
The DAMPING dial (D) works like helpful friction to prevent the sled from swinging as the rig returns to a trimmed state.

- Your operating hand performs most of the damping in normal operating, therefore very little Damping is necessary most of the time.
- Damping is affecting **all three axes** at once, but is most noticeable when making large tilt moves, like quickly returning the post to vertical.
- Damping becomes less effective with increased motor strength settings; adjust in proportion to your Tilt strength.

TIP: *Use higher motor strength for heavier rigs and rigs with more inertia, like long mode. Less strength is needed for lighter or tighter builds.*

Volt pan sub-menu

To further customize the performance of the Axis, there are two additional Volt adjustments available in a secondary Menu-2, giving the dials second functions. By toggling from Menu-1 into Menu-2, you are able to adjust **pan inertia** and **pan drag** using dial A and dial B. Pan inertia alters the force required to start and stop a pan move, and pan drag is similar to fluid head drag which slows a pan move.



MENU-1 is indicated by a single-pulse pattern of the * (power) LED, and the dials adjust:

- PAN strength
- TILT strength
- ROLL strength
- DAMPING

NOTE: *When powering up the Axis, the Volt always defaults to Menu-1. Both menu sets may be accessed in Pause or while the Volt motors are active.*

While the rig is powered on, press the PAUSE button for 2 seconds to toggle between the two menus.

MENU-2 is indicated by a double-pulse pattern of the * (power) LED, and the dials adjust:

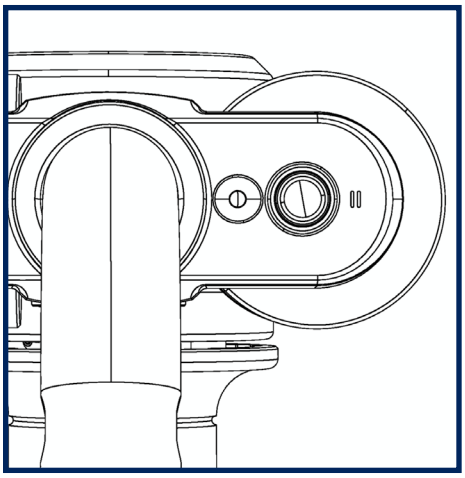
- Pan INERTIA (A)
- Pan DRAG (B)
- Dials C and D are inactive, reserved for future updates.

Set your **pan strength** to at least 50% while adjusting inertia and drag, to ensure you feel the changes, then re-adjust the pan strength to suit your needs.

TIP: *Set up your Axis sled on the balance pin and try out different combinations of strength (Menu-1) and the additional pan adjustments (Menu-2) to acquaint yourself with how each changes the feel of the sled. Then try with the sled on the arm to fully appreciate moving the Axis through space.*

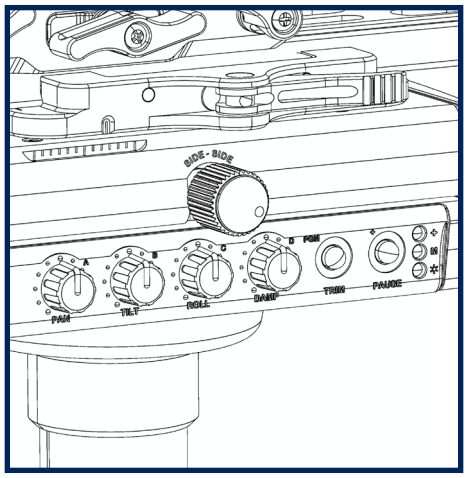
Volt presets

Tying all of your Volt options together are the Volt presets, controlled by the second button on the gimbal. There are two presets (Scene-1 & Scene-2) where you will save settings ready to be activated anytime! The Axis always powers up running Scene-1 (gimbal preset LED is dark) using the stored settings saved in that preset, so this is a great opportunity to make this your personalized "go-to" setup. A press of the preset button will swap to Scene-2 (gimbal preset LED illuminates) running your *second set* of stored values, great for changing Volt behaviors during a shot. Here's how to save settings in either scene:

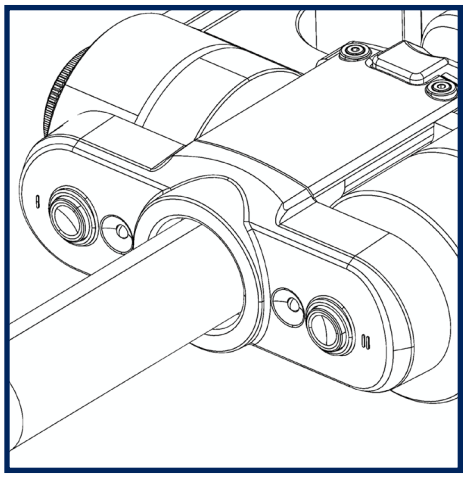


- Preset LED off = Scene-1
- Preset LED on = Scene-2

Toggle between the two with a momentary press of the button.



Set your Menu-1 and Menu-2 dial values you wish to save. Dial settings are temporarily stored while the Axis power remains on.



Press the preset button for 3 seconds until the LED blinks. This memorizes all Volt settings into the current scene slot.

NOTES on working with the Volt presets:

- Scene-1 is always active at startup, so the dials will not necessarily reflect your settings. However, you can change settings on the fly at any time.
- Adjusting any dial will change the working value of that dial, but the remaining dial values stored in the scene preset will continue to run. This allows making immediate changes as needed (adding more Roll during a shot for example) without stopping.
- Changes made while running either preset will remain in working memory regardless of switching scenes, but will not be automatically stored to either scene.
- Turning off the Axis before saving will result in losing unsaved settings. Use the 3 second preset press to merge any new dial settings into either scene.
- Unfortunately, you cannot display any saved preset values. A helpful trick is to stick a piece of paper tape to the top stage, above the dials, and write the dial settings (0-10) above each. Or keep a set of notes elsewhere.
- Remember, button II on the right is the default "preset" button, but goofy operators may swap the two gimbal buttons! See page 34 for details.
- For the latest software revisions and operating procedures, visit Tiffen.com.

The Steadicam vest

The Steadicam vest is the major connection between your body and the Axis system. It is adjustable to fit most body types via Velcro® straps and micro-adjustable buckles. Taking your time to properly fit the vest will ensure you get the highest performance and most comfort out of the system.

Take a look at the general components of the A-30 vest:

NOTE: *Refer to the user guides at Tiffen.com for additional details and for a complete fitting guide. Some customization may be required for optimal fit, depending on your build.*

Steadicam vest fitting

Adjust the size of the vest using the Velcro straps at the shoulders, back, and hips.

Set the length of the vest to place the waist pads low over the hip bones, yet still allow your legs to lift for climbing stairs.

Set the chest straps, but don't fasten the buckles yet.

The shoulder connectors should not ride high and the shoulder pads should rest on your shoulders.

Set the hip straps second, but don't fasten those buckles.

The fit should be very snug, but not straitjacket tight.

You must be able to breathe!

Pull down on the vest to make certain the hip pads are centered over your hip bones, and the shoulders fit well.

Close the chest buckles first, and finish with the hip buckles.

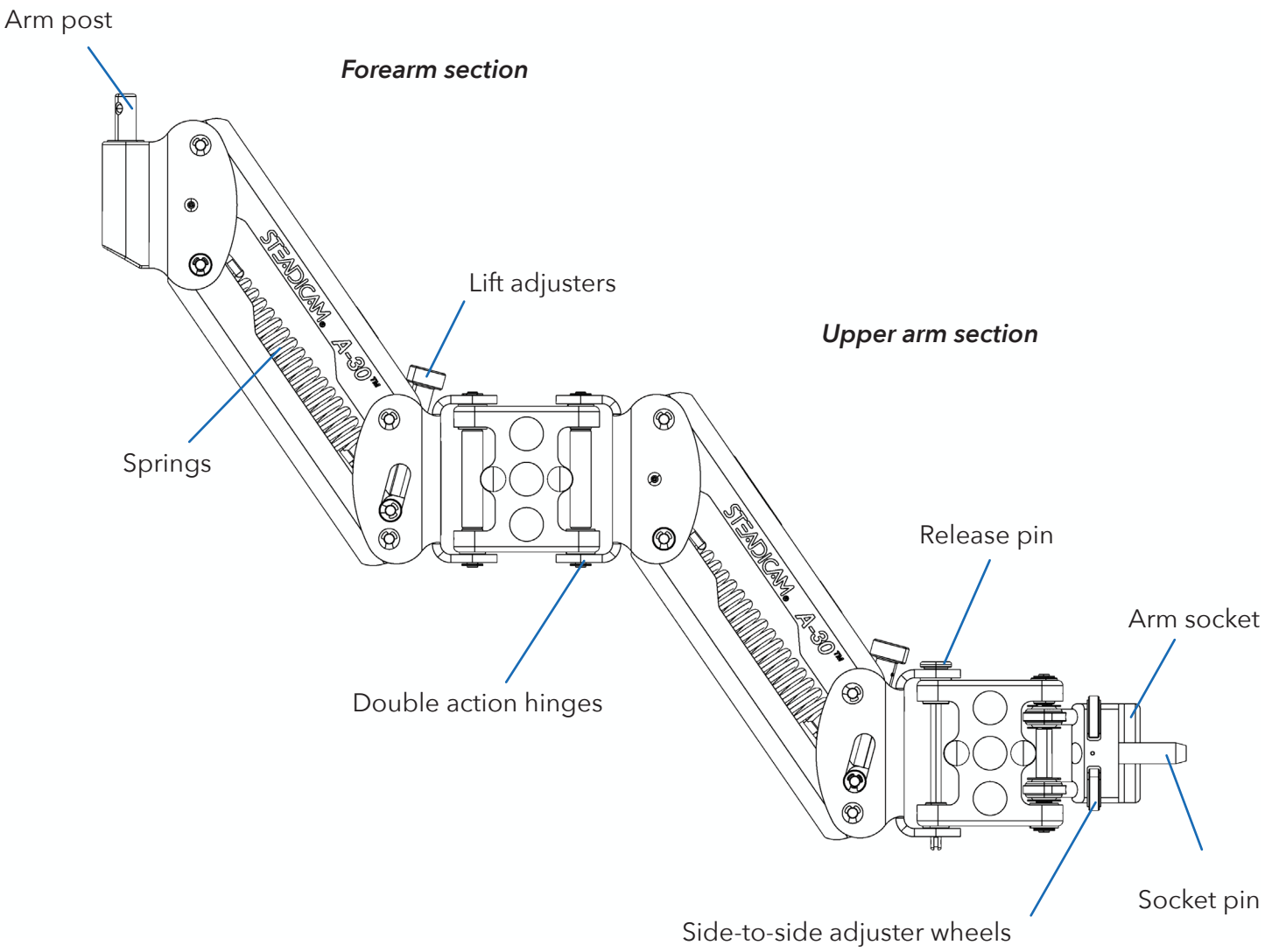
The center spar should stay centered on your torso and not slip to either side.

Your vest should fit as well as illustrated in these pictures.

The Steadicam arm

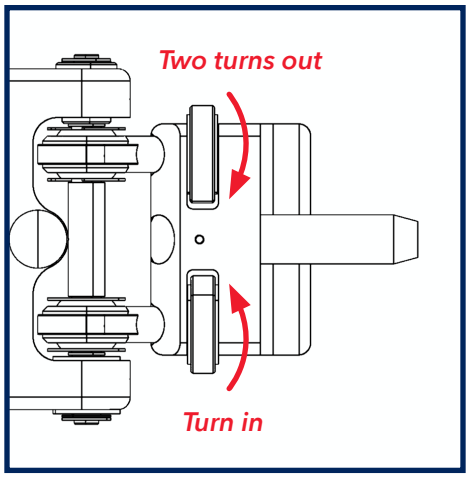
The Steadicam arm supports the weight of the Axis system, while helping isolate the camera from the operator's movements, and facilitates booming up and down. The lifting strength of the arm is adjustable to accommodate a wide range in payload, but the adjustment knobs can only be turned with the arm loaded.

Here are the general components of the A30 arm:



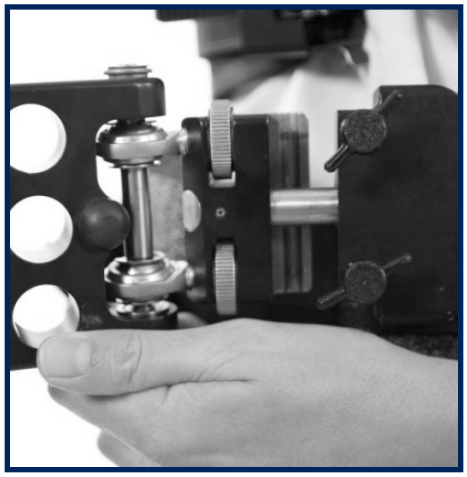
NOTE: *Refer to the user guides at Tiffen.com for additional details, instructions for swapping sides, and warnings for the use of A-series arms. Always keep your fingers out of the arm sections when it's loaded!*

Lifting the Steadicam



Confirm that the side to side adjustment wheels are set:

The bottom knob should be turned ***all the way in.***
The top knob is turned all the way in, and then ***TWO turns out.***

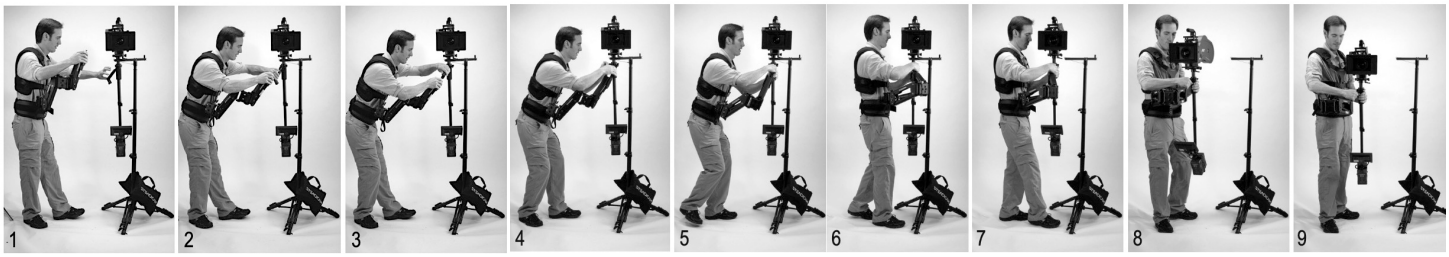


Insert the arm pin into the vest socket block fully.

IMPORTANT: *always maintain control of the arm with at least one hand, so nobody gets hurt.*

Secure the arm to the vest by tightening both fore-aft adjustment knobs equally, so the sockets are parallel.

The knobs must be snug, but they do not need to be overly tight.



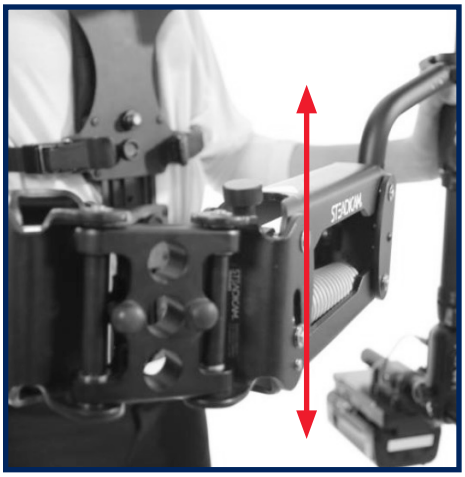
Lifting and docking the sled takes some practice. It's best to adjust the stand high enough so the gimbal is slightly below your shoulders, and have an assistant secure the stand. Don't bend your knees while docking or un-docking, especially if you have trouble finding that sweet spot where the arm post and handle release.

- With the vest on and arm attached, face the rig and bow at the waist to connect the arm post to the gimbal receiver. Right hand should be in control of the arm while the left hand aligns the gimbal handle.
- Rotate the gimbal handle over the battery (behind the post) and insert the arm post.
- Once the gimbal handle is fully seated onto the arm post, switch your grip so your right hand is on the gimbal handle and your left hand is on the post grip.
- Step towards the rig while standing up so the arm takes the weight of the sled, but remains secured to the dock with the aircraft pin. Relax a moment and feel the weight. If the arm lift isn't adjusted yet, you may need to press down on the gimbal handle to load the arm as you step in.
- Remove the pin from the dock and step back from the stand. Move the sled to a position about 45° off your left hip as shown. We call this missionary and it's your optimal static starting position.

Arm and vest settings

With the sled on board, we adjust the lifting strength of the arm. Start with the forearm (nearest the sled) and then adjust the upper arm. The goal is to have each arm section move together as you boom up and down. The ideal neutral point is just above horizontal, though you may wish to set the arm a little high or low to help achieve each shot, with very little penalty in performance.

IMPORTANT: *The LIFT adjustment knobs can only be turned when the arm segments are slightly above horizontal. They cannot be turned when the arm is unloaded, i.e., when not lifting the sled, nor if the arm sections are boomed too far up or down. Do not force the lift knobs. At the right angle, they turn easily.*



Move the arm to the middle of its boom range and let it rise or fall. Never completely let go of the sled.

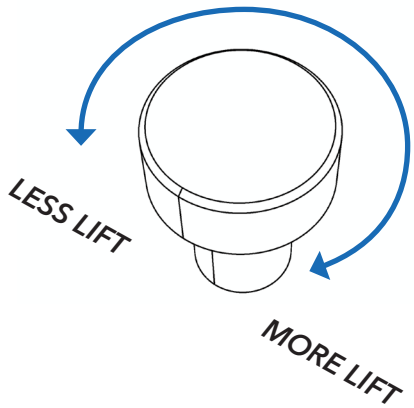
Ideally, each section of the arm come to rest slightly above horizontal, by about 5° to 10°.

Adjust the lift knob on each arm section until both sections of the arm are neutral just above horizontal.

Remember they are only adjustable in **that sweet spot just above horizontal.**

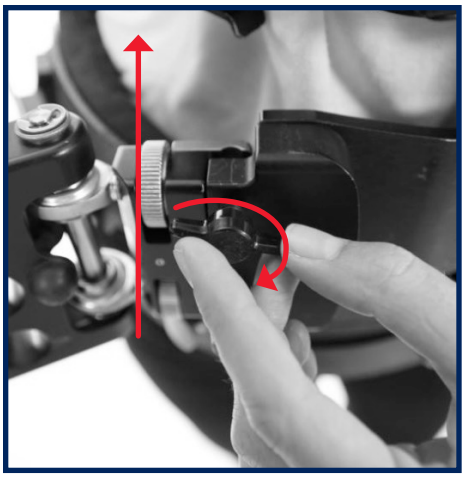
With the arm lift adjusted, stand up straight and hold the system slightly to your side, standing close to the sled without bumping the monitor or battery.

Feel if the system is balanced on your body, or whether you have to lean one way or another to float the rig.



WARNING: *Keep your fingers and toes out of the arm sections when the arm is loaded! Lifting or docking the rig could potentially squish your tender digits.*

Arm and vest settings



If the rig tends to **move straight away from you;** loosen the bottom thumbscrew and slowly tighten the top thumbscrew until the rig is neutral.

Then re-tighten the bottom thumbscrew.

If the rig tends to **move straight towards you;** loosen the top thumbscrew slowly, until the rig behaves, and then tighten the bottom thumbscrew.

TIP: *remember these settings (count the threads showing) so you can attach the arm quickly every time!*

Repeat the arm adjustments as needed until the Axis system is neutral when set slightly to your operating side, in balance with your vest.

You're now ready to fly!

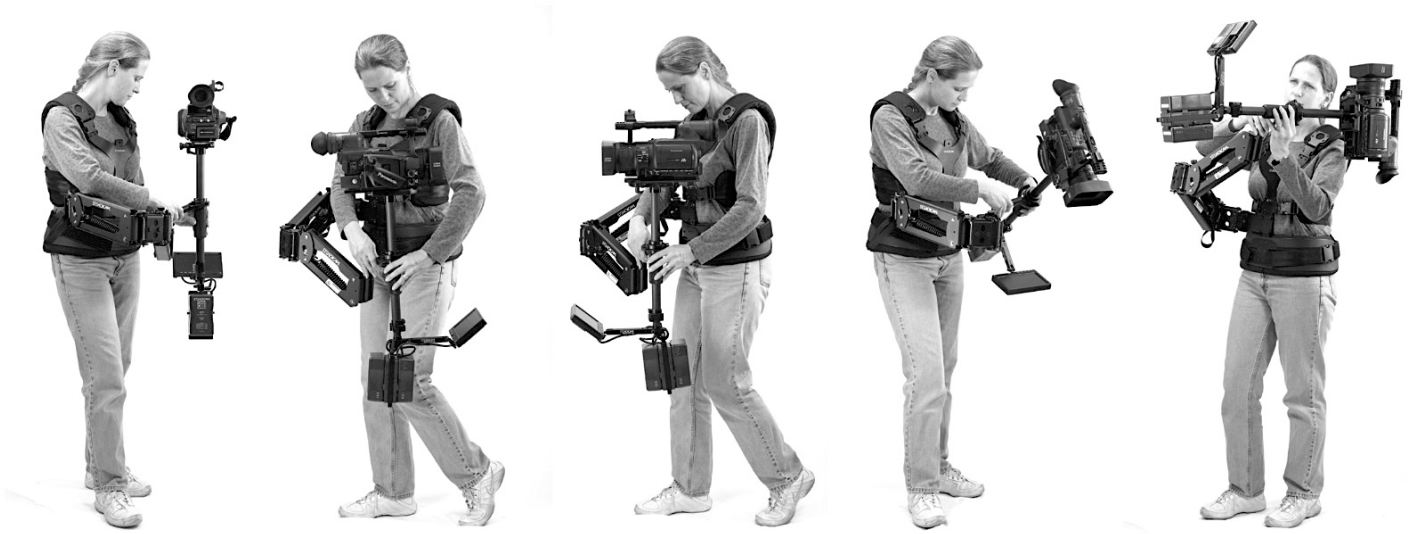
Quick operating lessons

The two-handed technique was invented by Garrett Brown while working on *The Shining*, and it has been the preferred method of operating ever since. Basically, the right hand does the work of positioning the sled in space, and the left hand aims the sled (and therefore the camera) by panning and tilting. Try practicing with the Volt strength settings reduced to improve your feel for the rig.

The right hand fine tunes the position of the sled, moving it side to side or closer to or farther from the body, and booms the arm up and down. It also prevents unwanted up and down movements as you move along.

Grab the center post with your left hand just below the gimbal. All five fingers should be **LIGHTLY** in contact with the post. Don't just use your fingertips – wrap your fingers around the post.

The preferred grip, with the fingers stretched along the length of the gimbal grip, gives the operator greater control and feel for what the rig is doing.



TIP: *A Steadicam workshop is the best way to quickly build all of the skills needed to be creative and efficient with your Steadicam, enabling you to have a long career behind the camera. Refer to the list of resources.*

Quick operating lessons

Your posture is extremely important to getting the most out of your Steadicam Axis. When operating, stand up straight whenever possible, and let the arm and vest do the work. Your standing posture should place most of your weight over one foot, so you're always ready to move in any direction.

Keep the rig as close to your body as possible, while letting it move independently of your walk.

Hold headroom by booming the lens height, NOT by tilting.

As the sled gets farther away from your body, you must lean back a tiny bit more and use your arm reach to keep that light balanced touch. If you lean forward, the Axis will try to move away from you – fast! – requiring a firmer grip, tiring your back muscles more quickly, and most importantly, not flying properly with that great Steadicam stabilizer feel.

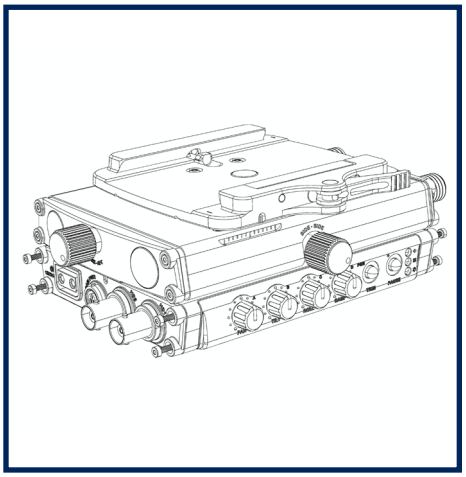
Begin and finish each move with the arm. Your steps can be clunky, so stop stepping early and feather the camera to a stop.

Look away from the monitor to spot your footing, and ask for assistance when going backwards more than a few steps.

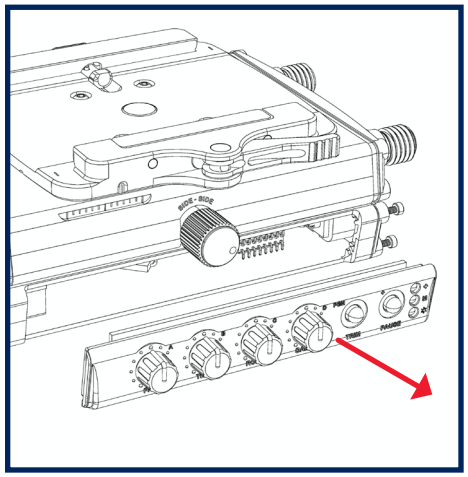
Swap to goofy

Operating with a Steadicam on your left is traditional, as inventor Garret Brown preferred that side. But if you prefer to operate on your right side, we call it goofy foot. Each component, the vest, the arm and the rig are capable of switching to accommodate operating on the right side. Here are the rig changes:

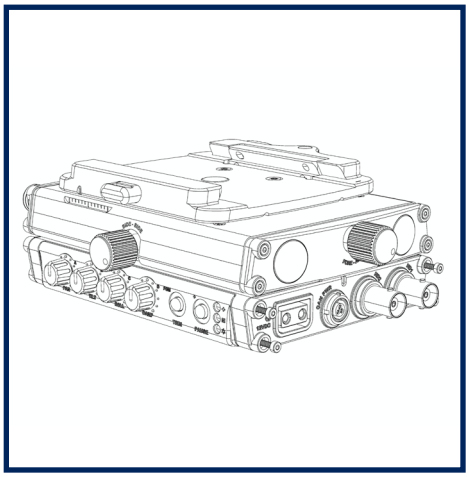
The Volt controls on the top stage may be customized for right side operating by swapping sides.



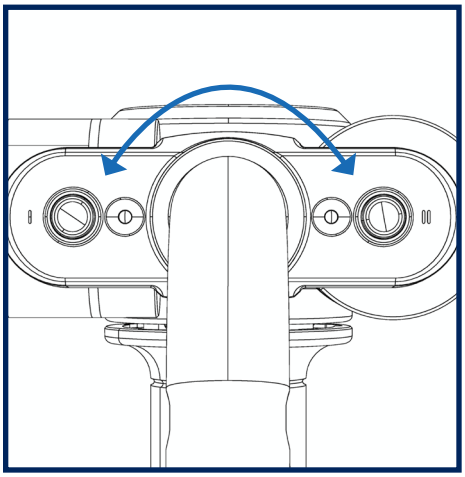
Using a 1.5mm Allen wrench, unscrew the four LOWER hex head screws about 1/4" (6mm) from BOTH ends of the top stage, enough to remove the covers.



Carefully slide the control panel from the top stage, disconnecting the integrated connector.
Also remove the blank panel from the other side.



Press the control panel into the left side, press the blank panel into the right side, and tighten the eight hex screws.



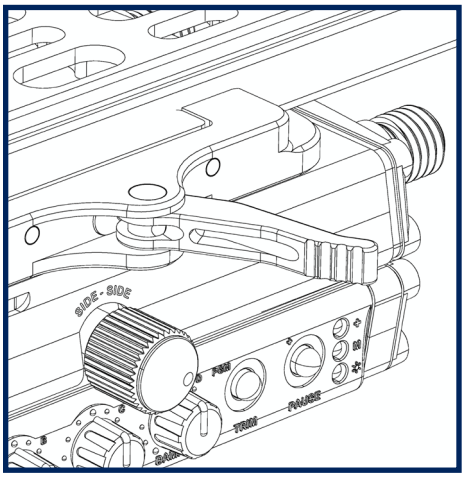
To assign the mode function to the button and LED you prefer, start with the power off.

1. Hold BOTH gimbal buttons while powering on the Axis.
2. Both gimbal LEDs should be blinking.
3. Select which button you wish to be the mode button and **press it one time.** Your selected button LED will go solid ON.
4. Press and hold the same button again until the LEDs extinguish, aprox 3 seconds, indicating you've completed button assignment.
5. Power the Axis off and on again and you're ready to go!
6. The mode button on the gimbal will be indicated by the illuminated LED when the Volt motors are activated, not in Pause mode.

IMPORTANT: *Make sure one LED is solid and one LED is blinking when you long-press to store your mode button selection. If both are solid, you will be resetting the gimbal alignment, not the mode button!*

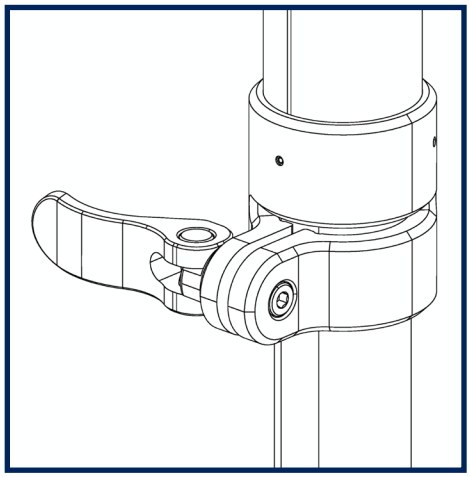
Clamp adjustment

The post clamp, gimbal clamp and dovetail clamp are easy to use and offer a positive lock. You should occasionally test to ensure everything is being clamped fully by trying to move the components with the clamps closed. If anything slides with a camera on board, it will affect your balance, so make sure they're tight enough. DO NOT over-tighten these! Doing so can cause damage like distorting the post sections.

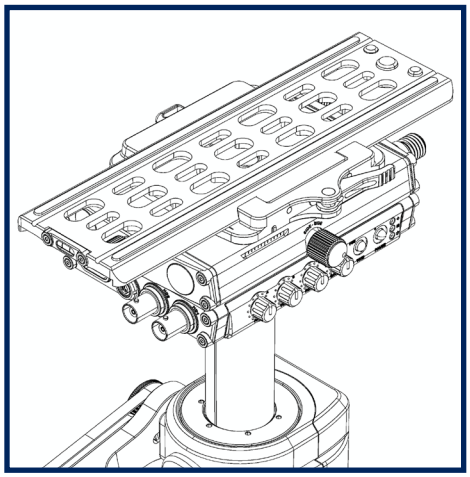


If a clamp requires adjustment, do so with the clamp OPEN.

Don't over tighten! Use the minimal clamping force necessary to achieve a firm hold.



Use a 3mm Allen wrench for the post and gimbal, or a 2mm Allen wrench for the dovetail clamp, and turn the screw a tiny amount.



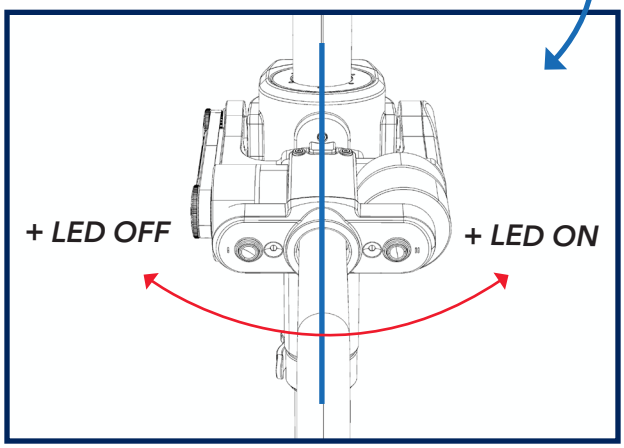
Test the action of the clamp lever, and the holding power with the clamp closed. Repeat if necessary.

Gimbal alignment procedure

Calibration of the gimbal rotational position to the stage and post is critical for proper Volt operation. This alignment is initially factory set and typically will not require adjustment or re-calibration. However, if recalibration is required for any reason, follow the steps listed below.

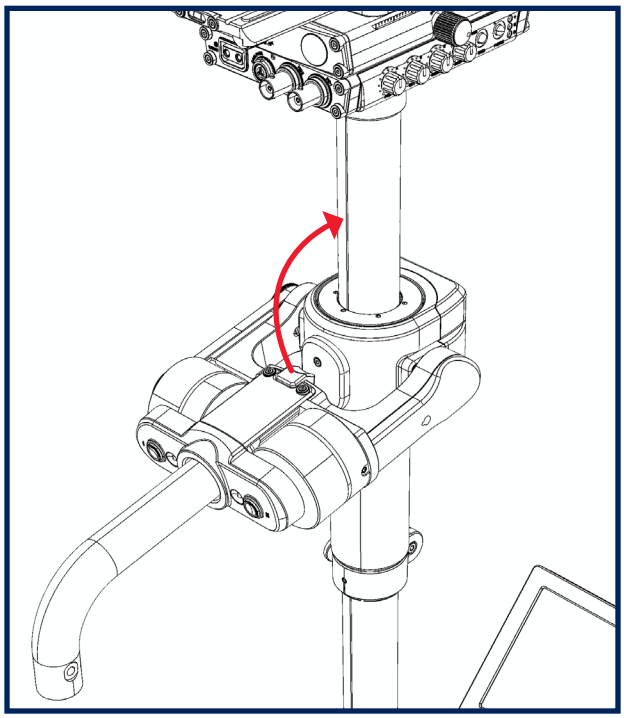
Before proceeding however, follow the troubleshooting suggestions and read through the FAQs starting on page 40 and confirm there isn't a simpler explanation for the behaviors you're experiencing.

The + LED on the top stage may be used as an alignment indicator at any time: With the Axis powered on in Pause mode, rotate the gimbal around the post. The LED should transition from OFF to ON when the gimbal handle is aligned with the exact rear of the post, and therefore in line with the top stage.
Note that the LED will transition from OFF to ON also if the gimbal is facing backwards, so pay attention!

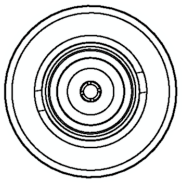
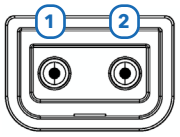
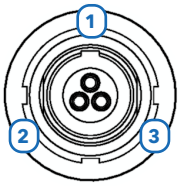
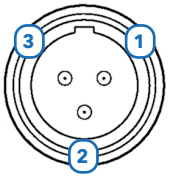
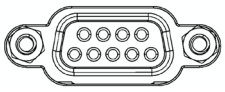


To set the gimbal alignment:

1. Place the sled in the docking fork and adjust the gimbal height about halfway down the upper post.
2. Confirm the yellow index lines on the gimbal and post align exactly, and close the gimbal clamp.
3. Hold **both gimbal buttons** and power-up the sled.
4. Both gimbal LEDs should be blinking.
5. Press each gimbal button once so **both LED's go solid ON**. The rig is in index alignment mode.
6. Lift the gimbal handle up until rubber bumper on gimbal contacts the post and align the center of the bumper with the yellow post line above the gimbal.
7. While holding the gimbal in this position, press **either gimbal button for aprox 3-seconds** until both LEDs extinguish, indicating you have completed the alignment. Power down and back on again.
8. Use the **+ LED** to confirm the gimbal is now properly aligned with the post and top stage.



Connectors and pinouts

Axis Connector Pinouts					
	PINS		Maximum Current	Description	
BNC	N/A	N/A	N/A	HD-SDI VIDEO IN/OUT	
P-TAP	1 2	+12V PWR GND	5A MAX - SELF RESETTING FUSE	UNREGULATED 11-17VDC	
CAM	1 2 3	PWR GND +12V RESERVED	7A MAX	LEMO® 0B-303 COMPATIBLE	
MON	1 2 3	PWR GND +12V NO CON	5A MAX	3-PIN MINI XLR	
GIMBAL	N/A	N/A	N/A	DB-9 VOLT GIMBAL INTERFACE ONLY	
USB-C	N/A	N/A	DO NOT USE AS POWER SUPPLY	FACTORY PROGRAMMING ONLY	

IMPORTANT: *Total Axis current draw not to exceed 10A.*
All power ports on Steadicam Axis are unregulated battery voltage, typically around 14V.
Both HD video lines are direct connections from top stage to base with no processing.
Do not plug anything into either USB-C port (top stage or gimbal) they are for factory programming only.
The Volt electronics are not user serviceable except as shown in this guide.

Accessories and part numbers

There are some accessories which make each day a little easier and there are others which are absolute necessities. Be careful when using custom or rented power cables, as polarity may not be correct and you risk damaging cameras, monitors or more. Refer to the pin outs on the previous page and test if you're unsure. The power connectors all provide unregulated battery voltage, so confirm compatibility before plugging stuff in.

The threaded rod mounts on the face of the top stage are compatible with widely available M12 threaded 15mm rods at the LWS standard 60mm spacing. The height to your lens will depend on your setup. Some customizing or careful selection of parts may be required. The base rods conform to LWS as well.

Steadicam Axis Accessories	
Part Number	**Description**
Bags and Cases	
807-7960	BAG, A-15 / A-30 ARM
807-7970	BAG, A-30 VEST/ZEPHYR
850-7930	BAG, AXIS SLED
FFR-000014	STEADICAM SANDBAG
FFR-000013	BAG, TOOL KIT
FGS-900065	WEATHER COVER, ARMS
Hardware Accessories	
078-1121	CAMERA MNT SCREW 1/4-20
078-1122	CAMERA MNT SCREW 3/8-16
601-7411	WASHER 1/4-20 TO 3/8" ADAPTER
078-7393-01	LOW MODE KIT 1/2", W F-BRACKET & CLAMP
300-7901	LOW MODE F-BRACKET
900-1035	BALANCE WEIGHT 1/4 lb/114g, 1/4-20
900-1036	BALANCE WEIGHT 1/2 lb/228g, 1/4-20
850-7916	WEIGHT KIT, 2 x 1/2 lb & 4 x 1/4 lb
815-7520	RETURN MON MOUNT, 15mm ADJUSTABLE
807-7275-01	DROP PIN QUICK RELEASE 4"
Cables	
078-4122-01	CABLE, 75-Ohm Video, 24"/61cm, BNC to BNC
078-7351-01	CABLE, 12V,30"/76cm, RA XLR-4 to 0B-303, 12V VIDEO CAM
802-0116	CABLE, 12V, RED, 15"/38cm, 1B-306 to 0B-303
	EPIC/SCARLET/DRAGON/KOMODO/WEAPON/GEMINI
802-0120	CABLE, 12V, ARRI, 15"/38cm, 2B-308 to 0B-303
	ALEXA MINI/MINI-LF/AMIRA, 12V ONLY

FAQs and troubleshooting

If you're experiencing undesirable behaviors, first check the following:

- Make sure you're using a fully charged battery.
- Cycle the Axis power switch off and then on again.
- Make sure your Axis is **neutrally balanced**.
- Make sure your gimbal mark is properly indexed to the etched line on the post.
- Make sure your gimbal cable has sufficient slack and is plugged in at both ends.
- Are your camera, monitor, battery, and accessories firmly fastened in place?
- Remember to run the Volt motors by pressing the Pause button on the top stage.
- With power on, set all your dials to 0 then back up to 50% and try again.
- Don't forget the inertia and drag settings in Menu-2.
- If you're not seeing an image, are the camera and monitor powered on?
- Are you using the same HD line (#1 or #2) at the top stage and at the monitor?

When powering on the Axis, the LED's turn on, then fade off. What is wrong?

- Answer: The most likely cause is low battery voltage. Try using a fully charged battery.

My Axis does not hold level when tilting.

- Answer: Turning up the Roll strength adjustment will correct this. Roll accuracy for the Volt on the Axis is approximately ±1°.

My Axis does not hold a tilt when tilting in regular or sticky mode.

- Answer: Turning up the Tilt strength adjustment will help correct this. Confirm your neutral balance.

Why does my Volt not correct the horizon when I shoot at a Dutch angle?

- Answer: The Volt is designed to control the roll axis of the sled up to a ±25° roll angle, with reduced power being applied to the roll motor beyond ±5°.

When I take the Volt out of Pause mode, the sled seems to tilt and roll uncontrollably.

- Answer: The most likely cause is that the gimbal handle is not aligned mechanically or electronically with the post or stage. Make sure the yellow index mark on the gimbal grip is aligned to yellow line on the post, and that the "+" LED transitions on/off when the gimbal is centered about the yellow post line. If this does not work, check the sled balance and check that all dials are appropriately adjusted.

What do I need to do when working in cold weather conditions?

- Answer: It is a good idea to let the Volt warm up for a few minutes before operating in cold temperatures to help prevent any potential sluggish response.

FAQs and troubleshooting

How much time does the Volt need to transition from high to low mode?

- Answer: The normal response time for the Volt to obtain a stable level when transitioning between high and low modes is dependent on the operating temperature and a few other factors. This is normal and should take the Volt an average of 10-20 seconds to stabilize.

NOTE: *Low Tilt and Roll strength settings may increase the time it takes the Volt to obtain level as more motor power equates to a faster response. In addition, a rig that is not neutrally balanced may take longer to achieve level because the motors need to work harder to move the sled.*

Do Tilt and Roll settings effect each other at all?

- Answer: No, the Tilt and Roll controls adjust motor feedback directly aligned with the camera's tilt and roll axes, independent of the pan orientation.

Why is my rig vibrating or making a digital grinding noise?

- Answer: The most likely cause is that one or more of the control dials are adjusted too high causing motors to vibrate due to excessive power. Simply turning down the appropriate dial(s) will eliminate this issue.

How often do I need to recalibrate?

- Answer: No periodic calibration of the Volt is required under normal conditions. However periodically verify that your gimbal has remained electronically centered/indexed to the yellow line on the post and has not been accidentally adjusted.

Will I be able to update the Volt myself in the future?

- Answer: Software updates are currently limited to our worldwide dealer network and Steadicam repair facilities. Please contact your nearest dealer for information on the latest updates.

Are there any settings or controls inside the Axis that I can adjust or that need maintenance?

- Answer: No. The Volt portion of the Axis is factory calibrated using specific procedures and calibration jigs. All calibration requires the return of the Axis to the factory. In fact, if some internal controls are tampered with, the Volt could become inoperable and require factory re-calibration. Use of internal controls and settings are for factory use only!

Is the Axis weatherproof?

- Answer: No. Like other equipment with precision bearings and electronics, if the Axis is being exposed to water or contaminants, it is always best to protect it as much as possible.

How do I clean the Axis?

- Answer: Simply wipe it down with a damp, lint-free cloth. A small brush can be used to get into any tight to reach places. Avoid the use of cleaning fluids or oils.

FAQs and troubleshooting

Balancing FAQ's

Do I really need to dynamically balance the Axis?

- Answer: A sled in dynamic balance pans flat without any input from the operator or the Volt. The less work the Volt motors must do, the better the response and the lower the power draw. Faster pans, and whip pans in particular, generate a lot of force. The better the dynamic balance, the less compensating force needs to be applied by the operator or the Volt motors, and the better your operating looks.
- See the diagram below for a visual demonstration of the relationship of monitor, battery and camera placement on dynamic balance. It's helpful to understanding where to place the camera CG when building any Steadicam. Also, *The Steadicam Operator's Handbook* includes much more about the nuances of balancing and the physics behind dynamic balance.

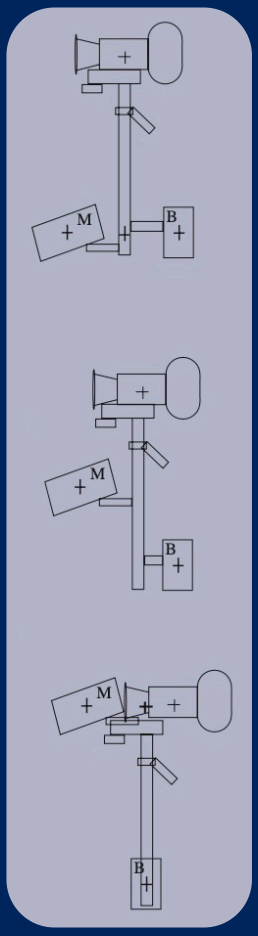
Three figures to better understand dynamic balance:

The top figure looks a lot like your Axis sled. The camera c.g. is centered over the post, and the monitor and battery are on the same horizontal plane, with their common c.g. in the post. This unit is in dynamic balance and pans flat.

The second figure has the battery lowered relative to the monitor. This looks like many other sleds, or your Axis with the battery flipped down. Note that the battery c.g. is moved closer to the post, and the camera c.g. has moved slightly to the rear. Why?? See the third figure.

In the third figure, the monitor has been raised all the way up in front of the camera. It's absurd, of course, but it makes a point. Now the common monitor and camera c.g. is over the post, and the battery's c.g. is directly under the post.

So you can see that as the monitor is raised (or battery lowered) the camera c.g. must move to the rear and the battery c.g. must move towards the post. As you set up your Axis sled, take note of the battery, monitor and balance weight arrangement to help you judge where to place the camera c.g. to achieve dynamic balance much quicker.



Why does the Axis require neutral balance?

- Answer: Two things: One, when a sled is neutrally balanced, it requires very little force for the sled to be tilted or rolled in any direction. This allows the Volt motors to move the sled with very little applied force. This translates into quicker response times for the Volt and a smaller power draw by the motors to adjust the sled position. Two, a neutrally balanced sled does not pendulum as it is accelerated or decelerated. Therefore, the Volt motors have even less work to do to hold the sled at the right attitude as the sled moves and stops.

With the Volt off, my Axis does not stay 100% level when static balancing.

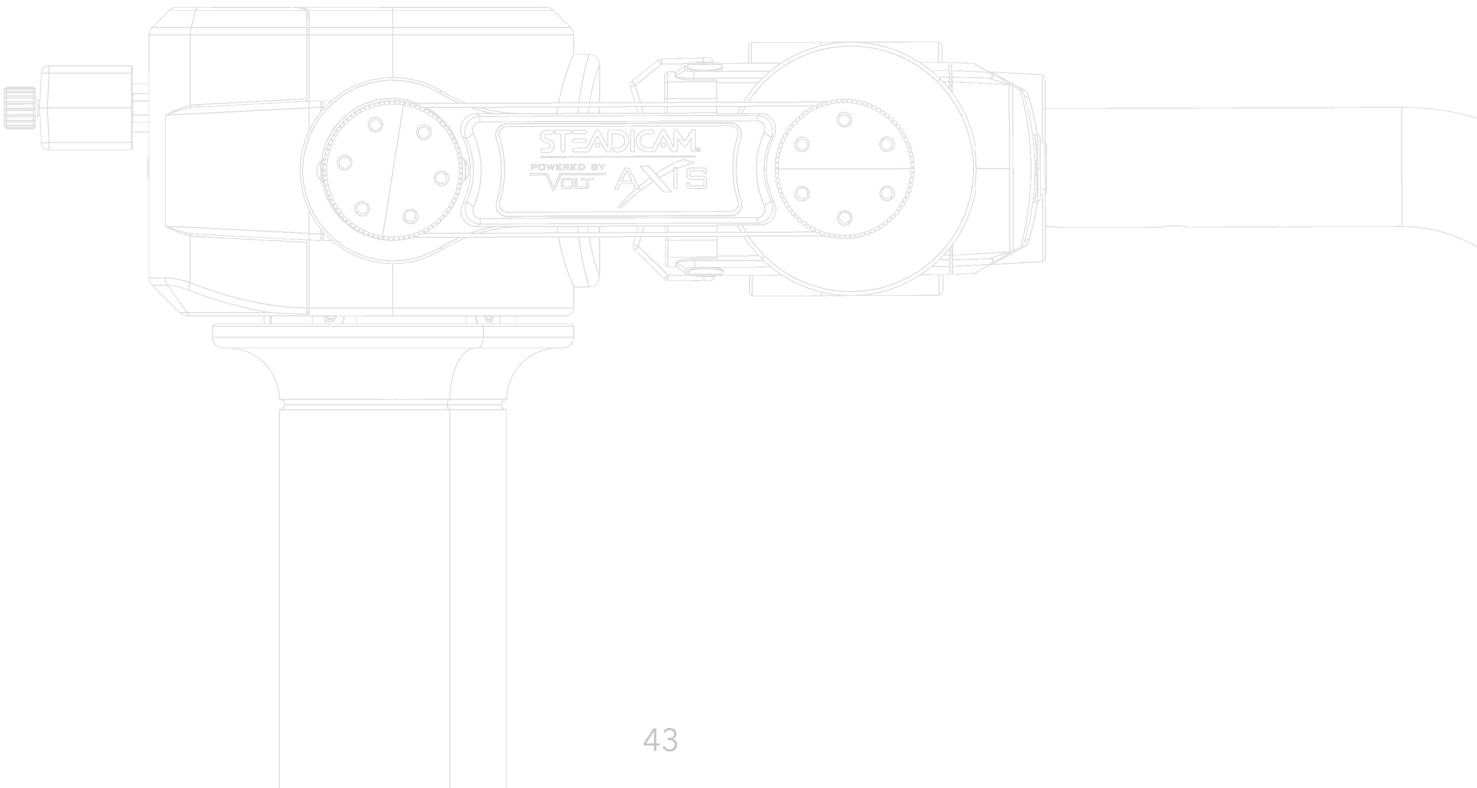
- Answer: Perfect static balance is not required for the Axis to operate properly. You can be off by 10° or more and the Volt will correct it when active. Neutrally balanced sleds will show more balance offsets than sleds with 2+ seconds drop time because this configuration is more sensitive to imbalance and the friction caused by the Volt motors and belts.

I feel friction when I'm panning with Volt off, what could be causing that?

- Answer: The Axis is meant to be powered while operating. When not powered, normal magnetic cogging of the pan motor translates into what is perceived as friction.

I just can't get it to work!

- If all else fails, please reach out to Tiffen Customer service or your nearest Steadicam Dealer. We are here to help.



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User guides and videos:
https://tiffen.com/pages/steadicam-manuals-instruction-guides

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