

# STEADICAM<sup>®</sup>

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# AERO<sup>™</sup>

## *Operator's Manual*



## **Steadicam AERO Operator's Manual**

**LIT-825000**

### **Revision: A**

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# Table of Contents

<b>A Word from Garrett Brown</b>	<b>1</b>
<b>Get to Know the Steadicam AERO</b>	<b>3</b>
AERO components	4
Operating Accessories	7
<b>Setting Up</b>	<b>9</b>
Assembling the AERO Sled	10
Mounting your Camera	13
<b>Balancing</b>	<b>19</b>
Static Balance	20
<b>The Steadicam Vest</b>	<b>27</b>
Fitting the Vest	28
<b>The Steadicam Arm</b>	<b>29</b>
Connecting the Arm & Vest	30
Lifting the System	31
Adjusting the Arm & Threads	32
<b>Steadicam Operating</b>	<b>35</b>
Operating 101	36
Weights & Post Extension	41
Goofy Operating	45
Advanced Operating	47
Dynamic Balance	49
<b>Maintenance</b>	<b>53</b>
<b>Cleaning</b>	<b>54</b>
<b>Electronics &amp; Connectors</b>	<b>55</b>
<b>Contact Tiffen</b>	<b>57</b>

# A Word from Garrett Brown

Dear Friends,

Congratulations on your new Steadicam® AERO™.

I'm amazed to say that Steadicam operating is now 40 years old and the equipment is *seventh generation*—and both are more sophisticated and more vital than ever!

As each new Steadicam gets better and tougher, as great cameras become ever smaller, our lightweight versions increasingly resemble our 'big rigs,' with the same features and perks that help top operators nail difficult shots.

The AERO™ is a true Steadicam top to bottom. It's arguably stronger and more capable than any rig in its class, and is certainly a user-friendly choice for beginners. If you're a newbie, get your hands on *The Steadicam Operators Handbook* and watch the "EFP Training Video".

AERO is also a superb 'run & gun' rig for veterans and flat-out stunts. It's rigid and precise and has all the bells and whistles you're used to. In fact, a lightweight Steadicam, harshly operated for violent moves, yields much more realistic action sequences than handheld!

And an excessively-light camera (what a concept!) can easily be brought up to inertial snuff with supplied weights added to the proprietary corner-mounts on the stage. That makes AERO a terrific rehearsal rig *before* you have to lug your heavy metal through those 10 minute shots!

In short, the AERO is brilliant – precise, tool-free, super-adjustable and super strong. It has the same center post that is used on the Steadicam Zephyr model sled, and an even more rigid stage, so with the A-30 Arm and Vest your AERO can support camera payloads up to 20 pounds!

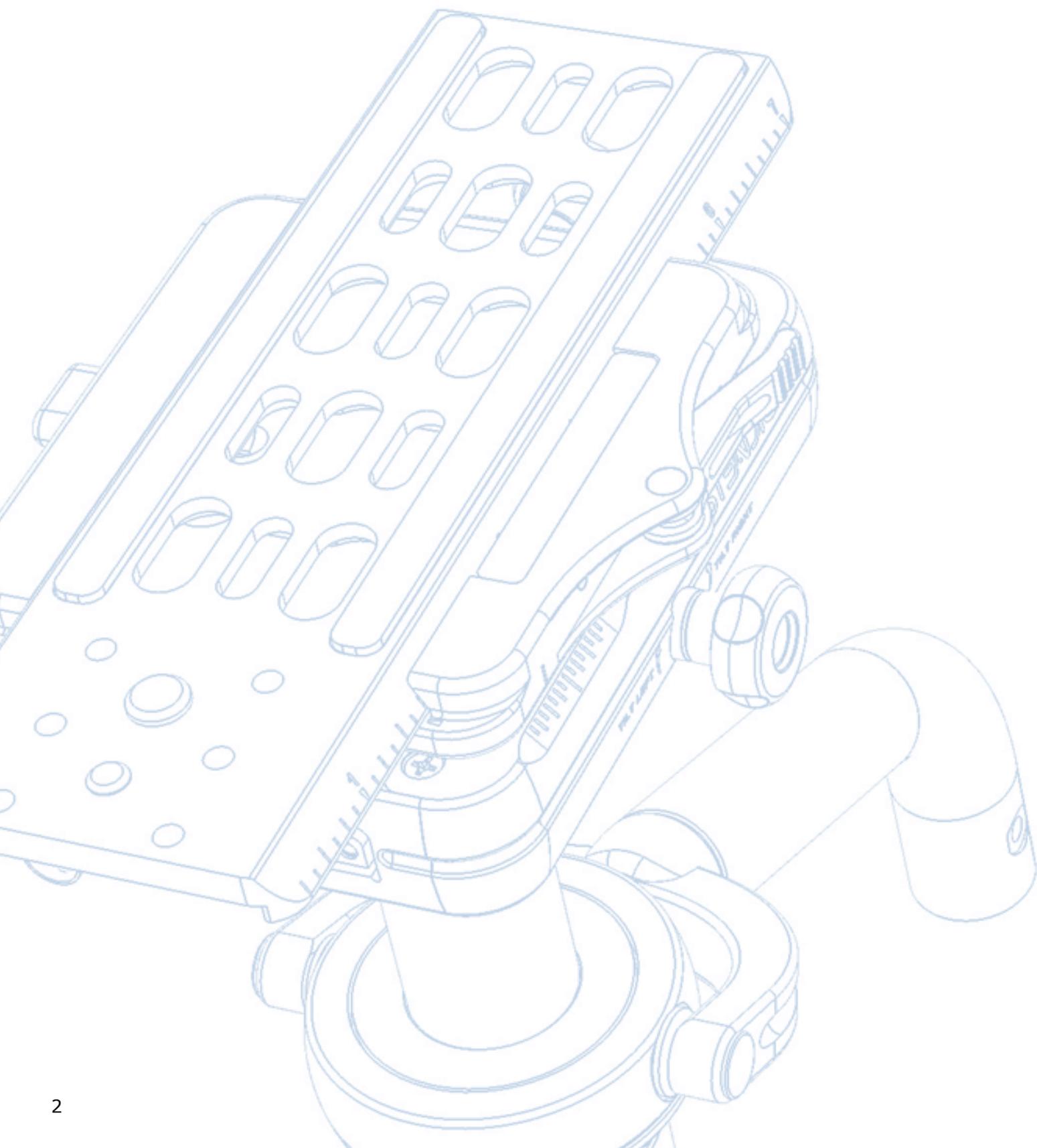
Good luck with your new Steadicam AERO™ and good shooting!  
It's the best light Steadicam ever!

Best,



Steadicam® Inventor  
Philadelphia, 2016  
[www.garrettcam.com](http://www.garrettcam.com)

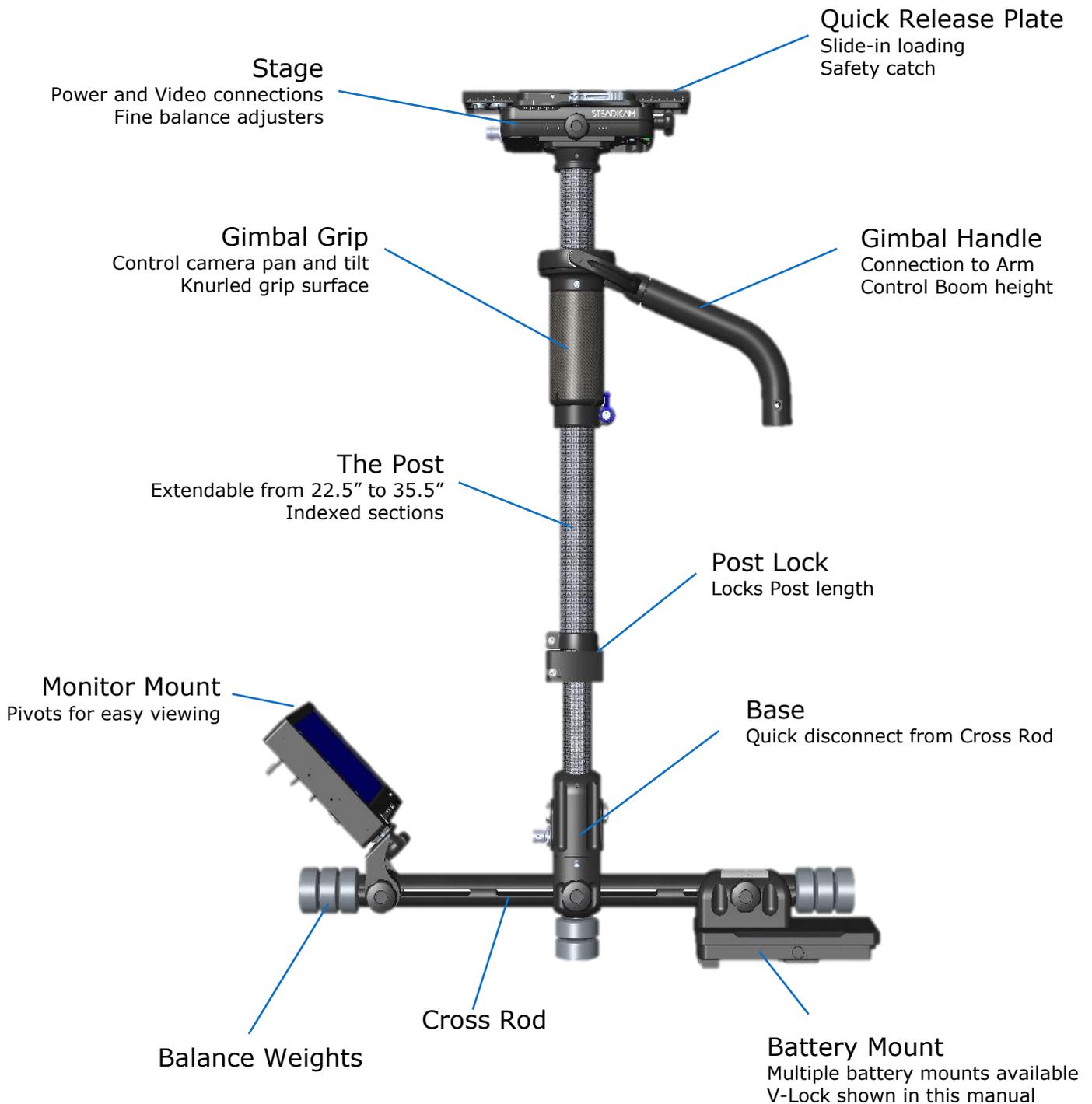




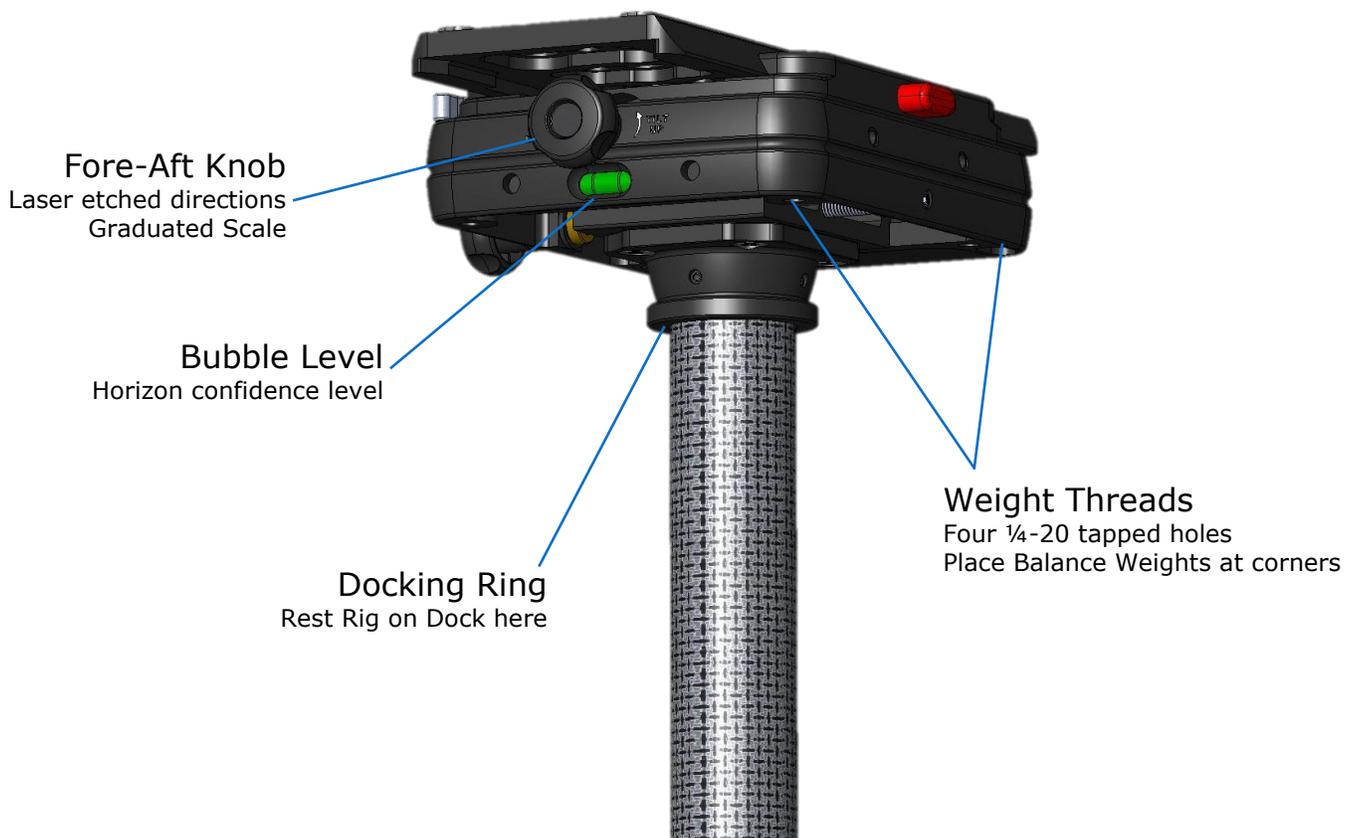
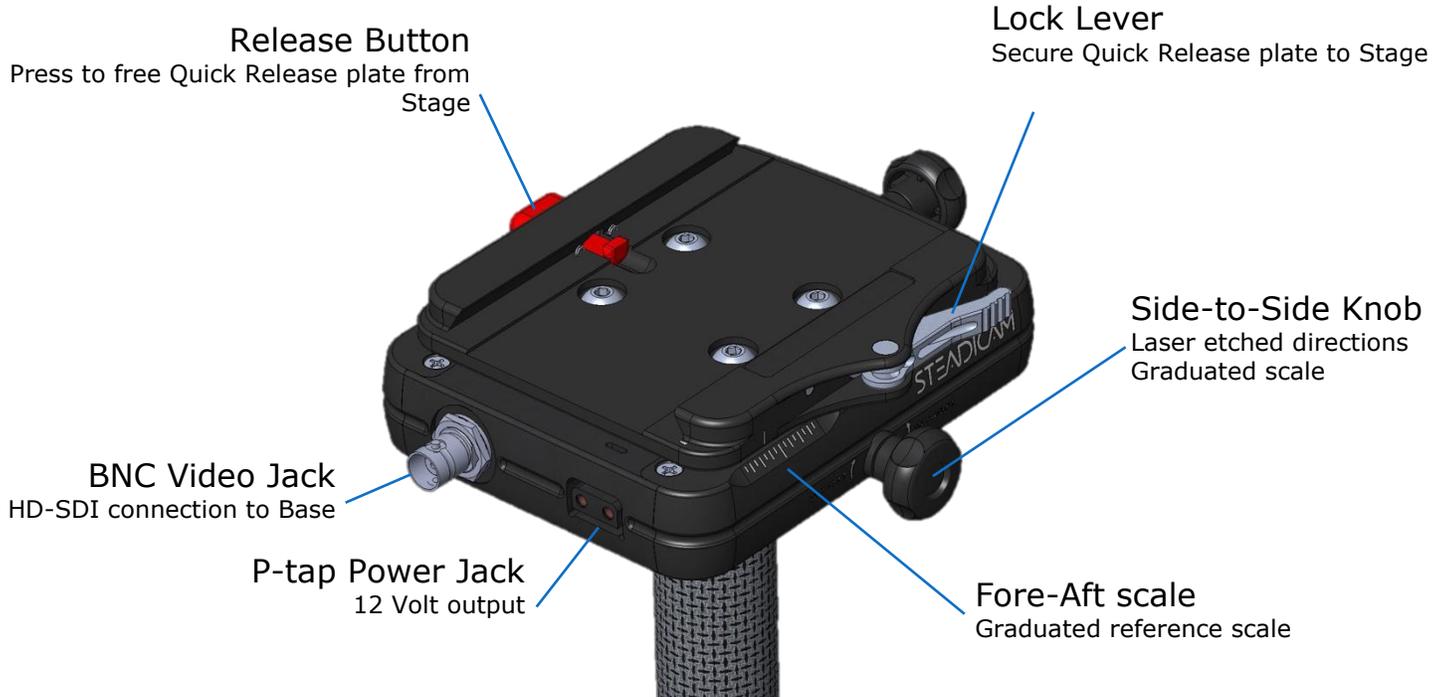
# Get to Know the Steadicam AERO

**The Steadicam AERO** is designed to be precise, user-friendly, and versatile enough to fly a wide range of cameras for a variety of productions. The AERO is tools-free so you can quickly make adjustments to your Sled in order to suit the shot or your operating preferences. Take a moment to familiarize yourself with the components and features of the Steadicam AERO.

## The Sled

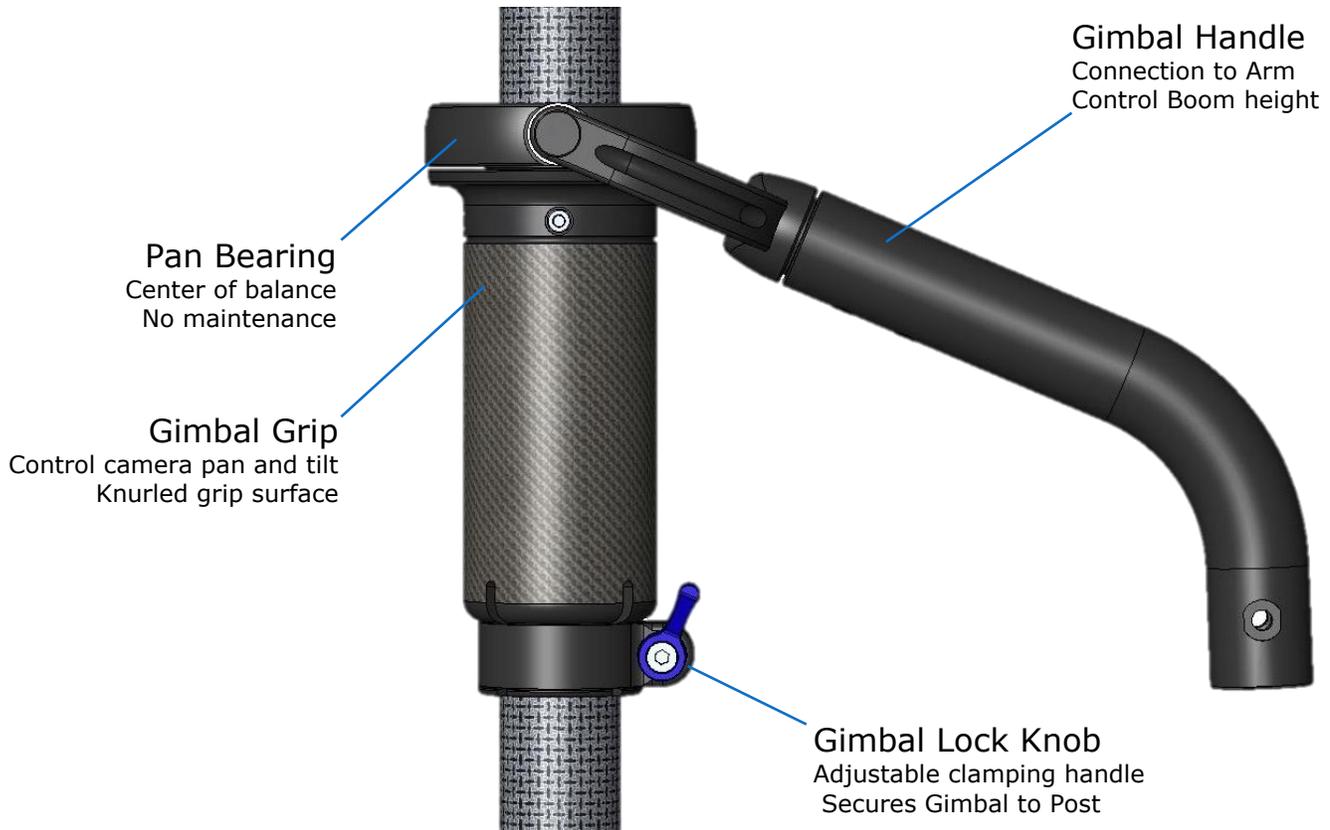


## The Stage



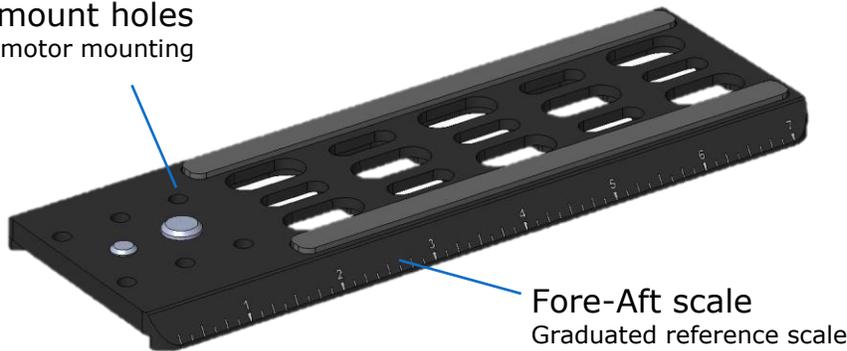
# Get to Know the Steadicam AERO

## The Gimbal



## Quick Release Plate

Rod mount holes  
Focus motor mounting



## Balance Weights

.25 lb each  
1/4-20 threaded



## Base Front

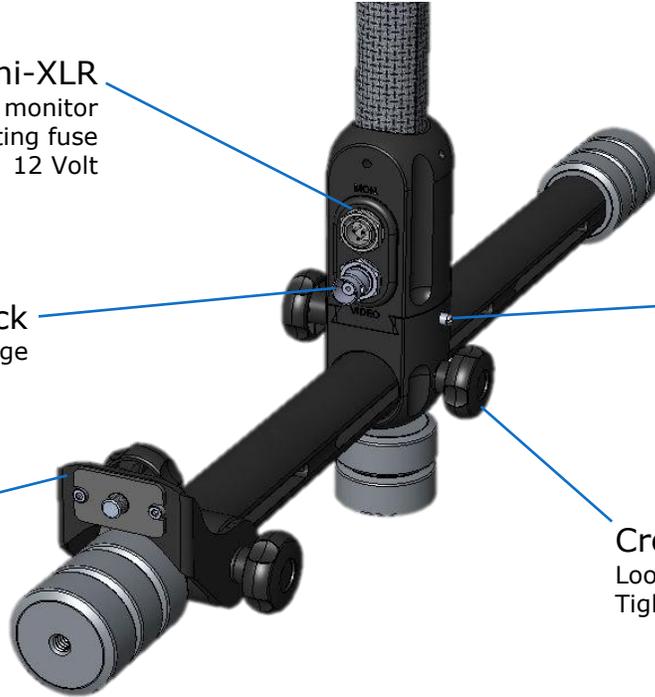
**Monitor Power 3-Pin Mini-XLR**  
Power your monitor  
5A self-resetting fuse  
12 Volt

**BNC Video Jack**  
HD-SDI connection to Top Stage

**Monitor Mount**  
1/4"-20 threads  
Fits most monitors  
Angle adjustable

**Base Release Safety**  
Depress to unlock the Base  
to detach Cross Rod from  
Post for storage and  
transport

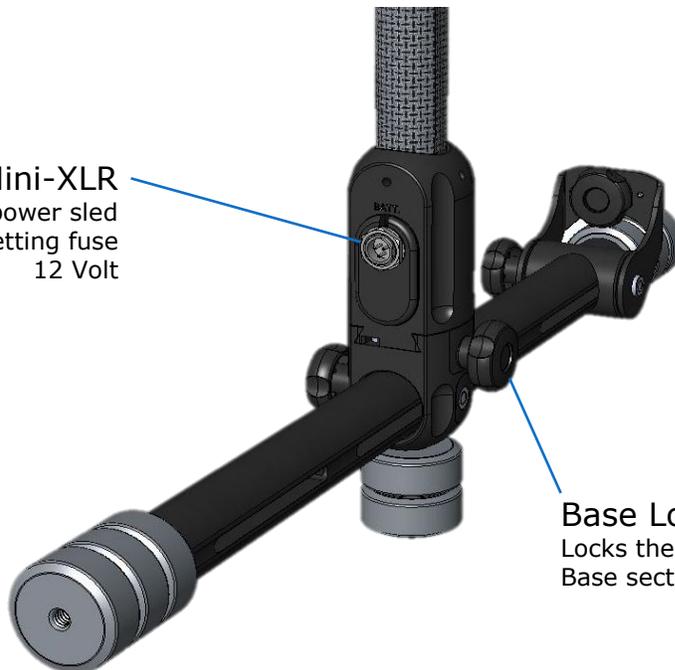
**Cross Rod Clamp Knob**  
Loosen to slide Cross Rod in Base  
Tighten to lock Cross Rod



## Base Rear

**Battery Input 3-Pin Mini-XLR**  
Plug in battery cable to power sled  
5A self-resetting fuse  
12 Volt

**Base Locking Knob**  
Locks the upper Base section to the lower  
Base section



# Operating Accessories

Operating accessories that are suggested in order to get the most out of your Steadicam AERO are illustrated throughout this manual. Please find a list of these accessories here, along with other optional operating accessories, and consider adding them to your kit if you don't already own these components.

## **Suggested Components for your Steadicam AERO:**

### **Docking Bracket**

804-7900 – ½" Basic Docking Bracket (*comes included with AERO 15 Systems*)

807-7920 – ½" Deluxe Docking Bracket (*comes included with AERO 30 Systems*)

### **Stand**

601-7901 – Steadi-Stand

FGS-900073 – American Heavy Duty Stand

### **Sandbags**

FFR-000014 – Steadicam Sandbag (sand not included)

### **Balance Weights**

821-7910 – ¼ lb balance weights, ¼-20 threaded (*8 balance weights come included with all AERO configurations*)

### **Monitor**

MSC-200595 – 7" 3G-HD/SDI/HDMI 1000 nit Monitor (*comes included with most AERO configurations*)

### **Battery Mounts** (*comes included with most AERO configurations*)

825-7300-01 – V-Lock Battery Mount with D-Tap

825-7300-02 – Anton-Bauer Battery Mount with D-Tap

825-7300-03 – Sony BP-U Battery Mount

825-7300-04 – Canon LP-E6 Battery Mount

825-7300-05 – Sony NP-F970 Battery Mount

825-7300-06 – Panasonic D28 Battery Mount

### **Arm Post Adapters**

If you already own an arm and vest and purchased the AERO Sled only, you can use your arm and vest with the AERO sled. Just be sure to use the correct arm post adapter for the ½" AERO gimbal handle.

801-7291 – Pilot Arm Post Kit (adapts Merlin Arms to fit AERO gimbal)

802-7204-01 – G-50x ½" Arm Post

800-7204-04 – G-70x 6" Arm Post with ½" Top

800-7204-05 – G-70x 12" Arm Post with ½" Top

### **Other**

078-7393-01 – Low Mode Kit: F-Bracket & Handle Clamp

825-7420 – AERO Quick Release Camera Plate

078-4122 – 12" Video Cable, BNC-BNC

078-1121 – ¼-20 Camera Mounting Screw

078-1122 – 3/8-16 Camera Mounting Screw

601-7411 – ¼-20 to 3/8" Camera Mount Spacer



# Setting Up

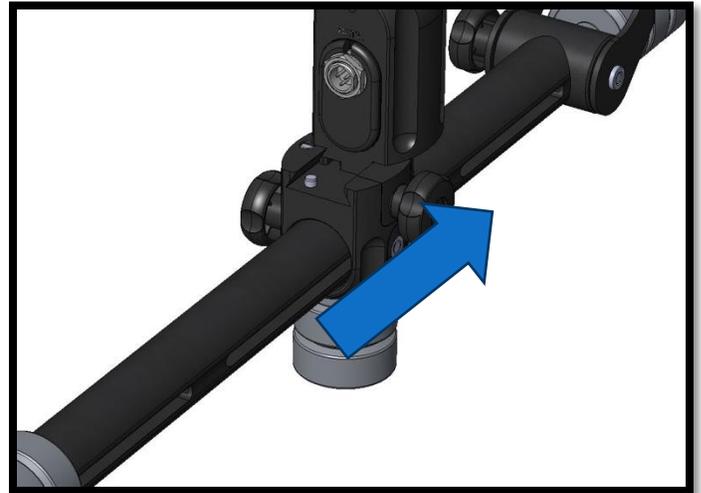
**The Steadicam AERO** arrives disassembled in a compact kit with the optional accessories you selected. The customizable nature means your rig might differ slightly from the units pictured in this manual. However, all the major parts and adjustments are the same.

## ***Build the AERO from scratch:***

Slide Base together, connecting the Post to the Cross Rod. The Base only slides in from the battery side.

Tighten the Base Lock Knob securely.

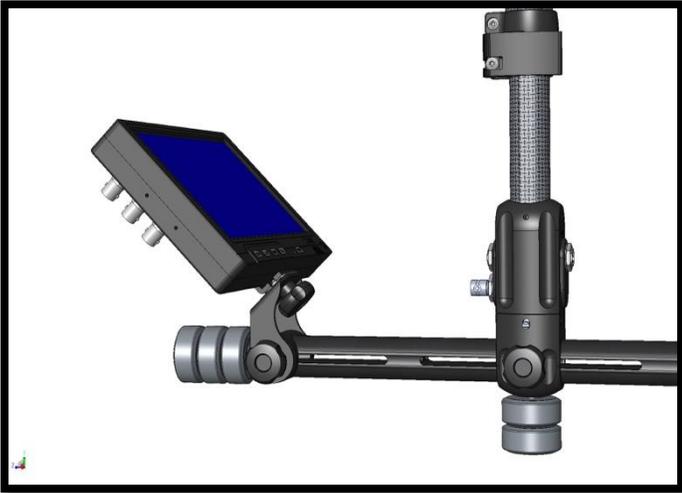
**Note:** To disassemble the Sled later, loosen the Base Lock Knob, then press the Base Release Safety while sliding the two halves apart.



Add your choice of monitor by lining up the registration pins and attaching it to the monitor mount via the captive ¼-20 screw.

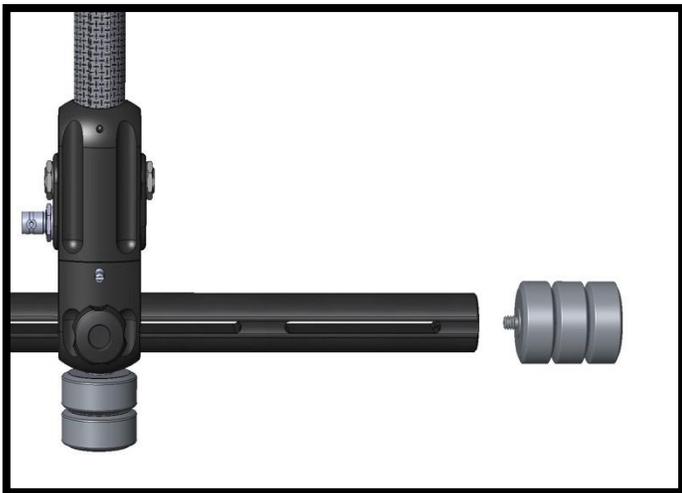


# Assembling the AERO Sled



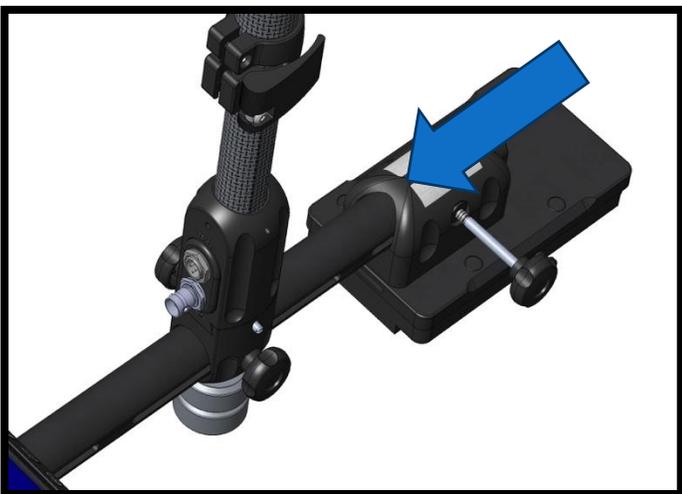
We suggest operating with the monitor at a 45° angle to the Cross Rod. This is adjustable by loosening the Monitor Mount Knob with one hand while supporting and adjusting the monitor with the other.

Once you've adjusted the angle to your liking, re-tighten the Monitor Mount Knob.



Add your choice of battery mount to the opposite end of the Cross Rod. A complete list of available mounts is on page 7.

First, remove any weights from the Cross Rod (your AERO comes out of the box with balance weights installed on both ends of the Cross Rod; you may need to reinstall these later when you balance your AERO).

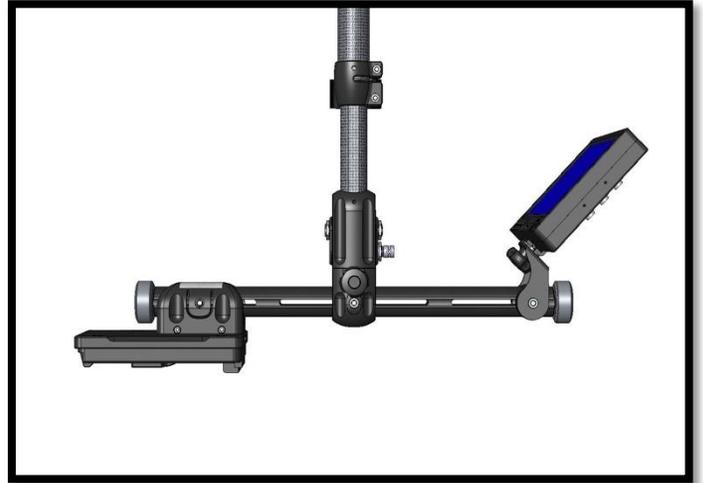


Second, remove the Battery Mount Locking Shaft, slide the Battery Mount onto the Rod and reinstall the Battery Mount Locking Shaft.

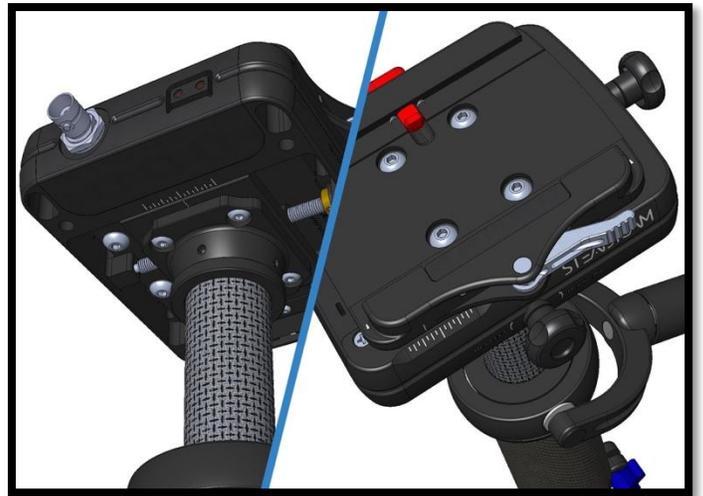
# Setting Up

Roughly center the Cross Rod to the Post after loosening the Cross Rod Lock Knob. Make sure the Lock Knob is retightened.

Start with *one* weight on each end of the Cross Rod for most cameras.

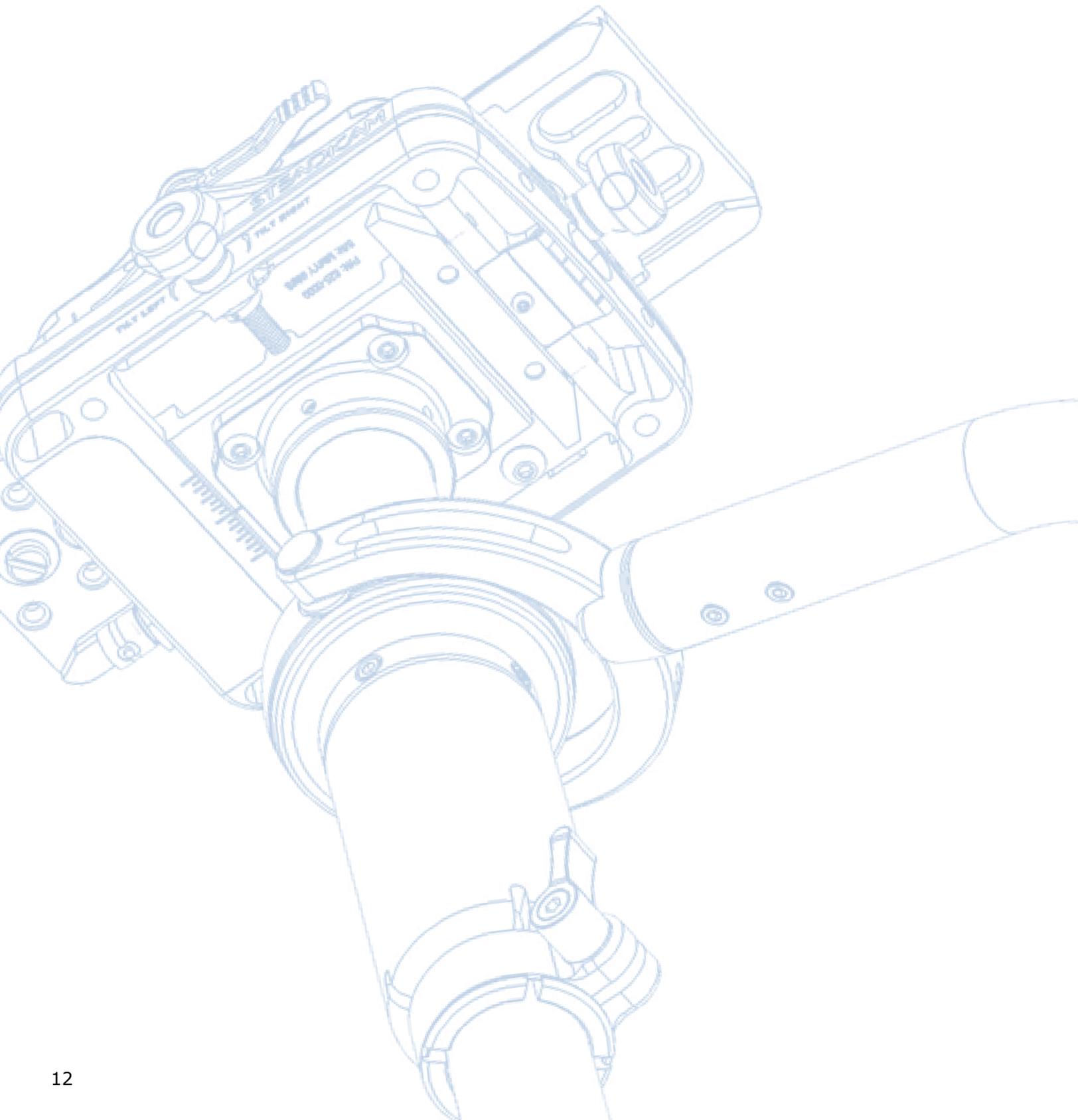


Center the Stage in both Fore-Aft and Side-to-Side axes by looking at the etched Scales and dialing the appropriate Adjustment Knob.



Your AERO is now ready to add a camera!

# Assembling the AERO Sled



# Setting Up

**Mounting the camera** to the Stage is the critical first step to balancing any Steadicam. The goal is to precisely locate the camera's center of gravity, or CG, in one precise location on the Stage. It's a simple procedure, but take your time here to make balancing the Sled quicker and easier. [Watch the Video: Mounting the Camera](#)



Build your camera setup exactly as you plan to use it. This includes batteries, sound gear, media cards and any wireless focus or video devices.

## **Some Tips on Setting Up:**

Use shorter cables to avoid extra loops that you need to tie down.

Secure all loose cables with Velcro or gaffer's tape.

We suggest you keep your flip-out LCD screen closed. The screen can move, which will upset your balance. It is also safer to view the monitor at the base of the sled, so you can keep an eye out for where you are walking.

# Mounting your Camera



***Find the Center of Balance of your camera setup.***

Use a rod or something cylindrical to find the Side-to-Side balance point.

Place the camera on the rod with the rod parallel to the lens. Find the point where the camera balances left to right.



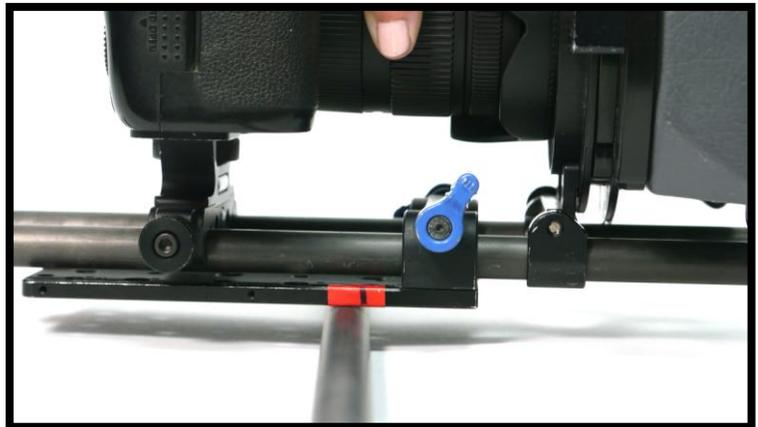
Mark this point with a piece of tape on the rear of the camera.



Rotate the camera 90° to the rod and find the Fore-Aft balance point using the same method.

# Setting Up

Mark this point as well.



**Note:** Some camera setups, such as a DSLR with a zoom 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 Quick Release Plate to the camera and use the base of the Plate to find the Fore-Aft balance point.

## ***Fasten the Quick Release Plate to your camera:***

Unlatch the Lock Lever and press the Release Button while sliding the Quick Release Plate from the Stage.

Then, remove the two included camera screws.



# Mounting your Camera



Center the camera on the Quick Release Plate using the Fore-Aft and Side-to-Side balance point marks you made.

**Note:** The Quick Release Plate should be mounted with the Rod Mount holes forward. However, it will work in either orientation if necessary.



Fasten with the appropriate camera screw in the nearest opening. Do not over tighten, but ensure the camera will not rotate.

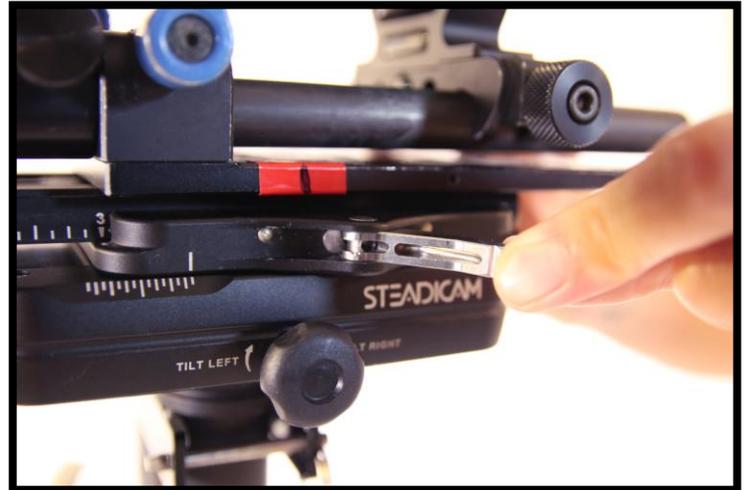


## **Mount the camera to the Stage:**

Slide the Quick Release Plate into the Stage and position your Fore-Aft mark about 1/4" (6 mm) *behind* the center of the Post.

# Setting Up

Close the Lock Lever securing the camera to the Stage.



Using the Side-to-Side Knob, visually align your Side-to-Side mark with the center of the Post.

Next, we balance!



## Notes

A series of horizontal blue lines for writing notes, with a vertical red margin line on the left side.

# Balancing

**The Steadicam AERO** works by carefully balancing the camera, monitor, battery and balance weights. We always balance the Sled to help us get each shot– it gives the operator fingertip control and maximum isolation from unwanted movements. The primary method of balancing the AERO is called “static balance.” In this process, we balance the Sled in all three axes (top-to-bottom, fore-aft and side-to-side) so the Sled hangs upright and is not too bottom heavy.

[Watch the Video: Balancing](#)



Static Balancing will typically result in the Post being perfectly vertical, with the camera on top, the monitor angled for viewing and the gimbal close to the camera.

If your camera is especially light, you should consider adding weight through accessories like a larger battery or audio receiver.

You can also add 4 or more Balance Weights beneath the Stage. Always add weights symmetrically.

Augmenting the weight of a light camera will keep the Gimbal closer to the camera and weighs down the Sled to properly load the Arm.



# Static Balance



Set up the Docking Bracket on a stand and use a sand bag or a friend to keep it from toppling while the rig is on the balance pin.

With the balance stand stable, place the AERO Gimbal Handle on the balance pin of the Dock, but don't let go of the rig.

**⚠ CAUTION:** always keep at least one hand on the Sled at all times while it's on the balance pin, no matter how well-balanced it is.



## ***First: initial top-to-bottom balance-***

Make sure the camera Lock Lever is tight.

Rotate the Post to horizontal. With one hand firmly on the Post, loosen the Gimbal Lock Knob. The Post will move freely inside the open Gimbal.



Grasp the Post, it will move freely inside the open Gimbal. Grasp the Gimbal Grip or use your thumb to push against the Gimbal, sliding the Post one way or the other until the Sled balances horizontally like a seesaw.

This is neutrally balanced.

**⚠ CAUTION:** always keep the Post horizontal when the Gimbal Lock Knob is open; if you don't and the Sled rotates, the Post will slide thru the Gimbal and can damage your equipment.

# Balancing

Now, slide the Gimbal  $\frac{1}{2}$ " towards the Stage.  
This will move the Sled's CG below the pan bearing, giving us the *slightly* bottom heavy Sled we want.

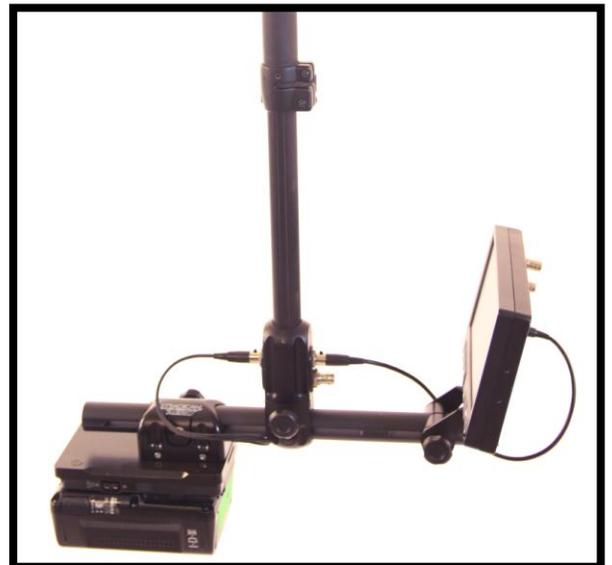
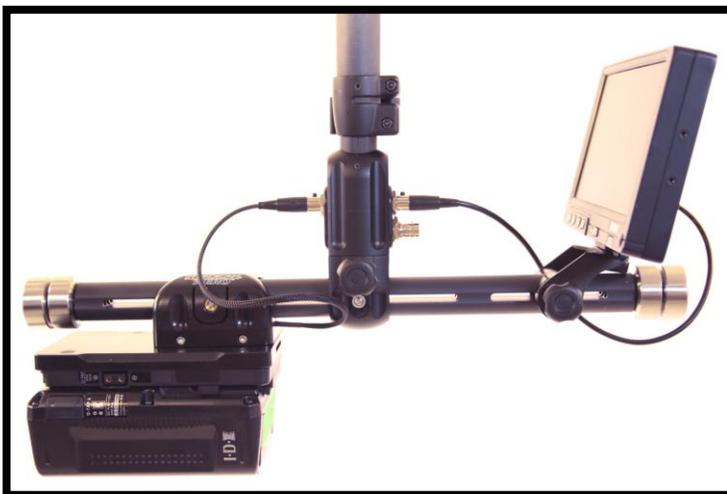
Tighten the Gimbal Lock Knob.

We'll fine tune the top-to-bottom balance after trimming the other two axes.



If you're balancing a heavier camera with a lightweight battery on the Base, you may not be able to find the balance point.

If this is the case, add two or more additional Balance Weights to each end of the Cross Rod or extend the Post by a few inches. Then repeat the neutral balance procedure and slide the Gimbal  $\frac{1}{2}$ " towards to camera.



# Static Balance



## **Second: set the Fore-Aft balance–**

While still on the balance pin, hold the Post vertical and loosen your grip to see which direction the camera tilts Fore-Aft.

We're only focusing on one axis at a time.

And remember, don't completely remove your hand while the sled is on the balance pin.



If the camera tilts significantly, loosen the Cross Rod Clamp Knob and slide the Cross Rod fore or aft until the camera remains horizontal. Then lock in the position by retightening the Knob.

**Quick tip:** always slide the weight "uphill" to find horizontal.



Fine tune the tilt by turning the Fore-Aft Knob one way or the other to bring the camera to horizontal.

Small accessory levels are handy to get it just right!

# Balancing

## **Third: set the side-to-side balance-**

While still on the balance pin, loosen your grip again to see if the camera leans side-to-side.

The side-to-side lean should be minimal if you were able to align your side-to-side balance mark with the center of the Post.



Fine tune this axis by turning the Side-to-Side Knob one way or the other to bring the camera completely level.

You can reference the built in level on the Stage or use a small accessory level.

**Note:** if you reach the end of the adjustment range with the Side-to-Side Knob and your camera is not level, you might need to re-mount the camera on the Quick Release Plate in a different location.



Your Sled should be resting with the Post vertical now.

If either axis is slightly off vertical, go back and adjust it with the appropriate Balance Knob.

## ***Fourth: confirm top-to-bottom balance–***

Let's fine tune our top-to-bottom balance by using the "Drop Time" test.

Drop Time is a gauge of the bottom heaviness of the Sled.

Re-check that the camera Lock Lever is fastened and make sure your stand is securely grounded.



While on the balance pin, rotate the Sled to horizontal.

Release the Post and observe how long it takes for the Post to pass through vertical.

We're aiming for 2-3 seconds of Drop Time.

If your Drop Time is shorter than 2 seconds, adjust the location of the gimbal **AWAY** from the Stage by a tiny amount.

If your Drop Time is longer than 3 seconds, adjust the location of the gimbal **CLOSER** to the Stage by a tiny amount.

Make a small change as needed and then secure the Gimbal Lock Knob.

# Balancing

Re-test your Drop Time.

You may need to repeat the process a few times until it's around 3 seconds.

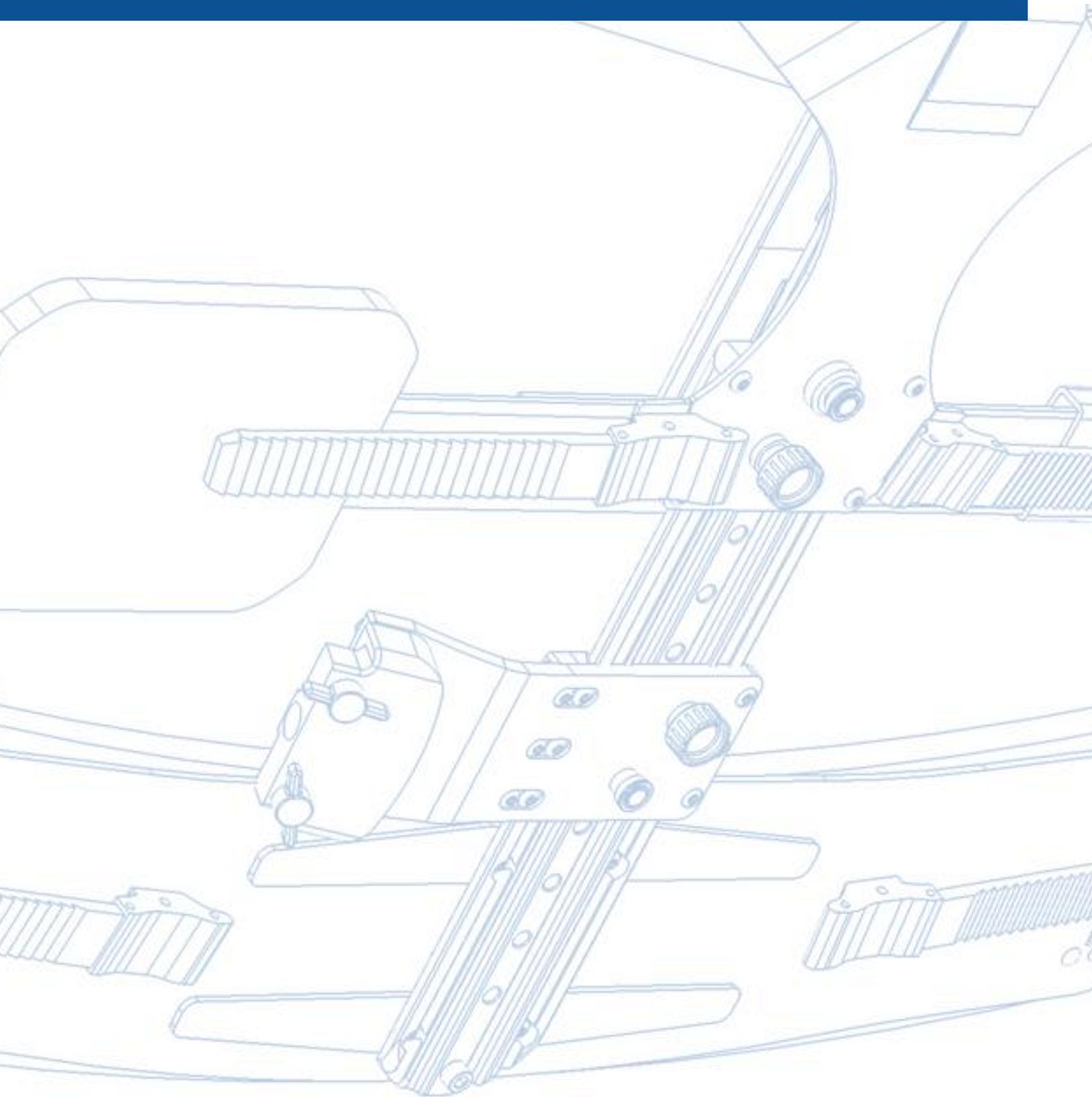
**Note:** You may alter the Drop Time to suit your specific shot: longer Drop Time for easier tilts and rapid accelerations, shorter Drop Time for easier static horizons or windy conditions.

Now re-check your Static Balance with the rig vertical on the Balance Pin.

You may need to fine tune your Fore-Aft and Side-to-Side balance slightly after achieving your desired Drop Time.

The AERO is now in static balance!





# The Steadicam Vest

**The Steadicam Vest** is the major connection between your body and any Steadicam System. It's adjustable to fit most body types via Velcro straps and adjustable buckles. Just like setting up the AERO, taking your time to properly fit the Vest will ensure you get the highest performance and also the most comfort from the system. [Watch the Video: Fitting the Vest](#)

## General components of a Steadicam Vest:



**Note:** Each Vest has its own unique fasteners and design, so yours may look different than the Vest pictured above. You should be able to identify the components on your own Vest.

# Fitting the Vest

## Proper Vest fit:

The length of the Vest should place the waist pads over your hip bones, yet still allow your legs to lift for climbing stairs.

The Center Spar should stay centered on your torso and not slip to either side.

The Shoulder Connectors should not ride high and the Shoulder Pads should rest on your shoulders.

The fit should be very snug but not straightjacket tight.

The Socket Block should move with you and not shift under load.

When adjusting Velcro straps, keep them symmetrical across the back and waist.

It can be helpful to have a friend assist you when fitting the Vest for the first time. If you don't have someone to assist you, check the fit in a full length mirror.



1. Open all buckles on the left side of the Vest and slip on the Vest.
2. Close the Shoulder Connector.

*Leave all Buckles open until instructed to later in the fitting process.*

3. Connect the chest straps and center the Chest Plate on your chest.
4. Pull down on the Chest Plate to seat the shoulder pads on your shoulders.

5. Adjust the overall Vest length so the Hip Pads are centered over your hips.
6. Be sure the Hip Straps are horizontal on the Pads and tighten them evenly.

7. Push down on the Vest to ensure it's centered and covering your hips.
8. Cinch the hip straps.

9. Cinch the chest straps.

*The Vest should be snug but not uncomfortable.*

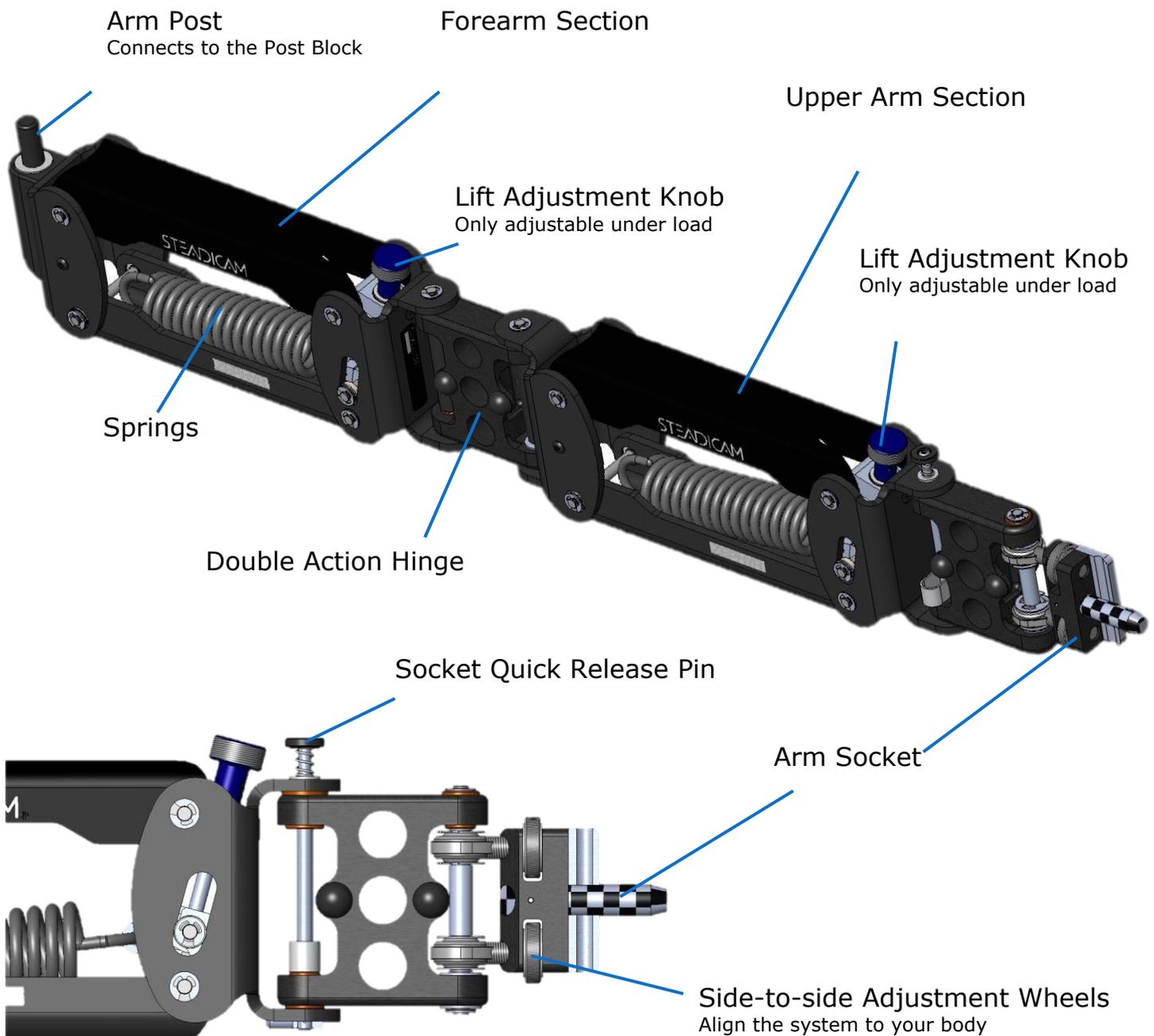
10. Look at the good fit in this photo. It's important that the shoulder pads contact your shoulders and the shoulder connectors are sitting low.

**Note:** A few operators may want to add or remove padding and shorten or extend straps in order to get a perfect fit to their body. Customizing your Vest can make you much more comfortable.

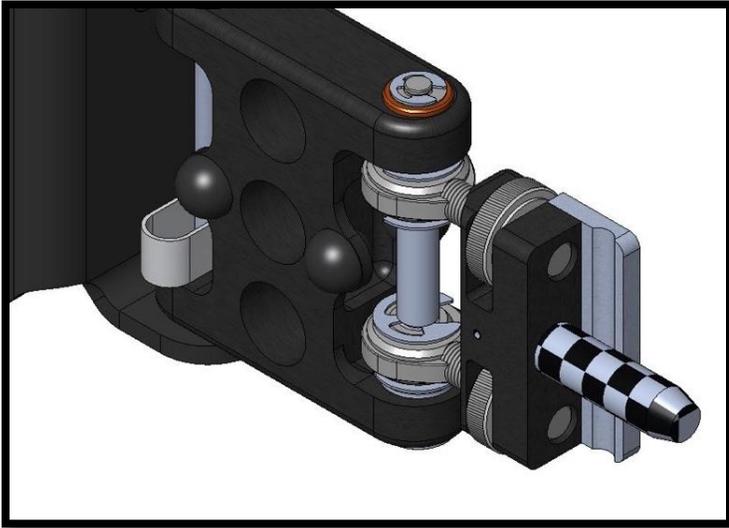
# The Steadicam Arm

**The Steadicam Arm** supports the weight of the Sled 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. It also incorporates Side-to-Side Adjustment Wheels which help align the lifting axis to your body. [Watch the Video: Attaching the Arm](#)

## General Components of a Steadicam Arm:



# Connecting the Arm & Vest

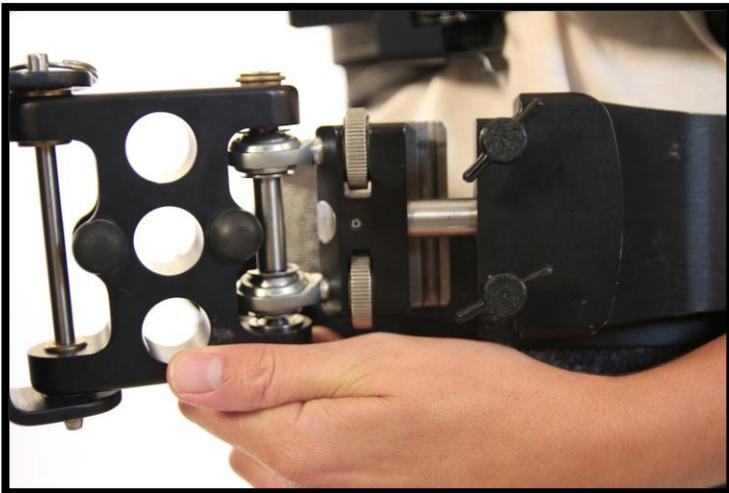


## **Set the "Threads" to start:**

Turn the top Adjustment Wheel all the way in, so no threads are showing and then turn it back out 2 full turns.

Turn the bottom Adjustment Wheel the way in until it stops.

This setting will put the lifting axis in line for most operators. We'll confirm the alignment when you pick up the Sled.



Insert the Arm Socket into the Socket Block of the Vest. Then use the Thumbscrew Bolts to secure the connection.

**Note:** Always keep a hand on the free end of the Arm or you risk hitting someone, something, or even yourself in the face!



If you're slender, the top Thumbscrew will be most of the way in. If you're more generously proportioned, the top Thumbscrew will be some turns out from there.

Always dial the top Thumbscrew to your preferred setting and then snug up the lower screw.

The Thumbscrews do not need to be especially tight, but snug enough to keep the Arm secure in the Socket Block.

# Lifting the System

**We're almost there!** Let's learn to pick up the rig and get the Arm adjusted for your body and the weight of the AERO System. You'll have to wear the weight of the system to make these adjustments. [Watch the Video: Lifting the System](#)



With the Docking stand raised so the Stage is roughly shoulder high, bow to the stand and place the Arm Post into the receiver of the Gimbal Handle.

Keep your knees straight and bend at the hips.



Take a step towards the Rig and stand up straight. Let the Arm take the weight and compress.

You can now lift the AERO System clear of the docking stand and step back.

**Note:** docking is the exact opposite; rest the base of the Stage on the Dock and bow to release the Arm Post before stepping back.



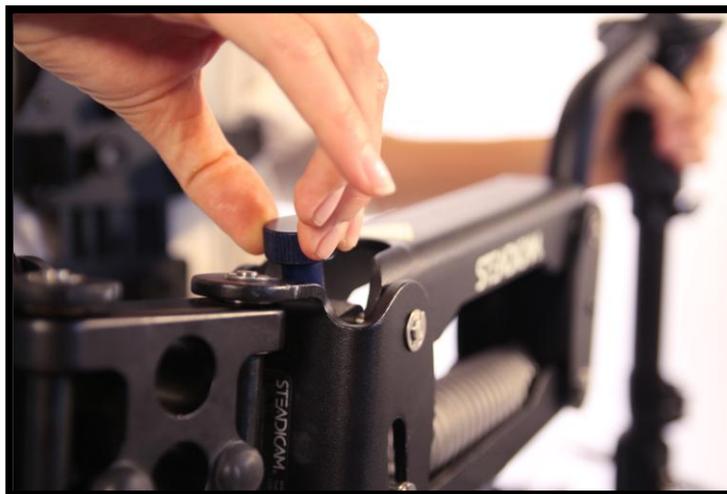
# Adjusting the Arm & Threads



## **Adjust the Lift:**

**Important:** The Lift adjustment knobs can only be adjusted when the Arm segments are slightly above horizontal. Do not force the knobs when the Arm is unloaded or boomed too far up or down. At the correct angle, the knobs turn easily.

If the Arm floats too high or too low for your payload, it will be necessary to lift or lower it to find that sweet spot to make adjustments.

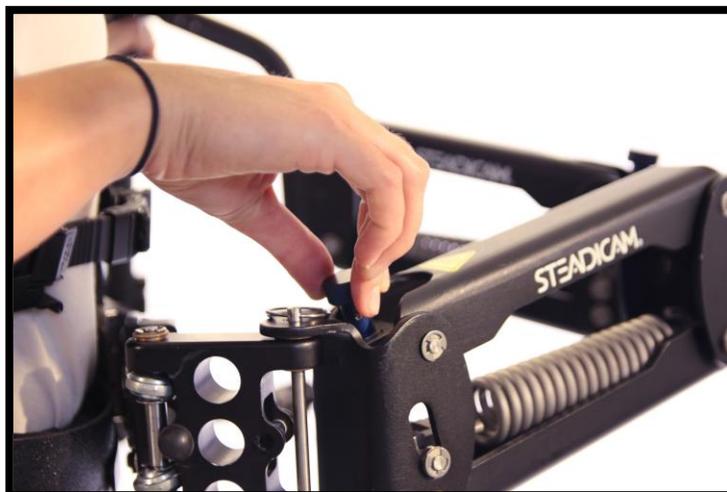


Ideally, both Arm sections will come to rest slightly above horizontal, by about 5-10°.

With the Arm in the middle of its boom range, does it rise or fall?

Turn the Forearm Lift Adjustment Knob clockwise to add lifting strength or counterclockwise to reduce the lifting strength.

Make small adjustments until the Forearm segment rests just above horizontal.



Repeat the adjustment on the Upper Arm section in the same way. Both Arm sections should move together when booming up and booming down. Test it to see.

**⚠ Caution:** Never let your hand or fingers reach into the open areas of the Arm near the springs. If the Arm rises while anything is in this area, it may be pinched and injured.

# The Steadicam Arm

## **Testing your threads:**

Stand up straight and look straight ahead.

Is the Steadicam AERO comfortably staying in one place in front of you?

**Note:** it's helpful to remember your thread settings so you can return to the ideal settings quickly next time.

**If the rig tends to move straight away from you:** loosen the bottom Thumbscrew and tighten the top Thumbscrew until the rig is neutral. Then re-tighten the bottom Thumbscrew.

**If the rig tends to move towards you:** loosen the top Thumbscrew until the rig behaves and then tighten the bottom Thumbscrew.

**Note:** both Thumbscrews must be snug before you get to work.



Typically, your side-to-side adjustment won't need to be changed, but if the System does move to one side, you can correct it here.

Dock the Sled and remove the Arm from the Gimbal then add or subtract a half turn of the **top** Adjustment Wheel at a time and retest.

Most operators leave the bottom Adjustment Wheel at 0 turns and the top Adjustment Wheel set 1.5-2.5 turns out from 0.



[Watch the Video: Checking Threads & Adjusting Lift](#)

# Adjusting the Arm & Threads

## Notes

A large area of lined paper for taking notes, with a vertical red margin line on the left side. The lines are light blue and spaced evenly down the page.

# Steadicam Operating

**Steadicam Operating** is not learned in a day, or even through reading this manual. It is physically and mentally taxing and only through practice can you become a capable operator. We highly recommend taking at least a 2-day workshop and purchasing the Steadicam Operator's Handbook for an in-depth look at all aspects of the craft from the technical to the creative to the business.

Our goal with operating is twofold: to create the best shots we can, with the most accuracy and repeatability, and also to be as comfortable as possible while working to ensure long days and a long career. It **all** starts with the right posture:



## Stand up straight

As if carrying no weight at all  
Don't lean back

## Neck slightly tipped forward

NOT hunching over to see monitor  
Shoulders back

## Hold rig close to body

But not touching knees or hips  
Leave baggy clothes at home

## Hips turned slightly in

Angled towards the Rig  
Keep it as close as possible

## Don't bend at the knees

Let the Arm isolate your movement  
Un-learn your handheld habits

## Weight on ONE foot

Don't get locked into position  
Be ready to change direction

## **The Hands:**

Your right hand on the Gimbal Handle is in control of placing the camera in 3D space. Boom up and down, move it closer to your body or away. This hand always has a firm grip capable of pushing around the weight of the entire system.

Your left hand on the Gimbal Grip is in control of aiming the camera. With the rig properly balanced, this should take very little effort.

The Grip is as light as possible, often with just fingertips controlling the pan and tilt of the rig.

Touch the Gimbal as high on the Grip as possible, and perpendicular to the Lens.

**Note:** If working with the rig on your left feels odd to you, maybe you're a "goofy" operator. Check page 45 to learn how to switch over to goofy.



But the hand on the Gimbal Grip must also counteract the pendulum effects of accelerating, cornering and stopping.

So our grip gets firmer when necessary from a light touch to a full hand to maintain horizon, headroom and framing.

We must anticipate the unwanted movements and change this grip accordingly every second.

# Steadicam Operating

## ***Make it Float***

With proper posture, and setup of the Arm and Vest, you can control the location and direction of the sled with your body.

Stand up straight, turn your hips toward the rig and loosen your grip.

Try to keep the rig floating next to you; lean slightly away from the direction the rig wants to go.

This float is always at work: Whether static or moving, we should always be in balance. Our torso is maintaining the location so that the rig is isolated from our movements.

Push the rig away and we lean back slightly.

Push the rig to one side and we lean slightly to the other side.

## ***Walking is as easy as walking***

Walk as normally as possible.

Walk with intention; move to a specific spot along a specific path.

Use the handgrip to prevent the sled from going off level.

Learn to walk forwards and backwards, being sure to stand up straight.



## **Start and end moves with the Arm**

Lean slightly in the direction you're headed and start the camera moving first. Once the rig is moving, take your first step and follow along with the sled.

To finesse the end of your move, stop walking and let the rig continue moving briefly, finishing the move with just the Arm.

**Tip:** If you don't need to walk, just use the Arm to move the camera; it can be much smoother than taking a step.



## **Headroom**

Use the boom range to control headroom with actors and on camera talent.

As they approach camera, boom up.

As they move away, boom down.

Resist the temptation to tilt!



# Steadicam Operating

## **Pan**

The friction free bearing allows perfectly smooth panning action. Learn to control your starts, panning speed and stops.

Combine a pan with booming for headroom as an actor passes by camera.



You can also perform a "body pan" by rotating on your foot, hinging your entire body.

This can be preferable to maintain viewability of the monitor and for larger pans, like 180°



## ***Tilt***

Tilting is performed by the Gimbal Handle hand.

Keep the rig clear of your legs and the Vest.

Your grip will need to change a little to support the weight of the rig.

Stay in balance.

While tilting, your Gimbal Grip Arm should maintain a comfortable angle.

Walk normal.

Continue to feather your moves with the Arm.



# Steadicam Operating

**In addition to helping balance the AERO Sled,** the Balance Weights and extendable Post allow adjustment of inertia and lens height to help you achieve each specific shot. Inertia is resistance to acceleration; the more inertia we have across each axis of our Steadicam, the more resistant the rig is to pan, tilt or roll. In combination with adjusting Drop Time, you can tune the AERO to be quick handling and active or slow handling and stable to suit each shot.

## **With a lightweight camera:**

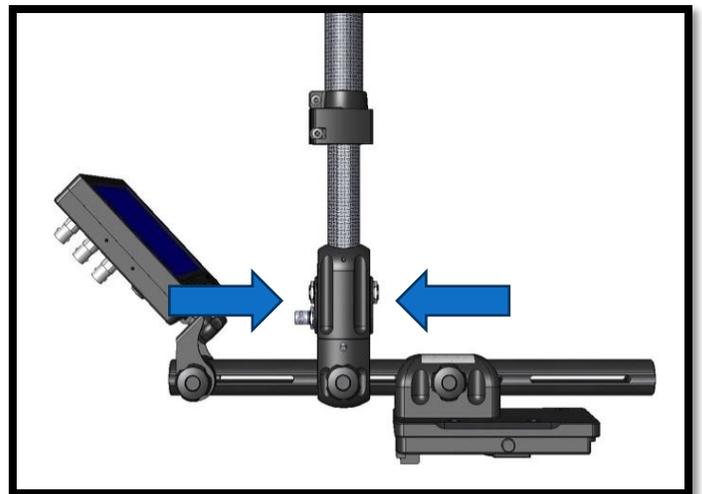
We usually add four or eight weights to the bottom of the Stage to get the Gimbal closer to the camera and provide weight for the Arm.

This also increases Panning inertia slightly.

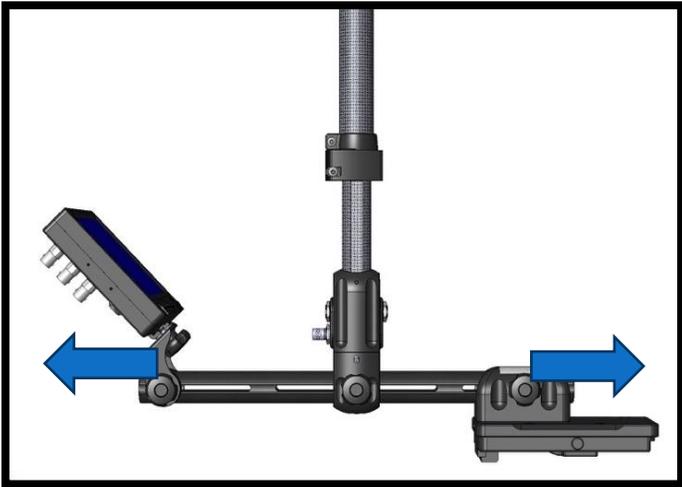
We can also adjust the length of the Post to increase lens height AND to increase the Tilt and Roll inertia.



It's possible to **reduce** the Pan inertia by moving the monitor and batteries closer to the Post. This makes the camera "whippy" for action scenes or a more handheld look.



# Weights & Post Extension



Or we can **increase** the Pan inertia by extending the masses away from the Post, making the camera more resistant to panning for architecture shots or walk and talks.

**Note:** keep the camera's CG aligned slightly behind center of the Post and balance Fore-Aft by sliding the battery mount or sliding the entire Cross Rod.

## **With a heavier camera and heavy batteries:**

You have more options available to you.

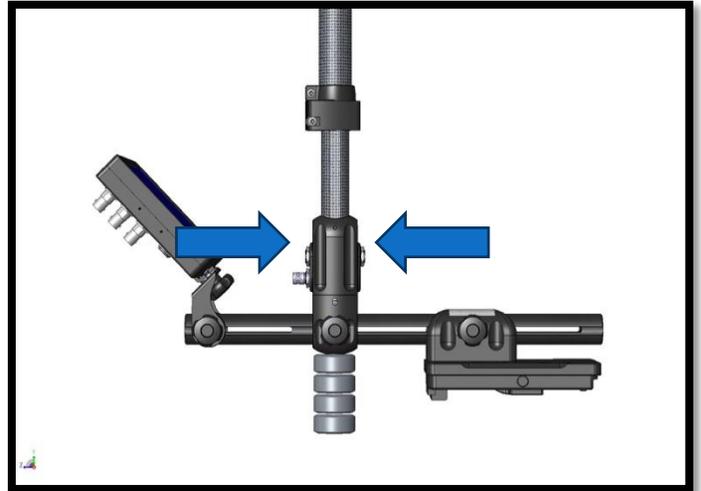
Short Post for compact size and easy tilts, or Long Post for higher lens height and slower Tilt and Roll axes.

Add weights to the Stage so you can position the Gimbal closer to camera, or add balance weights the Cross Rod to slightly increase lens height and/or increase the Pan inertia.



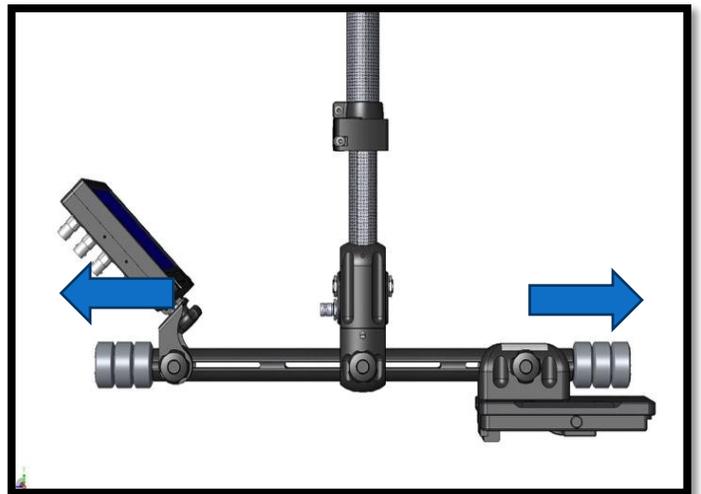
# Weights & Post Extension

Just like with the lightweight camera setup, it's possible to **reduce** the Pan inertia by moving the monitor and batteries closer to the Post. If you're using weights to keep the Post short or increase lens height, add them directly under the Post.

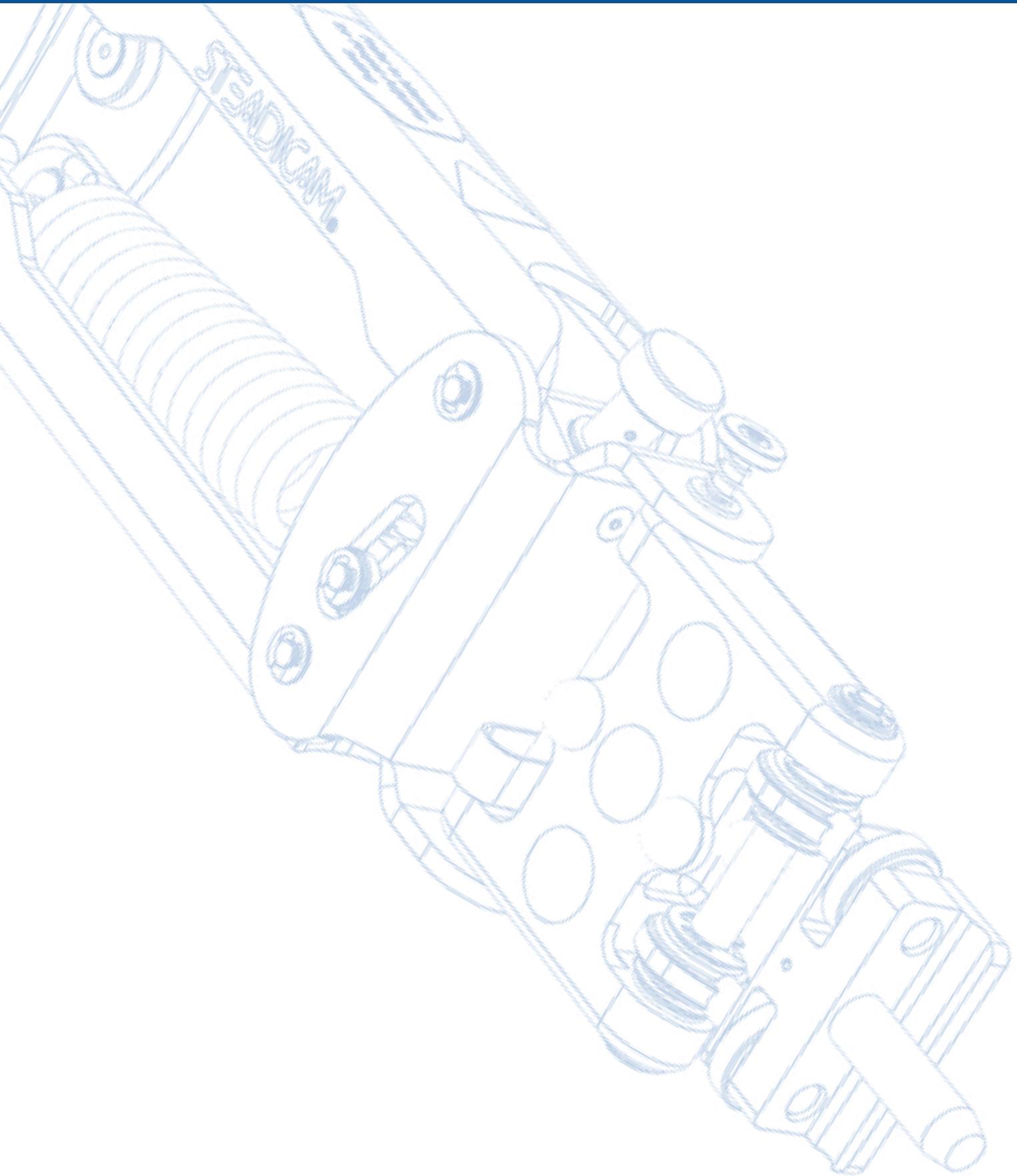


Similarly, you can **increase** the Pan inertia by extending the masses away from the center Post, including the Accessory Weights.

**Note:** keep the camera CG aligned slightly behind center of the Post and balance Fore-Aft by sliding the batteries.



When starting any scene, consider all the possible adjustments and set up the Sled so it helps you get the shot.



# Steadicam Operating

**If operating with the camera on your left feels odd**, maybe you're naturally Goofy footed. Switching the camera to the right side requires changing the Vest Socket Block plate, flipping the Arm's Socket and re-setting your threads. The Sled remains the same. It should only take five minutes.

Even if you're a normal-sided operator, there will come a time where a shot **requires** you to have the camera on the opposite side, so practice this occasionally to be prepared!

Disassemble your Vest as needed to gain access to the Socket Block Plate.

Each Vest is slightly different, but most require the chest straps and neck yoke to be removed from the Center Spar.

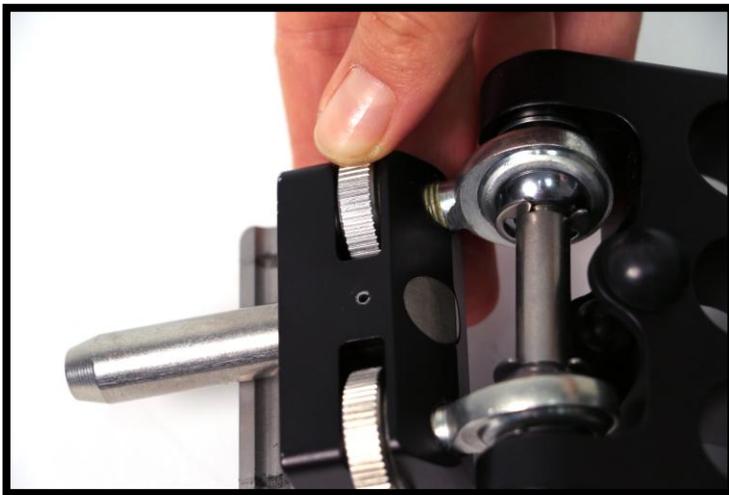


Flip the Plate over so the Socket is on the LEFT side of the Vest and reassemble.



# Goofy Operating

Pull the Socket Quick Release Pin from the Arm and flip the Arm Socket over. Re-install the Socket Quick Release Pin.



Your threads are now flipped, so reset the Side-to-Side Adjustment Wheels. Approximately 0 turns out on the bottom and 2 turns out on the top wheel.

Now you're ready to have the camera on the right side.

Does this feel better to you? Some people are ambidextrous, others strongly prefer one side over the other.

Operate on your dominant side but occasionally switch to your weak side to keep in practice.



# Steadicam Operating

**Now we're getting serious.** Advanced techniques like the following are explained in great detail in the Steadicam Operator's Handbook, so we'll just touch on the concepts here. Check out the Handbook for practice drills, the science of Steadicam and countless additional advanced techniques for getting each shot.

And there's no better way to help accelerate your skills than by enrolling in a 2-day or one week Steadicam Workshop. Visit [www.SteadicamWorkshops.com](http://www.SteadicamWorkshops.com) for more info on classes near you.

## ***Leading an actor***

Practice walking backwards with a spotter.

Get comfortable communicating your needs and listening to the spotter's notes.

Look away from the monitor briefly when stepping over obstacles, but maintain the correct framing.



For faster, longer or more complex leading shots, try using Don Juan mode.

Walking forward is much easier and safer, but framing with the camera facing backwards becomes the challenge.





## **Low Mode**

Extend the Post, add weights to the Cross Rod and adjust the monitor so it's visible when inverted.

Re-balance by finding neutral and moving the Gimbal ½" AWAY from the Stage. This inverts the Sled.



Add the optional F-bracket to the Gimbal Handle. *Always* use the Stainless Steel pin that is included with the F-bracket.

**Note:** the camera is usually inverted to save time and complexity on set. This requires inverting the image in the edit as well as on monitors at location.

Operate with your hand **BELOW** the Gimbal on the Post.

It's often more difficult than normal mode because of the awkward hand position. Plus tilting the Post takes extra practice and having the monitor so far above the lens takes getting used to.

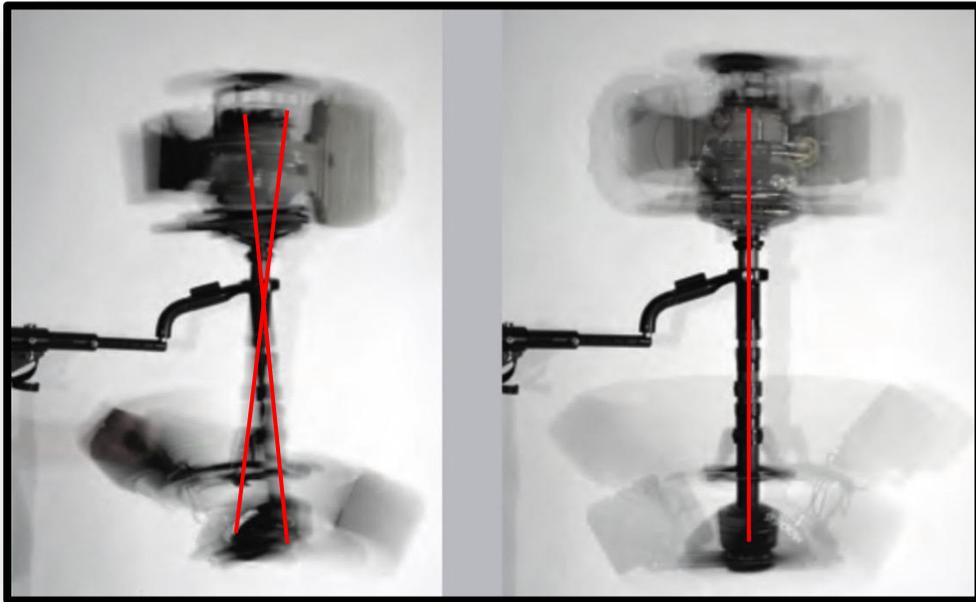
Practice, practice, practice!



# Steadicam Operating

**A Steadicam Sled is in Dynamic Balance** when the Center Post remains vertical while the Sled is panned. Dynamic Balance is extremely important for precise operating, especially whip pans. For a detailed explanation of the physics of panning a Steadicam, look to the Steadicam Operator's Handbook. For every combination of camera, batteries, Post length and Balance Weights, there are multiple positions which will be in Static Balance but only **one** of these will be in Dynamic Balance.

The good news is that we can use a simple process of trial and error to find the precise alignment for each combination that is Dynamically Balanced.



Spinning a bit wobbly.

Looking good!

Test your Steadicam AERO which is already in Static Balance. (If the camera is not perfectly level, go back to page 20 and get it right!)

Use a light touch very close to the Gimbal and spin the Sled.

It is not necessary to spin the rig very fast.



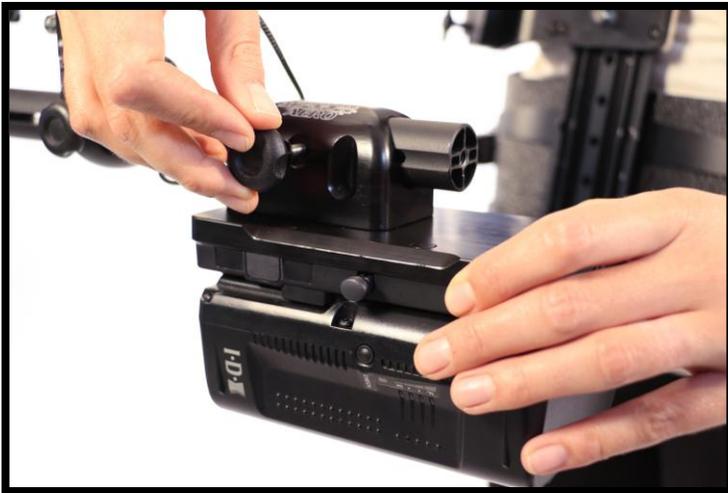
# Dynamic Balance



If it spins without wobbling, you're in luck! But chances are it'll need some fine tuning.

Since we like where the monitor is for viewing, we can only move the battery and the camera.

AND we only have one axis to adjust, fore-aft.



You have a 50% chance, so pick one direction and slide the battery fore or aft by 1/2 inch.

Re-balance the Rig by adjusting the camera position.

Ensure the Post is vertical by using a bubble level in two directions on the camera, Gimbal or Stage.



Re-test the Dynamic Balance with a spin.

Did it improve or get worse?

**Note:** Depending on the shot you're preparing for, you may not need to be precise with Dynamic Balance. But if you have lots of pans or are starting your day, it's always nice to be Dynamically Balanced.

# Steadicam Operating

***If it's better***, but not good enough for your shot, try moving the battery in the same direction again and re-balancing with the camera.

***If it got worse***, slide the battery 1 inch the opposite direction and re-balance with the camera.



Once the AERO is in Dynamic Balance it's easy to maintain despite later changes to camera setup. As long as you only make ONE change and re-balance with that component, it'll still be in Dynamic Balance.

Honest.

If you add accessories or change lenses on the camera (above the Gimbal), leave the Base as it is and re-balance with the camera and you'll be right back in Dynamic Balance.



Or, if you change battery size or Balance Weights at the Base to adjust inertia, leave the camera where it is and re-balance at the Base and Dynamic Balance is preserved.



## ***Congratulations!***

You're ready to fly your AERO. Hone your skills and improve your operating confidence by enrolling in a workshop and reading the Steadicam Operator's Handbook. Be patient and dedicate time to wearing the rig.

# Maintenance

## ***Adjusting the Stage Clamp***

Open the Lock Lever, insert a 2 mm Allen key through the opening and tighten by 1/8 turn.

Test to ensure the clamp holds the Quick Release Plate securely and closes completely.

**DO NOT** overtighten, the fastener should only be tight enough to secure the Quick Release Plate.



## ***Adjusting the Post Clamp***

Open the Post Lock, use a 3 mm Allen key to tighten the screw by 1/8 turn.

Re-test to ensure the Post Lock holds the Post securely and closes completely.

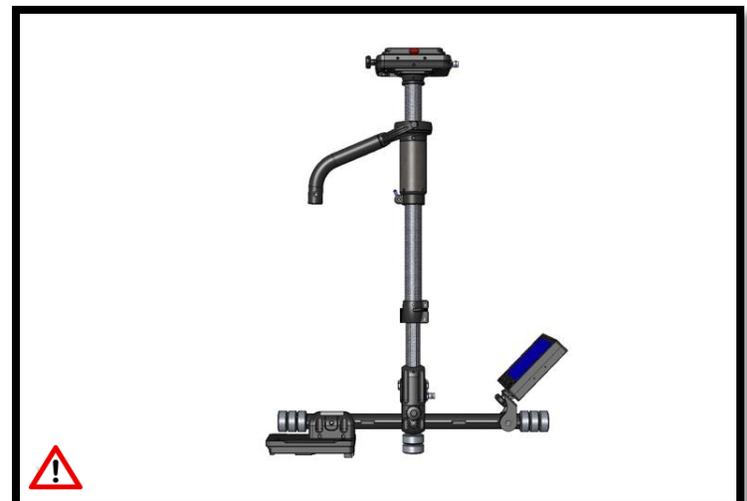
**DO NOT** overtighten, the fastener should only be tight enough to secure the Post.



## ***Lubricating parts***

A touch of light grease on Knob or Screw threads will keep them working smoothly.

**DO NOT** lubricate the bearings in the Gimbal or Gimbal Handle. And never use WD-40 on *any* components of the AERO.

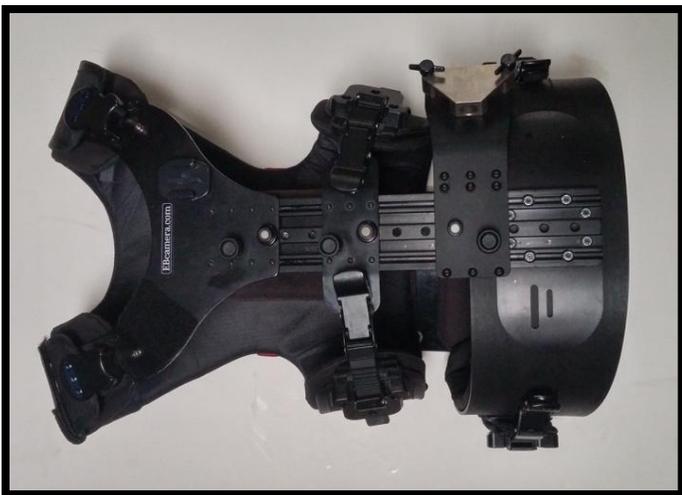




## **The Sled**

A microfiber cloth misted with window cleaner can be used to remove grime and fingerprints. Do not use harsh chemicals.

Check the movement and condition of all parts between shoots to ensure everything is operating properly.

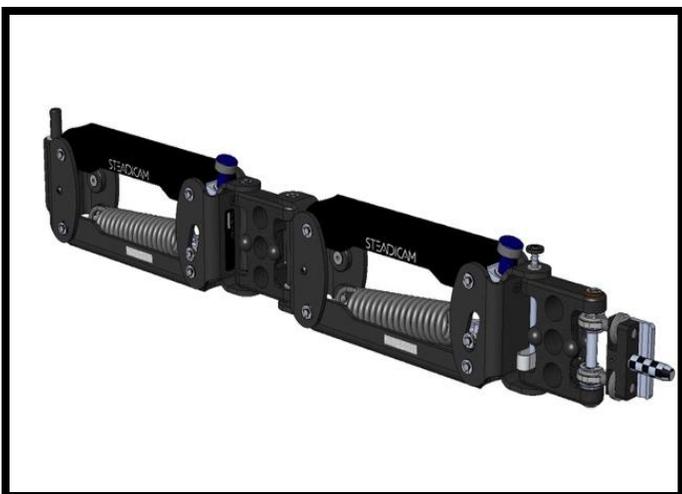


## **The Vest**

Use a lightly dampened microfiber cloth to wipe dirt and grime off the hard parts of the Vest.

Since the vest pads are removable, they can be hand washed and air dried. Not a bad idea after a few shoots in warm weather.

Check the mechanical pieces occasionally for wear, damage and fasteners that may have come loose.



## **The Arm**

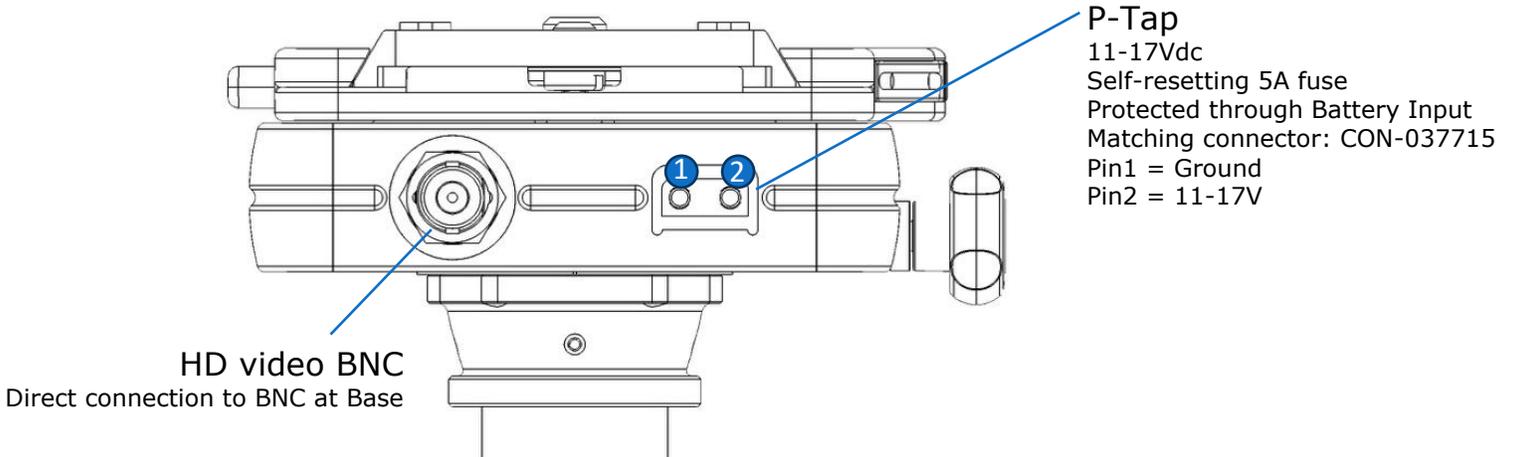
Like the rest of the system, cleaning the Arm is just a matter of wiping it with a microfiber cloth sprayed with window cleaner.

Visually check the Arm for any damage, especially if it's experienced rough use.

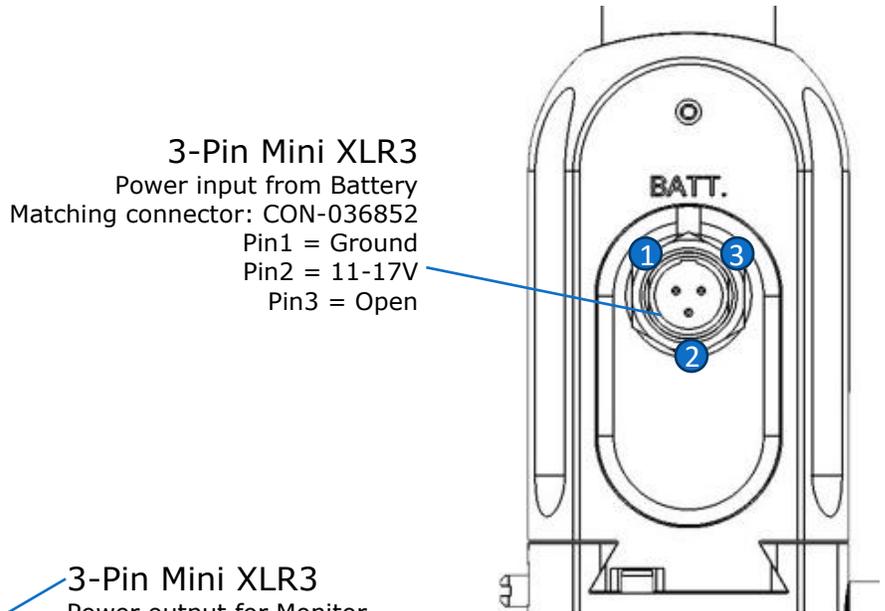
**⚠** DO NOT lubricate any part of the Arm! It should be silent, free moving and consistent. If for any reason it's not, contact Tiffen for service.

# Electronics & Connectors

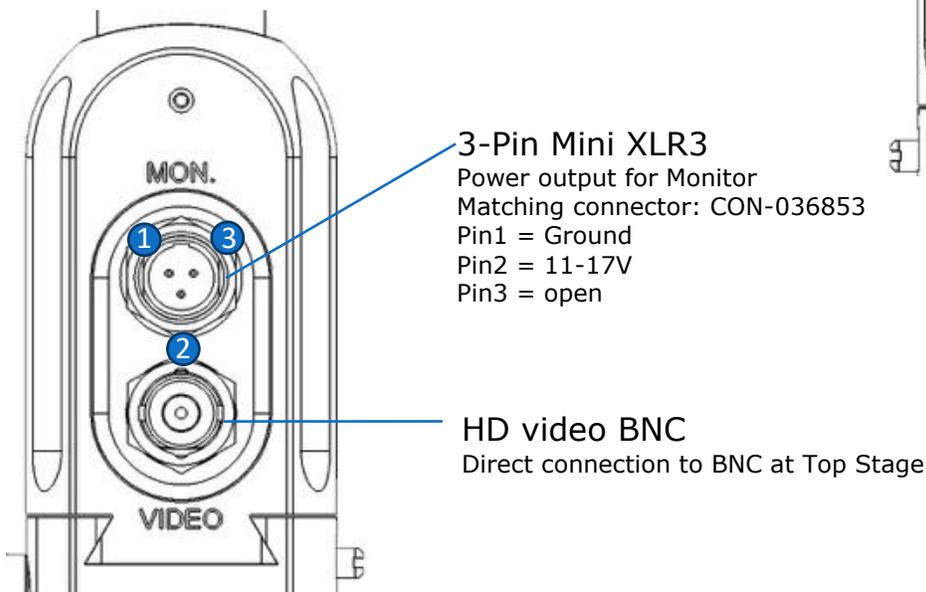
## Top Stage Front

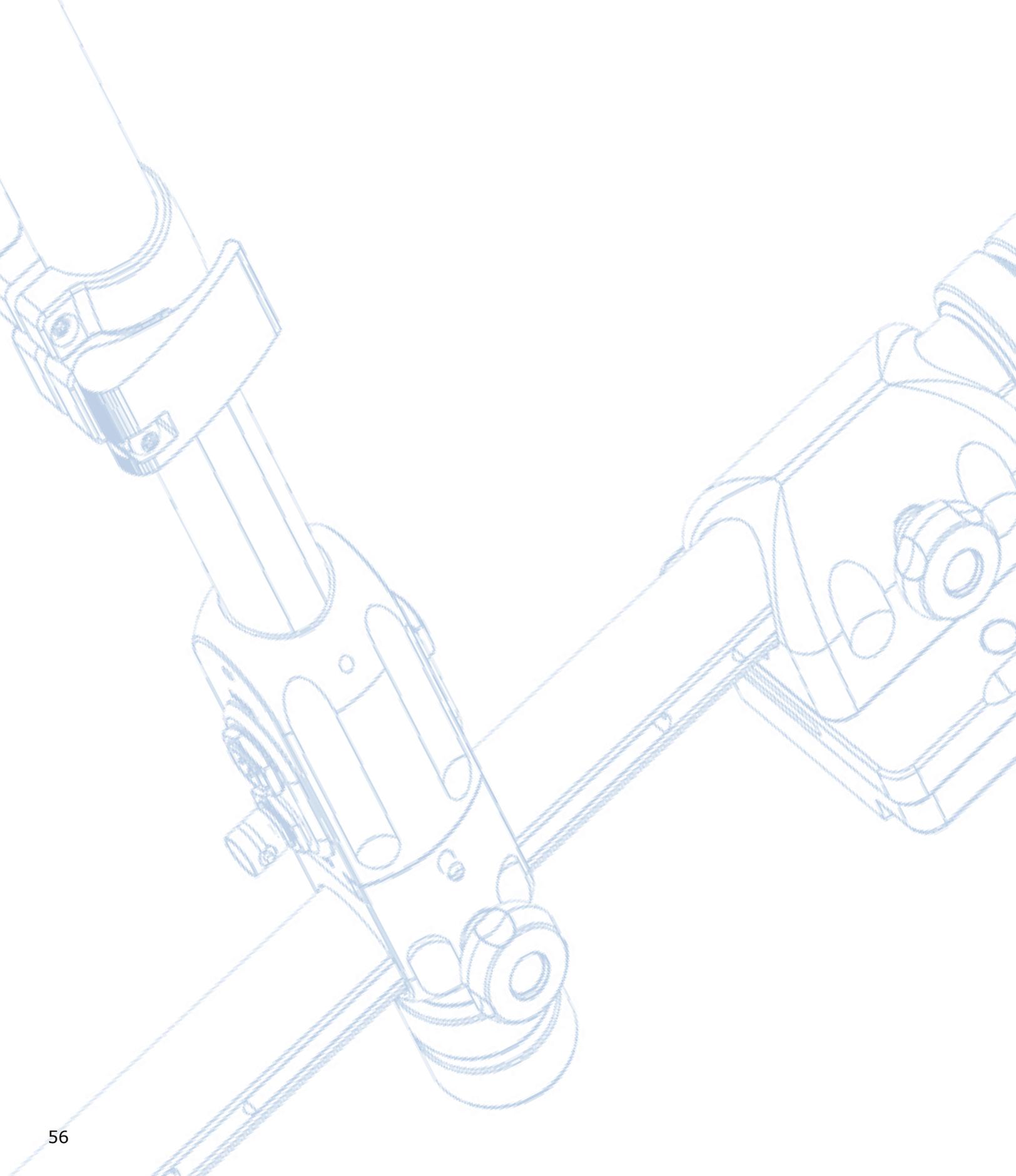


## Base Rear



## Base Front





# Contact Tiffen

## Contact Tiffen

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