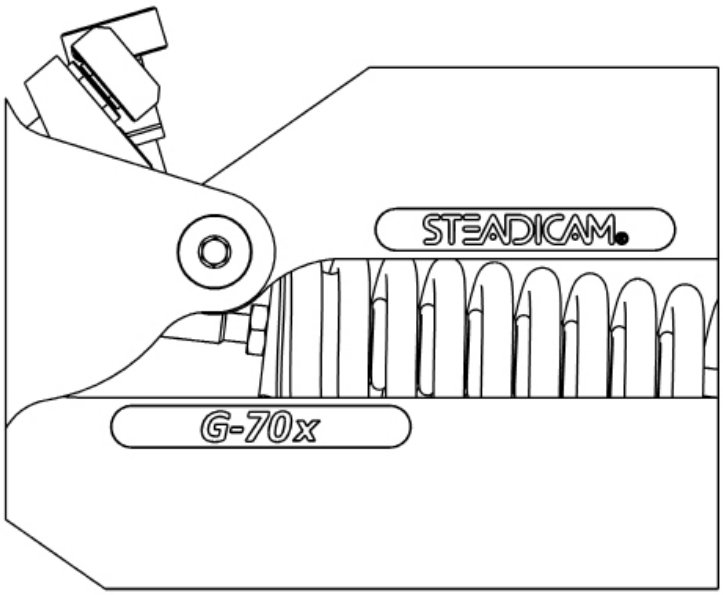
STEADICAM®

G-70x

Operating Manual



G-70x Operating Manual
Rev. B
p/n LIT-805720

Overview

The Steadicam® G-70x Arm is the third release of Tiffen's G-Series arms. The revolutionary, patented Geo spring geometry optimizes performance throughout its lifting range. It tames high/low arm travel with adjustable-length crankshafts that dynamically rock the spring termination as the arm is boomed up or down. Powered by coaxial titanium spring sets, the G-70x arm smoothly carries any load from 13 to 70 pounds (5.8 to 32 kg).

The design criteria for the G-70x arm: light weight (10.8 lbs / 4.9 kg), user-maintainable, and a 29 inch (73 cm) boom range. It has soft bumpers at each end of travel so the arm can be boomed right to its limits without shot-disturbing clunks. The G-70x also has a ***Ride*** control that adjusts the iso-elastic response of the arm.

Note: Iso-elasticity can be defined as the vertical bandwidth throughout which lifting power closely approximates load.

Two more G-70x innovations: The arm posts are locked in place by a single lever, so switching arm posts is quick and easy. This quick-change mechanism also has an adjustable drag for the post's rotation, from completely free to totally locked.

At the socket block end of the arm is a new, ***"kick back" link***, which gets the arm further out of the way as the sled crosses the operator's body, and keeps the arm from banging against the stops in normal operation.

The net result: the smoothest, best performing arm ever built, and all parameters are user adjustable.

Steadicam, G-70x™
Iso-Elastic Stabilizer Arm

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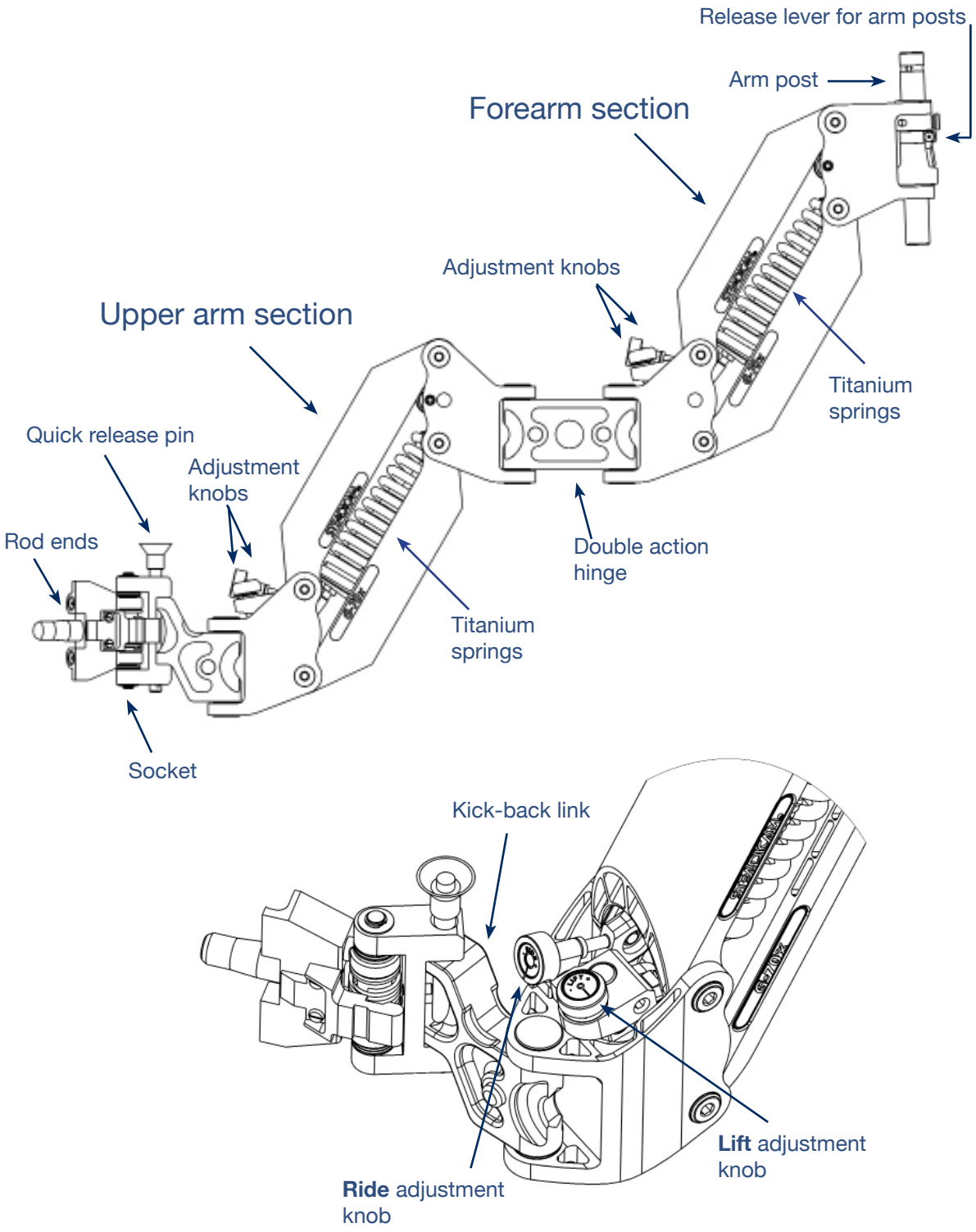
The G-70x Arm


Release lever for arm posts
Arm post
Forearm section
Adjustment knobs
Upper arm section
Titanium springs
Quick release pin
Adjustment knobs
Rod ends
Double action hinge
Titanium springs
Socket
Kick-back link
Lift adjustment knob
Ride adjustment knob

Adjusting the ride or "iso-elasticity"

The G-50x and G-70x arms have an adjustable active link as part of the "Geo" feature. This adjustable link gives the operator greater control over the dynamic changes, and thus more control over the arm's performance.

We want to achieve three things in setting a G-series arm:

1. We want both arm segments to lift the sled and "float" at the same angle. (This is true of all arms.) The default angle is about 5 -10 degrees up from horizontal, but this angle can be varied up or down 30 degrees or more as needed by the shot.

2. We want both arm segments to work or track together, without lagging, leading, or hanging up.

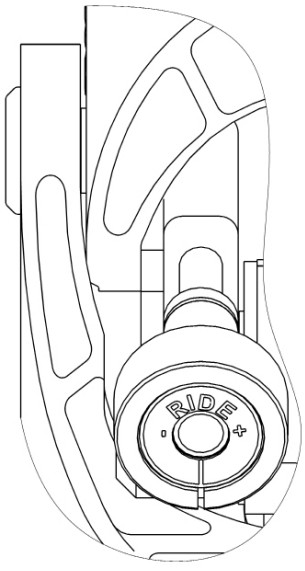
3. We want to exert the least amount of effort to boom the arm fully up or down. Or to put it another way, we want the most iso-elasticity the geometry of the arm will allow. With the Ride set to the maximum possible setting for the required lift, there is not only less effort to boom up or down, but there also is less vertical reactivity in the arm as one walks, climbs a curb, goes over a bump, etc. The result is less dampening work for the operator and more vertical control.

The basic adjustments: Ride and Lift

Each arm segment has two adjusting knobs. The Ride knob alters iso-elasticity from a hard ride to a super iso-elastic ride, and the Lift knob dials lifting power continuously from 12 to 50 pounds (5.4 to 22 kg) with the G-50x arm and 13 to 70 pounds (5.8 to 32 kg) with the G-70x arm.

Adjustment of Ride:

If you can, preset Ride close to the desired level of iso-elasticity in both arm segments before picking up the sled and adjusting Lift. Because the ride knob can only be turned when the arm segment is raised to its highest, unloaded position, it is easiest to adjust before you pick up the sled. Ride also can be adjusted when carrying the sled by booming up fully. We've found it's often easier to roll the knobs rather than use the classic "pinch and twist" technique.



Start by presetting the both Ride knobs to the middle of their travel (about 20 -25 threads visible). Once you get the iso-elastic feel you like, make a note of the threads and the camera weight for future reference.

Adjusting the ride: the arm must be angled up at the top of its range.

Note: the ride knob is horizontal, the lift knob is nearly vertical.

Adjustment of Lift:

All lift adjustments must be done while wearing the rig, standing properly, and with your normal threads in the vest to arm connection.

Adjust the forearm segment first (the arm segment closest to the gimbal).

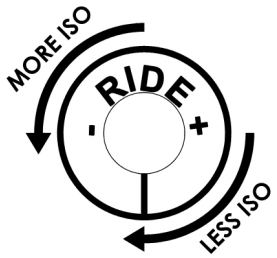
Hold the arm segment slightly above level. Slightly raise or lower the arm segment to find the sweet spot where it's easy to turn the knob. Adjust the arm's lifting power so that the foream

arm segment seeks a position (or floats) slightly above horizontal. When the forearm segment is set correctly, adjust the upper arm segment to follow (track with) the upper arm segment as you boom fully up and down. At this point, don't worry if either arm segment tends to lock up or down, or dwells in the middle.

After the lift is set, re-adjust the Ride knob for the desired iso-elastic response.

Note that the Lift knob has a range of adjustment of 30 turns. This means that each turn of the Lift knob will add or subtract about 1.5 pounds (.7 kg) of lift.

Adjusting iso-elastic response:



With the arm set to carry the load, we micro-adjust the Ride.

If we dialed in too much iso-elasticity, the arm segments will "hang up" at the upper or lower extremes of boom travel. If we dialed in too little iso-elasticity, the arm may not track well in the middle of its range. The only way to tell if the ride is set correctly is to wear the rig, boom up and down fully, and watch how the arm behaves.

To adjust the arm for maximum iso-elasticity at any given lift, we turn the Ride knob counterclockwise until the arm segment begins to "lock" up or down at the extremes of travel. We then turn the ride knob clockwise a couple of turns. This will keep the arm from locking up or down. We test and micro-adjust the lift and ride knobs as necessary.

Next, we watch the arm segments as we boom up and down. If the upper arm segment hesitates or dwells in the middle of its boom range, it is not iso enough to work with the forearm segment. We can either increase the iso of the upper arm segment or decrease the iso of the forearm segment to correct the problem.

Typically we try to increase the upper arm segment first – to have the most iso in the whole arm. But if we can't increase the iso, that is, if the upper arm locks up at the extremes of travel, we must decrease the iso in the forearm segment until the upper arm does not hesitate or dwell in the middle of its travel.

Lift and ride interact to some degree, so some tweaking of lift may be needed after setting the ride.

Typically, the G-Series arms are very forgiving of less than perfect adjustments of lift and ride.

Some tips in setting up the G-Series arms:

To minimize any lifting required with heavier cameras and/or to hold high boom heights, we often set the arm segments to float at a higher nominal angle (+25 degrees or more!). We find pushing down is easier than lifting fully with the extended boom range possible with the G-Series arms.

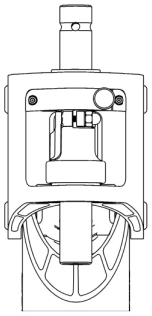
The arm can also be adjusted to hang lower than normal for shots with low boom heights, with very little penalty in performance.

Ride does not have to be adjusted if you set the float point higher or lower than "normal." Minor changes in sled weight (± several pounds) also do not require adjustment of the Ride knob: it's not something you change during the average day.

Some operaters prefer a centered ride setting for a feel similar to a IIIA arm. In addition, a centered ride setting is preferred while using a hard mount on rough terrain. Our advice: experiment and use the arm the way it helps you operate and get the shot. However, our preference is to have the maximum iso in all situations.

Physical reality: With the same ride setting, all G-Series arms become progressively less iso-elastic as the arm's lift is increased. Heavier loads will require turning the Ride knob to increase iso-elasticity. Lighter loads need the Ride knob turned to reduce iso-elasticity. Learn to adjust the Ride knob to obtain — or maintain — your desired iso-elastic performance as the load changes.

Working with arm posts:

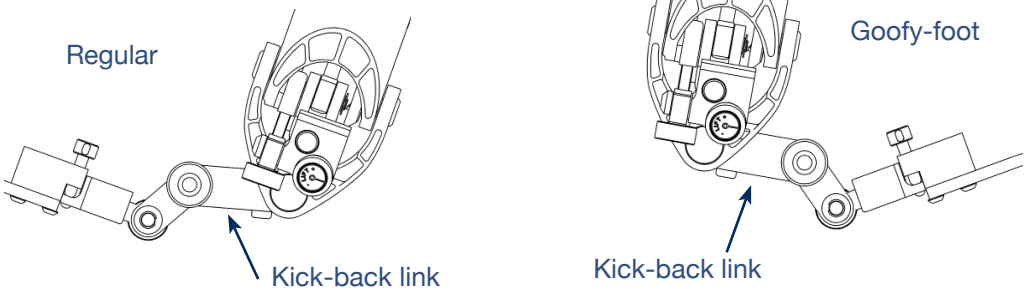


To change posts, rotate the mechanism to expose the release lever. Raise the lever to horizontal to unlock the post. Note: the mechanism will remain in place. Replace post with desired length post, leaving at least 1.125 inches (2.8 cm) protruding above the arm. Clamp by rotating lever back to vertical.

To set the rotational drag, turn the drag knob clockwise to increase drag and counterclockwise to decrease drag. Changing a post does not affect the drag setting.

Working with the "kick back" element:

To accommodate both regular and goofy-foot operators, the two mating parts held by the quick release pin can fit together in two ways. The design intent is to "kick back" the upper arm segment as shown in the examples below. The parts need to be set one way for regular operating, and the opposite way for goofy foot operating.



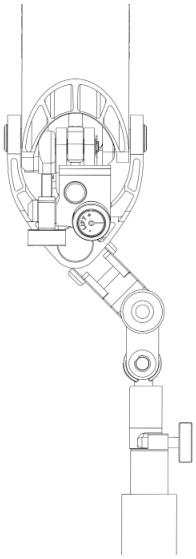
When using with a back mounted vest:

When using a back mounted vest, set the kickback link inwards as shown in the photo. This is the opposite direction from the kickback link's use in a front mounted vest. The idea is to get the socket block both closer to the body and to the Steadicam sled. Why? See the next tip.

When using any back mounted vest, all arms are more extended from the load (the sled) to the attachment point (the socket block). Additionally, the "end block" nearest the body is pointing fore and aft. With a normal, front-mounted vest, the arm extension is less and the end block is oriented sideways to the load.

When you lean back with a back mounted vest, the upper arm section's end block leans back in line with the upper arm section. (With a front mount vest, the end block rotates perpendicular to the upper arm section as you lean back). With a back mounted vest, this leaning back puts the end block in a more iso-elastic position, making the upper arm section more likely to lock up.

All arms behave this way, but the consequences become evident with an extended range (+/- 70 degree) and very iso-elastic arm like the G-70x or G-50x. The travel in most other arms is restricted to +/-50 degrees, and this effect occurs above that angle.



Operators with "back mounted" vests should also orient the connection to send the arm to the inside. Regular operating orientation is shown in the diagram.

The solution is to have about one-half the “iso” help (1/2 the threads) in the upper arm section that one has in the forearm section. You fine tune the adjustment the same way as described on page 4 & 6, increasing the iso-elastic response until the arm starts to lock up, then dialing it back in a few turns.

Walking with a back mounted vest also “activates” the socket block more than with a front mounted vest; it rocks back and forth in line with the upper arm section, again with consequences for the arm’s response. It may require an even smaller “less iso” link.

If you leave the forearm fully iso, it has the “helper torque” throughout its range, low to high, and when the arm is extended, it tends to force the upper arm over centers. Consequently, you should not only reduce the iso for the upper arm link with a back mounted vest, but also reduce the iso for the forearm. That way when raised, the operator is lifting a little, the torque is reduced correspondingly and the transferred torque is likewise reduced – hence a smaller tendency for the upper arm section to lock up. Even with the iso dialed down, the G-70x’s response in the +/- 50 degree range is more iso-elastic than other arms.

Some adjustment tips:

When adjusting from a light load to a heavy load: It helps to have an assistant independently control the height of the upper arm and make his lift adjustment at the same time as you adjust the forearm lift.

It also helps if you raise your docking stand so you can stand next to it and insert the arm post into the gimbal yoke of your docked sled with your heavy camera aboard. As you and your assistant adjust the lift of both arm segments, they will gradually pick up the weight until it floats free of the dock.

When adjusting from a heavy load to a light load: Leave the heavy load aboard if possible, and with the sled on the stand, remain adjacent to the stand while you lighten the lift of both arm sections at the same time. Then remove the heavy weight and rebalance the sled for the light camera and then see if the lift needs further adjustment.

Lift can be altered by forcefully holding the arm segments at the correct angle while adjusting, but be prepared for some exertion! You might be shocked how energetic the springs feel if you are raising or lowering the lift by 30 pounds (13.6 kg)!
