Inertial control

Always remember to make the Steadicam's balance and inertia work for you, not against you.

All Steadicam sleds work (in part) because various masses are added to and mounted away from the camera, which slows down the camera's angular response to external forces.

Our primary tool for inertial control is extending or compressing the centerpost and/or the battery, monitor, and other components. The "moment of inertia" generated by each component is a function of its mass (weight) times the square of its distance to the center of rotation (the gimbal). Doubling the distance creates four times the inertia.

Positioning masses away from the gimbal will increase inertia, while bringing them closer to the gimbal (the point of rotation) will reduce inertia.

In general, the "bigger" the sled is, the slower its rotation and the more stable it will feel.

Extending the center post will slow down the rig's angular response in tilt and roll, while extending the battery and/or monitor will slow down the rig's response in tilt and pan.

Reducing the length of the post or bringing in the battery and monitor will make the rig rotate more quickly on those same axes.

If you want a quick, fast panning and tilting rig, bring the masses in as close as possible to the gimbal. If you want a slow rig, or need the shot to be as stable as possible, spread the masses far apart. Every time you move one component, other things happen with static and dynamic balance and with viewing and clearances and stability.

Ultra^2 at maximum horizontal extension.

To get one effect or benefit you may have to sacrifice performance in some other area. For instance, changing the post length also will have some effect on the lens height (although a lot less than the post extension), and the position of the gimbal relative to the camera mounting stage or the electronics module.

Experiment to become familiar with all that happens as you move components around. Although the sled is stabilized in all three axes, the sled is most stable or inert in the tilt axis. This is the consequence of an important, early design consideration, which was to get the Steadicam close to the body and to make panning the Steadicam as easy as possible.

Some actual numbers

The monitor and yoke weighs approximately 4.8 pounds. The two batteries, the mount and the converter weigh 4.6 pounds.

In the maximum configuration, the monitor's c.g. is extended 17 inches, the battery pack's c.g. is extended 16 inches, creating a total of about 2,564 pound inch^2 in the pan axis.

In the minimum configuration, as shown, the monitor is extended 5 inches and and battery 5.5 inches, creating only 259 pound inch^2 — almost 10 times less angular resistance in the pan axis. We love the square law!!

If you remove one battery for a 12 volt rig, flip the battery down, and push the battery pack all the way in, you can reduce the pan inertia even further - to 139 pound inch^2!

Ultra^2 at minimum horizontal extension.

Minimum pan inertia with one battery.