

GyroSteady

Camera Gyrostabilizer



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Introduction

Hand-held gyrostabilizers for binoculars and cameras have been around since the 1950's and have been used extensively in the film industry as a means to stabilize the video footage. There are numerous scenarios where the camera is being buffeted causing unwanted blurring or shaking. In many cases gyrostabilizers enable shots that would otherwise be impossible. For example the chase scene in the forest from the film Return of the Jedi required an ultra-smooth shot as the cameraman walked/ran through the forest floor. The footage was then sped up giving the illusions of a fast smooth but intense chase scene.

The Concept

The concept is simple; a gyrostabilizer connected to a camera gives stabilization, resisting movement in given directions. Each gyrostabilizer unit provides stabilization on a single axis, either pitch, yaw or roll depending how you choose to mount it. You can also stack multiple gyrostabilizers together providing stabilization on extra axis/axes. Fittings are built into the gyrostabilizer to allow you to mount two together for both pitch and yaw axis. So In other words it helps with twisting motions left/right and twisting up/down. If the roll axis needs to be stabilized too (rare) a third gyrostabilizer needs to be added (no mounts to do this are provided at present).

It is important to understand what can be achieved and what can't. There are 6 movements a camera can make. Gyrostabilizers can only assist with 3 of the axes (pitch, roll and yaw).

As it happens, pitch, roll and yaw are the movements that tend to cause the most problems.

A 10mm movement of a video camera vertically up and down is probably barely noticeably provided the subject is a reasonable distance from the camera. However a 10 degree on the pitch axis will **ALWAYS** be noticeable regardless how far the subject is away.

When a person is filming, walking around with a hand held camera, it is hard to get video footage without camera shake. The pitch/roll/yaw is where most of the 'shake' comes from. Remove this and footage becomes much better. The movements on the other axes are less apparent and look more natural.

Axis	Movement	Can be Gyrostabilized
1	UP/DOWN	NO
2	SIDEWAYS LEFT/RIGHT	NO
3	FORWARDS/BACKWARDS	NO
4	PITCH	YES
5	ROLL	YES
6	YAW	YES

Comparison with other stabilization techniques for video

Technique	Benefits	Disadvantages
Traditional Tripods and Rigs	Simple low cost solution. Good for static or simple shoots	Fixed. Often not enough freedom of movement.
Steadies of various kinds (mounted to body)	Allows movement while walking and running. Better than holding by hand. Often combined with gyrostabilizers.	Can still provide wobble on pitch/yaw/roll.
Lens Camera stabilization	Simple solution that is slowly becoming standard on 'prosumer' and professional cameras.	Very limited stabilization. Best suited for when the camera is still and there is slight hand shake.
Built-in Camera image stabilization	Simple solution that is slowly becoming standard on 'prosumer' and professional cameras. Easy to combine with other techniques.	Tends only to support limited movements. A large image is taken. Movement is detected and the image is cropped by the camera (invisibly). Would be a powerful method if the camera makers increased the sensor size (and greater cropping).
Camera Gyrostabilizers	Mechanical solution to unwanted camera movement. Can be combined with other techniques.	Not a silent solution. 1 gyrostabilizer per axis.
Post-production software	Changes can be made after filming. User can select the amount of stabilization. Can be 'undone' and retried.	Does crop the image and hence reduce the image quality. Takes up time to process and check. Quality varies between software.
Combining techniques	Benefits from all techniques.	Expensive option.

Still Photography

Although the majority of these Gyrostabilizers will be used for Video there are some cases where they will be used for still photography. Most modern digital cameras can operate well with high shutter speed negating blur and the need for a GyroSteady. However there will be cases where the lighting conditions won't allow high shutter speeds and hence a steady shot is required.

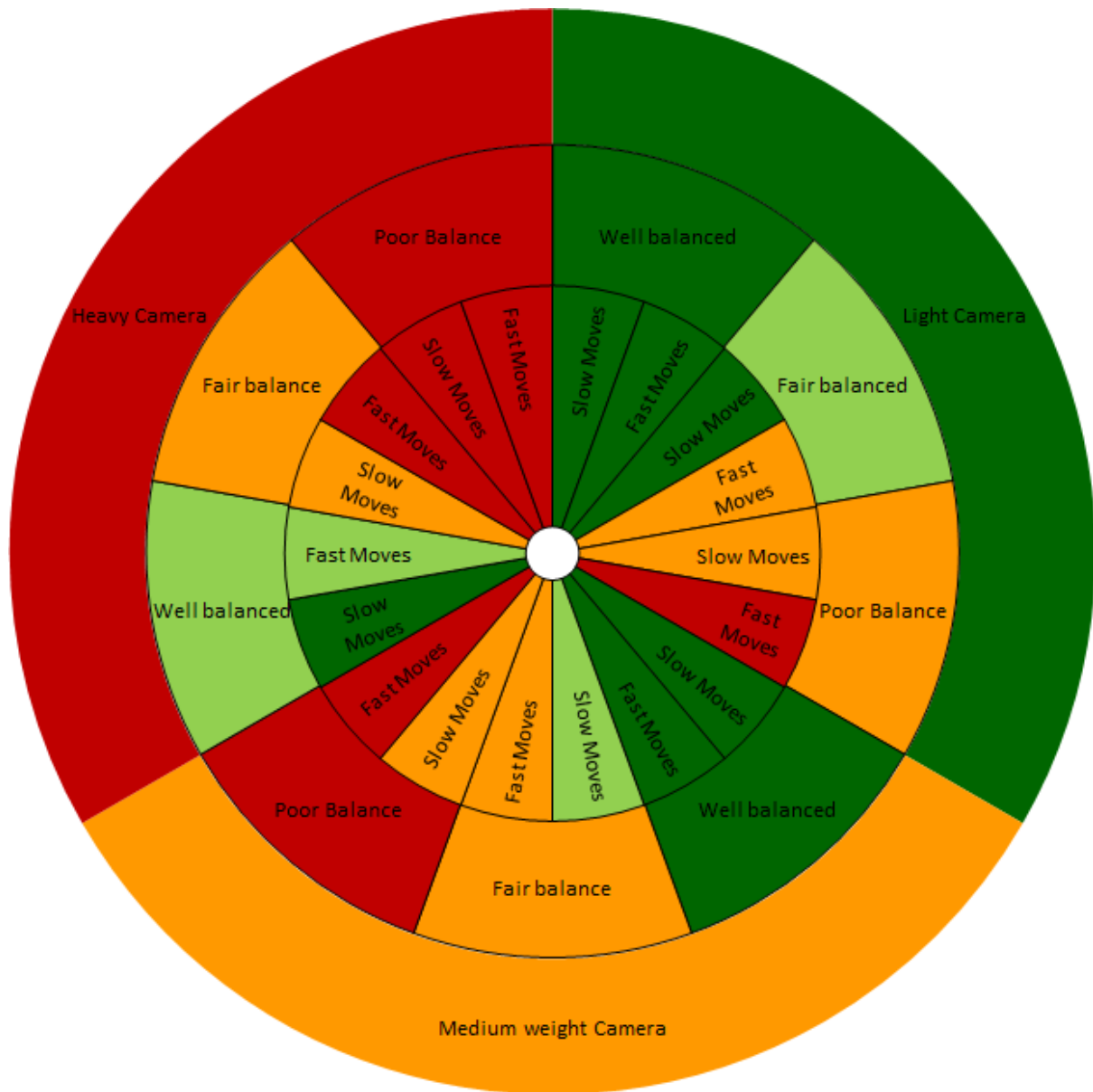
Power Supply

Power comes from a lightweight long lasting external battery. The battery has built in over charge, over discharge and short circuit protection. The battery is 4Ah and 12 volts. If the GyroSteady is used continuously it should run for around 2.5 hours. Battery charge time is similar. Be warned, the more intensively the GyroSteady is used the more energy is required and hence the shorter running time. The battery provides power for most scenarios, where extra running time is required please contact us as we can supply batteries up to 22Ah which will give up to 12 hours running time.



What is the maximum/ideal camera weight for the GyroSteady?

This is almost a “how long is piece of string” question. In truth it depends on a 3 factors, the weight of the camera you are trying to stabilize, how well balanced the setup and finally how quickly the movements are taking place. For example in order to stabilize a heavy camera the system must be well balanced and not moving too quickly in order for it to stand a chance.



RED = Bad

ORANGE = Acceptable

GREEN = Good

Light Camera = < 750 grams. Medium weight = 750-2000 grams. Heavy 2000 grams +

Chart only gives an indication of the likely outcome. The definitions of everything in the chart are quite rudimentary and not exact. Remember it is just to give some indication!

Making the GyroSteady work well - Devil is in the detail

There is no reason why the GyroSteady couldn't be bolted underneath a camera and some benefit instantly received, for some simple cases this may be the best option. Although you may want to consider how you hold the entire setup and whether extra handles are required somewhere.

However in many cases you won't want to or can't firmly hold the entire setup. From talking to people it is also likely that custom rigs are going to be commonly used with the GyroSteady devices. In these cases to get the best performance you really need to make sure the entire rig is well balanced. From the chart on the previous page you will understand that good balanced is one of the key elements for good performance.

Example Basic Configurations

1 GyroSteady stabilizing the pitch axis



2 units stabilizing the pitch and roll



Looking after you GyroSteady

Gyroscopes are delicate and need to be looked after. If they are dropped or experience high levels of G force it will cause damage, either to the gyroscope shaft or bearings. What some people will consider gentle another person will consider rough. I noticed that some old aircraft gyroscopes used to have the warning “*handle like eggs*”. I think this is a really good description that everyone can relate to.

Packing for Transit

Because the GyroSteady is delicate it is important to pack it well for transportation. We can supply a flight case. This is perfect if you are personally carrying the GyroSteady somewhere. If it is going to be couriered or treated as luggage (e.g. on a flight) it is suggested that it is put in the flight case and then the case placed in a box. Pack it so there is NO MOVEMENT and the case can't move around in the box. Use shock absorbing material such as high density foam, starch packing chips or polystyrene chips. Mark as fragile, handle with care etc.

The odd X-ray will not affect the GyroSteady, although like most modern electronics continued X-raying could corrupt the electronics.

Damage Indicator

The GyroSteady has a damage indicator under the GyroSteady. If the GyroSteady experiences a heavy drop or high G forces the damage indicator will go from white to red. This does not necessarily mean it is damaged but gives an indication that it may have experienced some damage. If the damage indicator is red any warranty is null and void. However servicing and repair will still be possible.

Servicing and Repair

If anything on the GyroSteady becomes damaged it will be difficult for you to repair. You will need to have electronic skills and good mechanical engineering skills, along with plenty of specialised equipment and spares. We have been making various types of gyroscopes for many years and realise that accidents do happen. Although at the time of writing, no repair service is yet available, we do fully intend to offer a servicing facility shortly after launch.

Noise Levels

The noise of the GyroSteady is 60dB at 5 meters and 72dB at 1 meter. It is therefore not suitable where quiet conditions are required. Where people intend to use the GyroSteady seems to vary wildly and in many applications the noise levels won't matter. If it is too noisy don't despair; at the time of writing (4th of August 2013), production has started on many parts, but manufacturing of key parts has been deferred allowing us to work on noise reduction. If we can reduce the noise levels we will!

Features

- Reduces/stops camera shake where there is Pitch, Roll or yaw (1 axis per gyrostabilizer)
- Reduces blurring on still cameras
- Enables use of slower shutter speeds
- Can be used with binoculars and similar equipment
- Can work with most types of cameras, including SLR/DSLR cameras
- Works with small/medium sized video cameras
- Ideal for use in Helicopters and Fixed wing aircraft
- Works with any vehicles not providing a complete smooth ride
- Can be used where bulky equipment cannot go
- Can be used wherever there is a problem with vibration or unwanted movement
- Could even be used with some RC aircraft and UAVs (weight permitting)
- Stackable for easy 1 axis or 2 axis stabilization (pitch + yaw)
- 3 axis stabilization possible with your own mounting equipment
- Built in Camera mounts to connect to most cameras and video cameras

Specification

Size:	H 91mm x W 156mm x L 72mm (excludes camera brackets)
Weight:	1440grams (about 3.2lb). Excludes battery.
Battery:	360grams. Built in over charge, over discharge and short circuit protection. UN 38.3 transportation tested.
Battery size:	76 mm x 115 mm x 32 mm
Battery life:	up to 2.5 hours
Battery capacity:	4ah
Battery features:	Built in battery gauge
Battery Charger:	1.6 amp charger (approx. 2.5 hours to charge)
Electrical requirements:	12volts~ and 4amps~ at start-up. 1.2- 1.5amps when running.
Start-up time:	approximately 40 seconds to full speed
Stop time:	NA
Noise levels:	60dB @ 5 meters, 72dB @ 1 meter
Gyro RPM:	digitally controlled at 12,000rpm
Status Indicator:	Small LED shows if on, starting up or at full speed
Tripod mounts:	A standard size 1/4-20 UNC male connector on the top of the GyroSteady and a standard size 1/4-20 UNC female connector underneath
Country of Manufacture:	England