



Frequently Asked Questions about the Steadicam® Merlin™

Compiled by Garrett Brown

Thanks to Mikko Wilson, Robin Thwaites, Dan Ikeda, Michael Craig and James Elias for questions frequently asked on DV forums and customer help-lines.

Questions from prospective buyers:

1. Why is the Merlin more expensive than the old 'JR' with a monitor? Is it more stable?

The JR was made with glass-filled plastic. The Merlin is machined out of aluminum, brass and stainless steel which are much more rigid, so it 'conserves' less vibrational input from the operators hands. Merlins are also more precisely fitted and mechanically tight and therefore require less attention to stay 'in trim'. But of course precision-machined metal parts cost more than molded plastic parts.

2. Can I fly my (HVX/DVX/FX1/etc..) camera on the Merlin? It's just over 5lb -- will it still work?

The 'official' weight limit is still under 5 lbs (2.3kg), but we have learned, for example, that the Sony 'Z' HDV series and the Panasonic HVX200 (both just at the limit) can balance beautifully on Merlin with medium batteries and no wide-angle adaptors; so, depending on the shape of the 'payload' (accessories mounted high up make it harder to balance), and the strength of your arm you can lift nearly 6 lbs (2.7kg)

3. If my camera plus accessories are overweight, what options do I have? Can I add more counter weights?

Lightness and rigidity are opposing requirements -- Merlin was engineered to optimize both at its official maximum payload. Adding additional counterweights may cause detectable vibrations if your hand shakes. Try custom-mounting accessories such as wireless microphone receivers down below the gimbal to help keep the total weight down. (See Jim Farrell's ingenious aftermarket accessory shelf at: www.jimfarrell.com/merlin which replaces one of the supplied stainless weights and has mounting locations for more as required.) The new Metal Ball-Bearing Gimbal is sturdier than the original, so if you don't mind lifting the extra weight, you may get away with a heavier payload up top and ordering a couple more counterweights to mount down below. (*See the next question and answer!*)

4. How long can I use the Merlin before I get tired? Do I need to start working out so I can carry it? Do I need the Merlin Arm & Vest?

How heavy is your camcorder? Your full 'payload' will be 1.3 times that weight, including counterweights, plus 12.8 ounces (.36 kg) for the Merlin itself. So, for example, the lightest half-pound camcorders will total less than 1.5 lbs (.68 kg)! The heaviest allowable cameras may require the entire set of supplied weights plus one or two more and the total weight might exceed 10 lbs (4.5kg), and require much more work to lug around. For heavier cameras, we suggest, at least initially, that you design shorter shots! A two minute moving sequence is longer than most theatrical Steadicam shots. Simply using your Merlin will strengthen the relevant arm muscles over time and within weeks your endurance 'in the rig' will greatly increase. We doubt you'll need to 'work out.' Check the instructional video for tips on sharing the load with both hands. If you plan to make a habit of using heavy cameras for long continuous shots, then by all means look into acquiring the ultra-light, ultra-high-performance Merlin Arm & Vest. (<http://www.steadicam.com/merlinarmvest.html>)

5. Why do I need the Merlin if my camera has EIS (Electronic Image Stabilization)?

EIS is meant to counteract the small angular vibrations that occur when you hold an object somewhere other than at its exact center-of-gravity (which of course is buried inside your camcorder!). Of course as soon as you begin to walk or attempt to move your camcorder with your arms, the size of the unwanted angular moves becomes way too large for EIS to counteract and spoils the smoothness of your shots. In two important ways, Merlin beats the drawers off of 'Steadishot' and other electronic image stabilizing features. The first way is that Steadicam in general, (and Merlin in particular) provides superior stability against both small and large angular influences by shifting that famous "C.G" from inside the camera body and placing it at the center of a 'gimbal' that isolates the entire structure against angular shakes. In addition, Merlin turns your camcorder into a poised, balanced, angularly inert object that can be oriented—panned and tilted—with gentle finger pressure, and moved energetically through space *without angular influence*. In other words, Steadicam is inherently a more elegant, smooth and precise way to hold a camera than handheld. Your camera can be as still as if on a tripod. Or your entire range-of-movement—your full arm reach, bending-to-the-floor and lifting-overhead, your the full freedom to walk and run—will be accessible to your lens without the 'handheld' bumps and shakes. Expert Merlin shooting takes practice, but you will take pride in your growing skills and eventually deliver work that can be indistinguishable from Hollywood dolly-and-jib shots!

6. So would I leave EIS active when using Merlin?

If the so-called Gezornenplatz screw (you'll understand later!) can extend to reach your camera body or lens housing, you will be able to turn off EIS and save on battery drain. Otherwise, at full telephoto, EIS may provide additional vibration damping, but be aware that some versions introduce hesitations at the beginning of panning and tilting moves if the circuitry decides it's the beginning of a bump.

7. What is the difference between the Merlin and other hand-held stabilizers?

Of course I'm biased, but the Merlin is by far the lightest, and I think the most elegant and functional of the lot. It has the best (patented) three-axis ball-bearing gimbal, the most precise and accessible trim controls, and is considerably more stable than any other. Rotational inertia increases by the square of the distance between the masses, and the Merlin has the greatest separation between its counterweights. It also is the only hand-held stabilizer that can be placed in true dynamic balance, and the only one with our (patented) caliper hinge, that always folds into the perfect storage position, regardless of the adjusted size of the 'arc.' Oh, and did I mention that the camera removes instantly and can be docked on the available tripod-adaptor-plate.

8. Any chance for the Merlin to deal with even heavier cameras like the 24p's - the CanonXL2's and XLHD?

No. Sorry. They over 7 lbs (3.2kg) which is a bit too heavy. (You may want to look at the sensational new Steadicam *Pilot* <http://www.steadicam.com/pilot.html>).

Merlin was carefully engineered to be as light as possible and still be stiff enough for 5+ lb cameras. The new metal Six-Ball-Bearing Gimbal (which now comes standard, and which can be ordered as an accessory for earlier Merlins) will handle cameras up to nearly 7 lbs including all accessories. Note that you will still need to order two additional 'mid' weights to counterbalance the extra camera payload, and your Merlin will increasingly be subject to 'whipping' vibrations if your overstressed hand begins to shake during a long continuous shot. Therefore, with payloads in the <5 lb range, you may want to consider the excellent new Merlin arm and vest. (see question # 4 above), which will let you shoot all day with near-zero fatigue.

Questions from owners:

1. I can't get my new Merlin to balance with my camera. Help!

Balancing a mechanical object is soooo 19th century! 21st century types are more used to pushing buttons and tapping keys to achieve results; however, once you 'get it' balancing is a great new skill which can be exercised almost effortlessly. Believe it or not, experienced hands can put an unknown camera in balance on a Merlin in a minute or two. Try not to panic or get frustrated if yours continues to behave strangely, tries to hang upside down, etc. *Stay calm, revisit the DVD and the manual and of course check the 'Cookbook' and the 'Magic Formula' as in #2 and #3 below, which can get you tantalizingly close. If you still need help, see my Ultimate Simple Balancing Instructions at the end of these FAQ's:*

2. My camera isn't in the 'Cookbook!' Help!!!

If your camera isn't listed in the settings table at merlincookbook.com, see if you recognize a comparable model, of roughly similar size and weight, and write down your (approximate) 'settings'. If not, click on the link to the 'Magic Formula.' This provides a spreadsheet that will calculate all your settings if you simply enter two numbers: your camera's exact weight and its "vertical c.g. distance".

3. How do I use the 'Magic Formula?' and what the heck is the "vertical CG distance?"

Even if your camera does not yet appear in the Cookbook tables, two simple measurements will let you easily obtain your approximate settings. Download and read the 'Magic Formula Instructions and Diagram' that accompanies the spreadsheet link. Now determine your camera's final shooting weight (with tape, accessories, etc.) and its 'Vertical CG distance' as instructed. The 'vertical CG distance' can be found by experimentally balancing a flat side of your camcorder (or the lens cover or the battery) on your finger and marking that balance point with a grease pencil or a sliver of masking tape; then measure the distance from that mark down to the base of your camcorder. What you have detected is the location, within your camcorder, of the plane of that famous CG point, and additionally how high up from the camera mounting surface that point is located. Note that you have three spreadsheet choices—for zero, one, or two 'nose weights.' (If your camera is relatively light, I'd suggest using the latter—the .41 oz (186 gm) version—to provide maximum inertial stability). Now, if you enter those two numbers—weight and vert. CG—in the marked boxes, the blue columns of the spreadsheet will show all possible solutions for balance. The brown column to the right will show the 'dynamic moment' of each possible solution—*don't ask*, just use the one with the smallest 'dynamic moment' number and write down the indicated settings. This will give you a great head start for balancing. You will still need to finish the job, and fine-balance and trim your Merlin as per question #1 above, but you should be quite close!

3. Why does the camera want to pan by itself when I walk around and I'm only holding the handle?

The Merlin gimbal has six essentially frictionless ball bearings and since it is an inert object, it tends to keep pointing in the same direction, regardless of your moves. To control the camera's angle (as opposed to its position in space), grasp the 'guide ring' with two fingers and thumb, *but very lightly*, unless you need to alter the angle of pan or tilt, and then use only the minimum force required. (Remember that, as Isaac Newton discovered, any move you start will require equal force to stop, since the Merlin behaves like an object floating in zero-gravity.)

4. When I start moving, the camera tilts down and when I stop it tilts up. How do I prevent this? (Is it related to my horizon going off when I go around a corner?)

Good question. First understand that if the Merlin is neutrally balanced at the gimbal, what you describe would not happen. However we have found that neutral balance creates many other problems -- it is way too touchy. If a mosquito landed on your lens, it would theoretically tilt straight down! So we employ an invaluable compromise—we balance for slight bottom heaviness, which allows Merlin to be trimmed to hang level (or at any angle you choose). The downside is a slight tendency to be a slow pendulum when you start, stop or go around a corner. You will learn to counter this tendency with an equally slight, opposite pressure from your fingers. If this tendency is extreme, your Merlin is too bottom-heavy. See the manual to check 'drop-time' and re-adjust so it takes at least one full second.

5. How can I mount a wireless microphone receiver to my camera (or the Merlin)

See Jim Farrell's ingenious aftermarket accessory shelf at: www.jimfarrell.com/merlin

6. How do I zoom/focus/adjust camera settings while flying? How do I start and stop recording?

For now, various stand-alone zoom/focus/pause controls are available on the market. Panasonic made (and discontinued) a particularly small and light version which, if you can find one on e-bay, can be velcro'd to the Merlin handle. If you master one-handed operation, you can also control these functions with the other hand by means of the infrared remotes supplied with many camcorders. Watch these FAQ and Steadicam.com Merlin pages for notice of future LANC-type controllers compatible with Merlin

7. I have a wired zoom/focus controller, but when I use it with the Merlin it throws off the balance. What can I do?

It is important that the path of the wire, either curly-cord or straight, be arranged to minimally influence balance. We suggest that the cord should pass up along the side of the camera just above the Merlin gimbal (flex-tie it to the camera's side handle, for example), so it has the shortest possible 'lever-arm' to influence pan/tilt. Of course the thinner and more flexible the wire, the more satisfactory the results.

8. Is it possible to set the Merlin to hang at some other angle than level - to trim tilt for a specific shot?

(Aha! You must be an American -- you didn't look at the DVD or read the manual!) Yes. The blue roller on the side of the stage adjusts the nominal hanging angle of the Merlin. Pushing up on the roller causes an up-tilt. Pulling down causes a down-tilt. Experiment. And by the way, the blue roller under the stage controls the side-to-side angle, AKA 'roll.' (If you don't know what the 'stage' is, you may actually have to read the instructions!)

9. I'd like to shoot looking up or down at something, is there a way I can set the camera to be tilted way up or down?

The Merlin can be trimmed to tilt radically up or down (push up the blue fore/aft trim roller to balance tilted up), but we would only recommend it if your entire shot was to be at that angle – otherwise you would have to 'fight' that trim the rest of the time. If a single shot has both high and/or low angles and at times needs to be level, try reducing bottom-heaviness so the Merlin is more neutrally balanced (see the video or manual – counter-clock the 'Z' ring 3 or 4 turns so the 'drop time' is up to 3 seconds) – and it will require almost no effort for your fingers to hold those extreme tilts. Keep in mind that this more-neutral trim will make subsequent operating a bit more touchy and harder to keep level, so remember to return to slight bottom-heaviness for the rest of your shots)

10. I got it all balanced, then I put in the tape and opened up the LCD, but now it's all wrong. Why?

I mean no disrespect whatsoever, but 'Duh'! You changed the distribution of mass! You moved weights sideways! C'mon! I know people aren't used to balancing things in the 21st century, but, as we say in Philly, 'Yo!' (See my [Ultimate Simple Balancing Instructions](#) at the end of this FAQ.)

11. Why does my Panasonic DVC-30 want to hang upside down? I used the Cookbook settings!

This was my error. I provided our web designer the wrong setting for the lower weights. I apologize to all DVC-30 owners. It has been corrected! And I take back any previous abusive remarks!

12. Why doesn't Merlin have a monitor? My operating is limited if I can only use the cameras monitor.

Using the camcorder's monitor is indeed somewhat limiting and requires contortions to view-find at certain angles. We may eventually offer a slick, lightweight monitor to screw on in place of the front weight.

13. Do I have to use two hands? (Or: can't I operate one-handed?)

Two-handed operation is generally easier to control and is thus more precise. One-handed operating requires more practice. Watch the DVD closely to see the exact hand position. Keep the gimbal handle a bit sideways so that the part of your first finger between the first and second joint lightly contacts the front tongue part of the gimbal, and your thumb lightly contacts the rear surface of the gimbal. Open and close your finger & thumb for intermittent contact with the gimbal, if the angle of the shot needs changing. When you start a pan, make your whole hand turn a bit, so your fingers are never strained or contorted. If your grip is uncomfortable then it is incorrect. Closely watch the sections of the DVD that describe one-handed operating.

14. Can I mount the Merlin or my camera to a tripod quickly, or do I need to buy a quick release plate?

I recommend that you acquire the formerly optional Merlin Tripod Adaptor Plate, (now standard). The Merlin dovetail mount with camera attached, instantly unlocks from the Merlin and locks onto the tripod adaptor plate. Note your Merlin 'stage mark' beforehand so you can remount your camera back in the balanced position with a minimum of re-trimming.

15. What's a dovetail?

On full-sized Steadicams the dovetails are the thick camera mounting plates with beveled edges. On your Merlin it's the blue & black sheet-aluminum sandwich with the 15 camera-mounting holes and the locking lever.

16. What is the "Gezornenplatz screw"? (Garrett, where the heck did this name come from?)

I thought I made up the word, but remembered that it was the punch line of a Bob Newhart sketch. (An "infinite number of monkeys with typewriters" would eventually, randomly write Shakespeare's works, but also lots of dreck like: "To be, or not to be, that is the Gezornenplatz.") In Merlin terms, the flimsy mounting structures on many camcorders may cause visible vibration: Counterclock the supplied plastic bolt upward until it kisses the underside of your lens housing, and you'll be able to work at much longer focal lengths (now that is the Gezornenplatz!")

17. The Gezornenplatz screw doesn't seem to contact properly on my Sony HDR-FX1. Any tips? Have you heard this from other FX1 owners?

The head of the 'Gezornenplatz' screw is narrow. We used it because it's lightweight and won't mar camera surfaces. You can slide the dovetail plate forward or rearward before you lock it down which may help this issue. Then adjust the fore/aft trim roller to get back in balance. The consequence for dynamic balance will probably be slight. If that doesn't do the trick, You can replace the supplied 'gezornenplatz' with any so-called "1/4-20" screw or bolt (quarter inch diameter, 20 threads per inch). So, if the Gezornenplatz is too short, or too narrow at the top, you can acquire a longer screw or wider version at any hardware store. We suggest you put some tape on the top so it won't scratch your camera.

18. I Just bought a "Steadistand" but can't figure out what it has to do with the Merlin. It did not come with any manual or pictures, so I was just wondering if you could clue me in on the proper use of the Steadistand?

They are two different products. The "SteadySTAND" is a compact light stand that can be set up on the floor, and raised to any height. It comes with an offset top bracket with a pin that fits into the Merlin handle' so it's convenient for 'docking' the Merlin as needed. Maybe you have the less-expensive Merlin Table Top Stand. If you are working within a location and can keep the table-top stand nearby on a table, it provides a safe place to quickly set down your Merlin and camera between setups, shots or even individual takes if your camera is heavy.

An additional benefit is that your 'trim' settings will be exactly preserved.

<http://www.steadicam.com/merlinstands.html> shows photos of both. Here are their part numbers:

MERLIN Table Top Stand - P/N 801-7910 \$84.95

SteadySTAND P/N 601-7910 \$165.00

The Docking Bracket clamps onto a light stand (the kind with a 5/8th inch stud on top). the Merlin handle is lowered gently onto the upright pin, and is 'docked' safely so you can walk away. The Steadistand is a bit more

complicated. Loosen the joints and arrange them in an arc so the 'yoke' part is horizontal and roughly over the stand base... then lock the joints tightly. The merlin gimbal can be set down within the arms of the yoke, and docks with the handle dangling. The former is for floor use. The latter sits on a tabletop.

19. The mounting screw loosens when placing the the camera - mounted on the Merlin - on my knees while sitting in a driving car (on bumpy road). What should I do?

Did you put two parallel strips of cloth 'gaffers' tape on the base of your camera running fore and aft at either side of the mounting hole? We designed the mounting screw to have the maximum threads to grip the camera.

If, on some cameras, the screw is nearly 'bottomed out' you will need these tape strips. They will compress slightly when the screw is tightened and keep it under pressure, as well as making the mounting a bit more firm. (If you already have such tapes, as per the manual and DVD, add another thickness).

20. The Velcro patch on the Grip loses stickiness to the matching Velcro under the bubble level after short time of use.

If the velcro has worn out already I would be surprised. However, if you can find thin black self-adhesive velcro strips -- In the US, for example, at 'radio shack' -- stick a short male and female strip together (adhesive to adhesive) and then use the female side to contact the stage. This will have the effect of making the velcro protrude further and the 'male' side will give you additional contact with the 'female' velcro on the handle.

21. Can I tell the new metal gimbal from the original gimbal by its appearance?

The Metal gimbal looks almost the same as the original except that several parts are now made of metal and all six bearings are ball-type. The original gimbal (which works very well, by the way) had ball bearings in 'pan' (not visible) and the rest were plain bearings. We felt that the metal gimbal would be somewhat stronger for the nearly seven lb camcorders that may be used with the arm and vest. In use, you may not know the difference... the ball bearings have only slightly less friction in tilt and roll than the original.

22. You stated "Move the Merlin dovetail around on the camera base as per manual and video so your grease-pencil 'mark' is located under Hole 'H'." Does "under the hole H" mean the small locating hole on top of the letter H, or it is the big mounting hole below the letter H?

You can put the grease pencil mark under the actual letter (between holes), then find the nearest set of plate holes that match the camera holes.

23. Recently my Merlin has started acting differently. What's wrong?

Inspect your equipment closely if any unusual symptoms occur. A collision or a dropped Merlin may have caused a loose dovetail or spar, or a broken component. Tiffen can quickly repair or replace a damaged Merlin. Contact Tiffen Customer Service (<http://www.steadicam.com/steadicamService.html>) to get shipment and warranty information. If you are in the middle of a shoot and a mechanical problem occurs, common sense may suggest a temporary solution. A loose dovetail, for instance, can be 'band-aided' with a layer of tape stuck inside the bent portion that contacts the top stage, which serves to increase the tightness of the locking lever.

24. I think my Merlin is well balanced and I have practiced for days but my shots still look a bit erratic/off level/jerky. What am I doing wrong?

Fortunately (we think), Merlin is an instrument, rather than a simple tool. It's not a simple black box with a 'steady' button. If so, anybody could do it and there would be no cachet, no particular pride in the accomplishment of great operating. As it is, Steadicam in general, and Merlin operating in particular, rewards practice and experience and as a result is correspondingly satisfying and valuable—not to mention potentially lucrative for skilled practitioners. Like a guitar or violin, it isn't easy to master, and aptitudes may vary, so we urge you to give it your best. Record and playback and analyze your practice takes, study the 'operating' section of the manual and DVD and pay attention to some of the great Steadicam shooting in movies, TV and live broadcasts. Astonishingly, in practiced hands, the Merlin is capable of equally fine work, and can greatly augment your capabilities as a film and videomaker.

Those interested in all aspects of the moving camera might also enjoy a pair of relevant articles online at: <http://www.garrettcam.com/zerb.php>

Ultimate Simple Balancing Instructions:

Here goes:

The combo of your camera (plus accessories) and your Merlin is balanced in two independent directions *which are achieved separately*, one at a time. Think of the center of the gimbal as the master balance point (like the pivot of a see-saw) for both directions of balance.

The two directions, (or 'planes') to be balanced are *vertical* and *horizontal*, and they may be interactive at first, so you may need to alternate—go back and forth—balancing in one direction and then the other, until they no longer interact.

Vertical balance:

Hold the Merlin exactly sideways, supported by the gimbal (as if you were about to do the 'drop test' shown in the manual and video). Be sure the gimbal is free to move and not limited by an obstructive handle angle.

Let go!

One side or the other—the camera side or the Merlin side—will fall downward.

If the camera falls rapidly, add another weight and increase the 'arc distance' by an inch or so.

If the Merlin side falls, remove a weight and decrease the 'arc distance.'

Repeat as necessary, in finer and finer steps, until the Merlin side falls slowly. (if the camera seems to also roll forward and back, or moves confusingly, jump ahead to a bit of horizontal balancing):

Horizontal balance:

Hold the Merlin upright, gimbal handle vertical. Let go!

Watch how it falls—either front or rear or to the side (or with components of both motions.)

Adjust the long blue trim control on the stage, with full turns as shown in the video, until it no longer falls to front or rear, and that component at least is roughly balanced.

Adjust the short blue trim control underneath the stage, with full turns, until it no longer falls to either side, and that component is also balanced—in other words, it hangs level.

Good!

Now hold it sideways and check that it still falls slowly toward the Merlin arc side. If not, touch up the fine vertical adjustment of the arc distance (if you run out of arc adjustment, add or subtract a weight and re-adjust the arc)

Note: after any alteration of arc distance or weights, you will need to touch up horizontal trim.

Good!

Now set the final 'Z-adjustment' by pushing in the lock button and turning the 'guide ring' clockwise (if it falls too slowly*) or counterclockwise (if it falls too rapidly*) a turn or two.

*If the 'drop time' takes one full second—"Go, one thousand and one"—from the time of release sideways to the moment it passes vertical, you're as good as done!

Hold the Merlin vertical once again and touch up the sideways trim for level, and the fore/aft trim knobs so it hangs at an appropriate attitude for your desired 'headroom.'

And you're done!