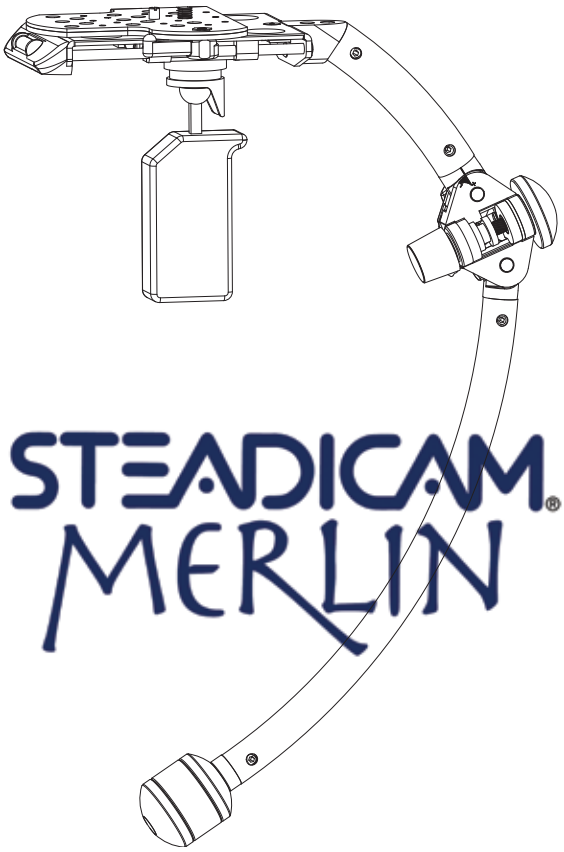
STEADICAM®

MERLIN

Setup and Operation Manual



STEADICAM®
MERLIN

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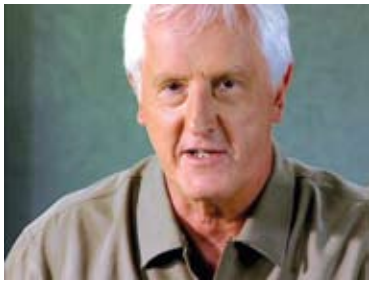
A letter from Steadicam Inventor, Garrett Brown



Dear Friends,

You are about to have a two-part experience. Even this manual is in two parts. First you will go through the Setup of your particular camera on the Steadicam Merlin — think of this as a brief game of weights and balances — after which you will progress to the fun part: Operating!

Steadicam is a compelling and evolving art, and the Merlin is a true instrument – fully as capable as its big brothers in the movie world. Between the DVD and this manual, you'll find everything you need to get started; and a bit later, as your skills develop, you may find it worthwhile to have a second look through the 'Operating' section for info and tips you may have missed.

Meanwhile, for those familiar with the Steadicam JR, here's a bit of history: the original 1990 prototype was made of aircraft aluminum, the lightest, stiffest, most precise 'JR' ever. Until now.

The ***Steadicam Merlin***™ with its new Folding-Caliper hinge, is that legendary, first-ever, camcorder stabilizer, reborn! Ultra-light, ultra-rigid aluminum construction permits moving shots at unprecedented focal lengths, and the Folding-Caliper extends and retracts to balance cameras weighing from one-half pound to five pounds, yet automatically seeks the compact folded position. I hope that you will really enjoy owning and using the Steadicam Merlin, and I look forward to seeing some of the results – in sample reels, documentaries, commercials, home movies and feature films!

Good luck and have fun.

Garrett Brown,
Philadelphia, 2005
www.garrettcam.com

Part One — Setup

Congratulations on your purchase of the Steadicam® MERLIN™!

The ***Steadicam Merlin*** is a camera stabilization system for lightweight camcorders based on the professional Steadicam technology used worldwide in professional film and television production.

Features

- ***Ultra-light:*** by itself weighs less than a can of soda!
- ***Ultra-compact:*** folds to less than two inches thin
- ***Ultra-rigid aluminum construction:*** supports longer-focal-length shooting
- ***Precision two-axis vernier stage*** for accurate, repeatable horizontal balance
- ***Adjustable vertical trim***
- Patent pending ***'Folding-Caliper' hinge***—magically finds true folding position
- ***Quick-release aluminum dovetail*** with three-position lock
- ***Quick-release tripod adaptor***
- Tough, modular, ***user-serviceable construction***
- Flies cameras weighing from one-half pound to five pounds
- Patented ergonomic, ***three-axis inter-gimballed handle***

Camcorder video quality is now superb, but unstable shooting still looks amateurish. When you master the ***Merlin***, you will be able to move your camera smoothly, with a high level of artistic and creative freedom. With the ***Merlin*** your moves can be virtually indistinguishable from those made by dollies, cranes and the big Steadicam.

The ***Steadicam Merlin*** is an instrument that requires know-how and practice. Please read the rest of this introduction and then carefully follow the recommended procedure for setup and operation. You'll save time in the long run and minimize the risk of damaging the unit.

1. Overview — Read this first

How to Use the Merlin Manual and DVD

The Merlin manual and DVD are designed to be used together. They are divided into corresponding sections. Watching the video for each section will show you the basic principles and operations of the Merlin and give you a feel for how to perform them. Then the manual will take you step-by-step through the same operations with your Merlin and camcorder. We recommend that you proceed as follows:

Read this introduction all the way through and prepare for setup as described.

From this point on, each step requiring a specific action on your part will contain space for a check mark and should be checked off as performed.

Now watch Sections 1 (Introduction) and 2 (Tour of the Merlin) on the DVD. Watch them all the way through, and don't attempt to follow along with your Merlin. We've found that it's almost impossible to work with the Merlin and watch the video at the same time!

At the end of Section 2, the DVD will pause and you can turn to Section 2 of the manual. Perform each step as requested and check them off as you go. If you determine that a step does not apply to you, check it off anyway.

It is important to perform the steps in the proper sequence, to avoid both frustration and the risk of damage to the Merlin. Do not unfold the unit or attempt to mount your camera except as directed.

The Merlin Cookbook

Recommended settings for some popular camcorders may be found in the Online Cookbook at:
www.merlincookbook.com

Note: *Due to the ever-increasing number of camcorders, we may not yet have your camera setting listed. If your camera is not in the cookbook, we recommend the following:*

> If you know that your camera generically resembles one that is listed, try using the specifications for that camera.
>
> If not, we'll help you balance 'from scratch', and you can help us in return, by e-mailing your successful Merlin settings for cameras not yet listed in the cookbook to: merlincookbook@Steadicam.com to be posted in the "User-Reported Settings" Table.

Requirements for setup

Set aside an hour or so for your first session with the Merlin. Set up a comfortable work chair and table in front of your TV and near a bright light. Put the following items within easy reach:

- The Merlin packing case. Don't unpack yet.
- Your camcorder, with a fully charged battery.
- Check for your camcorder listing at: www.merlincookbook.com and write down the settings here (we'll explain):
  - Number and size of forward weights _____
  - Number and size of lower weights _____
  - Arc size _____
  - Mounting hole letter (A-O) on dovetail plate _____
  - Stage position _____
  - 'Guide': number of turns. _____
- Large and small flat-head screwdrivers.
- A pencil.
- A tape measure.
- A white grease pencil or china marker (optional).
- A shallow cereal bowl or glass pie plate (optional).
- The DVD remote. It can help to perform the setup as a team effort. One person reads the manual, checks off each item and plays the sections of the DVD as appropriate; the other performs the setup of the Merlin.

You will perform these basic operations

- Unpacking and identifying each part.
- Learning to safely unfold the Merlin into "flying mode" and to re-fold it into "travel mode." Don't attempt to unfold the Merlin until you reach this section.
- Presetting Merlin balance for your camera.
- Preparing and mounting your camera.
- Trimming (fine-tuning) Merlin balance.

Once the camera is properly balanced on the Merlin, we recommend that you leave it attached to the Merlin's quick-release dovetail plate. By itself, your camera can be hand-held or instantly attached to your tripod with the included Tripod Adaptor Plate, and when mounted on your Merlin it can be tucked against your shoulder for extra stability if shooting conventionally, or quickly folded for traveling or storage.

Merlin setup takes a little time, but if you do it right you'll only have to do it once. Even if you remove the dovetail plate from your camera the locating pin will insure that it can be remounted in the correct, balanced position with just a single screw.

Now, you're ready to start.

View the first two sections of the DVD, including Section 1: ***Introduction*** and Section 2: ***A Tour of the Merlin***.

Follow up by reading ***A Tour of the Merlin*** in this manual.

2. A Tour of the Merlin

Before you take your Steadicam out of the box…

We'll begin by describing the purpose of the system and identifying the major components. Then we'll cover the procedure for safely unpacking and unfolding the unit. So leave it in the box for now!

Camcorders are unstable because the human beings holding them are always in motion. Small rising, falling and side-to-side movements don't really show unless there's some object close in the foreground, but tilting the camera up, down or side-to-side by a similar amount will noticeably affect the framing.

- ☐ Activate your camcorder, go fairly wide-angle and frame a scene across the room. Keeping the camera level, try raising and lowering it about an inch by slightly bending and unbending your knees, then moving it side-to-side the same amount by slightly shifting your weight from one foot to the other. Note that the effect on the framing is slight.

- ☐ Now tilt the camera half an inch or so to the left…to the right…up…down. Note the dramatic effect on framing of these tipping motions.

Hand-holding a camera, particularly a small camera, results in angular motions (little 'tilt' and 'pan' corrections) which are quite disturbing because the human eye doesn't see the world with the shakes. So-called 'digital stabilizers' and optically stabilized lenses work well to eliminate vibrations, but are useless for the large-scale bumps that occur when you attempt to walk, run or climb stairs.

The Steadicam works by disconnecting the camera support from the camera and allowing you just enough angular influence to aim it. In addition to being a great stabilizer, *it is also an elegant way of holding a camcorder* to permit complicated and graceful moves that would otherwise be impossible.

Locate the following parts on Diagram 1:

- ☐ ***Gimbal*** and ***Grip***. The shape of the Merlin is designed to stabilize the system by placing its center-of-gravity below the camera — in fact, just below the center of the Gimbal. The Gimbal won't permit any angular force to pass through it, so it doesn't matter if your hand shakes while holding the Grip, which is below the Gimbal and therefore isolated from the camera.

- ☐ Just above the Gimbal is the ***Guide***, the small surface you use to aim the Merlin. Since your "gripping hand" does all the work in supporting the Merlin, your "guiding" hand can retain the extremely light touch necessary to aim the camera without transmitting the shakes.

- ☐ Your camera will mount to the quick-release ***Dovetail Plate***, which attaches to the ***Stage***.

- ☐ The ***Trim Controls*** on the Stage make it possible to tune the balance of the system so that it is poised level on the Gimbal, but is every-so-slightly bottom heavy.

- ☐ The ***Upper Spar*** and ***Lower Spar*** distribute the mass of the system. (Note the tapered Start and Finish weights screwed together at the end of the Lower Spar.)

- ☐ The ***Folding Caliper Hinge*** has two functions: It permits the Merlin to fold and unfold between the travel (storage) and shooting positions; and it adjusts the size of the arc between the upper and lower spar, to tune the vertical balance of the Merlin. (Note the single Finish weight in place.)

- ☐ The ***Caliper Release Lever*** prohibits inadvertent folding with heavy cameras.
- ☐ The ***Upper Locking Knob*** and the ***Lower Locking Knob*** release the upper and lower spars to expand or contract at the Caliper Hinge, and then lock them tightly to prevent vibration when shooting
- ☐ The ***Caliper Adjusting Knob*** raises and lowers the lower spar to adjust the size of the arc between them.

The combination of these elements works astonishingly well, and we hope you will enjoy the Merlin as much as we do. With practice, you can move easily through almost any shooting opportunity, walking, running or climbing stairs, and deliver wonderful shots.

Diagram 1

Unpacking and identifying parts

Remove the parts one at a time from the box. Make a check in the space provided as you identify each part. Any part that is packed in an envelope should be identified and then kept in that envelope until it's called for. Do not throw away any packing material until all parts are accounted for. If anything is missing, please contact Tiffen for a replacement.

You should have:

- ☐ ***Steadicam Merlin***, including 3 pre-installed weights and dovetail plate
- ☐ ***DVD***: "The Art of Steadicam Merlin"

Nine threaded stainless-steel weights (with cushioning rubber O-rings installed):

- ☐ One Start and two Finish weights (shipped installed on Merlin)
- ☐ Six Mid weights

Plastic Bag, containing:

- ☐ One ***Mounting Screw*** for mounting camcorder to Merlin
- ☐ One ***Locating Pin*** set: pin and attaching screw
- ☐ One ***"Gezornenplatz" Screw*** (provides optional stiffening and support for some heavy camcorders)

- ☐ ***Tripod Adaptor Plate***

When all parts have been located and identified, watch Section 3 of the DVD, ***Unfolding the Merlin.***

Then continue with the Manual.

3. Getting Started

Unfolding the Merlin into Flying Mode

The Steadicam Merlin is shipped to you in its compact ***Folded*** or ***Travel Mode***.

It is important to unfold and fold the unit in the proper sequence, to avoid accidental damage. There are only two positions.

Begin by unfolding the unit into ***Flying Mode*** as follows:

- ☐ Position the Merlin as shown. Hold the **Stage** and the **Grip** together with your hand.
- ☐ Note the storage position of the **Grip** in the folded unit, velcro'd up under the stage alongside the folded lower spar.
- ☐ Check that the **Caliper Hinge Release** is open and out of the way.

- ☐ With the other hand, swing down the **Lower Spar** sideways until it clicks into the fully opened position.

If you plan to use a heavy camera, get into the habit of locking the **Caliper Hinge Release** when the Merlin is unfolded into Flying Mode.

The Steadicam Merlin is now in Flying Mode. When a camera is properly mounted on the Stage, you will be able to hold the unit by the Grip (with the Velcro side always forward and in contact with your fingers) and the camera will "float" in balance above it.

Folding the Merlin into Travel Mode

- ☐ Open the **Caliper Hinge Release** and swing it up out of the way.

- ☐ 'Dock' the **Gimbal** under the stage by pressing the Velcro patch on the **Grip** to the matching Velcro under the bubble level.
- ☐ Grasp the **Stage** and the **Grip** with one hand and swing up the **Lower Spar** until it clicks into the 'Travel' position under the stage alongside the grip.

Practice folding and unfolding the Merlin between Flying Mode and Travel Mode.

Identify the following parts:

☐ ***Gimbal***. We identified the Gimbal in Section 1, but now examine its range of motion. The Gimbal contains delicate bearings and must not be forced beyond its natural range of movement.

☐ ***Grip***. The Grip supports and positions the Merlin. The Grip should always be held with the Velcro side facing forward in contact with your fingers. If it's held backward, movement of the Gimbal will be impeded and under some circumstances the Gimbal could be damaged. Try gently moving the Grip and Gimbal around to compare its range of motion in the correct vs. incorrect positions.

☐ ***Guide***. This is the black ring above the Gimbal. The Guide provides a minimal surface so the thumb and one or two fingers can aim the camera. The "Tongue" at the front of the Guide provides extra surface area to assist in tilting the camera. Do not rotate or adjust the Guide yet.

☐ ***Blue Fore-and-Aft Trim Roller***, along the side of the Stage.

☐ ***Blue Side-to-side Trim Roller***, under the Stage at the back of the Gimbal mount.

Now you are ready to begin balancing the unit for your camera.

Watch Section 4 of the DVD, ***Presetting Balance***.

Then continue with the Manual.

4. Pre-Setting Balance

When your camera is mounted onto the Merlin, the entire unit must be set-up and balanced so that the combined center-of-gravity (camera plus Merlin), ends up just below the center of the fulcrum (the Gimbal), and precisely adjusted to be slightly bottom-heavy. Let's take a moment to understand this.

- ☐ Try balancing a shallow pie plate on the tip of your finger. It's very difficult to do, because the center-of-gravity (c.g.) of the bowl is above your finger.
- ☐ Turn the bowl upside down. Now it's much easier to find the balance point and once you find it you can move your finger from side-to-side and it won't fall off. That's because you've made the bowl bottom heavy and put its center-of-gravity below your fingertip.

c.g. is above finger

c.g. is below finger

Slight bottom-heaviness is the key to Steadicam stabilization. That's what the compact stage and the weights on the Lower Spar are for: to provide just enough mass well below the Gimbal to compensate for the much greater weight of your camera just above the Gimbal. Of course you'll want the unit to be somewhat bottom-heavy before attempting side-to-side or front-to-back balance, or the camera will tend to flop over and hang upside-down.

Three ways to balance bottom-heaviness

Because the Merlin accepts cameras weighing from one-half lb (220g) to five lbs (2.2kg), we provide three graduated ways of achieving appropriate bottom heaviness.

1. Adding weights

The coarsest adjustment of bottom-heaviness is obtained by adding or subtracting weights, particularly at the end of the lower spar. The Steadicam Merlin comes with nine threaded stainless steel weights:

One 'Start' weight:
1/8 lb (57g)

Two 'Finish' weights:
1/8 lb (57g)

Six 'Mid' weights:
1/4 lb (114g)

"Z" Balance

You won't need to screw them on tightly. Each weight has a rubber ***O-ring*** at the back of the threads that keeps it from working loose, even when barely tightened.

- ☐ Screw and unscrew two weights together and apart, notice that they only need to be lightly tightened (until just snug), so they remain easy to add and remove.
- ☐ Unfold the Merlin and unscrew the Start weight from the forward position and the Start and Finish weights from the lower position and set them aside.
- ☐ If your camcorder is in the Online Cookbook at www.merlincookbook.com note the number and type of weights specified for both the forward and lower positions, and note them again here:

  Forward Position: *1* Finish (always) + ____ Mid (0 or 1)

  Lower Position: ____ Start (0 or 1) + ____ Mid (0 to 6) + *1* Finish (always)

- ☐ Install the weights specified at both the forward and lower positions. Note, as above: a Start weight may not be called for, but cameras weighing a pound or more will almost always employ Finish weights, both forward and below.

Balancing from Scratch I: Formula for adding weights

If you don't see your camcorder in the Online Merlin Cookbook, here's a rough formula to help you preset vertical balance. Weigh your camera accurately (or look up its weight in the camera's manual or on the manufacturer's website). Make sure you have the tape, disc or memory card aboard, plus a camera battery when you weigh it. Note that the compact structure of the Merlin puts its counterweights about four times as far below the gimbal (think fulcrum!) as the center of your camera's mass is above it. Therefore you'll need at least a quarter of your camera's weight down below as counterbalance.

- ■ For every pound of camcorder weight, add at least a quarter-pound Merlin weight to the lower spar.

< 1 lb Cameras under one pound will generally need one Finish weight forward and one Finish weight below.

> 1 lb Cameras weighing over one pound will also need a tapered Start weight added below.

> 2 lbs At two pounds, add one Mid weight below.

> 3 lbs At three pounds, add one more Mid below and also add a Mid in front (but never more than one Mid and one Finish in the forward position -- they are for increased inertia and don't contribute much to vertical balance.)

+1 For every additional pound, add at least one more Mid weight below.

Note some of the heavier HDV cameras suggested for use with Merlin, such as the Sony "Z" have higher than normal centers-of-mass and may require the Mid weight in front to be moved down onto the lower spar. The idea is to add as little weight as possible to balance your camera and so preserve the essential lightness of the Merlin system. (Without its weights Merlin weighs just 12 oz, or 340g!)

2. Adjusting the Caliper Hinge

The second method of balance – for a finer adjustment of bottom-heaviness – involves expanding and contracting the angle of the Merlin's lower spar. This adjustment raises or lowers the weights relative to the camera.

☐ Identify the **Caliper Hinge Locking Knobs**. They tighten the connection between the upper and lower spar and keep the Merlin rigid to prevent vibration.

Loosen both **Locking Knobs.**

☐ Identify the **Caliper Adjusting Knob**. It adjusts the angle of the lower spar.

Notice the graphic on the knob. It tells you which direction to turn to expand or contract the ***Arc Size***. Clockwise expands. Counterclockwise contracts.

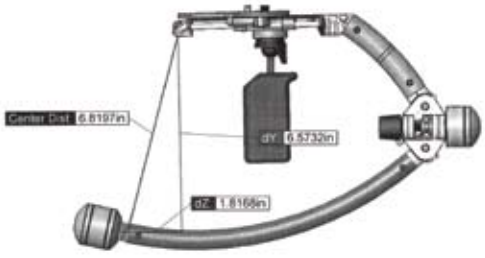
☐ If weights have already been added, support the lower spar rest on the surface of the table to make the **Caliper Adjusting Knob** easier to turn. Turn the knob clockwise to increase bottom-heaviness.

☐ Continue until you reach the maximum expansion of the **Arc Size** between the upper and lower spars – almost 13 inches (33cm) – but don't force this adjustment further. Use this maximum Arc Size for cameras weighing much above two pounds (.9kg), so you can use as few weights as possible.

☐ Turn the **Adjusting Knob** counter-clockwise to reduce the **Arc-Size**. You will reach the minimum arc size at just under 7 inches (17cm) This size is only used for the lightest 1/2 lb (227g) camcorders.

☐ If your camera is listed in the Online Cookbook, note the **Arc Size** distance specified again here:

Arc Size for your camera: _____ inches.



The distance is measured from the lower weight to the top of the Stage.

- [ ] Lay the Merlin on its side on the table. Using a tape measure, open or close the **Caliper** as needed to set the suggested distance from the lower weight to the top of the Stage.

- [ ] Now hold the Merlin vertical and lock both **Locking Knobs** tightly to prevent vibration.

Balancing from Scratch II: Pre-adjusting the Caliper Hinge

- If your camera weighs approximately a pound (450g) set the Caliper Hinge to about 10 inches (25cm).

- If your camera weighs more than two pounds (1kg), preset the Caliper Hinge so that it's almost fully open at 12 inches (30cm), so you will need fewer weights. This will keep the mass of the entire unit as low as possible.

3. Adjusting the Guide Ring

The finest adjustment of bottom heaviness is obtained by rotating the threaded Guide Ring to raise or lower the Gimbal, closer or farther from the underside of the Stage.

- [ ] Identify the **Guide Ring**, for vertical ("Z") axis balance adjustment. (The X axis is fore-and-aft and the Y axis is side-to-side). Don't adjust the Guide Ring until directed to do so.

- [ ] Consult the Online Cookbook and note the **Guide Ring** setting for your camera here: _____ turns. (Number of Z turns counterclockwise = number of threads showing above the Guide Ring.)

- [ ] With the unit unfolded and open in **Flying Mode**, turn it sideways and examine the **Guide Ring** above the **Gimbal**.

- [ ] Identify the **Guide Latch Button** at the front of the ring that keeps the ring from rotating. If this button is depressed with a fingernail or the back of a pencil (it's purposely stiff) the **Guide Ring** can be rotated one full turn before the Latch snaps back to lock it in the correct position. But read the next several paragraphs, including the warning before you try it!

- Rotating the Guide Ring clockwise screws in the ring and raises the Gimbal closer to the Stage.

- Rotating counterclockwise unscrews the Guide Ring and lowers the Gimbal away from the Stage.

This adjustment fine-tunes the location of the center of mass to the optimum point just below the pivot point of the Gimbal. We call this the 'Z' axis, or vertical balance. Note that your Merlin was shipped from the factory with the Guide unscrewed (counterclockwise) three full turns. (You'll need to push the Latch again and rotate the Ring around a full turn each time as the Latch button detents facing forward).

WARNING: The Guide can be difficult to rotate if screwed all the way in. Also, tightening the Guide all the way can make the latch difficult to release.

The Gimbal contains delicate bearings. Excessive force will cause the Gimbal Ring to break.

DO NOT use the Grip as a lever for turning the Guide. Also,
DO NOT use the tongue as a lever for turning the Guide.

- ☐ Now depress the latch and gently rotate the **Guide** two turns clockwise, pressing in the latch each time it comes to the front of the unit. It should rotate easily. You may be able to rotate it part of a third turn but DO NOT ATTEMPT to force or tighten it.
- ☐ After determining that the **Guide** is screwed all the way in clockwise, back it off to the first detent position (latch forward). Then rotate it counterclockwise the number of turns specified in the "Cookbook" for your camera.
- ☐ Always leave the **Guide Ring** with the latch and tongue in the forward position, locked into place. If the Guide Ring is left with the tongue at the rear, the handle will strike it and may snap off the tongue when the unit is folded into travel mode.

more bottom heavy

less bottom heavy

You have now preset the rough vertical balance of the Z (vertical) axis. After the camera is mounted, this balance will be further adjusted.

Now watch Section 5 of the DVD, ***Installing Dovetail Plate.***

Then continue with the Manual.

5. Installing the Dovetail Plate

Before mounting your camera, let's preview docking the Dovetail Plate on the stage.

- ☐ Hook the folded metal edge of the **Dovetail Plate** over the left side of the **Stage** (toward your camera's fold-out monitor), and the long flat surface will be toward the front.
- ☐ The three-position **Dovetail Locking Lever** goes to the other side.
- ☐ Hold the **Locking Lever** straight forward and lower the **Dovetail Plate** gently onto the **Stage**.

- ☐ Swing the **Locking Lever** straight out away from the **Stage**. Notice that the plate is held on loosely, but can still be slid fore and aft.

  LOOK CLOSELY at how the shape of the Lever allows the Plate to drop past it when the lever is forward, and to be held against the Stage when the lever is swung toward the rear.

- ☐ Swing the **Locking Lever** to the rear to tighten the **Dovetail Plate** in position. Note that the Stage Position markings can show you the correct position, and help you return to it when the camera has been removed from the Merlin.

- ☐ Refer to your list of Cookbook settings for your camera and note the suggested **Stage Position** here: _____

Prepare your camera

Accessories have a big influence on the center of balance, so leave them off for now. Eventually you may want to balance the Merlin with your preferred combination of accessories in place, including a wide-angle adaptor, but to get started, the Cookbook settings are for a fairly stripped down camera.

- ☐ Make sure the tape, disc or memory card is installed in your camera. Tuck your lens cap away so it stays put while you're shooting, and remove the shoulder strap or anything else that might dangle.

- ☐ We recommend that you put a narrow strip of thick Gaffer's Tape (fancy duct tape!) running fore and aft at either side of the threaded insert (mounting hole) on the underside of the camera.

Since camcorder mounting surfaces can be small, irregular and often somewhat weak, this increases the friction between camera and Dovetail Plate and improves the tightness of the fit.

Note: *If your camera weighs more than four pounds, we recommend that you plan on using the lightest, rather than the heaviest batteries you own, and cameras approaching 5 lbs (2.2kg) may be overweight for Merlin with a wide-angle adapter. Remember that once the Caliper Hinge is fully open, each object added to the camera will require additional counterweight below.*

Attaching the camera to the Dovetail Plate

Because the center-of-gravity of each type of camera is different, their positioning on the Stage will vary. Gross positioning of the camera above the Gimbal is accomplished by the proper choice of mounting hole. (Fine positioning is accomplished with the fore-and-aft and side-to-side trim knobs.)

☐ Consult your settings from the Online Cookbook to find the correct mounting hole on the **Dovetail Plate** for your camera, identified alphabetically, from A to O.

Note it here: Hole _____

☐ Examine the fifteen mounting holes on the **Dovetail**. Directly in front of each is a smaller hole for the **Locating Pin**. Circle the suggested hole with a grease pencil or other marker. Be sure the Dovetail Plate is oriented so that the long flat side will be toward the lens of your camera.

☐ Identify the **Locating Pin** and the small screw that will hold it to the **Dovetail Plate**. Insert the screw in the underside of the small hole, forward of the selected mounting hole and thread on the Locating Pin from the top. Tighten gently with a small flat-head screwdriver.

☐ Hold the **Dovetail Plate** against the underside of your camera, align the **Locating Pin** correctly in your camera's Locating Pin hole, and insert and tighten the camera **Mounting Screw**.

☐ Note the **Stage Position Scale** on the top of the Stage which will indicate the position on the Stage for the **Dovetail Plate**.

Balancing from Scratch III: Find your camera's c.g.

If you did not find your camera in the online cookbook, here's how to find and mark your camera's center of balance, and locate the correct hole on the Dovetail Plate. (This is a good thing to know in any event.)

- Be sure the camera's monitor screen is folded out in the viewing position.

- Keep one hand in control of your camera so it doesn't topple over, and experimentally find the spot on the underside where the entire mass can roughly balance on the tip of your finger.

- Invert the camera and mark that spot with a pencil or grease pencil. Your mark will probably not exactly coincide with the threaded insert (mounting hole) in the camera. Some of them are wildly different – that's why we provided 15 mounting holes!

- Hold the Dovetail Plate inverted over the underside of your camera so the true center of the plate (roughly hole 'H'), is located over your mark (and therefore over the center of your camera's mass).

- Keeping the Dovetail Plate in place, visually locate the mounting hole on the Dovetail Plate that coincides most closely with threaded insert (mounting hole) on your camera. You should be able to view right through to the bottom of the hole. (It may or may not be hole H)

- Mark the hole on the Dovetail Plate and install the locating pin just forward of it as described above.

- Hold the Dovetail Plate so the Locating Pin engages the locating pin hole in your camera, and align so that you can insert and tighten the camera mounting screw.

Your camera is now ready to mount on the Merlin.

Now watch Section 6 of the DVD, ***Balancing and Mounting the Camera.***

Then continue with the Manual.

6. Balancing and Mounting the Camera

Before your camera is mounted, inspect both trim rollers

- [ ] Unfold the Merlin into the Shooting Mode.

- [ ] Look at the blue **Fore-and-Aft Trim Roller** alongside the ***Stage***. Notice that it is pre-adjusted at the factory to be closer to the front than the back of the Stage. (There should be about one inch (25mm) of threaded rod showing in front.)

  Note the two arrows forward of the Roller. They indicate that when you need the front of the Merlin to tilt up, push the roller up. It may take several energetic turns to make a difference, as this is a very fine adjustment. When you need the front of the Merlin to tilt down, pull the roller down.

- [ ] Look at the smaller blue **Side-to-Side Trim Roller** underneath the **Stage**. It is pre-adjusted to the center of its travel, with about an equal amount of threaded rod showing on either side.

  Note the two arrows to the left of the Roller. They indicate that when you need the left (or monitor) side of the camera to go upward, push this roller up, and vice versa.

- [ ] Observe the **Bubble Level** at the back of the **Stage**. The **Side-to-Side Trim Roller** will be used to help balance the Merlin to stay level.

- [ ] Try giving both **Trim Rollers** a couple of quick, energetic turns. Hold the **Upper Spar** still with one hand, and use the thumb of your 'support' hand on the **Grip** to push either Trim Roller up or down. The action of the Trim Rollers is best seen from underneath. Observe how they alter the balance of the system by moving the Gimbal carrier fore-and-aft or side-to-side relative to the camera.

- [ ] Now return the **Trim Rollers** roughly to their preset positions.

Mounting your camera

By now your camera should be attached in the correct location on the **Dovetail Plate**. Your Merlin should have the correct weights aboard and be adjusted to have the correct **Arc Size** for your camera – either per the Cookbook settings or according to our Balancing-From-Scratch instructions. Here goes:

- [ ] Hold the Merlin **Stage** with one hand and the camera with the other hand. Hook the bent portion of the **Dovetail Plate** over the monitor side of the Merlin Stage as you practiced earlier.

- [ ] Hold the **Dovetail Locking Lever** in the forward position to carefully allow the Dovetail Plate to drop down onto the stage.

- [ ] Swing the **Locking Lever** straight out to the side.

CAUTION: Be sure to keep a hand on your camera whenever the locking lever is unlocked to keep your camera from falling off.

- ☐ Slide the **Dovetail Plate** until the forward edge is at the correct **Stage Position** (according to the Cookbook as noted).
- ☐ Now, swing the **Locking Lever** toward the rear to lock the **Dovetail** to the **Stage**.

Balancing from Scratch IV:

- ■ If your camera is not in the Online Cookbook, set the default stage position to "0" before locking the lever.

The 'Gezornenplatz' for large, heavy camcorders:

Even on heavy camcorders, the mounting structures are often less than rigid, and we have tried not to make the Merlin too massive, so if you're moving violently or running and your hand is shaking there may be some relative motion between the front of the camera and the Merlin stage.

Here's the solution: We provide the so-called 'Gezornenplatz' – the little screw-in platform that goes into the 1/4-20 threaded hole at the front of the Merlin stage to dampen these vibrations.

- ■ If you have a large, heavy camcorder, screw in the Gezornenplatz (from the top) all the way down into the threaded hole at the front of the Merlin before you mount your camera.
- ■ Mount your camera at the correct Stage Position, and then look under it from the side and carefully adjust the Gezornenplatz upward until it just touches the underside of the camera body. Stiffening the connection between camera and Merlin, dampens any relative motion between them and you will be able to shoot more telephoto without vibration in your shots.
- ■ Be careful not to over-tighten the Gezornenplatz screw against the underside of your camera; it can make the Dovetail Plate harder to mount or dismount from the Merlin, and may even bend it or cause excessive strain to the camera's threaded insert.

The Caliper Hinge Release

If you have more than three or four weights attached to the Lower Spar, the 'click-stop' catch that keeps the Merlin in the Flying Mode, may not be strong enough to restrain the weight when held out sideways and the hinge may open. With heavier cameras, get in the habit of locking and unlocking the Caliper Hinge Release when you unfold and fold the Merlin. (That will also prevent it from opening inadvertently when set down sideways between shots.)

☐ Practice opening and locking the **Caliper Hinge Release**.

Note how it prevents the Merlin from folding inadvertently.

☐ Practice folding the Merlin with the camera mounted: Velcro the **Gimbal** up under the **Stage**; hold the Stage, and Gimbal with one hand.

☐ Be sure the **Caliper Hinge Release** is open.

☐ Swing up the **Lower Spar** in an arc to find it's notch. Now open it fully into the **Flying Mode** until it clicks.

DON'T RUSH these maneuvers and pay attention to what you are doing. If you forcefully fold the unit, for example and the Caliper Hinge Release is still locked, or if it's in the way when you try to unfold, it could be bent or damaged.

Now watch Section 7 of the DVD, ***Horizontal and Vertical Trim***.

Then continue with the Manual.

7. Horizontal and Vertical Trim

Horizontal trim

You have preset vertical balance and camera position on the Stage, but your Merlin is still unlikely to be in perfect balance. Let's see how unbalanced it is, and in what direction.

- ☐ Grasp the **Grip** with your right hand and slide up your hand so you can steady the **Guide** with your right thumb and forefinger. Steady the upper spar with your left hand and tentatively release it. It will probably start to tilt over – either to the front, back or sideways (or both).

  Note the direction of tilt.

- ☐ If the Merlin tries to tilt forward, use your thumb to push up several times on the blue **Fore-and-Aft Trim Roller**.

  If the Merlin tilts backwards, pull down several times, and try it again.

- ☐ The adjacent arrows will remind you which direction to adjust each Trim Roller. ***Use quick full turns.***

- ☐ Each time you trim, hold the Merlin level before you release it so you can tell if you are getting close. Repeat as needed until it hangs level front-to-back.

- ☐ If the Merlin also goes off-level side-to-side (which is likely), use your thumb to push up or pull down on the **Side-to-Side Trim Roller** under the **Stage**.

  Follow the arrows. If the monitor side of your camera needs to come up, push up. If the monitor is too high, pull down.

- ☐ Remember to hold it level each time before you release. Repeat as necessary.

- ☐ Alternate trying to trim fore-and-aft and side-to-side. It is easier if you don't try to balance one axis entirely all at once. Go back and forth from one **Trim Roller** to the other as you get closer.

Making a large fore-and-aft adjustment

If your camera is way out of balance fore-and-aft, as might happen if you're balancing from scratch, it may fall quickly when released. In that case you may slide the camera forward or backward on the **Stage** to get closer to rough balance before trying to use the **Fore-and-Aft Trim Roller**.

- ☐ Don't grab the **Lower Spar** if the Merlin falls off-level. Just slide your 'Grip' hand up and stabilize the **Guide Ring** with your thumb and fingers in order to keep the Merlin from tilting too far in any direction.

- [ ] Keep one hand lightly on the camera to keep it secure and swing the **Locking Lever** straight out to the side to loosen the **Dovetail Plate**. Now slide the camera backward or forward until it feels roughly in balance. Then lock it by swinging the Locking Lever to the rear.

- [ ] Now touch up fore-and-aft balance with the **Trim Roller**.

Top-heaviness

If you have trimmed repeatedly and the Merlin never seems balanced, it may be top-heavy (with the center of mass above the gimbal). If so, it will never hang upright – it will always try to flip upside down.

If you pre-set your Merlin according to the Online Cookbook settings for your camcorder, this condition is likely to be mild, but even if you balanced from scratch, you can diagnose it as follows:

- [ ] Hold the **Grip** with one hand and move the **Upper Spar** out to one side with the other hand until the entire unit is horizontal. It will be easy to feel if it wants to keep going and hang upside down! The stronger this tendency, the more top-heavy it is.

- [ ] Cure slight top-heaviness by loosening both **Locking Knobs** and expanding the **Arc Size** with the **Caliper Hinge Adjusting Knob** (if you have not already opened it fully).

- [ ] Cure moderate top-heaviness by adding weights to the **Lower Spar**.

Note: *Both of the above 'cures' will alter trim, and you will need to re-balance with the Fore-and-Aft Trim Roller.*

Severe top-heaviness is unlikely if you followed the formula for "weights added vs. weight of camera." But the cure is the same: add more weight below. Remember that the Merlin is only designed to support cameras weighing five pounds (2.25kg)) or less, and you may need to remove wide-angle adapters, or heavy batteries.

Excess bottom-heaviness

If the center of mass of the entire unit is too far below the gimbal, trimming will seem to have little effect and moving the Grip rapidly to one side will create an obvious pendulum effect.

- [ ] Hold the **Lower Spar** out to the side and let it go briefly to see if it falls rapidly – a sure sign it's too bottom-heavy.

Note: *Whenever you hold the Spar out sideways and let it fall, be sure to grab it just as it passes through vertical, and also tilt your Grip hand as it falls, so you do not forcefully exceed the range of the Gimbal bearings.*

- [ ] Cure mild bottom-heaviness by loosening the **Locking Knobs** and reducing the **Arc Size** with the **Caliper Hinge Adjusting Knob**.

- [ ] Cure moderate bottom-heaviness by removing weight from the **Lower Spar**.

Again either 'cure' will require re-trimming fore-and-aft.

Drop test

A Merlin that's in correct top-to-bottom balance can be moved rapidly back and forth laterally and it will essentially stay upright! It is technically bottom-heavy, but only slightly!

- [ ] Hold out the lower spar sideways and let it go, If it falls slowly, if it takes a full second (say "Go…one-thousand-and-one") until it passes through vertical, in Merlin terms that's the magic!… That's just where you want it to be! This is the famous **Drop Test** and your Merlin is ready to shoot!

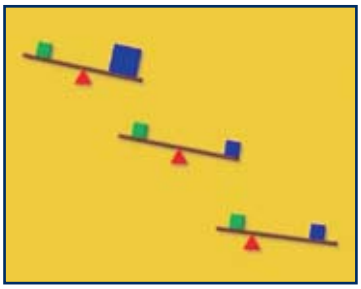
This **Drop Test** is the way Steadicam Operators worldwide discuss and calibrate the elusive quality of slight bottom-heaviness. Some prefer as long as three or four seconds for their full-sized rigs to fall through vertical.

Experience, however, has shown that the Merlin works best with a **Drop Time** of about one full second.

- [ ] Once your **Drop Time** is correct, touch up the **Side-to-Side Trim Roller** so the Merlin hangs level on its gimbal.

- [ ] And finally, adjust the **Fore-and-Aft Trim Roller** so the Merlin's tilt angle helps maintain the headroom of your shot.

The Merlin's Gimbal is like the pivot point on a see-saw



There are three ways to change the balance of a see-saw:

- you can change a weight
- you can move a weight
- you can change the location of the pivot point itself

In ***Merlin*** terms:

- you can add and subtract weights at the ***Lower Spar***
- you can move a weight by expanding or contracting the ***Caliper Hinge***
- you can move the fulcrum laterally by ***Trimming*** fore-and-aft or side-to-side
- remember that ***Guide Ring*** – you can move the fulcrum up or down by counter-clocking, or clocking the Guide Ring, which is a super-fine adjustment of bottom heaviness.

Check bottom-heaviness with a careful ***Drop Test***. How long does it take for the spar to fall from sideways through vertical? Now counter-clock the Guide Ring one full turn, and note that the drop time is just a little slower.

Trimming Review

- ☐ If the camera tilts forward, push up the **Fore-and-Aft Trim Roller** alongside the **Stage** several quick turns (like the arrows) to raise the front of the Merlin, and vice versa.

- ☐ If the camera tilts toward the monitor (to the left), push up the **Side-to-Side Trim Roller** several quick turns to return to level. If it tilts right, pull down on the Roller.

In each case, hold the Merlin level and steady. Then, let it go to test your trim.

- ☐ Perform the **Drop Test** to check the degree of bottom-heaviness. If it's top-heavy, the camera will stay tilted over. If it's excessively bottom-heavy, the **Lower Spar** will fall too quickly. Remember to also tilt your **Grip** hand as it falls, so you do not forcefully exceed the range of the **Gimbal** bearings.

- ☐ If your Merlin is correctly balanced, slightly bottom heavy, the **Lower Spar** will slowly fall and the camera will right itself. The **Spar** should take just over a second to swing through the bottom of its travel, like a slow pendulum. Remember to stop it from swinging further by grasping the **Upper Spar**.

If your Merlin is very slightly top-heavy (falls too slowly):

- ☐ Raise the **Gimbal** by pushing in the small black **Latch** and rotating the **Guide Ring** clockwise.

If your Merlin is very slightly bottom-heavy (falls too quickly):

- ☐ Lower the **Gimbal** by pushing in the **Latch** and rotating the **Guide Ring** counter-clockwise.

Note: *The total "Z" travel available is 12 turns counter-clockwise from fully tightened. When unscrewing the Guide, watch for the unthreaded band above the threaded section. When it appears, it is dangerous to further unscrew the Guide as it may fall out of the socket.*

- ☐ When the camera is level, grasp the **Grip** with your strongest hand. Remove your other hand from the unit and try moving your Grip hand from side to side. The camera should remain essentially level. (If the **Lower Spar** swings like a pendulum when you stop you may still be too bottom-heavy.)

- ☐ Put the thumb and forefinger of your other hand gently on the **Guide Ring** above the **Gimbal**. Try using your fingers to tilt the camera up and down and to swivel (pan) from side to side. A properly trimmed Merlin can be panned and tilted with almost no effort on the Guide.

- ☐ Under most circumstances, you will want to trim to keep the **Bubble Level** at the back of the **Stage** centered, indicating that your camera's framing is not tilted to either side. As you shoot, you will find that fine-tuning of both trim controls becomes a familiar, ongoing process.

Congratulations! You have now completed the Setup part of the manual. Now you are ready for the fun part, Operating.

If you have performed all set up adjustments in a single session, you may want to take a break and continue when you are fresh and rested!

As soon as you are ready, watch Section 8 of the DVD: ***Hand Positions***.

Then begin reading ***Part II – Operating*** in the Manual..

Part Two — Operating

Please read this manual carefully and keep it as a reference. It includes a number of useful operating tips that are not shown in the DVD.

Operating! This is the fun part!

The Merlin is not just a stabilizer, it's a uniquely elegant way to *hold* a camera at the center of balance, with the full freedom of your extended arms, and none of the awkward jerks and lurches of handheld shooting.

With this finely tuned instrument in your hands, trimmed for your shot, moving and booming and changing positions at your will, genuine moving-camera artistry is within your reach.

And here's the good news: It's like riding a bicycle—you'll never forget the "trick" of how to operate Steadicam. *Once you get it, you have it for life.* We'll show you the same hand and body positions that allow professional Steadicam operators to make those magically smooth moving shots on Movie and TV sets worldwide. And we'll teach you the nuts-and-bolts tricks of the trade – techniques of shot design and preparation – that help make them possible. We'll teach you how the professionals setup and trim for every shot until it becomes second nature, and we'll show you how to pace yourself and operate in ways that avoid fatigue.

The Merlin is versatile, durable and precise, and once you become expert in all its uses, you may never want to shoot without it.

Cautions

- ***Handle only works one way. Hold it with your fingers on the velcro side.*** Holding the handle backwards can cause damage.
- Avoid pinching your finger between the moving gimbal yoke and the bottom of the Guide. Keep fingertips either on the Grip or on the outer surface of the guide.
- Avoid violent camera moves. It is possible for a strong operator to move a Merlin and camcorder at many times the acceleration of gravity but mounting attachments on some camcorders are not strong enough and might pull loose. We recommend not exceeding roughly 1.5 g's of vertical or horizontal accelerations. (That's somewhat faster than the speed of an object falling from your hand.)
- Avoid shooting in windy conditions as the Merlin's stability requires isolation from all external influences and its performance will degrade proportionately. Attempt to shield the camera with bodies or find the "lee" of a nearby structure.

8. Hand Positions

Two-handed operating position

This is the smoothest, easiest and most precise way to operate the Steadicam Merlin. The force to support it is isolated from the camera and the force to aim it can be almost non-existent. The camera is free to rotate on excellent bearings. What's more, it is highly inert! The combination will provide you with an entirely new sensation as you orient an object that acts as if it were floating in space. (Ignore the weight and you can almost believe it!)

One hand (your choice) holds the **Grip** and supports all the weight. You can't pan or tilt with that hand and it has no influence on the camera's angle unless you bump the stage or upper spar. This is the hand that **'Flies'** your Merlin through space and avoids contact with anything (legs, elbows, clothing, furniture!) that could disrupt your shot.

The thumb and two fingertips of the other hand lightly touch the **Guide Ring** and the **Tongue** when you want to change where it's pointing, and otherwise more or less leave it alone.

In other words: ***barely touch*** it as long as the framing is correct and ***use minimal force to re-aim*** as necessary.

Two-handed support

Try not to let your **operating hand** touch your **support hand** unless you need help holding up a heavy camera. In that case, you can hook the pinkie of your guiding hand in between the fingers of your gripping hand, (like a modified golf grip), and help support it with the operating hand, while still maintaining that light and isolated finger contact on the Guide.

Inertia

Remember that the Steadicam is both inert and free to rotate. This means that you must think ahead if you want it to start panning and begin early, with the smallest force possible. Also remember to stop the pan – the Steadicam obeys several of Newton's laws, such as the one about "remaining in motion."

Use your thumb and finger like a drum brake to stop a pan, releasing the pressure the instant the camera is aimed where you want. Let your wrist bend a little to stay out of the way of the spars. *The inertia of Steadicam makes it hard to react instantly – try to anticipate your moves.*

One-handed operating position

Slide up your hand on the Grip, so that your second finger is just below the notch.

Hold the Grip strongly with your second, third and little finger. Your thumb and first finger can just reach the Guide and contact it lightly and intermittently.

Use your entire arm as a crank when you pan, while you intermittently accelerate the Guide with your fingers.

Tilt by keeping your forefinger crossways as shown so it won't also induce unwanted pan rotation, and use your entire arm as a lever, re-

setting its angle relative to the guide, as you intermittently hold and let go the Guide with finger and thumb. (This is esoteric stuff – check the DVD for this one!)

One-handed operating is not as precise as two-handed, but it can be extremely useful when you need a free hand to open doors, move extras out of the way or hold a sandwich. It is invaluable for extending your reach, particularly for shots high over your head, moving through a crowd, or for shooting way out to one side, so it is definitely worth practicing.

REMINDER: Correct Trim is essential for both one- and two-handed operating. (See Section 6.)

9. Body Positions

Forward mode (aka 'Missionary')

Missionary is what Steadicam operators have called the basic **Forward Position** since the earliest operating workshops in Rockport, Maine in 1980. It is defined as *operating with the camera aimed roughly in the same direction as the forearm of your guide hand.* Try it two-handed.

Hold the Grip with one hand (your choice), the Guide with the other.

Stand with the camera facing ahead but don't hold it way out in front of you.

Shift camera to either left or right, so the spar settles in *beside* your body. Either your "grip" or your "guide" hand will now cross in front of your body. Practice on both sides. Be sure not to bump yourself with the lower spar.

Trim the camera to hang level and try a walking shot. The fastest way to get the "trick" of isolating your Steadicam from all unwanted movements, is to walk rapidly for a city block or so. Steady it once you are in motion and then virtually let go with the "guide" hand, even if the framing wanders a bit, even if it ends up looking sideways.

As you walk, gradually touch the Guide more frequently, so it begins to point where you want, and then continuously, but ultra-lightly.

Learn to avoid that over-controlling death-grip on the Guide (the symptom is unwanted lurching of the frame side-to-side).

Forward Position is for easy straight-ahead shots and shots looking to either side. This is your standard, everyday, meat & potatoes shot and it's how you'll operate Merlin 90% of the time,

You can approach or follow somebody, and even when you're backing up, it's still the 'Forward Position' if the camera and your guiding forearm are pointed mostly the same way.

Forward Position ranges from the camera pointing forward to the operator's right side, as he walks forward or backwards.

Reverse mode (aka 'Don Juan')

The Don Juan was also whimsically named circa l980, and it's still what the professional operators in 40 countries call the other major operating position: the **Reverse Position**, defined as operating with the camera aimed roughly in the reverse direction as the forearm of your "guide" hand. Try it two-handed.

Assume the ***Forward Mode*** as shown above…

Pan the camera to the rear without moving your body. Flex the wrist inward as necessary to avoid bumping the spar. But it's the same finger position on the Guide. It is exactly like Forward shooting except the camera is pointed in the opposite direction and you must turn your gaze sideways to see your monitor. Keep your head angled down as shown—it lets the widest arc of your peripheral vision see the path ahead of you.

Reverse Position ranges from the camera pointing backward to the operator's left side, as he walks forward or backwards.

Remember, your camera is not connected to you, so it no longer has to point the way you're headed.

Reverse Mode is for when you need to shoot backwards, but also want to see where you're going. Following people is easy but can be boring. Shots that *precede* people are friendlier because you see their faces. Reverse shooting helps you avoid bumping into things or falling down. It's a very common Steadicam shooting mode, used in thousands of feature films and lets one precede the action, sometimes at high speed, and even up and down steps, but it definitely takes practice.

Note: *Reverse Mode shooting can be dangerous if you lose your footing or get too involved with your shot to notice where you're going.*

DO NOT attempt a Reverse Mode shot without first scouting the terrain for obstacles and hazards your peripheral vision might miss.

Boom Height

Another essential technique for Steadicam is ***Booming***. In many instances it is easier to control headroom on your subject by adjusting camera height rather than tilting.

Note: *Booming moves do not affect the angular isolation of the camera.*

Boom high for shooting adults

Boom low for correct headroom for kids. This lets you see the world from a kid's perspective, rather than looking down on the top of their heads.

Boom up as you approach your subject (instead of tilting) to maintain correct headroom.

Boom up and down if the height of the ground is changing between you and your subject. Example: You are following someone who steps off a curb. Boom down as they lower in your frame. *Boom up when you step off the curb* because your subject will appear to be rising in frame. Steadicam is an inert object and tilting rapidly is difficult. Booming is easy because moving the Grip hand straight up or down has no effect on the camera's angle and can be done as quickly as you like.

Note: *Your framing is the sum of the tilt angle and the boom height.*

Experiment with different combinations. A low-angle shot (boomed low, tilted up) can be much more dramatic than the usual eye-level stuff. A high-angle shot (boomed up over your head, tilted down) looks great for similar reasons. Don't always just shoot at the conventional hand-held lens height. *Adjust your camera's monitor screen as needed and experiment with raising and lowering the height of the camera and notice the effect that it has on your shot.*

When you boom up and down, make sure that the operating hand (on the Guide) rises and falls right along with the lifting hand (on the Grip). In fact, when booming, it's helpful to let both hands remain slightly in contact with each other so they can move ***in sync***.

Combo Tilt/Boom Shots

Working with, rather than against, the unique nature of any Steadicam, large or small, will make your shots easier to obtain. Booming is easy. Tilting is difficult due to the increased inertia of the tilt axis.

Combine booming and tilting: raise the camera part way when tilting up, lower it when tilting down – it keeps your hand positions less radical and your shots more precise.

Body Clearances

Learn how to avoid bumping your body or clothes with the spars and the weights.

Bend your elbow out sideways to avoid hitting the Merlin as you boom up.

Flex your wrists out of the way of the spars as you make extreme pans to either side.

10. Extreme Trimming

Trimming for Shots

Operating Steadicam is radically different from almost every other human activity—including normal camera operating! It requires a number of unusual moves and techniques such as ***trimming,*** so the desired headroom can be effortlessly maintained.

Side-to-side trim should be checked every few minutes to confirm that the Merlin is hanging approximately level (check the bubble). The balance required is so fine that it can never be set permanently. In addition the Merlin's multiple joints and articulated moving parts may cause folding and unfolding operations to affect trim and require a slight touch-up.

Professional operators tweak fore-and-aft trim between almost every take so the camera's exact attitude can help get the shot, rather than hinder the framing.

- trim up slightly to maintain headroom for tall people
- trim down slightly for shorter people

Use *quick full turns of the trim rollers—it's a fine micrometer adjustment, and otherwise would take forever.*

Steadicam stabilizes best when trimmed so you could let go with the guiding hand and the camera would stay where you want it. If not, the camera must be continually forced up or down to hold your shot and would tilt the moment you let go. *It is axiomatic that human beings cannot exert a constant force – but they can exert no force – constantly! Your shots are much more stable when you don't have to walk along holding the camera above or below the tilt angle it's trimmed for.*

Make Tilting Easier

For shots that may tilt *both* up and down, we suggest reducing bottom-heaviness by counter clocking the Guide Ring and increasing the drop time – which will make it easier to aim up or down with just finger pressure – and just trim fore-and-aft for the most difficult part of the shot.

Remember that *trimming is approximate, never perfect,* so don't fuss with it. *Get it roughly correct and try a take. You may want to trim differently make some other part of the shot easier to get.*

Note: *Don't try to tilt or pan the Merlin by grabbing the spars. It 're-connects' you to the camera, and will not be much more stable than ordinary hand-held shooting.*

Extreme Trimming for Extreme Angles

If your entire shot requires an extreme angle of tilt (like up to a cathedral ceiling or down from a high balcony):

- Don't be afraid of radical fore-and-aft trimming, so the camera holds the desired position for you. It may take a dozen or more quick turns of the Trim Roller – it's a very fine micrometer adjustment –to achieve this. If many turns is not sufficient, it suggests that your Merlin may be too bottom heavy. Counter-clock the Guide Ring several turns and try again.

- Don't forget to re-trim afterward for normal shooting! It's like keeping a

11. Stairs

Stair shots can look great and be easy to shoot, if you:

Reduce bottom-heaviness by counter-clocking the Guide one turn, and then trim for the average angle required for going up or down, including any landings.

Boom up and down to make additional adjustments for headroom.

(Your subject will rise and fall in your frame because you both cross-landings at different times.)

Trimming & Booming for Stairs

If you're following someone up the stairs (in Forward Mode), trim the Merlin so the camera tilts slightly up and then use the boom range of your arms to maintain headroom – it's easier, faster and more intuitive than constantly trying to tilt to compensate for the rapidly changing framing. Booming can also be more accurate, and has the additional virtue of providing the least radical camera angle at any moment.

This can help you avoid the less-than-elegant look of following someone's posterior wide-angle from below!

If you're preceding your subject, shooting downward, looking to the rear, for instance, in the Reverse Mode, trim the Merlin down and likewise use the boom range of your arms to avoid radical angles down on someone's bald-spot!

This is an advanced technique, so don't try it in earnest until you have enlisted a stand-in and gotten lots of practice!

12. Shooting and Resting Positions

The Steadicam Merlin plus camcorder weighs somewhere between 1.5 and 5 pounds. It acts weightless but of course it isn't and it can tire your Grip arm fairly rapidly (though it gets easier with practice). Here are some tips to help with fatigue:

Share the load by also supporting the Grip with the little finger of your "guide' hand. Slip your pinkie underneath the fingers of your Grip hand and share the load. You can still operate up above with the lightest touch of thumb and finger on the Guide.

Rest the elbow of your grip hand on a chair arm, a table or your knee whenever you don't have to move the camera — you can easily fly up and away from those rest positions without any visible bump in your shot!

Shorten your moving shots — use cuts between a series of moving and static shots.

Change hands to share the load. *Practice changing hands safely* to avoid dropping your camera. One way is to shift up your "Grip" hand to the "one-handed" position, and release the Grip as your other hand takes over.

Hold the Steadicam as *close* to your body as possible. When shooting in either the Forward or Reverse Modes, hold it right beside you instead of out in front. Stand sideways to your shot whenever possible so you can keep it closer, and be extra-careful not to bump the spar against yourself when working that close.

Shoulder Modes

The Merlin can also rest on your shoulder and still act as a brace for conventional hand-held shooting:

Open the caliper hinge release and swing the Upper Spar up into the travel mode underneath the stage

Set the end of the weights on your shoulder (make sure the Gimbal is out of the way so it doesn't get damaged).

Adjust your viewfinder screen and control the lens as usual. The mass and braced position of the Merlin will provide extra stability for hand-held type telephoto shooting.

Another version of Shoulder Mode is even handier:

Press the fully-open Merlin against your torso by holding the Caliper Hinge with your left hand

Insert your right hand through the camera strap to secure the camera and operate the lens conventionally.

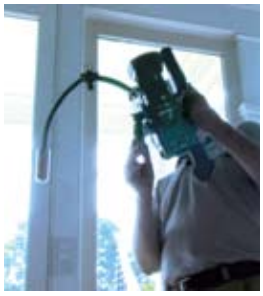
You may be able to have your eye on the viewfinder in this mode, yet, with practice, you can learn to reposition your right hand onto the Grip and 'fly' away from this position to continue shooting Merlin-style.

Rest by docking the Gimbal and placing the Merlin on your shoulder.

Docking and Carrying

Merlin can be quickly set-down between shots as follows:

Stow the Gimbal underneath your Stage and set the unit down on a table (or other flat surface) that has room underneath for the Lower Spar to dangle.



Cushion the Tongue (the hard extension below the Guide Ring) to avoid damaging the furniture; and be sure that it is in a safe area and will not be bumped by passers-by.

The Merlin can be conveniently carried for long distances between shots as follows:

Unlock the Caliper Hinge Release

Fold it into Traveling mode and simply hold the camera's hand strap with the lens facing forward, and off you go.

This is also the smallest configuration for temporarily stowing your camera and Merlin in a case. ***However, we recommend removing the camera by unlocking the Dovetail Plate, for long-term storage or shipment.***

13. Vehicle Shots

Steadicams in general and the Merlin in particular can provide superb camera stabilization in moving vehicles — riding in a car or hanging out the back of an ATV or a pickup truck. You'll see the world smoothly from virtually any non-violent conveyance (including our new 'HandsFree" version of the Segway Transporter), or you can include your fellow passengers and reveal the true motions of the vehicle in the foreground.

Vehicle technique is similar to normal Steadicam shooting except that long periods of vehicular acceleration will make even a slightly bottom-heavy Merlin try to go off-level. (Humans on foot rarely get up to 50 mph!) The solution is to *reduce bottom-heaviness* even further by counter-clocking "Z" trim (the Guide Ring) one or more turns so that the camera acts less like a pendulum, and diligently control level with your operating hand.

Two-handed shooting with a light touch on the guide works best. Support the Merlin with one hand, pan and tilt with the other and let the Gimbal take out the angular shakes. Be sure you are securely seated and/or belted in, or:

Hold on with one hand and operate one-handed if there is any chance of falling off or hurting yourself, such as on boats, on bicycles, on horseback, etc.

One-handed operation is also recommended for 'vehicle' shots that require personal agility and balance, such as skiing, skating, riding horseback, running-with-the-bulls, etc.

WARNING: We do not recommend using the Merlin on risky stunt shots.

The concentration required for operating increases the likelihood of accidents involving yourself and your equipment as well as the people around you. In stunt-type shooting situations, operate at your own risk.

Do not subject anyone else to danger, and be prepared to lose both camera and Merlin, in case of a mishap.

WHEN IN DOUBT, TOSS AWAY THE GEAR AND SAVE YOURSELF!

Rehearse vehicle shots whenever possible: *Have a trial run without the Merlin* and make sure you can remain in contact with your driver, drover, pilot or mahout. Make sure these persons will *not* exceed the speeds you arranged beforehand, no matter what, and immediately slow or stop the vehicle if asked. Cornering and braking can generate a lot of force. *Don't exceed 1.5 "g's" of force on the Gimbal* in order to avoid damage to either the Merlin or your camera.

Clear space around you, so there is room for the Merlin to avoid bumping anything as the vehicle moves up, down and around you! *Even a minor collision with the Merlin's spars could subject the Gimbal to many 'g's' of force.*

Relax your arm to make as flexible a 'spring" as possible. Don't be alarmed if the Merlin mysteriously moves up and down. It is just obeying Newton and trying to stay at the same height above the center of the Earth as the vehicle rises and falls!

14. Merlin Technique

Good technique can make your shots much easier to get.

Lack of technique can make them nearly impossible.

Moves & Results

Watch section 14 in the DVD. It is a 'wordless workshop' of Steadicam moves, along with the picture-in-picture results. Play it several times and compare the physical maneuvers of the operators with the shots produced. You'll be surprised at the amount of ground covered, and the magnitude of the booming moves involved in these simple-but-elegant shots!

Here are some general tips:

Design shots based on ideas – even bad ideas. There is no substitute for planning and rehearsing, or at least trying to think a bit ahead. Otherwise you are just looking and reacting at random.

Start the camera moving with your arms, and move your body an instant later.

Stop your body first when ending a move, and ease the camera to a stop a moment later.

Walk with your feet along an invisible straight line – your arms will not have to compensate side-to-side for the weaving of your body.

Think ahead about panning. Think ahead about stopping your pan! (Watch objects at the edge of the frame to be sure your shot doesn't 'backlash' and remains still.)

Practice keeping the edges of walls and doorways just in frame as you turn corners).

Reach laterally with your arms to help make quick framing adjustments *instead* of panning – as you might boom instead of just tilting. And if moving subjects speed up or slow down unexpectedly, *use your arm reach to instantly vary the speed of the camera* – you'll react more quickly than by accelerating or decelerating your whole body.

Don't crowd your subjects, except briefly for effect – stay back as much as possible. Vary the figure-size from an over-the-shoulder or a close-up 'bust shot' to a so-called 'knee-figure' (mid-calf to above head), to a full-figure (including the feet), to a wide shot with your subject small in the frame, *but don't stop on an in-between framing – it's a convention of movie composition to not cut subjects at the waist or ankles.*

Vary subject sizes, speeds, directions. Perfectly stabilized tracking shots can still be lifeless, even boring at times, without some variation – keep them alive, breathing and unpredictable.

Schedule your ***Attention Cycle***. That's how professional operators concentrate their momentary attention to squeak through all the simultaneous hazards and opportunities that make for great Steadicam shots.

Since framing is, at times, the least volatile element, due to the inertia of the Steadicam, one's attention can cycle between headroom, level (look at the bubble!) navigating (watch out for that curb!), and framing, etc. This can be quite absorbing.

In addition, you must pick the best moment to look from one element to the next – check the bubble when your framing is not changing radically and vice-versa and make sure your Attention Cycle gets around to Navigation in time to avoid the alligators! After watching a Steadicam master at work, calmly lugging a seventy-pound rig through a diabolical shot, you may conclude that he or she has really earned that big salary!

Use your peripheral vision to see what's going on outside the frame; not only for navigating, but also to help plan where your shot should go next and anticipate encounters with actors, extras and vehicles.

Relax your "grip" arm, and let it flex so you can sense the direct path of the camera, even if you are bouncing up and down on stairs or rough ground. Counter your body motions by, in effect, booming up and down in the opposite direction. Practice flying the Steadicam smoothly above a railing or alongside a banister as you climb stairs, so you can see in your monitor when you are successfully isolating the camera from yourself!

Use your senses to navigate. Seems obvious, yes?—what else are you going to use? Well we just want to remind you of a couple of non-obvious sensory possibilities:

- ***Use a foot*** to reach out and locate obstacles and identify doorways, etc. when backing up or shooting blind.
- ***Check*** your auditory circuits now and then for voices whispering useful suggestions like "watch out!" (You'll be amazed. Steadicam operating is so absorbing that you may become oblivious to car horns, explosions and the word 'Cut!')
- ***Use*** what boaters call a "range" by memorizing the visual alignment of a near background object with a far-background object (such as the corner of a chair lining up with a distant wall switch) just as you are about to back through a doorway. By definition, spotting such a visual alignment means you are on the exact same path every time.
- ***Scout*** the terrain without the Steadicam if possible before you shoot, so you aren't unpleasantly surprised by the unexpected cliff, pit, low doorway or mad dog.

Level control. Trim will only provide a basic tendency for the camera to hang level side-to-side. *It is up to you to keep your shots level* by paying close attention and controlling the guide. Here are some tips to help you manage this:

- ***Check*** the bubble whenever you are moving in a straight line – it will not be accurate when you are cornering.
- ***Control*** the slight tendency of the lower spar to swing outward when you are cornering. Imagine that you are holding a stick upright, and let your hand tell you if it's level.
- ***Watch*** the monitor screen to see that vertical objects such as door frames, appear vertical as they pass by the center of your screen. Remember, verticals may not appear vertical at the sides of the screen if you have tilted it all up or down!

Shooting Opportunities

Experiment with longer focal lengths. Shoot mid-telephoto. With a little care, you can make some amazing moves and shoot close and complimentary shots of people without having to be right on top of them. Plus, today's amazing auto-focus circuitry can keep them sharp.

Walking zooms. Pick a good focal length and use your legs to approach and depart! Unlike optical zooming, actual approaches and departures have a pleasing three-dimensional effect and emphasize foreground objects as they grow (or shrink) faster than distant backgrounds.

Pass the Merlin close to people's faces and they probably won't shy away as they might if you came at them with a camera covering your own face. They understand that it's a hand-held object, that you have binocular vision, and you won't bump into them — the result can be some wonderfully affecting pass-by shots.

Hand focus. Merlin's various shoulder-modes let you "pull" focus by hand. Many of today's camcorder owners have never experienced the fun of hand-focusing fast-paced telephoto shooting! Use all your senses to determine the next move of your subject. *Humans can still "pull focus" faster and more accurately than most auto-focus devices.*

Digital stabilization. So-called 'digital stabilizers' and optically stabilized lenses work well to eliminate vibrations, but are useless for the large-scale bumps that occur when you attempt to walk, run or climb stairs. We recommend turning them off unless you intend to make telephoto moving shots, which can be very pleasing, and surprisingly easy to obtain if you make clever use of your camera's auto-focus circuitry. Even without internal stabilization, the stiffness and rigidity of the Merlin encourages shooting at surprisingly long focal lengths.

One-handed operating can be quite comfortable, can allow you to reach higher with the camera and further out to the side. It is essential for opening doors, or for including yourself in a shot!

Hand-offs (passing the Merlin to another camera person) can be useful, but please practice and be careful not to drop the things in the process.

Shot geography thrives on familiarity. Scout the terrain, visualize your shot by eye, sneak furniture and props out of your way, be aware of lights that might encroach, and rehearse, rehearse, rehearse until you can get through it blindfolded.

Control the size and speed of foreground objects in your frame. Use your eyes. Watch the monitor closely and make the dynamics of your frame as satisfying as your composition. The moving camera makes two-dimensional images appear to be three-dimensional.

Panning, Whip-Panning & Dynamic Balance. Panning accurately is an art, and panning rapidly is pure magic, when you can start and stop on a dime, even during a complicated move. Here are some useful techniques:

- ***Establish a pan rate*** and go with it! A good trick, not explained in the DVD, permits ultra-smooth telephoto shots circling 360˚ around, for example, a dancing couple. Try a mid-telephoto focal length such as 20mm. Begin circling at a distance that looks promising. You have now automatically established a "pan rate" which the Merlin will continue on its own if you were to let go of the guide. Continue circling, and *use your walking speed to keep your subjects centered in frame!* The camera will continue its slow pan – you just have to keep up!

- ***Practice Whip Pans*** (lightning fast pans). Start with slow 180˚ pans – always from a given start frame to a consistent stop frame, and gradually speed them up. Do hundreds of them! (I'm serious!), and master the technique at each speed before going faster; and faster; and faster!

  Whip Pans are extremely difficult, even on a tripod, but are particularly satisfying and useful on Steadicam, since you have the option to change the cameras height or position during the whip!

  Starting a rapid whip is relatively easy. *Be sure that your thumb and finger pressure to start the Guide turning is level and consistent. The trick is stopping the pan where you want, and without backlash due to flex in the skin of your fingers – success requires releasing all finger pressure at the instant you stop the pan* so the inert Merlin will sit still on your desired frame!

  Whip pans are a terrifically dynamic technique and worth ardent practice to master. Even a Steadicam Master can sometimes be seen having a few 'practice swings' to get his hands and eyes adjusted to the day's exact conditions, since even the humidity can affect whip pan performance!

- ***Dynamic Balance*** helps keep fast pans from 'precessing' off level. If your camera also tilts a bit when panned rapidly, dynamic balance can be experimentally achieved by opening the Dovetail Locking Lever and sliding the camera slightly forward or back on the stage. Then re-lock and then re-trim the Fore-and-Aft Trim Roller the reverse distance to restore level trim. Try adjusting camera position on the Stage in small increments until it 'behaves' when panned rapidly. Good Luck! Keep at this one – it's worth it!

Wind. Professional Steadicam operators get nervous when they hear a windy weather forecast. It is an "outside" influence that can make your camera hard to control. The only way to help the Merlin in wind is to shield the camera by using your body or someone else's, or by staying in the lee of buildings etc. When shooting directly into the wind, try to stand in front of large objects (or several people) to "backstop" the wind so it doesn't rush directly past your camera.

WARNING: Stunt shooting and leaping over cliffs with the Steadicam is tempting but remember: it's only a movie. We don't advise trashing a thousand-dollar camera or breaking your leg—even for the "Shot of the Century!"

Home Shooting Tips

BIRTHDAY PARTIES

Sit on the floor among very young children as they play around you. Relax and take the load off your arm by bracing your elbow on your knee. Watching *both inside and outside your frame* for the next good moments—remember you are free to move your camera nearly five feet from side to side with your arms without even getting up!

Circle the birthday table, mid-telephoto. Once the kids get used to you, you can cruise up on wonderful spontaneous moments, the sound will be excellent because you aren't shooting from across the room.

Hold the camera out right into the middle of the action. Party games look great with Merlin, and intimate wide-angle shots at your kid's eye-level can hold the birthday boy or girl and a number of friends in the frame at the same time, with the relative emphasis you select.

HOLIDAYS

Christmas, Hanukkah and summer vacations all provide priceless opportunities for Merlin shooting. Go caroling, hunt Easter eggs, run on the beach—document your life in a way that looks more like the movies and less like amateur night. Traveling shots made on professional dollies and cranes can look terrific, but the very bulk of the equipment makes intimacy difficult to achieve. You can have closeness as well as smoothness, and effortlessly be there for the moments that really count!

SPORTS

Whether you're covering professional sporting events from the stands in shoulder-mode, or shooting family contests or even watching yourself dribbling the ball, Merlin offers unique advantages. It can be moved with great speed, yet isn't massive enough to be dangerous. You only have to remind yourself now and then to not pull too many "g's" as you follow the action right up to the basket!

FAMILY TRAVEL

Family travel becomes a group activity again for the whole family when the person with the camcorder isn't left behind. You can keep up, shooting what everybody sees as they see it, holding back just enough to let them enter your shots as you capture all the dialogue close up. *A camera which is mobile from within a group has a much more intimate and friendly feeling than one on the sidelines.* Trains, cars and buses become magical platforms for seeing the world smoothly, instead of the bumpy vibrating embarrassments that plague typical screenings.

Professional Uses

The advent of DV and HDV formats have thrust camcorders into contention for high-end professional applications. Cameramen who have spent their lives working with large crews are becoming fascinated with ultra-light cameras and their auto-color-balance, auto-iris, and auto-focus circuits that, if used intelligently, can deliver excellent results. The resolution is "broadcast quality" yet the small size encourages an entirely new style of shooting. Steadicam Merlin is the most compact and versatile way for the pros to get the smooth traveling shots they're used to.

WEDDINGS

Nuptials are seldom photographed with moving cameras, except those involving hereditary monarchs, heads-of-state, film stars and friends of Steadicam Operators!

Walk up the side aisle, mid-telephoto, parallel with the bride and her father as they move up the center aisle. You will pass rank upon rank of wedding guests craning to see them – those near you are looking away from camera, those on the far side are looking toward you, and the bride and her Dad reappear between each row as the central motif of your shot, glowing and emotional in a way that could not otherwise be recorded.

Rush back down the aisle after the ceremony, ahead of bride and groom as the well-wishers lean out to see them sweep by.

Move along the receiving line, shoot 360 circles around the groom and the bride's mother dancing at the reception, use your optional "Obie" light to bring up couples on the floor. The possibilities are limitless.

DOCUMENTARIES

Merlin is the ultimate documentary tool. It is uninhibiting and unobtrusive. Add its unparalleled mobility and tripod-like pauses, and you have a potent, versatile way to record or persuade or to simply *witness* processes and events that would leave traditional methods of production far behind. The Merlin can represent the "eyes" of a distant CEO in the hands of a trusty local manager, and will perhaps soon be to "desktop video" what the Macintosh was to desktop publishing!

REAL ESTATE VIDEOS

The difficulties of making good real estate videos cannot be overstated. Don't just grab your Merlin and race through a house. If you want to sell your house, or help a friend sell a house, here are some tips:

Plan and rehearse your shots in advance and play them back to see what needs changing.

Slow down. Imagine that your traveling shots are being done on a slowly moving camera dolly.

Stop already! Don't neglect still shots.

Connect the rooms in the viewers mind, to show them the layout.

Turn on the lights, let the camera auto-color-balance, but pre-set manual focus for at least ten feet.

Practice extensively; shoot several houses and examine your playbacks before attempting this professionally.

Plan moves that can elegantly reveal the floor plan and layout.

Pan slowly, without touching the guide, turning yourself along with the Merlin, for ultra smooth, 360˚ views of rooms—and also try moving slowly around the perimeter to enhance the effect.

Boom during slow pans to allow coverage of high and low room details without needing to tilt, thus preserving the maximum isolation of the camera.

Turn on house lights, even in daylight.

Select manual iris for your camera, if available, set it to preserve interior exposures despite "hot" windows, Select manual focus and set it to a hyperfocal distance of about 10' if your camcorder's auto-focus tends to wander. Rehearse and playback with auto-color balance, or try a manual color-balance in half tungsten/half daylight. This will yield a "film" look with the outdoors appearing bluish and the interior lighting not excessively warm.

FEATURE FILMS

Famous director/camera auteurs are embracing DV and HDV formats for their 'personal' features because of the total control, the intimacy, the spectacular low-light possibilities, the affordability of the 'raw stock', and the almost invisible nature of the gear – and the Merlin is poised to be their one indispensable tool!

The Moving Camera

Those conceptually interested in the Moving Camera can read further at:

http://www.garrettcam.com/movingcamera.shtml

15.Accessories

The Tripod Adaptor Plate (included) screws onto your tripod and accepts the Merlin dovetail plate; so you can switch your camera instantaneously back and forth between tripod and Merlin. Simply unlock the Dovetail Plate and remount it onto the Tripod Adaptor. Then be sure to return it back onto the same mark on the Merlin stage so your fore-and-aft trim will be retained.

The Obie Light (optional), otherwise known in the movie biz as a "basher" or "eye light", was invented by the cameraman, Lucien Ballard and named for actress Merle Oberon. It is a highly useful accessory for Merlin shooting. Since Steadicam tends to cruise in close proximity to people, the "Obie" gives you just enough beautiful illumination to properly expose eyes and faces without blowing out the true ambient lighting in the room.

Try it at parties to "fill" people in the middle of typically lit rooms It is useless outdoors or in bright environments, but it perfectly complements the excellent low-light performance of today's camcorders. The Merlin Obie Light contains a 3 watt halogen bulb and is powered by two re-chargeable lithium-ion AAA batteries (included), and an included AC charger.

Adding & Subtracting Accessories to the camera involves some rebalancing and re-trimming. Don't worry, it's easy to do.

Here's a reminder:

1. Restore rough X-Y balance by adjusting the side-to-side and fore-and-aft Trim Rollers. (If you added a wide-angle adapter to the lens, push the Trim Roller up. If you added a larger camcorder battery to the back of the camera, pull the Trim Roller down. Adding both at the same time, may compensate for trim, but you must still correct bottom-heaviness:
2. Depending on the amount of weight added (in order of magnitude):
   - Screw in the Guide Ring,
   - Decrease the Arc Size by adjusting the Caliper Hinge, or
   - Add a small weight to the lower spar. (the Z-axis adjustment of the Guide is the easiest and requires no additional trimming, so try that first.)
3. Touch up the fore-aft and side-to-side trim for level and the fore-and-aft trim for your intended shot.

CAUTION: If accessories bring the weight of the camera over five pounds you will exceed the recommended capacity of the Merlin and risk stress to the Gimbal and the Caliper Hinge.

DO SO AT YOUR OWN RISK.

16. Troubleshooting

TROUBLE OPERATING

If things don't feel right, if your Merlin doesn't seem to behave like the ones in the video, check out these possibilities.

Yawing (rolling). Merlin is probably excessively bottom-heavy, a too-rapid pendulum. Try counter clocking the Guide Ring until the 'drop-time' approaches one full second. Once trimmed, side-to-side, don't let the camera 'swing' – use a light touch on guide to keep the camera level.

Erratic, unsmooth. Excessive finger pressure on the guide—use a lighter touch, and *almost* let go if the shot needs no correction.

Off-level. Trim side-to-side, and pay more attention to the bubble level until level shooting becomes second nature (if that doesn't work, see 'WON"T STAY TRIMMED below)

MECHANICAL TROUBLE

Won't stay trimmed. This may indicate that your Merlin isn't bottom heavy enough—screw the Guide Ring in clockwise a turn or two and check the drop time. Note: trim is not a cure-all, nor is it necessarily permanent, after folding and unfolding—your guide hand must ultimately keep your camera level.

Inadvertent pan/tilt shake or drag.

1. *Check that Upper and Lower Caliper Locking Knobs are tightened.*
2. Possible dirt in Gimbal bearings—unscrew the Guide Ring fully to remove, and blow dry the Gimbal with "Dust-off" dry gas. Reinstall. If this doesn't work, pack the Gimbal handle assembly carefully and send back to Tiffen for service (see contact information on page one). (Use of Merlin in sandstorms, etc. not recommended).
3. Possible bent gimbal components – return handle assembly to Tiffen for replacement – *Avoid violent panning moves above 1.5 "G"!*

Guide won't lock (rotates freely). Broken detent on guide – tape with electrical tape to temporarily prevent inadvertent rotation of guide during panning. Return to Tiffen for replacement.

Avoid ultra violent panning moves.

17. Maintenance

During normal operation your Merlin should require minimal maintenance. **Spar, Stage, Hinge and Dovetail Lock** tightness should be checked occasionally, and can be tightened with standard US allen-wrenches.

18. Glossary of Steadicam Terms

Attention Cycle: sequential check of framing, level, navigating, etc., that helps Steadicam operators get tough shots.

Basher: self-powered fill light, aka "Obie", "Eye-Light" – which is optional with Merlin.

Boom: to smoothly raise or lower the entire Merlin and camera unit.

Boom Height: height at which you choose to carry the Merlin.

Bottom Heaviness: strength of camera's tendency to hang upright – calibrated by drop time.

Center-of-Gravity: balance point of masses—used interchangeably on the DVD video to mean "Center of Balance".

c.g.: center of gravity.

Don Juan: Colloquial term for the Reverse Shooting Position—lens aimed in roughly opposite direction of operating forearm.

Drop Time: defines pendular 'period" of Merlin spar. Held out horizontally and let go, should ideally pass through vertical in about one full second.

Flying Mode: fully unfolded balanced mode which permits isolated, stable moving shots.

Fore-and-Aft: front-to-rear.

Gimbal: mechanism to provide angular isolation.

Grip: portion of handle below gimbal for supporting and positioning camera.

Guide: portion of handle above gimbal, for aiming the camera.

Headroom: space in frame above top of subject's head. Allow less or none in close-ups.

High-Angle Shot: camera held high, looking downward.

Iris: The lens aperture which controls the amount of light and/or brightness of shot.

Locating Pin: supplied pin to prevent camera rotation on stage.

Low-Angle Shot: camera held low, looking upward.

Missionary: colloquial term for the basic Forward Shooting Position—lens aimed in similar direction as your forearm.

Obie Light: fill light—aka "basher" or 'eye-light'—named for actress Merle Oberon.

Oil-Canning: flexibility of bottom of camcorder resulting in less adherence to stage, potentially causing vertical vibration.

Pan: pivoting the camera horizontally, "looking around".

Roll: pinvoting the camera around the lens axis—"seasick" horizon, i.e. aileron trim for pilots.

Shoulder-Mode: semi-folded position for comfortable static shooting, as from audience.

Stage: platform for mounting the camera, includes micrometer trim adjustments.

Telephoto: Long focal-length (or magnified), end of zoom lens.

Tilt: pivoting the camera vertically—looking up or down.

Tongue: additional surface on front of guide, helps tilting.

Trim: fine adjustment of Merlin balance fore-and-aft and side-to-side.

Vehicle Shot: use of Steadicam while being transported instead of walking.

"Z" adjustment: Guide Ring adjustment of gimbal position on "Z" axis alters bottom heaviness.

"Z" axis: vertical axis through center of gimbal carrier.

STEADICAM MERLIN

Notes

Notes

STEADICAM MERLIN

Manufactured in the USA by:
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Inventor: Garrett Brown
US Patents 4,946,272, 5,098,182 and 5,229,798
Other US & Foreign Patents applied for.
Industrial Design by Tony Sacksteder
Manual Design by Laurie Hayball

v. 1.0 This manual will be updated periodically and available on Tiffen's website.