

QSI Auto-Focus Mounting Bracket



The camera mounting bracket makes extensive use of sliding dovetails. The dovetail joint gets immense strength from a trapezoidal pin trapped in a slot. The internal flats of the dovetail joint make the joint self aligning, intrinsically orthogonal, and very rigid. Sliding dovetails make this camera mounting bracket enormously adjustable.



Set screws tighten the dovetail pins in the slots. Please do not over tighten the set screws.

The strength comes from the dovetail itself, not the set screw.

QSI583WSG with Lodestar guide camera mounted on QSI Dovetail Camera Mount, with Hurst focus motor, QSI 67 lens adapter, Pentax 67 55mm f/4 lens, prototype red dot finder plate, and red dot finder.

All systems incorporate a focus motor. If you did not get a motor with the kit, you'll need to add one. See the Technical notes at the end for motor options.

Parts:

1. Dovetail Plate
2. QSI Riser Assemblies
 - a. QSI Riser
 - b. QSI Camera Mounting bracket Tabs
 - c. Button head hex socket screws 14/20 1/2" (2)
3. Motor Drive Assembly
 - a. Motor Plate
 - b. Motor Mount Block
 - c. Socket head cap screws 6-32 (2)
 - d. Focus Motor
 - e. Motor drive pulley
 - f. Timing belt, ~13"
4. Universal Blocks (2)
5. Set Screws 10-24 1/4" soft tip
6. Optional Red Dot Finder Plate



Terminology:

Male dovetail parts are called PINS. Female dovetail parts are called SLOTS. If you look at the end of the dovetail plate, there are 3 slots. The remaining aluminum forms positive dovetails, we'll refer to

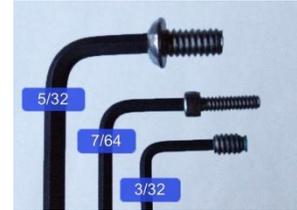


these as RAILS. The plate has 3 slots and 4 rails running the length of the plate, and one cross slot nearer one end. As far as the lens goes, we'll refer to the part you turn to focus the lens, the FOCUS COLLAR.

Tools

Hex head "Allen" wrenches are used to assemble and adjust the plate.

We suggest you work on padded surface.



Section 1, Instructions to attach QSI cameras that only have side mounted tripod sockets.

Note: If you have an 8 position filter wheel, you will not use the risers, you'll use the bottom socket on the filter wheel housing, so skip to section II.

We'll attach the camera and lens to the plate, attach the focus motor, then if you have a red dot finder plate we'll attach that last.

Look at the QSI Camera Mounting bracket Tabs. They slide into the small dovetail slots on the risers. There is a set screw in the riser dovetail that will be tightened to hold the tab in place. The tabs will be attached to the camera with the two button head 1/4-20 1/2" screws.



Look at the top of the dovetail plate. In the bottom of the cross slot you'll see two threaded holes with a set screws.

Next have a look at the risers. These are the boot shaped pieces. The bottom of the boot has a long male dovetail pin. The sides of the risers have dovetail slots. In the dovetail slots there are threaded holes for set screws. The two risers are identical so it doesn't matter which goes on which side. You'll also see a threaded hole in the foot of the riser, that threaded hole is not used here but is provided for future use.



Slide the toe of one of the risers into the cross slot. It doesn't go in far, the end of the riser dovetail pin only goes in so it is even with the inside edge of the first rail. Gently snug the set screw in the bottom of the dovetail plate so it just holds the riser in place but you can still slide it a bit if you want. Repeat with the other side.



Electrical panel on bottom of QSI camera

Since the QSI electrical connections are on the bottom of the camera, the bottom of the camera must extend over the end of the plate. Lower the camera into the space between the risers so that the camera extends off the end of the dovetail plate.

Adjust the risers so they rest against the side of the camera. The bottom of the camera should sit on the "toes" of the risers. Look into the end of the dovetail plate under the camera and see that the dovetail pins of the risers (the "toes") are equally inserted on each side. Gently tighten the set screws in the plate to hold the risers in position but still allow you to adjust the position.



Next you'll use the TABS to fasten the camera in place. Look at a tab. It has an offset dovetail pin and a countersunk hole for a 1/4-20 button head screw. Slide the pin of the tab into the dovetail slot in the riser. The tab will be positioned flush against the side of the camera, adjust the camera and tab to align hole in the tab with the camera's side mounted tripod socket. Use the 1/4-20 1/2" button head screws to fasten the tabs to the camera. **NOTE: You must not use a screw or bolt longer than 1/2 inch.** The supplied button head screws are 1/2 inch long. If you lose one of the supplied button head screws and replace it, make sure that you don't get one that's too long. (Using a screw or bolt that is too long can damage your camera because the long bolt can be turned with such force that it can punch through the thin aluminum that forms the base of the camera's tripod socket.)

Once the tabs are mounted securely to the camera use the set screws in the dovetail of the riser to anchor the tabs firmly. Next tighten the set screws in the bottom of the dovetail plate to hold the risers firmly in position. Again, please don't over tighten the set screws.

Next we'll mount the motor assembly. If you have not mounted the lens to the camera, you'll need to do so now.



Fasten the focus motor to the focus motor mount plate. Fasten the belt drive pulley to the focus motor. Look at the motor mount block. The dovetail slot on the bottom allows it to slide on to the main dovetail plate side rail. Slide the block on to the rail. Don't attach the motor plate to the block because you don't yet know which holes to use.



Loop the timing belt over the lens focus collar. Next hold the focus motor and plate in position and hook the timing belt over the drive pulley. Adjust the position of the block so the timing belt will be positioned roughly in the middle of the lens focus collar, and tighten the set screw in the block to fasten it in place. The lens may block access to the set screw. If so, remove the lens from the camera, tighten the set screw, and remount the lens.

Pull the motor away from the lens to tighten the belt and identify which holes you'll want to use. Attach the motor plate to the block with the two 6-32 cap screws. The slots will allow you to tension the belt and tighten the cap screws. Please see the technical note at the end of this document, specifically the note on lens focus collars.

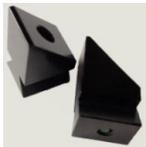
You are done. Read on, though, because you might have occasion to mount an SLR, or you might upgrade the QSI camera to the 8 position filter wheel. You already have all the parts to properly mount these. When we mount anything with a bottom tripod socket, we do not use the risers or the tabs, we mount the bottom socket directly to the dovetail plate.

Section II, Attaching any camera with a bottom tripod socket including the QSI camera with the 8 position filter wheel.

Any camera with a tripod socket in the camera base plate should be attached directly to the dovetail plate with one of the 1/4-20 X 1/2" button head screws. Two of the holes in the dovetail plate that are nearest the cross slot are countersunk and unthreaded. You can use either one of these unthreaded holes to mount the camera.



NOTE: You must not use a screw or bolt longer than 1/2 inch. The supplied button head screws are 1/2 inch long. If you lose one of the supplied button head screws and replace it, make sure that you don't get one that's too long. (Using a screw or bolt that is too long can damage your camera because the long bolt can be turned with such force that it can punch through the thin aluminum that forms the base of the camera's tripod socket.)



Next, have a look at the universal blocks. Each block has a set screw to secure it to the plate. (Not shown here but present on your blocks will be an additional threaded hole. That additional hole is for future use.) After the camera is secured to the dovetail plate, both universal blocks should be secured against the camera body and fixed in place by tightening the set screws. This prevents the camera from rotating around the tripod socket. The blocks may be placed against either the front or the rear of the camera body. Please don't over tighten the set screws.

QSI cameras that lack the bottom tripod socket and have the two side tripod sockets are mounted with the QSI risers and tabs. For those, please use the instructions in Section I.

Compact Travel Mode

If storing the QSI Autofocus Mounting Bracket or traveling, it is possible to arrange the pieces in a much more compact configuration and still have all parts securely mounted so none can get lost. To do this, remove the risers and switch the sides then fully insert them. This will both point the tabs forward and will reduce the overall width of the risers. Next reverse the motor plate on its block and slide the focus motor assembly up between the tabs. Next slide the universal blocks up next to the other components. Next store the two 1/4-20 button head screws in the two threaded holes in the bottom of the plate.



Technical notes:

Lens collars



Pentax 6X7 focus collars have two different grip patterns. The later lenses designated as "67" have a dense textured pattern which is fine. The earlier lenses designated as "6X7" have a series of longitudinal ridges with smooth gaps between sections of ridges. These earlier focus collars will allow belt slippage. With computerized focus, the computer has to be able to accurately move the focus collar to a repeatable position. If any part of the system allows slippage, focus will fail. There is a simple solution for the older lenses. A piece of inexpensive waterproof foam tape can be placed on the focus collar of the lens under the belt. A tape that works well is Nexcare first aid tape, available in drug stores, grocery stores, and Wal-Mart. The tape is flesh colored so isn't so attractive but it results in excellent V curves, which are attractive. If color is important, the tape can be blackened with an alcohol based marker.



Focusers

If you have a Robofocus, Starlight Instruments, or Moonlight focuser system, you already have the electronic controllers and software.

You can buy a Robofocus motor from Technical Innovations. If you want to buy a bare motor that is compatible with the Robofocus system, you'll want a Hurst LSG35012F76P Model LSG35 Geared Stepper Motor. You can buy one directly from Hurst. You'll need to solder 6 wires to a 9 pin serial connector (available from Radio Shack). The proper stepper motor connections are listed in your Robofocus documentation.

You can buy a Starlight Instruments Feathertouch compatible motor and mounting plate from Starlight Instruments. These motors use finer steps so offer finer precision. This motor requires the Starlight Instruments controller.

Moonlight focusers are compatible with Robofocus controllers but will need a different "phone cord" connections so you'll need to make an adapter.

Belts

The focus motor turns the lens focus ring by using a toothed belt called a timing belt. McMaster-Carr has a selection of compatible timing belts. The belts are the smallest series that McMaster-Carr offers, their "MXL" series with a 0.080" pitch. 1/4" is a good width. There are two types of belts, one is rubber (Neoprene), the other is plastic (urethane). Do not get the plastic urethane belt, it will not grip the camera focus collar anything like as well as the grippier rubber based Neoprene. A good length is about 13" which will work with most lenses, McMaster Carr's number for this belt is 7887K85. A compatible drive pulley is their 1375K34 which will drive the 1/4" belt, has a 3/16" hole, and the fewest teeth to provide the most resolution while focusing.

If you buy a belt from another source, you should buy a drive pulley from that same source. The shaft on the focus motor is 3/16" and has a flat for a set screw.

Bolts

The supplied bolts are 1/4-20 threaded and 1/2 inch in length. If you lose one, replace it with a 1/2" long bolt only. If you use a longer bolt you risk camera damage, punching out the thin metal that forms the base of the camera's threaded tripod socket. If in doubt, place the bolt in the intended hole and examine the exposed threaded portion of the bolt. There should be no more than 3 full threads exposed. Ace Hardware stores carry the stainless bolts. The bolt to buy is a "button head hex socket screw", 1/4-20, 1/2 inch long. Other half inch 1/4-20 bolts will work for the camera tabs but the heads will be too tall for the countersinks in the bottom of the dovetail plate, so won't be useable there.

Set screws

The set screws are 10-24 threaded and 1/4" in length. Standard set screws have a sharp cup shaped end that will mar an anodized finish. McMaster-Carr sells stainless set screws with plastic inserts that are unlikely to mark the anodized contact point unless severely over tightened. They run about \$0.65 each in packages of ten. Their number is 90291A238 for the 1/4" and 90291A234 for the shorter 3/16" length.

Other notes

In a pinch it is possible to mount the QSI camera on its side directly to the dovetail plate. It isn't recommended but it is possible, and knowing this may save an evening imaging at a remote site.