

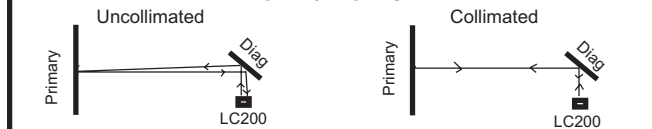
The Teleport LC200 Laser Collimator



Caution!

The LC200 uses a class IIIA, 670 nm laser diode of less than 5 mw, safe for consumer use. You should avoid letting the beam enter your eye, directly or after reflection from a mirror, though it's okay to look at the image of the red spots on the mirrors or collimator target face.

How it works



The LC200 uses the principle of autocollimation. From the center of the focuser, it sends a beam to the diagonal, on to the primary, back to the diagonal, then back to the focuser. When collimated, the beam hits the center of both mirrors and returns directly to its source.

Optical autocollimators are good to check collimation, but not to adjust it. The laser does both at once, and is the fastest, easiest way to set the mirror angles. Collimation also requires that the focuser be at a right angle to the primary axis, and that the diagonal is on the focuser axis and centered (or offset as desired) in the tube.

Be sure these are correct before first using the LC200. Once set, they shouldn't need routine adjustment like the mirror angles. If your scope gets really knocked, check them before again using the LC200.

These instructions refer to a Newtonian, but the principles apply to other types. Refer to your scope manual for the specifics of adjusting and handling of its mirrors, and be careful with them!

The Primary Center Ring

To use the LC200, you must see the location of the center of the primary, and it must be clear to reflect the laser beam. The center of the primary is shadowed by the diagonal and does not help form the image, so an open dot sticker can be placed there without harm. If you do not already have one, install the one provided with the LC200:

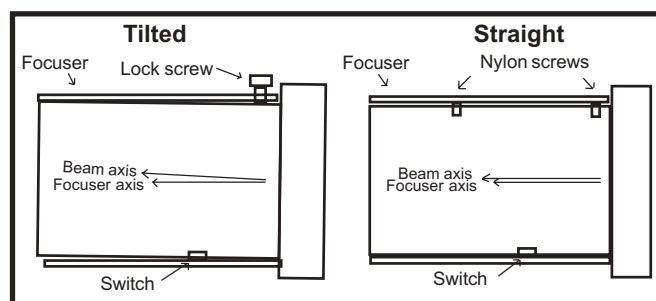
Locate the center of the primary and place a pencil dot there. With a good ruler and some care, verify that it is in fact the center, with the shortest distance from the dot to the mirror edge the same in at least four places about 90° apart. Peel the backing off the spot and press it accurately centered on the dot. Reinstall the primary.

Make it Fit

The collimator beam must be parallel to the focuser axis. If it's off the axis a few thousandths, an error of only those few thousandths will result. If it's out of parallel by 1°, the error can be quite large.

Focusers are oversize and eyepieces are undersize, so all eyepieces will go in all focusers. Most focusers feature a locking screw, which is usually at the upper end. This screw can tilt the collimator with respect to the focuser axis and cause significant uncertainty or inaccuracy. The Teleport collimator provides a better way.

The LC200 has two nylon slot setscrews opposite the switch. They should be set to press against the focuser so the collimator is snug and its axis is parallel to the focuser axis. The screws are soft. Select a good screwdriver that fits properly to avoid damaging them.



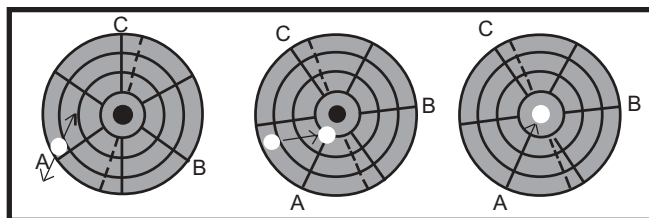
The fit of the LC200 collimator in the focuser may vary with the focuser or with a large temperature change. If it does not fit properly, adjust the nylon slot setscrews a tiny amount for a smooth fit. A little attention in this area will have a big payoff. A collimator whose axis is tilted for whatever reason cannot perform well.

Collimation Procedure

You need to see the open dot on the primary. At night, a red flashlight is helpful. Point the scope up about 60°, a typical viewing angle. Never point your scope at or near the sun! You may need to rack your focuser in to see the target face inside. If you have a "too tall" focuser and still can't see the target face directly, look into the front end of the scope at the image of the target face in the primary.

Insert the collimator, with the adapter if needed, fully into the focuser, which will turn on the laser. It will be a snug fit if you have the screws correctly adjusted per the last section.

Secondary: Adjust the secondary mirror screws so the laser beam hits the primary within the clear center spot on the primary.



Primary: Note where the returning beam strikes the target face of the LC200. If your primary is so far off that the beam misses the collimator target face, wave your hand in front of the secondary to find it, and rough adjust the primary until it hits somewhere on the target.

Further adjust the primary until the spot falls in the center hole from which the beam is emitted. If it even partly covers the hole, you're probably better collimated than most scopes on the field.

Instead of trial and error, the three lines on the target face can tell you which primary screw to turn in which direction. In a Teleport, orient the collimator so the dashed line aligns with the spider vane just above the focuser. The primary collimation bolts should be labeled "A" at the top, "B" on the right, and "C" on the left.

For other scopes, determine the orientation as follows: Turn the top primary screw a half turn CW and note the direction the spot moves. Turn it back and check again. Rotate the collimator so the line with the "A" is parallel to the spot movement direction and turning the top screw clockwise will move the spot toward "A". Repeat to refine the accuracy of the collimator orientation. Note that turning the other two screws will now move the spot parallel to the other two lines.

Now peel the backing off the ABC labels and place them on or beside the three primary collimation bolts to mark which bolt moves the spot toward which letter on the target face when you turn that bolt clockwise. Always orient the collimator the same way and you can collimate with only a couple of trips back to the primary.

Batteries

The LR44 or AG13 batteries in your LC200 will provide about two hours of continuous use. SR375 lithium batteries are more expensive but have longer life. Either allows dozens of collimations if you get proficient and remove the collimator promptly each time. They are commonly available where watch and camera batteries are sold.

To replace them, carefully pry off the end cap with the "Teleport" label using a knife blade as shown and unscrew the battery compartment cover ccw (needle nose pliers may be used if needed). Dump out the old batteries and dispose of properly. Insert three new batteries, (+) side out. Replace the cover just finger tight, then press the end cap in place. You may find it useful to orient the label so the switch is up.



Handle with Care

Keep the LC200 in your eyepiece case, and handle it with the same care. Place it so it won't get switched on. Try not to drop it and don't turn the socket set screws that align the beam!

To check its internal alignment, place it in the focuser or adapter with its nylon screws properly adjusted. Rotate it gently and if the beam swings in a circle on the primary larger than the outside diameter of the center spot, it is off enough to need alignment. Try it yourself if and only if you are the careful, patient type.

Loosen one of the three socket set screws and tighten the others, a little at a time (as you would align a finder scope) and rotate it again to check. At the factory, I set it accurately in a lathe with a special target. I can realign yours for \$5. A set of 3 long-life lithium SR375 batteries is \$7. Add \$5 for shipping for either or both.

The LC200 is warranted for one year against defects in material and workmanship. If you have a problem, just email or call me.

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