

SIPS instructions for installation and use

Introduction

Thank you for purchasing the Starlight Integrated Paracorr System (referred to as SIPS hereafter), which incorporates the best focuser on the market – a Starlight FeatherTouch focuser – with all the benefits of the Paracorr Type 2. The SIPS is the only combination focuser and stationary coma corrector currently on the market.

With this finely crafted piece of equipment set up properly, all you have to do is put in a TeleVue eyepiece. After proper installation, whenever an eyepiece is focused (for infinity-corrected vision), it is automatically at the best position for optimal image quality. No “tuning” is needed - just enjoy the views.

How does it work? Placing the SIPS lenses at the proper location during the adjustment step ensures that you will see the best results that the Paracorr Type 2 system is capable of producing, no matter the focal ratio of your telescope, and no matter which TeleVue eyepiece you place in the focuser. (While the Paracorr and SIPS are tailored for and recommend for use with TeleVue eyepieces, it may be used with oculars manufactured by other companies if the positioning of the focal plane allows them to come to focus.)

Considerations for eyeglass wearers

The SIPS is meant to be used by people with infinity-corrected vision, which means that observers who are strongly near- or far-sighted should use their glasses and long eye-relief eyepieces when observing with the SIPS. Observing with the SIPS without eyeglasses may induce coma because the eyepiece-to-SIPS position will vary from its coma-corrected position when the observer focuses.

NOTE: *If you are strongly near- or far-sighted and prefer to observe without corrected vision (without your glasses), choosing a regular Paracorr 2 with a tunable top instead of a SIPS will maintain coma correction independent of focus position.*

Coma correction

The Paracorr Type 2 is the updated version of the popular Paracorr coma corrector. It offers improved performance over the discontinued Type 1 at all focal ratios, especially in the range below F/4. Using the Paracorr 2 with an F/3 mirror makes it perform like an F/12 without a Paracorr - virtually diffraction limited over the full field as noted on the TeleVue website.

http://www.televue.com/engine/TV3_Page.asp?return=Advice&id=103

Other reasons to choose a SIPS – a note by Mike Lockwood

Personally, I prefer a SIPS (Starlight Integrated Paracorr System) for four reasons, two optical and two mechanical:

- 1) I don't binoview. The SIPS usually needs to be completely removed for this. However, binoviewers also don't generally agree well with very fast telescopes anyway, so this is not an issue for me.
- 2) For infinity-corrected vision, the Paracorr 2 in the SIPS is always perfectly "tuned" after the setup procedure is completed. I never have to worry about tuning it, no matter what eyepiece is used. This saves me time while observing. However, I don't wear glasses. If you do, you will want to keep them on so that you are infinity-corrected.
- 3) The lens group is always exactly centered on the optical axis and is never tilted. The way it is machined ensures this. The tunable top Paracorr 2 unit can tilt slightly in some focusers as the thumbscrews are tightened, slightly degrading images. I have experienced this myself, and it is clearly noticeable under good observing conditions.
- 4) The SIPS unit has its mass closer to the focuser board, resulting in slightly less flexure of a focuser board. With the tunable top Paracorr, the Paracorr and an eyepiece are extended well above the focuser, increasing flexure of the system and focuser board. When using the SIPS, the focuser has only the eyepiece in the barrel, and this results in less flexure of the focuser.

For these reasons, I recommend the SIPS for all visual Newtonian telescopes, and have used it myself down to $f/2.8$, and even $f/2.55$ in an experimental instrument.

Designing your telescope for use with the SIPS

It is simple to design for the SIPS if you are building your own telescope.

Refer to Figure 13 at the end of this document – this diagram shows where the focal plane would be if the Paracorr was not there - 88mm above the bottom lens. So, for your telescope design, put the focal plane 88mm from the bottom of where the SIPS lens will be. (This value does not change with $f/\#$.) This will let you size the secondary mirror for a given illuminated field.

From the diagram, note that the locking ring (the part that has "STARLIGHT INSTRUMENTS, LLC" painted on it), which contacts the top of the mounting plate and locks the rotation of the SIPS unit after it is adjusted, adjusts from 20-40mm from the bottom lens. Let's center it at 30mm for sake of this example, leaving you 10mm of adjustment up or down to tune the SIPS during the initial setup, which should be enough unless the telescope is set up differently than most.

That means that we have:

$$88 \text{ mm} - 30 \text{ mm} = 58 \text{ mm from the focal plane to the top of the mounting plate.}$$

The mounting plate is 6mm thick, so the focal plane should be:

58 mm + 6 mm = 64 mm from the top of the focuser board.

So, that's your rule - **set the telescope up to put the focal plane about 64 mm (~2.5") above the top surface of your focuser board**, and then install and tune the SIPS as per the SIPS instructions.

In case you're wondering how large of a field you should illuminate with the secondary mirror, TeleVue calculated the fully illuminated field for the Paracorr 2, assuming a 60" focal length:

f/2.5 - 14.0 mm	f/4.0 - 27.9 mm
f/3.0 - 22.4 mm	f/4.5 - 29.8 mm
f/3.5 - 26.0 mm	f/5.0 - 31.6 mm

So, as you can see, that's large enough for comfortable visual use down to f/2.5, and because our vision is not sensitive to a smooth falloff in illumination, we probably won't notice that at low powers. I have never actually noticed illumination falloff in my 20 F/3 or my 14.5" F/2.55.

Now it's time to install the SIPS.

Diagram

The parts of the SIPS are labeled in *Figure 1*. (The eyepiece is not included!)

The focuser portion is a standard 1.5"-travel Feather Touch focuser. The focuser can be purchased with the rest of the unit, or you may use your own 1.5"-travel Feather Touch if you already have one.

IMPORTANT: The SIPS unit was designed for use with the 1.5"-travel, 2"-diameter Feathertouch focuser. Other diameters will not fit. Longer focusers will bottom out, possibly providing insufficient travel. Shorter focusers may also provide insufficient travel.

By removing the need to "tune" the Paracorr, less focuser travel is required to reach focus with all TeleVue eyepieces. The 1.5"-travel model comfortably covers the required focusing range.

The focuser portion is mounted on the Paracorr module of the SIPS. It is attached with three setscrews. The Paracorr module sits below it. A locking ring is threaded onto the Paracorr module. Loosening this ring allows the whole assembly to be rotated. This adjusts the height of the whole assembly by threading it into or out of the mounting ring, which sits below the locking ring and inside of the base. The base mounts on your telescope.

Installation

Carefully unpack the SIPS unit parts.

If you already have a 1.5"-travel Feather Touch focuser mounted on your telescope, detach it from the base by loosening the two setscrews that hold it in place. Either a leveling base or standard base (without leveling screws) may be used with the SIPS.

If you do not have a Feather Touch focuser, you will need to purchase and install the focuser and SIPS package.

To install the base, accurately center the base over the existing hole and drill mounting holes. Install the base using the provided bolts and nuts (*Figure 2*).

Next, verify that the mounting ring and locking ring are both threaded onto the SIPS Unit. Install this assembly in the base by tightening the two setscrews on opposite sides of the base (*Figures 3, 4*) using the provided hex wrench.

Install the Feather Touch focuser on top of the SIPS Unit by tightening the three setscrews around the top of the unit (*Figures 5, 6*). But first rack-out the drawtube!

This completes the assembly of the SIPS unit.

If you have purchased a leveling base, then after the focuser is installed, align the focuser using the adjustment screws.

Assemble your telescope if you have not already done so.

Collimation

To collimate your telescope, you must remove the Paracorr lens group.

We recommend pointing your telescope near or at the horizon before removing the lens group. (This will reduce the chance of dropping it onto the ground should you lose your grip on it.)

Reach inside the secondary cage and grasp the knurled bottom of the Paracorr lens group. Carefully unscrew it (counterclockwise). You will feel gentle resistance from an O-ring that provides friction - this reduces the chance of the lens group becoming loose or falling out due to vibration during transport. After a few turns, the lens group will disengage from the threads and it can then be pulled out carefully into the secondary cage. (See *Figure 12*.)

Carefully set it aside where it will be safe and clean.

Perform your collimation procedure as normal with your laser, autocollimator, or other collimation tool(s).

To replace the lens group, carefully insert it back into the bottom of the SIPS and turn it clockwise until it stops. **Do not over-tighten it.**

Adjustment

Now the Paracorr lens group must be positioned the proper distance from your primary mirror. The SIPS may be used before this step is completed, but the best performance will only be obtained after positioning is done.

If there is no tape present, place two pieces of frosted tape (Scotch® Magic™ Tape) across the top of the positioning aid (plastic cylinder). This is shown in *Figure 7*.

Under the night sky, point the telescope at the moon, a bright planet, or a bright star. Using an eyepiece, center the object in the field of view. If your telescope has tracking, engage the drive so that the object stays centered in the field of view. If it does not have tracking, you will need to move the telescope every so often to keep it in the field of view.

With the object roughly centered, remove the eyepiece, and set it aside where it will be safe.

Slide the positioning aid all the way down into the focuser barrel (*Figure 8*). It will bottom out when it touches the top of the Paracorr lens group. This places the tape at a particular distance from the lenses. Tighten the thumbscrews on the focuser to hold the positioning aid in place.

IMPORTANT: Verify that the focuser is racked **all the way in**, that is, it will go no farther down. The top of the barrel will be even with the top of the focuser housing.

Loosen the locking nut by turning it counterclockwise (*Figure 9*).

The entire SIPS assembly may now be turned (*Figure 10*). Turning it counterclockwise will raise the unit, and turning it clockwise will lower it.

Adjust the height of the unit so that the bright object is sharply focused on the tape. This means that you should make the image of a bright star or planet as small as possible on the tape. The moon, however, should be focused as sharply as possible. (Using the edge of the moon's disk may be the easiest way to do this.)

Figure 11 shows Jupiter focused on the tape. (*Figure 11* was a time exposure and the telescope was not tracking, so it appears as a short, thin line rather than a point.)

One method that may make adjustment easier is to thread the SIPS all the way into the base until it stops. Use the focuser to find the sharpest focus, and then raise the unit by rotating it counterclockwise until the sharpest focus occurs when the focuser is racked all the way in (down).

With the object focused sharply on the tape and the focuser racked all the way in, adjustment is complete.

It is important to realize that this procedure sets the distance between the Paracorr lens group and the primary mirror. If the primary mirror moves up or down in its cell due to collimation adjustments that are made over time, the SIPS position should be adjusted

periodically to maintain the proper distance between the Paracorr lens group and the primary mirror.

Remove the positioning aid, insert an eyepiece, and enjoy the views!

Usage and Accessories

The SIPS should always be used when using an eyepiece, or you will likely not be able to reach focus. Take your time and use care when removing or reinstalling the SIPS lenses in the dark. Do not force the lens group back into place – if the group does not easily screw into place, stop and inspect the threads and clean if necessary.

You may wish to consider removing the SIPS while transporting the telescope. It is possible that very rough roads may cause the lens group to unscrew from the housing.

Over time the SIPS lenses and other mechanical parts may become dirty. Please refer to TeleVue's instructions for cleaning the lenses. The mechanical parts, including the threads in the SIPS body and on the lens group, can be cleaned with a soft, damp cloth or cotton swab. Keeping the threads clean will ensure that the threads do not become damaged.

Various accessories, such as cameras, binoviewers, etc., may be used so long as they do not come into contact with the Paracorr lens group. Be careful when inserting these accessories into the focuser barrel if you have not previously verified that they do not contact the lenses. (Maximum safe depth below the top of the focuser body is 1-3/4".)

To use other accessories that reach more than 1-3/4" into the barrel or require more in-travel of the focuser, the SIPS may be removed. Detach the focuser from the SIPS, and remove SIPS from the base without loosening the locking ring or mounting ring (thus ensuring that it will be positioned properly when it is reinstalled. A piece of tape may be used to keep the locking ring from rotating). The focuser may then be mounted directly on the base.

To reinstall SIPS, reverse the process described above.

Final Notes

For information on cleaning of the Paracorr lenses go to the link below, or contact TeleVue directly.

http://www.televue.com/engine/TV3_Page.asp?return=Advice&id=103

Credits:

Mike Lockwood (<http://www.loptics.com>) for his time and effort in the production of this manual.



Figure 1 - Parts Diagram



Figure 2 - Installing the Base



Figure 3 - Installing the Paracorr Unit

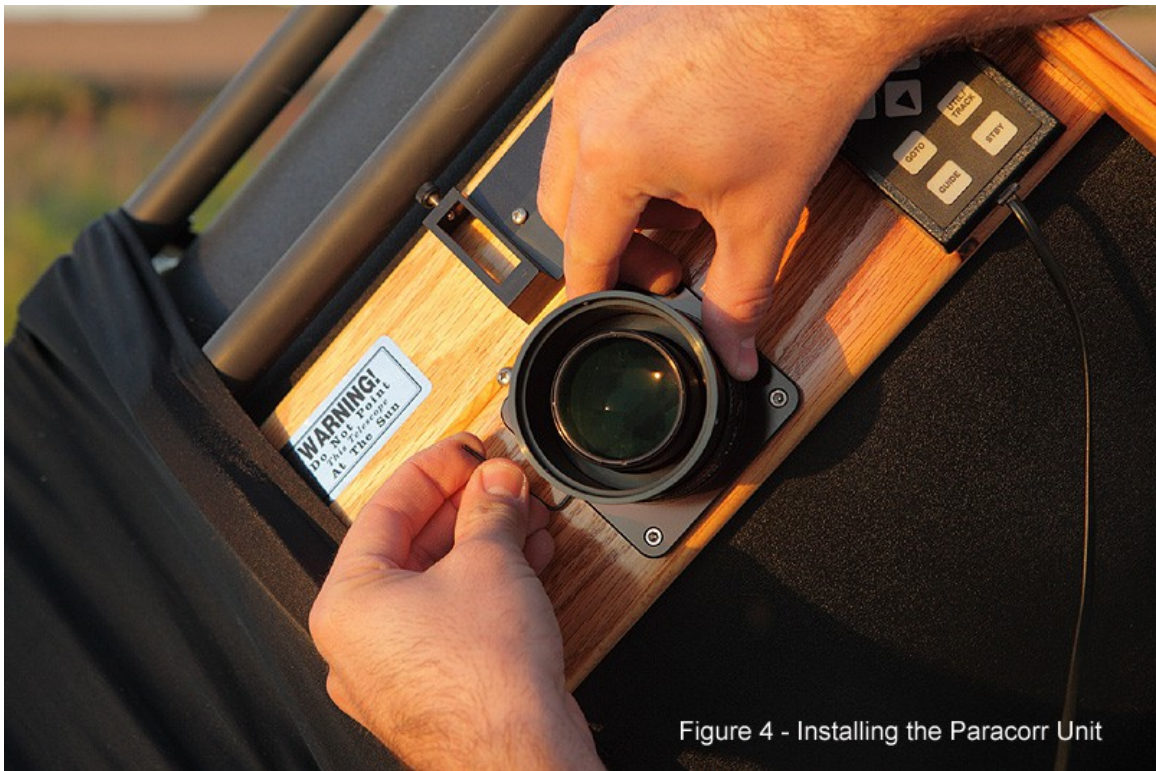


Figure 4 - Installing the Paracorr Unit

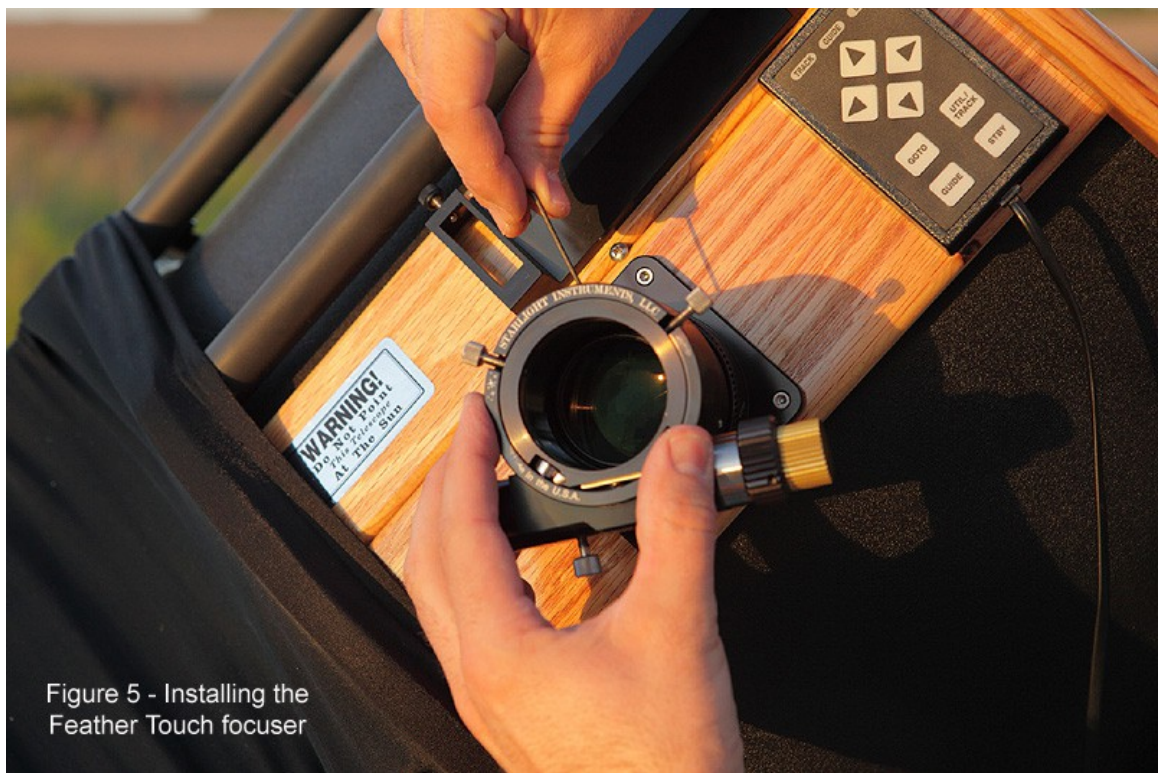


Figure 5 - Installing the Feather Touch focuser



Figure 6 - Installing the Feather Touch Focuser



Figure 7 - Frosted tape installed on the positioning aid



Figure 8 - Positioning aid installed in the focuser

Figure 9 - Tightening or loosening the locking ring



Figure 10 - Adjusting the Paracorr position by rotating the focuser/Paracorr assembly (locking ring loose)



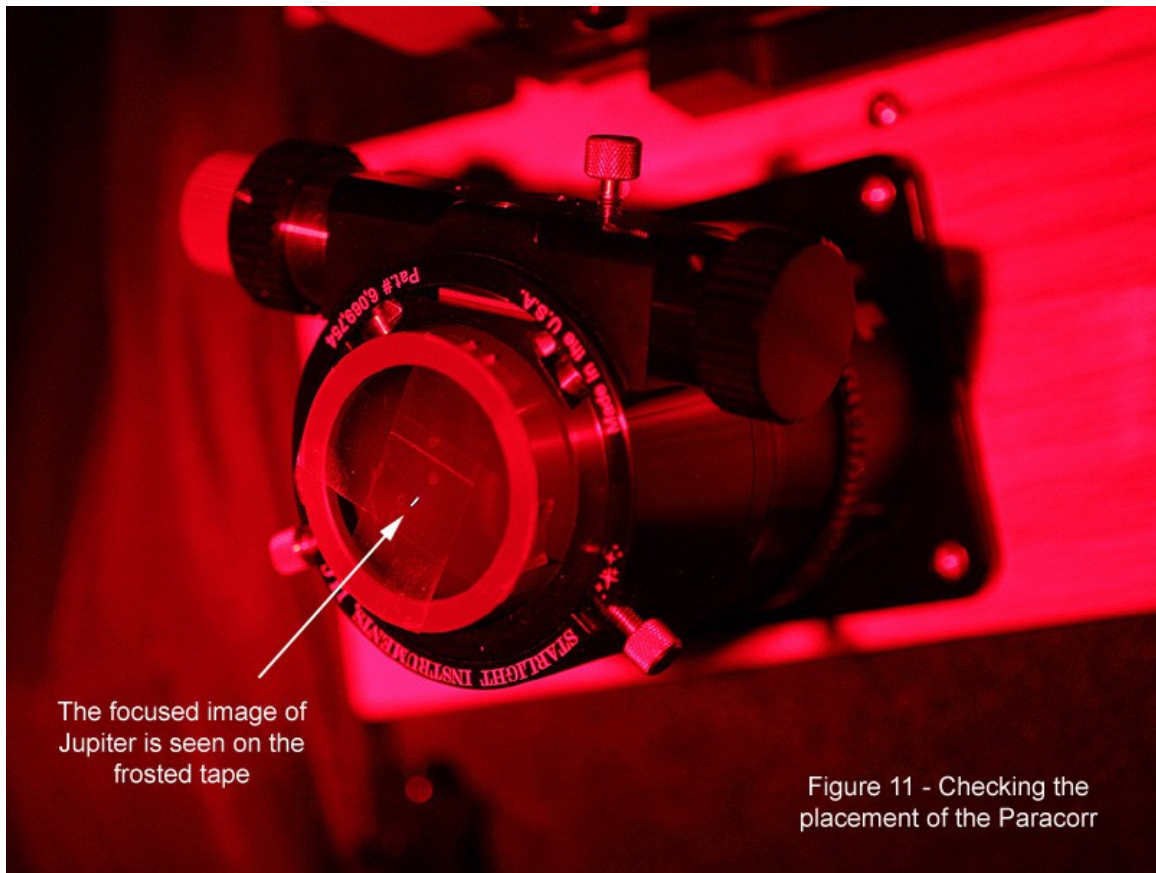




Figure 13 – SIPS diagram with dimensions