

This newest Version A of the Astro-Tech AT14RCT Ritchey-Chrétien astrograph (named a Sky & Telescope Hot Product for 2015) has:

14" f/8 true Ritchey-Chrétien hyperbolic mirror optical design

carbon fibre Serrurier truss tube design with CNC-machined stainless steel and aluminium components

low thermal expansion quartz primary and secondary mirrors

three built-in cooling fans in rear cell

3" dual-speed compression ring Crayford focuser with 2" and 1.25" adapters

focuser attachment collar isolated from the primary mirror and baffle tube

dust covers and finder shoe

*"Overall I'm very impressed with the AT14RCT. It's a great scope for visual observing as well as deep-sky photography. The lack of a field flattener limits its use with the largest CCDs, but that's not a handicap for anyone working with smaller detectors up to and including any of the highly popular KAF-8300-based cameras. And when you factor in the scope's cost, it's an outstanding value. It's a winner!"* Dennis di Cicco, in a 4-page review in the July 2016 Sky and Telescope.

This newest version of the Astro-Tech AT14RCT makes 14" coma-free true Ritchey-Chrétien imaging available to the DSLR and large format CCD astrophotographer at a price less than that of some large format CCD cameras by themselves.

Featuring first-quality premium low thermal expansion quartz mirrors, rather than aluminized Pyrex glass mirrors, this reasonably-priced 14" Astro-Tech truss-tube R-C provides the coma-free photographic field that large format CCD and DSLR astrophotographers crave, but can't get from conventional reflectors and Schmidt-Cassegrains.

Likewise, as a pure two-mirror system, the AT14RCT has a wide spectral response and is totally free from the spurious colour that affects the imaging of all but the most costly apochromatic refractors, and it does it with a 14" aperture that dwarfs the light gathering of every commercially-available apo refractor.

If serious astrophotography is your goal, but the price of true Ritchey-Chrétien optics has been keeping you from the optical design most modern professional observatories use, your wait is over. The 14" Astro-Tech AT14RCT truss-tube R-C can bring the world of professional DSLR/CCD deep space imaging to your backyard observatory at a truly affordable price.

Features of this Astro-Tech AT14RCT Ritchey-Chrétien . . .

Optical design: True Ritchey-Chrétien Cassegrain-type two-mirror optics, with hyperbolic primary and secondary mirrors. The 288mm usable back focus (from the end of the focuser attachment port) allows for the use of long CCD equipment trains.

Optical specifications: 14" aperture, 2850mm focal length, f/8 focal ratio. Multiple Zygo interferometer tests, during every stage of optics manufacturing (after rough figure generation, after fine figure generation, after final polish before coating, and after dielectric coating), assure premium optical performance.

Hyperboloid primary mirror: Made of low thermal expansion quartz. Ground and polished under precision computer control. Unlike catadioptric designs (SCTs, Maksutovs, etc.) that move the primary mirror fore and aft in the optical tube to focus (which can lead to image shift and a changing focal length and focal ratio as the mirror position changes) the AT14RCT's non-moving primary mirror is supported by a multi-point floatation system. Primary mirror collimation is pre-set at the factory, but can be adjusted if needed using three heavy-duty spring-loaded push/pull locking adjustment screw sets.

Hyperboloid secondary mirror: Made of low thermal expansion quartz, rather than Pyrex. Ground and polished under precision computer control. Mounted in a CNC-machined four-vane spider and fully collimatable using standard Cassegrain reflector collimating techniques. The secondary mirror is precisely center-spotted to make collimation easier.

Unlike complicated R-C designs that use motors to move the secondary mirror fore and aft to focus, the AT14RCT secondary mirror is fixed and focusing is done externally by means of an optional external focuser, discussed in the focuser section below.

Sky & Telescope said that the Astro-Tech R-C's fixed primary and secondary mirrors "eliminate image shift, which has been the bane of Cassegrain scopes with moving-mirror focusing systems . . . It also keeps the effective focal length of the system constant, and the infinity focal point remains at a fixed point outside of the telescope, neither of which is the case with moving-mirror systems that change the separation between a Cassegrain's primary and secondary mirrors."

The secondary mirror's baffle obstruction is 6.5" (166mm) in diameter (46.6% by diameter and 21.7% by area of the 14" primary.)

Carbon fibre truss-tube design: Four CNC-machined aluminium support rings form the basic structure of the optical tube. Light-weight and rigid carbon fibre tubes connect the support rings in a Serrurier truss design, using CNC-machined stainless steel ball and socket hardware. The middle and rear support rings have a hexagonal outer shape, measuring 20.5" (521mm) across at their widest point. They are 10mm thick. The dual front support rings provide attachment points for the secondary mirror spider vanes, as well as for the truss tubes. They measure 17.75" (451mm) across at their widest point of their hexagonal outer shape and are 5mm thick. The AT14RCT measures only 33" long (1156mm) from the front support ring to the end of the focuser mounting collar, and weighs 65 pounds (29.5kg) without focuser.

The Serrurier truss solves the problem of optical tube flexure by supporting the primary and secondary mirrors with two sets of opposing trusses mounted before and after the center support ring. The trusses are designed to have an equal amount of flexure, which allows the optics to stay on a common optical axis. When flexing, the "top" truss resists tension and the "bottom" truss resists compression. This has the effect of keeping the optical elements parallel to each other. The net result is that the optical elements stay in collimation regardless of the orientation of the telescope, including when passing through the meridian during imaging.

The truss tubes are made of a light weight/high strength woven carbon fibre-reinforced composite material with extremely low thermal expansion characteristics. This reduces the possibility of temperature-related focus changes that can occur with steel or aluminium optical tube scopes during extreme temperature swings.

The Astro-Tech AT14RCT is 39" (991mm) long without focuser. The supplied focuser adds 5.25" (133mm) with the drawtube retracted. The center and rear truss tube support rings are 19" (483mm) in diameter, while the front support ring is 16.5" (419mm) in diameter. The AT14RCT weighs 65 lbs (29.5 kg) without focuser. The supplied focuser adds 2.2 lbs (1 kg).

**3" Crayford focuser:** The AT14RCT is supplied with a basic light duty 3" Crayford focuser to get you started imaging. While acceptable for casual imaging with a light imaging train (such as a light DSLR body by itself), upgrading to a high quality rack-and-pinion focuser is required for serious imaging with an optical tube of this quality. A heavy multi-component imaging train will require a rack-and-pinion focuser to support the extra weight without focus shift. Alternatively, you may already have a premium focuser being used on another scope that you would like to use for imaging.

The supplied light-duty Crayford focuser can be unthreaded from the focuser attachment collar, allowing you to use another focuser. One popular choice is the dual-speed 3" diameter 1.5" travel Feather Touch #3015 rack and pinion focuser, available from your Astro-Tech dealer.

The newly designed focuser attachment collar is bolted rigidly to the back plate of the AT14RCT, completely independent of the primary mirror and baffle tube. This allows it to be collimated separately from the primary and secondary mirrors if needed, using the built-in focuser collimating ring. The focuser attachment collar has a male 117mm x 1mm pitch thread for attaching the focuser.

The Feather Touch #3015 normally comes with a 109mm threaded collar for connecting to a scope. Using the #3015 with the AT14RCT therefore requires an optional #M117x1 Feather Touch adapter. The #M117x1 adapter threads onto the focuser attachment port. The #3015 focuser (without its 109mm collar) then slips into the #M117x1 adapter and is held in place by three large brass Delrin-tipped retaining knobs. Only focusers with a maximum 1.5" drawtube travel, such as the Feather Touch #3015, are recommended for use with the 14" Astro-Tech AT14RCT Ritchey-Chrétien. For other focusers, such as a MoonLite, contact the focuser manufacturer for an adapter to fit the 117mm x 1mm port on the rear of the scope.

**Back focus:** To fine-tune the 288mm usable back focus of the AT14RCT to the requirements of your camera and equipment train, three threaded extension rings (one 2" and two 1" in length) are provided to thread singly or in combination between the focuser attachment collar and the focuser of your choice. These rings provide a flex-free solid metal extension that changes the distance between your chosen focuser and the rear cell. This lets you accommodate the varying back-focus requirements of DSLR-type camera imaging versus long equipment train CCD imaging. The 2" threaded ring weighs 14.4 ounces, the 1" rings weigh 7.2 ounces each.

**Mount requirements:** Because of the 65 pound (29.5 kg) weight of the AT14RCT, plus the weight of your focuser, ancillary camera equipment, and any photoguide scope, installing the AT14RCT on a German equatorial mount with a 90 to 100 pound minimum payload capacity is recommended. Such mounts include the Losmandy 100 pound capacity Losmandy HGM Titan; the 220 pound capacity Astro-Physics 1600GTO; and the 90 pound Software Bisque Paramount MX or 240 pound capacity Paramount ME II. Other suitable mounts are also available.

**Cooling fans:** To allow the AT14RCT to reach ambient temperatures more quickly for optimum imaging performance, there are three low vibration/high CFM primary mirror cooling fans built into the AT14RCT's rear support truss/back plate. The high speed DC fans are powered by a standard equipment battery pack that plugs into a 5mm female jack in the back plate. The battery pack uses eight user-supplied AA batteries. An optional external DC power supply, such as a rechargeable 12VDC battery pack can also be used to power the fans.

Two dovetail mounting rails: Two 15.5" (394mm) Losmandy-style "D-plate" dovetail rails are bolted to the top and bottom of the center and rear truss-tube support rings. These allow you to install the AT14RCT directly on an equatorial mount and mount optional accessories (such as rings for a photoguide scope) that attach to a scope by means of Losmandy-style "D-plate" dovetail adapters. The undersides of the dovetails have been hollowed out to lighten their weight without compromising their strength.

Other accessories: This new Version A of the AT14RCT includes slip-on dust covers for both the primary and secondary mirrors. Also included is a mounting shoe for a red dot-type finder, such as the Astro-Tech ATF. The mounting shoe can also accept the Astro-Tech ATF50QRB 50mm finderscope quick release bracket.