

FASTMAX180

Dovetail Mounting Plate and Dovetail Saddle Accessory Plate

A custom Dovetail Mounting Plate is attached to the rotating rings. It is a standard D-style 9" plate for securing your FASTMAX180 to your mount. It is recommended that your mount use a short dovetail saddle (such as the AP 8.5" DOVELM2) to facilitate balancing. Safety screws are included for your dovetail plate (1/4-20 x 1/4").

Also included is a custom Dovetail Saddle Accessory Plate (ACPLMA). This saddle accepts both the 8" (SB0800) and 10" (SB1000) sliding bars that are used for mounting accessories, such as dew heater controllers, balance weights, or cameras, to the scope. This saddle can be attached in any of four different positions on the rotating rings for your convenience. A second one can be added for additional accessories or to counterbalance heavy loads on the primary saddle.

Important: Please note that these accessory sliding bars are not Vixen-style bars and that the Vixen-style cannot be used with the ACPLMA, as the dovetail angle is different.



Focuser

The focuser is a FeatherTouch low profile Crawford design with a fine-focus reduction knob on one side. You will find the fine-focus feature very handy due to the fast (f/4.5) speed of the scope. The image will snap in and out of focus.

Because of the Newtonian design, the focuser has a short travel range. The backfocus of this Mak-Newt is approximately 2.3" (59 mm). Different eyepieces intersect the focus point at different positions. We have included two 2" extensions (1.45" and 1.8") so that the appropriate focus point can be achieved with a variety of eyepiece designs and brands.

It is also possible to use some cameras (not all) with this scope. We recommend only using cameras with APS-C size sensors or smaller. Roland has tested the scope with a QSI WSG 683 camera (KAF-8300 sensor) successfully.

Eyepieces

The focus point of eyepieces varies greatly. Different brands and even different designs within the same brand have big differences. For that reason we are including two different extensions in order to cover as many eyepieces as possible. Nevertheless, there may be eyepieces in the marketplace that will not reach focus...that can't be helped. The vast majority will work.

Barlow

The Advanced Convertible Barlow (BARADV) offers the best way to increase magnification for stunning planetary views or splitting tight double stars. It adds approximately 2x to the magnification of your eyepieces. Due to the restrictions of the short travel focusers required by the Mak-Newt design, a modified upper extension has been developed (purchased separately)...it is the ADA206. The optic section of the BARADV should be attached to the ADA206.

The BARADV (and our earlier BARCON version) optic section will also allow cameras to have enough in-travel to reach focus. It can be unscrewed and then attached to the nosepiece of cameras or to the nosepiece of a binoviewer, providing the necessary in-travel.

Binoviewer

It is necessary to use the Advanced Barlow (BARADV) optic section attached to our 2" Nosepiece (AP16T) in order to allow enough in-travel when using the MarkV Binoviewer with the FASTMAX180. It is not necessary to use a Glasspath Compensator in this configuration.

Finder / Guidescope

The 10 x 60 Baader Vario-Finder (1060VQ) and the Vario-Finder Guider Bracket Kit (1060VGKIT) can both be used with the FASTMAX180. It requires mounting a Quick-Release Base (QRBASED or QRBASEG) with the provided finder screws (located to the right of the focuser). All our earlier bases and finders can also be used.

Solar Filter

Safety note: Always use caution while solar viewing. Check the filter to ensure that it is in place and not damaged. Adult supervision is necessary when children are viewing.

The Kendrick Solar Filters using Baader Solar Film are an excellent way to observe sun spot activity. The Kendrick Visual Filter (KDRA206V) provides wonderful safe viewing of the sun. You may want to use either a Neutral Density 1.8 filter (BPND18) or a Solar Continuum filter (BPSC2) for added comfort and detail.

It is important to note that seeing conditions due to the increased heat of the day may cause a softness or turbulence to be viewed. The large aperture of the scope will be more affected by turbulence than a smaller aperture scope, but when the seeing is good, the views will be superb. An off-axis filter could be used to reduce the aperture and improve seeing on turbulent days. A link for making custom filters can be found on our Website on the solar page.

Dew

The formation of dew is slowed, but not prevented, by the dew shield of your instrument. As long as the air temperature is falling, the lens surface lags slightly behind and dew will not form. When the air temperature stabilizes, the lens eventually reaches dew point and will then dew over.

If dewing is a problem at your location, we suggest the Kendrick Dew Remover System, which applies a slight amount of heat to the lens cell. This will prevent dew from forming. Turn it on at the beginning of your session to a low or mid-level setting and you will be observing long after others have been forced to close down for the night.

It is not advised to blast dew off with a hot hair dryer, or to wipe it with cloth. Hot blasts of air cause optical glass to rapidly expand and will ruin the lens's figure for the better part of the evening. If dew must be removed by blowing air at the lens, use cool or very slightly warmed air (blow the air at the back of the hand to judge its temperature). Keep the dryer well away from the lens surface. In below zero degree conditions, it is not advisable to blow any hot air at the lens surface (warm air is okay).

As in cold weather, at the end of your observing session, place the scope with the dust cover into the case prior to bringing it into the house or other warm environment. This will help to prevent the formation of dew or frost since the scope will return to room temperature at a slower rate inside a closed case.

Dew Shield

The dew shield is a slide on and off design. Slide the felted end onto the front of the scope approximately one inch (look into the dew shield and see when the felted area is fully on the tube) and tighten the locking thumbscrew. For storage, the dew shield can be slid onto the rear of the scope with the felted area slid on last (dew shield pointed forward) and the locking thumbscrew tightened.

Dew Heaters

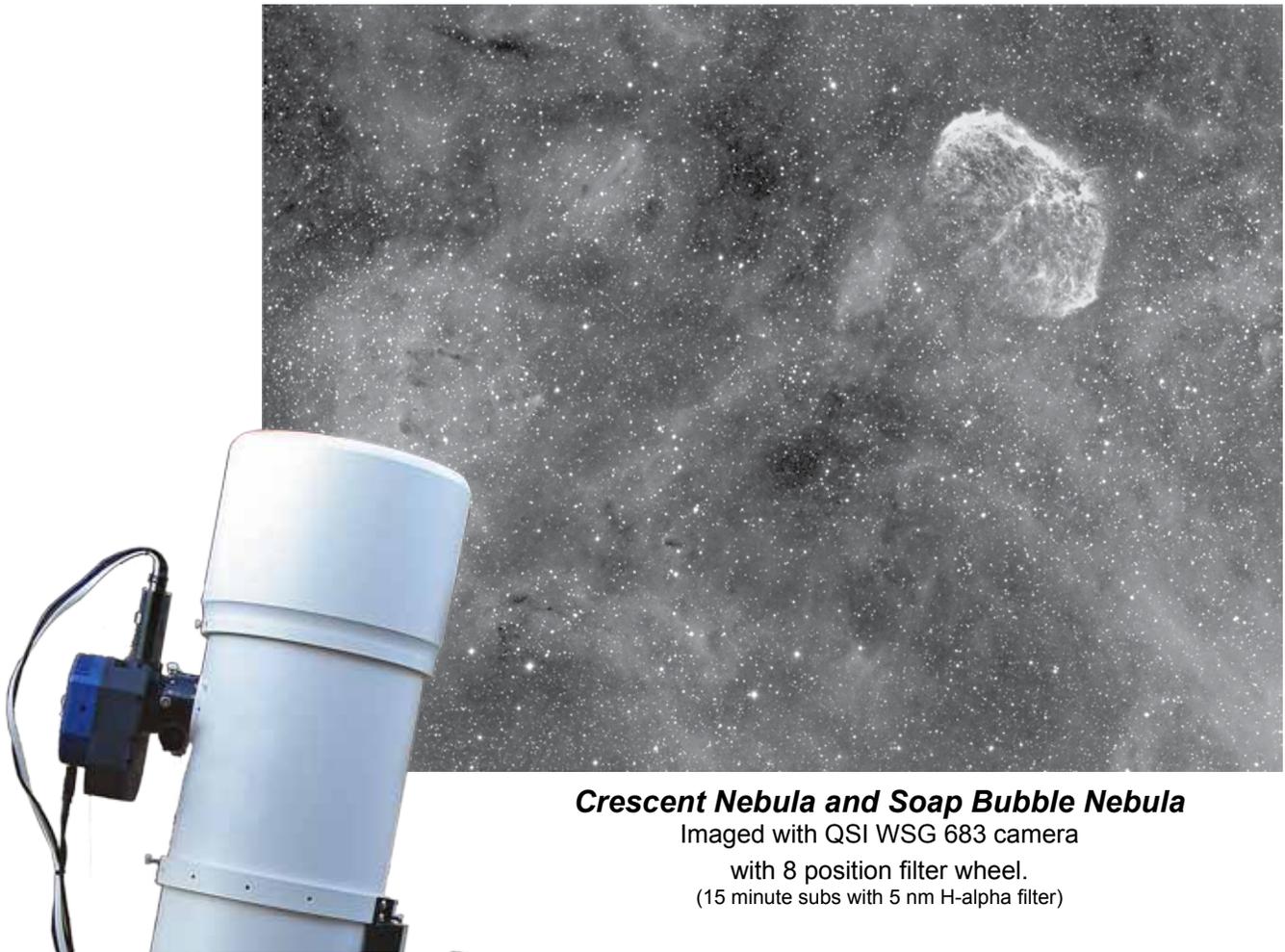
Those in heavy dew areas will find the use of dew heaters a necessity. We offer the Kendrick line of dew heaters and controllers. The Standard Dual Channel Controller (KDRSDCC) is a great choice for both the casual visual observer and the single night imager. Imagers located in an observatory or at multiple night Star Parties may find the increased control of the DigiFire 12 Controller useful. The 9-10" Heater (KDR910) is the size used with the scope. A second 2" or 3" heater would be used for the finder/guide scope.

Cold Weather

There are steps you can take to minimize thermal shock. Leaving the scope in an unheated garage, instead of the warm indoors, is a good example. You should leave the dust cover in place for the 1st hour. This will act as insulation around the outside of the corrector cell, thus assuring a more even cool down of the glass. You do not want to carry a scope from a 70° house into a 0° winter night.

We suggest that you leave your case outdoors while you are observing. This will assure that your scope and case will be about the same temperature at the end of the evening. If there is a lot of dew, you may wish to place it under an overhang, in your car or cover it to keep it dry. To prevent moisture from accumulating inside the case, keep the lid closed.

When taking the scope down, cover the corrector with the dust cover while the lens is still cold. Place the tube assembly in the case while you are still outdoors. If you do this, the scope will warm up gradually in the case when you take it indoors. Do not take the tube assembly indoors without the case. A tremendous dewing and moisture buildup will occur just as it does on eyeglasses when you step into the house on a cold day. Alternatively, you can wrap the scope in a blanket so that it warms slowly and moisture does not condense. Remember: Thermal shock is to be avoided.



Crescent Nebula and Soap Bubble Nebula

Imaged with QSI WSG 683 camera

with 8 position filter wheel.

(15 minute subs with 5 nm H-alpha filter)

Cleaning

Minimal cleaning of your optics is recommended. Over time under heavy dewing conditions, or in areas of airborne dust or pollutants, the front surface of the lens will acquire a layer of dust, pollen and water marks from dew. Normally, this will not degrade the image quality. Improper cleaning procedure will cause micro scratches on the front surface of your lens. A little bit of dirt is preferable to damaged optics. We recommend cleaning once a year or less if the scope is not used often.

Note: A lens coating is not like a mirror coating that can be stripped and recoated. A lens coating becomes part of the glass and cannot be removed (only by refiguring the lens).

Lens Cleaning Formula

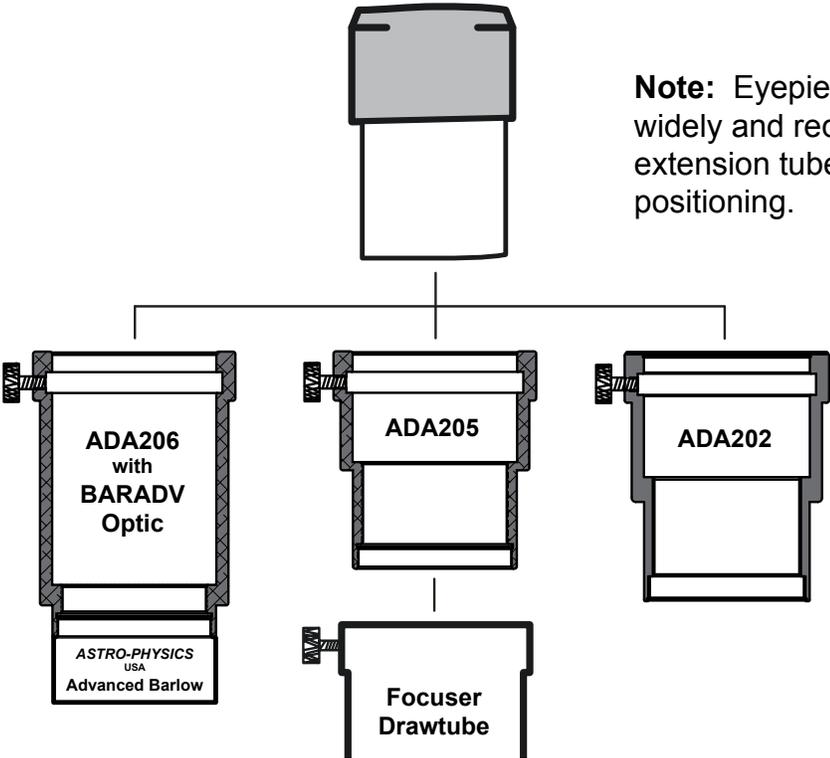
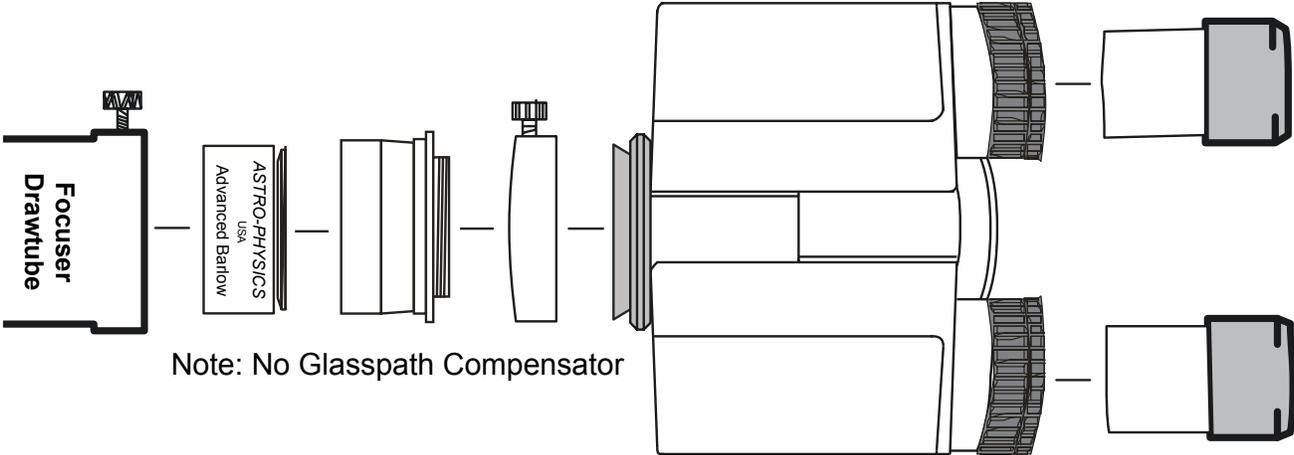
(To make 16 oz. of solution)

- 3 parts distilled water
- 1 part Isopropyl alcohol (90%+)
- 1 drop biodegradable dish soap (backpacking store)

We recommend the following procedure, if you must clean:

1. Blow and brush the optic with an air bulb and camel hair brush before cleaning. You want to remove any loose particulate matter that may be stuck to the lens.
2. Combine the above ingredients and spray onto white Kleenex. Swipe the Kleenex across the optic applying only the weight of the Kleenex. Use a new sheet of Kleenex for each swipe. Be sure to use Kleenex with no additives and no color print. Repeat several times.
3. If you have a stubborn spot, put saliva on a finger and rub the spot until it is gone. Once the spot is gone, be sure to remove the saliva using the above cleaning formula. Perform a last cleaning and blow off any "Kleenex dust".
4. It is not necessary to concern yourself with any lens streaking, though if you wish, you can do a couple swipes with acetone. However, if you choose a final swipe with acetone, do not let the acetone touch any painted surface!

FastMax180 Viewing Configurations

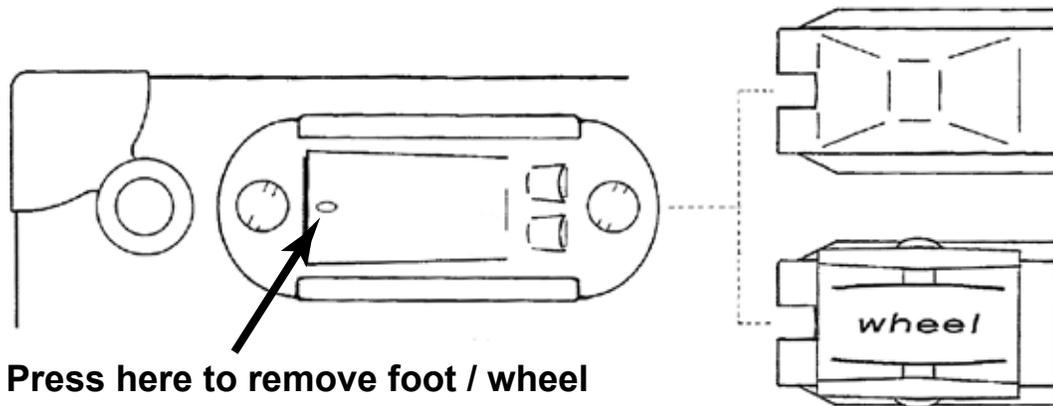


Note: Eyepiece designs vary widely and require different extension tube lengths for positioning.

INSTALLING / REMOVING THE WHEELS OF YOUR CASE

Your Astro-Physics case is equipped with optional wheels for two corners to make transport of your instrument much easier. For shipping and general storage of the case, we suggest that you install the plain metal foot pad. Install the wheels when you are actually moving your case. Please be careful to avoid lateral impact to the wheels, for instance if the case is lying on a flat side and you roll it over to the side with the wheels. Also if lifting out of a car, ease the wheels to the ground rather than allowing them to impact with great force. In other words, use reasonable care.

To remove the metal foot pad or wheel, use a screwdriver to press on the point marked below. This will release the part, allowing it move out of the slot. Install by inserting the part into the groove, pushing in place until it engages. We suggest that you store the wheels or foot pads in an accessory case to keep them handy.



SPECIFICATIONS

Clear aperture: 180 mm (7.1")

Central obstruction: 46 mm (1.82"), 26% of diameter, 6.5% of area

Focal length: 810 mm (31.9")

Resolution: 0.63 arc seconds

Coating: 3 layer multi-coat on corrector, enhanced aluminum on mirrors

Magnification range: 20x to 500x

Primary Mirror: 191 mm (7.5") Precision annealed Pyrex, edged perfectly round, plane-parallel disc

Secondary Mirror: 46 mm (1.83") Precision Quartz elliptical flat

Corrector: Precision annealed BK7 optical crown

Secondary obstruction: 25% of the diameter, 6.3% of the area

Tube assembly: 229 mm (9") diameter

Focuser type: 2" Low-profile Feathertouch with 10:1 fine-focus knob, 1.25" adapter

Back Focus 59 mm (2.3")

Telescope length: 749 mm (29.5")

Dew shield length: 210 mm (8.25")

Weight with dew shield: 13.6 kg (30 lbs.)

Mounting Rings: Rotating lockable rings

Carrying case type: Wood case with grey vinyl covering and foam-lined interior

Case O.D.: 34 cm x 33 cm x 84 cm (13.5" x 13" x 33")

Weight of case: 4.9 kg (10.7 lbs.)

35 mm prime-focus field: 1.7 x 2.4 degrees @ f/4.5

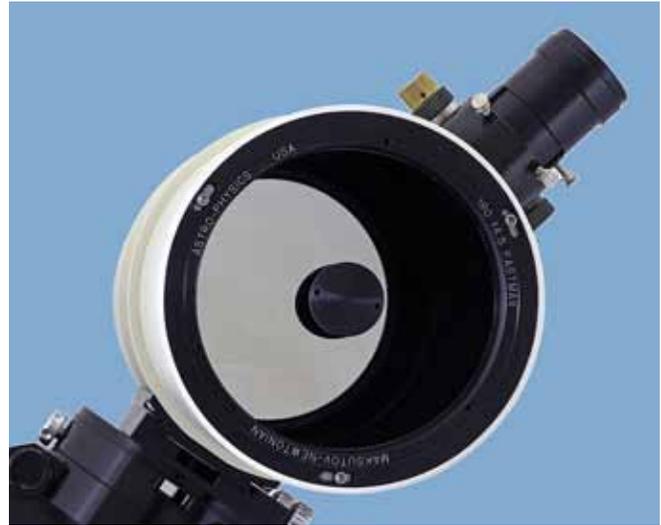
GENERAL INFORMATION

HISTORY

This telescope harkens back to another era when high-contrast visual observing was very important to amateurs. CCD imaging had only just begun, and visual was primary. Although we produced all the parts and some of the optics for 11 sets of Mak-Newts, only two telescopes were finished and the rest of the parts were put into storage. Recently, we decided to finally complete fabrication of the optics, coat the mirrors, assemble these scopes and make this limited number of instruments available. Although many years have passed since production began, the design is timeless.

When we made the first 180 Mak-Newt back some 20 years ago, we took it to the Starfest star party in Ontario. We observed Jupiter's impact sites (remember the extraordinary Jupiter impact of Comet Shoemaker-Levy in July 1994!), Saturn's ball and ring system, and various deep sky objects and double stars at powers ranging from 23x to over 600x. We heard very many positive comments about the sharpness of the images, the smoothness of the focusing mechanism, the utter lack of backlash and velvety smooth motion of the mounting rings. People came back again and again to examine this instrument. We thoroughly enjoyed using the FASTMAX180 over the next couple of years at various events.

If this scope worked so well, why didn't we go into full production? Well, about the same time, inexpensive Russian Mak-Newts were flooding the market. We decided that we couldn't compete at those prices. However, it was a shame that the scopes that we had started had never seen starlight, so we decided to offer them at last.



DESIGN

The optical design is an all-spherical Maksutov system in a Newtonian configuration. The all-spherical design of the optical surfaces results in an extremely smooth wavefront with low spherical error and very high color correction from deep in the U.V. to far infrared. The Newtonian configuration allows the use of a much smaller secondary obstruction than a comparable Cassegrain system. This produces the highest possible definition and contrast so necessary for a sharp visual telescope.

The focal ratio of f/4.5 is ideal for wide-field viewing while also allowing for high-power views with modern eyepieces. The razor-sharp optical configuration works extremely well for high-power lunar/planetary or double star observation. The instrument is well-suited for CCD photography with light-weight cameras. The 59 mm back focus may not allow for off-axis guiders or thick color filter wheels to be used with this telescope.

The tube assembly, mirror and lens cells are all precision-fabricated on our CNC lathes. The tube assembly is very rugged and easily withstands the rigors of transport and field setup. In fact, no alignment screws are provided since no alignment is ever necessary, even if the mirror is eventually removed for recoating. Except for the eyepiece opening, the tube is completely sealed from dust and dirt. Coatings should last 10 years or more.

PERFORMANCE

Performance of the FASTMAX180 exceeds our highest expectations for such a fast mirror telescope. Thanks to the Maksutov corrector and all-spherical design, coma is just 1/10 that of a comparable Newtonian. The wide field is extremely clean and sharp when using almost any low-power eyepiece. We've used simple 3 and 4 element eyepieces (classic Orthoscopes) as well as the more expensive ultra-wide field designs (Panoptic, Nagler, Ethos designs). The views through the less expensive wide-field eyepieces are quite good, however our favorite is the 35 mm Panoptic. The field characteristics of this flat-field ocular matches the Maksutov almost perfectly, producing a spectacular 3.3 degree clean, sharp view of the sky with an exit pupil just over 7 mm.

High-power views of the planets and the Lunar surface are similar to views through a quality 6" refractor. No need to put the object into the "sweet" spot in the exact middle of the field as in a normal Newtonian. Also, there are no diffraction spikes radiating out from bright objects to spoil the fine definition. We have had good views with the 7 mm and 4.8 mm Naglers (116x and 169x). These powers can be increased with a good Barlow. Other oculars can be used to achieve even higher powers. Double stars are easily separated to the theoretical limit of the 180 mm aperture.

COOL DOWN

The FASTMAX180 does a great job of cutting through poor seeing, (although slightly more affected than a totally unobstructed telescope due to the secondary obstruction). On the other hand, the FASTMAX has a faster settling down time than a similar size refractor (example: our 180 mm f/9 StarFire EDT refractor). The Mak has less thermal mass in the optics and tube components. There are very small thermal effects when the temperature plummets, and this imperfection disappears within 10-15 minutes as the optics settle down. Tube currents are also almost non-existent due to the proper clearances between the optical path and tube walls. The tube is finished with a multiple-layered paint that not only gives a professional appearance to the telescope, but actually cuts down the thermal interaction between observer body heat and the light path. Even the dew shield has been specially machined to prevent thermal gradients while giving extremely good protection against dew forming on the optics. With the dew shield in place, we saw no dew forming even 8 hours after nearby SCTs were hopelessly dewed over. Water was running down the Mak tube and the optics were still clean.

CONSTRUCTION

We designed and built this Maksutov telescope using the knowledge and experience gathered from years of refractor construction. This telescope uses very refined construction techniques. It works like a refractor because it's built like one. If you did not see the position of the focuser, you would swear you were looking at a refractor. The corrector lens is ground and polished to exacting tolerances with techniques we developed for fabricating Apo lens elements. The two surfaces of the corrector are matched to reference surfaces by interferometry. During figuring, we can tell immediately what the resulting wavefront errors of the completed telescope will be without actually assembling all the optical components. The mirror is similarly constructed. For good thermal performance and precise alignment, the mirror is ground exactly parallel and edged round to within .0002". The mirror and corrector cells are precisely machined to prevent any sort of wedge or misalignment anywhere in the optical path. These components are then assembled into the machined tube in such a way as to hold their optical alignment indefinitely. Any of the optical components can be removed and reassembled without loss of alignment.

The secondary mirror is quality quartz flat that is bonded to a permanently-aligned secondary holder. Focusing is accomplished by a precision-machined Crayford non-image shift focuser with coarse and fine focusing knobs for really critical sharpness, visually or imaging.

FEATURES OF THE OPTICS

- High-resolution all-spherical design gives refractor-like performance at high powers
- Optional Advanced Barlow (BARADV) allows you to choose f/4.5 or f/9
- Optical design has 1/10 coma of normal Newtonian parabolic mirror
- Sharp flat field matches almost perfectly the field characteristics of widefield Nagler and Panoptic oculars
- Optics are mounted in special cells similar in construction to refractors - no shifting images
- Thermally fast settling down time - typically 15 minutes in summer, 1 hour in cold of winter

FEATURES OF THE TUBE ASSEMBLY

- Unique machined tube - optics always in alignment
- Optics mounted in special cells which eliminate differential flexure. Allows use of a guidescope which is critical to accurate CCD imaging.
- Machined 250 mm (10") diameter dew shield fits over back of the tube assembly for compact storage
- 2" Low-profile focuser with both coarse and fine focusing knobs
- 2" and 1.25" adapters with brass locking ring
- Beautifully machined parts and expertly finished in textured cream-white paint or black-anodized
- Silky smooth rotating tube rings which move easily into a new position, then lock into place
- Accessory and mounting plates can be used as a handle for easy handling of tube assembly
- Aluminum dust cover to protect against dust
- Focal position allows both visual and photographic capability
- Sturdy foam-padded carrying case