

FASTMAX 180 F4.5

*Built like a refractor
to give refractor-like views*

Limited Edition Maksutov-Newtonian by Astro-Physics



180mm f/4.5 Maksutov-Newtonian on Mach1GTO German Equatorial

(Dew Shield not shown in this photo)

Astro-Physics has been evaluating a number of compound optical designs for many years in search of performance characteristics that mirror (all puns intended) those of our quality refractors. This Maksutov-Newtonian is an excellent choice for the following reasons:

- The image quality is as close to a refractor as an obstructed system can be
- 180mm (7.1") aperture in a 29" tube for easy transport and handling
- The optics settle down quickly unlike most Maksutov-Cassegrains
- Fast, sharp optics, precise focusing
- Rugged tube assembly will remain permanently aligned
- Fast focal ratio for breathtaking deep sky views

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.

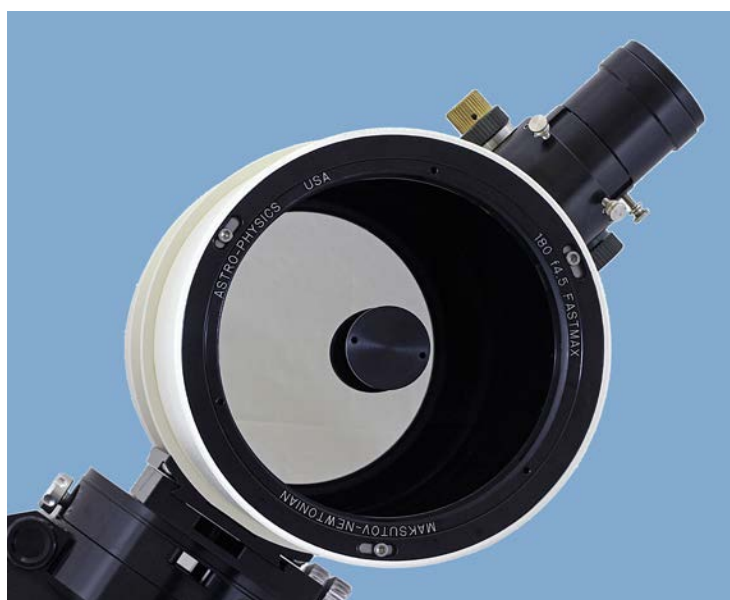
When we made the first 180 Mak-Newt back some 20 years ago, we took it to the Starfest star party in Ontario. We observed Jupiter's impact sites (remember the extraordinary Jupiter impact of Comet Shoemaker-Levy in July 1994!), Saturn's ball and ring system, and various deep sky objects and double stars 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 FASTMAX 180 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 f4.5 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 59mm 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 FASTMAX 180 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 Orthoscopics) 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 35mm 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 7mm.

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 7mm and 4.8mm 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 180mm aperture.

The FASTMAX 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 180 has a faster settling

down time than a similar size refractor (example: our 180mm f9 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 FeatherTouch Crayford non-image shift focuser with coarse and fine focusing knobs for really critical sharpness, visually or imaging.



SPECIFICATIONS

Clear aperture:	180mm (7.1")
Central obstruction:	46mm (1.82"), 26% of diameter, 6.5% of area
Focal length:	810mm (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:	191mm (7.5" Precision annealed Pyrex, edged perfectly round, plane-parallel disc
Secondary Mirror:	46mm (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:	229mm (9") diameter
Focuser type:	2" Low-profile focuser with 10:1 fine-focus knob, 1.25" adapter
Back Focus	59mm (2.3")

Telescope length: 749mm (29.5")
Dew shield length: 210mm (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.: 34cm x 33cm x 84cm (13.5" x 13" x 33")
Weight of case: 4.9 kg (10.7 lbs.)
35mm prime-focus field: 1.7 x 2.4 degrees @ f4.5

FEATURES OF THE OPTICS

- High-resolution all-spherical design gives refractor-like performance at high powers
- 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
- Optional Advanced Convertible Barlow (BARADV) allows you to choose f4.5 or f9.

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 250mm (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

WHAT'S INCLUDED

- 180mm f/4.5 Maksutov-Newtonian Tube Assembly with Dew Shield and built-in Rotating Rings
- Custom Dovetail Accessory Plate for Mounting Rings (ACPLMA), fits our 8" or 10" Sliding Bars
- Two 2" Extensions to provide 1.45" and 1.8" optical spacing distance
- Mounting holes for finder bracket
- Carrying Case

RECOMMENDED MOUNT

The FASTMAX 180 looks great on the Mach1GTO, so we are offering a special package price that includes the mount, counterweights and Eagle Pier.

RECOMMENDED ACCESSORIES

- Advanced Convertible Barlow (BARADV) – we recommend that you also purchase ADA206 to use in place of the extension that is provided with the Barlow. This extension will place the Barlow in the correct position.
- 10x60 Vario-Finder with 10x60 Quick Release Bracket (1060VQ)
- 8" or 10" Sliding Bars (SBD0800 or SBD1000)
- Additional custom accessory plates (ACPLMA), up to four are possible

PRICE AND AVAILABILITY

This instrument is being offered first to people who signed up on our notification list many years ago. We will not add new names to the list since we do not have plans to produce additional Maksutov-Newtonians.

FASTMAX 180 f/4.5 Tube Assembly with all items listed above: \$7,800

FASTMAX 180 f/4.5 with Mach1GTO, DOVELM2, Four 9 lb. Counterweights, Eagle Pier, special package price: \$15,890 (discounted \$500 from \$ 16,390 normal price)