

## Questar Duplex

### 3.5" Telescope

### Specification Sheet

The Questar Duplex is the most versatile Questar instrument because its design permits it to be separated into two parts. The barrel, which is actually the Field Model with moon map and star chart added, can be carried separately in its own case for field trips. When the two parts are assembled, the Duplex has every feature of the fully mounted Questar Standard astronomical telescope. To separate the barrel from the mounting, hold it in one hand, and release the knurled screw under the collar which supports it. The screw attaches to the  $\_20$  hole in the bottom support of the barrel which is used also to connect it to a tripod.

The Duplex includes lens cap, removable optical tube assembly with mounting holes for most tripods, 16mm (80-120X) and 24mm (53-80X) eyepieces, built-in finder (4X & 6X), Barlow lens for eyepiece port, star-diagonal prism, 110 VAC synchronous electric drive. Continuous 360° slow motion controls 25:1 with manual override slip clutch on both axis, Declination clamp, setable right ascension and fixed declination setting circles, finder solar filter and carrying case. Velvet lined case has door pouches that hold one eyepiece, 1.5" aperture solar filter, electric cord, powerguide hand control and legs for converting to table-top polar equatorial position. A 1/4-20 mounting hole centrally located on base can be used to attach most tripods. 30-45° legs are standard. Special order for other latitudes. Questar barrel has moon map and perpetual star chart; the latter pulls forward to form dew cap. Weight less than 8 lbs., in carrying case 15 lbs. Shipping weight 31 lbs. in specially designed packing and drum. (*Specify voltage and latitude*)

TYPE:	Maksutov Cassegrain Catadioptric. No coma, astigmatism or spherical aberrations.
CLEAR APERTURE:	3.5 inches, 89mm (Center Obscuration, 27.9mm)
FOCAL LENGTH:	Basic Visual 50.5 inches, f/14.4, 1300mm
FOCAL LENGTH:	Camera close, 56 inches, f/16, 1400 mm
FOCAL LENGTH:	Camera with Ext. Tubes, 64 inches, f/18, 1600mm
FINDER LENS:	4" FL, 4x and 8x, Field 12° and 8°
POWERS:	Powers are eyepiece dependent and can range from 40x to 270x with Questar Brandon eyepieces
POWERS LIMIT:	Resolves 1 sec. Arc at 50feet EFL
FIELD OF VIEW:	Photographic model, 1°30min, visual field of view 1.1° to .16°
LENS:	BK7, MgF <sub>2</sub> coated, passes UV to 3300 A, IR to 1 micron, parfocal
MIRROR:	F2, Pyrex®, Zerodur® or Quartz. AlSiO coated 3.800" dia. (All Questars for UV or IR on special order)
SPECIAL COATINGS:	On special order, broad-band dielectric coating applied to the mirror, which increases its reflectivity. To both sides of front lens, a very low reflection coating is then applied which reduces the light loss at each surface to less than 1/10 of 1%. It transmits all frequencies of the visible spectrum and improves total light grasp by approximately 22%
EYEPIECES:	24 mm Brandon, 45° ap. Field; 16 mm 4 lens Brandon, 45°Ap. Field, optional eyepieces of 8mm, 12mm, 32mm
AMPLIFYING/BARLOW LENS:	Minus 43.9 mm FL
ERECTING SYSTEM:	Star Diagonal type, 90° BK7, MgFL <sub>2</sub> coated
BARREL ASSEMBLY:	Barrel: forged aluminum, machined full length
LENS CELL:	Aluminum 24S-T4, black anodized
REAR CLOSURE PLATE:	Stainless steel CENTRAL TUBE - precision machining and alignment after assembly.

DEWCAP: Internally black-flocked Synthane seamless tube 1/32" thick, to which is bonded a pre-rolled aluminum sheet

FOCUSING MECHANISM: Mirror thimble, stainless steel sliding tube. Slides on stainless, fixed, light-baffle tube, with front-end insert tube of .010" wall thickness. Conical ss spring-loaded. Focus rod ss 303, ground shaft, 56 T.P.I. precision ground threads

KNOBS: Aluminum 24S-T4, corrosion-resistant, hand-turned on turret lathe, stainless steel shafts and levers.

EQUATORIAL MOUNT: Aluminum sand casting, virgin alloy 356-T6 heat treated. Toolroom hand-turned and polished. Highly corrosion-resistant. Jig-bored and precision threaded for legs. Bottom flange 7" o.d. Fits tripods with \_-20 threads

TURNTABLE OR LOWER FORK BASE: Sand casting same alloy, toolroom turned, jig-bored and precision-reamed, aircraft polyurethane painted

LEGS: Aluminum 61 S-T3, centerless-ground and threaded, anodized. Center leg adjustable. Butyl rubber tips

SYNCHRONOUS DRIVE MOTOR: \_ R.P.M. 110V. 60 cycles, other cycles, voltages and direction of rotation available. Sealed, lubricated gear train, 2.7 watts

RIGHT ASCENSION GEAR: Bronze, 4" diameter, and 4" diameter teflon-facing bearing surfaces

SIDE ARMS, INNER FORK BRACKETS, CONTROL BOX: Die castings of corrosion-resistant aluminum alloy 13, toolroom turned, milled, jig-bored, tapped and reamed. Special painted aluminum and clear-urethane protected

FINDER MIRROR CAGE: stainless steel, brushed satin finish

ALTITUDE OR DECLINATION CIRCLE: 3-15/16" diameter, 301 s.s., cemented and riveted to bracket ring assembly, 1° divisions with etched and filled markings

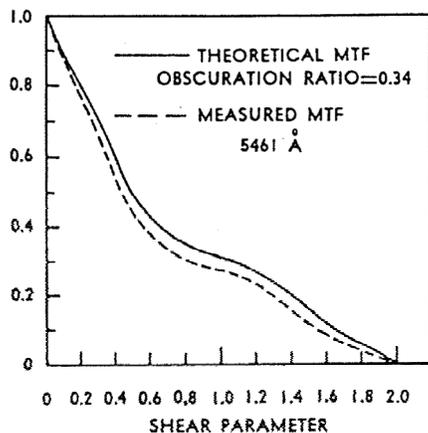
CLAMP: Bakelite padded s.s. stud clamps dec. circle to side arm

AZIMUTH OR R. A. CIRCLE: 6" diameter, anodized aluminum, silk-screened, graduated to 1° and 4 min of time. May be set as celestial clock. Manual slow-motion independent of drive

SLOW MOTIONS: Continuous 360° rotation, safety clutch held. Permits control to a few seconds of arc. Absolutely free of backlash, lag, or play. Ratio 31 to 1

TUBE & MOUNT INTERFACE: Dual axial alignment pins, precision milled mounting surface and \_-20 thread knob with knurled O.D.

DIMENSIONS: Height, upright, 14". With barrel horizontal, 11" high and long. Weight, 6.7 pounds



TYPICAL MTF FOR QUESTAR 3 1/2-INCH

Typical Questar 3 1/2 and Seven Modulation Transfer Function (MTF) as obtained with a shearing interferometer and expressed as a function of the shear parameter, S. To express the MTF as a function of the spatial frequency, R, in lines per millimeter, the following relationship can be used:

$$R = \frac{SD}{2 \lambda f}$$

where S=shear parameter,  $\lambda$  =wavelength, f= focal length, and D= clear aperture.