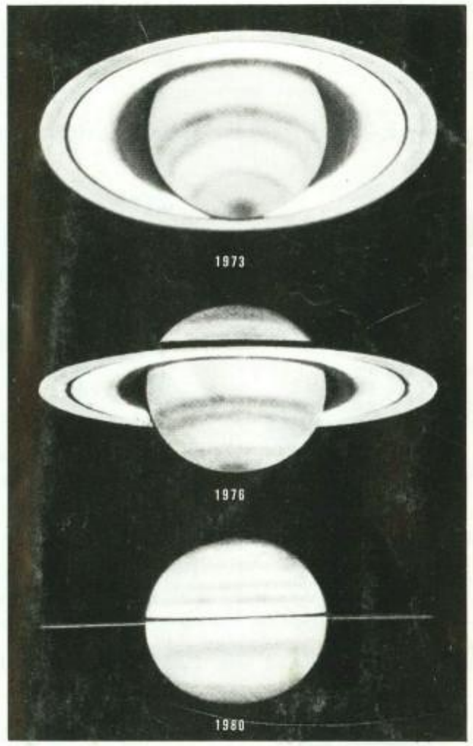
ROYAL
TOKYO

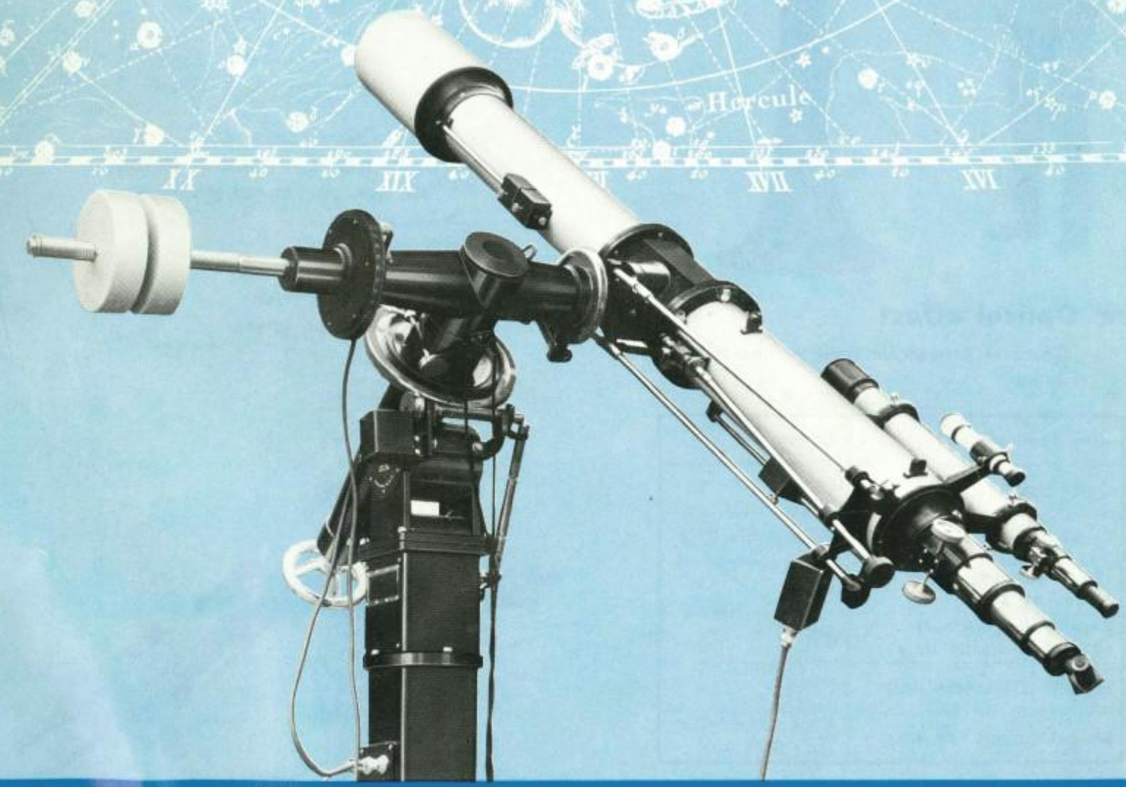



Printed in Japan

ROYAL
TOKYO

*Astronomical and Terrestrial*

# TELESCOPES



## ASTRO OPTICAL IND. CO.,LTD.

TOKYO, JAPAN

# 150mm Equatorial Refractor



**R—151**

A higher grade telescope for the use in schools, universities, observatories and public institutions.

It is the most suitable instrument for semi-professional astronomers.

The manipulation of the tube can be made automatically by an electrical device as well as by hand at the foot of the eye-end. The equatorial mounting rests on a heavy iron support which guarantees stability and assures minute observation.

## ★ Driving clock

Electric clock drive with synchronous motor for rate regulation, capable of setting the speed to the diurnal motion.

## ★ Accessories

6 Eye-pieces

| | | | |
|---|---|---|---|
| Orthoscopic | ····· | Or | 4mm |
| 〃 | ····· | Or | 6mm |
| 〃 | ····· | Or | 9mm |
| Kellner | ····· | K | 12mm |
| 〃 | ····· | K | 25mm |
| 〃 | ····· | K | 50mm |

1 Star finder 6×30mm 4°
1 Guide telescope D=60mm f=700mm (35x with cross-haired eyepiece)
3 Sun glasses
2 Moon glasses
2 Star diagonal prisms
1 Sun diagonal prism
1 Sun projection screen

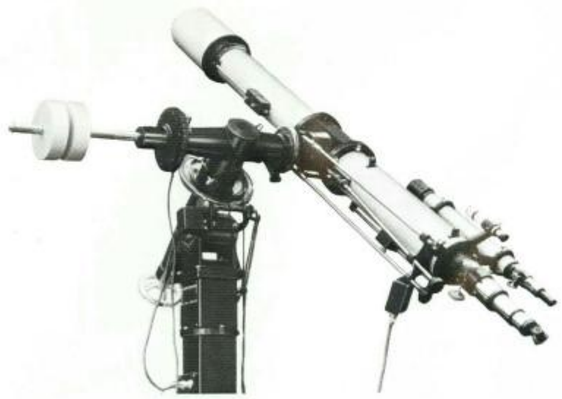
## ★ Optical effect

Objective (Fraunhofer type, Achromat, Hard coated)

| | |
|---|---|
| Lens aperture | 155mm |
| Clear aperture | 150mm |
| Focal length | 2250mm (F=15.0) |
| Light collecting power for naked eye | 460 × |
| Resolving power with respect to double stars | 0.8" |
| Faintest discernible stars | 12.7m |
| Magnifications for Astro. | 563×,375×,250×, 188×,90×,45× |

## ★ Mounting

Equatorial mount with hour and declination circles and slow motions on iron pillar stand.





# 108mm Equatorial Refractor



**R—101**

A fine telescope of advanced design for the purpose of the use of amateur astronomers or higher school students in its dome.

The insrtument is equipped with a precise siderial drive by the electric motor driving aparatus.

## ☆ Accessories

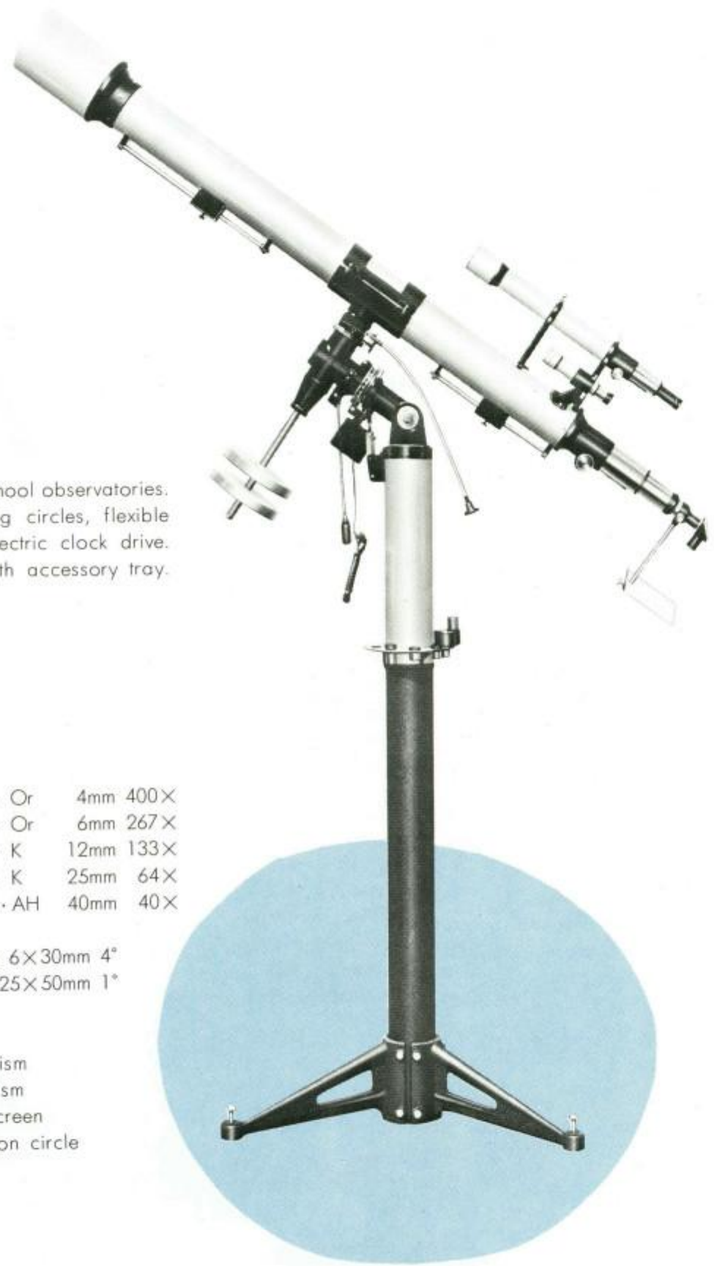
6 Eye-pieces

| | | | | |
|---|---|---|---|---|
| Orthoscopic | ····· | Or | 4mm | 400× |
| 〃 | ····· | Or | 6mm | 267× |
| 〃 | ····· | Or | 9mm | 178× |
| Kellner | ····· | K | 12mm | 133× |
| 〃 | ····· | K | 25mm | 64× |
| Huygens | ····· | K | 50mm | 32× |

2 Finder telescope 6×30mm 4°
〃 25×50mm 1°
2 Sun glasses
1 Moon glass
1 Star diagonal prism
1 Off axis stop & dust cap

| Model | Mounting | Optical effect | | | | | |
|---|---|---|---|---|---|---|---|
| | | Objective (Fraunhofer type, Achromat, Hard coated) | | | | | |
| | | Lens aperture | Clear aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star |
| R101 | Equatorial on iron pillar stand | 112mm | 108mm | 1600mm (F14.8) | 238× | 1.0" | 12.0m |

# 108mm Equatorial Refractor



**R–102**

An excellent telescope for home and school observatories. Complete equatorial mount with 3 setting circles, flexible slow motion controls and synchronous electric clock drive. Extra-rigid, heavy duty pedestal base with accessory tray. These are its outstanding features.

## ★ Accessories

5 Eye-pieces
Orthoscopic ····· Or 4mm 400×
〃 ····· Or 6mm 267×
Kellner ····· K 12mm 133×
〃 ····· K 25mm 64×
Achromat Huygens··· AH 40mm 40×

2 Finder telescopes 6×30mm 4°
〃 25×50mm 1°
2 Sun glasses
1 Moon glass
1 Star diagonal prism
1 Sun diagonal prism
1 Sun projection screen
1 Hour & declination circle

| Model | Mounting | Optical effect | | | | | |
|---|---|---|---|---|---|---|---|
| | | Objective (Fraunhofer type, Achromat, Hard coated) | | | | | |
| | | Lens aperture | Clear aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star |
| R102 | Equatorial on metal pedestal base | 112mm | 108mm | 1600mm (F=14.8) | 238× | 1.0" | 12.0m |



# 80mm Equatorial Refractor



**R–83**

The most excellent telescope for the use of comet seekers. Semi-apochromatic objective lens (D: 80mm, f: 600mm, in triple components) brings its genius into full play.

Built-in Polar telescope, setting circles, capable of setting the instrument speedy and correctly.

## ★ Accessories

2 Eyepieces (Or 12.5mm, Or5mm)
1 Finder telescope 6×30mm 4°
1 Polar telescope 5×25mm 5°
1 Hour & declination circle
1 Wooden carrying case



**R–82**

A fine telescope of advanced design for the purpose of the use of amateur astronomers and school students.

The equatorial mount is equipped with setting circles, flexible slow motion controls and synchronous electric clock drive which enables the user to obtain scientific observation and to take astro photography.

## ★ Accessories

3 Eye-pieces
Orthoscopic ····· Or 6mm 200×
〃 ····· Or 12.5mm 96×
Kellner ····· K 25mm 48×
1 Finder telescope 6×30mm 4°
1 Sun glass
1 Moon glass
1 Star diagonal prism
1 Sun diagonal prism
1 Sun projection screen
1 Hour & declination circle

| Model | Mounting | Optical effect | | | | | |
|---|---|---|---|---|---|---|---|
| | | Objective (Fraunhofer type, Achromat, Hard coated) | | | | | |
| | | Lens aperture | Clear aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star |
| R-82 | Equatorial on field tripod | 83mm | 80mm | 1200mm (F=15.0) | 131× | 1.4" | 11.3m |

# 76mm Equatorial Refractor



**R-76**

A high class telescope for amateur astronomers and school students for all-round purposes.
The instrument has an unusually high light collecting power which displays a very bright image.



**R-77**

A high class telescope of superior quality of amateur astronomers and school students for all-round observations. Scientific observation obtainable, according to Hour and Declination circles being provided.

| Model | Mounting & Tripod | Optical effect: Objective (Fraunhofer type, Achromat, Hard coated) Lens aperture | Clear aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star | Magnifications: Astro. | Terr. | Accessories: Finder telescope | Eye-piece | Sun glass | Moon glass | Star diagonal prism | Sun projection screen | Erecting prism | Hour & decl. circle | Barlow lens (2×) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R76 | Equatorial & Alt-azimuth on field tripod | mm 79 | mm 76 | mm 910 | × 118 | 〃 1.6 | ˙ m 11.2 | 182×, 75×, 36× | same as astro. | mm 6×30 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | — |
| R77 | 〃 | 〃 | 〃 | 1200 | 〃 | 〃 | 〃 | 240×, 100×, 48× (with Barlow lens 480×, 200×, 96×) | 〃 | 6×30 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |



# 60mm Equatorial Refractor



**R-61D**

A slick stream-lined instrument which is patented for its trim design, new mechanism and highly convenient mounting. Its high magnifying power provides extremely sharp images and the flexible shaft enables observation from any position.



**605**

A patented Astro type astronomical telescope for beginners, primary school and middle school students.
It is light and easy to manipulate, and has a high magnifying power. The convenient mount enables one to easily trace a comet, and it is popular for observation of distant landscapes and objects at sea or in the mountains.

| Model | Mounting | Optical effect: Objective (Fraunhofer type, Achromat, Hard coated) Lens aperture | Clear aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star | Magnifications: for Astro. | for Terr. | Accessories: Eye-piece | Finder telescope | Sun glass | Star diagonal prism | Erecting prism | Sun projection screen | Barlow lens (2×) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R61D | Equatorial & Alt-azimuth with slow motions on field tripod | mm 62.5 | mm 60 | mm 1200 | × 73 | 〃 1.9 | m 10.7 | 200×, 96×, 48× | same as astro. | 3 | 6×30mm4° | 1 | 1 | 1 | 1 | — |
| 605 | 〃 | 〃 | 〃 | 910 | 〃 | 〃 | 〃 | 152×, 73×, 46× (with Barlow lens 304×, 146×, 92×) | 〃 | 3 | 〃 | 1 | 1 | 1 | 1 | 1 |

# 60mm, 50mm Refractor



**R—68**

A simple astronomical and terrestrial telescope for beginners with yoke type alt-azimuth mounting on field tripod. It is light and easy to manipulate and has high magnifying power.



**R—51**

Smallest and effective astronomical telescope for amateur astronomers or school use with equatorial and alt-azimuth mount on field tripod.

| Model | Mounting | Optical effect: Objective (Fraunhofer type, Achromat, Hard coated) | | | | | | Optical effect: Magnifications | | Accessories | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lens aperture | Clear aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star | for Astro. | for Terr. | Eye-piece | Finder telescope | Sun glass | Star diagonal prism | Erecting prism | Sun projection screen | Barlow lens (2×) |
| R68 | Alt-azimuth on field tripod | mm 62.5 | mm 60 | mm 1000 | × 73 | 〃 1.9 | m 10.7 | 167×, 50× | same as astro. | 2 | 5×25mm5° | 1 | 1 | — | — | 1 |
| R51 | Equatorial & Alt-azimuth on field tripod | 52 | 50 | 750 | 51 | 2.3 | 10.3 | 125×, 83×, 40× | 〃 | 3 | 〃 | 1 | 1 | — | 1 | — |



# 60mm & 76mm Equatorial Refractor



**EM—6 ("Photo Mount")**

The most convenient equatorial mount for celestial photography with the camera attached as it follows the diurnal movement of the celestial bodies. This mount enables the user to make both an observation and photography at the same time which will meet the demand of astronomers.

Being built-in Polar Telescope (5×25mm 5°), setting up can be made easily and correctly. By fixing the guiding telescope and camera on the universal plate of the mount, the user can take easily celestial photography.

Following accessories are available at additional cost:

1. Universal telescope band (50mm—80mm)
2. Guiding telescope:
   D: 50mm f: 500mm
   D: 60mm f: 910mm
3. Eyepiece K12mm with cross hair
4. Pulse motor (Crystal Ossilator system)
   (DC 12V, and also electric power can be supplied from car battery)



**R—60 (D: 60mm, F.L.: 1000mm)**

A fine telescope of advanced design for amateur astronomers and astro photographers.

The equatorial mount is equipped with polar telescope, setting circles, flexible slow motion controls which enables the user to obtain scientific observation and to take astro photography.

Additional accessories are available at extra cost.



**R—70 (D: 76mm, F.L.: 910mm)**

An excellent telescope for amateur astronomers and school students which is very convenient for celestial photography and scientific observation.

Built-in polar telescope which enables the user to set up the telescope easily and accurately.

# Newtonian Equatorial Reflector

**LN－12E**

The most magnificent reflector for universities, observatories and professional astronomers.

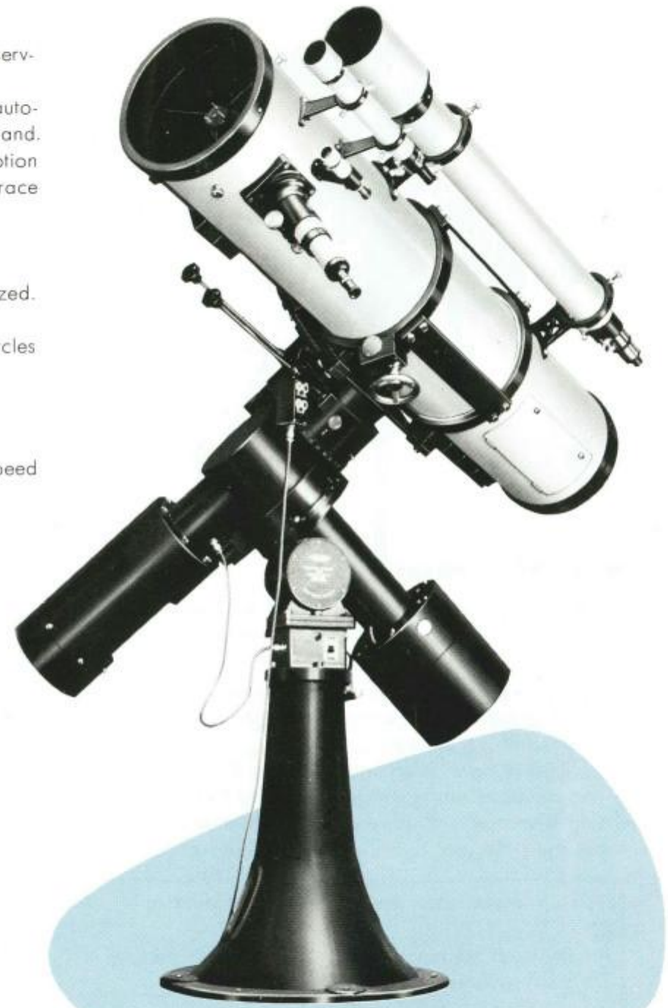
The manipulation of the tube can be made automatically by an electrical device as well as by hand. Equatorial mount with setting circles, slow motion controls and electric drive enables the user to trace precisely the celestial objects.

☆ **Main mirror :**
Pyrex, Parabolic surface, Aluminized & Siliconized.

☆ **Mounting :**
Equatorial mount with hour and declination circles and slow motion on heavy iron pillar stand.

## ★ Driving clock

Electric clock drive capable of setting the speed to the diural motion.



## ★ Accessories

7 Eye-pieces
Orthoscopic ····· Or 4mm 563×
〃 ····· Or 6mm 375×
〃 ····· Or 9mm 250×
〃 ····· Or 12.5mm 180×
〃 ····· Or 18mm 125×
〃 ····· Or 25mm 90×
Kellner ····· K 50mm 45×

2 Finder telescopes 6×30mm 4°
〃 25×50mm 1°
1 Guide telescope D=80mm f=1200mm
3 Sun glasses
2 Moon glasses
2 Star diagonal prisms
1 Sun diagonal prism

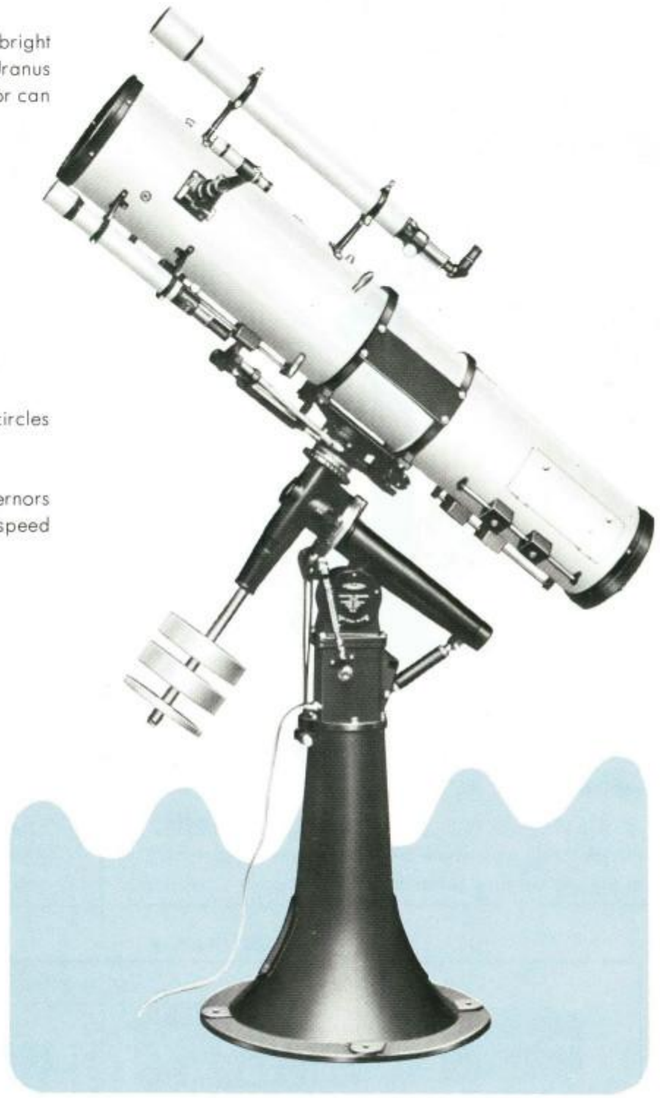
| Model | Mounting | Optical effect | | | | |
|---|---|---|---|---|---|---|
| | | Objective | | | | |
| | | Mirror aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star |
| LN12E | Equatorial on pillar stand | 300mm | 2250mm (F=7.5) | 1837× | 0.39" | 14.2m |



# Newtonian Equatorial Reflector

**LN－10E**

Magnificent reflector, high magnifications and bright images are obtainable. The satellites of Uranus "Oberon" and Owl nebulae (M97) in Ursa Major can be seen.



☆ **Main mirror :**
Parabolic surface, Aluminized & Siliconized

☆ **Mounting :**
Equatorial mount with hour and declination circles and slow motion on iron pillar stand.

☆ **Driving clock :**
Electric clock with motor or gravity governors for rate regulation, capable of setting the speed to the diural motion.

## ★ Accessories

6 Eye-pieces
Orthoscopic ····· Or 4mm 450×
〃 ····· Or 6mm 300×
〃 ····· Or 9mm 200×
Kellner ····· K 12mm 150×
〃 ····· K 25mm 72×
〃 ····· K 50mm 36×

2 Finder telescope 6×30mm 4°
〃 25×50mm 1°
2 Sun glass
1 Moon glass
2 Star diagonal prism
1 Sun diagonal prism
1 Sun projection screen
1 Hour & declination circle

| Model | Mounting | Optical effect | | | | |
|---|---|---|---|---|---|---|
| | | Objective | | | | |
| | | Mirror aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star |
| LN-8E | Equatorial on pillar stand | 200mm | 1600mm (F=8.0) | 817× | 0.6" | 13.3m |
| LN10E | 〃 | 250mm | 1800mm (F=7.2) | 1276× | 0.5" | 13.8m |

# Newtonian Equatorial Reflector



**LN－6E**

A higher grade reflector with driving clock for semi-professional astronomers. High magnifications and bright images are obtainable.



**LN－4E**

A high class astronomical reflector with equatorial mount for amateur astronomers and school students.



**LN－4T**

An excellent reflector with equatorial mount on rigid wooden tripod for amateur astronomers and school students.

| Model | Mounting | Optical effect | | | | | | Accessories | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Objective | | | | | Magnification | Eye-piece | Finder telescope | Sun glass | Moon glass | Off axis stop & dust cap |
| | | Mirror aperture | Focal length | Light collecting power for naked eye | Resolving power with respect to double stars | Faintest discernible star | Astro. | | | | | |
| LN-4E | Equatorial on pedestal stand | mm 100 | mm 1000 | × 204 | " 1.2 | m 11.8 | 167×, 80×, 40× | 3 | 6×30mm4° | 1 | 1 | 1 |
| LN-4T | Equatorial with slow motions on rigid wooden tripod | 100 | 1000 | 204 | 1.2 | 11.8 | 167×, 80×, 50× | 3 | 6×30mm4° | 1 | 1 | 1 |
| LN-6E | Equatorial on pedestal stand | 150 | 1300 | 460 | 0.8 | 12.7 | 325×, 217×, 108×, 52× | 4 | 12×40mm2° | 2 | 1 | 1 |



# Accessories & Parts

## ★ EYE-PIECE



It is necessary to change the range of magnification and or field of view according to the objects. And it is suggested that you use the H or HM type of eye-pieces for the Refractor, and the Orthoscopic or the Kellner for the Reflector.

Orthoscopic : This consists of a field lens of three components and a simple plano convex eye lens. It is by far the best eye-piece particularly for high magnification.

Kellner : This has a plano convex field lens and an achromatic eye lens. It is very popular for low and medium powers.

## ★ STAR DIAGONAL PRISM



A prism eye-piece which enables you to observe celestial objects in an easy and comfortable position. The horizontal position of the object is inverted, but the vertical position is seen correctly, and, therefore, substitutes the erecting prism.

## ★ SUN PRISM



When observing the sun only through a sun glass, there is the possibility the sun glass will crack from the heat of the sun. The sun prism absorbs 95 % of the sun's heat and enables you to observe the sun for a lengthy period of time.

## ★ ERECTING PRISM



With an astronomical telescope, the object is seen inverted which makes it inconvenient to see. The purpose of the erecting prism is to normalize the position of the object seen through the telescope. There are two sizes, large and small, and the use of these prism lenses provides a broader prospective than the ordinary eye-piece.

## ★ BARLOW LENS




A color-corrected, capsular lens which is inserted between the main tube and the eye-piece and which optically lengthens the depth of focus and increases the magnification exactly twice or thrice that of the normal magnification of the telescope lens. It is convenient when you do not have many varieties of eye-pieces. And it can be used for photographing the sun.

When it is used individually, has the quality of Garillei type telescope.

# Accessories & Parts

### ★ STAR FINDER



Astronomical telescope must be needed of the star finder telescope of which the low power and wide field. Can be fitted to the main tube and provided with adjustable graticule lined up with the optical axis of the main telescope. Small model with pillar and adjusting screws suitable of under 50mm diameter of the objective, and large model suitable for the larger diameter above 60mm of it.

### ★ DIAGONAL ELLIPTICAL MIRROR



From 22mm for 3" Reflector to 53mm for 10" Reflector

### ★ OBJECTIVE LENS



Fraunhofer type, Achromat, Hard-Coated Objective lens with mount :

The resolving power of the objective lens exceeds the Dawes limit criterion necessary to secure a point image. The objective mount is equipped with a special device which permits "squaring on" and centering the objective lens.

### ★ MOUNTING CELL for REFLECTORS



Cast aluminium cell with aligning screws and locking bolts.

### ★ MAIN MIRROR



Parabolic surface, Aluminized & Siliconized :

| Diameter | Thickness | Focal length |
|---|---|---|
| 105mm | 14mm | 1000mm |
| 155mm | 22mm | 1300mm |
| 203mm | 26mm | 1600mm |
| 260mm | 40mm | 1800mm |

### ★ DIAGONAL MIRROR HOLDER



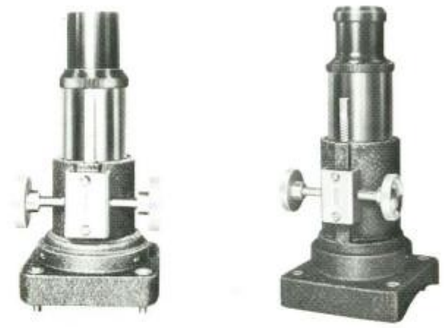
Designed for absolute rigidity, fit tube diameters of 3¼" to 10".

Made of brass, finished in dull black.



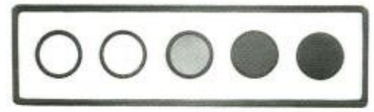
# Accessories & Parts

### ★ RACK & PINION EYE-PIECE MOUNTS



Rack & Pinion mechanism with variable tension for smooth focusing.

### ★ PHOTO FILTER



Astro photo filters are of solid glass, precision ground and polished from the finest optical glass, and the following five make one set.

Skylight : for Moon, Venus and Jupitor (color films)
Neutral density : for Sun, Solar eclipse and Sunspot (color films)
Yellow : for Moon and Venus (black & white films)
Green : for Sun near the horizon (black & white films)
Red : for Sun and Mars (black & white films)

### ★ ELECTRIC CLOCK DRIVE

Electric Clock Drive with synchronous motor for automatically tracking stars.



★ **PULSE MOTOR** (Crystal Ossilator system)

DC 12V, and also electric power can be supplied from car battery)



### ★ CAMERA MOUNT for REFRACTORS



Available for 50mm, 63mm, 70mm, 76mm and 90mm telescope tube.

### ★ CAMERA ADAPTER



Camera adapter for 35mm single lens camera to be fitted to our telescopes.

### ★ CHANGE RING to FIT



Nikon, Minolta, Canon, Konica, Asahi-Pentax (screw), Asahi-Pentax K, Olympus OM series 35mm SLR cameras.

### ★ CAMERA MOUNT for REFLECTORS



Available for any caliber reflectors, large or small.