TAL-65 REFLECTING TELESCOPE

INSTRUCTION MANUAL

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Dew to continuous product improvements, specifications are subject to change without notice.

09.03

GENERAL INSTRUCTIONS

Warning!
Never observe the Sun through your telescope or its finder scope without a black filter - permanent eye damage could result.
Do not let children use telescope at daylight without an adult control.

- ❑ The telescope TAL-65 (hereinafter referred to as the telescope) is designed for visual observations of celestial objects.
- ❑ The telescope can be used for individual observations by amateur astronomers, in the schools, in the astronomic societies.
- ❑ The telescope may be used at an ambient temperature ranging from 30° to -30°C and the relative humidity not more than 80%, on the assumption of fair weather.
- ❑ Read instruction manual first before using the telescope.

TECHNICAL SPECIFICATIONS

- ❑ Aperture — 65 mm
- ❑ Focal length — 500 mm
- ❑ Telescope magnification and angular field

With eyepiece f' = 15mm	30^x	1°15'
With eyepiece and Barlow lens	90^x	0°25'
With eyepiece, Barlow lens and plug	130^x	0°15'

- ❑ Resolving power — 2.2"
- ❑ Limiting visual magnitude — 11^m
- ❑ Right ascension turning angle — 360° (24h)
- ❑ Declination turning angle — ±90°
- ❑ Latitude adjustment range — 0…90°
- ❑ Minimum observation range — ≈ 25 m
- ❑ Dimensions, mm

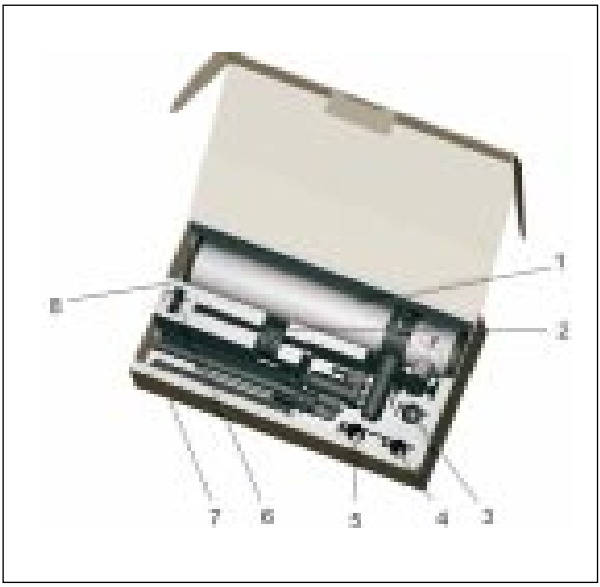
OTA* length	470
Telescope height	620

- ❑ Telescope weight — 3.6 kg

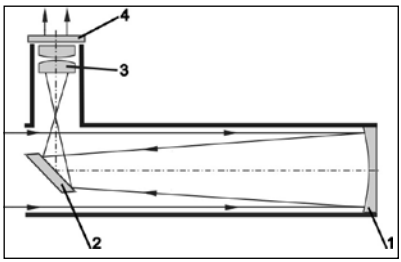
*Optical Tube Assembly

INVENTORY LIST

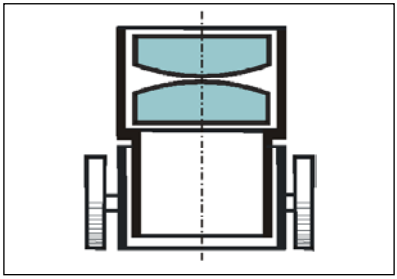
pos.	Component	Quantity
1	Telescope	1
2	Counterweight	1
3	Eyepiece	1
4	Barlow Lens	1
5	Plug	1
6	Black filter	1
7	Box	1
8	Instruction manual	1



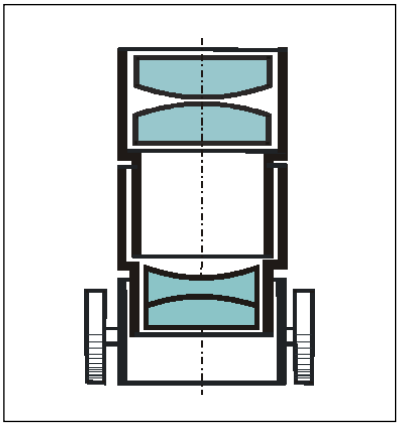
CONSTRUCTION OF THE TELESCOPE



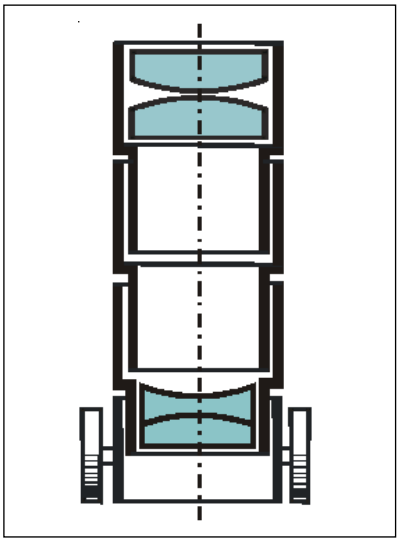
- The telescope consists of optical tube assembly (OTA) (1), German equatorial mount (2), a tripod (3).
- The optical tube is a basic component of the telescope. It includes all main optical units such as a primary mirror, a diagonal mirror and a focuser.
- A Newtonian Reflecting Telescope: parallel beams of rays enter the tube of the telescope and is projected at the focal plane of the eyepiece (3) with the help of primary (1) and diagonal (2) mirrors.
- It is necessary to use black filter (4), having established it on the eyepiece, while observing the solar events.
- The primary mirror is spherical, the diagonal mirror is flat. Both mirrors are covered with high reflection aluminum coatings with protective level. For flash reduction the internal tube surface is blackened.
- The eyepiece has Ramsden scheme.
- The telescope gives inverted image.



- The minimum 30^{x} magnification is obtained when the eyepiece is set into a focuser.

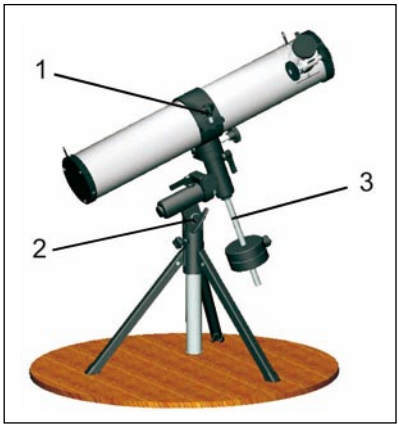


- Having established first the Barlow lens and than the eyepiece, the 90^{x} magnification is obtained.



- Having established the plug into the Barlow lens, then the eyepiece, the maximum 130^{x} magnification is obtained. The more the magnification of the telescope, the less the angular field of view. This is why the observation is recommended to begin with the minimum magnification, gradually increasing it.
- The equatorial mount is designed for pointing the telescope at the interesting objects.
- The mount with the optical tube are secured on the height regulated tripod.

PREPARING TELESCOPE FOR OBSERVATIONS



- ❑ Take a telescope out of the package. Release the clamp knob (1); lay the OTA in the rings at about the midpoint of the tube's length with and fix it with the knob.
- ❑ Release the handle on the latitude bracket (2), turn the tripod into the work position and fix it.
- ❑ Establish the telescope on the flat hard surface.
- ❑ Screw the axis with the counterweight (3).

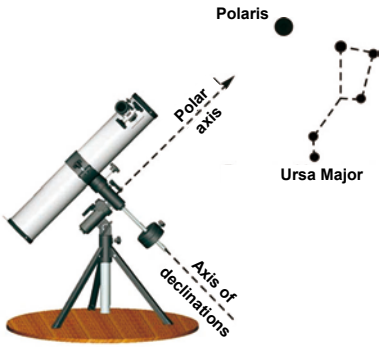
BALANCING THE POLAR AXIS

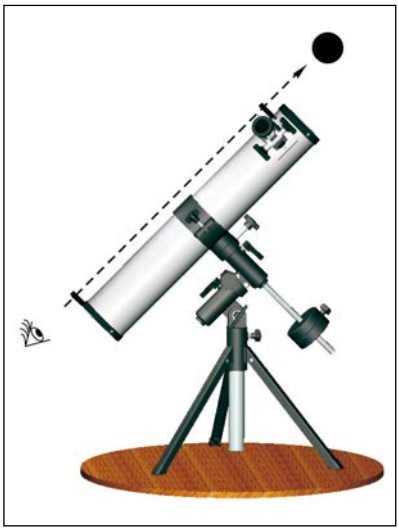
To provide a smooth motion of the telescope and reliable operation of equatorial mount drives, the balancing of the telescopes is required.

- ❑ Place the polar axis in the horizontal position (0° on the latitude dial).
- ❑ Release the handle, that fixes the polar axis. Slide the counterweights along the counterweight shaft until they counterbalance the OTA. Fix the polar axis.

BALANCING THE DECLINATION AXIS

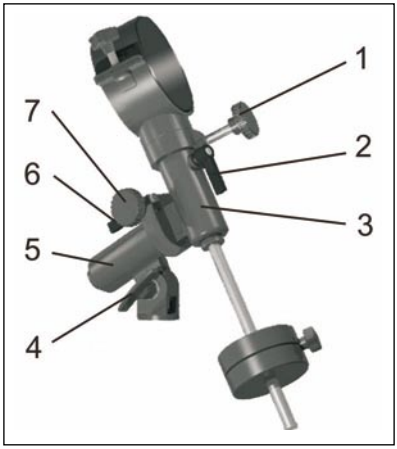
- ❑ Place the Dec. axis in the horizontal position.
- ❑ Release the handle, that fixes the Dec. axis.
- ❑ Slide the OTA forward or back in the tube rings until balanced.
- ❑ Fix the Dec. axis.
- ❑ Set the polar axis of the equatorial mount.
- ❑ Using latitude adjustment knob (3), move R.A. axis up or down in order to set the latitude of your location. Due to Earth's rotation, celestial objects move in the telescope field of view (the higher telescope magnification – the faster those movements appear). More precisely polar alignment is done, less correction is needed.



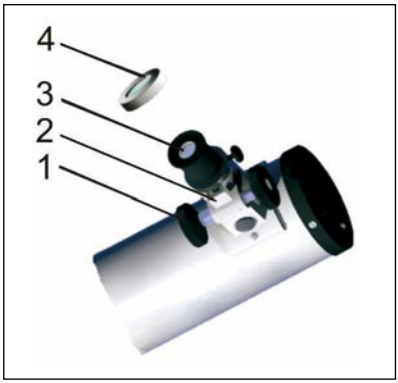


- ❑ For visual observations point the R.A. (polar) axis of the telescope towards Polaris (α UMi). See the picture. The tripod should be fixed in this position while observation is hold. This way the polar axis will be oriented to the celestial pole.
- ❑ Use finder system if quick pointing to the celestial object is required.

OBSERVATIONS



- ❑ The equatorial mount is designed for pointing the telescope at the celestial objects and tracking their movement.
- ❑ The equatorial mount consists of the polar axis (5) and the axis of declination (3).
- ❑ All operations of pointing OTA at different celestial objects should be made with help of clamps (2), (6) and slow-motion controls (1), (7).



- ❑ Set the eyepiece into the focuser (2).
- ❑ To change magnification use Barlow lens and plug (see “Construction of the telescope”).
  Slow-motion controls (1) are used for best clarity.
- ❑ When the sun is observed, set the black filter (4) on the eyepiece (3).
- ❑ Minimum magnifications are used when the wide field of view is needed. For example, when star accumulations, nebulas, comets or the Moon are observed.

- Maximum magnifications help observing some details on the Luna and planets, some double stars and the elements of star accumulations.

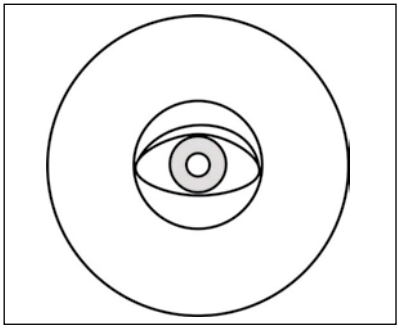
- Telescope's mirror is very sensitive to abrupt temperature changes, this is why let the mirror acclimatize first while observing outside in winter season.

- Avoid observations through a window if the inside and outside temperatures differ more than 2-3°C. Otherwise temperature differences cause images to look blurred and distorted, so that observations are meaningless.

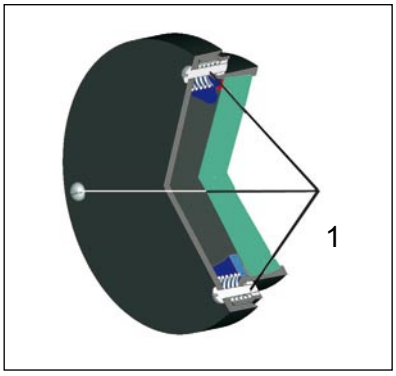
- It is necessary to preserve telescope from vibrations and knock for high-quality observations.

COLLIMATION (ALIGNMENT) OF THE OPTICS

As any other the primary mirror of a telescope needs collimation (alignment) from time to time*.



- This simple operation can be performed by everyone. Remove the Barlow lens and the eyepiece out of the focuser drawtube and check the reflection of primary mirror in the secondary one. The reflection of the secondary mirror together with the pier should be centered in the primary mirror. The alignment is needed when reflection is off-centered.



- While carefully rotating one of the three alignment screws (1), check the direction of the reflection displacement. Choose the screw and direction to center reflection.
- All screws are glued with the glue. Use a spirit to turn off the screw.

* Collimation (alignment) of the optics is permitted only in case of absolute necessity, and after expiration of manufacturer limited warranty.

MAINTENANCE

In order to keep telescope in good operating condition one should provide good care and maintenance for the instrument.

- ❑ Improper cleaning of the aluminized mirrors can scratch their coatings, so one should use blower bulb or special brush to remove dust from the surfaces.

- ❑ Spots of grease and smudges may be washed away. To clean the primary mirror, carefully remove the mirror cell from the telescope by loosening screws, which hold it inside the OTA. Do not remove mirror from the mirror cell. Carefully wet the mirror surface with a lot of pure spirit (alcohol) using the cotton cloth. Using the same cloth without pressure clean the mirror surface and then rinse the mirror under a stream of water. Wait till the water trickles away. Swab remaining water drops from the surface with a dry cloth edge.

- ❑ To clean the secondary mirror use the same procedure.

- ❑ Use only quality optical lens cleaning tissue and optical lens cleaning fluid specifically designed for multi-coated optics to clean your eyepieces and finderscope.

- ❑ Lens or mirror surfaces should be cleaned as infrequently as possible, only when absolutely necessary.

- ❑ Keep the dust cover on the front of the telescope and the end cap on the focuser tube when not in use.

STORAGE

- ❑ The telescope must be kept in a clean, dry (humidity must not exceed 80%), dust-free place with an ambient temperature between +5° and +40°C.

- ❑ Avoid collision and shaking of the telescope.

- ❑ It is prohibited to store acids, alkalis, and any chemically active substances, which may produce evolved gas or vapor harmful for the optics, at the same place with the telescope.

ACCEPTANCE CERTIFICATE

Telescope **TAL-65**, serial # _____

Passed the product approval and found serviceable.

Manufacturing date _____

Signatures _____

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