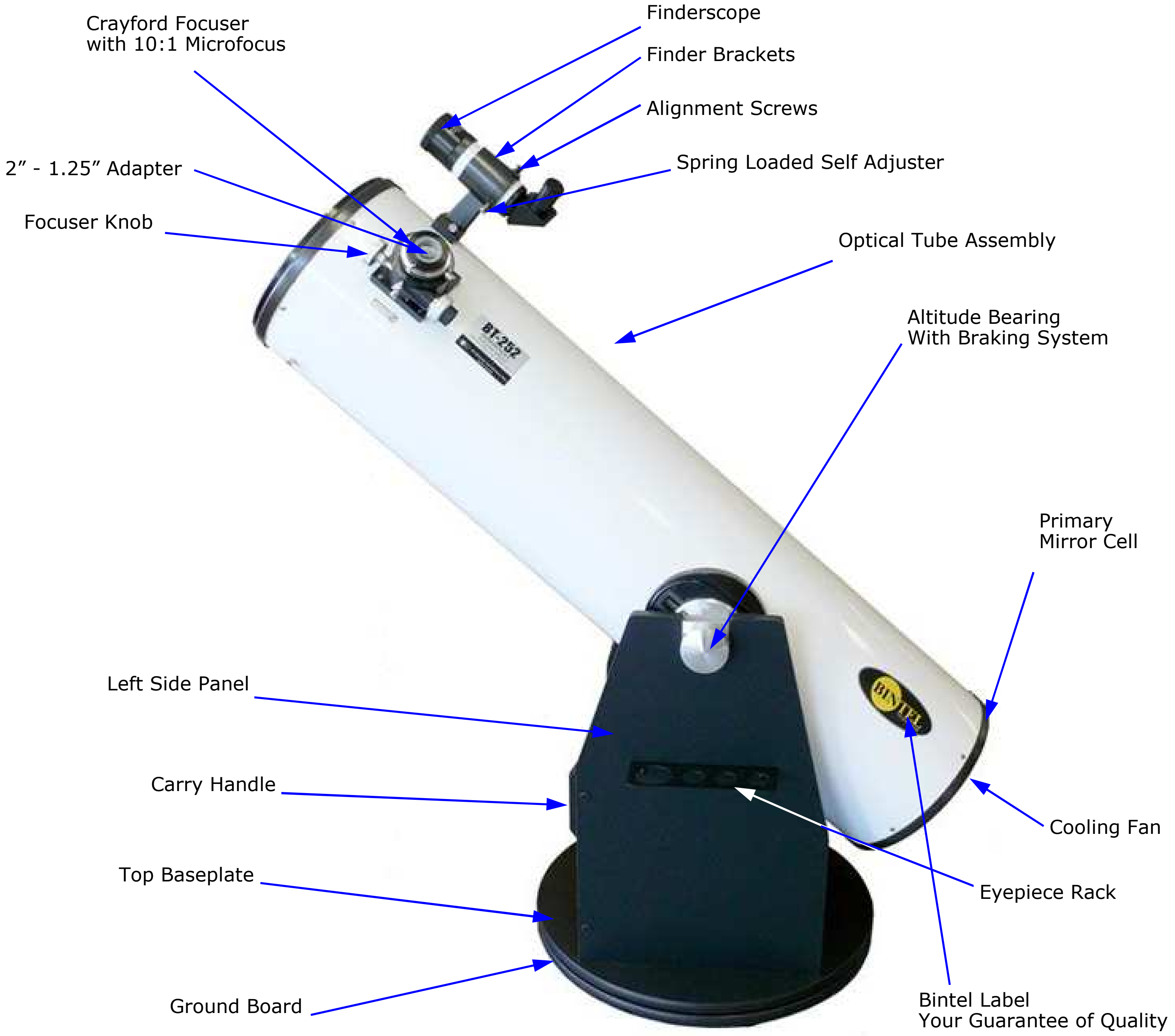
INSTRUCTION MANUAL

BINTEL TELESCOPES

DOBSONIAN TELESCOPES

THE BINOCULAR AND TELESCOPE SHOP
84 Wentworth Park Rd Glebe NSW 2037
519 Burke Rd Camberwell VIC 3124
Email: info@bintel.com.au
WWW: www.bintelshop.com.au & www.bintel.com.au

Parts of a Bintel Dobsonian



Congratulations and thank you for selecting a quality Bintel telescope. Your new Bintel Dobsonian is designed for high-resolution viewing of astronomical objects. With its precision optics and Dobsonian mount, you'll be able to locate and enjoy thousands of fascinating celestial denizens, including the planets, Moon, and a variety of deep-sky galaxies, nebulas, and star clusters. If you have never owned a telescope before, we would like to welcome you to amateur astronomy. Take some time to familiarize yourself with the night sky. Learn to recognize the patterns of stars in the major constellations. With a little practice, a little patience, and a reasonably dark sky away from city lights, you'll find your telescope to be a never-ending source of wonder, exploration, and relaxation.

For after sales service or friendly advice contact Bintels Service Dept.
Our qualified technical and astronomy staff will be happy to help.

These instructions will help you set up, properly use and care for your telescope.
Please read them over thoroughly before getting started.

Table of Contents

2. Unpacking

The telescope will arrive in two boxes.

The larger box contains the optical tube assembly and accessories.

The Large flat pack contains the unassembled Dobsonian base and hardware.

Below is a packing slip for both boxes.

When unpacking the boxes please be careful as there are some small parts that could easily become lost.

We suggest that this be done indoors. We recommend keeping the original shipping containers. In the event that the telescope needs to be shipped to another location, or returned to Bintel for warranty repair, having the proper shipping containers will help ensure that your telescope will survive the journey intact. Make sure all the parts in the Parts List below are present. Be sure to check boxes carefully, as some parts are small.

If anything appears to be missing or broken, call Bintel Customer Support (02) 9518 7255 for assistance.

Parts List

Box #1: Optical Tube Assembly and Accessories

Qty.	Description
1	Optical tube assembly
1	Dust cover
1	26mm Bintel Wide Angle eyepiece 2” barrel **(all models)**
1	15mm Bintel Plossl eyepiece 1.25” barrel diameter **(all models)**
1	9mm Bintel Plössl eyepiece, 1.25" barrel diameter **(all models)**
1	Right Angled 8 x 50 finder scope
1	Finder scope bracket with O-Ring
1	Moon Filter
1	Instruction Manual
2	Altitude Bearings with Braking System

WARNING:
Never look directly at the Sun through your telescope or its finder scope—even for an instant—without a professionally made solar filter that completely covers the front of the instrument, or permanent eye damage could result. Young children should use this telescope only with adult supervision.

Box #2: Dobsonian Base

Qty.	Description
1	Left panel
1	Right panel
1	Front brace
1	Top baseplate (has countersunk holes in it)
1	Ground baseplate
2	Metal disks
1	Roller Bearing Mat
1	Aluminium Tube (sleeve between top and bottom baseplates)

Hardware Pack

Qty.	Description
1	Eyepiece rack
2	Eyepiece rack mounting wood screws (length 3/4")
1	Handle
2	Socket-head cap screws, 5/16" (black)
1	Large Allen wrench (6mm)
8	Base assembly screws (length 2") **(BT 202 / BT252)**
12	Base assembly screws (length 2") **(BT 302)**
1	Small Allen wrench (size 4mm)
3	Plastic feet
3	Feet attachment wood screws (length 1")
1	Large hex-head bolt (length 3")

2. Assembly

Now that you have unpacked the boxes and familiarized your-self with all the parts in front of you, it's time to begin assembly.

Start with the Base.

Assembly of the Dobsonian base

The base need only be assembled once, unless you disassemble it for long-term storage. The assembly process takes about 15 minutes and requires, an adjustable crescent wrench, and the provided Allen wrenches.

1. Loosely attach the **front board** to the **two side panels** with four of the base assembly screws in the predrilled holes. Use the Allen wrench to tighten the screws. Do not completely tighten the screws yet. (See image below) **Note:** Be sure that the Predrilled holes for the eyepiece rack are on the **LEFT** of the rocker box. (as view from the rear).
   The Threaded inserts on the Front Brace are on the inside.

2. Turn this assembly upside down, and screw on the top of the base board. Continue using the large , hex-head screws . (See image Below)

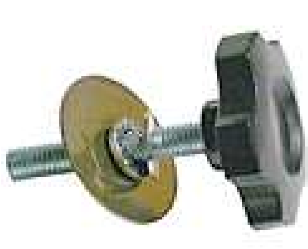
Once all base hex head screws are in place tighten them with Allen Wrench.

3. Screw the 3 feet into the small pre drilled holes on the bottom of the ground board with a Phillips head screw driver

Groundboard with Metal disks and

Roller Bearing fitted

4. With the rocker box still upside down, Place the Roller Bearing Mat between the two metal disks. Put the aluminium spacer tube into the bottom of the rocker box and put the metal disks and bearing mat over the spacer tube. Now put the Ground board on with the spacer tube coming through it. The captive T-Nut should be on the top (at this time) The 3 rubber feet should be on the top.
Now using Pivot Bolt screw it through the aluminium spacer tube from inside the rocker box and tighten. There is a fixed T-screw in the bottom of the ground board to secure it all.
Note: The Pivot Bolt has a Roller Bearing in it Do Not over tighten. LARGE Washer on bottom. Small Washer between Roller Bearing and Plastic Knob.



5. One side panel has 2 small pre-drilled holes for mounting the Eyepiece Rack. Attach the Eyepiece Rack with its screws. (see image below)

6. Attach the **handles** to the **Front Brace** with the socket-head screws. Insert the screws through the handle and into the predrilled holes. Fit the nuts at the rear of the front panel. Tighten the bolts with an Allen wrench. **Note:** Be sure that the threaded inserts are on the inside of the rocker box.

Attach the **handle** to the **front panel** with the two black socket-head screws. Insert the screws through the handle and into the predrilled holes.
Fit the nuts at the rear of the front panel. Tighten the bolts with an Allen wrench. (see image below)

\

Front Handle

Your Rocker Box should now be complete and look like the image below.

Optical Tube Assembly

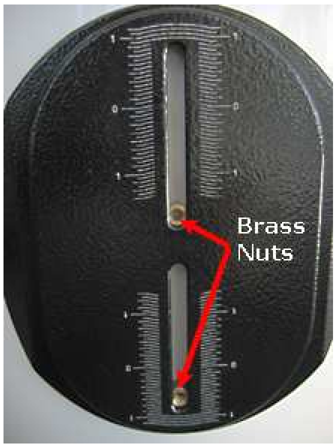
We are now ready to assemble the tube section of the telescope. First unpack the parts required and set aside.

1. Take Tube Assembly out of box and stand upright with sitting on the ground.

2. The Side Bearing Kit must be installed.
This comes in two brown boxes inside the Accessories Box. (see image at right)

Altitude Bearing with built-in Breaking System

3. With the telescope standing in the upright position. The side bearing housing is visible and it contains both a Scale and Two (2) Small Brass Nuts with Phillips Head Screws protruding from them.



Altitude Bearing Housing with Brass Nuts

4. Remove Phillips Head Screws and place Altitude Bearing in position so that the screws will screw into the Brass Nuts.

Altitude Bearing Fitted

Installing the Finder Scope

The Bintel Dobsonians come with a high quality, Right Angled 8x50 achromatic finder scope. This greatly aids in finding objects to view in the night sky. The "8" means it magnifies 8 times, the "50" means it has a 50mm diameter lens. It shows around 5 degrees of sky. Before attaching the finder scope bracket to the telescope tube, it is convenient to first install the finder in the bracket. Thread the two finder scope alignment thumb screws (with knurled lock nuts attached) into the holes on the outside of the finder bracket's rings. Pull the spring loaded adjuster out to enable you to slide the finder scope through the bracket's rings and secure it in place with the alignment thumb screws; make sure the knurled lock nuts are adequately loosened to do this. The finder scope should be oriented within the finder bracket as shown in Figure 6. Now, connect the entire assembly to the telescope. Do this by first removing the round knurled nuts on the two threaded bolts adjacent to the focuser. Then position the holes in the base of the finder bracket over the bolts, and secure the bracket in place with the two round nuts. The large (objective) end of the finder scope should be pointing toward the front (open) end of the telescope tube.

Right Angled 8x50 finder scope and bracket.

Inserting an Eyepiece

The final step in the assembly process is to insert an eye-piece into the telescope's focuser. Take the cover cap off the end of the focuser drawtube. Loosen the thumb screw on the 1.25" eyepiece adapter. Do not loosen the two thumb screws on the 2" eyepiece adapter. Insert one of the supplied eyepieces, then secure it by retightening the thumbscrew on the 1.25" eyepiece adapter. The other eyepiece can be placed in the eyepiece rack until it is needed. The assembly of your **Bintel Dobsonian** is now complete. It should appear as shown on page 2. The dust cap on the front of the telescope tube should always remain in place when the telescope is not in use. It is also a good idea to store eyepieces in an eyepiece case and to replace the cover caps on the focuser and finder scope when the telescope is idle.

Eyepiece being fitted to telescope

3. Using Your Telescope

It is best to get a feel for the basic functions of the Bintel Dobsonian during the day, before observing astronomical objects at night. This way you will not have to fumble around trying to orient yourself in the dark! Find a spot outdoors where you have plenty of room to move around the telescope, and where you have a clear view of some object or vista that is at least 1/4-mile away. It is not critical that the base be exactly level, but it should be placed on somewhat flat ground or pavement to ensure smooth movement of the telescope. Remember, never point the telescope at or near the Sun without using a proper solar filter over the front aperture!

Altitude and Azimuth

The base of the Bintel Dobsonian permits motion of the telescope along two axes: altitude (up/down) and azimuth (left/right) (see Figure 8). This is very convenient, since up/down and left/right are the most "natural" ways that people aim. As a result, pointing the telescope is exceptionally easy. Simply take hold of the telescope tube and move it left or right so the base rotates about its central azimuth bolt, and move it up or down so the altitude side bearings rotate in the base's cradle. Both motions can be made simultaneously and in a continuous manner for easy aiming. Move the telescope gently - let it glide. In this way you can point the telescope to any position in the night sky, from horizon to horizon. When moving he telescope, it may be convenient to grasp the front end of the telescope tube so that your fingers just protrude into it; this provides a convenient "handle".

The Bintel Dobsonian has two axis of motion: Altitude (up/down) and Azimuth (left/right)

Viewing with Eyeglasses

If you wear eyeglasses, you may be able to keep them on while you observe, if your eyepieces have enough eye relief to allow you to see the whole field of view. You can try this by looking through the eyepiece first with your glasses on and then with them off, and see if the glasses restrict the view to only a portion of the full field. If they do, you can easily observe with your glasses off by just refocusing the telescope the needed amount. If you suffer from severe astigmatism, however, you may find images noticeably sharper with your glasses on point you want to look at. Then look through the telescope's eyepiece to see if that point is centered in the field of view. If it is, the job is done. If not, make the necessary adjustments

Aligning the Finderscope

The finder scope must be aligned accurately with the telescope for proper use. To align it, first aim the main telescope in the general direction of an object at least 1/4-mile away -the top of a telephone pole, a chimney, etc. Position that object in the center of the telescope's eyepiece.

Now, look in the finderscope. Is the object visible? Ideally, it will be somewhere in the field of view. If it is not, some coarse adjustments of the two finderscope alignment thumb screws will be needed to get the finderscope roughly parallel to the main tube. With the image in the finderscope's field of view, you will now use the alignment thumb screws to center the object on the intersection of the crosshairs.

By loosening one alignment thumb screw and tightening another you change the line of sight of the finderscope. Continue making adjustments to the various alignment thumb screws until the image in both the finder scope and the telescope's eyepiece is exactly centered. Check the alignment by moving the telescope to another object and fixing the finderscope's crosshairs on the exact point you want to look at.

Then look through the telescope's eyepiece to see if that point is centered in the field of view. If it is, the job is done. If not, make the necessary adjustments until the two images match up. The finderscope alignment needs to be checked before every observing session. This can easily be done at night, before viewing through the telescope. Choose any bright star or planet, center the object in the telescope eyepiece, and then adjust the finderscope's alignment thumb screws until the star or planet is also centered on the finder's crosshairs.

The finderscope is an invaluable tool for locating objects in the night sky; its usage for this purpose will be discussed later., in detail.

Focusing the FinderScope

If, when looking through the finderscope, the images appear somewhat out of focus, you will need to refocus the finderscope for your eyes. Loosen the lock ring located behind the objective lens cell on the body of the finderscope Back the lock ring off by a few turns, for now. Refocus the finderscope on a distant object by threading the objective lens cell in or out on the finderscope body. Precise focusing will be achieved by focusing the finderscope on a bright star. Once the image appears sharp, retighten the lock ring behind the objective lens cell. The finder scope's focus should not need to be adjusted again.

Aiming/Pointing the Telescope

With the finder scope aligned, the telescope can be quickly and accurately pointed at anything you wish to observe. The finderscope has a much wider field of view than the telescope's eyepiece, and therefore it is much easier to first center an object in the finder scope. Then, if the finderscope is accurately aligned, the object will also be centered in the telescope's field of view.
Start by once again moving the telescope until it is pointed in the general direction of the object you want to see. Some observers find it convenient to sight along the tube to do this. Now, look in the finderscope. If your general aim is accurate, the object should appear somewhere in the field of view. Make small adjustments to the telescope's position until the object is centered on the finder's crosshairs. Now, look in the telescope's eyepiece and enjoy the view!

Focusing the Telescope

Insert the low power 26mm eyepiece into the focuser and secure it with the thumb screw . Move the telescope so the front (open) end is pointing in the general direction of an object at least 250m away. Now, with your fingers, slowly rotate one of the focusing knobs until the object comes into sharp focus. Go a little bit beyond sharp focus until the image just starts to blur again, then reverse the rotation of the knob, just to make sure you've hit the exact focus point.
If you have trouble focusing, rotate the focusing knob so the drawtube is in as far as it will go. Now look through the eyepiece while slowly rotating the focusing knob in the opposite direction. You should soon see the point at which focus is reached.
On the underside of the focuser there are two metal thumbscrews. The thumbscrew closest to the body of the scope will lock the focuser position, the other thumbscrew will adjust focuser tension.

Focusing the telescope

Magnification

Now that the object you want to view is well centered in the 25mm eyepiece, you may want to increase the magnification to get a closer view. Loosen the thumb screw on the 1.25" eyepiece adapter and remove the eyepiece. Place it in the eyepiece rack, if you wish. Insert the 9mm eyepiece into the 1.25" eyepiece adapter, then retighten the thumb screw. If you were careful not to bump the telescope, the object should still be centered within the field of view. Notice that the object being viewed is now larger, but somewhat dimmer.
The Bintel Dobsonians are designed to accept any eyepiece with a barrel diameter of 1.25" or 2". Magnification, or power, is determined by the focal length of the telescope and the focal length of the eyepiece. Therefore, by using eyepieces of different focal lengths, the resultant magnification can be varied.
Magnification is calculated as follows:

$$\textbf{Magnification} = \frac{\textbf{Telescope Focal Length (mm)}}{\textbf{Eyepiece Focal Length (mm)}}$$

The Bintel BT 202 Dobsonian has a focal length of 1200mm. So, the magnification with the supplied 26mm eyepiece is 1200mm ÷ 26mm = 46x.

The Bintel BT 252 Dobsonian has a focal length of 1250mm. So, the magnification with the supplied 32mm eye-piece is 1250mm ÷ 32mm = 39x.

The Bintel BT 302 Dobsonian has a focal length of 1500mm. So, the magnification with the supplied 32mm eye-piece is 1500mm ÷ 32mm = 46.8x.

The maximum attainable magnification for a telescope is directly related to how much light its optics can collect. A telescope with more light collecting area, or aperture, can yield higher magnifications than a smaller aperture telescope. The maximum practical magnification for any telescope, regardless of optical design, is about 40x per inch of aperture. This translates to about 320x for the Bintel BT 202 and 400x for the Bintel BT 252 and 480x for the Bintel BT 302

Keep in mind that as magnification is increased, the brightness of the object being viewed will decrease; this is an inherent principle of the physics of optics and cannot be avoided. If magnification is doubled, an image appears four times dimmer.
If magnification is tripled, image brightness is reduced by a factor of nine!

Note About High Magnifications:
Maximum magnifications are achieved only under the most ideal viewing conditions at the best observing sites. Most of the time, magnifications are limited to 200x or less, regardless of aperture. This is because the Earth’s atmosphere distorts light as it passes through. On nights of good “seeing”, the atmosphere will be still and will yield the least amount of distortion. On nights of poor seeing, the atmosphere will be turbulent, which means different densities of air are rapidly mixing. This causes significant distortion of the incoming light, which prevents sharp views at high magnifications.

Carrying the Telescope

Moving the Bintel Dobsonian is easy to do. Remove any eye-pieces from the telescope and eyepiece rack, and place them in an eyepiece case. You can also remove the finder scope and finder scope bracket, if you wish.

To carry the base, simply grasp the handle on the front of it. The tube should be carried with two hands. One way to do this is to grasp the tube with one hand while grasping the mirror cell end with the other . Another way is to grasp the tube with both hands around its circumference. Be careful when setting the tube down on its end so as not to bend or damage the primary mirror collimation screws on the bottom of the primary mirror cell.

When putting the Bintel Dobsonian into a vehicle, common sense prevails. It is especially important that the optical tube does not knock around; this can cause the optics to become misaligned, and could dent the tube.

4. Collimation (Aligning The Mirrors)

Collimation is the process of adjusting the mirrors so they are perfectly aligned with one another. Your telescope's optics were aligned in our work-shops, and should not need much adjustment unless the telescope was handled roughly during shipment. Accurate alignment is important to ensure the peak performance of your telescope, so it should be checked regularly. Collimation is relatively easy to do and can be done in daylight. To check the collimation, remove the eyepiece and look down the focuser drawtube. You should see the secondary mirror centered in the drawtube as well as the reflection of the primary mirror centered in the secondary mirror, and the reflection of the secondary mirror (and your eye) centered in the reflection of the primary mirror, as in Figure 12a. If anything is off-center, as in Figure 12b, proceed with the following collimation procedure It helps to put a piece of white paper on the inside of the optical tube opposite the focuser. It forms a bright background behind the secondary mirror, making it easier to distinguish the mirror holder from the background.

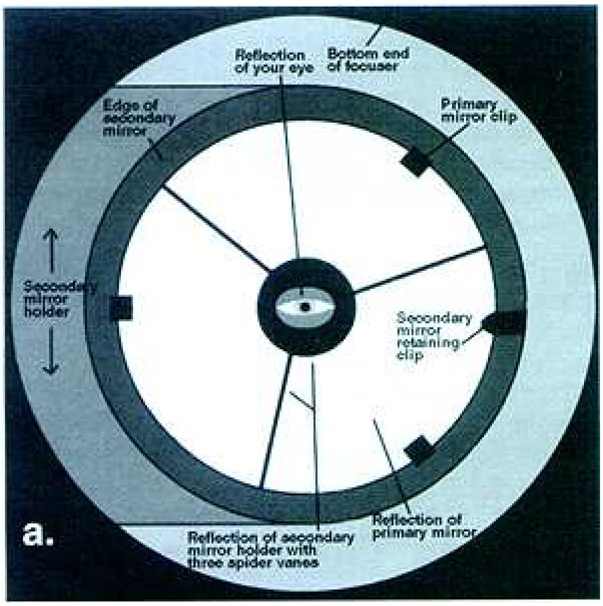
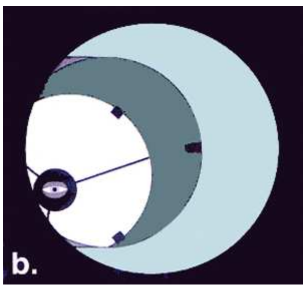
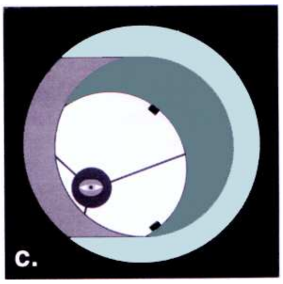


Figure 12a When all optical elements are collimated the view through the focuser should look like this.





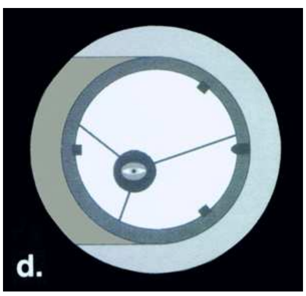


Figure 12b All elements are out of alignment

Figure 12c Secondary is centered under focuser but needs adjustment.

Figure 12d Secondary is collimated but primary needs adjustment

Use a Collimating Tool

To aid in centering your line of sight down the focuser drawtube, and in centering the mirror reflections during collimation, it is very helpful to use a precision collimating tool containing crosshairs, such as the Orion Collimating Eyepiece (#3640). We strongly recommend that you purchase one. Alternatively, you can make a crude collimating tool out of an empty, black plastic 35mm film canister. It will not have crosshairs, so it won't be as precise, but it will be better than nothing. Cut 1/2" from the top lip of the canister and put a 1/16" to 1/8" diameter hole in the center of its bottom. The film canister collimating tool goes into the focuser like an eyepiece, with the bottom end out.
The Bintel Deluxe Laser Collimator can also be used. It comes with it's own instruction manual.

Aligning the Secondary Mirror

With eyepiece removed, look straight down the open focuser drawtube at the secondary (diagonal) mirror. Ignore the reflections for the time being. The secondary mirror itself should be centered in the focuser drawtube, in the direction parallel to the length of the telescope. If it isn't, as in Figure 14b, it must be adjusted. (It helps to adjust the secondary mirror in a brightly lit room with the telescope pointed toward a bright surface, such as white paper or a wall.) Loosen the three small alignment screws in the center hub of the secondary mirror holder several turns. Now hold the secondary mirror holder stationary (be careful not to touch the surface of the secondary mirror!), while turning the center Phillips head screw (as in Figure 13). Turning the bolt clockwise will move the secondary mirror toward the front opening of the optical tube, while turning the bolt counter-clockwise will move the secondary mirror toward the primary mirror.
When the secondary mirror is centered in the focuser draw-tube, rotate the secondary mirror holder slight-ly until the reflection of the primary mirror is as cen-tered in the secondary mirror as it will get. It still may not be perfectly centered, but that is OK. Now tighten the three alignment screws to secure the secondary mirror in that position. This adjustment will rarely need to be done, if ever.

Figure 13 Adjust the tilt of the secondary mirror by adjusting the three alignment screws with a Phillips head screwdriver

Adjusting the Primary Mirror

The final adjustment is made to the primary mirror. It will need adjustment if, as in Figure 12d, the secondary mirror is centered under the focuser and the reflection of the primary mirror is centered in the secondary mirror, but the small reflection of the secondary mirror (with your eye inside) is off-center. The tilt of the primary mirror is adjusted with three spring-loaded collimation thumb screws on the back end of the optical tube (bottom of the primary mirror cell); these are the larger thumb screws. The other three smaller thumb screws lock the primary mirror's position in place; these thumb screws must be loosened before any collimation adjustments can be made to the primary mirror.

To start, unthread the thumb screws that lock the primary mirror in place a few turns each (Figure 14). The thumb screws are slotted, so if they are too difficult to loosen with your fingers, use a flat-head screwdriver.

Now, try tightening or loosening one of the spring-loaded collimation thumb screws one turn. Look into the focuser and see if the secondary mirror reflection has moved closer to the center of the primary mirror reflection. Repeat this process on the other two collimation thumb screws, if necessary. It will take a little trial and error to get a feel for how to tilt the mirror in this way to center the reflection. (It helps to have two people for primary mirror collimation, one to look in the focuser while the other adjusts the collimation thumbscrews.) Do not loosen (i.e., rotate counter-clockwise) each collimation thumb screw too much, or the thumb screw will completely unthread from the mirror cell. Rather, try tightening the other two collimation thumb screws. Once the secondary mirror reflection is centered in the primary mirror reflection, retighten the thumb screws that lock the primary mirror's position in place.

The view through the focuser should now show the reflection of the primary mirror is centered in the secondary mirror, and the reflection of the secondary mirror is centered in the reflection of the primary mirror. A simple star test will tell you whether the optics are accurately collimated.

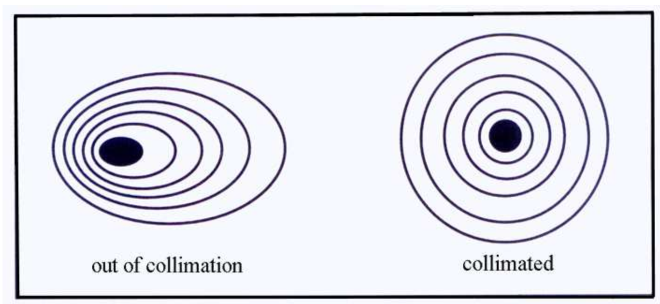
Shows the Primary Mirror locking screws

Shows the collimation adjustment screws

Star-Testing the Telescope

When it is dark, point the telescope at a bright star and accurately center it in the eyepiece's field-of-view. Slowly defocus the image with the focusing knob. If the telescope is correctly collimated, the expanding disk should be a perfect circle (Figure 16). If the image is unsymmetrical, the scope is out of collimation. The dark shadow cast by the secondary mirror should appear in the very center of the out-of-focus circle, like the hole in a doughnut. If the "hole" appears off-center, the telescope is out of collimation.

If you try the star test and the bright star you have selected is not accurately centered in the eyepiece, then the optics will always appear out of collimation, even though they may be perfectly aligned. It is critical to keep the star centered, so over time you will need to make slight corrections to the telescope's position in order to account for the sky's apparent motion.



Shows Star images when testing collimation

5. Astronomical Observing

Observing Tips

A. Site Selection
Pick a location away from street lights and bright yard lighting. Avoid viewing over rooftops and chimneys, as they often have warm air currents rising from them, which distort the image seen in the eyepiece. Similarly, you should not observe through an open window from indoors. Better yet, choose a site out-of-town, away from any "light pollution". You'll be stunned at how many more stars you'll see! Most importantly, make sure that any chosen site has a clear view of a large portion of the sky.

B. Seeing and Transparency

Atmospheric conditions play a huge part in quality of viewing. In conditions of good "seeing", star twinkling is minimal and objects appear steady in the eyepiece. Seeing is best overhead, worst at the horizon. Also, seeing generally gets better after midnight, when much of the heat absorbed by the Earth during the day has radiated off into space. Typically, seeing conditions will be better at sites that have an altitude over about 3000 feet. Altitude helps because it decreases the amount of distortion causing atmosphere you are looking through. A good way to judge if the seeing is good or not is to look at bright stars about 40° above the horizon. If the stars appear to "twinkle", the atmosphere is significantly distorting the incoming light, and views at high magnifications will not appear sharp. If the stars appear steady and do not twinkle, seeing conditions are probably good, and higher magnifications will be possible. Also, seeing conditions are typically poor during the day. This is because the heat from the Sun warms the air and causes turbulence. Good "transparency" is especially important for observing faint objects. It simply means the air is free of moisture, smoke, and dust. All tend to scatter light, which reduces an object's brightness.

C. Cooling the Telescope

All optical instruments need time to reach "thermal equilibrium" to achieve maximum stability of the lenses and mirrors, which is essential for peak performance. When moved from a warm indoor location, outside to cooler air (or vice-versa), a telescope needs time to cool to the ambient temperature.
All Bintel Dobsonian models have a Cooling Fan to assist in the cooling down period prior to use.
Caution: Cooling fan should be turned off before the scope is used. The battery pack normally sits in the bottom of the rocker.

D. Let Your Eyes Dark-Adapt

Do not expect to go from a lighted house into the darkness of the outdoors at night and immediately see faint nebulas, galaxies, and star clusters- or even very many stars, for that matter. Your eyes take about 30 minutes to reach perhaps 80% of their full dark-adapted sensitivity. Many observers notice improvements after several hours of total darkness. As your eyes become dark-adapted, more stars will glimmer into view and you will be able to see fainter details in objects you view in your telescope. Exposing your eyes to very bright day-light for extended periods of time can adversely affect your night vision for days. So give yourself at least a little while to get used to the dark before you begin observing. To see what you are doing in the darkness, use a red-filtered flashlight rather than a white light. Red light does not spoil your eyes' dark adaptation like white light does. A flashlight with a red LED light is ideal, or you can cover the front of a regular incandescent flashlight with red cellophane or paper. Beware, too, that nearby porch and street lights and automobile headlights will spoil your night vision.

Tracking Celestial Objects

The Earth is constantly rotating about its polar axis, completing one full rotation every 24 hours; this is what defines a "day". We do not feel the Earth rotating, but we can tell that it is at night by seeing the apparent movement of stars from east to west. This movement translates into a rate of .25° per minute, or 15 arc-seconds per second. (There are 60 arc-minutes in 1°, and 60 arc-seconds in one arc-minute.) This is called the sidereal rate. When you observe any astronomical object, you are watching a moving target. This means the telescope's position must be slowly updated over time to keep an object in the field of view. To keep the object in the telescope's field of view (to "track" it), the telescope must be moved by small increments every now and then, in the direction the object is moving. This is easy to do with a Bintel Dobsonian because of its buttery smooth motion on both axes. As the object moves off toward the edge of the field of view, you just lightly nudge the telescope to bring it back to the center. You will notice that it is more difficult to track objects when the telescope tube is aimed nearly straight up. This is inherent to the basic design of the Dobsonian, and stems from the fact that there is very little leverage to move in azimuth when the tube is in a near-vertical position.
To gain more leverage, try grasping the tube close to the altitude side bearings with both hands. Also, when looking overhead, if the telescope cannot be moved any more in altitude, rotate the telescope 180° in azimuth to continue motion. Remember that objects appear to move across the field of view faster at higher magnifications. This is because the field of view becomes narrower.

Eyepiece Selection

By using eyepieces of varying focal lengths, it is possible to attain many magnifications with the Bintel Dobsonian. The telescopes come with two high -quality Plossl eyepieces: a 15mm, which gives a magnification of 80x and 83x, and a 9mm, which gives a magnification of 139x and 133x as well as a wide angle 2" eyepiece, either 26mm or 32mm. Other eyepieces can be used to achieve higher or lower powers. It is quite common for an observer to own five or more eyepieces to access a wide range of magnifications. This allows the observer to choose the best eyepiece to use depending on the object being viewed. At least to begin with, the three supplied eyepieces will suffice nicely. Whatever you choose to view, always start by inserting your lowest power (longest focal length) eyepiece to locate and center the object. Low magnification yields a wide field of view, which shows a larger area of sky in the eyepiece. This makes acquiring and centering an object much easier. Once you've centered the object in the eyepiece, you can switch to higher magnification (shorter focal length eyepiece), if you wish. This is especially recommended for small and bright objects, like planets and double stars. The Moon also takes higher magnifications well.
Deep-sky objects, however, typically look better at medium or low magnifications. This is because many of them are quite faint, yet have some extent (apparent width). Deep-sky objects will often disappear at higher magnifications, since greater magnification inherently yields dimmer images. This is not the case for all deep-sky objects, however. Many galaxies are quite small, yet are somewhat bright, so higher power may show more detail. The best rule of thumb with eyepiece selection is to start with a low power, wide field, and then work your way up in magnification. If the object looks better, try an even higher magnification. If the object looks worse, then back off the magnification a little by using a lower power eyepiece.

Field of View

One of the most important considerations with eyepieces is also the most overlooked consideration when making eyepiece selection . In all star charts or catalogs the suggested power is never mentioned Deep sky objects are always shown by their size. The size is nearly always shown in arc minutes. To determine the field of view of any given eyepiece in arc minutes follow this simple formula.

Each type of eyepiece has an apparent field of view
ie (Plossl = 50° Apparent field)
Divide the Apparent field by the Magnification

The answer will the Real field of view in degrees

Multiply this answer by 60 and you will have the field of view in arc minutes.

Now pick the eyepiece that the object fits into and enjoy the view. It will be much better than just going by power alone.

Use of 2" Eyepieces

The Bintel Dobsonian comes with 2" focuser (Figure 9) as standard equipment. Because of its large size, it is able to accept eyepieces that have a 2" barrel diameter. 2" eyepieces are desirable because they allow for a wider field of view than 1.25" eyepieces. Many observers own at least one 2" eyepiece to yield the largest field of view possible for looking at wide deep sky objects, such as open star clusters and gaseous nebulae. 2" eyepieces can also give nice views of the Moon. To use a 2" eyepiece, simply remove the 1.25" eyepiece adapter from the end of the focuser drawtube. You must first loosen the two thumb screws on the 2" eyepiece adapter to do this. Now, insert a 2" eyepiece into the focuser, and secure it with the two thumb screws. Focus the eyepiece as described previously. You'll be stunned at the wide fields of view that 2" eyepieces can deliver. It makes you feel like you're floating through space!

Objects to Observe

Now that you are all set up and ready to go, one critical decision must be made: what to look at?

The Moon

With its rocky surface, the Moon is one of the easiest and most interesting targets to view with your telescope. Lunar craters, marias, and even mountain ranges can all be clearly seen from an average distance of 350,000 kms away! With its ever -changing phases, you'll get a new view of the Moon every night. The best time to observe our one and only natural satellite is during a partial phase, that is, when the Moon is **NOT** full. During partial phases, shadows are cast on the surface, which reveal more detail, especially right along the border between the dark and light portions of the disk (called the "terminator"). A full Moon is too bright and devoid of surface shadows to yield a pleasing view. Make sure to observe the Moon when it is well above the horizon to get the sharpest images.
Use the included Moon filter to dim the Moon when it is very bright. It simply threads onto the bottom of the eyepieces (you must first remove the eyepiece from the focuser to attach a filter). You'll find that the Moon filter improves viewing comfort, and also helps to bring out subtle features on the lunar surface. Some coloured filters also help to cast different shadows.

The Sun

You can change your nighttime telescope into a daytime Sun viewer by installing an optional full-aperture solar filter over the front opening of a Bintel Dobsonian. The primary attraction is sunspots, which change shape, appearance, and location daily. Sunspots are directly related to magnetic activity in the Sun. Many observers like to make drawings of sunspots to monitor how the Sun is changing from day to day.
Important Note:
Do not look at the Sun with any optical instrument without a professionally made solar filter, or permanent eye damage could result.

The Planets

The planets don't stay put like the stars, so to find them you should refer to our website (www.bintel.com.au/newsletter.html), or to charts published monthly in our newslettrer Night Sky or astronomy magazines like Sky and Space, Sky & Telescope.. Venus, Mars, Jupiter, and Saturn are the brightest objects in the sky after the Sun and the Moon.
Your Bintel Dobsonian is capable of showing you these planets in some detail. Other planets may be visible but will likely appear star like. Because planets are quite small in apparent size, optional higher power eye-pieces are recommended and often needed for detailed observations. Not all the planets are generally visible at anyone time.

JUPITER The largest planet, Jupiter, is a great subject for observation. You can see the disk of the giant planet and watch the ever-changing positions of its four largest moons -Io, Callisto, Europa, and Ganymede. Higher power eyepieces should bring out the cloud bands on the planet's disk.
SATURN The ringed planet is a breathtaking sight when it is well positioned. The tilt angle of the rings varies over a period of many years; sometimes they are seen edge-on, while at other times they are broadside and look like giant "ears" on each side of Saturn's disk. A steady atmosphere (good see- ing) is necessary for a good view. You will probably see a bright "star" close by, which is Saturn's brightest moon, Titan.
VENUS At its brightest, Venus is the most luminous object in the sky, excluding the Sun and the Moon. It is so bright that sometimes it is visible to the naked eye during full daylight! Ironically, Venus appears as a thin crescent, not a full disk, when at its peak brightness. Because it is so close to the Sun, it never wanders too far from the morning or evening horizon. No surface markings can be seen on Venus, which is always shrouded in dense clouds.
MARS The Red Planet makes its closest approach to Earth every two years. During close approaches you'll see a red disk, and may be able to see the polar ice cap. To see surface detail on Mars, you will need a high power eyepiece and very steady air!

The Stars

Stars will appear like twinkling points of light. Even powerful telescopes cannot magnify stars to appear as more than a point of light! You can, however, enjoy the different colors of the stars and locate many pretty double and multiple stars. The famous "Alpha Cenaturi" in the constellation Centaurus and the gorgeous two-color double star Albireo in Cygnus are favorites. Defocusing a star slightly can help bring out its color.

Deep-Sky Objects

Under dark skies, you can observe a wealth of fascinating deep-sky objects, including gaseous nebulas, open and Globular star clusters, and a variety of different types of galaxies. Most deep-sky objects are very faint, so it is important that you find an observing site well away from light pollution. Take plenty of time to let your eyes adjust to the darkness. Do not expect these subjects to appear like the photographs you see in books and magazines; most will look like dim gray smudges.

How to Find Deep-sky Objects:

Starhopping

Starhopping, as it is called by astronomers, is perhaps the simplest way to hunt down objects to view in the night sky. It entails first pointing the telescope at a star close to the object you wish to observe, and then progressing to other stars closer and closer to the object until it is in the field of view of the eyepiece. It is a very intuitive technique that has been employed for hundreds of years by professional and amateur astronomers alike. Keep in mind, as with any new task, that starhopping may seem challenging at first, but will become easier over time and with practice.
To starhop, only a minimal amount of additional equipment is necessary. A star chart or atlas that shows stars to at least magnitude 5 is required. Select one that shows the positions of many deep-sky objects, so you will have a lot of options to choose from. If you do not know the positions of the constellations in the night sky, you will need to get a planisphere to identify them. Start by choosing bright objects to view. The brightness of an object is measured by its visual magnitude; the brighter an object, the lower its magnitude. Choose an object with a visual magnitude of 9 or lower. Many beginners start with the Messier objects, which represent some of the best and brightest deep-sky objects, first catalogued about 200 years ago by the French astronomer Charles Messier.

Determine in which constellation the object lies. Now, find the constellation in the sky. If you do not recognize the constellations on sight, consult a planisphere. The planisphere gives an all-sky view and shows which constellations are visible on a given night at a given time. Now, look at your star chart and find the brightest star in the constellation that is near the object you are trying to find. Using the finder scope, point the telescope at this star and center it on the crosshairs. Next, look again at the star chart and find another suitably bright star near the bright star currently centered in the finder. Keep in mind that the field of view of the finder scope is approximately 5°, so you should choose another star that is no more that 5° from the first star, if possible. Move the telescope slightly, until the telescope is centered on the new star. Continue using stars as guideposts in this way until you are at the approximate position of the object you are trying to find (Figure 17). Look in the telescope's eyepiece, and the object should be somewhere within the field of view. If it's not, sweep the telescope carefully around the immediate vicinity until the object is found.. If you have trouble finding the object, start the starhop again from the brightest star near the object you wish to view. This time, be sure the stars indicated on the star chart are in fact the stars you are centering in the eyepiece. Remember, the finder scope (and main telescope eyepiece, for that matter) gives an inverted image, so you must keep this in mind when star-hopping from star to star.

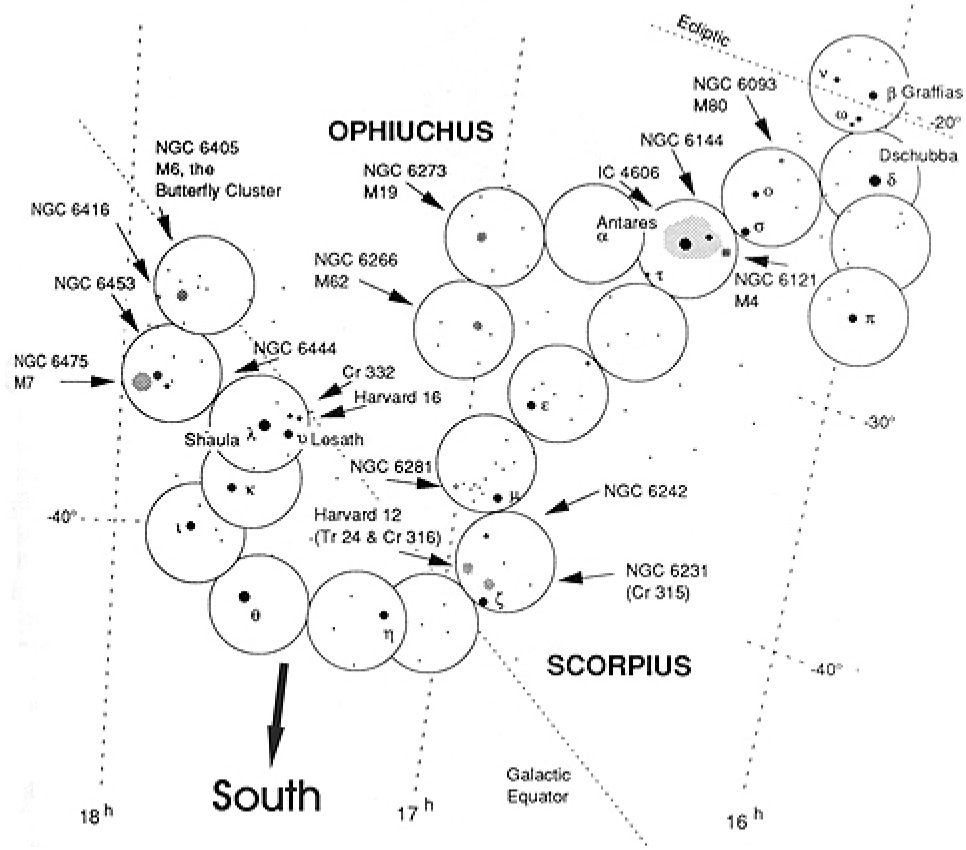
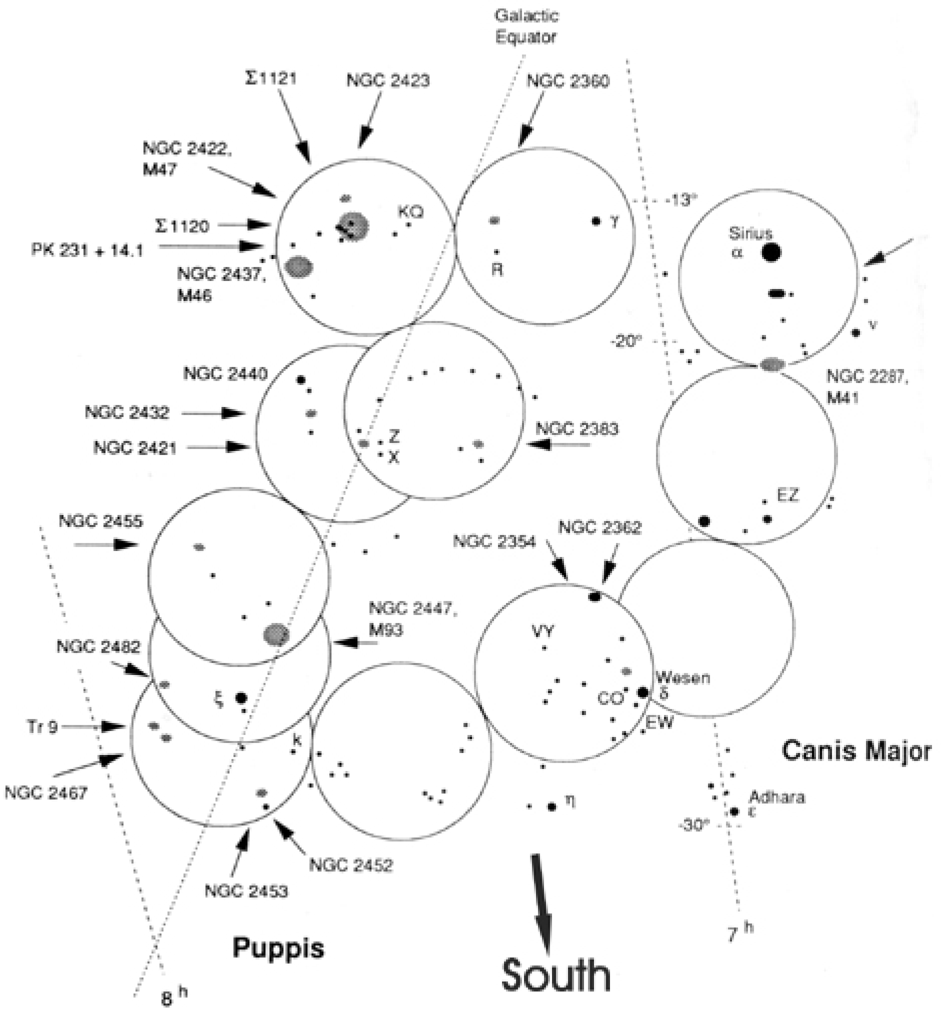


Figure Above shows the Scorpius area of the Winter Milky Way. Each circle is of a finderscope field of view.
Figure Below Shows the Puppis area of the Summer Milky Way



Star Hopping

In the star hops at left are two of the best regions of the night sky as seen from the Southern Hemisphere. The winter milky way has the centre of the galaxy going over head during the night and the constellation of Scorpius is most conspicuous by it's distinctive shape.

Using just the finderscope and a low power eyepiece and beginning at the bright star Dschubba in the head of Scorpius we move one finderscope field we find the 4.5 magnitude star Omicron Scorpii. In the same field of view is the Globular Cluster M80. (NGC 6093) Now that we have it in the field of view we can use low power to have a look at this object. If the conditions allow change to higher power for an even better view.
Back to low power and move one finder field to Alpha Scorpii (Antares). Messier 4 (NGC 6121) is a bright Globular Cluster with a line of 10th magnitude stars running north south through it.
By using the low power and moving one field at a time many objects will be found.

In the summer Milky Way the Puppis – Canis Major region lies south east of Orion.
Begin at the brightest star in the sky, Sirius. By placing Sirius at the edge of the finderscope Messier 41 (NGC 2287) should be at the other edge of the field. Centre it and using low power before moving to higher power.
Follow this star hop to see some of the summer skies best kept secrets.
The secret to starhopping is to take your time and start with low power. The more often you star hop the easier it will become and before you know it you will be navigating the skies and seeing more objects than if you just looked for single objects at a time.

6. Care and Maintenance

If you give your telescope reasonable care, it will last a life-time. Store it in a clean, dry, dust-free place, safe from rapid changes in temperature and humidity. Do not store the telescope outdoors, although storage in a garage or shed is OK. Small components like eyepieces and other accessories should be kept in a protective box or storage case. Keep the cap on the front of the telescope when it is not in use. The telescope requires very little mechanical maintenance. The optical tube is steel and has a smooth painted finish that is fairly scratch -resistant. If a scratch does appear on the tube, it will not harm the telescope. If you wish, you may apply some auto touch-up paint to the scratch. Smudges on the tube can be wiped off with a soft cloth and a household cleaner such as Windex or similar.

Cleaning Lenses

Any quality optical lens cleaning tissue and optical lens cleaning fluid specifically designed for multi-coated optics can be used to clean the exposed lenses of your eyepieces or finderscope. Before cleaning with fluid and tissue, blow any loose particles off the lens with a blower. Then apply some cleaning fluid to a tissue, never directly on the optics. Wipe the lens gently in a circular motion, then remove any excess fluid with a fresh lens tissue. Oily fingerprints and smudges may be removed using this method. Use caution; rubbing too hard may scratch the lens. On larger lenses, clean only a small area at a time, using a fresh lens tissue on each area. Never reuse tissues.

Cleaning Mirrors

You should not have to clean the telescope's mirrors very often; normally once every year or so. Covering the telescope with the dust cap when it is not in use will prevent dust from accumulating on the mirrors. Improper cleaning can scratch mirror coatings, so the fewer times you have to clean the mirrors, the better. Small specks of dust or flecks of paint have virtually no effect on the visual performance of the telescope. The large primary mirror and the elliptical secondary mirror of your telescope are front-surface aluminized and over-coated with hard silicon monoxide, which prevents the aluminum from oxidizing. These coatings normally last through many years of use before requiring re-coating (which is easily done). To clean the secondary mirror, first remove it from the telescope. Do this by keeping the secondary mirror holder stationary with your fingers while unthreading the center Phillips head screw in the hub of the 4-vaned spider. The entire mirror holder will come out of the telescope. The secondary mirror itself cannot be removed from the holder because it is glued into place. Handle the entire assembly carefully by the holder only; do not touch the mirror surface. You can clean the secondary mirror in its holder by following the same procedure described below for cleaning the primary mirror.

To clean the primary mirror, carefully remove the mirror cell from the telescope. This is done by removing the six screws that connect the entire mirror cell to the steel tube. These screws are located on the outside of the tube, just above the mirror cell casting.

Now, remove the mirror from the mirror cell by first removing the four mirror clips that secure the mirror in its cell. Use a Phillips screwdriver to unthread the mirror clip anchor screws. Next, hold the mirror by its edge, and remove it from the mirror cell. Be careful not to touch the aluminized surface of the mirror with your fingers! Set the mirror on a clean, soft towel. Fill a clean sink, free of abrasive cleanser, with room-temperature water, a few drops of liquid dishwashing detergent, and if possible, a cap-full of isopropyl alcohol. Submerge the mirror (aluminized face up) in the water and let it soak for several minutes (or hours if it's a very dirty mirror). Wipe the mirror under water with clean cotton balls, using no downward pressure and stroking in straight lines across the surface.

Use one ball for each wipe across the mirror. Then rinse the mirror under a stream of lukewarm water. And a final rinse with distilled water.

Dry the mirror in a stream of air (a "blower bulb" works great), or remove any stray drops of water with a Q-Tip. Water will run off a clean surface. Dry the bottom and edge surfaces with a towel (Not the mirror surface!). Once the mirror is completely dry it is ready for reassembling the telescope, which is the reverse of what you have just done

If you have any questions ring Bintel Customer Support on
(02) 95187255 or (03) 98220033

7. Specifications BT 152 / BT 202

Bintel BT 152:

Focal Length: 1200mm
Aperture: 152mm
Focal Ratio: f/7.9
Mirror Coatings: Aluminum with SiO_2 overcoat.
Minor Axis of Secondary Mirror: 47.0mm
Weight: 19.5kg.
Tube Length: 1181mm
Tube Outer Diameter: 176mm
Focuser: 1.25" Crayford design .
Eyepieces: 25mm & 9mm Bintel Plössl,1.25" barrel diameter, ND #96 Filter
Magnification: 48x & 133x
Finder Scope: 6 x power, 30mm aperture
Finder bracket: Dovetail base, spring-loaded X-Y alignment

Bintel BT 202:

Focal Length: 1200mm
Aperture: 203mm
Focal Ratio: f/5.9
Mirror Coatings: Aluminum with SiO 2 overcoat.
Minor Axis of Secondary Mirror: 47.0mm
Weight: 25kg.
Tube Length: 1181mm
Tube Outer Diameter: 235mm
Focuser: 2" Crayford design with 1.25"adapter.
Eyepieces: 30mm Superview (2"), 15mm & 9mm Bintel Plössl, fully coated with multi-coatings, 1.25" barrel diameter
Magnification: 46X, 80x & 133x
Finder Scope: 8x power, 50mm aperture, Achromat
Finder bracket: Dovetail base, spring-loaded X-Y alignment
Cooling fan with Battery Pack

8. Specifications BT 252 / BT 302

Bintel BT 252:
Focal Length: 1250mm
Aperture: 250mm
Focal Ratio: f/5
Mirror Coatings: aluminium with SiO overcoat.
Minor Axis of Secondary Mirror: 63mm
Weight: 26kgs (tube 16kgs., base 10kgs.)
Tube Length: 1220mm
Tube Outer Diameter: 303mm
Focuser: 2" Crayford design with 1.25" adapter.
Eyepieces: 30mm Superview (2"),15mm & 9mm Bintel Plössl, 1.25" barrel diameter, ND96 Filter
Magnifications : 48x, 83x & 139x
Finder Scope: 8x power, 50mm aperture,
Finderbracket: Dovetail base, spring-loaded X-Y alignment
Cooling fan and Battery Pack

Bintel BT 302:
Focal Length: 1520mm
Aperture: 304mm
Focal Ratio: f/5
Mirror Coatings: aluminium with SiO overcoat
Minor Axis of Secondary Mirror: 70mm
Weight: 37kgs (tube 22kg, base 15kg.)
Tube Length: 1450mm
Tube Outer Diameter: 360mm
Focuser: 2" Crayford design with 1.25" adapter.
Eyepieces: 30mm Superview, 2" barrel diameter, 15mm & 9mm Bintel Plössl, 1.25"
Magnification: 47x, 100x & 167x
Finder Scope: 8x power, 50mm aperture,
Finderbracket: Dovetail base, spring-loaded X-Y alignment
Cooling Fan with Battery Pack

9. Suggested Accessories

Bintel Plossl Eyepieces
Bintel Plossl eyepieces provide sharp, 50° apparent field with 1.25" barrels. Available in 40mm, 32mm, 20mm, 15mm, 12mm, 9mm, 6mm

Bintel Wide Angle Eyepieces 2"
65° Field of View. Sharp images, ghost free images. Available in 40mm, 32mm,.

TeleVue Eyepieces
These are the standard candle of eyepieces and come in various focal lengths. TeleVue eyepieces offer the sharpest images ..

Coloured Eyepiece Filters
Enhance planetary and lunar images with coloured filters, whether it be the equatorial belts of Jupiter, dust storms on Mars or crater details on the Moon, there is a filter to enhance the view.

Full Aperture Solar Filters
The only safe way to observe the sun is with a full aperture glass solar filter. Sunspots, their umbrae, penumbrae become easily and safely visible.

Bandpass Filters
Cut Light pollution and enhance Nebulae with Astronomik bandpass filters. CLS, UHC, OIII, H-alpha, H-beta SII filters available. Also EOS Clip in

Barlow Lenses
To gain magnification without loss of eye relief, the best way is to use a barlow lens. Barlow lenses range in price and amplifying power.

Star Charts

Astronomy 201?
This annual ephemeris is a practical guide to the night sky. The most useful book for Australian Amateur astronomers.

Tirions Bright Star Atlas
A very good easy to understand star chart for beginner to advanced astronomer alike.

Sky Atlas 2000.0 2nd Edition
A great set of star charts available in Field, Desk or Deluxe versions to suit all levels of astronomer.

Sky Atlas 2000.0 Companion
An invaluable partner to the Sky Atlas 2000.

Telescope Computer

Argo Navis
The worlds best Digital Telescope Computer.
30,000 Objects at your fingertips. Australian Made.
With Bintel Exclusive Hardware.

Two-Year Limited Warranty

This Bintel Dobsonian Reflecting Telescope is warranted against defects in materials and workmanship for a period of two years from the date of purchase. This warranty is for the benefit of the original retail purchaser only. During this warranty The Binocular and Telescopes Shop will repair or replace, at Bintel's option, any warranted instrument that proves to be defective, provided it is returned freight paid to:

The Binocular and Telescope Shop at
84Wentworth Park Rd Glebe 2037
519 Burke Rd Camberwell 3124

Proof of purchase (such as original invoice) is required. This warranty does not apply if, in Bintel's judgment, the instrument has been abused, mishandled, or modified, nor does it apply to normal wear and tear.
For further details contact The Binocular and Telescope Shop Customer Service on (02) 9518 7255

The Binocular and Telescope Shop
84 Wentworth Park Rd Glebe NSW 2037
519 Burke Rd Camberwell VIC 3124
Phone:(02) 9518 7255 in NSW (03) 9822 0033 in VIC
Email: info@bintel.com.au
Web: www.bintel.com.au