PENTAX®

MARINE 7x50 Binocular Owner's Manual

The PENTAX Marine roof prism binocular is designed particularly for the boating enthusiast, but is also ideal for any demanding environment or application where accuracy and durability is required. Featuring a liquid-filled compass built in to the viewing optics, compass "swing" stops immediately due to an advanced dampening design. Bearings are defined in easy-to-read precise 1-degree increments, ideal for navigation and locating objects accurately. A range-finding scale allows the user to estimate range based on objects of known size. The PENTAX Marine binocular is fully waterproof, fogproof, and shock-protected with sure-grip rubber armoring and twist-out eyecups for easy use. PENTAX Optics are fully multi-coated for excellent light transmission and clarity. The PENTAX Marine binocular comes complete with a rugged nylon case and neck strap. Built to last, the PENTAX Marine binocular features our lifetime Worry-Free Warranty.

SPECIFICATIONS:

Lens Construction	7 elements / 5 groups
Lens Coating	Fully multi-coated
Magnification	7X
Objective Lens Diameter	50mm
Prism Type / Coating	BaK4 – silver deposited
Eye Relief	17.6mm
Real Field of View	6.6 degrees
Field of View @ 1000 yds.	348 ft.
Field of View @ 1000 m	116m
Exit Pupil Diameter	6.8mm
Relative Brightness	51
Diopter Adjustment Range	+/-3
Interpupilary Adj. Range	56mm-73mm
Focus Range	3.3 feet – infinity (3m –infinity)
Eyecup	Helicoid type
Waterproof	Nitrogen-filled, 1.5m depth
Dimensions	7" H x 5.4"
Weight	34.4 oz (976 g)

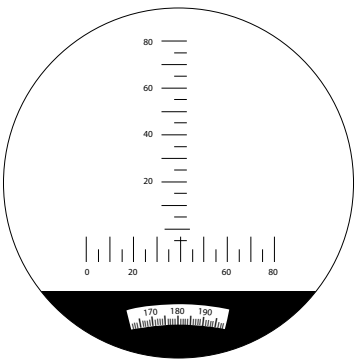
How to Use:

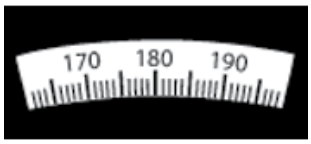
1. Adjust interpupilary distance until a single image circle is formed.
2. Acquire a test subject and sharply focus the left eye using the center focusing knob.
3. Looking through the right eyepiece turn the diopter to sharply focus on the same subject.

Each user may have to re-adjust the binocular to suit their particular vision correction.

Using the Compass:

The built-in precision compass features extremely fast dampening, so there is almost no "swing" and it is corrected for latitude (dip). The compass scale is defined in 1 degree increments and is aligned with the vertical range finding scale. When using the compass, always keep in mind the local variation between magnetic and true North.





Reticle:
The vertical scale of this reticle, (visible through the right half of the binocular), allows you to calculate distance from your position to an object, provided its height is known. You may also calculate the height of an object if you know its distance from you. Detailed instructions follow in this manual.

Compass Illumination:
The PENTAX Marine binocular features a compass illuminator that functions with available ambient light. Light enters through a small white diffuser disc on top of the compass housing to illuminate the compass scale. Bright ambient light levels make the scale appear bright and low light levels make the scale appear dim. In order to adequately view the compass scale in ambient light, make certain not to cover the diffuser disc.

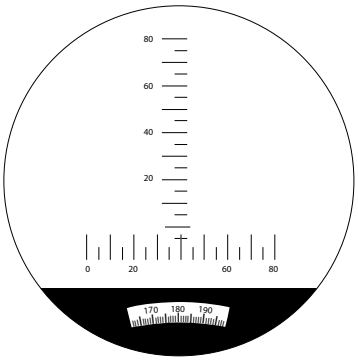
Using the Compass Illuminator Lamp:
The PENTAX Marine binocular is equipped with a built-in LED compass illuminator for use at night and in low light conditions. The compass housing is located on the top right side of the binocular. When the ambient light level does not permit you to see the compass scale clearly, depress the black power button on top of the compass housing to power the lamp. The lamp is illuminated only while the button is depressed. If the illuminator lamp is dim or does not come on, replace the batteries. If fresh batteries do not provide illumination, the unit may require service.

Changing Batteries:
Both batteries should always be changed at the same time. To change batteries, use a thin coin to unscrew the battery chamber cover, by turning it counter-clockwise. Remove the old batteries. Insert both new batteries properly seated with "+" facing up. Replace the battery chamber cover by turning it in a clockwise direction; making certain it is properly sealed (to prevent penetration of outside moisture). If the binocular is not to be used for an extended time, remove the batteries. This keeps the binocular safe from battery leakage during storage.

Battery type:	(2) LR43 (1.5v alkaline)
Equivalent types:	AG12, G12, 386, CX186 - (1.5v)

IMPORTANT:
AFTER DIRECT EXPOSURE TO SALTWATER OR SALT-SPRAY, RINSE THE BINOCULAR THOROUGHLY WITH FRESH WATER AND WIPE DRY. AVOID EXTENDED EXPOSURE TO BRIGHT DIRECT SUNLIGHT AND SEVERE TEMPERATURE FLUCTUATIONS. IF USED IN VERY COLD TEMPERATURES, GRADUALLY EXPOSE THE UNIT TO WARMER TEMPERATURES IN ORDER TO AVOID CONDENSATION BUILD-UP.

Ranging Reticle:
This reticle features vertical and horizontal scales. Each minor division on the horizontal scale and vertical scale indicates 5 mils and each major division indicates 10 mils.

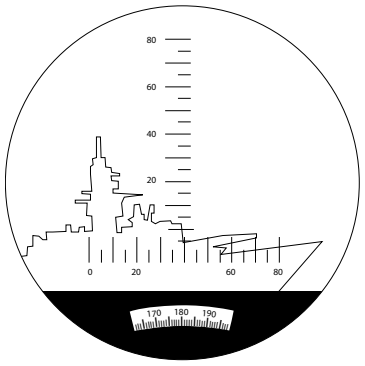


Equivalents:
5 mils = .3 degrees
10 mils = .6 degrees
1 degree = 17.8 mils
1 degree = 60 minutes
360 degrees = 6400 mils

Using the Reticle to Measure Azimuth:
Azimuth is defined as the angle (usually in degrees) between a reference plane and a point. In navigation, the reference plane is typically true North which is defined as 0 degrees North. In rotating your viewing position clockwise to a point due East (from true North), the azimuth is 90 degrees; due South the azimuth is 180 degrees, due West the azimuth is 270 degrees, and due North is referenced as 360 degrees on the compass scale.

The PENTAX Marine's mil reticle can measure the azimuth angle, altitude (elevation) angle, and can help you calculate distance from the viewer to the object, and the size of an object based on known distance from the viewer.

How to Measure Azimuth Angle:
In the binocular, azimuth angle is defined by the horizontal reticle scale. If the size of an object falls within the horizontal scale, select a single point on this scale as the reference, and position this mark on an outside edge of the visible object, and hold the binocular steady. Looking at the opposite outside edge of the object, simply read off the mils as indicated on the scale. (This is the distance from one edge of the object to its other edge - in mils).



If the size of an object is larger than the extent of the reticle scale, the same general method is employed, but by making several "step-by-step" measurements. Starting at an outside edge of the object, place either end mark of the scale on that edge so the scale overlaps the object, and read the distance to the opposite end of the scale, which will fall somewhere on the object. Visually note this location on the object. Move the same end mark of the reticle scale to meet this new reference point and note the remaining distance on the scale to the opposite outside edge of the object. Then simply add the sum of each step-by-step measurement to determine total azimuth in mils.

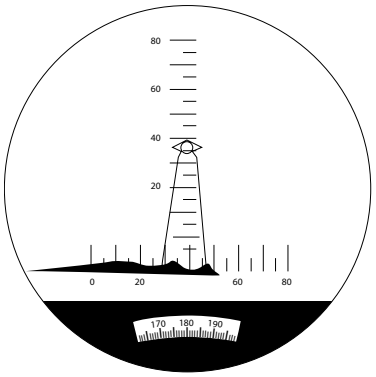
Azimuth can also be used to determine the distance (in mils) between two objects on the horizon. However, if the distance between two objects is greater than the range on the reticle scale, a point (or points) of reference on the horizon between the objects must be present for accurate step-by-step measurement.

Using the Reticle to Measure the Altitude (Elevation) Angle:
Altitude is defined as the angle (usually in degrees) from a point on the horizon, to a point above or below.

How to Measure the Altitude Angle:
In the binocular, altitude angle is defined by the vertical reticle scale. If the size of an object falls within the range of the vertical scale, and is measured above the horizon, select the bottom point of the vertical scale as the reference, and position this mark on the horizon (or bottom) of the visible object being measured, and hold the binocular steady. Looking at the top edge of the object, simply read off the mils as indicated on the scale. (This is the altitude angle from the bottom of the object to its top - in mils).

If the size of an object falls within the range of the vertical scale, and is measured below the horizon, select the bottom mark of the vertical scale as the reference, and position this mark on the bottom end of the object being measured, and hold the binocular steady. Looking at the end of the object on the horizon, simply read off the mils as indicated on the scale. (This is the altitude angle from the horizon to the end of the object below the horizon - in mils).

If the size of an object is larger than the extent of the reticle scale, the same method is employed, but by making several "step-by-step" measurements. Starting at an outside edge of the object, place either end mark of the scale on that edge so the scale overlaps the object, and read the distance to the opposite end of the scale, which will fall somewhere on the object. Visually note this new reference location on the object. Move the same end mark of the reticle scale to meet this new visual reference point and note the remaining distance on the scale to the other outside edge of the object. Then simply add the sum of the step-by-step measurements to determine total altitude in mils.



Using the Reticle to Determine Distance:
The reticle can be used to determine the distance from the viewer to the object.

Formula:
L(km)=H(m)/W
L = distance from observer to object (in kilometers)
H = height of object in meters
W = altitude angle measured with the reticle (in mils)

EXAMPLE:
To determine distance, the object height must first be known or estimated. Then, measure the altitude angle with the vertical reticle scale.

In this example the object is estimated to be 30m in height **(H=30)**.

The altitude angle is measured in the reticle at 60 mils **(W=60)**.

Simply divide the height by the altitude angle to determine distance.

30/60 = .5

The distance of the object is .5 kilometers from the viewer.

Using the Vertical Reticle to Determine the Height of an Object Using Altitude Readings:
You can calculate subject height using the following formula:

H=D x W
H= Object height
D= Distance from the viewer
W = Altitude angle

First, estimate the distance from the object being measured. Then, measure the altitude angle. Multiply the distance in kilometers by the altitude angle indicated by the reticle. This equals object height.

EXAMPLE:
The estimated distance from the viewer to the object being measured is .6km.
The altitude angle is 60 mils (0-60)
H = .6 X 60 = 36m
The object height is 36m

Using the Horizontal Reticle to Determine the Width of an Object Using Azimuth Readings:
You can calculate subject width using the following formula:
W = D X L

EXAMPLE:
D = estimated distance from the viewer to the object is .4km.
L = azimuth angle - which is 40 mils (0-40)
W = .4 X 40 = 16m
The object is 16m wide.

Using the Compass:
Azimuth angle can also be determined using the compass which is built-in to the right half of the binocular. It indicates azimuth (in degrees). Each graduation mark on the compass scale indicates 1 degree. The compass scale is below the reticle and is separate from it. However, the compass indicator mark is in direct line with the center of the vertical (altitude) reticle scale.

Identifying Compass Headings in Degrees:
North - 0 degrees (referenced as 360 degrees on PENTAX Marine's compass scale)
East - 90 degrees
South - 180 degrees
West - 270 degrees

In order to maintain accurate compass readings, the binocular should be held horizontally and as level as possible. This insures smooth fluid movement of the compass indicator, and reduces "jumping", "dragging" or binding of the scale (which can cause errors in readings). To increase accuracy, it is important to allow the compass scale to settle to a complete stop before attempting to determine headings.

Setting Your Position:
To verify your directional positioning (or bearings), simply rotate your viewing position until "360" is indicated in the center of the compass scale. This indicates the viewer is facing due North. For the greatest accuracy, always keep in mind the local variation between magnetic and true North.

Locating the Heading of an Object:
To locate the heading of an object relative to your position, simply align the vertical (altitude) reticle on the object and read the heading on the compass scale.

Compass Illuminator:
When ambient light levels are too low to see the scale, the scale illuminator lamp must be employed. However, in order to save battery power, do not use the illuminator lamp when ambient light levels are sufficient to see the scale.