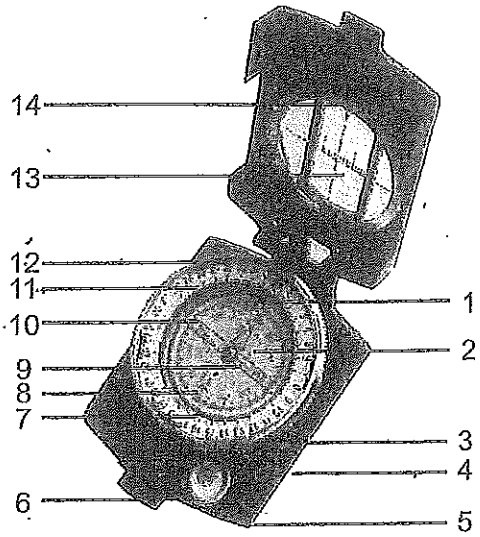


Prismatic Compass

1 Thumb ring

2 North line with north arrow

3 Bubble level

4 Compass rose with 360° scale

5 Rotary dial with 360° -scale.

6 Inch scale

7 Base table

8 Housing.

9 Lens prism, vertically adjustable

10 Sapphire bearing

11 cm scale

12 Stand thread

13 Sighting window with sighting line

14 Lind

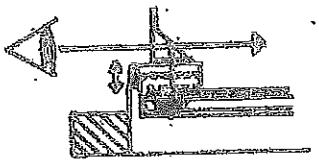
Instructions for use

Prismatic compass

The compass consists of a metal housing and a metal /plastic lid with a glass window with the sighting line etched into it.

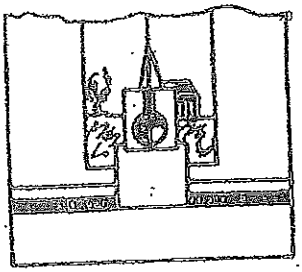
The spherically ground glass prism is mounted in a robust hinged housing that can be turned through 180°.This allows the prism to be moved into reading position and be folded back after use. The prism is attached to the compass housing by a vertical spring holder which allows appros.3mm of vertical , movement using either thumb pressure or the knurled head screw (according to the model being used). This movement allows for sharp focusing which is achieved as follows;

Move the prism holder either up or down to the point where the graduated scale is readable with maximum sharpness. While doing so keep the compass exactly horizontal. This may be checked by using the integrated spirit-level.



When the prism is folded back the lid may be completely closed to protect it.

A 0.3mm observation slit is provided above the prism. You can sight the objection slit is above the prism. You can sight the objective by simultaneously observing the dial through the observation sighting line in the glass window. With some practice you will be able to read the direction of travel where dial and sighting line are intersecting. Dial, sighting line and object will simultaneously appear in your field of vision when you hold the compass exactly horizontal.



The compass dial, of compass rose, has a sapphire bearing to ensure quick movement and optimal precision. Liquid damping prevents excessive oscillations of the magnetic needle, which is the case in conventional compass. The liquid filled membrane capsule consists of highly transparent, flexible plastics which dilate and contract when being exposed to extreme changes of temperature and of air pressure. In this case temporary air bubbles may occur which, however, do not affect the correct functioning of the compass. These bubbles are only a temporary phenomenon and will disappear again 24 to 48 hours, as soon as the compass is used again under normal conditions. The fluid capsule can be easily replaced by removing the screws on the base of the compass housing. Ensure that the foam pad is inserted again below the capsule.

The compass is provided with an integrated spirit-level. It can be screwed on a tripod by means of the threaded fitting in the base and serve as theodolite for simple terrain surveys.

The prismatic compass offers you considerable advantages over those models being equipped with magnetic needle and lifting mirror. Problems inevitably caused by mirror reading and potential parallax errors are eliminated by prismatic reading. Excellent damping of the dial system ensures rapid and precise reading to the fraction of a degree.

1. Using the compass

This compass is a precision instrument which is often used in connection with maps. For optimal precision you must consider the local magnetic declination, unless it is small enough to be neglected. For further details refer to page 19.

2. Taking a bearing

Open the compass until the lid is perpendicular to the housing. Fold the prism holder forward until the stop, look through the prism and adjust the prism height until the dial is sharply focused. Turn your body keeping the compass in hand until the sighting line is aligned with the object, then read the bearing at the point where the sighting line intersects the dial.

3. Walking a given bearing or direction of travel

When the bearing is known, simply look through the prism and turn your body until you can read the known bearing on the dial. The sighting line then intersects the object.

4. Orienting the map
When you have no particular destination in mind, only wishing to familiarize yourself with your surroundings, it will be useful to orient your map. For doing so, place the compass on the map with one of the contact edges to the meridian, next to your own position. The fixed luminous tip indicates to the top of the map. Meridians are parallel lines running from the upper to the lower end of the map. Turn map and compass until the north mark on the dial indicates the index line in the center of the fixed luminous tip. The map is now oriented and corresponds to the natural terrain features. The magnetic declination has, not been taken into account.

5. Determining the direction of travel on the map

a) Place the compass on the map with one contact edge along the line which is running from your own position to the objective. The fixed luminous tip points to the objective.

b) Turn the dial ring until the arrow on the glass window runs parallel to the next meridian. Read the bearing on the dial

in the center of the fixed luminous tip. The large luminous marking enable you to read the direction of travel day and night.

c) Pick up the compass from the map. Look through the prism and turn your body until the bearing taken in step appears in the prism. Select a prominent landmark (auxiliary objective) which is in line with the sighting line, proceed to it and repeat this process until you reach your reach your object.

6 Determining the direction of travel in the field

This task is easier when you select an intermediate object Turn your body from time to time, the compass keeping in hand, until the taken bearing (see point5) appears in the prism. Select a prominent landmark which is located in line with the sighting line. This helps you keeping the direction of travel when the objective cannot be seen. If there are no prominent landmarks, as often happens in the desert or in the Arctic, send one member of your group to the front and direct him, by giving signs with your hand, to a point situated exactly in your direction of travel. proceed to his position and repeat this process.

You may easily correct your direction of travel without having to open the compass. When the lid is closed and the hinge points to the objective, you can read the bearing on the interior dial of the compass rose, exactly below the sighting line (for models without clinometers only)

7. Determining your own position in the field

When you are in the field following a direction of travel determined by you according to the description in point 2 or 5 you can find your own position by selecting a prominent landmark in the field (monument, church spire, etc), which should be located at approx 90°from your direction of travel. Take the compass, take the bearing to this reference point and mark it on the map. Place the compass on the map with one of the two contact edges intersecting the reference point.

Set the bearing of this point on the index in the center of the fixed luminous tip. Turn the compass around the reference point until the arrow points to the upper and of the map. Extend the contact edge until it intersects your direction

of travel which you have already marked on the map. This intersection point is your own position. Similarity, you can also determine your position by taking bearings of two reference points which can be exactly located on the map. Utmost accuracy can be obtained when the reference point is approx. 90°from the direction of travel. This method also serves to determine the position of boats in coastal also serves to determine the position of boats in coastal waters.

8. Consideration of the magnetic declination

The magnetic declination is defined as the difference between the true course (map course), relative to the true north pole, and the magnetic course (compass course), related to the north magnetic pole. To ensure utmost accuracy, consider the magnetic declination when working with compass and map. You will find the magnetic declination in question on most topographic maps or by asking your county surveyor (topographic institute).

The following rules should be taken into account:

a) Every course marked on maps is a geographic or true course.

b) Every course determined by taking bearings is a magnetic course or may be called magnetic course.

The different between true course and magnetic course is the magnetic declination. In Central Europe this magnetic declination is approx,2°West, in the USA and in Canada it may vary from 35°East to 35°West.

To get from a course marked on the map (true course) to the compass course (magnetic course), add the local magnetic declination. To get from a compass course (magnetic course) to the map course (true course), subtract the local magnetic declination. This applies for Western declination. In case of Eastern declination proceed inversely, as can be seen in the following table.

When working	West Declination	East Declination
from map to field	map course + declination	map course - declination
	direction of travel	direction of travel
from map to field	direction of travel - declination	direction of travel + declination
	map course	map course

Example: The local magnetic declination is 8°West, you have measured a map course of 20°, i.e. you work from map-to field. Your direction of travel will be of 28°. If the magnetic declination is of 4°East, you direction of travel will be 16°.

9. Compass provided with clinometers (optional accessory)

The universal prismatic compass can also be provided with clinometers enabling you to measure slopes and gradients in degrees or in percent. Ensure that the pendulum is freely suspended.

Sight the upper or lower edge of the object from above the lower edge of the compass, taking care that the entire lower edge of the compass and the object are in alignment.

Slightly tilt the compass to the left to fix the pendulum in its position and read the angle of inclination from the scale provided for this purpose. You obtain the same result by sighting above the upper edge of the graduated dial. For computing the height of an object, refer to the table fixed on the back of the compass

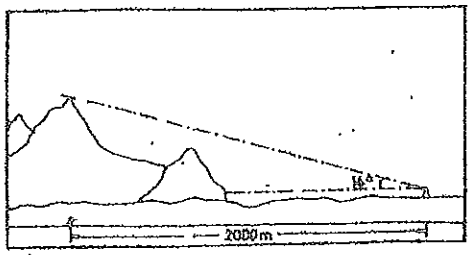
Table 1

Angle 0-360	Angle 0-400°	Gradient %	Ratio height (width) distance
1	1	2	1/60
2	2	3	1/30
3	3	5	1/20
4	4	7	2/30
5	5	9	7/80
6	6	10	1/10
7	8	12	1/8
8	9	15	1/7
10	11	18	1/6
12	13	21	1/5
14	16	25	1/4
17	19	30	3/10
18	20	33	1/3
20	22	36	3/8
22	25	40	2/5
24	27	45	4/9
27	30	50	1/2
31	35	60	3/5
34	38	66	2/3
35	39	70	7/10
37	41	75	3/4
40	45	84	5/6
42	47	90	9/10
45	50	100	1/1
50	56	120	1+1/5
I	II	III	IV

Table 2

Angle 0-360°	Angle 0-6400	Angle 0-400	Gradient %	width distance
1	18	1	2	1/60
2	35	2	3	1/30
3	53	3	5	1/20
4	71	4	7	2/30
5	89	5	9	7/80
6	107	6	10	1/10
7	125	8	12	1/8
8	142	9	15	1/7
10	178	11	18	1/6
12	219	13	21	1/5
14	250	16	25	1/4
17	302	19	30	3/10
18	320	20	33	1/3
20	355	22	36	3/8
22	391	25	40	2/5
24	426	27	45	4/9
27	480	30	50	1/2
31	551	35	60	3/5
34	604	38	66	2/3
35	622	39	70	7/10
37	658	41	75	3/4
40	711	45	84	5/6
42	747	47	90	9/10
45	800	50	100	1/1
50	889	56	120	1+1/5
I	II	III	IV	V

You can measure or estimate the distance to the object on the map. Multiply this distances by the factor indicated in column III or IV (Table 1) or column IV or V (Table 2) (whichever is easier for you), referring to the angle in column 1 measured with clinometers.



Using column III (Table 1) Or column v (Table2)

2000m/25 =500m
100%

Using column IV (Table 1) or columo v (Tablo2)

2000m/1/4=500m

The above mentioned example is based on an angle of 14°and a distance of 2000m.

For measuring the angle to an object situated below your own position. Simply turn the compass until hinge points to you and proceed in accordance with the above mentioned instructions.

10. measuring of distance in the field

The distance between two prominent landmarks can be measured by applying the method described under point 9. This enables you to measure the width of rivers, bridges, woods. etc provided that you know the distance to the object and that the line to your own position to the object is as perpendicular as possible to the object line .A fluid damped prismatic compass has the great advantage that it allows angular measurements of utmost accuracy.

Measuring angles

Sight the right edge of the object. The compass rose immediately falls into its normal swing. Note the determined degree and

slowly turn to the left edge of the object. Deduct the second degree from the first one. The difference being the degree between left and right object side.

Measuring angles via North

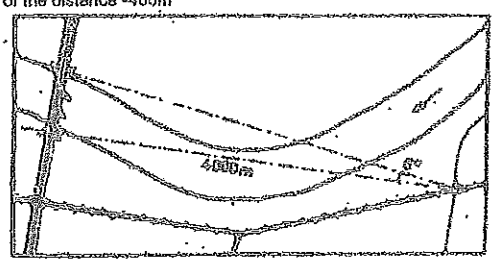
If during the measurement of angles the number 360(North) runs through the prism , please note that in this case 360°-0°calculate :360°-second degree +first degree

Example:

If the first degree is 8°and the second degree is 357°,the measured angle will be 11°,the width of an object is the percentage (gradient in %)of the distance to the object corresponding to the measured angle or, it easier to calculate, the corresponding fraction(column IV, Table1 or column V, Table2) of the distance

Example:

At a distance of 4000m a bridge spans a river. Transverse to the line of vision .How long is the bridge if an angle of 6°-10% or 1/10 of the distance -400m



11.Determining the distance to an object of known width or height.
By simply reversing the above mentioned calculation ,you can determine the distance to an object if its width or height is known

or if it can be found on the map. In other words .If the table indicates that for an angle of 7°the width of an object is 1/8 of the distance to it. Then this is also true in the reverse case .Is the distance is 8 times the width (height)

Example1:

A TV-tower is visible in the field and its height is known to be 200m.The angle measured with the
Clinometers is 7°from bottom to top of the tower.
Column III (gradient in %) indicates 12%for 7.
Calculate as follows:

$$\frac{100\% \times 200m}{12\%}$$ (height of object) (from column III. Table1 or Table 2)

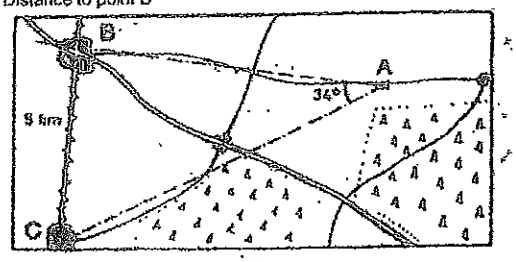
For some angle it is easier to calculate with the inversion from column IV. Table1or column V. Table 2
200m/8(inversion of 1 / 8) =1600m

Example2:

The angle measured between objects B and C(see figure) is 34°.the distance between B and C is 5km according to the map .column III .Table 1or column V, Table 2 indicates 66%.

$$\frac{100\%/5km}{66\%} = 7.5km$$

When using the inversion of column IV the result is
5km*3/2=7.5km
Distance to point B



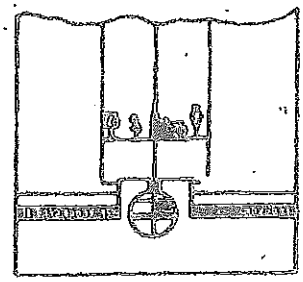
When using this method .the object of known width must be perpendicular to the line of sight

Lent compass

The compass consists of a metal and metal/plastic lid with a glass window with the sighting line an etched into it.

This lens system being provided with an integrated index line and excellent magnifier allows extremely precise reading. Correct handling of the instrument ensures that you are able to observe at the same time object though the observation slit, situated above the lens mount in the housing as well as the compass dial. Optimal results are obtained when you keep the compass at a distance of 1-2cm from your eyes.

Distance compensation is possible by adjustment in front or front left side, by means of a knurl-head



A 0.3mmobsrevation slit is above the lens. Within the observation slit appears the sighting line which is intensified through an optical illusion. If you simultaneously observe the compass dial in the lens sand the objective .intersected by the sighting line. You can be read along the index line.

By skillfully handing the compass the sighting line corresponds to the index line. Thus ensuring that eyes. Compass

dial and object are at same level and resulting in utmost accuracy. This method allows to read fraction of an angular degree.

The fluid filled compass capsule is similar to that in the prismatic compass and can be replaced the screws from the base. After replacement ensure that the foam pad is inserted again below the capsule. Turn the new capsule until the sighting line and the index line are in alignment. Prior to mounting the base plate again.

Using the compass

With the exception of the optical system, this compass is used like the prismatic compass. Proceed according to the specific data of the instructions for use of the prismatic compass.