

ESSEX BRASS

Exclusive Brassworks

BRASS COMPASS (LARGE)

Model 42433

ASSEMBLY & OPERATING INSTRUCTIONS



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For technical questions and replacement parts please call 1-800-444-3353.

REV 01/05

THANK YOU for choosing a **HARBOR FREIGHT TOOLS** product. For future reference, please complete the owner's record below:

Model _____ **Serial No.** _____ **Purchase Date** _____

SAVE THE RECEIPT, WARRANTY AND THESE INSTRUCTIONS. It is important that you read the entire manual to become familiar with the unit BEFORE you begin assembly.

Technical Specifications

Dimensions: 3-1/2" W x 3-1/8" D x 1-1/2" H
Mirror Dimensions: 2-1/4"
Features: Mirror, Sine Chart, 2 levels and Spyhole



READ ALL INSTRUCTIONS BEFORE USING THIS PRODUCT!

Safety Warnings and Precautions

WARNING: When using product, basic safety precautions should always be followed to reduce the risk of personal injury and damage to equipment.

Read all instructions before using this product!

1. **Keep work area clean.** Cluttered areas invite injuries.
2. **Observe work area conditions.** Keep work area well lighted.
3. **Store idle equipment.** When not in use, the Compass must be stored in a dry location to inhibit rust. Always lock up products and keep out of reach of children.
4. **Use the right product for the job.** There are certain applications for which the Compass was designed. Do not modify the Compass and do not use the Compass for a purpose for which it was not intended.
5. **Check for damaged parts.** Before using any product, any part that appears damaged should be carefully checked to determine that it will operate properly and perform its intended function. Check for any broken or damaged parts and any other conditions that may affect its operation. Replace or repair damaged or worn parts immediately.
6. **Replacement parts and accessories.** When servicing, use only identical replacement parts. Use of any other parts will void the warranty.
7. **Do not operate product if under the influence of alcohol or drugs.** Read warning labels on prescriptions to determine if your judgment or reflexes are impaired while taking drugs. If there is any doubt, do not operate the product.
8. **Do not look into the mirror if it is reflecting bright light such as the Sun.**
9. **Do not allow children to play with the Compass.** Because of its intricate parts, the Compass can be damaged by improper use.

WARNING: The brass components of this product contain lead, a chemical known to the State of California to cause birth defects (or other reproductive harm). (California Health & Safety code 25249.5, et seq.)

Warning: The warnings, cautions, and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

Unpacking

When unpacking your Compass, check to make sure the following parts are included. If any parts are missing or broken, please call **HARBOR FREIGHT TOOLS** at **1-800-444-3353**.

Operation

This manual explains the parts and basic use of the Compass. It is important that you read the entire manual to become familiar with the product BEFORE you use the Compass.

We recommend you use a separate book (not included) on Compass usage or Orienteering, to learn how to use the Compass for more complex applications.

Note: We want to thank Mr. J. Calvert (<http://www.du.edu/~jcalvert/personal/pershom.htm>) for providing additional information that was included in this manual. This information was used with his permission.

The Brass Compass is a type of compass called a "mirror compass." It has many uses and can be used for the practical measurement of angles.

All magnetic compasses use the Earth's magnetic field to supply a reference direction for the measurement of horizontal angles. This direction has a fundamental significance only when the directions on the earth's surface are to be specified, and then the magnetic declination must be taken into account.

This Compass can determine the magnetic heading of an object and its angle of elevation or declination. Magnetic declination is the difference between the true geographic north (north pole) and the magnetic north (in northern Canada). This variation fluctuates throughout the world.

The following list will explain the uses of the parts of the Compass highlighted in **FIGURES 2** and **3**.

1. Mirror - This is used to view the compass capsule. It is designed in this way so you can see your target and get a measurement at the same time. When hinged at 45 degrees, the mirror can aid in finding the altitude angle measurements while simultaneously looking at the object.

Note: To get proper directional orientation, the mirror should be used to read the compass.

2. Graduated Dial - By increments of 1 degree, the dial is graduated 0 degrees through 360 degrees. It is used to read compass bearings.
3. Levels - Allows for altitude and angles measurement as well as plumb leveling.
4. Clinometer Arrows - The arrow pointing to the ground when the Compass is on its side, is used in conjunction with the orienting circles to measure angle of inclination.

5. Pendulous Arm - To read the vertical angle of an object of elevation or declination.
6. Magnetic Declination Scale - Works in conjunction with the Pendulous Arm for reading angles of elevation and declination.
7. Compass Needle - To be used with the Graduated Dial for basic bearings. The Red Mark points toward magnetic north.
8. Peep Sight - With the Lid fully open, you can use the Peep Sight in conjunction with the Mirror to look directly at an object while taking a reading. Warning: Do not look at the Sun.
9. Sine Chart - Standard geometrical reference numbered 1 to 45 degrees of angle and the figure opposite each degree is the linear measurement from the baseline at 1 inch from the vertex of the angle. For example: Envision 2 lines meeting to form a 45 degree angle. The point they meet is the vertex. Add 1 inch from this point; the measurement from one line to the other is .707 inches-see Figure 1.

Figure 1-Sine Chart

NATURAL SINE					
1	017	17	292	30	510
2	035	18	309	31	515
3	052	19	326	32	520
4	070	20	342	33	525
5	087	21	358	34	530
6	105	22	375	35	535
7	122	23	391	36	540
8	139	24	407	37	545
9	156	25	423	38	550
10	174	26	438	39	555
11	191	27	454	40	560
12	208	28	469	41	565
13	225	29	485	42	570
14	242			43	575
15	259			44	580
16	276			45	585

INDIA

Opening up the Compass

The Compass opens up into two sections. The lower section contains the Magnetic Needle, the Graduated Circle, and a Sight. The upper section contains the Mirror, a Sighting Line and a Sight.

Note: **The Compass produces best results when it is used on a firm, level surface.**

Preparing the Compass for Use

The Compass contains a Circular Bubble Level. Check the Circular Bubble Level to make certain that the Compass is perfectly horizontal. Make certain that the Needle is free to rotate. Extend the Front Sight making certain that the slotted part is horizontal and that the sight is vertical.

Sighting with the Compass

Take a sighting of the object you wish to measure. A sighting can be taken either by the mirror or using the Sight. Once the object is sighted, press down the needle clamp so that the Needle is held in a fixed position. Note the position before unclamping the Needle.

Azimuths

The direction of a line can be specified by its azimuth, the angle the north end of the compass' horizontal projection makes with north (magnetic or true), measured clockwise from 0 degrees to 360 degrees.

Measuring a Horizontal Angle

1. To measure a horizontal angle, adjust the Mirror so that when you look into the Mirror you see the Front Sight.
2. Move the Compass around until the Sighting Line is lined up with the tip of the Front Sight and with the object you are sighting. The Compass is now aligned.
3. Read and note the position of the Needle. This will give you an accurate reading to 1 degree.
4. Sight a second object the same way as in steps 1,2 and 3. The difference in the azimuths obtained by the two sights is the angle between the lines from you, the observer, to the two objects. For instance, if object one is at 280 degrees and object 2 is at 170 degrees, the angle is $280-170 = 110$ degrees.

Measuring an Angle with the Compass Firmly Supported

1. Use this method only if the Compass is firmly supported. Open the Compass up completely. Look through the aperture near you to the tip of the far Sight. Line up the object in these sights. The Compass is now aligned.
2. Making certain that the Compass does not move, move your eye away from the Sights and note the measurement on the Compass.

Measuring a Vertical Angle

Located in the lower half of the Compass are an index and Vernier that can be rotated by an arm on the outside of the Compass case. Also there is a Bubble Level, and a Circular Level. Finally, there are two scales. The inner one measures in degrees to + or - 90°. The outside scale measures in percent grade, from 0% to 100%.

1. Sight from the Front Sight through the small hole in the Mirror. Adjust the Mirror so that you can see the Frame and the Bubble Level.
2. Move the Lever so that the Bubble Level is centered while you are sighting the desired object.
3. Note the reading on the Scales.

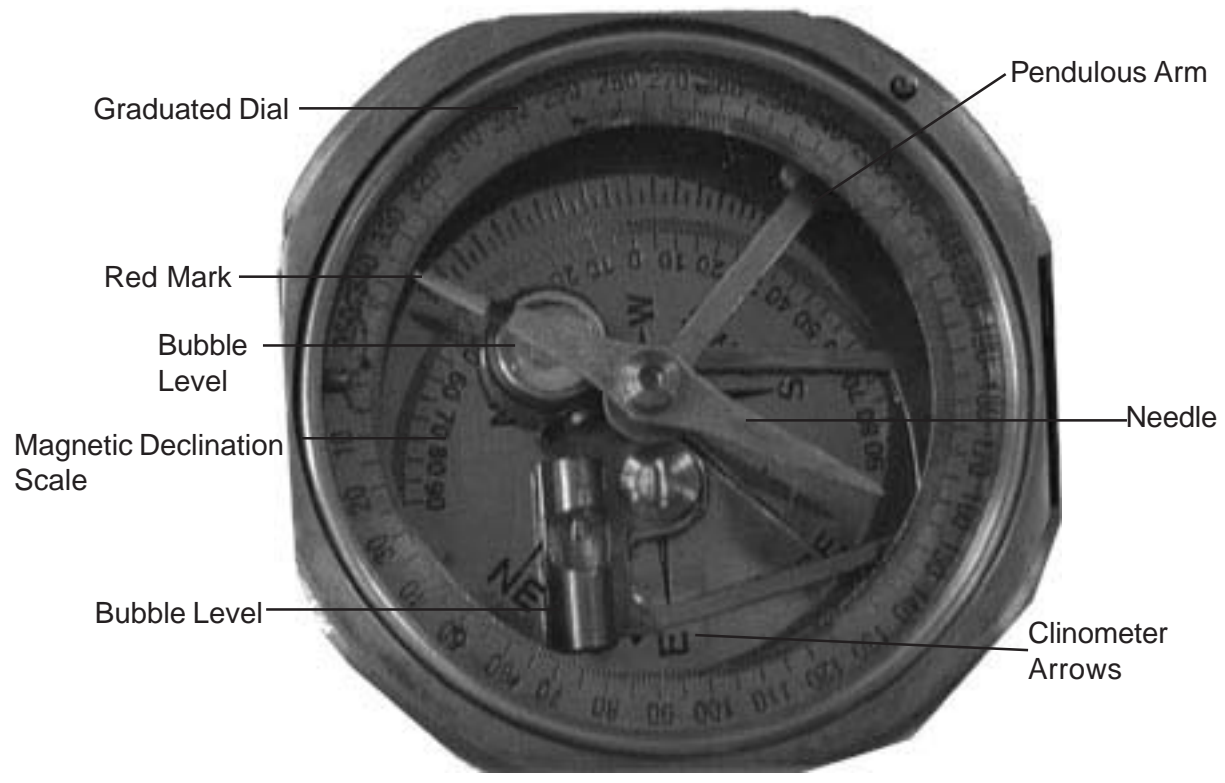
Estimating the Inclination of a Line

The inclination of a line can be estimated by opening the Compass all the way up. Line up the edge of the case with the line that you want to estimate the inclination of. Move the lever until the Level Bubble is centered. Note the reading.

Figure 2



Figure 3



Note: Some parts are listed and shown for illustration purposes only and are not available individually as replacement parts.

PLEASE READ THE FOLLOWING CAREFULLY

THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER NOR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.

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