

# The Sun Compass Compensation and Deviation Tables

The sun compass is a handy device for both setting the compensation magnets on a compass and creating a deviation table. Typically, the compensation magnets, once set at installation do not need to be reset. However, in trailerable boats which are subject to a lot of road vibration, these magnets can move.

A sun compass can be constructed by anyone with a little mechanical ability.

- [Building a Sun Compass](#)
- [Using the Sun Compass](#)

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# The Sun Compass Construction

## Materials

- A flat plate, either plexiglass, plywood or aluminum, about 10 x 10 inches. It should be thick enough to support a vertical rod. (Plexiglass can be layered in the area where the rod will go to build up thickness.)
- A straight, thin rod about 8 inches long. Brazing rod and coat hangers may not be stiff enough and can bend. You can use a piece of stainless steel CB or VHF Marine band antenna or check for a long needle at a fabric store.
- A compass "card" about 8 inches in diameter. You can get "polar coordinate" graph paper (similar to plotting sheets) at some office supply stores, or you can [download a gif file](#) (260K). NOTE: since you will be using the shadow of the rod, the card should be labelled in reciprocal bearings -- ie. 90 degrees (East) will be at the 9 o'clock position. It is labelled counter-clockwise.
- Varnish and/or spray waterproofing for fabric, and glue (contact cement or similar, and a little epoxy if you want to mount the rod permanently.)

## Construction

- If using a plywood base, sand smooth and varnish.
- Apply the glue or cement and affix the card to the base.
- After the glue is dry, coat the card with clear varnish or two coats of silicone fabric protector, allowing it to dry between coats. NOTE: The fabric protector technique also works for other porous paper -- it is waterproof so ink usually will not run when it gets wet, but you can still write on the paper in pencil.
- Drill a hole the diameter of the rod EXACTLY in the center of the compass card. If possible, use a good drill press to assure the hole is perfectly vertical. If using a thin base, drill the hole all the way through the material. You can then glue a small piece on top, over the hole to build up thickness -- then flip it over and drill through the new material using the hole in the back side as a pilot hole.
- Insert rod and optionally epoxy it in.

## [Using the Sun Compass](#)

# The Sun Compass Use

## General

- Supplies -- A means to temporarily mount the sun compass, such as tape or clamps.
- Crew -- You will need at least one helper. Two is better, since one can serve as a look-out for boat traffic and obstructions.
- Weather -- Early mornings or late afternoons on sunny days are best for the shadows. Calm seas are also a major benefit.
- Mounting -- Optimally, mount the sun compass in view of the boat's skipper where it will be in the sun on all headings.
- Time -- Due to movement of the sun, you should try to accomplish each task within 5 minutes or you will have to reset the sun compass. This should not be a problem in compass compensation, since you have to reset the sun compass with each "run." If you cannot do the deviation table within about 5 minutes, reset the sun compass back at the "magnetic north/sun compass north." Don't try to continue where you left off.

## Compass Compensation

- Have the sun compass ready to be locked in position. You may be able to tape a piece of plywood to the seat backs and then clamp the sun compass to the plywood.
- Begin by slowly heading due NORTH on the MAGNETIC COMPASS. Rotate the SUN COMPASS so that it too reads due north and clamp/tape it down.
- Come about and head due SOUTH. If possibly, have the skipper steer by the SUN COMPASS.
  - Steering by sun compass -- The crew should note the error on the MAGNETIC COMPASS, and using the north/south compensation screw on the magnetic compass remove HALF THE ERROR.
  - Steering by magnetic compass -- Read the error from the sun compass, tell the skipper what heading half the error would produce, and again quickly remove HALF the error on the magnetic compass.
- Repeat the process. Again head due NORTH and reset the sun compass while on the "new" magnetic north heading.
- Now, do the same thing for EAST and WEST -- head due east based on the magnetic compass, fix the sun compass, come about, remove HALF the error, come about, reset the sun compass and repeat.
- NOW...go back and check the north/south again to make sure that the east/west corrections didn't affect those setting. If they did, go back and do the north/south AND east/west one more time.

## Making a Deviation Table

Have available a pre-made table, ready to be filled in. There should be three columns, with the first one filled in starting with 0, 15, 30 etc.;

Magnetic Heading	Sun Compass	Deviation
000	000	000
015		
030		
045		
060		
075		
090		
...		
...		
330		
345		
360	360	000

The skipper will steer by the boat's magnetic compass. There should be one crew member in charge of reading the sun compass, recording the readings, and giving the skipper the next heading.

- Head the boat due North using the magnetic compass. Rotate the sun compass so that it also reads north and clamp/tape it down. (Deviation at 0-degrees will always be 0.)
- The crew in charge of the sun compass will then say "15 degrees."
- When the skipper has steadied the boat on a heading of 15 degrees, he should say "Mark." The crew should note the reading from the sun compass, write it down, and then tell the skipper the next heading (30 degrees in this case.)
- Repeat at 15-degree intervals around the compass.
- Remember, try to do this promptly or you will have to start over. You don't have to be too, too accurate. Most small compasses are only accurate to 2 or 3 degrees.
- Once the table is filled in subtract the sun compass reading from the magnetic compass readings. e.g.

Magnetic Heading	Sun Compass	Deviation Absolute	Deviation East/West
000	000	000	000
015	013	002	002 E
...	...	...	...
...	...	...	...
330	334	-004	004 W

345	348	-003	003 W
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- Positive deviation is EASTERLY, while negative is WESTERLY.
- Typically, a graphic plot of these will look like a sine wave (an "S" on it's side), with half of the errors being negative. This occurs since the source of the deviation (engine, other ferrous metal) will attract the compass magnet in opposite directions on reciprocal courses.
- Now, remember the basic piloting adage

## Correcting -- Add -- East

When one word of the three change, one other word must also change to make things equal.

- Using the absolute values colume of the table, you would always add to correct and subtract to uncorrect. HOWEVER, rember that subtracting a negative number is adding its absolute value.

If you had determined from your chart that you wanted to set a course of 340 Magnetic, you will want to UNCORRECT the 340 degress to a Compass course. So.....

To uncorrect subtract. Since 340 is about half way betwewen the 334 and 348 on the table above, you will want to subtract a negative 3.5 degrees (=ADD 3.5) to the 340 and steer a course of 343-344. (NOTE: the -3.5 is the midpoint of the -003 and -004 in the example.)

Now, just when you thought you were done. Turn on all you normal running light and electronics and make another one to see if their electric current affects your compass.

Good Luck

[Using the Sun Compass](#)

# The Shooting Star



## Boating Safety Page

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