

Track-Wind-Drift Gauge Version 1 and 2 (TWiD)



This gauge is designed to display the following information:

- a) Heading magnetic
- b) Course magnetic
- c) Track magnetic
- d) Drift, left/right
- e) Wind direction
- f) Wind speed

The gauge is available in two styles; corporate (larger image above) or commercial/military.

Heading magnetic

This gauge uses a gyro compass to display directional information. The heading on this gauge will be the same as that for the directional gyro on a typical panel. The magnetic heading for an aircraft is shown at the top indentation pointer located on the rim of the gauge. Above, the heading that is shown is 360-degrees north, line **B**.

Course magnetic

This is the magnetic course between two points. The cursor indicating the course is set manually using the CM button (+ -) on lower, right side of gauge. The upper half of the button will rotate the Course cursor one-degree clockwise per click. Holding the mouse button depressed longer than one-second will cause a 5-degree movement in the cursor.

The lower half of the button will rotate the Course cursor one-degree counterclockwise per click. Holding the mouse button depressed longer than one-second will cause a 5-degree movement in the cursor.

The illustration above shows the Course cursor set to 344-degrees, line **A**.

Track magnetic

This cursor indicates in degrees the actual path traveled over the earth's surface. It is measured in relation to magnetic north. The track shown above is 344-degrees, line **A**. In this illustration, both course and track are equal. Under this condition, the effect of drift on the aircraft has been cancelled. How this is accomplished is described below.

Drift

The white needle in the center of the gauge provides drift information. It has a maximum value of 40-degrees left and right. The drift value that is displayed is the difference in the magnetic heading of the aircraft and the magnetic track. In the above illustration, the aircraft has a magnetic heading of 360-degrees and a magnetic track of 344-degrees. The needle indicates the 16-degrees difference and is displayed as left drift.

Wind direction

The green cursor indicates the direction of air mass movement (wind). In the above illustration, that direction is from 70-degrees indicating that the aircraft is flying in air traveling to the west southwest. This movement causes the aircraft to drift left over the ground.

Wind speed

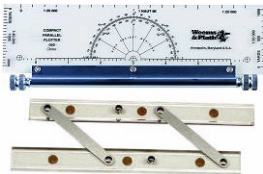
Below the drift dial, the speed of the air mass is shown. This scale has a maximum value of 60-knots.

Determining magnetic course

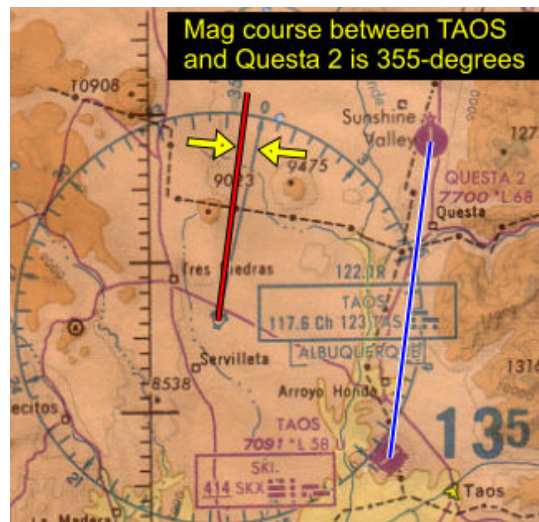
One method for measuring magnetic course is shown at right. A course line (blue) has been drawn on a chart between the departure and arrival airports, TAOS and QUESTA 2. The magnetic heading of this line can be measured directly at the nearby VOR station because these radials are oriented to magnetic north. As you can see here, the zero-degree radial is not parallel to the longitude line to its left. The radial has been rotated clockwise to offset the magnetic variation for that area.

The line in red is parallel to the blue course line. During flight planning, this would not be an actual line; rather, it would be the edge of a parallel ruler set to the course line, then moved to the center of the VOR.

Two types of parallel rulers are shown at left. The top instrument rolls on rubber wheels to maintain the parallel setting. The bottom ruler steps across the chart while keeping the parallel setting. By setting the edge of either ruler along the course line, then moving the edge to the VOR, the heading of the course can be measured.



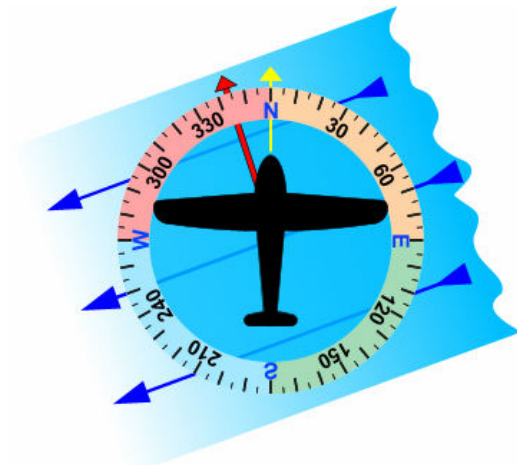
When the bearing of the red line is read on the VOR circle, it shows a magnetic course between the two airports of 355-degrees. This is the value used to set the Course cursor on the TWiD gauge.



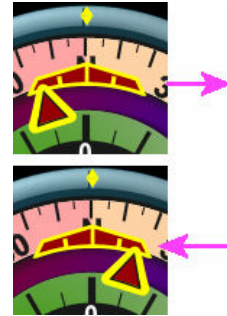
Dealing with drift

At right, the nose of the aircraft is pointing to 360-degrees. It is flying in an air mass (blue) moving west southwest. This causes the path over the ground (red arrow) to differ from the heading of the aircraft (yellow arrow). The extent of this difference will depend upon the velocity and direction of the wind and the speed of the aircraft.

The further the aircraft flies without compensating for drift, the further it deviates off course.



To overcome the effect of drift with the TWiD instrument, follow this procedure:
Using the compass rose available on the gauge, manually set the Course cursor to the magnetic course value. When ready to fly this course, turn the aircraft until the Course cursor is under the heading indentation at the top of the gauge. This position is shown at right. Allow the aircraft to stabilize on the new heading so the effects of drift can be detected by the gauge. Degrees of drift left and right will be displayed by the drift needle. It can also be seen by observing the position of the Track cursor.



If the Track cursor is not centered under the Course cursor, then the desired course is not being followed. The aircraft is experiencing drift, either left or right, depending on the direction of the wind.

The heading of the aircraft must be adjusted to compensate for this drift. If the Track cursor is to the left of the Course cursor (top diagram at right), then turn aircraft to the right. If the Track cursor is to the right of the Course cursor (bottom diagram at right), then turn aircraft to the left. As you can see, the aircraft is turned in the direction you wish the Track cursor to move.

The Course cursor represents the path you intend to fly; the Track cursor represents the actual path being flown.



Continue to adjust the heading of the aircraft until the Track cursor comes into alignment with the Course cursor (line **A**, at left). When this happens, the Course cursor will likely no longer be positioned at the top of the gauge. That is not important. What is important is that both cursors are centered no matter where on the dial this occurs.

In this example, the nose of the aircraft was turned to north, line **B**, before the two cursors were in correct alignment. When they are positioned properly, compensation will have been made for the wind drift. The aircraft will then follow the desired course, line **A**.

Even after the effect of drift has been cancelled, the drift needle will continue to show drift. That is because drift has not been eliminated, but only taken into account. Drift is zero only under no-wind conditions, or flying with a headwind or tailwind.

A note to helicopter pilots; The Track cursor can swing a full 360-degrees which can be helpful to helicopter pilots when hovering or landing because it will indicate sideways and rear movement of the aircraft.