QuDieM®
NAVIGATOR

www.qudiem.com

Before using the instrument, you are recommended to read this leaflet fully

QuDieM®NAVIGATOR is a unique aid for pilots flying at an air speed of 100kts ±10%, a range covering the cruising speed of the majority of single engine light aircraft. Restricting the instrument's speed range enables much greater simplicity of operation and clarity of information and presents no practical limitation for the majority of PPL pilots. Careful design has ensured that wind compensation accuracy is well within practical limits.

With no need for supplementary plotting or computing tools, **QuDieM®NAVIGATOR** is a uniquely versatile and convenient aid, equally suited to pre-flight and in-flight planning.

The capability to easily plan a diversion without reliance on the mental application of traditional "rules of thumb" under exam conditions makes it particularly relevant to student pilots undertaking their navigation skill test.

Compatibility with VOR and NDB tracking and position plotting ensures that whatever the navigation challenge, **QuDieM®NAVIGATOR** is the aid you will want at hand.

Principle of Operation

QuDieM®NAVIGATOR operates by establishing the relationship between true and magnetic compass, track (course) and wind direction and using this to display still-air magnetic heading and sector time (ETA) at 100kts, together with their associated compensation factors. Pre-selection of wind speed provides that only the relevant compensation factors are displayed.

Having pre-set magnetic variation and wind parameters, the planned track heading and distance are set into the instrument by placing the centre of the instrument over the departure point on a 1:500,000 chart and adjusting the Bearing Arm to position the Target Aperture over the next waypoint.

Accuracy

QuDieM®NAVIGATOR is intended for use at Indicated Airspeeds of 100kts +/- 10kts, a speed range covering most single engine light aircraft.

Wind Correction is calculated at sixteen points of relative wind direction/track around the compass.

Compared to those obtained using a conventional wind computer:

Wind corrected Heading is within

- 2^{O} for wind speeds up to 20kts, a deviation of just two miles in sixty.
- 4^{O} for wind speeds up to 40kts.

Wind Corrected Sector Time (ETA) at 100kts is within

- 4% for wind speeds up to 20kts, less than 2.5mins in an hour's flight.
- 8% for wind speeds up to 40kts.
- Different IAS's have a substantially constant impact on sector time and are easily accounted for, eg. flying at 90kts will increase the Sector Time by 10%.

In practice, Headings and Sector Times will be much more influenced by differences between forecast and actual wind and atmospheric conditions, combined Compass/Direction Indicator inaccuracies and the practical limits of accuracy to which light aircraft are flown.

As with all navigation aids, it is good practice to carry out a "sanity check" prior to applying the results obtained from the NAVIGATOR to ensure no gross errors have been made.

Disclaimer

The Navigator is an aid to flight navigation. The pilot must at all times rely on his own skill and judgement to ensure the flight is conducted safely within the local regulatory environment.

Product Guarantee

The **QuDieM®NAVIGATOR** is designed for student and private pilots of light aircraft. It is constructed from materials consistent with normal operating requirements and care has been taken during design and manufacture to ensure that its accuracy and durability will give many years of service in its intended use.

CavOK Ltd. guarantees the **QuDieM®NAVIGATOR** against defective materials, workmanship and shipment damage for a period of twelve months from purchase and will provide a free of charge replacement provided that the faulty item:

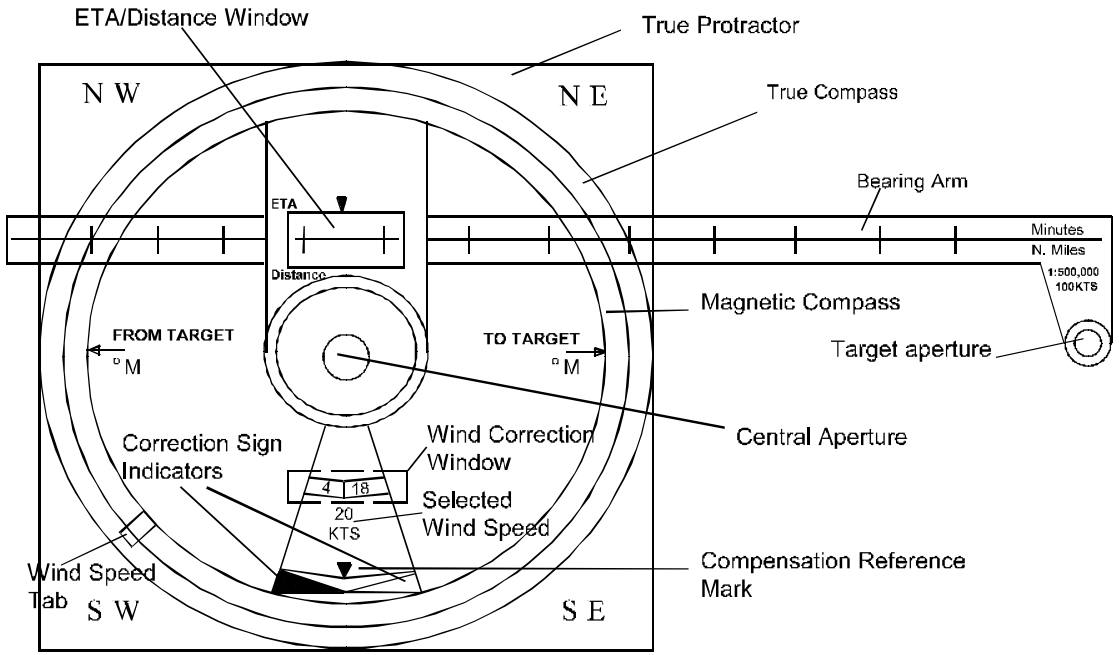
- has been paid for in full
- is returned, carriage paid, to ***CavOK*** within twelve months of purchase
- in the opinion of ***CavOK***, has not been subject to misuse or accidental damage
- is returned on receipt, carriage paid, to ***CavOK*** in the event of a claim against shipment damage

We trust that your **QuDieM®NAVIGATOR** will add to your flying pleasure for many years.

Caring for your NAVIGATOR
It is recommended that the instrument be kept in the wallet in which it was supplied to protect it from dirt and minor accidental damage.
As with most plastics, lengthy exposure to strong sunlight is best avoided.
Should one of the retaining latches around the Central Aperture become unseated, pressing it up from below easily resets it.

CavOK Ltd disclaims all responsibility for any damage sustained by any party associated with the use of this instrument.

CavOK Ltd PO Box 641, Weybridge, Surrey, United Kingdom KT13 3EB



Example

Pre-set magnetic variation to 5° West and wind 240/20.
Simulate a sector of 50 N. Miles on a track of 125°M by rotating the Bearing Arm to position the TO TARGET pointer against 125° on the yellow magnetic compass and sliding the Bearing Arm to position 50 N.Miles on the distance scale against the reference pointer.

Note that the still-air ETA at 100kts is 30mins.

Centre the Compensation Reference Mark clockwise. The wind compensation is +10° and –7%.
Apply these to:

- Magnetic track to give a planned Heading of 125+10=135°M
- ETA to give a sector time of 30 - 2mins (7% of 30) = 28mins.

Looking at the relationship between wind and track shows that the aircraft will drift left, so an increased heading is confirmed, and has a tailwind, confirming a reduced sector time.

If airspeed is 90kts,

- ETA compensation would be –7(wind)+10(airspeed) = +3% to give a sector time of 30+1(3% of 30) = 31mins.

If airspeed is 110kts,

- ETA compensation would be –7(wind) -10(airspeed) = -17% to give a sector time of 30-5 (17% of 30) = 25mins.

For simplicity pilots may choose to round combined ETA compensation to the nearest 10%

Pre-setting the Instrument

Before using the NAVIGATOR the following parameters must be set or checked.
Magnetic Variation: Aligning the reference mark on the underside of the True Protractor against the adjacent scale, using the raised thumb bars. Although this may not require frequent re-setting, it should be checked prior to each use to ensure no accidental misalignment.

Select Wind Speed: Restrain the Wind Speed Tab and use the Bearing Arm to rotate the Display Window until the required speed clicks into view.

Set Wind Direction: Rotate the Wind Mark to the forecast direction on the True Compass. Moistening thumbs will help.

Planning a VFR Flight or Diversion

Check that the pre-set parameters above are correct. Note that for accurate ETA, a 1:500,000 chart must be used.

Set the Bearing Arm to the approximate sector heading. This will minimise final adjustment and help ensure that the protractor is correctly aligned.

Position the Instrument with Central Aperture over the sector departure waypoint and align the True Protractor with north on the chart. Grid lines are provided on the protractor to assist this.

Position the Target Aperture over the next waypoint by rotating and linearly adjusting the Bearing Arm while keeping the True Protractor in place. The most convenient position to hold the protractor will depend on the required heading and whether you are left or right handed. The instrument may now be removed from the chart.

Note Magnetic Track indicated by the TO TARGET pointer against the yellow Magnetic Compass and still air **ETA at 100kts** to the target waypoint in the Bearing Arm Window. Distance to target waypoint is also shown.

Centre the Compensation Reference Mark on the nearest convergence point of opposing Correction Sign Indicators as shown.

Apply the Wind Compensation angle (°M) and time (%) displayed in the left and right column respectively of the Wind Correction Window. Whether the triangle below each column is open or solid indicates how the its associated compensation must be applied. If open the heading or ETA is increased by the displayed °M or % respectively.
For airspeed other than 100kts, the time compensation should include the relevant % adjustment e.g. for a flying speed of 90kts, the % time compensation is increased by 10. For 110kts decrease by 10.

If the wind is within 10° of track, the application of heading compensation is determined by the direction from which the Compensation Reference Mark was centred. In the illustration below, the heading compensation would be added if centred clockwise and subtracted if counter-clockwise.

Radio Navigation

Compass points within the Central Aperture of the instrument allow it to be aligned directly with a VOR compass rose.

Pre-set magnetic variation and wind parameters as for VFR. Operation is the same as for VFR, the reference beacon being either the departure waypoint (tracking FROM) or target waypoint (tracking TO). Having noted the magnetic track and still-air ETA, the Compensation Reference Mark is centred and heading and time compensation applied as for VFR.

When **Tracking from a Beacon**, the TO TARGET pointer indicates the magnetic radial FROM the beacon (OBS setting for VOR) to the next waypoint.

Tracking to a Beacon, the TO TARGET pointer indicates the magnetic radial TO the beacon (OBS setting for VOR).

To plot **Present Position** set the FROM TARGET indicator to the reference beacon's QDM as determined from the cockpit CDI/ADF. Align the instrument over the beacon as above and, holding the instrument to prevent rotation, draw a line on the chart by extending the Bearing Arm using a marker inserted through the Target Aperture. Repeat the process with a suitable second beacon to locate the aircraft's position at the intersection of the lines.

DME equipped aircraft can locate their position by aligning the instrument over a single beacon/DME. With the QDM set as above and the DME reading set on the Bearing Arm Distance scale, the aircraft's position will be indicated by the Target Aperture.