E6B Flight Computer

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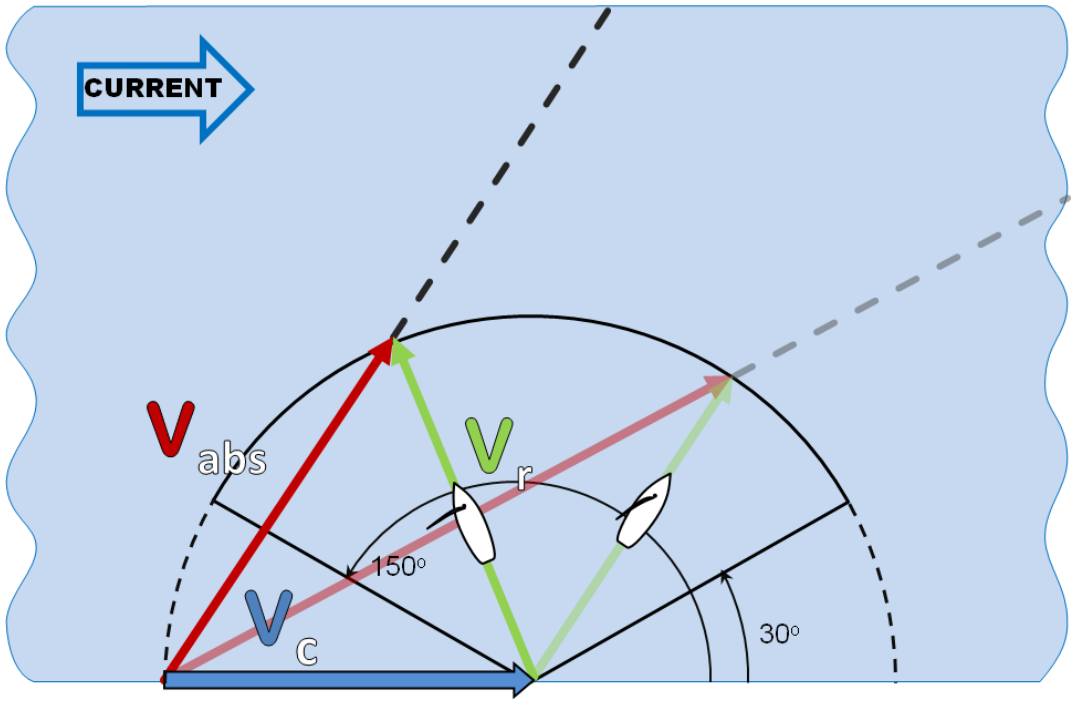
Some Terms

Computer Side

Wind Side

Solving for Wind

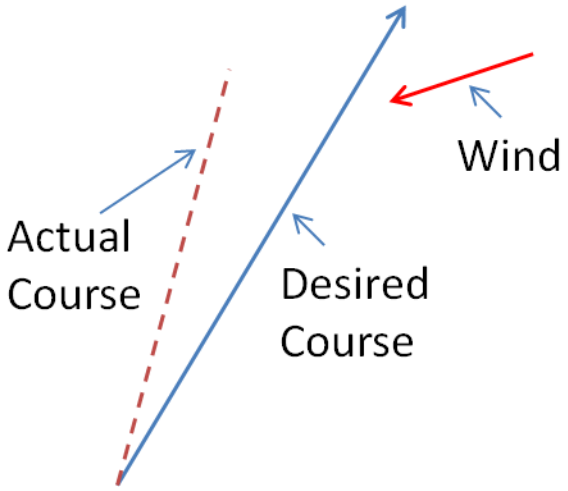
- Wind is a Vector
  - It has both Direction and Speed
  - Imagine a boat going across a river



Wind (cont.)

- The Solution – Find Corrections in Our Aircraft Heading so Actual Course = Desired Course
  - Compute Vector Equation, or
  - Trial and Error

• Here the Desired Course Has Been Altered by the Wind
• This Results in a Actual Course (we call that a Track) That is Different



Some Terms

- True or Magnetic – Units Applied to Headings, Course, or Track
- Heading – What the Aircraft is Flying – *Normally we Always Fly a Magnetic Heading*
- Course – the Line of Distance and it's Angle Measured from Start to Finish (*This is What We Plot on our Charts*)
- Track – What We Actually Fly – *Hopefully it is the Same as the Desired Course*

Winds

- Wind Velocity (Speed Provided In Knots – Direction Provided as True)
  - Note this is a Vector

- MH = TH +/- Magnetic Variation
- TH = TC +/- Wind Drift

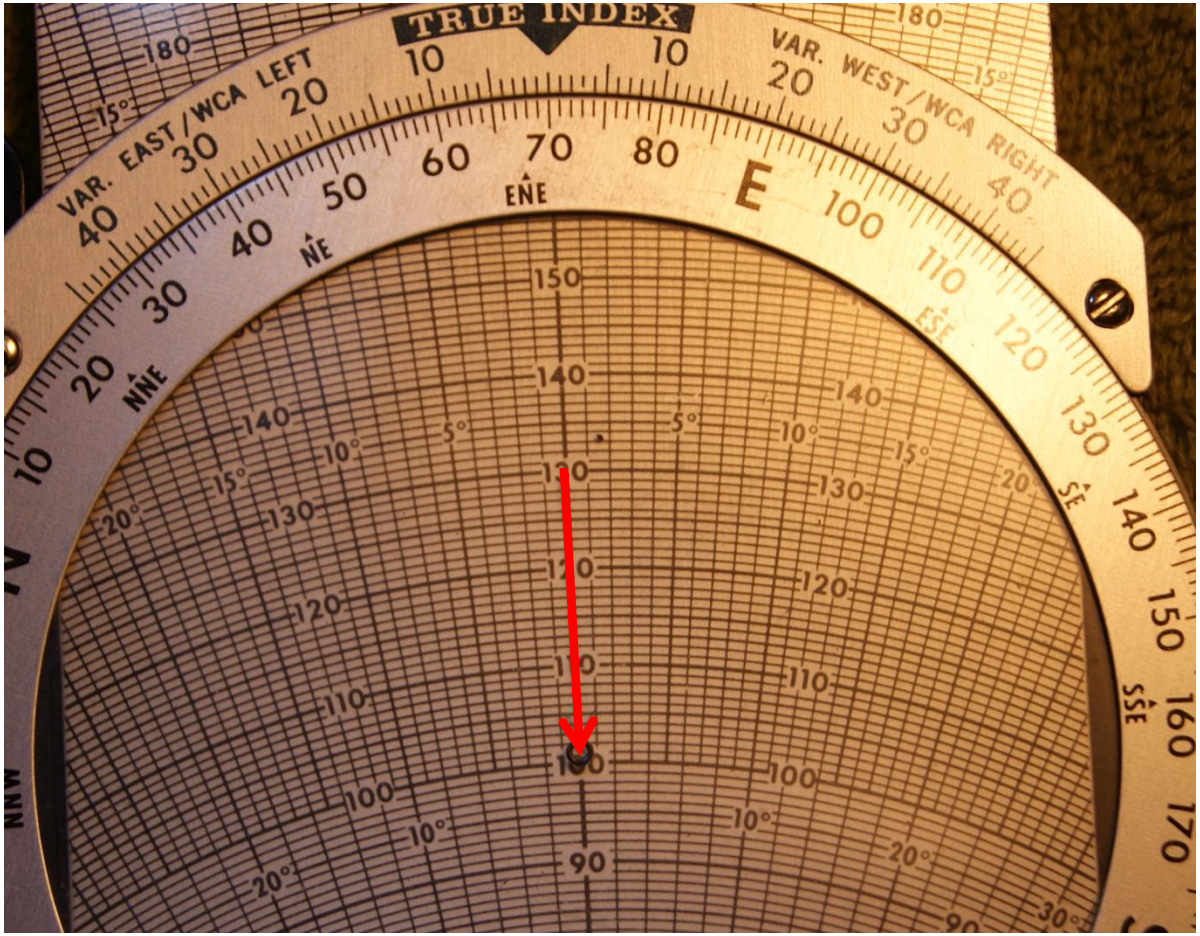
Exercise 1 – Lay Out a Course Line and Determine True Heading and Ground Speed

- Given – Wind (from FA at 6,000) = 0730+14
- From San Marcos (KHYI) to Yoakum (T85)
  - Distance = _____
  - True Course = _____
- Use the Plot Tool

Exercise 1 (cont.)

- Now Apply Wind to Determine True Course
- Our True Airspeed (TAS) is 90 knots (in this case the true in the TAS has nothing to do with direction, but is the speed through the air – more on computing TAS later)
- Turn Compass Rose until 70 degrees is under the True Index
- Set Grommet Over 100
- Draw a Line Down from 130 to the Grommet (see next page)

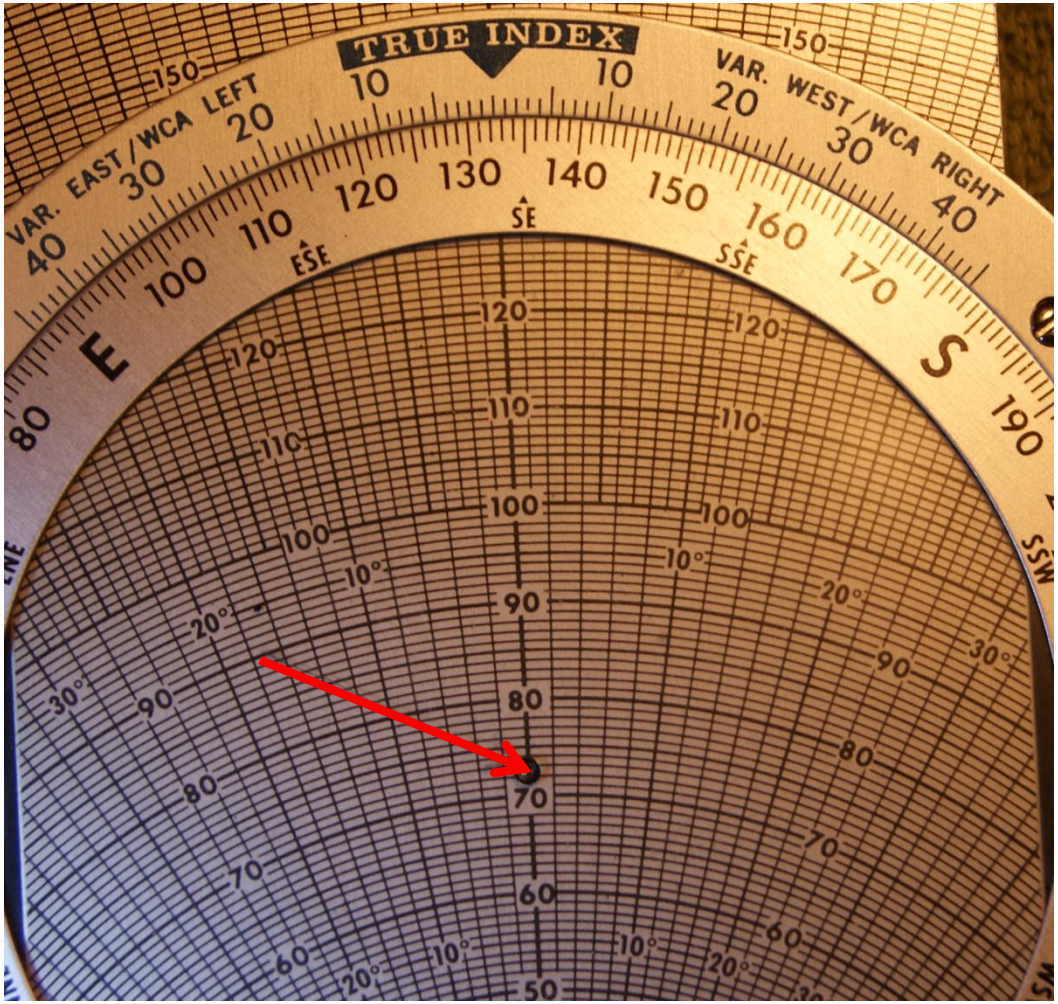
Exercise 1 (cont.)



Exercise 1 (cont.)

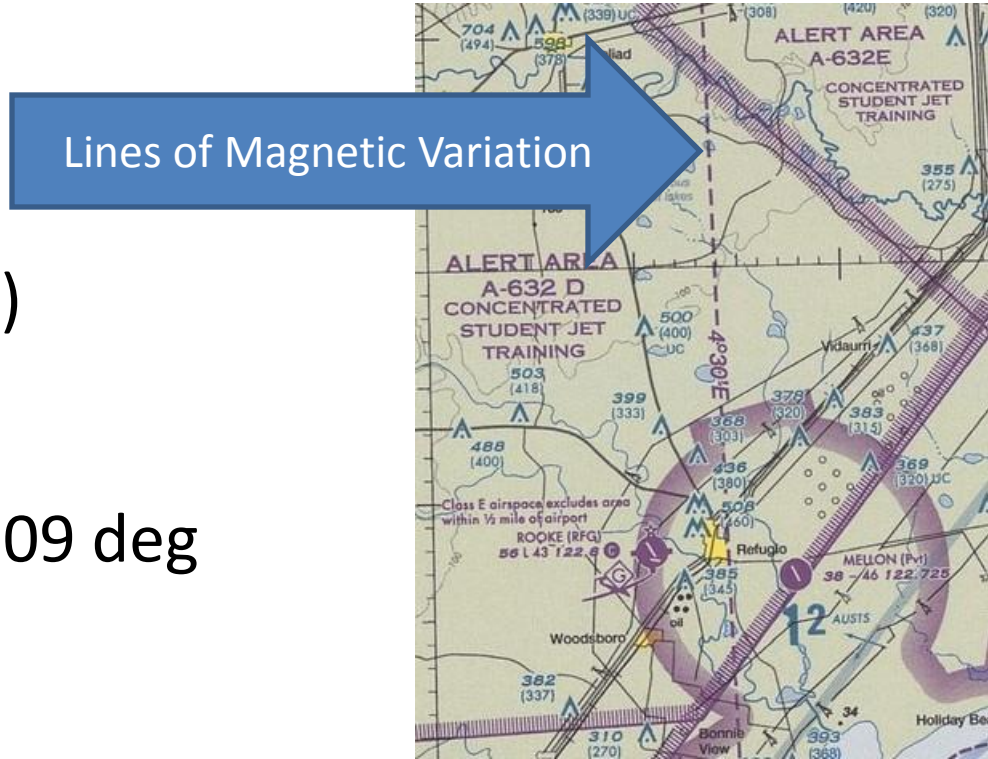
- Now Turn to place 132 under True Course Index and Slide Until Tail of Wind is on the 90 degree Line (see next chart)
- Read Wind Correction Angle as 18 degrees Left
- True Heading (TH) = True Course (TC) +/- WCA
  - Left WCA is Minus
  - Therefore TH = 132 – 18 = 114 degrees
  - We Also Solved Ground Speed as 72 knots

WCA



Exercise 2 – Now Solve for Magnetic Heading (MH)

- We Fly Using Magnetic Reference, not True
- Variation Between Magnetic and True
- Here it is 4.5 degrees East
- MH = TH +/- Variation (VAR)
  - If VAR is East it is minus
- MH = TH(114) – VAR (5) = 109 deg



FOR (MAGNETIC).....	S	210	240	W	300	330
STEER (COMPASS).....	180	212	243	274	303	332

Exercise 3 – Find the Compass Heading (CH)

- Deviations (DEV) Between What Compass Indicates and Actual Magnetic Heading
  - Electrical Currents from Avionics and Equipment Disturb Magnetic Field Around the Compass

FOR (MAGNETIC).....	N	30	60	E	120	150
STEER (COMPASS).....	0	28	57	86	117	148
FOR (MAGNETIC).....	S	210	240	W	300	330
STEER (COMPASS).....	180	212	243	274	303	332

  - In This Case ~ -3 DEV
  - Therefore, CH = MH (109) – DEV (4) = 105

Some Final Thoughts on the Wind Side

- Good for Flight Planning
- Winds Aloft Forecasts (FA) Notoriously Bad
- Likely Need to Revise Once Flight Begins
- Draw Wind With an Arrow Pointing to Grommet
- Use Pencil, Not Ink

Computer Side

- Solve for TAS, Density Altitude
- Time, Distance and Rate Problems

Example 4 – Find Density Altitude

- Flying at Leadville, CO
- Airport Elevation 9,934’
- Say OAT is 85 deg F
  - ~29.5 deg C
- Density Altitude ?
- Use Airspeed Corr. Window
- Set 30 deg C against 10,000’ – Read 13,800’

Example 5 – Compute TAS

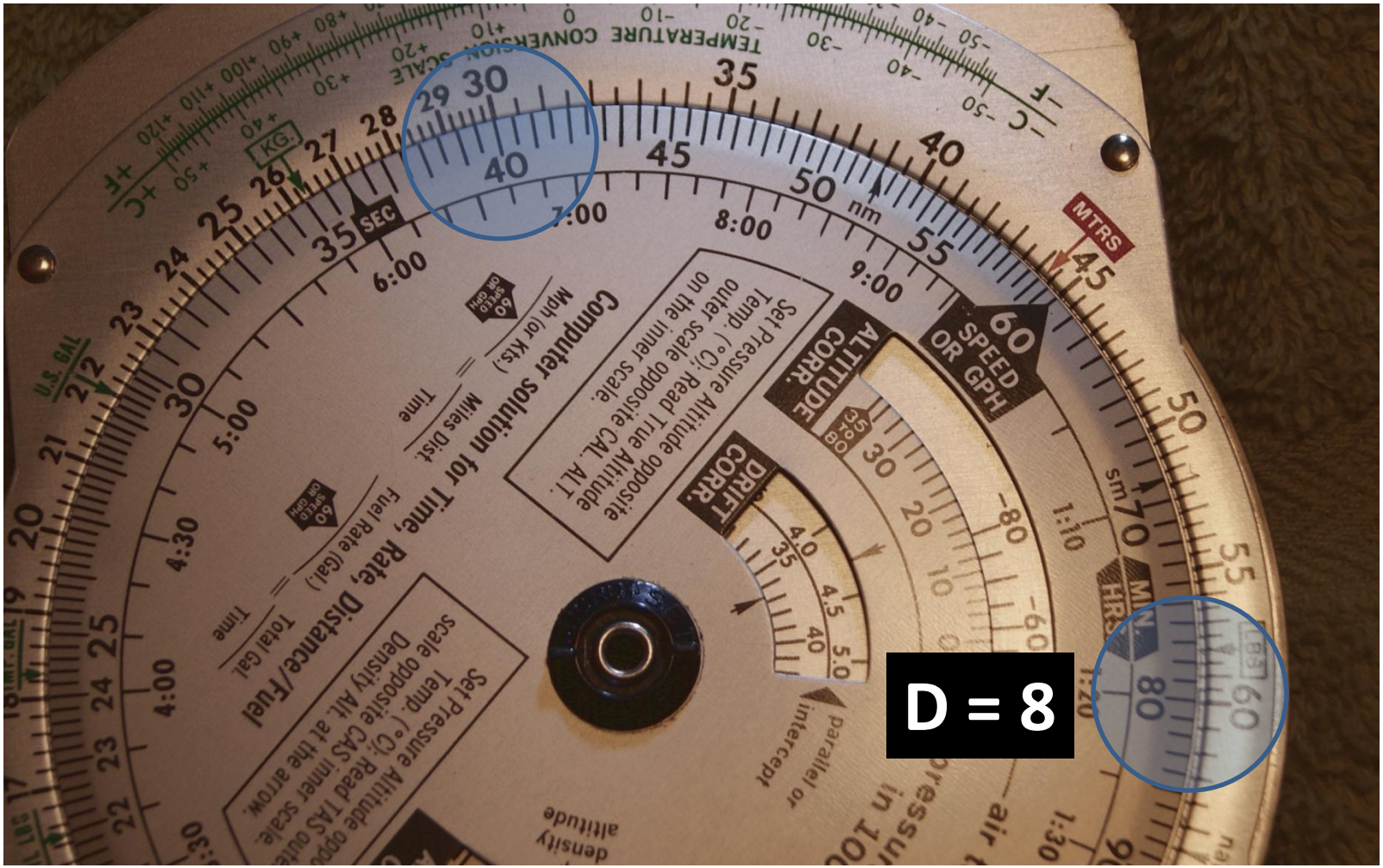
- Without Changing, Find TAS if KIAS = 90 knts
- KIAS is Inner Circle, Outer Circle is KTAS
- Opposite the 90 (inside) read KTAS = 112 knts
  - Increases Landing and Takeoff Distance
  - Decreases Rate of Climb
  - May Be Beyond Airplane's Service Ceiling

Time, Distance, Rate

- All Are of the Form: $\frac{A}{B} = \frac{C}{D}$

- Always Put A and C on Outer Ring,
- Read B or D on Inside Ring,
- e.g., A = 3, B =4, C = 6, D = ?

Answer



In Class Problems

- Ground Speed
- Time Between Points
- Fuel Rate and Fuel Usage