Gliding Australia Training Manual

Trainer Guide

Unit 39

Advanced soaring instruments and flight computers

Unit 39 – Advanced Soaring Instruments and Flight Computers

AIM

To develop the student's knowledge and skill in the use of modern flight computers without degrading their lookout and situational awareness.

The focus is on moving map flight computers, including personal devices such as the Oudie and mobile phones.

The pilot should become familiar with the operation of the devices they will use and apply the concepts outlined in this unit.

PRE-REQUISITE UNITS

- GPC Unit 38 Meteorology and flight planning

COMPETENCY ELEMENTS AND PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARDS
1. Describe information available and assumptions	**Describe** o Averager and netto modes of electric variometers o The purpose of relevant items shown on flight computer pages and at what stage of the flight each item is of use o The basis on which flight computer predictions of wind, ETA and arrival height are made
2. Demonstrate practical use of a flight computer	• **Demonstrate** o Setting up a task and parameters on the ground o Navigating a task and adjusting parameters (such as thermal strength) in the air o Excellent lookout with minimum "screen time" o Correct interpretation of the information displayed

KEY MESSAGES

- The pilot needs to think and look ahead.
- Flight computers can be a distraction from the tasks at hand and degrade pilot performance.
- Flight computers display accurately what's happening now and in the past. Predictions of finish height, ETA etc. are based on assumptions of climb rate and winds.
- Flight computers can display a huge amount of information - only relevant or useful information should be displayed.
- The display should be uncluttered to allow relevant information to be seen clearly and quickly.

LESSON PLANNING AND CONDUCT

Briefing

Electric Variometers

Brief the concepts of electric varios with reference to:

- Averaging of the instantaneous vertical climb/sink rate (averager)
- Netto and relative netto
- Configurable parameters such as total energy compensation based on a mix of the total energy probe, pitot, GPS and inertial sensors
- Speed to fly information
- Many other display features blurring the distinction between varios and flight computers

Note that electric variometers still suffer from limitations related to lag and gust sensitivity. Advanced functions require configuration and a good understanding of what is displayed.

Flight Computers

Discuss the many types of flight computers available (there's a list in the pilot guide for this unit). This unit can't cover the breadth of these devices, and nor is it appropriate for an in-experienced pilot to use many of the features – they should learn to fly cross country using the basics first then move on to the fancy devices if they wish. However there are common principles which are covered below.

All systems display and allow configuration of:

- A task
- MacCready setting (assumed climb rate)
- Airspace boundaries
- Wind vectors
- Required track and actual track
- Distance and bearing to next turn point
- Finish height or final glide data

Using an example device such as those available in the club gliders, demonstrate configuration and display of the above items. Most devices have a simulator that can be run on a computer – these are a great way to

demonstrate use of the device. Or use the appropriate pages from the manual and then demonstrate in a glider. If the club gliders don't have flight computers try using the Oudie simulator (search for it on google).

Explain the effects of the MacCready setting, wind, bugs, ballast and finish height on the predictions made by the computer for the task (particularly ETA and finish height).

At the flight computer to be used:

- Ensure correct computer setup for the pilot, glider polar, bugs, airspace, turn-points, finish height, ballast and connection to other devices.
- Help to set up a short task on the flight computer.
- If possible, run through a simulation or replay of a flight on the computer so the pilot can see how it works and what it displays.

Flight Exercises

Do the short task set in the flight computer. The whole task may be within gliding range of the airfield or can be combined with a flight for one of the other GPC units.

Monitor the student's lookout and understanding of the information being displayed. Be aware that the student may become absorbed by the computer and lose lookout and awareness.

COMMON PROBLEMS

Problem	Probable Cause
• Distraction with flight computers resulting in poor lookout	Lack of familiarity with use of flight computers Lack of discipline with dividing on-screen tasks into small units
• Relying too much on the information displayed	Lack of understanding of the underlying assumptions and calculations used by flight computers Incorrect configuration of the flight computer

THREAT AND ERROR MANAGEMENT

- Flights computers, otherwise known as "advanced distraction devices" introduce significant threats that must be carefully managed. Pilots must be aware of the distraction from other tasks such as maintaining good lookout.
- Screen time should be kept to a minimum – this can be achieved by ensuring that only the required information is presented and that the pilot is well practiced in using the device.
    - Where increased screen time is unavoidable, such as reprogramming a task, this should only be conducted after moving away from other aircraft, conducting a full scan lookout with a 180 degree turn, and then regular full scans. Break longer tasks into smaller sub-tasks and conduct a full scan between each sub-task.
- Incorrect interpretation of the information displayed can lead to errors such as misjudging final glides or infringing airspace. In addition, configuration of flight computers is complex and misconfiguration may give erroneous results, potentially impacting safety. All pilots using them must be familiar with the use of the device, be aware of limitations and the potential for incorrect setup; basic setup problems include such items as incorrect glider polar, weight, airspace, and task. This should be practiced on the ground.

- Even with correct configuration, predictions by a flight computer are dependent on history and assumptions about future events. For example the flight computer won't know about wind changes and changes in flight conditions ahead – so ETA and final glide height may be incorrect.

TRAINING MATERIALS AND REFERENCES

- Flight computer manuals and device simulators