DDSC OpenVario

BASIC USER GUIDE

David Nash | DDSC Airworthiness | Rev 1 (Sept 2023)

Contents

Introduction

This is a supplementary manual for any DDSC aircraft fitted with a OpenVario flight computer. The manual shall be read in conjunction with the specific aircraft's flight manual, handing notes and similar documents.

The pilot shall understand fully this document before using the OpenVario fitted to any glider. A pilot that has not read and understood this manual shall only fly the aircraft with the OpenVario switched-off to ensure the safety of the pilot (misinterpreting the information presented) and/or damaging the OpenVario and associated equipment.

No person shall access behind the aircraft instrument panel unless they hold the appropriate airworthiness qualifications.

OpenVario is an open source hardware design running the open source XCSoar software. Those familiar with XCSoar will notice the interface is a little different (compared to a tablet/phone) but quite simple to navigate.

This manual does not teach the pilot how to use XCSoar, but introduces OpenVario installed at DDSC and how to access the various features of the extensive XCSoar software.

Preparation

CARE

The screen of the OpenVario is not a touch-screen, so it should remain free of fingerprints. If needed, cleaning the screen shall follow the same procedure as a glider canopy.

The input devices shall be cleaned with a damp cloth. A mild detergent may be used if required, but the components aren't waterproof (so be careful).

The silicone pad protecting the control column mounted thumb-joystick with supplementary push buttons will be damaged if mishandled. A damaged silicone pad shall be replaced immediately to protect the integrity of the underlining pcb circuitry.

SD CARD AND USB STICK

DDSC OpenVarios have been setup with a front-of-panel mounted USB socket *. This allows each pilot to use their own USB stick to load tasks and download flight logs. Default (write-protected) profiles have been provided for each glider, however pilots may want to add their own profiles with their preferences, look and feel (recommended for advanced users only).

The USB stick (with a specific folder format) is required to:

- Upload files to the OpenVario (ie task and waypoints- easiest way to set a task)
- Download fight logs from:
  - OpenVario
  - Any of the connected devices (eg flarm)
- Add profiles (advanced users only) in addition to the default DDSC profiles provided.

An OpenVario USB stick can be purchased from the DDSC bar.

Each glider has a default profile setup to assist with training and getting started. Once a pilot becomes familiar with the platform, they may choose to incorporate their own profile/s.

The pilot needs to select the required profile when the OpenVario first starts. The possible options will include other profiles created by other members. Ensure any profile selected is for the applicable glider.

* the front-of-panel mounted SD Card has been removed (as of June 2023) from the fleet in favour of an inaccessible behind-the-panel common sd card arrangement. This previous arrange proved unreliable.

A pilot can upload their profiles and tasks using their usb stick.

ORIENTATION

Before attempting to use the OpenVario in flight, the pilot should spend time on the ground becoming familiar with the system. This can be achieved in the specific glider to be flown, or the ground training rig (see below).

OpenVario ground training rig (note – photo shows SD card in slot on RHS of Panel. This is no longer fitted/used)

There are 3 types of input devices available across the DDSC fleet. These are:

1. Dual-shaft rotary encoder <u>without</u> supplementary push buttons
2. Dual-shaft rotary encoder <u>with</u> supplementary push buttons
3. Control column mounted thumb-joystick with supplementary push buttons

Note that the ground training rig has the #2 type input device. Type #2 and #3 have many similarities, while #1 is quite different (may be upgrade to type #2 in the future).

Input devices

There are 3 types of input devices available across the DDSC fleet. These are:

1. Dual-shaft rotary encoder <u>without</u> supplementary push buttons
    a. Fitted to Hornet (as at May 2022)
    b. 'push-button on the encoder end has numerous functions (enter/esc/menu) as placarded in the aircraft
    c. Mouse-mode <u>is not</u> available
2. Dual-shaft rotary encoder <u>with</u> supplementary push buttons
    a. Fitted to Duo Discus
    b. push-button on the encoder end provides the 'enter' function (only).
    c. 3 supplementary pushbuttons are:
        i. function (changes modes from *mouse <-> arrow-key*)
        ii. esc
        iii. menu

d. the encoder moves the cursor or highlighted-selection up-down and left-right
e. a momentary pushbutton on the control-column toggles both Borgelt varios (front and back seat) between cruise/climb function in unison.

3. control column mounted thumb-joystick with supplementary push buttons
   a. Fitted XOT (and possibly the Jeans in the future)
   b. 4 supplementary pushbuttons on top of the control-column are:
      i. function marked *Fn* (toggles modes between *mouse <-> arrow-key*)
      ii. menu marked *M*
      iii. esc marked *X*
      iv. radio transmit marked *PTT*
   c. push-button on the thumb-joystick provides the 'enter' function.
   d. the thumb-joystick (surrounded with 4 arrows\ markings) moves the cursor or highlighted-selection up-down and left-right
   e. a fifth pushbutton on the back of the control-column toggles the Borgelt vario between cruise/climb function. Hold the button for 1 second and the current vario mode (cruise/climb) will be displayed on the OpenVario as a popup message (esc (X) button will clear the message)

4 x pushbuttons and thumb-joystick (described above)   fifth pushbutton on back of stick for cruise/climb (described above)

NOTE:

1. unlike phone or tablets, **the OpenVario does not have a touch-screen. Please do not try !** 😐

# Basic Pilot Actions

Introduction

Many of the files in the OpenVario have been write protected leading to some error messages. These can be ignored.

These instructions don't cover how to set up a pilot's own profile. Since at the time of writing only one pilot at DDSC has done this, it has been omitted from the body of this manual for simplicity.

Doing an aircraft's Form 2, the SD Card will likely be reflashed to incorporate updates and remove accumulated data (flight logs, obsolete club and pilot profiles, etc). At any time an SD card could also become corrupted and need to be replaced. Therefore, if you make your own pilot profile, or want a record of a special flight, please ensure you back it up/download it and then save it securely elsewhere (in case you lose it/overwrite it). Otherwise, like any other software file, it may be lost. You have been warned!

Selecting (Glider) Profile

When the OpenVario first powers on, the below screen will be presented, giving the pilot the option to select the required profile.
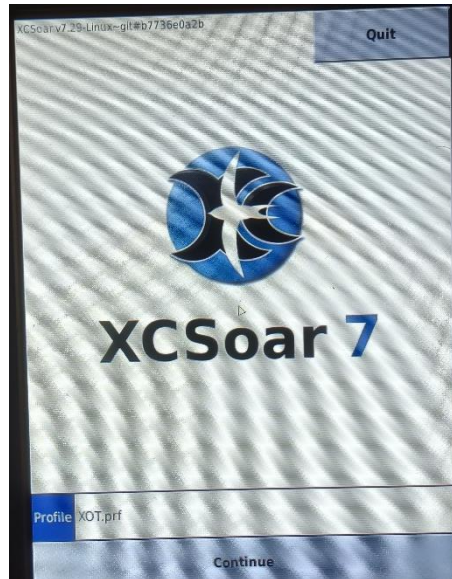
The pilot highlights "Profile" and then scrolls to obtain the required selection (eg XOT shown); highlights "Continue"; then presses enter.

Alternatively, the pilot can highlight 'Profile' and press enter, revealing the below screen:
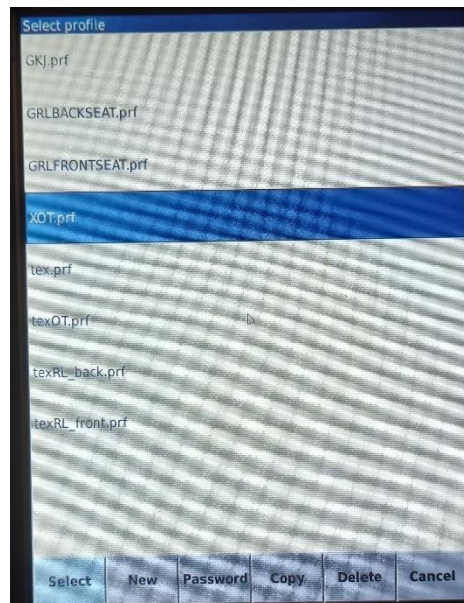
This gives the pilot the option to create(new) copy and delete a profile. Note the profiles provided by DDSC (eg GRL_BACKSEAT, GRL_FRONTSEAT, GKJ, XOT) are write-protected. You cannot edit them.

Note 'Tex' (advanced user) has added some profiles with his own look and feel.

Download A Flight Log/Trace

If one wants to download a flight trace from OpenVario to the specially formatted usb stick, they must do so in the 'shell' outside the XCSoar program. The shell can be entered by:

- by selecting QUIT on the startup menu (before running XCSoar), or
- exiting the XCSoar program via menu ('M') and then selecting QUIT.

A basic menu will be presented, with the second option is *"Applications"*.
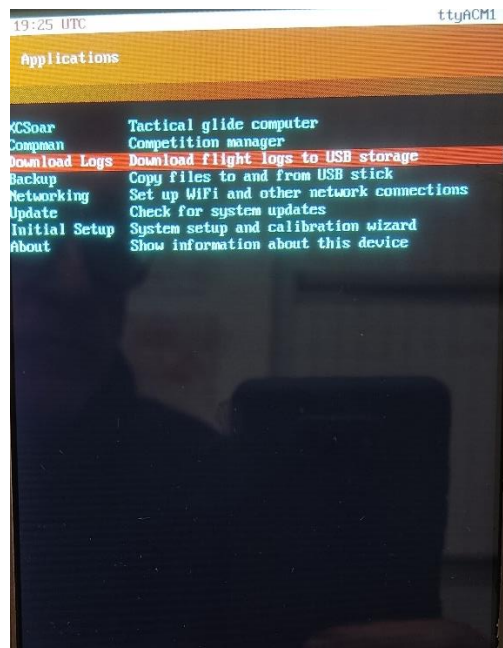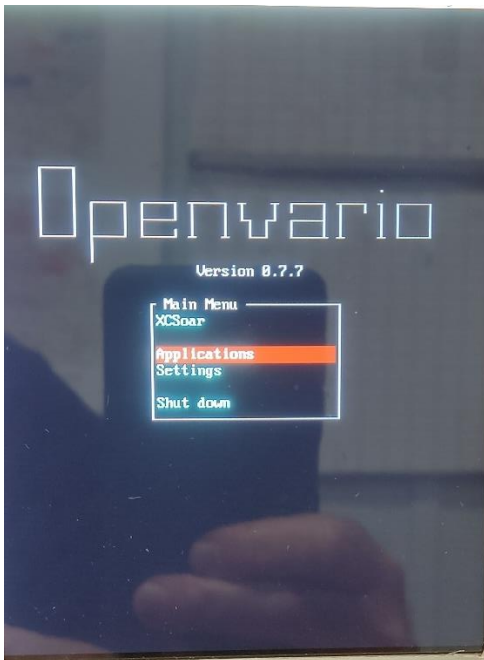
Shell (outside XCSoar) Menu

Use the encoder/thumb-joystick to highlight this selection and 'enter'.

Insert your formatted USB stick.

Then select *"Download Logs"*.

All the logs on in the OpenVario will be downloaded into the root directory on the usb stick. These files can then be uploaded to Weglide, analysed in SeeYou, etc via a PC.

Backup And Restore From USB Stick

See separate section Download A Flight Log/Trace to download a flight log/trace. This procedure isn't relevant for this action.

If one wants to upload or download files (except a flight trace) to/from the specially formatted usb stick they must do so in the 'shell' outside the XCSoar program. The shell can be entered by:

- by selecting QUIT on the startup menu (before running XCSoar), or
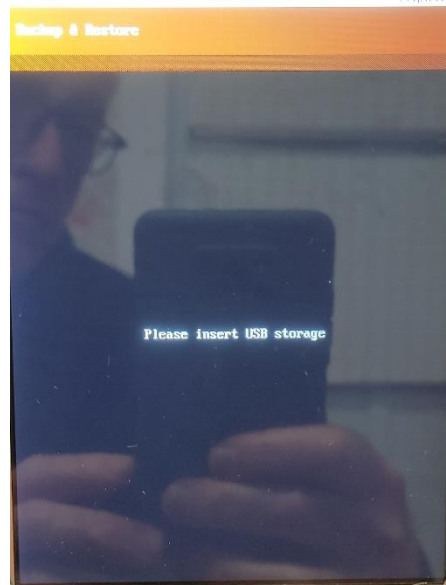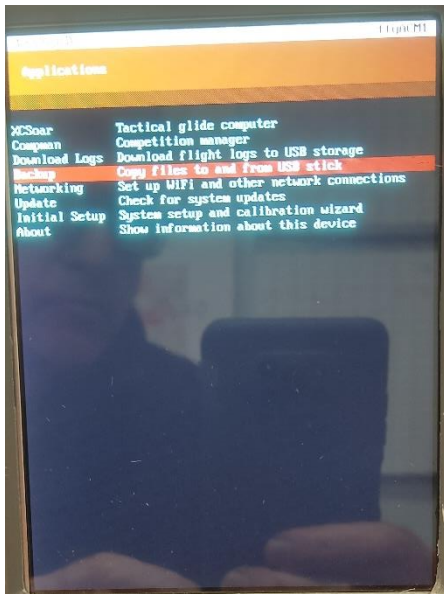- existing XCSoar via menu ('M') and then selecting QUIT.

An basic menu will be presented, with the second option is *"Applications"*
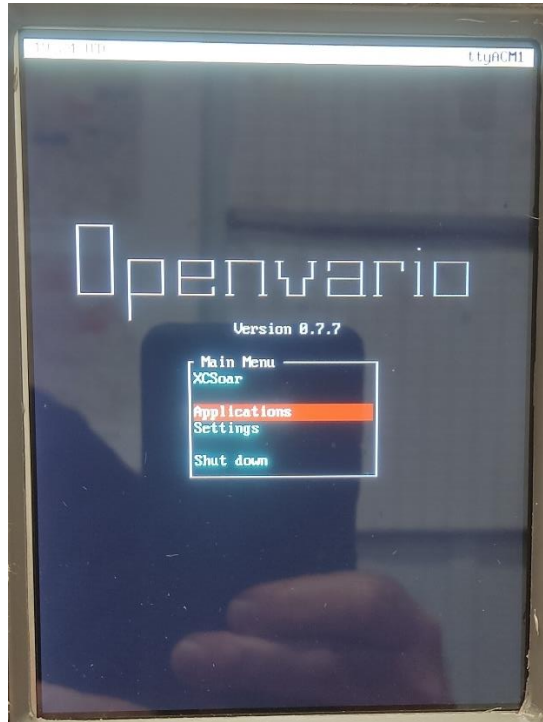
Shell (outside XCSoar) Menu

Use the rotary encoder/thumb-joystick to highlight this selection and 'enter'.

Then select *"Backup"*.

Then insert your OpenVario formatted USB stick.

Then select either:

- *"Backup"*
    - files (to be uploaded) must be in the **openvario\backup\home\root\.xcsoar** folder
    - the most common would be:
        - waypoints and task (default "*mySeeYouFile.cup* ")
    - update other files as need including:
        - airspace
        - flarmnet (flarm database)
        - maps
        - etc
    - default files have been provided already in the OpenVario.
    - once the required file is uploaded, they should be removed from the usb stick to prevent repeated uploads
   - the usb stick can be removed when the 'dismount' message is displayed on OpenVario

- *"Restore"*
    - PLEASE NOTE:
        - **THE AVERAGE PILOT WON'T HAVE A NEED FOR THIS OPTION UNLESS THEY HAVE CREATED A UNIQUE PILOT PROFILE OR SIMILAR**.

- Your usb stick will be <u>updated</u> with files from the OpenVario (internal sd card). THIS MAY OVERWRITE your files.
- This (option) isn't used to download flight logs/traces. See earlier section for instructions.
  - If a connected device flight log needs to be downloaded, this must be done inside XCSoar prior to exiting to the shell. See elsewhere for how to do this.
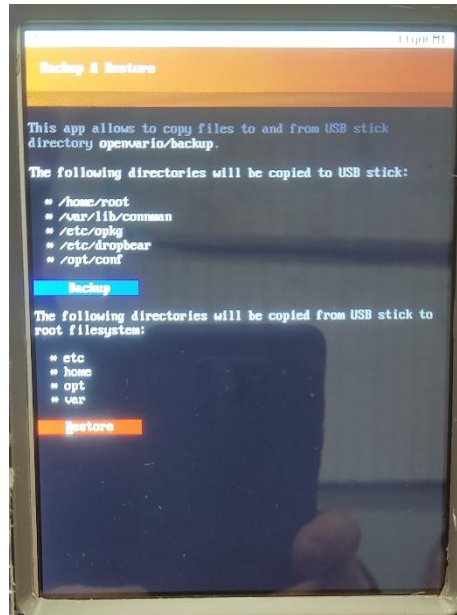
Menu

Once XCSoar is running, the 'menu' button (or equivalent) will open a matrix of options. To exit the menu, press 'esc' (or equivalent).
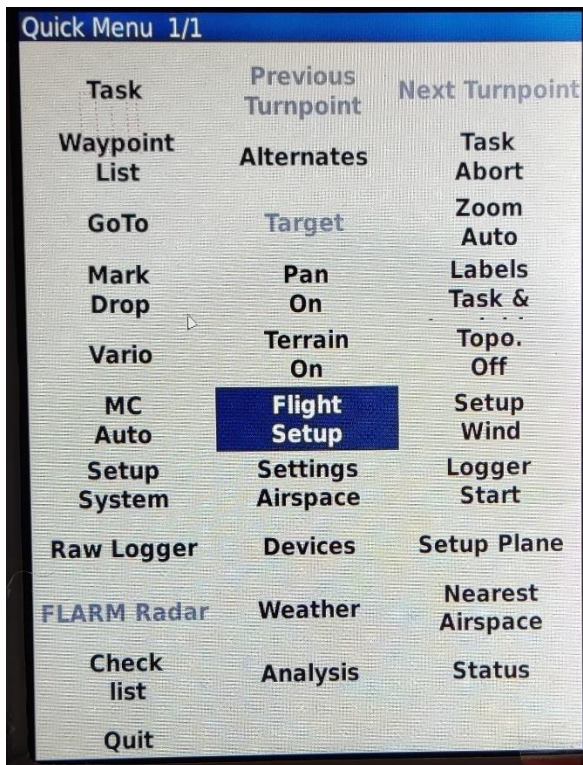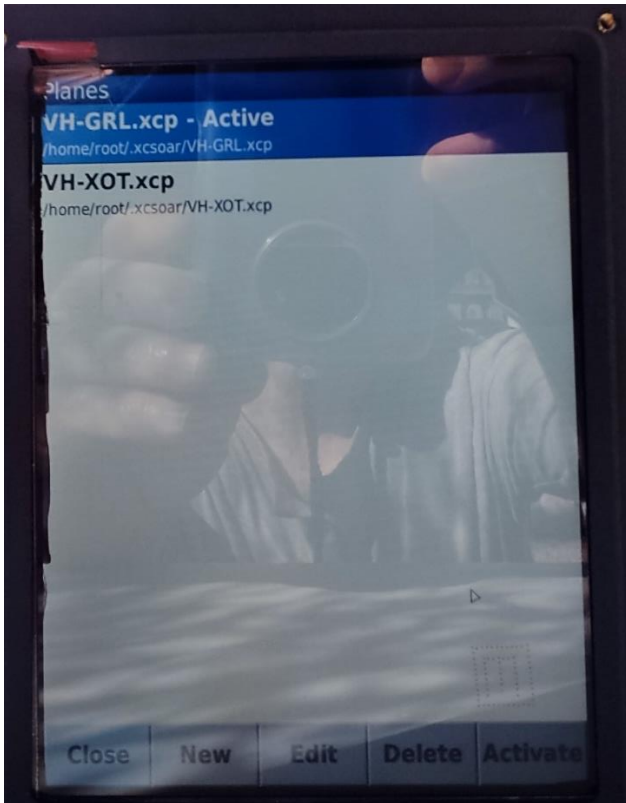
Main Menu list within XCSoar

To navigate to a particular menu item, highlight it using either the arrow-key or mouse and then 'enter'.

Most of these items are self-explanatory or outside the scope of this introductory document. Further details can be found online.

Setup Plane

When XCSoar is first started, the pilot should ensure the correct aircraft has been activated (otherwise final glide calcs etc will be wrong!). To do this select 'Setup Plane' from the main menu.

Highlight the glider, then enter the mouse-mode and move the cursor to 'activate' and 'enter'.
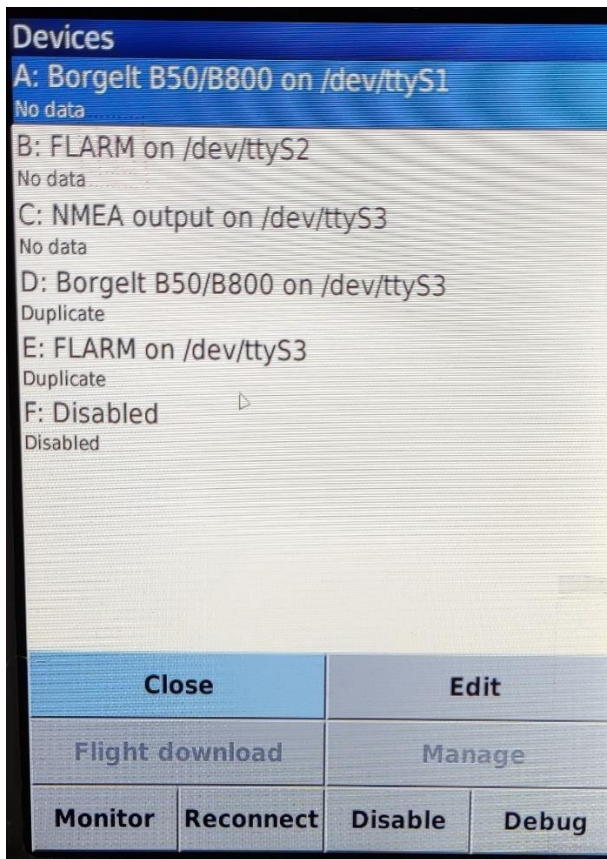
Setup Plane Menu list within XCSoar soaring default glider profiles (May 2022)

DEVICES

Note: <u>nothing</u> in this section should be changed by a pilot customizing their profile

When XCSoar is first started, the pilot should ensure the connected devices are communicating.

Devices List – note 'No Data' items on A, B & C indicting a problem (try Reconnect) ... This is XOT (May 2022) with Vario & FLARM turned OFF

To do this select 'Device' and this will list the:

- Device A
  - tty1 - Borgelt Vario
  - *GPS, air-data etc* should be listed on the second line of the item listing when operating correctly
- Device B
  - tty2 – FLARM
  - *GPS FLARM* should be listed on the second line of the item listing when operating correctly
- Device C
  - tty3 – NEMA OUTPUT
  - *GPS, air-data, FLARM etc* should be listed on the second line of the item listing when operating correctly ONLY IN THE 2-SEATERS.
- Device D
  - tty 3
  - Borgelt data in the BACKSEAT OF 2-SEATER ONLY

- o this replaces Device A & B (BACKSEAT OF 2-SEATER ONLY)
        - o data is sent from front seat OpenVario via tty3
            - ▪ *note that the FLARM data is coming through also*
    - Device E
            - ▪ disabled

If the expected devices aren't connected (ie no data), highlight the device, enter the mouse-mode and move the cursor to 'reconnect' and 'enter'. If the device is 'ON' the disconnected device should now reconnect.

The information sent to OpenVario is prioritized from Device A (highest) to Device E (lowest). If for example, Device A & B provides GPS data, the GPS data will come from Device A when available, then B, etc

If there is a "NO GPS Fix" message on the map, the first thing to do is see whether the accompanying devices are communicating (before takeoff!). The OpenVario does not have its own GPS airdata etc.

The following devices should be connected (unless not connected (eg shown as 'no data', 'duplicate', etc) in each glider. Device F is disabled across all gliders

Glider/Seat	Device A Borgelt	Device B FLARM	Device C NEMA outout	Device D Borgelt	Device E Flarm
XOT	GPS fix, Baro	GPS fix, Baro, FLARM	No data	Duplicate	*Disabled*
GRL/front	GPS fix, Baro	GPS fix, Baro, FLARM	*No data*	Duplicate	*Disabled*
GRL/rear	No data	No data	*Disabled*	GPS, Baro, *FLARM*	*Disabled*

Warning to Instructors (and other rear seat pilots) in GRL. The front OpenVario must be ON (and functional) to pass data to the rear OpenVario. <u>The rear OpenVario is just a repeater </u>and obtains all its data from the front unit. (ie it has no gps, flarm, etc).

GOTO

The simplest mode of navigation is to select GoTo menu item, one waypoint at a time. Maybe ok for casual flying following the clouds for example but can be a major distraction in flight.

A better method is to use Task option below

TASK

There are 2 main ways to set and declare a task in OpenVario:

Import (upload) on USB Stick

This is the superior method.

Save the task/s (ie task A & B at a comp) on the formatted OpenVario USB stick in the upload folder (**openvario\backup\home\root\.xcsoar**). The default file is called "*mySeeYouFile*".

The author finds it easiest to take the formatted OpenVario USB stick to briefing, open the waypoint file (the default file is called "mySeeYouFile.cup") in SeeYou, set the task/s for the day (delete the old ones if you wish) and save it back to the usb stick …

Insert the usb stick in the front-of-panel usb socket and power the OpenVario "ON". Exit into the shell menu (Quit on startup screen, or quit XCSoar) and upload as detailed in **Backup And Restore From USB Stick** section.

If you have saved the waypoint file the same as on the usb stick (and System Setup / Site Files/Waypoints) the procedure is:

- 'manage' -> 'browse' -> 'more'
- select the task required -> 'load' (good idea to save as a meaningful name (eg task A) under Options in SeeYou if more than one task is uploaded)

   Check the task

- 'manage' -> 'declare'   (optional)
- 'close'   -> 'close' (to save).

If Task B is enacted on the grid (usually due to deteriorating weather during a competition), just repeat above steps, as all tasks in the waypoint file were already uploaded.

However, if the waypoint file is saved as a different name, one needs to go into System Setup / Site File to point XCSoar to the correct waypoint file. Then follow the above procedure (easier to reuse the old file names …)

### Manually via the Input Device (or a keyboard) on the OpenVario

this is the least preferred option and is rather clunky (you have been warned)

- 'manage' -> 'new task'
- 'turn points' -> 'add turnpoint'
- select waypoint -> 'OK'
- repeat as required (until task is set)

- 'edit points' for each waypoint to get the sector correct (start line, finish circle, beer can or thistle, etc)

When task is finalised

- 'manage' -> 'declare'   (optional)
- 'close'   -> 'close' (to save)
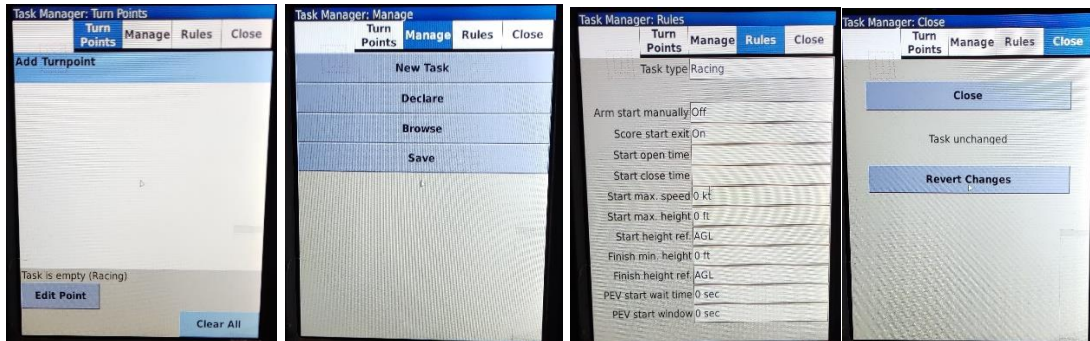

Task (Manager) submenus

SYSTEM SETUP

this is where the main look and feel of XCSoar can be personalized. A couple of pointers:

- if planning on significant edits, find a combination usb keyboard/mouse (or separate with a usb hub) compatible with Linux machines. Plug this into the front-of-panel usb socket.

wireless (via usb dongle) keyboard/mouse that works well with OpenVario

- Site Files (subfolder) are where the airspace, waypoint, flarmnet (database), maps are selected. If uploading new waypoints, the pilot will need to activate (select) them here.
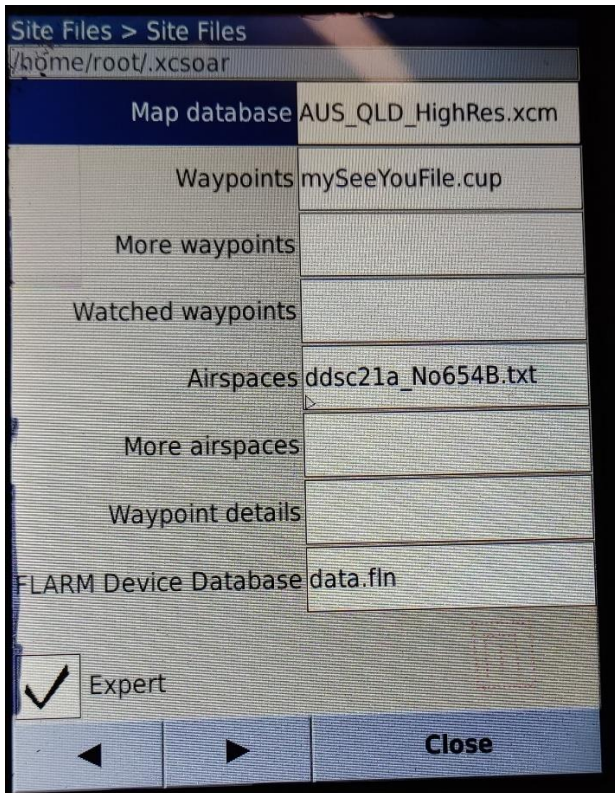
XCSoar's main reference files that can be easily replaced/updated as required

- the look and feel of the maps and info boxes. *Definitely recommend using a keyboard and mouse to edit these …*
- the default waypoint file is called "mySeeYouFile.cup".
- additional waypoints can be added from different databases (if required) to "More waypoints". It can be confusing and probably better just selecting the "Waypoints" required before flight.
- lots of other stuff
- finish heights, terrain clearances, task rules, etc

Creating Own Profiles

… coming if demand requires …