DDSC OpenVario

BASIC USER GUIDE

David Nash | DDSC Airworthiness | Rev 0 (May 2022)

Contents

Introduction

This is a supplementary manual for any DDSC aircraft fitted with 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. 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 SD Card slot and USB socket. This allows each pilot to use their own SD card with their preferences, look and feel transportable from glider to glider.

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

- Upload files to the OpenVario (ie task and waypoints- easiest way to set a task)
- Download fight logs from:

- o OpenVario
- o Any of the connected devices (flarm)

A default SD Cards and USB stick can be purchased from the DDSC. These have a default profile setup to assist with training and getting started. Once a pilot becomes familiar with the platform, this default profile can be changed as required. One should consider backing up the SD Card and USB stick in case they are lost or corrupted.

NOTE: the OpenVario will not operate unless a valid SD card is inserted and remains in the front-of-panel SD Card slot. SD cards shall not be inserted directly in the rear if the OpenVario (as they can easily slip inside the case and become completely inaccessible).

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

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 placard in the aircraft
   c. Mouse-mode <u>is not</u> available
2. Dual-shaft rotary encoder <u>with</u> supplementary push buttons
   a. (will be) Fitted to Duo Discus and DG
   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 Jeans in the future)
   b. 4 supplementary pushbuttons on top of the control-column are:
      i. function marked *Fn* (changes modes from *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)

Type #2 and #3 have many similarities, while #1 is quite different (may be upgrade to type #2 in the future).

NOTE:

1. unlike phone or tablets, **the OpenVario does not have a touch-screen. Please do not try !** 😐
2. **if the OpenVario is OFF the 'cruise mode' of the Borgelt Vario cannot be selected** (the stick gets its power from the OpenVario USB)**.**

Basic Pilot Actions

UPLOAD AND DOWNLOAD FROM USB STICK

If one want to upload or download files from/to the specially formatted usb stick they must do so in the 'shell' outside the XCSoar program. The shell can be enter by 'esc' while the OpenVario is initially starting (after power-on) or 'quit' from the XCSoar 'menu'.

An basic menu will be presented, with the second option is *"File - Copy file to and from OpenVario"*
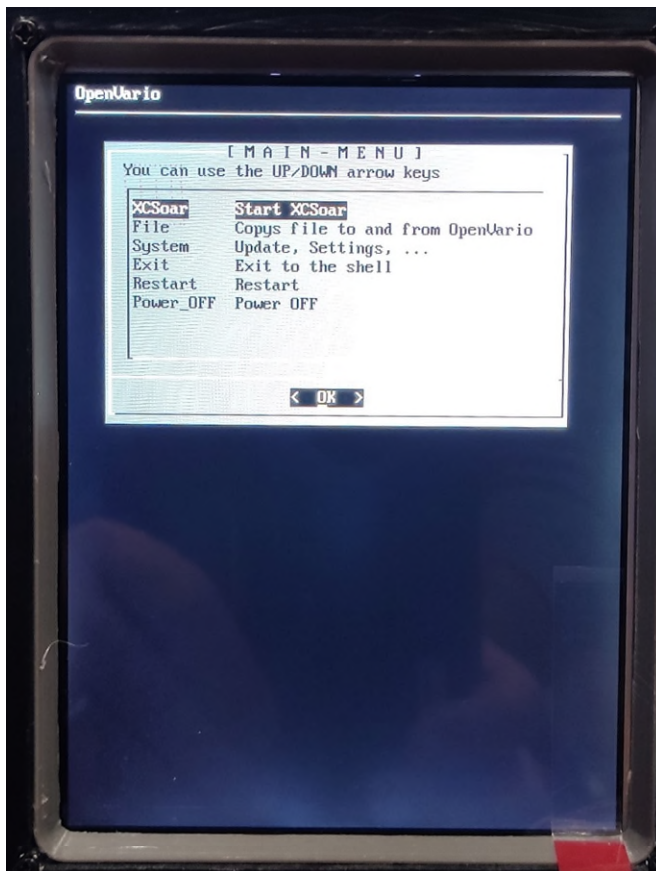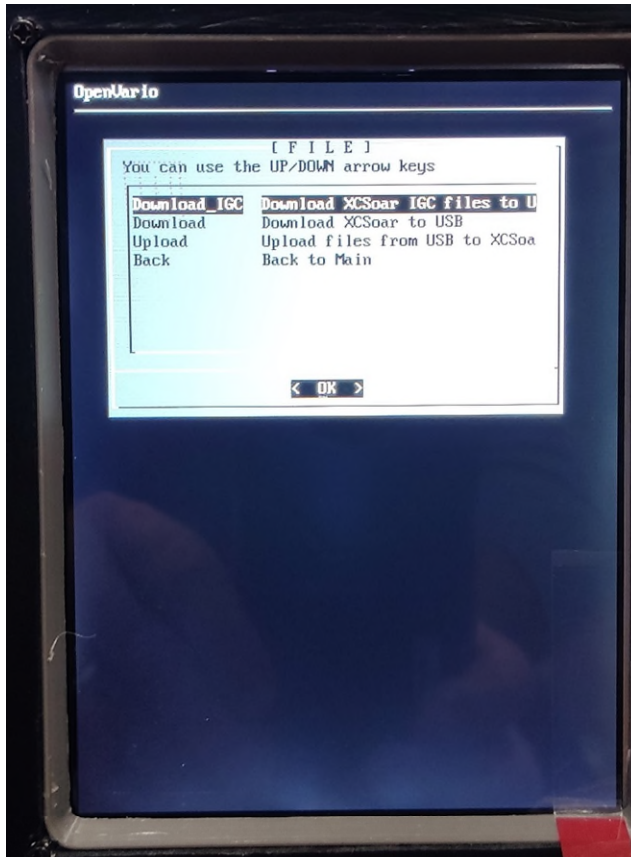
Shell (outside XCSoar) Menu

Use the encode/thumb-joystick to highlight this selection and 'enter'. Then select either:

- *"Upload – Upload files from USB still to XCSoar"*
  - files (to be uploaded) must be in the *openvario/upload/xcsoar* folder
  - typical files are:
    - waypoints (default "*mySeeYouFile.cup* ")
    - airspace
    - flarmnet (flarm database)
    - maps
    - etc
  - default files have been provided already on the DDSC purchased SDCard
  - 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 (however the SD Card must remain insitu!)

- *"Download_IGC – Downlaod XCSoat IGC files to USB"*

- o IGC files will be downloaded to the *openvario/igc* folder
- o If a connect device flight logs want to be downloaded, this must be done inside XCSoar prior to existing to the shell. See elsewhere for how to do this.

Shell (outside XCSoar) submenu

Menu

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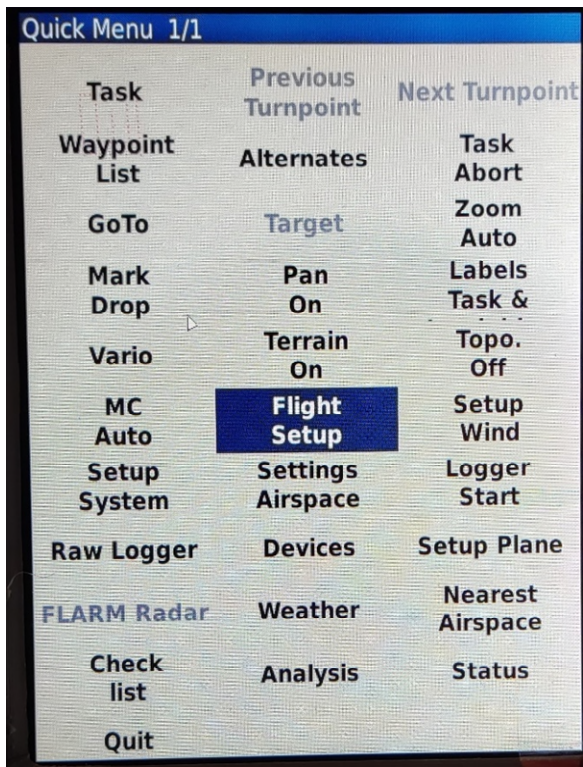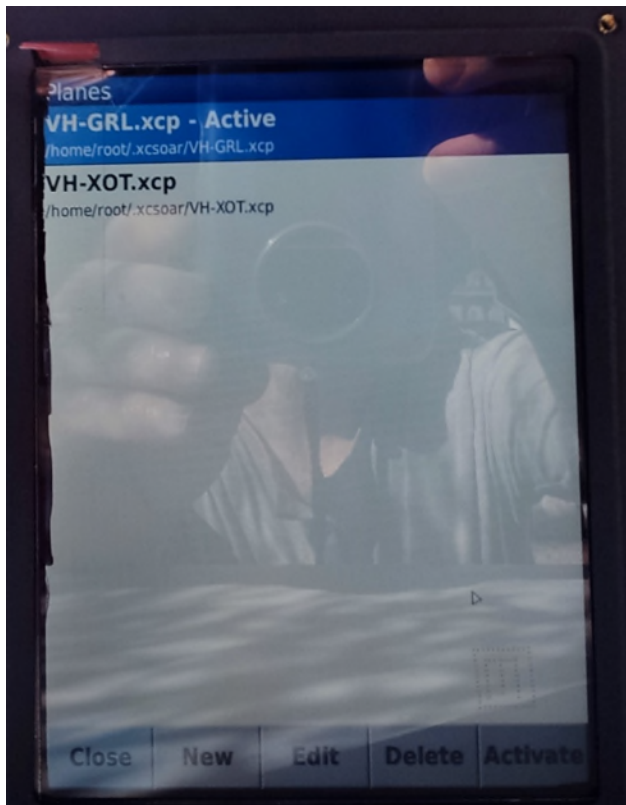
Main Menu list within XCSoar

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 is selected (otherwise final 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'.
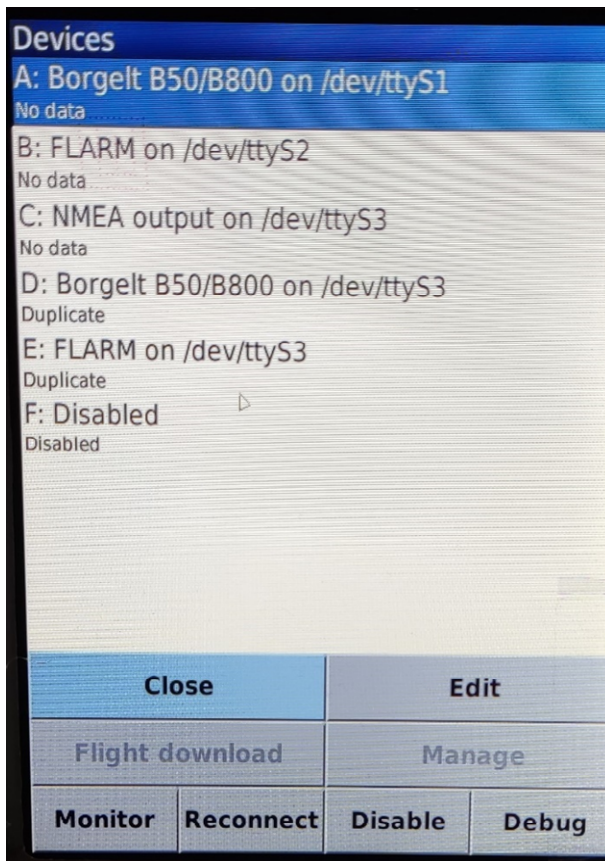
Setup Plane Menu list within XCSoar soaring default glider profiles (May 2022)

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 initial testing shows the FLARM data is coming through also*
- Device E
  - o tty 3
  - o FLARM 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 initial testing shows the FLARM data is coming through on the Borgelt port above …*

note: Not sure about the 2-seater until it is tested !!! TBC

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 takoff!). 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	Duplicate
GRL/front	GPS fix, Baro	GPS fix, Baro, FLARM	*No data*	Duplicate	Duplicate
GRL/rear	No data	n/c	**Disabled ** (see warning)**	GPS, Baro, *FLARM*	*Duplicate*

** **Warning to Instructors (and other rear seat pilots)**

Failure to follow these directions will render the rear OpenVario unusable (no gps, flarm, etc).

- Device C needs to be

- o Disabled when in the rear seat of the Duo
- o Enabled when in the front seat of the Duo
- o By default the profile is Enabled (when you purchase the DDSC profile), and
- o It doesn't matter (either enable or disabled) when in XOT as it isn't used (so you may be able to set it up once only)
- Only Enable or disable Device C when the other OpenVario is OFF (otherwise it will crash). To be sure exit the XCSoar sothe settings are saved
- An alternative (particularly for those not tech savy), is to save an SD card for the front seat and another for the rear (just be sure to label them)

Note that during bench testing, the flarm data was coming through the Borgelt (device D) in the Duo rear seat (hence Device E status is *Duplicate*)

The above configuration (if it works) allows the same SD Card to be used across the DDSC glider fleet, except the Hornet (TBC).

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 specially formatted usb stick in the upload folder (openvario/upload/xcsoar). The default file is called "*mySeeYouFile*".

I find it easiest to take the 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 (ESC on startup, or quit XCSoar) and upload as detailed in *Upload and download from USB stick* section.

If you have saved the waypoint file the same as on the usb stick (and System Setup / Site Files/Waypints) 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), 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)
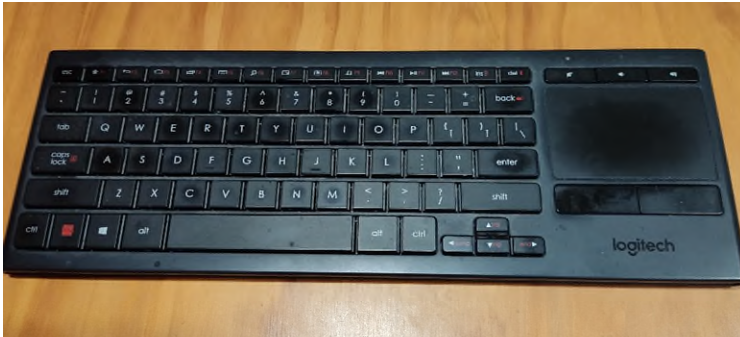- 'close'   -> 'close' (to save)
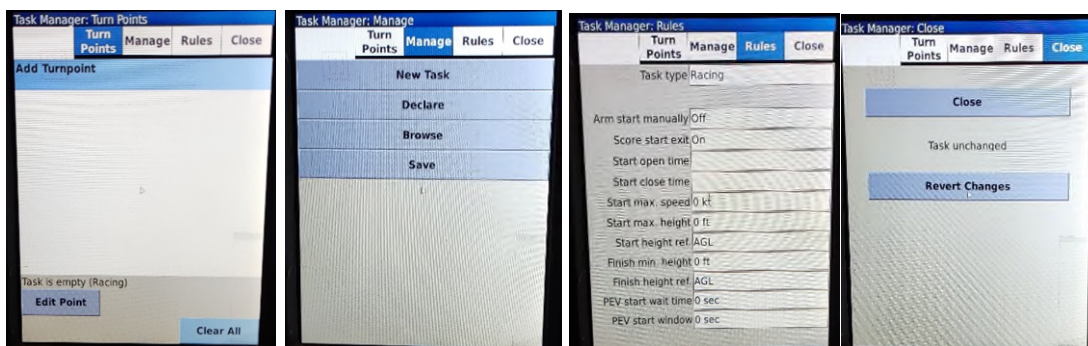

Task (Manager) submenus

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 (usb dongle)

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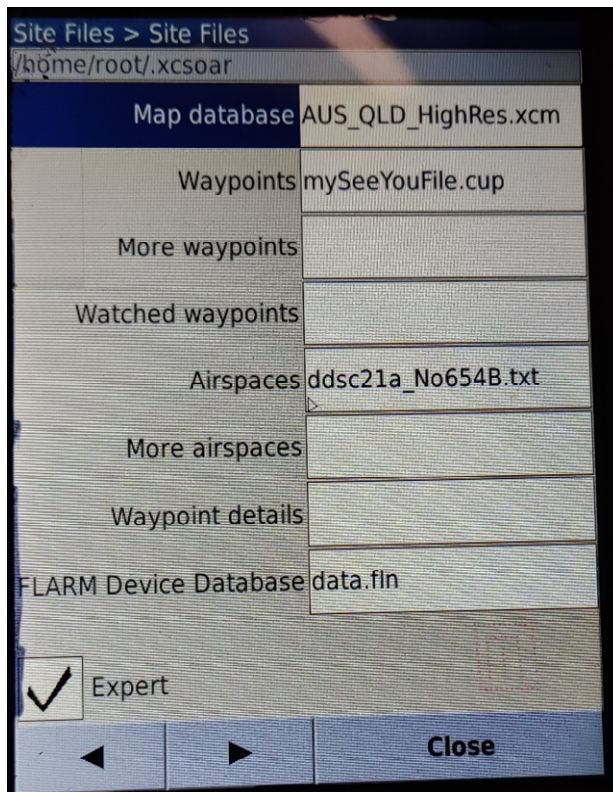
XCSoar's main reference files that can be easily replaced/updated as required

- 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