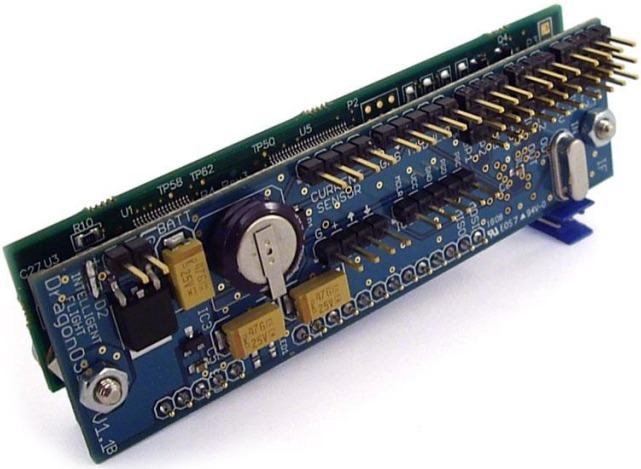
DragonOSD

Advanced On Screen Display/Autopilot



Software version 4.7 (14th May 2008)

Board revision 1.1B

Manual revision 2.0 (21st May 2008)

Intelligent Flight

Contents

© Intelligent Flight 2007-2008

Introduction

The DragonOSD began as an open sourced OSD project that is fully featured, with innovative design, and high quality graphics.

Some of the more interesting features of this OSD are:

- *Flight logging* – GPS tracks can be downloaded and viewed in Google Earth
- *Autopilot* – can be set to fly the plane home automatically
- *Home indicator* – will always indicate the direction back to launch site
- *mAh meter* – will give an indication of mAh consumed
- *Open sourced* – the user can modify the firmware
- *Blank screen* – you can turn off all on screen display for video purposes
- *High resolution* – through the use of the highly-acclaimed BOB-4 OSD

Of course, the OSD will also perform all the other standard functions such as the display of heading, altitude, time elapsed, battery voltage(s) and so on.

While you can probably just plug the DragonOSD in and just fly with it, you stand to get the most out of the device if you understand the various functions and the hardware interfaces. That is the purpose of this document, to familiarize you with the various aspects of the DragonOSD.

© Intelligent Flight 2007-2008

Required Accessories

While your DragonOSD might be everything you need, Intelligent Flight has a range of accessories for it which you might require or find helpful.

- 150mm and 300mm Female to Female servo cables, for connecting the DragonOSD to your R/C Receiver. You will need at least one of these. [Parts: IF-CABLE-150F-F and IF-CABLE-300F-F]
- Current Sensor for DragonOSD [IF-100ACURDG]
- USB Connection cable for retrieving flight log [IF-USB]
- 2 cell or 3 cell LiPo Battery with JST connector for powering the OSD [LM-2S1P800MAH]
- 5Hz MTK GPS unit [IF-3302GPS]
- Video cable for the DragonOSD - Connects to our Flight Kits, including Hobby Lobby International's PilotView FPV system. [IF-DGNVID]

Power supply

While earlier designs of the DragonOSD (pre-1.1) ran best on 2S, the current versions can run from 6V to 14V, making it possible to run from 2S to 3S. Even with this capability, it should be noted that it is still recommended to run the board at 2S voltages in order to minimize the amount of heat dissipated.

Other Requirements

For proper implementation of the autopilot in failsafe mode, you will require a receiver that has programmable servo positions in failsafe mode. An example of this might be the JR SPCM receiver series, or the Futaba PCB1024 receivers.

© Intelligent Flight 2007-2008

Installing the DragonOSD

For proper operation of the DragonOSD, there are several guidelines that one should follow. This is in order to ensure minimal interference to the more sensitive electronics. In general:

- Keep the video transmitter well clear of the GPS module
- Keep the video transmitter well clear of the R/C receiver and it's antenna
- Keep the DragonOSD as far as possible from the GPS module
- Keep the camera away from the R/C receiver and it's antenna
- Keep the DragonOSD away from the R/C receiver if possible

Based on this:

- The GPS module can be close to the R/C receiver and it's antenna
- The video transmitter can be close to the camera
- The camera can be close to the DragonOSD
- The ESC can be close to the camera and DragonOSD

As there are quite a number of additional cables to account for the control lines, one should also take care to:

- Use twisted cables where possible
- Use clip-on chokes for groups of cables
- Keep the servo and control cables as a group, away from the receiver
- Keep all cables as short as possible
- Keep ESC cables away from the video cables if not shielded

© Intelligent Flight 2007-2008

DragonOSD Board Connections

The DragonOSD board has a number of headers and there are also some connections that need to be made for proper operation.

As can be seen from the photo above (*Figure 2*), there are 15-headers. The headers are:

First Group – Four Connectors – Inputs

From left to right as in the photo:

- Control channel from receiver
- Aileron 2 input (optional)
- Aileron-1 input from receiver (can also be rudder input)
- Elevator input from receiver

Second Group – Three Connectors – Outputs

- Aileron-2 output to servo (optional)
- Aileron-1 output to servo (can also be applied to rudder servo)
- Elevator output to servo

© Intelligent Flight 2007-2008

Third Group – Three Connectors – Dual Use

These connectors are currently unused, however are available to people modifying the source code for inputs and outputs.

- GP3 (General Purpose)
- GP2 (General Purpose)
- GP1

Fourth Connector – 5 Pin GPS Module

The GPS unit plugs into the DragonOSD through this connector. We recommend an IF-3302 5Hz GPS, with the 5 pin cable.

Fifth Connector – Current Sensor

The current sensor is used for connecting an Intelligent Flight DragonOSD Current Sensor [IF-100ACURDG] to the DragonOSD.

ICSP Header

This header is located opposite the GPS connector, towards the centre of the board. It is used for reprogramming the DragonOSD. A PicKit2 plugs in with the white arrow towards the UART2 side of the header. There is a small white triangle on the corner of the ICSP header you can line it up with.

UART 2 Connector

The UART2 connector is an extra serial port. This is for use with our IMU for generating an artificial horizon.

Power Connector

There are two pins by themselves on the right hand edge of the board (in the photo) which are used for connecting power. You must be very careful not to connect the power the wrong way. Positive (Red wire) is towards the edge of the board (right side) and the negative (Black wire) is towards the inner side of the board. There is a + on the circuit board designating positive, and a G designating ground/negative.

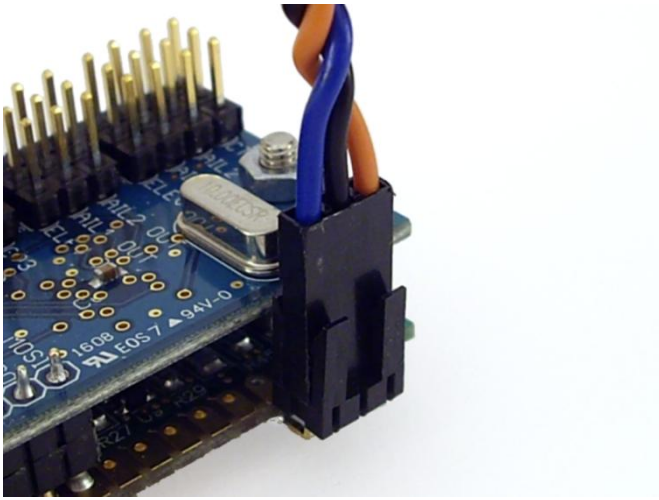
© Intelligent Flight 2007-2008

Video Connector

The video connector is a 3 pin connector with black shrouding that protrudes from the top of the board.

The pins, from left to right are:

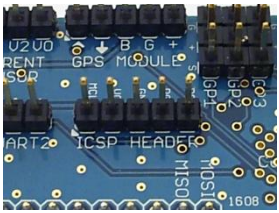
- Video In (from camera)
- Ground
- Video Out (to video transmitter)



The ICSP programming header

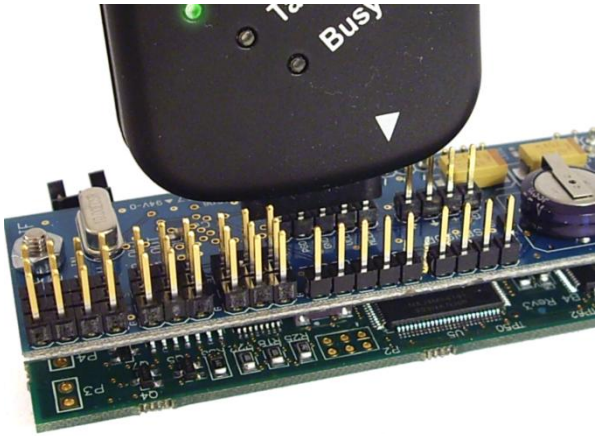
The ICSP programming header is used to program the onboard dsPIC30F4011 microcontroller. The pin out of this header conforms to the ICD2 convention which is also used by Olimex ICD2 and Microchip PicKit2 programmers. The pin outs are (from left to right) as per below photo):

- MCLR
- VCC
- GND
- GPD
- PGC



You will notice that the ICD2 header actually has 6-pins. The extra pin is for the PGM connection (yellow wire if using the Olimex cable) and is not used on the DragonOSD. If you are using a Mikro Electronika dsPICprog, there is a programming adapter available from Intelligent Flight [IF-DSPICAD].

Connecting a MicroChip PICKit 2 Programmer:



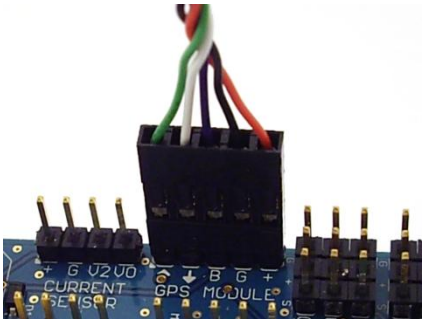
Connecting Devices to the DragonOSD

Connecting the GPS module

We recommend using the IF-3302 5Hz MTK GPS with the DragonOSD. This section has instructions for this GPS unit.

The header has the following connections:

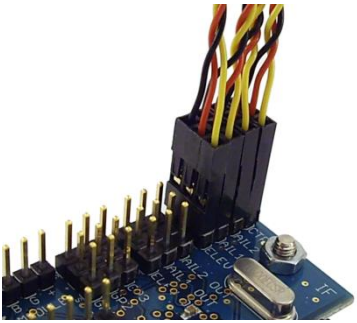
- Voltage – Red Wire
- Ground – Black Wire
- Battery Backup – Purple Wire
- Serial TX – White Wire
- Serial RX – Green Wire



See the photo right for how to connect the GPS to the DragonOSD.

Connecting the Receiver and Servos

To connect the DragonOSD to your receiver, you will need to use Female to Female servo connectors. These are available in 150mm and 300mm lengths from Intelligent Flight. One end of the cable has a beveled connection which will plug into all standard R/C receivers correctly.

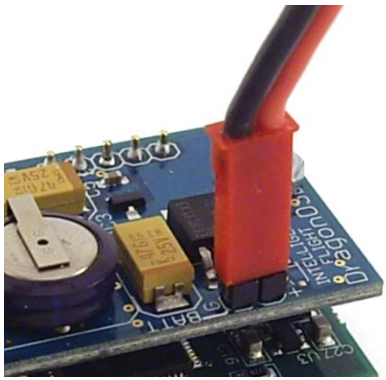


When connecting to the DragonOSD, the yellow wire is towards the centre of the board, and the black wire to the edge of the board, as in the photo above.

When connecting your servos and receiver, ensure that you plug them into the DragonOSD correctly, with Black towards the edge of the board. If you are

unsure of the connections, see the DragonOSD Board Connections section of this manual.

Connecting the Power Supply



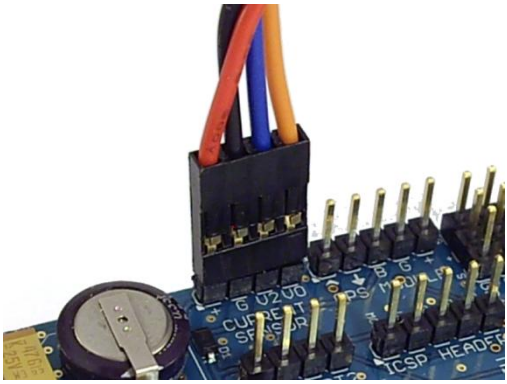
There are two pins by themselves on the right hand edge of the board (in the photo) which are used for connecting power. You must be very careful not to connect the power the wrong way. Positive (Red wire) is towards the edge of the board (right side) and the negative (Black wire) is towards the inner side of the board. There is a + on the circuit board designating positive, and a G designating ground/negative.

Connecting the Current Sensor

To connect the current sensor, plug the cable into the DragonOSD as in the photo below.

The wires match up to the text on the board:

- Red to “+”
- Black to “-“
- Blue to “V2”
- Orange to “VO”



DragonOSD Startup

Upon powering up the DragonOSD, you should see a short countdown with the words "GPS/OSD STARTUP 2" in the middle of the screen. Once the countdown is complete, the words "Waiting for GPS data …" will appear in the middle of the screen.

If you find that nothing is happening, you may want to check that the GPS cable is properly connected with the correct orientation, and then try to re-connect the power to the DragonOSD board.

Once the GPS starts sending data you should see the satellites acquisition screen (right).

The bars at the center of the screen indicate the signal strength of the satellites that the GPS module is seeing. Immediately below each bar is the unique number of that satellite. Just because several bars are present, does not necessarily mean that the data has been locked in and at the top of the screen it may still say "0 SATS".

Above the signal strength display are the words "HOME not set". Once the satellites are locked and the data is accurate enough – the home position countdown will begin. If the satellite data becomes inaccurate, the countdown will stop until it improves. During this time the home position will be set so the autopilot is able to return the aircraft, and the home indicator points the correct

way. The countdown requires at least 3 satellite locks. *You should not move the aircraft during this time.*

While waiting for satellite locks, it is not unusual to see the GPS coordinates and the altitude fluctuate. The altitude displayed at this time is exactly what the GPS reports, the altitude above sea level. Once HOME is set, this becomes the altitude relative to the HOME position/altitude.

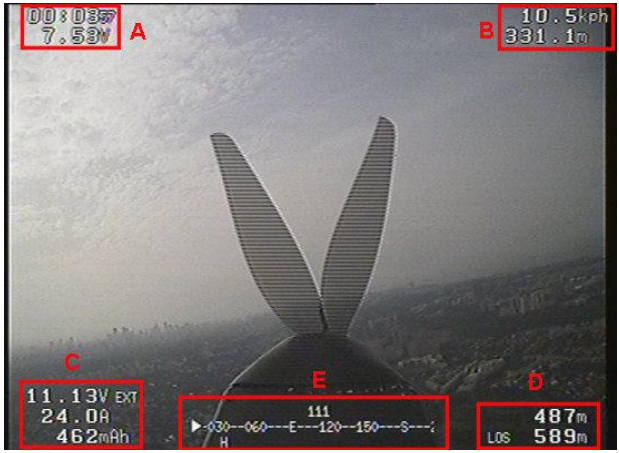
Once the home position has been recorded, the screen below will be shown.

Depending on the altitude fluctuation (can be up to a few meters) the GPS

coordinates, number of satellites locked in, and the HDOP display may be automatically turned off. This is determined by the LOWALTRATIO menu setting. If the relative altitude divided by the ground distance from HOME is above LOWALTRATIO, the display will be turned off automatically. If the plane should lose too much altitude, the display will automatically come back up. This is so if the plane is about to crash, the GPS coordinates will be displayed and captured by any recording device that may be recording the flight, and which can then be used to help find the downed plane.

Another thing that you will notice is that on the right side of the screen, a group of values will be displayed under the heading “PEAK VALUES”. This group will show up when HOME is set and the ground speed falls below about 0.5kph. It will display the highest speed, altitude (absolute above sea level), distance (line of sight) and current drawn (if the current sensor is connected), that were recorded. Once the plane starts moving, this display will disappear.

Display elements



This section discusses the primary display elements in 5 major groups.

Group A

This group consists of two elements, the upper being the elapsed time. The count-up begins as soon as HOME is set and will continue until the device is powered down.

The lower element is the battery voltage that is supplying the DragonOSD board. From the starting voltage, the program will make a guess as to the number of Li-Po cells that are in use and from there compute an appropriate low voltage warning threshold. If the voltage should drop below that threshold for whatever reason, this element will begin to flash as a way of warning the user of impending loss of power.

Group B

This group consists of an upper element, the ground speed as supplied by the GPS module, and a lower element, relative altitude. By relative altitude, we mean the altitude relative to the HOME position/altitude.

When the altitude to ground distance ratio falls below LOWALTRATIO as set in the configuration menu, this lower element will begin to flash as a way of warning the user. On the right of this display will be seen an up or down arrow indicating the vertical direction of the plane. This will usually become more frequently visible for large changes of altitude rather than for smaller changes.

Group C

This group will only be displayed if the current sensor is connected, and a battery is connected to the current sensor.

The first element is the voltage of the current sensor; this should correspond to the main battery voltage (maximum of 25V). There is an "EXT" suffix to indicate that it is the external battery voltage that is being measured.

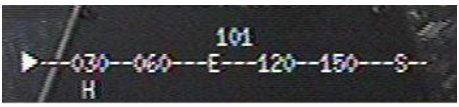
The second element amount of current being drawn, and below that is the mAh consumed thus far. There is also a warning threshold associated with the mAh reading. When the reading exceeds the MAHWARNING value (which can be changed in the configuration menu), it will start flashing to warn the pilot of impending loss of power.

Group D

This group consists of two elements, the upper one being the ground distance while the lower one is the absolute or line-of-sight (LOS) distance. The ground distance can be set to turn off automatically when beyond a certain range. The rationale for this is that at greater distances, the ground distance will approximate the LOS distance so having both may be deemed unnecessary clutter by some. You can configure this to be always on by simply setting a high value for the SHOWHOMELIM parameter in the configuration menu.

Group E

This is a complex group of 4 elements.



The first element is the number in the middle ("101" in the picture) which represents the GPS track. Note that the track is not necessarily the same as the heading in that it represents which way your plane is moving, and not which way it is pointing. As such, you may be pointed towards what you think is your launch point, but the track could be off due to side slip as a result of a crosswind, for example. Below that is the compass reticule which also indicates the GPS track and will scroll to show which way you are turning. This reticule represents the forward 180 degrees of the GPS track heading.

Below the reticule, you can sometimes see a "H". This represents the heading for the launch point. It will only be visible if the launch point is somewhere in the front 180 degrees of the track heading.

If the launch points goes outside of that 180 degrees, then the arrow at the left (or right as it may be) end of the reticule will become outward pointing rather than inward pointing. That will indicate the direction of the launch point but that it is behind rather than in front.

When the track heading is directly towards the launch point, the heading indicator will be highlighted to make it more obvious.

Autopilot

If the autopilot is engaged, either deliberately or automatically, there will be the words “AUTOPILOT” displayed in the middle of the screen and all GPS coordinates and satellite information will be displayed as well. Note that the autopilot will not engage unless home position is already set.

Note that, all the displayed elements can be turned off (while retaining full function) through the control channel.

Configuration Menu

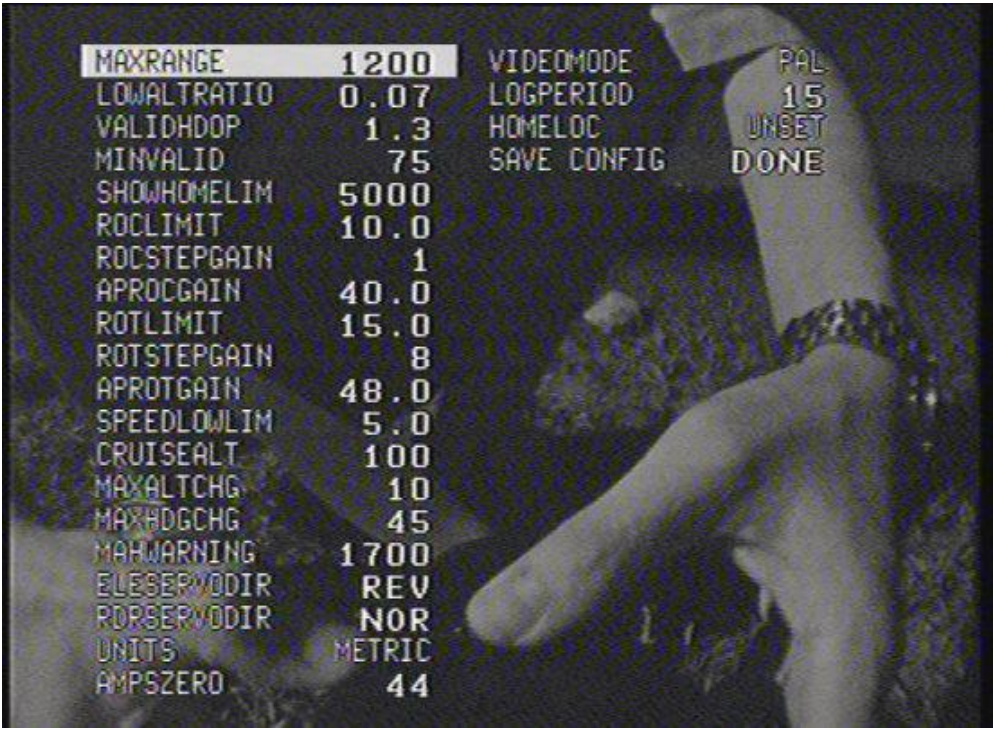
The configuration menu allows various parameters and options to be set for the DragonOSD. In order to use the configuration menu, the Aileron-1 and Elevator inputs must be connected to the appropriate channel on the receiver. Additionally the control channel must also be connected to a spare channel and the pulse width on that channel be set to more than 1.93ms and less than 2.01ms. Above 2.01ms, the display will be turned off.

Once the configuration menu has been called up, you can move up and down through the items using the elevator stick (up or down). To change a setting, move the aileron positions (left or right). If a stick is held in a position other than neutral, it will repeat the incrementing/decrementing action until it reaches the maximum/minimum limit. If the direction of the movement does not correspond to the stick direction, you may have to change the ELESERVODIR and/or RDRSERVODIR setting until it behaves correctly. Doing this will usually also ensure that the servo directions are correctly configured. All changes take place immediately but are not saved unless explicitly commanded by the user. Note also that when you re-enter the configuration menu, you will still be at the same setting as when you exited the configuration menu last. This will assist in making

© Intelligent Flight 2007-2008

quick adjustments without having to move the selection to the desired item all over again.

Note also that any changes you make are immediately active the moment you change it, but they are not saved unless you explicitly select the SAVE CONFIG option. Doing so will make the changes survive power cycling.



MAXRANGE *(default 1200m)* determines the Line Of Sight distance beyond which the LOS distance indicator will begin to flash.

LOWALTRATIO *(default 0.07)* is the ratio of the altitude to the ground distance below which the altitude indicator will begin to flash and the GPS coordinates be displayed automatically.

VALIDHDOP *(default 1.3)* is the maximum HDOP acceptable before the HOME SET countdown begins. The lower this value is, the tighter the GPS reception criteria is (demands greater accuracy). Setting this too low will lead to difficulty in setting the home location. Setting it too high leads to inaccurate home locations.

MINVALID *(default 75)* is the number of good HDOP readings required before the GPS reading is considered valid for home location. The greater the value, the more stable the GPS reading must be.

SHOWHOMELIM *(default 5000m)* is the distance beyond which the ground distance display will automatically be turned off. By setting a high value here, you can ensure that it never gets turned off.

ROCLIMIT *(default 10.0 m/s)* is the maximum permissible rate of climb that the autopilot will use in trying to achieve the desired cruise altitude. This value should be adjusted with care.

ROCSTEPGAIN *(default 1)* is the gain used by the altitude setting loop for driving the elevator servo. By setting this to a very low value such as 1, you effectively disable the altitude control component of the autopilot. Too great a value here can lead to excessive elevator movement and severe porpoising. Change this value gradually while observing behavior.

APROCGAIN *(default 40.0)* is the autopilot gain that determines how sensitive the loop is to altitude errors. Change this value gradually and with care. It is preferably to adjust ROCSTEPGAIN first before adjusting this. Changes may be difficult to perceive.

ROTLIMIT *(default 15.0 degrees/s)* is the maximum permissible rate of turn that the autopilot will use while correcting for heading.

ROTSTEPGAIN *(default 8)* is the gain used by the heading correction loop for driving the aileron/rudder servo. By setting this to a very low value such as 1,

you effectively disable the heading control component of the autopilot. Too great a value here can lead to excessive aileron/rudder movement and severe oscillation. Change this value gradually while observing behavior.

APROTGAIN *(default 48)* is the autopilot gain that determines how sensitive the loop is to heading errors. Change this value gradually and with care. It is preferably to adjust ROTSTEPGAIN first before adjusting this. Changes may be difficult to perceive.

SPEEDLOWLIM *(default 5.0kph)* is the speed below which the autopilot will not attempt to climb to the cruise altitude.

CRUISEALT *(default 100.0m)* determines the desired cruising altitude for the autopilot. You may or may not always achieve this depending on how much energy the plane has. All being well, the autopilot will reach this altitude and try to stay as close to it as possible which flying back to the launch point.

MAXALTCHG *(default 10m)* determines how aggressively the autopilot will make its' altitude corrections. Change gradually and with care.

MAXHDGCHG *(default 15 degrees)* determines how aggressively the autopilot will make its' heading corrections. Change gradually and with care. Too great a value can lead to the plane rolling over!

MAHWARNING *(default 1700mAh)* is the mAh threshold above which the mAh display will begin to flash.

ELESERVODIR *(default NOR)* is the elevator servo direction as seen by the DragonOSD board. This does not affect the user control of the servo, just the autopilot's control. If your menu item selection is moving the wrong way in relation to your up/down movement, you will want to change this setting. Note that because it takes effect immediately, it can sometimes lead to some confusing effects. If the menu movement is correct, usually it also indicates that the servo direction has correctly been set.

© Intelligent Flight 2007-2008

RDRSERVODIR *(default NOR)* is the aileron/rudder servo direction as seen by the DragonOSD board. This does not affect the user control of the servo, just the autopilot's control. If your menu item selection is moving the wrong way in relation to your left/right movement, you will want to change this setting. Note that because it takes effect immediately, it can sometimes lead to some confusing effects. If the menu movement is correct, usually it also indicates that the servo direction has correctly been set.

UNITS *(default METRIC)* determines the units used in the OSD display. If IMPERIAL is selected, then miles and feet will be used instead of meters. Note that within the configuration menu, however, the settings will remain in metric units.

AMPSZERO *(default 120)* is used to zero the ammeter reading. This should be adjusted so that when the ESC is not connected, the reading of the ammeter is just fluctuating between 0.0A and 0.1A. [On 1.0 boards, the default value for this is 66] In general the default values should work.

VIDEOMODE *(default PAL)* is the video mode in use. Select NTSC if your video equipment does not support PAL mode (which also offers better resolution).

LOGPERIOD *(default 15s)* is the interval between each logged point in the flight log. At 15 seconds, you get approximately 22 minutes worth of log-time. By increasing this value, you get longer log times but at the cost of lower resolution. Conversely, by using a shorter log period, you increase log resolution at the cost of shorter total log time.

HOMELOC is a special function. If the HOME has already been set, this will indicate "SET". In this case, if you wish to reset the HOME, just change it to "UNSET" and the HOME setting routine will be run all over again. This can be useful if the GPS readings have stabilized further (particularly altitude).

MAHMULT *(default 0.00075)* is the coefficient used to compute the mAh readout. You can increase or decrease this to adjust the readout to match the

amount of energy you are putting back into the battery with the charger after each flight. As long as you are within 100mAh or so, you should be alright although you probably want a more conservative setting. Ensure that the AMPSZERO reading is correctly set before adjusting this parameter. Note also that due to the nature of the sampling, the reported values will vary with how you actually fly your plane. Some variation is normal.

As these default values are for the ACS755-050, you will need to change the settings if you're using a different current sensor. The Intelligent Flight current-sensor, for example, uses the ACS755-100 and will require a setting of 0.00150, for example. When you charge the battery and put back X mAh into the pack, but the OSD reported Y mAh consumed, you can work out the new value as:

newMAHMULT = X / Y * oldMAHMULT

AMPMULT *(default 0.08105)* is the coefficient used to compute the current readout. You can increase or decrease this as needed to get the amperage reading as close as possible under nominal current draw conditions. Ensure that the AMPSZERO reading is correctly set before adjusting this parameter.

As with the MAHMULT numbers, these default values are for the ACS755-050. If you use the IF sensor, the value should be 0.16210. Similarly, you can work out corrected values for AMPMULT to accommodate any variations.

SAFEZONE *(default 0)* allows you to move the display components away from the edge thus forming a "safe zone" where the displayed text will not be obscured or cut off. This is useful for older monitors which do not display 100% of the video image. Large values (more than about 20) can lead to text overlap.

VOLT1LOWARN *(default ON)* enables or disables the Voltage1 warning. This is for those who have made the modification to run the board of 5V so that this will prevent the incessant flashing.

DRAWHORIZON *(default OFF)* enables the drawing of the artificial horizon. This should only be used when the IMU is attached.

SAVE CONFIG is used to save the changes to EEPROM if so desired. If any changes have been made that has not been saved, an asterisk "*" will be displayed. Once you change this to "DONE" the data will be saved.

Control Channel operation

The control channel is used to switch the DragonOSD between the various operating modes:

Operating mode	Control channel pulse width
Autopilot	< 1.2ms
Normal	1.2ms – 1.92ms
Configuration menu	1.93ms – 2.01ms
Normal with display turned off	> 2.01ms

This is done by changing the pulse width on the output of the receiver channel being connected to the Control input on the DragonOSD. One way to do this easily is to assign a slider to that channel and adjust the endpoints so that you can access all the operating modes. Another way is to assign it to a three-way switch and select three of the above modes to be assigned to the three switch positions.

In the event of a failsafe, the control channel should be programmed to automatically select the autopilot mode.

© Intelligent Flight 2007-2008

Autopilot

The autopilot is designed primarily as a contingency for when the radio control link has failed. To properly set this mode, you need to trim out the plane for level cruising. Once this is done and the plane is stable, program that aileron (or rudder), elevator, and throttle position as your failsafe position. Also make sure that in failsafe, the control channel goes to autopilot mode.

The autopilot works by monitoring the rate of turn (ROT) and climb (ROC) of the plane. It tries to correct the heading of the plane while maintaining the ROT and ROC within specified limits. Ideally, it will turn and climb very gradually, rather than turn or climb sharply. The more aggressive the settings, the higher the chance of oscillations or an unwanted roll-over. The autopilot works best with gradual turns. This also means that it won't fare as well in very strong wind conditions, or with inherently unstable planes. A plane with high-wing, and/or polyhedral wing design tends to work better with the autopilot.

Even when the autopilot is engaged, the user can still provide control inputs through the stick if the radio link is still good. The control resolution, however, won't be as good in this mode as in normal flying mode. This feature is especially useful when trying out new settings as it allows you to quickly correct from a bad situation without first having to turn the autopilot off.

When using the autopilot, you have the option of using rudder steering or aileron steering. Both should work although aileron steering is preferred. If your plane uses two separate channels for ailerons, you can connect the second receiver input and servo channel to the Aileron-2 input and output channels respectively. This should allow you to continue to use dual channel features such as flaperons and spoilerons. This is, however, and untested feature so use with caution.

Note that since the autopilot relies heavily on the GPS input, one should verify that the GPS reading is reliable before engaging the autopilot.

© Intelligent Flight 2007-2008

Flight Log

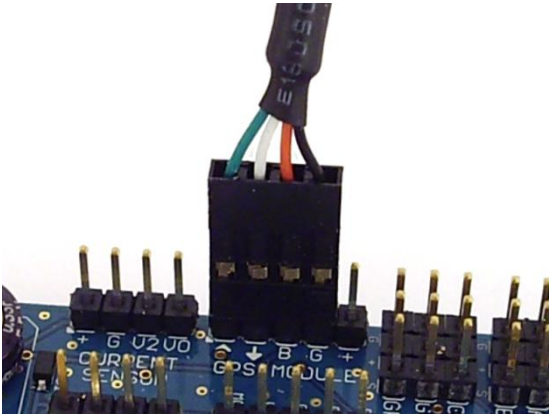
The DragonOSD will automatically log each session. A session is defined as a power cycle, which begins as soon as HOME is set and proceeds recording at the intervals defined by the LOGPERIOD in the configuration menu, for as long as the speed is more than 0.5kph. It will stop logging if it runs out of storage space. Currently a 15-second logging interval will yield about 22-minutes worth of total log time.

If you make a second flight after cycling the power (such as through changing or disconnecting the power to the DragonOSD), a new session comes into effect and the new log will overwrite the previous log. If you wish to retain a log, you can set the LOGPERIOD to zero which will disable logging. This way your subsequent sessions will not overwrite the flight log. If you wish to do this, you need to set the LOGPERIOD to zero *before* you disconnect the power and thus ending the session. You can always re-enable it later by setting the LOGPERIOD to a non-zero setting.

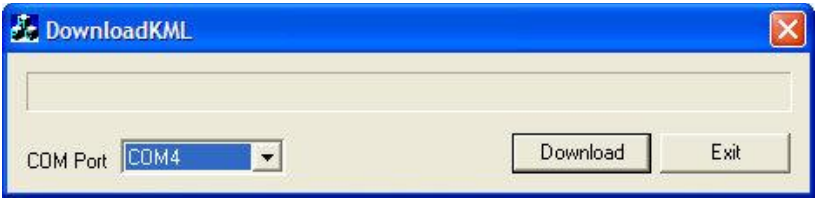
To download the flight log, you will need to connect an Intelligent Flight USB connector to the DragonOSD's GPS port.

To do this, you only need to connect the RX1, TX1 and the GND pins to the respective pins on the USB module. The following photo shows how this should be connected.

© Intelligent Flight 2007-2008



Once this is done, you can use the DownloadKML utility to download the KML file from the DragonOSD. You can find this on the Support page at http://www.intelligentflight.com/.

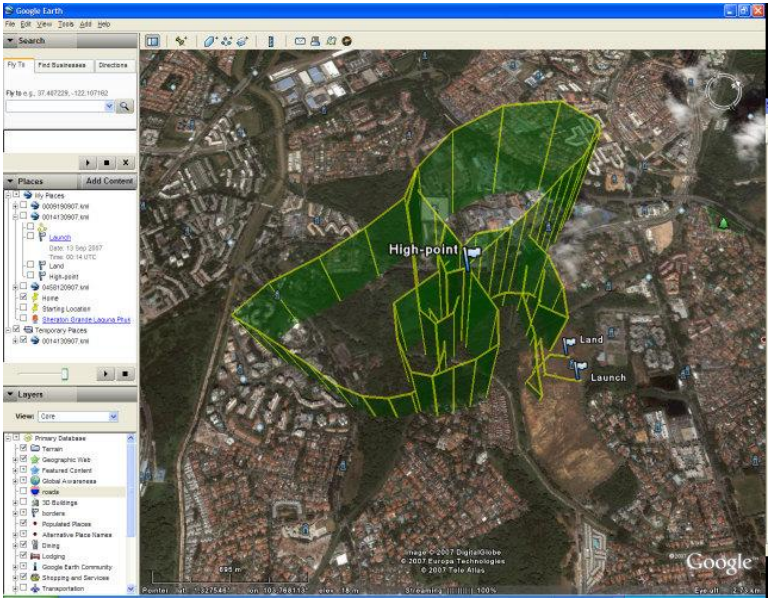


You must first select the correct COM port for the USB serial port from the drop down list. Make sure that the DragonOSD is connected to the USB connector and powered up. Click on the “Download” button and wait for a few seconds. You should see the progress bar fill up while the “Download” button is grayed out. When the download is completed, the “Download” button is displayed normally again. You may sometimes need two tries to get the file downloaded correctly.

If nothing happens after a few seconds of waiting, you can click on the “Exit” button to close the downloader. Then run it again and repeat the above. Usually this will result in a successful download of the KML file.

© Intelligent Flight 2007-2008

The file will be given a unique file name with a 10-digit number and KML extension; this will be found in the same directory as the DownloadKML utility. To view this file, open it up with Google Earth and you will see a 3-D flight log.



There are 3-markers for each flight log – the Launch, Land, and High-point markers, corresponding to the launch point, the landing point, and the highest-point in the flight, respectively. If you click on the Launch marker, you will be able to see the starting date and time for the flight. Clicking on the High-point will show you the highest absolute altitude (i.e. above sea level) achieved in that flight.

Writing your own firmware

One of the unique aspects of this OSD is that the source code is freely available for Intelligent Flight's website. The source code was written on and compiled using the MikroElectronika mikroC for dsPIC30/33 and PIC24 compiler version 4.0.0.0. Once you have compiled it to an INTEL hex format file, you can burn it into the dsPIC using any of a number of programmers, such as mikroElektronika's own dsPICprog2, Olimex's ICD2 or the Microchip PICKit 2. You can use the ICD2 or Microchip programmers (with ICSP programming headers) with the freely available MPLAB software to update the firmware.

Note that while the source code has been made public, the terms of use prohibit anyone from using it for commercial gain or profit. It is provided solely for individual use where no pecuniary interest is involved. If you want to use it commercially, such as with boards that you have made on your own, and intend to offer those boards commercially, please approach Intelligent Flight to discuss possible arrangements. The DragonOSD's firmware is only for use on Intelligent Flight DragonOSD boards.

Lastly, everything here is offered in an "as is" condition. Intelligent Flight cannot and will not be held to any liabilities arising from the use of the DragonOSD or derivatives thereof. While everything has been done to ensure reliability and performance, you still use this at your own risk.

© Intelligent Flight 2007-2008

Troubleshooting

Problem: The GPS data is taking too long to stabilize and the home takes a long time to set, or never at all.

Resolution: Try lowering the MINVALID or increasing the VALIDHDOP. Start with increasing the VALIDHDOP to where the GPS has stabilized at (for example to 1.5 instead of the default 1.3).

Problem: GPS reading seems to get stuck every now and then.

Resolution: Make sure that the GPS module is not too close to the video transmitter or the BOB-4SG board. If possible keep a distance of 10cm or more between the GPS module and the video transmitter and OSD board.

Problem: The OSD stops at the "Waiting for GPS data …" screen and does nothing.

Resolution: This usually means that the OSD is not seeing data on the GPS incoming line (TX1) and could be indicative of an intermittent connection. Try to check the connections as well as powering down and then back up again. If you're having this problem when testing with a TV, the leakage current from the TV can cause corruption of the voltage levels. Grounding the OSD may solve the problem, or simply just test it with an LCD display.

Problem: Occasionally the configuration menu does not respond to stick inputs.

© Intelligent Flight 2007-2008

Resolution: Try adjusting your setting for the control output a bit more. It seems that there is a zone where the control will activate the menu but is marginal enough that the other inputs are not accepted for the selections.

Problem: Text at the edges of the screen is getting cut off.

Resolution: Try increasing the SAFEZONE parameter in the menu configuration.

Software Change Log

Version 4.7 to 4.6

- Fixed bug in BOB-4 communications which could lead to reset
- Fixed omissions that caused ROTSTEPGAIN, ROCSTEPGAIN, MAXHDGCHG not to work
- Fixed autopilot computation that biased return-tracking to the left
- Fixed display issue with imperial distances exceeding four digits
- Added support for IMU horizon display
- Added option to turn on or off the horizon display
- Added feature to recover from watchdog reset without losing home position or mAh logging information
- Added auto-neutralizing of stick positions when entering configuration menu
- Added initialization string to activate WAAS mode in the GPS
- Made the setting VOLT1LOWARN sticky through power cycles
- Improved current reading algorithm, tracks linearly and more accurately now
- Improved auto-pilot update rate, more responsive and aggressive now
- Improved overall loop and interrupt efficiencies, menu response is snappier now
- Removed some redundant code

Version 4.6 to 4.5

- Satellite screen now comes up after unsetting home

Version 4.4 to 4.5

- Changed menu updating to be more responsive
- Fixed vertical adjustment in SAFEZONE

© Intelligent Flight 2007-2008

Version 4.1 to 4.4

- Added new menu item MAHMULT
- Added new menu item AMPMULT
- Added new menu item SAFEZONE.
- Added new menu item VOLT1LOWARN
- Fixed some issues in the home heading calculations
- Version 4.3 was pulled due to bugs