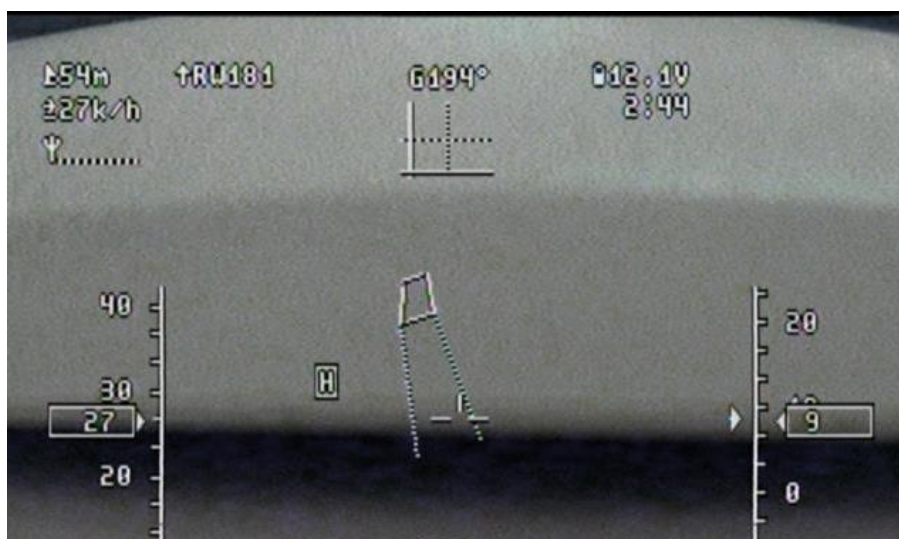


Instrument Landing System (ILS Assistant) in Pitlab&Zbig OSD

ILS (stand for Instrument Landing System) is a system supporting safe and accurate landing of airplane model in case of reduced visibility (fog, darkness, drops of rain on camera lens, etc.), or failure of camera or their wires. In such a situation pilot has full visibility of OSD layer, but limited visibility of picture from camera. In case of darkness or fog there is also limited possibility to land in a classic way due to lack of visibility of the airplane from the ground.

Functionality of ILS gives pilot real possibility to perform accurate landing with support from OSD. This support is similar for those known from regular airplanes and airports, which informs pilot about difference between ideal glideslope and actual position of airplane (altitude and course).

In addition, our system visualises on OSD screen borders of acceptable approach path, and locations of runway, making approach and landing more natural and easy.



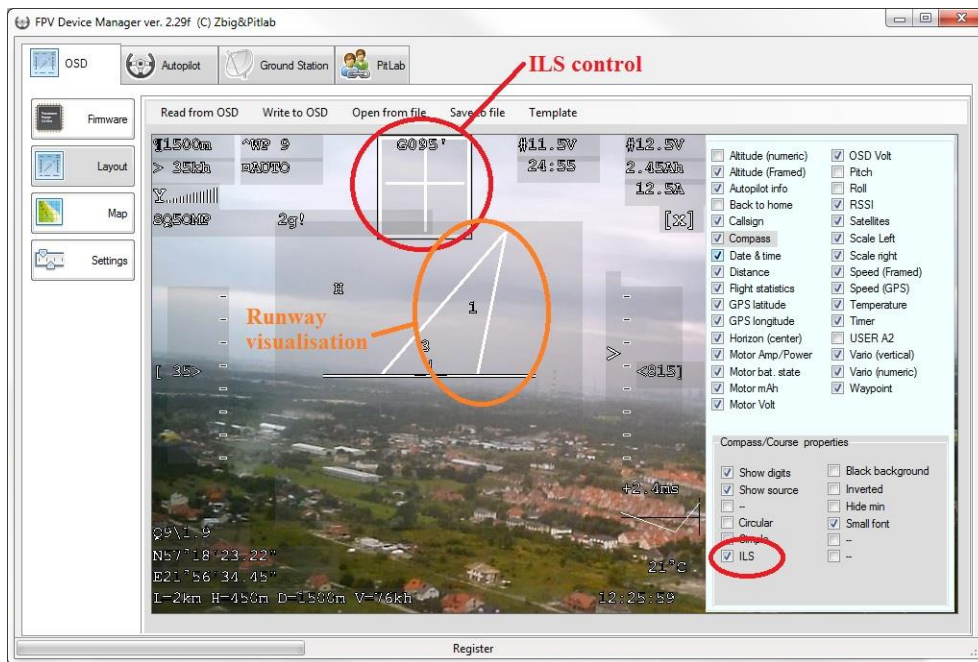
Requirements

ILS assistant is embedded in OSD and requires only GPS to work. It is just a new piece of software, and no extra hardware is required on board. Also in opposition to airliners, ILS Assistant do not requires any special equipment on the ground.

ILS assistant is supported by OSD Firmware since version 2.30, and works with all OSD hardware.

Preparations

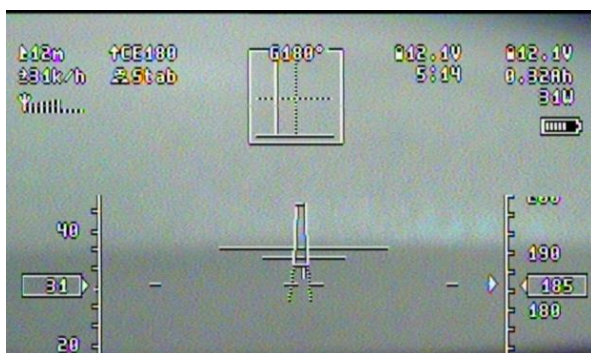
To activate ILS feature one need to define one or more runways (their location, size and approach course), and prepare OSD layout with enabled ILS controls and runway visualisation. This can be done using FPV_manager application and USB connection before flight. Then before landing pilot selects runway to use (e.g. according to present base location and wind direction) and changes layout to one supporting ILS.



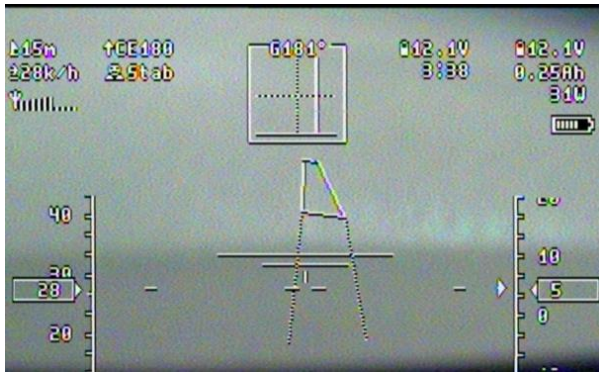
Note: ILS control is combined together with Compass/Course control, and can show also actual course/heading. There are many options to change appearance of this control. We encourage to experiment with different settings to obtain optimal visualisation of ILS.

Runway visualisation is combined together with Horizon (center / radar) control.

NOTE: When ILS is turn ON, scale (range) of "radar" feature showing waypoints distance and runway is calculated dynamically based on actual airplane altitude. It means that from high altitude runway appears smaller and all waypoints are closer to each other (and radar range covers wider area), but on lower altitude runway becomes bigger and area covered by radar is smaller. This is more natural and similar to our eyes perspective. Bigger size of runway visualisation on low altitudes helps also in properly tracking approach path.

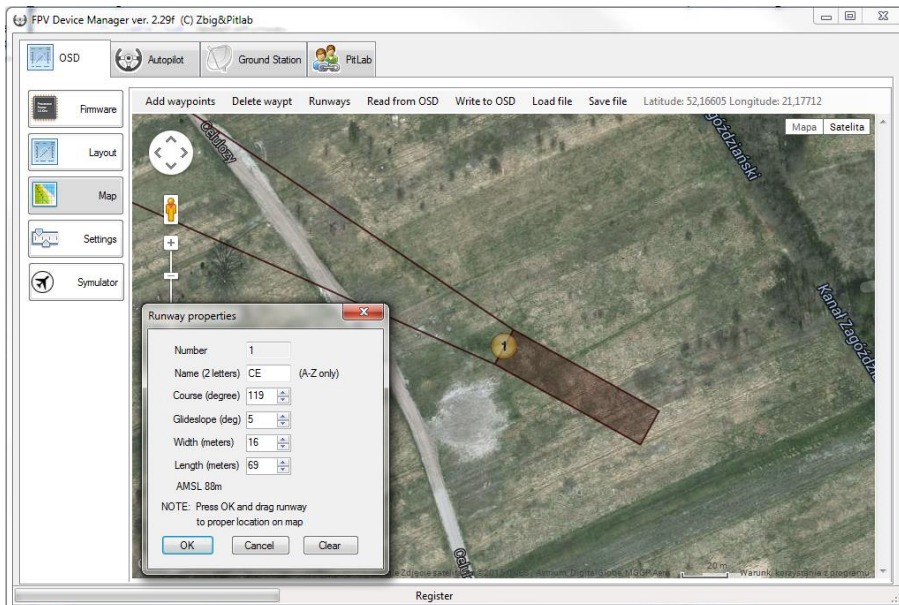


Picture 1 Runway visualisation on high altitude



Picture 2 Runway visualisation on low altitude

Runway can be defined directly from OSD menu **Runways**, or in FPV_manager on map, and upload into OSD using USB connection. In both cases runway is defined by GPS location where airplane should touch the ground, approach course for this runway, and glideslope angle. These parameters are required by ILS. Additionally for runway visualisation one can define width and length of airfield, and its two-letter name to be shown on navigation field, together with approach course, like RW180, NY053 etc.

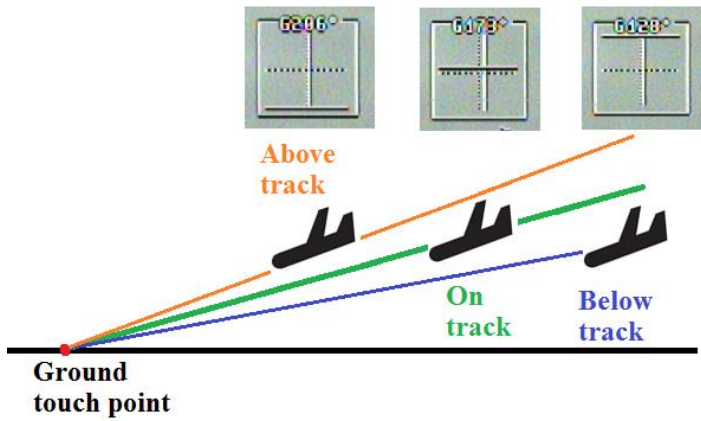


Picture 3 Runway definition in FPV_manager

Technical info

Sensitivity of ILS is factory fixed.

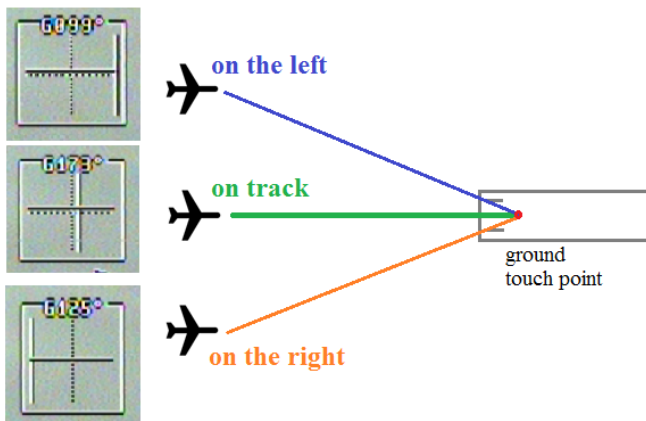
ILS Full scale sensitivity vertically is +/- 3 degree from ideal glideslope (approach vertical angle)



Picture 4 ILS vertical sensitivity and indications

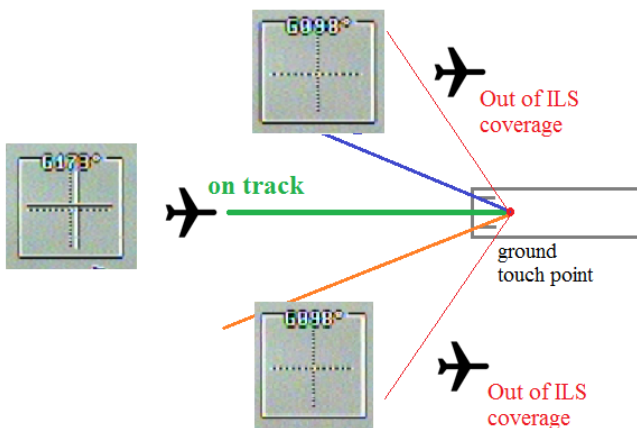
NOTE: glideslope angle is settable in OSD menu for each runway separately between 2 and 12 degree, according to airplane and local conditions (e.g obstacles)

ILS full scale sensitivity horizontally is +/- 6 degree from ideal approach course.



Picture 5 ILS horizontal sensitivity and indications

ILS coverage (area where ILS is active and guides airplane to runway) is +/- 70 degree from ideal approach line



NOTE: When layout with ILS is active, navigation information (e.g distance) is toward selected runway, not the base point. Also in Autopilot AUTO/RTH mode (mode switch AUTO and throttle to low) will lead airplane into GPS ground touch point instead of base location. After reaching GTP autopilot will loiter around this point on altitude set in autopilot's settings. Autopilot has no functionality of autonomous landing on selected runway.

Navigation toward selected runway allows to define emergency runway in case of long distance flight and risk of battery discharge when wind conditions changes during flight. Activating AUTO/RTH mode will direct airplane to this emergency landing area, and after discharging power battery airplane will eventually glide and land in this predefined area, even after RC link lost.

ILS tips and tricks

ILS is based on GPS and due to its nature accuracy of airplane position is limited to several meters, or in bad weather condition (or sun electromagnetic activity) to tenth of meters. Also altitude indication may vary after long flight depending on air pressure change. According to this ground touch point should not be set at the very beginning of the runway, but several meters afterwards, giving some space for instrument inaccuracy.

Define proper glideslope angle, according to airplane characteristics and local obstacles (trees or bushes on approach path) to avoid collision.

Before trying ILS in bad condition (darkness, fog etc.) practice how to land using instruments, to be familiar with their indications and to make your reactions more automatic and fast.

Endings of side approach lines in runway visualization are always 300 meters before ground touch point in a runway. This is a good starting point to approach for landing, but for fast airplanes or during trainings it is recommended to start approaching from further distance. There is no limit of ILS range (LOS), and indications will work from bigger distance than 300m.

Due to nature of ILS (its angular sensitivity), there is a lot easier to keep airplane on track on distance (far away from runway) than when airplane is close to runway, so it's good idea to start practicing away from runway (of course starting from proper direction).

We wish you a lot of safe landings with our ILS Assistant.

Pitlab Team.