SWIFTAI OSD MINI
OPERATION MANUAL

CONTENTS

INTRODUCTION

Please read this User Guide carefully. It will help to quickly and easily install SwiftAI OSD Mini ™ onto your model, configure and use all the system features in the optimum way.
Before flights, we recommend that you use the compact and handy User Memo, which provides information, which you would presumably like to have on hand.

We know that user experience is the main driving force in development of the system, and we look forward to your comments on the use experience and suggestions on development of SwiftAI OSD Mini™.

STRUCTURE AND OPERATING PRINCIPLES

SwiftAI OSD Mini ™ Telemetry Unit is an electronic device, which performs measurement, processing and displaying of necessary flight parameters, such as, for example, altitude, speed, current direction of flight and direction to the starting point, flight time, battery voltage, used charge of the drive battery current consumed on it.

Physical parameters are measured by means of remote pressure, current, temperature and other sensors, plugged to the connectors on SwiftAI OSD Mini ™ board.

Processing and filtering of data from the sensors and displaying of results in graphical form is performed by means of a microcontroller installed on SwiftAI OSD Mini ™ board.

Sensor scanning, information processing and formation of on-screen information is continuous, with a frequency of several tens of times per second, which allows us to continuously observe the change in the measured parameters in real time.

Telemetry data are displayed on the screen of your display device by adding a specially created signal to the video signal supplied from the video camera, photo camera composite output or another composite video source mounted on the model.

Thus, for comprehensive operation of SwiftAI OSD Mini ™, a power supply, an on-board model video source, a video transmitter and a device receiving and displaying video on the ground - video glasses, video camera, TV, laptop, etc. are necessary.

PACKING LIST

The SwiftAI OSD Mini™ packing list includes:

- SwiftAI OSD Mini™ processor board;
- GPS module with built-in antenna on cable with connector;
- remote current sensor on cable with connector;
- remote temperature sensor on cable with connector;
- cable for connection with RC-receiver;
- cable rod with connector for batteries;
- power connectors for connection to current sensor;
- remote altitude baro sensor on cable with connector (optional);
- remote speed baro sensor on cable with connector (optional);
- User Memo;
- User Guide;
- protective package.

TECHNICAL SPECIFICATIONS

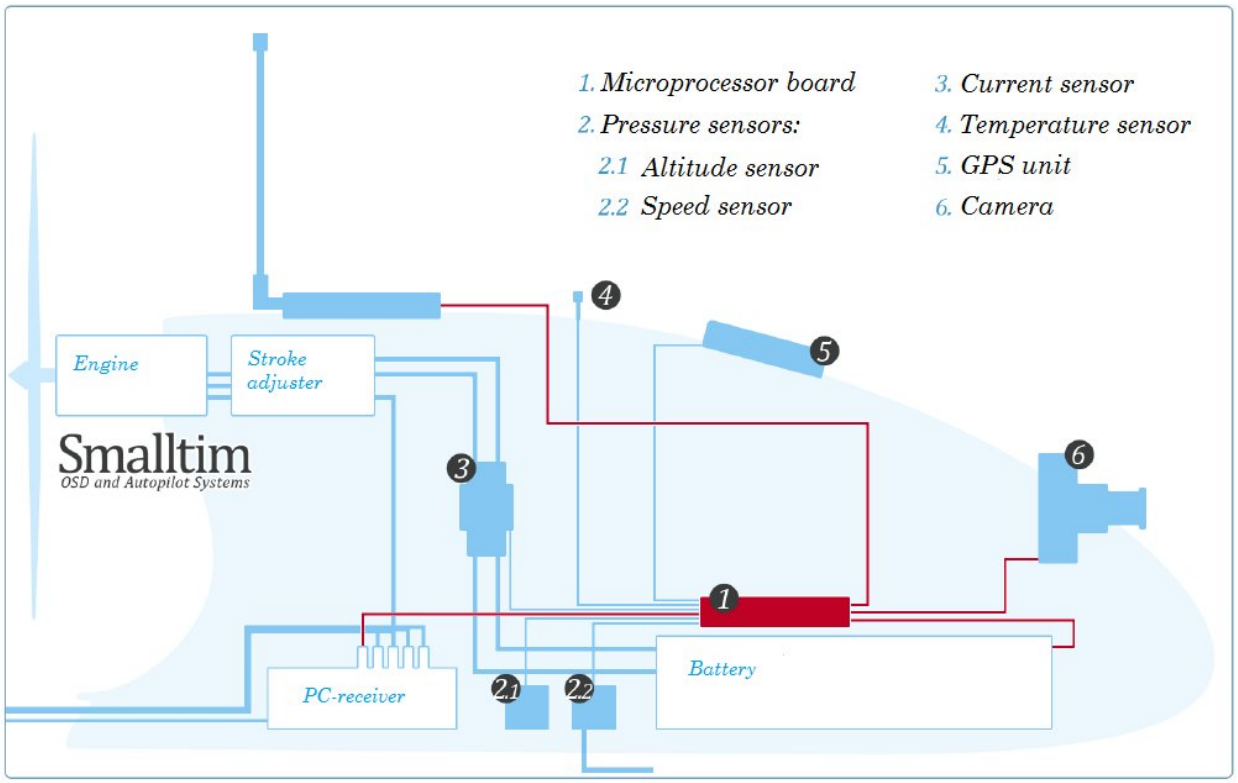
- OSD board dimensions — 45x24x6 mm;
- weight (sensors excl.) — 6 g;
- weight (sensors incl.) — 49 g;
- power consumption — <150mA;
- power voltage — 6-15 V;
- supported video format — PAL/NTSC;
- input and output video parameters — resistance 75 Ohm, 1V p-p;
- physical parameters display:
    - flight time — h:mm:ss;
    - quality/availability of RC signal reception from transmitter for PPM receivers;
    - altitude on barometer sensor — -999-9999m (optional);
    - climb indicator (climb/dive);
    - air speed — 0-350 km/h (optional);
    - temperature — -45 - +165°C;
    - current — 0-99A;
    - voltage — 3 x 0-15V;
    - used battery charge — 0-9999 mAh.
- GPS information display, with screen update rate of 10 Hz:
    - altitude by GPS — -999-9999 m;
    - speed in reference to earth on GPS — 0-999 km/h;
    - distance on earth from unstick point on GPS — 0-9999 m;
    - current speed vector direction — ‘compass’ strip;
    - direction to home — from -180 to 180 degrees, home icon;
    - climb indicator (climb/dive);
    - number of visible GPS satellites — 0-12;
    - GPS position fix format — NA / 2D / 3D;
    - GPS latitude/longitude — 1234.567N/89012.345E.

FLIGHT SAFETY

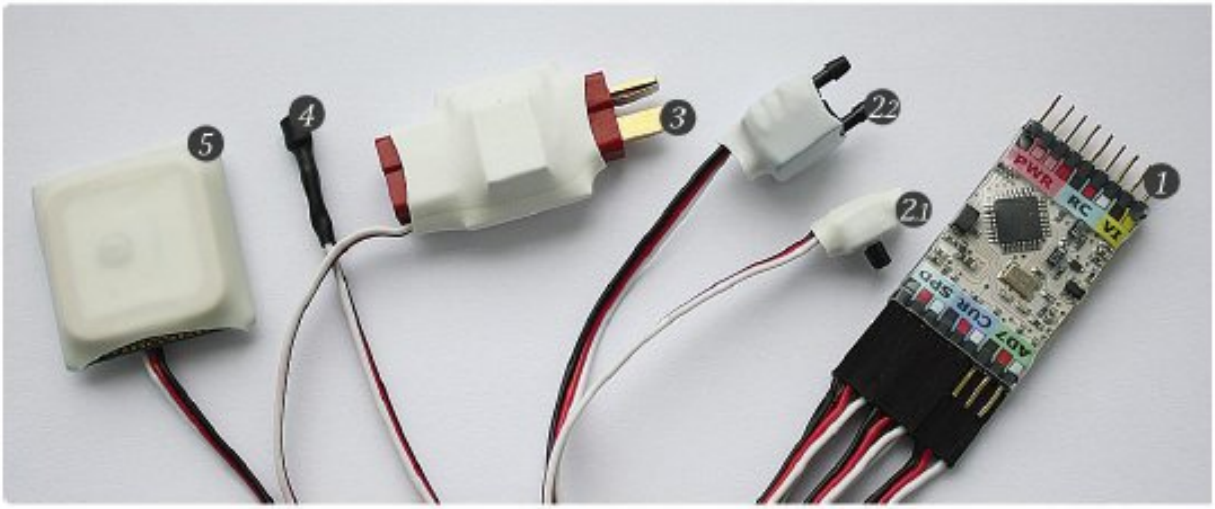
- ***Before each flight, check the operation condition of the RC transmitter, the model and the on-board electronics, the battery level of the RC transmitter and of the models.***
- ***Do not carry out flights overhead people, buildings, power lines, near airports and routes of civil aviation and small aircrafts.***
- ***Do not carry out flights outside the range of sight.***
- ***Do not carry out flights in adverse weather conditions.***

INSTALLATION

SwiftAI OSD Mini™ system components allow your model to be installed in any convenient place, except for locations, where it can be damaged in case of crash landing or rough handling of the model, for instance, the bottom surface of the hull.



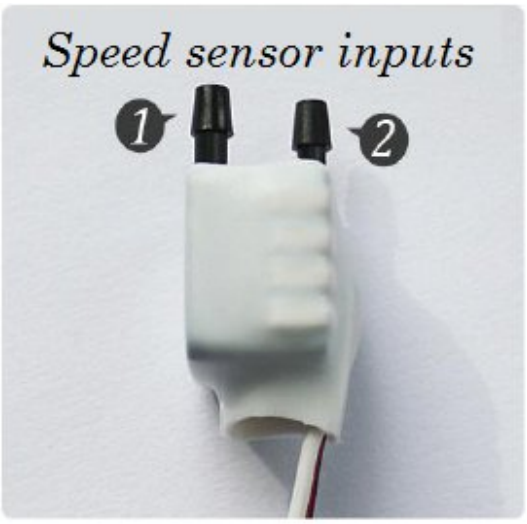
We recommend that you maintain a distance of at least 15 cm between the components of SwiftAI OSD Mini ™ and the sensitive components of on-board electronics and strong radiation sources, such as, the RC receiver and the video transmitter antenna.
If required, the SwiftAI OSD Mini ™ sensor cables can be extended up to 1 m with servo-extensions.



1. Microprocessor board: any convenient location inside the hull. We recommend slight air flow in the place of microprocessor board installation for a more efficient heat removal off the board.

2. Pressure sensors:

2.1 Altitude sensor, 2.2 Speed sensor.

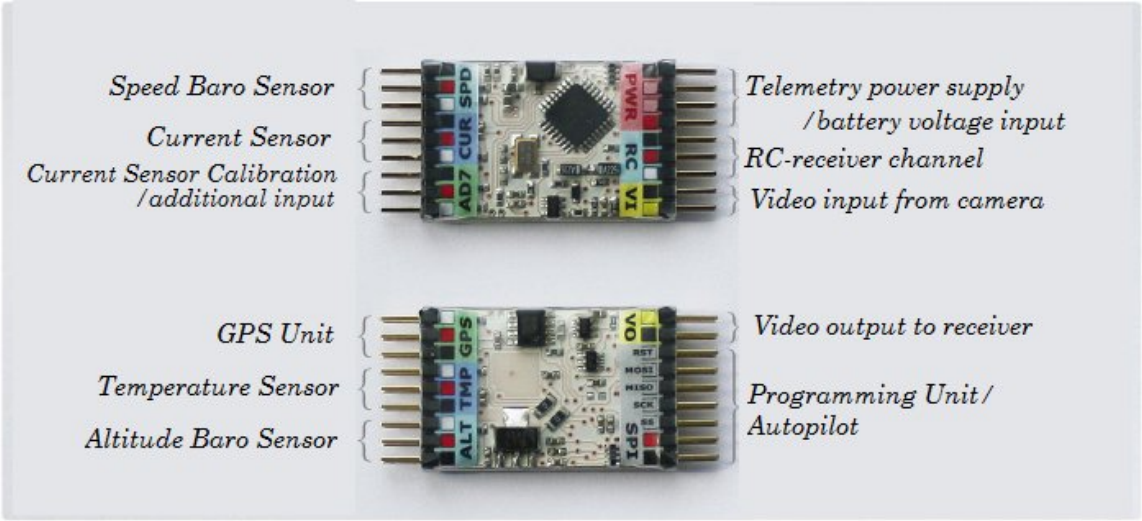


Any convenient location inside the hull. Do not install pressure sensors in airflow blown locations, otherwise their readings may be inaccurate. Speed sensors require airflow pressure applied to the input 1 and the static pressure applied to the input 2. The static pressure at the sensor installation location applies to input 2, and the pressure of the oncoming airflow required for the measurement of air speed, can be brought to input 1 with a flexible tube of any convenient diameter. The air pressure receiver may be a thin-walled tube of 3 - 5 mm in diameter, mounted on the wing or hull of the model towards the oncoming airflow.

3. Current sensor: any convenient location inside the hull.
4. Temperature sensor: any convenient location inside the hull. Correct temperature readings are necessary for most accurate calculation of height and speed based on air pressure, so it is necessary that the temperature sensor be airflow blown.
5. GPS Unit: Must be installed in such a way that the antenna is directed to the sky and is not blocked by current-carrying model structures (metal, fiberglass).

PINOUT

SwiftAI OSD Mini™ sensors are equipped with a tricolor cable for connection and the color marking on the SwiftAI OSD Mini™ board enables to avoid incorrect sensor connection.



Color marking for all sensor connectors:

- white — signalling wire;
- red — sensor power (+5V from stabilizator on SwiftAI OSD Mini™board);
- black — common wire (‘ground’).

SwiftAI OSD Mini ™ power connector , in addition to supplying power, transfers the input voltage to the board for monitoring. SwiftAI OSD Mini ™ automatically detects the number and the type of batteries connected by selecting one of the following display options:

1. Displaying 3S LiPo per-cell battery voltage:
   - red — plus output of the third cell;
   - pink 1 — plus output of the second cell;
   - pink 2 — plus output of the first cell;
   - black — battery minus (‘ground’);
2. Displaying 2S LiPo per-cell battery voltage:
   - red — plus output of the second cell;
   - pink 1 – not connected;
   - pink 2 — plus output of the first cell;
   - black — battery minus (‘ground’);
3. Displaying 2S LiPo per-cell battery voltage:
   - red — battery plus;
   - pink 1 – not connected;
   - pink 2 – not connected;
   - black — battery minus (‘ground’);
4. Displaying the voltage of 2 batteries:
   - red — first battery plus;
   - pink 1 — second battery plus;
   - pink 2;
   - black — battery minus (‘ground’).

CONFIGURATION AND CALIBRATION

SwiftAI OSD Mini™ system was designed in the view of maximum adjustment and configuration simplicity, hence all the calibrations took place automatically during first 15 seconds after system shut-down. Current sensor should be calibrated manually only once.

Current sensor calibration

If it's not calibrated, an "asterisk" flashes on the screen near current sensor readings.
For sensor calibration, the current sensor must be connected to the telemetry board, close two AD7 input contacts (white and red), supply power to the system and wait 5 min.
After calibration the sensor usually doesn't require recalibration, if necessary, it can be carried out at any time following the aforesaid procedure.

Screen configuration

If SwiftAI OSD Mini™ is equipped with the baro sensors, during the first 15 seconds after the start one can select the main readings: the altitude and the speed according to baro sensors or according to the GPS unit.
In this case the transmitter arm should be lifted up to the maximum on the connected SwiftAI OSD Mini™ channel, at the same time the lines "GPS" and "BARO" will flash in turns every 3 seconds, displaying current selection.

After SwiftAI OSD Mini™ initialization is completed, the current selection is displayed by means of "G" and "B" lines within next 45 seconds.

Customized settings are stored to non-volatile memory and used at the next OSD board start-ups.

CONTROLLING THE OSD SCREEN ON THE FLY

In flight, SwiftAI OSD Mini™ enables to switch the modes of information display on the screen. To do this, one must lift the transmitter arm to the maximum on the connected SwiftAI OSD Mini™ channel and the screen layout will be switched repeatedly every 3 seconds. Layout settings are memorized and used at the next start-ups.

Full layout / layout without GPS coordinates shown

1 — indicator of quality / connection with RC transmitter.

The indicator starts flashing when SwiftAI OSD Mini™ records the PPM impulses of ordinary width at input connected to one of the channels of the RC receiver. In case of intense noise, long distance between the model and the RC transmitter or when the RC transmitter is off, the width of PPM impulses overpasses the set limits or the impulses run sporadically and the indicator switches off.

RC signal quality is defined by measuring the width variations of PPM impulses emitted by the RC receiver during a specified period of time. The more PPM impulses width varies, the worse the receiving conditions are. When one indicator “stick” switches off, it means that the noise of PPM impulses width has increased fourfold.

In virtue of the selected implementation of RC signal quality assessment, SwiftAI OSD Mini™ indicates temporary RC signal quality “deterioration” at the change of the RC transmitter arm position on the channel connected to the system. Thus, it’s advised that SwiftAI OSD Mini™ should be connected to a free channel of the RC transmitter or to a rarely used discrete channel.

Attention: the receivers with Fail Safe mode provide appropriate PPM output signal regardless of the receiving conditions, that's why the indicator will flash on the screen if SwiftAI OSD Mini™ is connected to such receivers.

2 - flight time (min, sec).

Flight time countdown starts when power is supplied to SwiftAI OSD Mini™ and video signal is received from the camera. The flight time counter uses video signal for synchronization, dividing the amount of shots per second by 50. Without input video signal SwiftAI OSD Mini™ switches over to hibernation.

3 – indicator of model current speed direction in relation to the earth.

Current model speed direction (course) is defined by means of the data received from the GPS unit. Please, note, that in the conditions of head or side wind, current model course direction can mismatch the model orientation.

4 – speed (km/h), main indicator, speed scale.

Type of the main indication (GPS or baro sensor data) is selected and memorized at SwiftAI OSD Mini™ initialization. Scale position is bound to the main indicator. Scale division – 50 km/h.

5 – speed (km/h), additional indicator.

Type of the main indicator (GPS or baro sensor data) is selected at the SwiftAI OSD Mini™ start, the indication is chosen during initialization. If the GPS readings are main indicators, the baro sensor data are the additional ones, and vice versa. Additional indicator value is displayed near the lower edge of the main indicator.

6 - climb indicator, main indicator.

Altitude change according to main indicator (GPS or baro sensor data) is displayed by means of a pictograph.

7 – altitude (m), main indicator; altitude scale.

Type of the main indicator (GPS or baro sensor data) is chosen and memorized at the SwiftAI OSD Mini™ initialization. Scale position is bound to the main indicator. Scale division – 50 m.

8 – altitude (m), additional indicator.

Additional indicator value is displayed near the lower edge of the main indicator scale.

9 – indicator that identifies the model unstick point.

The indicator position on the screen is determined through mutual location of the model start point and speed vector direction towards the ground. The indicator displays the angle the model should be turned by left or right to fly towards the start point.

The angle change makes the pointer move on the scale. The middle of the scale corresponds to 0° - the model is flying due the start point, left and right edges of the scale correspond to 90° left and 90° right.

If the angle is larger than 90°, the pictograph is accompanied by the value in degrees that's necessary for the turn.

A – GPS unit service information.

Service information includes the amount of visible satellites according to GPS data, navigation mode (2D/3D) initialization pictograph of the start point.

The more satellites the GPS unit "sees" , the more precisely and reliably it defines the model coordinates. Generally, under open space conditions the unit "sees" from 7 to 11 satellites. If there are just 4 satellites or fewer, 3D navigation mode is unavailable and the altitude readings displayed by telemetry module are incorrect.

If the amount of the satellites is lower than 3 or the GPS unit runs initialization process (up to 1 min after power supply), the navigation is unavailable and the telemetry unit outputs "NA" value . When GPS module starts sending correct data, start point initialization pictograph begins to flash, after storing necessary amount of packages with correct information, the coordinates from the GPS unit are memorized as start point coordinates. At that moment, start point initialization pictograph stops flashing and lights up permanently.

B – GPS coordinates in strings.

Degrees, minutes, latitude minute fractions (seconds) in the format of YYMM.MMM, the indicator of north (N) / south (S) latitude. Degrees, minutes, longitude minute fractions (seconds) in the format of YYYMM.MMM, indicator of east (E) / west (W) longitude. In the "Layout without GPS coordinates in strings" mode this line isn't displayed, but when SwiftAI OSD Mini™ detects RC signal loss, the line flashes until the signal is recovered.

C – distance to the start point, ignoring altitude(m).

D – current temperature (Celsius degree).

E – actual current (A).

F – consumed charge of the battery connected via the current sensor (mA/h).

G – battery/batteries voltage (V).

Simplified layout

1 - indicator of quality / connection with RC transmitter.

2 - flight time (min, sec).

3 – current main readings indicator (GPS/baro sensors) flashes in any mode for 45 seconds after SwiftAI OSD Mini™ initialization.

4 – speed (km/h), main indicator.

5 - GPS unit service information.

6 - consumed charge of the battery connected via the current sensor (mA/h).

7 - indicator that identifies the model unstick point.

8 - climb indicator, main indicator.

9 – altitude (m), main indicator.

10 - distance to the start point, ignoring altitude (m).

11 - battery/batteries voltage (V).

Display off

Apart from the three aforesaid modes, the screen switching cycle includes “display off” mode. Selection of this mode can’t be memorized and used at future start-ups.