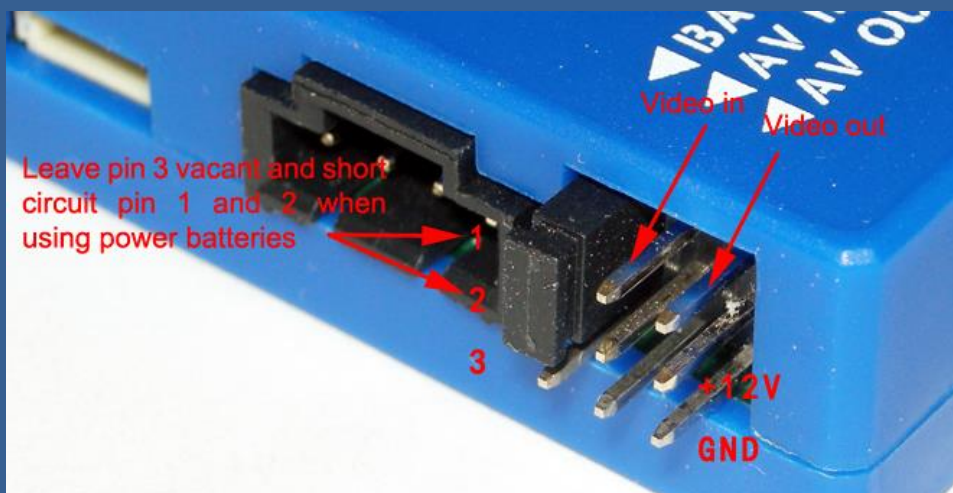
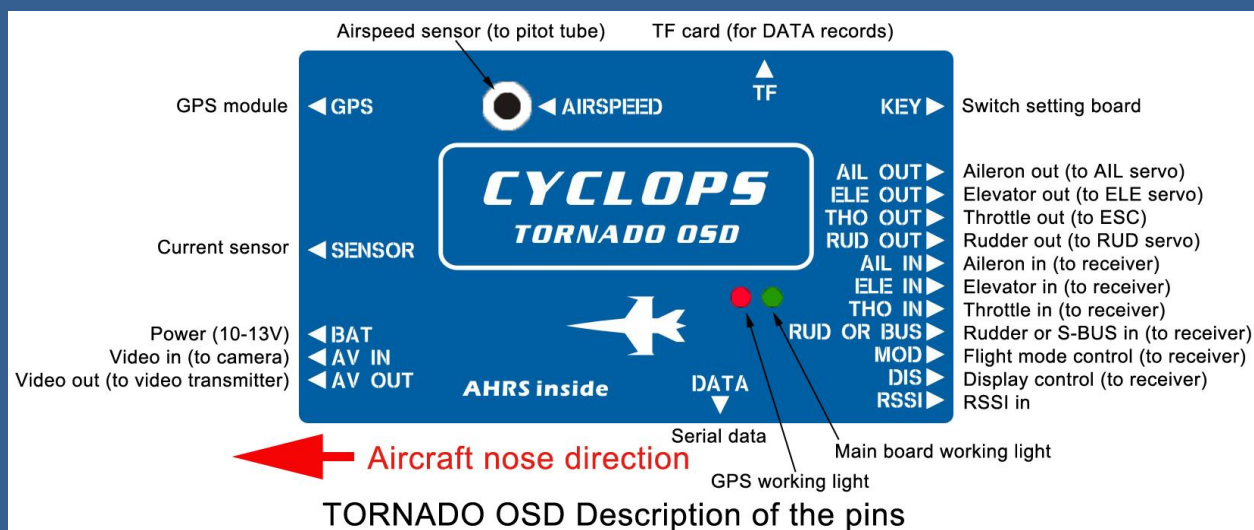


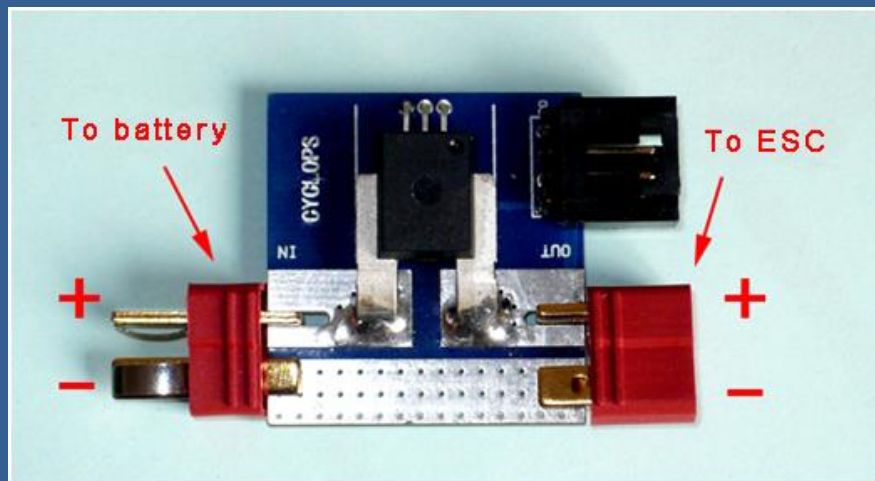
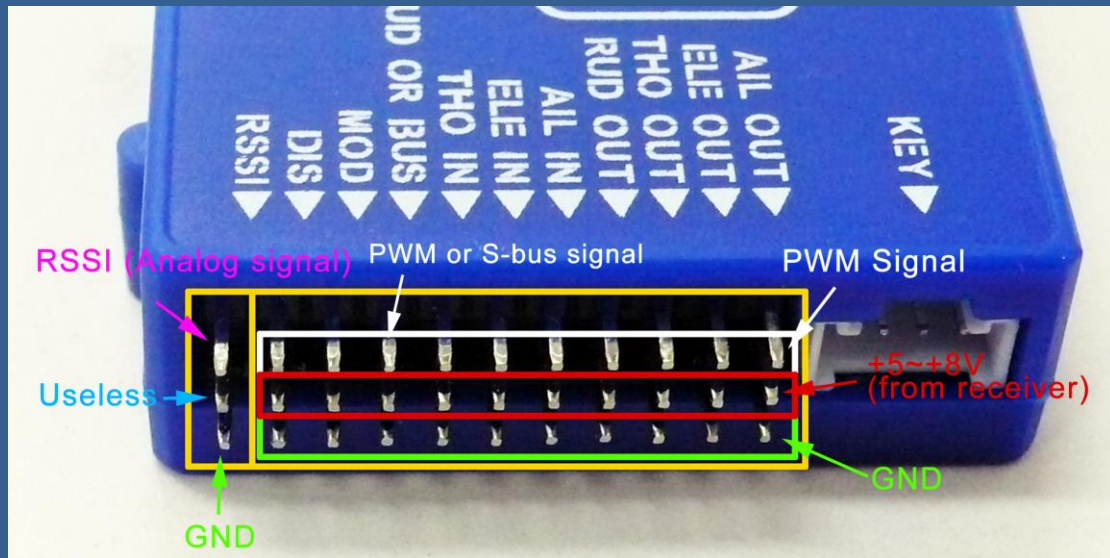
CYCLOPS TORNADO OSD V1.0 manual

Thanks for buying and using CYCLOPS OSD series products, please read this manual carefully before use.

Installation of connections



Important: select Jumper instructions: 1, 2 short circuit for using power batteries(which must be 12V, or 3S LIPO batteries); remove the jumper cap, and connect 2 and 3 to power up OSD and wireless video equipment separately with additional 12V power supply. When mounting OSD main board to the aircraft, please check whether the position is installed correctly, namely the nose of the small white plane design on the main board points to the direction of the aerial carrier's nose.



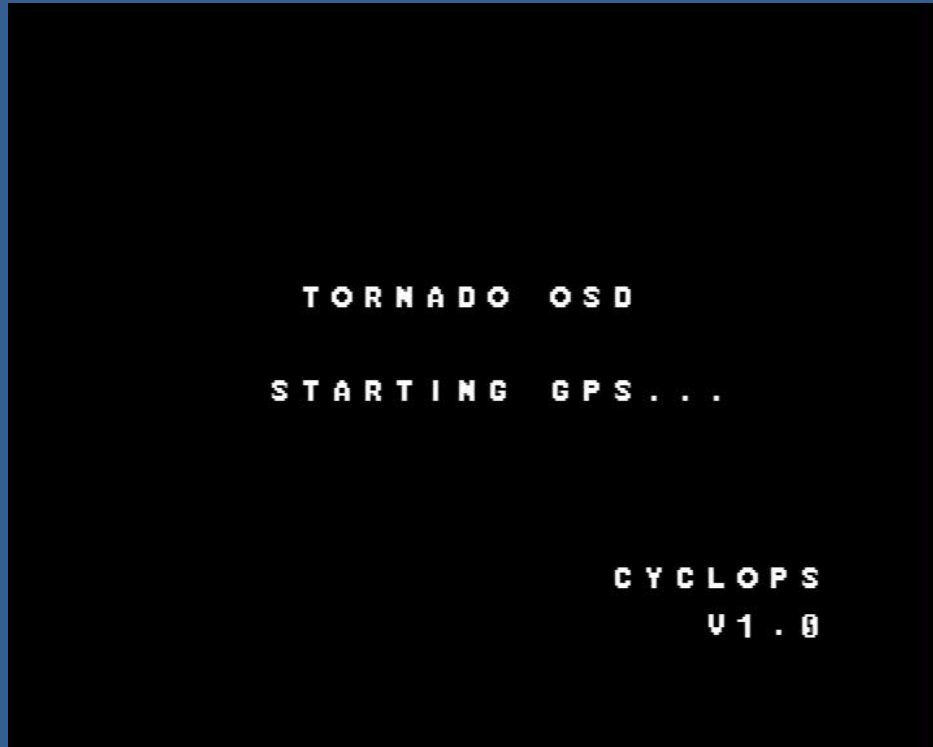
Current sensor wiring Diagrams (with a T plug)



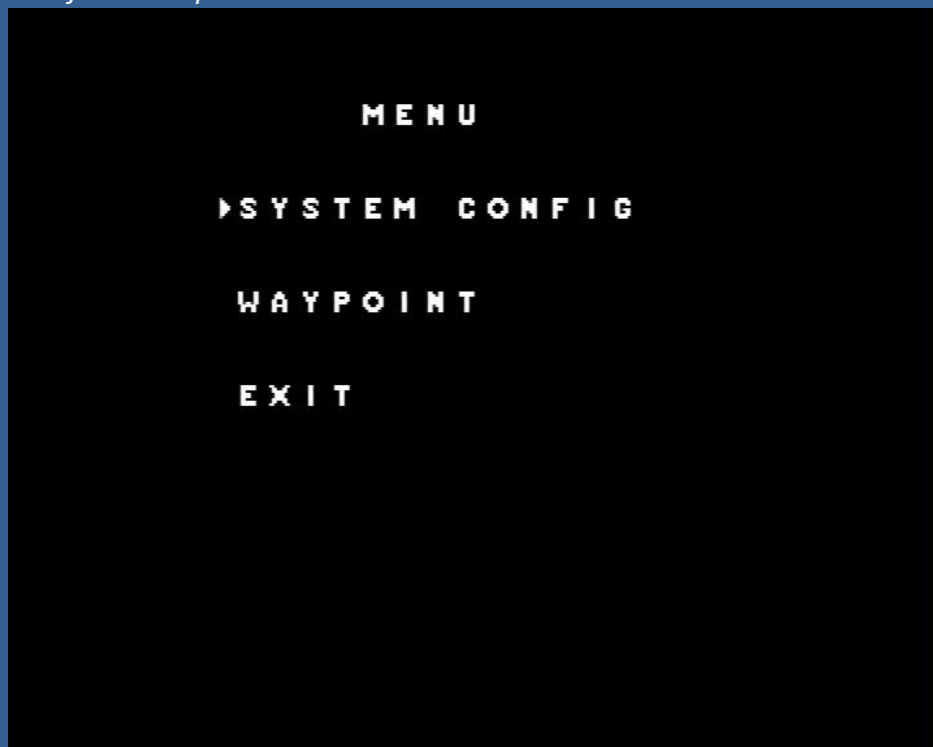
GPS Module Installation

System parameter setting

Connect the GPS module and OSD correctly according to the above instructions, switch on the power, the red light on the OSD main board flashes, then it will enter the following boot interface:



Press the "UP" and "DOWN" buttons on the switchboard at the same time to enter the main menu settings. Press the "UP" or "DOWN" can move the cursor, "OK" button used to confirm the options.



SYSTEM CONFIG setup instructions

```
          SYSTEM CONFIG
▶BAT SCALE 1500 MAH 100%
  RESET CURRENT      OK
  SERVO CENTER       OK
  REV                AIL  ELE
  ELEVON              N
  TRIM  AUTO  P  R  B
  RESET GYRO         OK
  RSSI              MAX  MIN
```

1/3

```
          SYSTEM CONFIG
▶ROLL  GAIN 80% ANG 25°
  PITCH GAIN 80% ANG 10°
  RESET AIRSPEED      OK
  CRUISE AIRSPEED     70 km/h
  SPEEDMAXLIM         100 km/h
  SPEEDLOWLIM         10 km/h
  PA HEADING HOLD     Y
  LOW POWER RTH       10.5V
```

2/3

SYSTEM CONFIG

▶PA SAFE RANGE 2000M
VIDEO FORMAT AUTO
AHI ON P100% R100%
SBUS Y
RETURN

Options		Setup instructions	Comments
PAGE 1			
BAT SCALE		mAh alarm value	When the power consumption reaches the set value in flight, the battery capacity symbol and value will flash to indicate it. The mAh consuming can be adjusted by 0%-200%.
RESET CURRENT		Reset the current sensor to zero	At first use or after replacing the current sensor, it needs to set this option
SEV	CENTER	Servo center confirmation	Please make a test flight of the model aircraft test and adjust the center point of the control surface before confirming this option. After replacing the model plane, the servo centers need reconfirmation.
REV	AIL	Aileron reverse setting	With error-free connection and power, switch the flight mode to PA, sway model aircraft to the lateral and pitch direction, check the rudder of each control surface is correct, if the rudder is adverse, adjust the option to make it right.
	ELE	Elevator reverse setting	
ELEVON		ELEVON linkage function	It is used for flying wing model planes. When selecting Y, you must close the mixed controls of the ELEVON on the remote transmitter.
TRIM		Fine adjustment of main board installation levelness	Put the model aircraft with TORNADO OSD flat and power it on, observe posture angle parameters at the surface. If due to the installation errors, the P, R parameters are not 0, you can adjust this option, such as P-3, R+5, then adjust the P to -3, R to +5 in the TRIM, exit the menu and observe the posture parameters again, until all are 0. This only needed to be set once after the installation of OSD main board, unless the replacement of aircraft or reinstallation of OSD main board. Auto-calibration of stabilization position function is added, put your plane on the ground horizontally, and enter this option, the OSD will reset the center point of roll and pitch.
RESET GYRO		Gyro calibration	It needs to recalibrate when it is used for the first time (very important ! ! !) or it is placed for a long time, during calibration, OSD main board must be placed horizontally, and strictly remains still ! ! !
RSSI		Signal strength indicator	You need to confirm the max and min value in the configuration menu. When the RSSI value is under 5%, the display will disappear, and the radio icon will flash to warn you that the signal is too low or lost. The RSSI will not show up when the min and max settings of RSSI are equal.

PAGE 2			
ROLL	GAIN	Roll sensitivity	Adjustment of the roll control sensitivity
	ANG	Maximum turn Angle	Default 25°, Maximum 45°
PITCH	GAIN	Pitch sensitivity	Adjustment of the pitch control sensitivity
	ANG	Maximum pitch angle	Default 10°, Maximum 20°
RESET AIRSPEED		Clear airspeed	Re-clear the airspeed. We recommend reset airspeed before takeoff if the environment changes.
CRUISE AIRSPEED		Set cruise airspeed.	Airspeed value (0-200Km/h) during auto pilot, when set as OFF, the system will not control the airspeed.
SPEEDMAXLIM		Maximal limit of airspeed	The air speed of the throttle in PA mode
SPEEDLOWLIM		Lowest limit of airspeed	When the air speed of the model plane is lower than the set value, the system will not climb to avoid stall.
PA HEADING HOLD		Heading mode selection	It's optional to lock the course when in PA mode; you can choose to disable it.
LOW POWER RTH		Low-voltage protection automatically return to home	In PA or AUTOPILOT when power voltage lower setting value, automatically RTH until user switch back to manual flight mode.
PAGE 3			
PA SAFE RANGE		Flying range exceed setting value	In PA when flying range exceed setting value, automatically RTH until user switch back zero, which disable function.
VIDEO FORMAT		Video format selection	Video input format options between PAL, NTSC and AUTO, when choosing AUTO option, the OSD will automatically adjust the OSD display according to the input video format, default PAL when no video input.
AHI		AHI ON/OFF	User can choose show hide AHI (Artificial Horizon Indicator), size adjusted through percent value fit different cameras monitors.
SBUS		FUTABA S-BUS input	Chose Y and quit the Menu page, connect FUTABA Receiver SBUS1 (Do not use SBUS2!!!) to RUD in and restart OSD. The Transmitter Chanel mapping as: 1CH-AIL; 2CH-ELE; 3CH-THO; 4CH-RUD; 5CH-MOD; 6CH-DIS
RETURN		Return to menu	When return to menu, the system will save all settings.

WAYPOINT setup instructions

```

      WAYPOINT
>A  DIS  400  ANG   0
    ALT  200  ON

    B  DIS  400  ANG  90
    ALT  200  ON

    C  DIS  400  ANG 180
    ALT  200  ON

```

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```


      WAYPOINT
>J  DIS  400  ANG  90
    ALT  200  ON

  ⏏ ALT  200  RAD 100
    DIR R

MAXDISCHG          30
RETURN

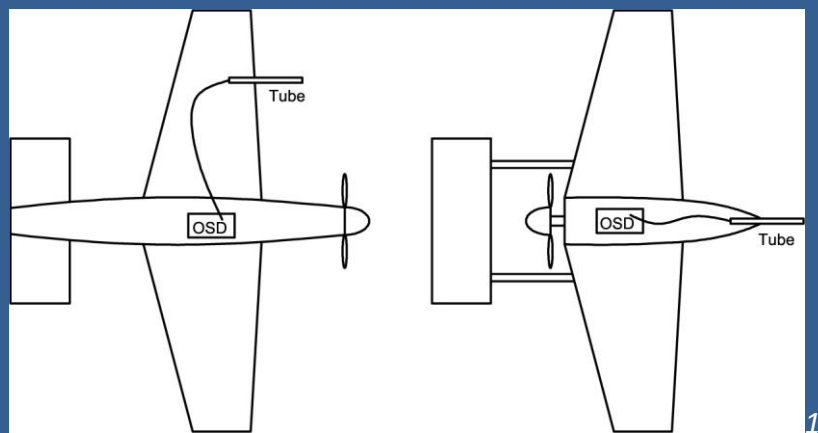
```

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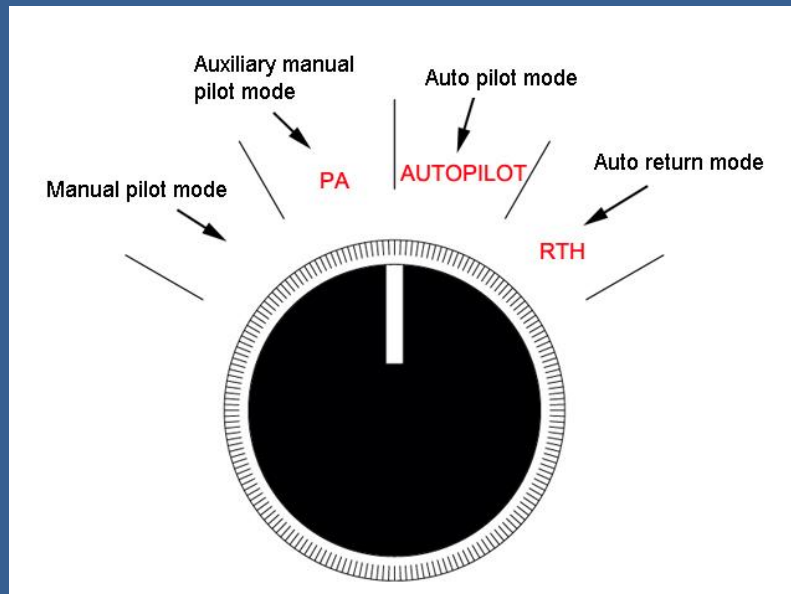
PAGE 1 to PAGE 3 (Waypoint “A” to “J” and “HOME” point)			
Options		Settings	Remarks
DIS		Waypoint distance	The distance between the Waypoint and the home point, setting range: 0-5000meters
ANG		Waypoint angle	The angle between the line of waypoint and the home point with the due north, setting range: 0-359
ALT		Altitude of waypoint	Setting range 0-800 meters
ON/OFF		Whether to use the waypoint	
PAGE 4			
	RAD	Hovering flight radius	The hovering radius with the certain waypoint as the center, setting range: 0-500 meters
	DIR	Hovering flight direction	L: counterclockwise; R: clockwise
MAXISCHG		Advance distance for waypoint shift	Setting range: 0-100 meters
RETURN		Return to menu	When return to menu, the system will save all settings.

Directions for use

- 1、 We recommend the clients to use electric power model airplane with good stability.
- 2、 Place TORNADO OSD in your plane horizontally, keep the logo plane's heading point to your plane's heading. If the plane slope over 15 degree, the OSD will keep display the boot interface until you put the plane horizontally.
- 3、 For prop planes, it's important that the tube be placed so that it is not directly in the plane's prop-wash, which will result in erroneous readings. The best place to install the tube is on the leading edge of the wing several inches out from the fuselage. For jets, gliders, or "pusher" prop planes, the nose cone often provides a perfect mounting location, as shown in Figure 1.

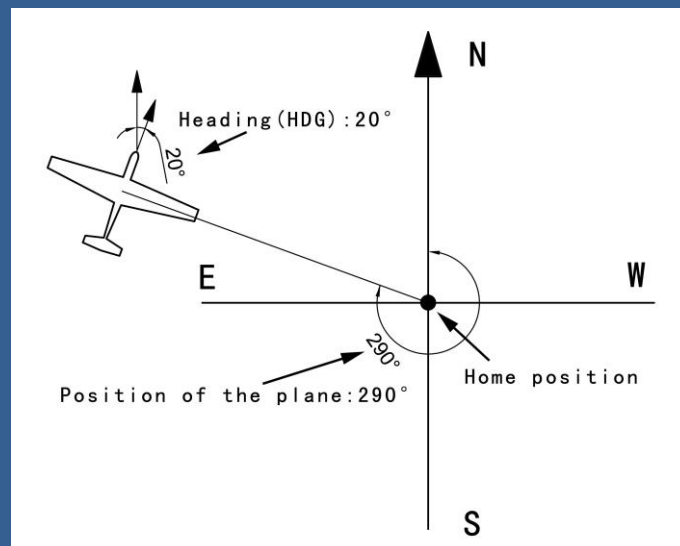


- 4、 As GPS beginning to search satellites, the satellite number is indicated by the GPS strength icon on the upper right corner. A flashing icon indicates weak or unreliable GPS strength and cannot be used as positioning parameters. With good GPS signal, the satellite searching would last 1-5 minutes depending on different circumstances.
- 5、 Flying mode shift shall be connected to any knob ratio channel on the remote controller. Under different modes, the flying interface will display different information, PA (auxiliary manual pilot mode), AUTOPILOT (auto pilot mode), and RTH (Auto return mode). At auto pilot mode, turn the knob AUTOPILOT to PA and quickly back to AUTOPILOT, the system will shift to the next waypoint, as shown in Figure 2.



2

- 6、 We recommend to use remote controller with failure protection functions (F/S function). You may set plane pilot mode shift channel fail protection as auto return pilot. In this case, the plane can automatically return in case of losing control.
- 7、 Pressing the DOWN button can switch between display modes and save the mode, carry out the last saved display mode next time you start.
- 8、 The meaning of current azimuthal angle of the plane: The location of plane is based on the take-off as the base point, and rotates from due north from 0 to 360 degree. For example, if the plane is at the southeast direction, it will display 135, Figure 3.

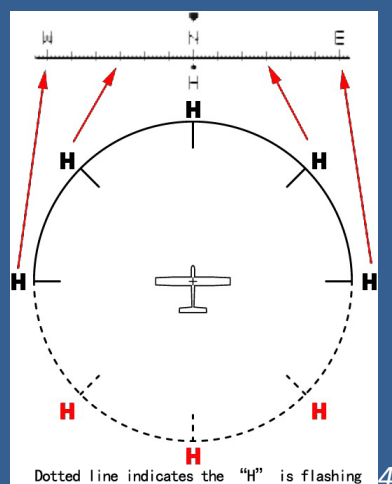


3

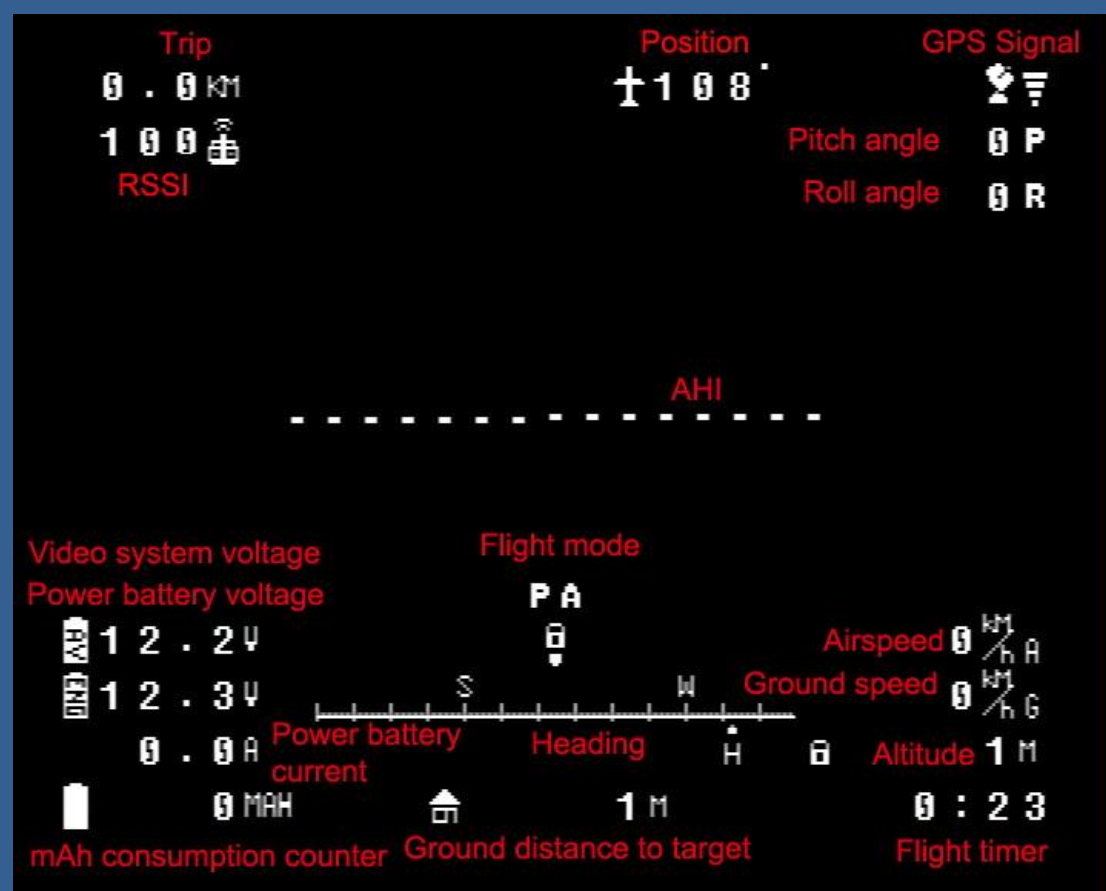
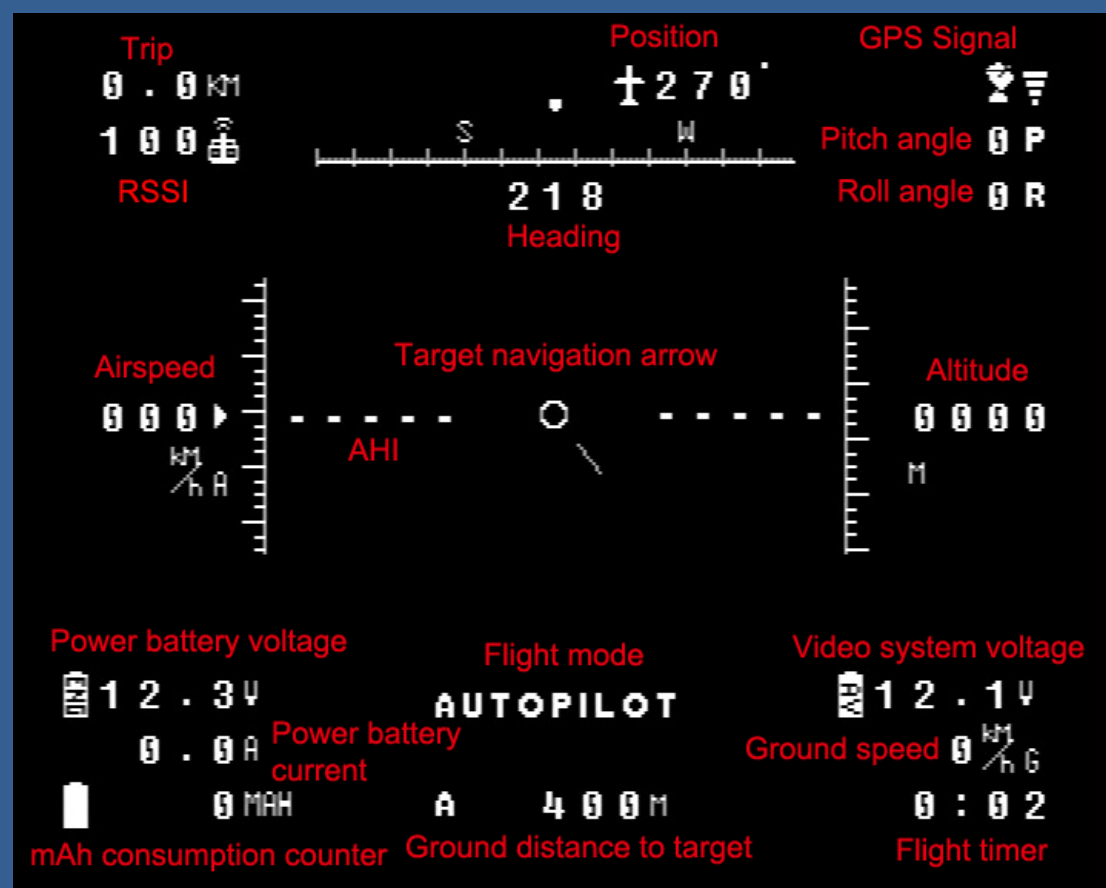
- 9、 In PA mode, the system can keep the course and altitude automatically, and the screen will display to "LOCK" symbols as follows. If the operator controls aileron (direction steer) or elevator steer, the course or the altitude lock will be released. At this time, the system will automatically control the plane attitude according to the control amount of the operators. For example, if the aileron is in 100%

amount, the plane will fly left (right) at 45 degree slope, if the elevator steer is in 100% amount, the plane will lift (lower) at 20 degree angle. Until the control lever returns to the neutral, the system will lock and keep the course and altitude at the moment.

- 10、 Before taking off, press reset button to reset all parameters. (This operation will reset altitude, distance, timer, current and mAh consumed).
- 11、 When OSD detect 0 voltages on the power battery, it will not display voltage, current and mAh consumed of power battery.
- 12、 TORNADO OSD can display RSSI voltage (receiver signal strength indicating voltage) measuring range: 0.1-3.3V, when this voltage is below 0.1v, OSD will not display this parameter. In order to display RSSI voltage, the user has to open the receiver and to solder wires by him, so the manufacture bears no responsibility for all consequent damage due to this operation.
- 13、 Screen Display Control Surface (DIS port) can be connected to any switch on the remote control unit to switch between fighter and concise surfaces. In concise surface, directions designation of returning to the take-off point indicates H in the screen represent the take-off point; When H is in the middle and not flash, it indicates the plane is heading directly to the take-off point; When the H is in the middle and flash, it indicates the plane is flying 180 degree away from the take-off point. Switch between interfaces with the remote control will not be stored, as shown in Figure 4.



- 14、 When TF card is inserted into the system and the system detects satellite signal, press for seconds UP button, and SD symbols will appear on the upper-left corner and flash. At this point, the card starts storing the system data. Press Reset and the card will restart storing the system data. If you want to end data storage, press UP button for 3 seconds and SD card symbol stops flashing, and you end data storage.



100 
RSSI

GPS Signal


----- AHI -----

Flight mode
P A

Current latitude and longitude
40.0073920N
116.3290240E

Latitude and longitude of target
 40.0073920N
116.3290112E

Notes of other special symbols



Power alarm symbol. When the power consumption of the dynamic system reaches the set value BAT SCALE in the menu, this symbol will appear and flash to alarm.



Semi manual stabilization mode symbol, when the flight mode switch switches to the stabilization mode, this symbol will appear, at this time, the aileron is in auto-balance operating mode, and the OSD automatic will automatically begin the fixed altitude flight.



Height and heading locks of automatically fixed altitude flight symbol. When switch Flight mode to PA, the system will record the switching time, altitude and heading values and in the PA mode, it will automatically maintain the altitude and heading in flight.

When the manipulator control the elevator or aileron joystick, the lock symbol disappears, and can change the flight altitude or heading; when the joystick returns to the neutral position, the lock symbol appears again and re-lock the current altitude or heading value and begin the auto fixed altitude and heading in flight.



Automatic waypoint flight symbol.



Automatic return symbol.



Recording data to the TF card.



GPS disconnected or data errors.



Posture alarm symbol. The occurrence of this symbol indicates the system's measurement of posture value is not accurate, and can only manipulate the aircraft manually, switching flight mode to PA AUTOPILOT and RTH is forbidden by the system.

Possibilities of the occurrence of posture alarm symbol:

- 1、 Excessive aircraft vibration
- 2、 The first 10 seconds after starting the OSD
- 3、 The aircraft's lateral posture tilt exceeds 70 degrees
- 4、 After the aircraft's violent flight actions (such as spiral, long-time inverted flight etc.)

TORNADO OSD accessories

Name	Number	Parameters
TORNADO OSD main board	1	
GPS module	1	10Hz
GPS cable	1	20cm-long
Current and voltage sensor	1	30V 100A
Current sensor cable	1	20cm-long
Servo cable	6	20cm-long
Setting board	1	
Switch board cable	1	40cm-long

Technical Data

Weight 35g (main board)

Current 85mA (12V & without GPS module)

Size 75.3mm*44mm*15mm (L*W*H)

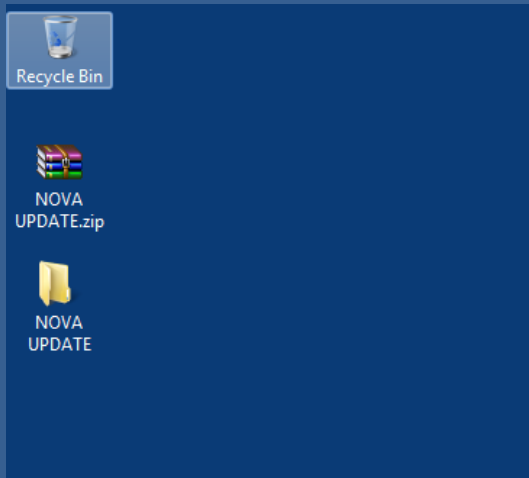
Please use this product strictly complying with relevant state laws and regulations. This manual provides the detailed instructions of the product's installation and debugging use it correctly on the basis of full understanding. During the flight, please stay away from the crowd or the buildings, CYCLOPS shall not be liable for any losses caused by improper use. When there is updated software, modified version, or renewed instructions, please pays close attention to the agent's website updates in time. CYCLOPS reserves the rights to the final explanation of this manual.

The following conditions are not covered by warranty :

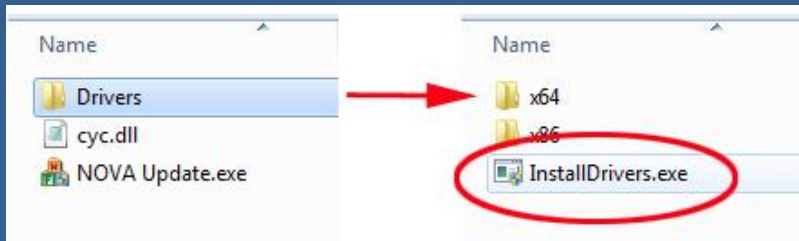
- 1. Repair, change specification, replaces components by yourself and etc.**
- 2. Damage caused by improper use, such as connection error.**

TORNADO OSD update guide

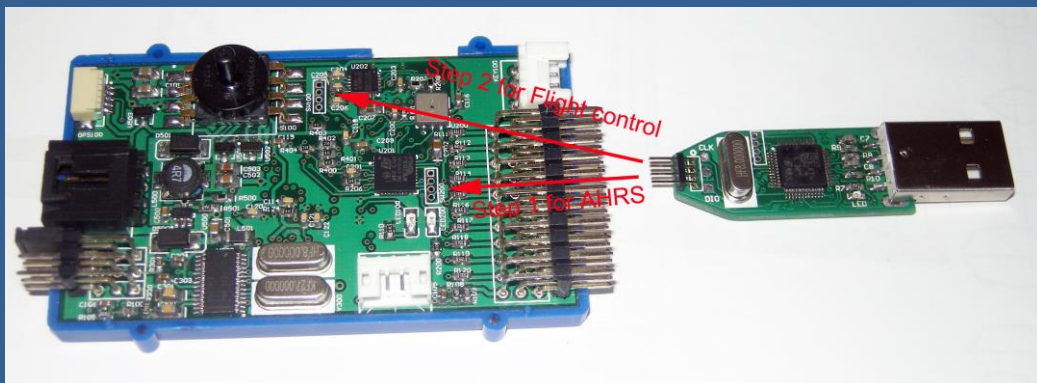
1、Unpack the file



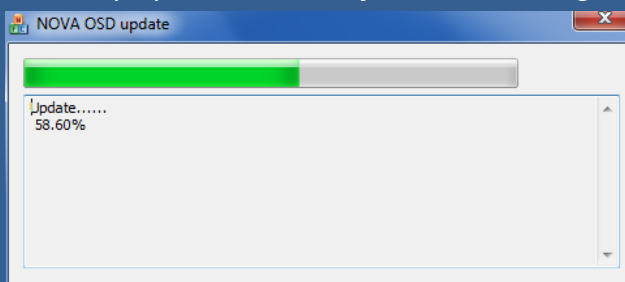
2、Install the driver



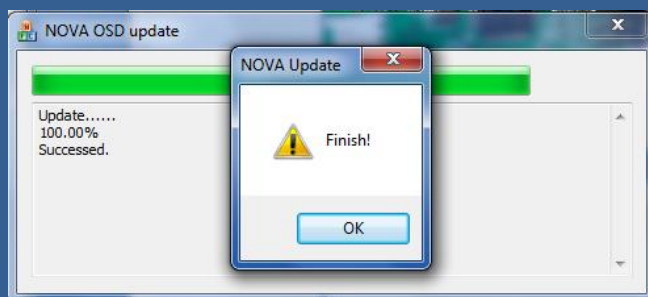
3、Power on the TORNADO OSD and connect the update kit to the main board as shown on the pictures below.



- 4、 First step update the AHRS firmware, clicking on [TORNADO AHRS update.exe](#)



The update progress is as above, DO NOT disconnect the update kit or cut off the power supply of TORNADO OSD.



Click on OK to finish the update then cut off the power of TORNADO OSD and remove the update kit.

- 5、 Second step update the Flight control firmware.
- 6、 The OSD will enter auto detection mode during the first power on, connect GPS module and the main board should be placed strictly horizontally and statically, avoid any movement or vibration. If there is any error during the detection, there will be error shows on the OSD screen, cycle the power and do it again.
- 7、 When the detection is done, the OSD screen will enter the working mode, please set all your configurations one time again, specially, don't forget to reset the GYRO and confirm the SEV CENTER items.