Rev 0: 3rd December 2011

FEIYU TECH

HORNET OSD
OPERATION MANUAL

Downlink Video telemetry data streaming for FY Autopilot
Installation & Operation Guide

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HORNET OSD Manual Update list

Revision	Date	Updated page	Topic updated
0	3rd December 2011	N/A	First Release of Manual
			•

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INTRODUCTION

Dear Pilots:

Thank you for purchasing the OSD of Feiyu Electronic Technology. In order to achieve full potential and safe operation of this product, please carefully read this manual prior to installation.

Preface

The Hornet- OSD overlays flight telemetry information onto your downlink video image. The telemetry information displayed includes flight altitude, flight speed, flight direction, and home direction and so on. You also can save the telemetry information to a MICRO SD card, then trace playback via FYGCS software.

The Hornet-OSD can be connected to the FY-21AP, FY-31APand FY-3ZT systems to display autopilot telemetry data, or to a GPS receiver to display positioning data.

Hornet-OSD automatically adapts to either PAL or NTSC video input and confirms if there is a MICRO SD card or not. The adaptive processes are within 2 Seconds.

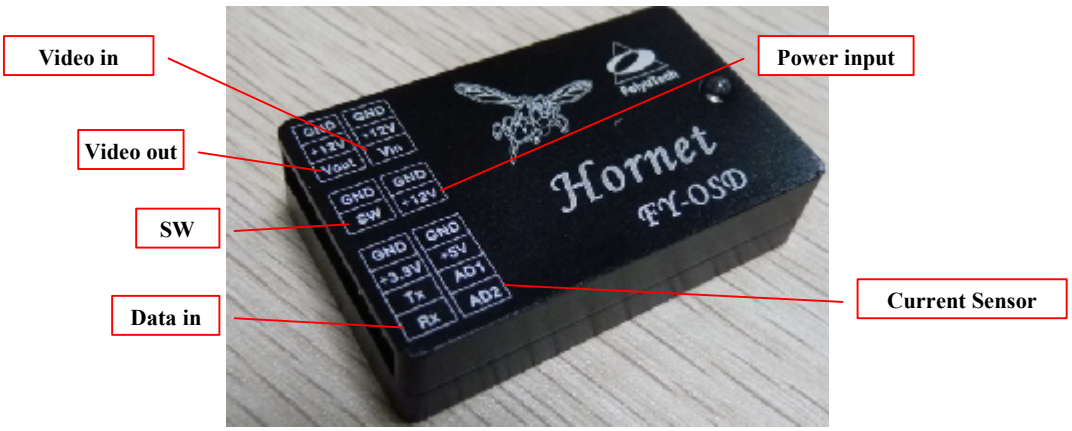
WORKING STATUS

a) After connecting the power supply, the indicator LED light will be activated. The Hornet- OSD will automatically detect the incoming video.

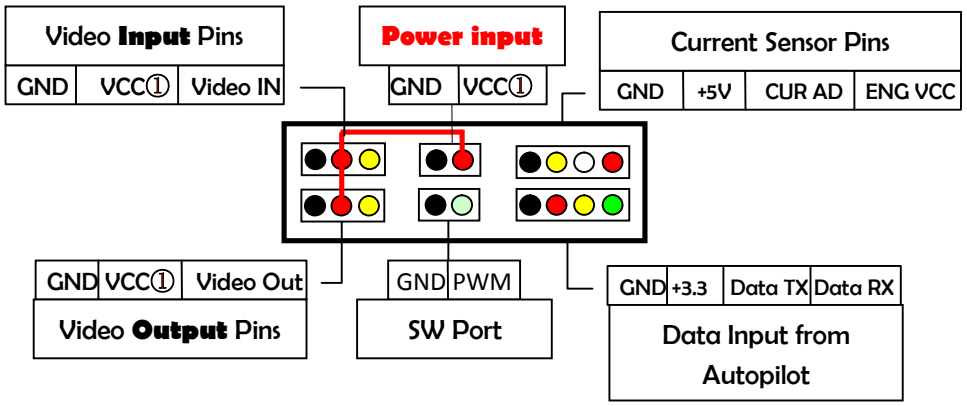
b) Depending on your video output signal, "NTSC" or "PAL" characters will be shown on the video screen when signal is detected.

c) If Data is received from the autopilot (FY-21AP, FY31AP, FY-3ZT or GPS module) the LED indicator of Hornet- OSD will begin to flash.

d) Once the input video is detected even if there is interruption in video signal, the telemetry data of the Hornet- OSD will continue to be transmitted via the video stream.



INTERFACE SCHEMATIC DIAGRAM



① **DANGER:**
The three "VCC" ports (positive) for ***Video Input***, ***Video Output*** and ***Power In*** are all **inter-connected**.
Therefore you are allowed to connect ONE 12 Volt input power only.
DO NOT input more than one power supply through any of the positive pins or damage to the Hornet OSD board will occur.

a) It is recommended to power the OSD independently to ensure a clean video display.

b) Note that power to the OSD is **not** supplied by the FY31AP or Autopilot module. Power is via the 12 volt input only.

LIST OF INTERFACES

PORT	Connection Description
Video in	Camera or video input port
Video out	OSD Overlaid video output, connect to video transmitter (for testing, you can also connect directly to a video display unit)
SW	RC receiver switch input to control OSD display
Power	Power supply shared by the Hornet OSD, Video Camera and Video Transmitter. **DO NOT** input more than one power supply through any of the positive pins or damage to the Hornet OSD board will occur.
Data in	Connect to FY21AP / FY31AP / FY3ZT / GPS Receiver
Current Sensor	Current sensor input for measuring the battery voltage and current.

Video INPUT Port :

GND	Connect to the camera GND
VCC	Connect to camera's power supply "VCC". (Note: Power is supplied from the OSD to the Camera. Do not input any other power supply through this port or damage will occur).
Video IN	Video input (Connect to the camera video signal output).

Video OUTPUT Port :

GND	Connect to video transmitter GND
VCC	Connect to video transmitter power supply input "VCC". (**Note**: Power is supplied from the OSD to the video transmitter. Do not input any other power supply through this port or damage will occur).
Video Out	Video output (connect to video transmitter video input).

SW PORT

GND	Connect to the power "GND" port of the RC receiver.
PWM IN	Connect to the signal port of your RC receiver (you need to designate to a free channel).

POWER INPUT

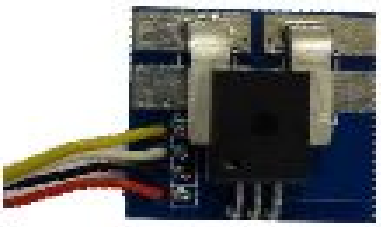
GND	Connected to the power "GND" that supply to the OSD control board.
VCC	This port powers up the OSD Board, Camera and Video transmitter. Safe input range is between **DC6 Volts to 16 Volts**. Since the positive leads are connected, please use a Camera and Video transmitter of the same voltage. E.g. if you are using a 12 volt Video Camera, please use a 12 volt Video transmitter, and connect a 12 volt power supply to the Hornet OSD Power input. **DO NOT** input more than one power supply through any of the positive pins or damage to the Hornet OSD board will occur.

Detailed description of the "Data in" port

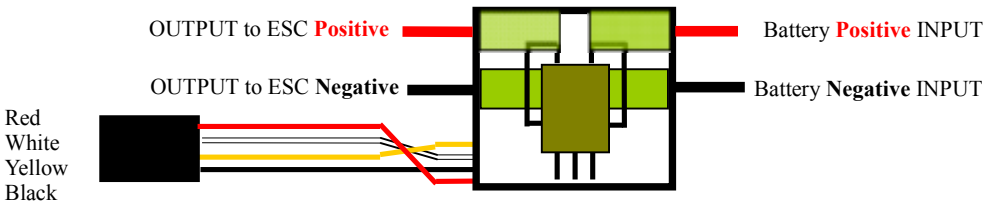
GND	FY21AP / FY31AP GND / FY3ZT GND or the GND of the GPS
+3.3V	This pin outputs +3.3 Volts to supply power to the FY GPS Receiver. **DO NOT** connect this pin to the FY21AP / FY31AP or FY3ZT autopilots.
Data TX	Connect to the "RX1" data output port of the FY21AP / FY31AP / FY3ZT or the "RX" port of the GPS module.
Data RX	Connect to the "TX1" data output port of the FY21AP / FY31AP / FY3ZT or the "TX" port of the GPS module.

CURRENT SENSOR

a) The Hornet current sensor is rated for 100Amps and 60 Volts maximum. Do not exceed this rating.

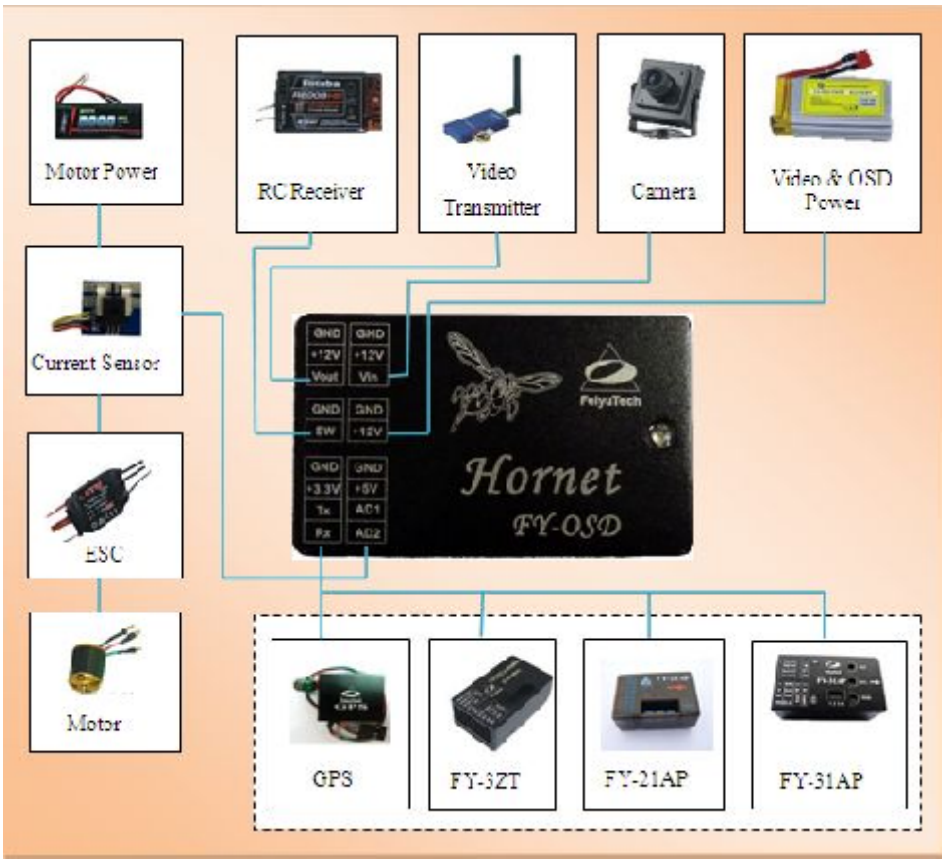


+5V	+5V power supplied to the current sensor from Hornet OSD (Yellow)
CUR AD	Connects to the current sensor data output signal (White)
ENG GND	Connects to battery negative (Black)
ENG VCC	Connects to battery positive (Red)



HORNET OSD INSTALLATION DIAGRAM

The Hornet OSD is connected to the data output port of either FY-21AP, FY31AP, FY-3ZT or the GPS module. Note: The modules in the imaginary line frame means that you can choose any one of these modules to connect to the Hornet OSD.



TELEMETRY DATA INTRODUCTION

The full telemetry data display is as follows:

1	Attitude measurement error coefficient	11	The quantity of satellite used for positioning
2	GPS speed (Unit: km/h)	12	Power battery current (Unit: A)
3	The pitch angle of the plane (Unit: deg)	13	Relative altitude (Unit : m)
4	The roll angle of the plane (Unit: deg)	14	Horizon position display
5	Current latitude and longitude of the plane (Format: “dddmm.mmm”)	15	The angle of turning to the return point (Unit: deg)
6	Total flight time (Format: “mm.ss”)	16	Course angle of flight (Unit: deg)
7	Flight mode	17	Operating temperature(Unit: ℃)
8	Distance to take-off Point (Unit : m)	18	The battery voltage of the video transmitter (Unit: V)
9	Power battery voltage (Unit: V)	19	The battery power consumed (Unit: mA / h)
10	Climb / Decent rate (Unit: m/s)		

Error Coefficient Assessment

(Attitude measurement error coefficient assessment)

1. Attitude measurement error coefficient (ECA) is an assessment of the aircraft attitude stabilization errors as measured by FY21AP, FY31AP or FY3ZT.
2. “0” value is normal, maximum value is “1000”.
3. The higher the ECA the more error in autopilot attitude stabilization controls.
4. If this coefficient continues to increase to 1000 in the flight, this indicates the autopilot does not meet the requirements of automated flight, so flight control will be transferred back to you (manual flight or RC mode).
5. This is usually caused by installations that result in high vibrations or shock to the autopilot module. You will need to check your setup to reduce vibration.

Flight Mode Display for FY21AP, FY31AP or FY3ZT

Name	Introduction
RC	Manual Flight. Autopilot deactivated.
ABM	Auto balance mode
FAF	For FY-21AP:Fixed Altitude flying mode; for FY-3ZT/FY-31AP:Air route fly mode
RTL	Auto Return Mode
ACM	Auto Circle Mode

DISPLAY MODES SELECTION

a) The OSD can be controlled to show different display information via one spare channel of your radio Rx.

b) There are 5 optional display modes controlled by the different PWM signals.

c) You can use default mode if you do not want to change the display modes.

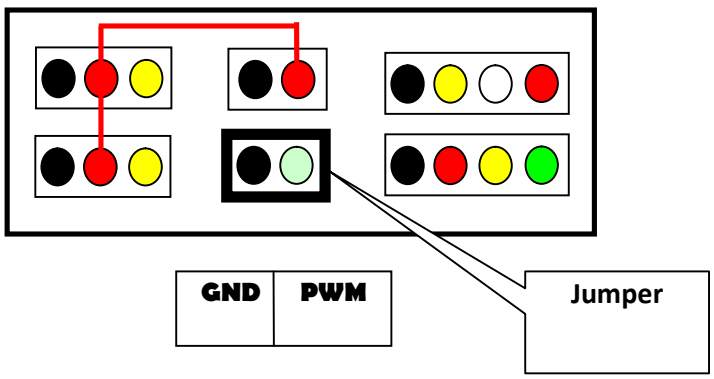
How to change the display modes:

a) You only need a 2-way switch to change the display modes.

b) Set your channel end points to output around 900μs to 1200μs for the Lower (L) signal output. And 1800 μs to 2100 μs for the Higher (H) signal output.

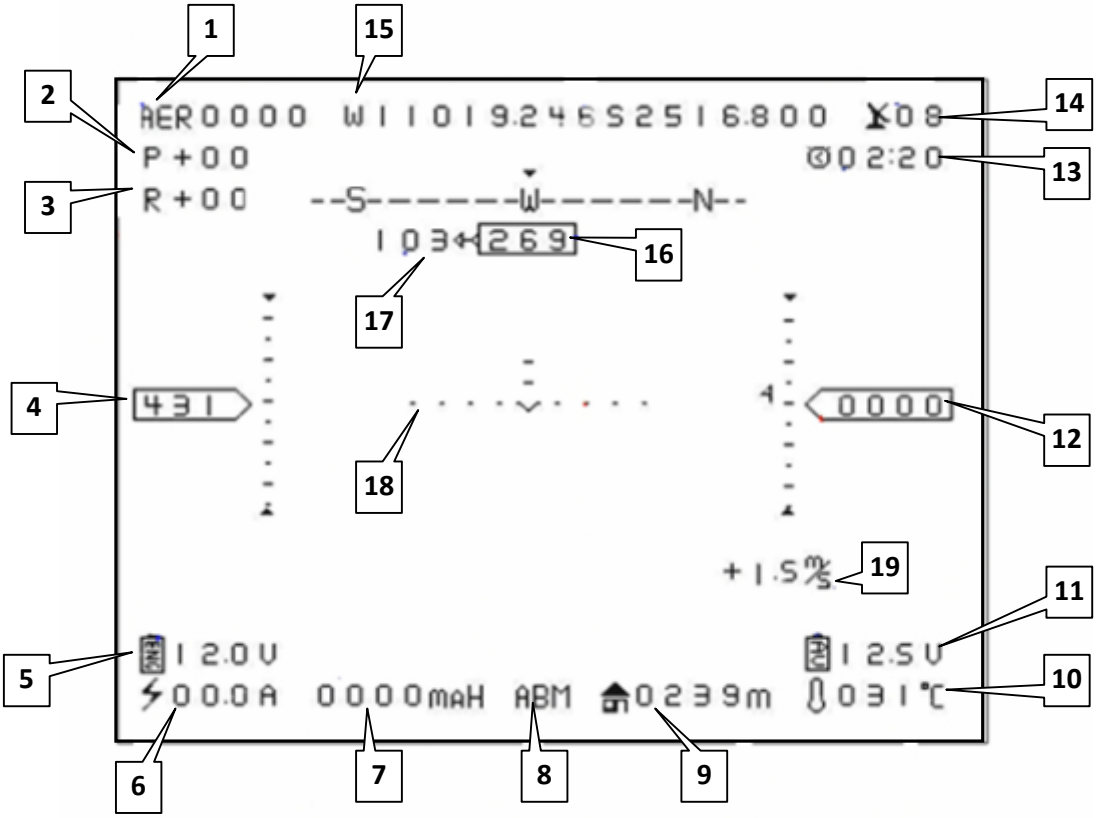
c) By toggling between (L) and (H), you will change the display mode. The last display mode you selected at power off will be the default display mode when you next power up.

d) If a jumper is installed at the SW connector, the OSD will display default Mode B.



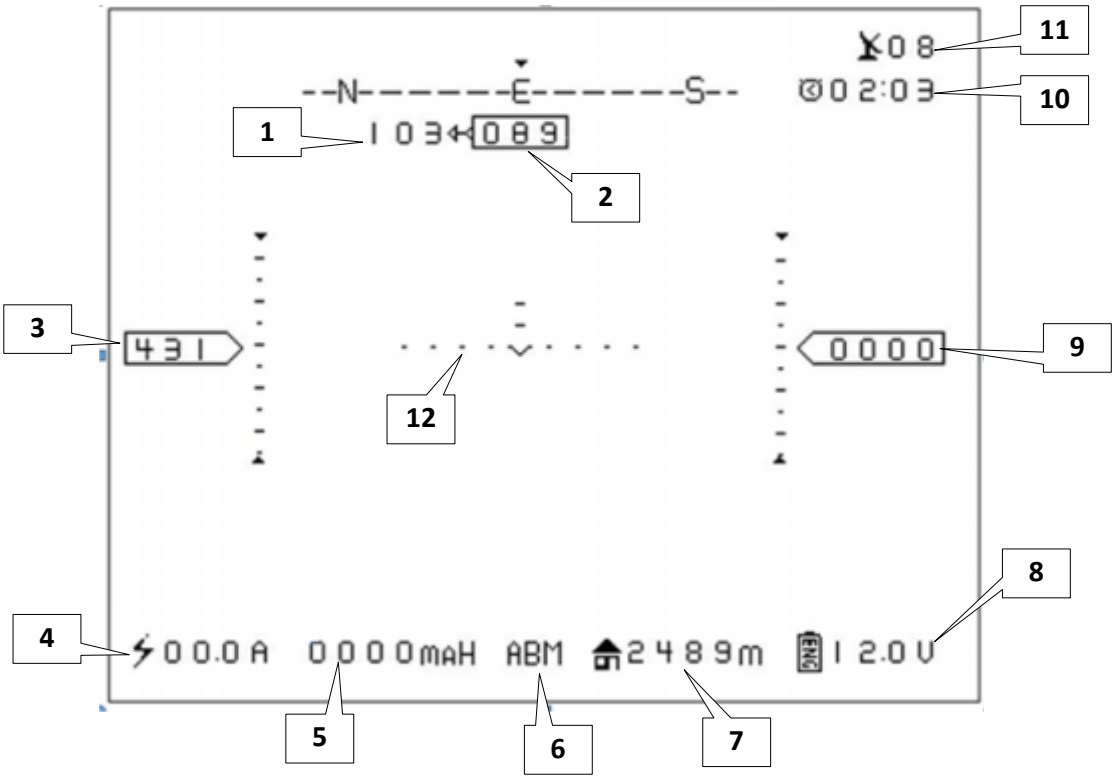
DISPLAY OPTION DIAGRAMS

a. All information displayed



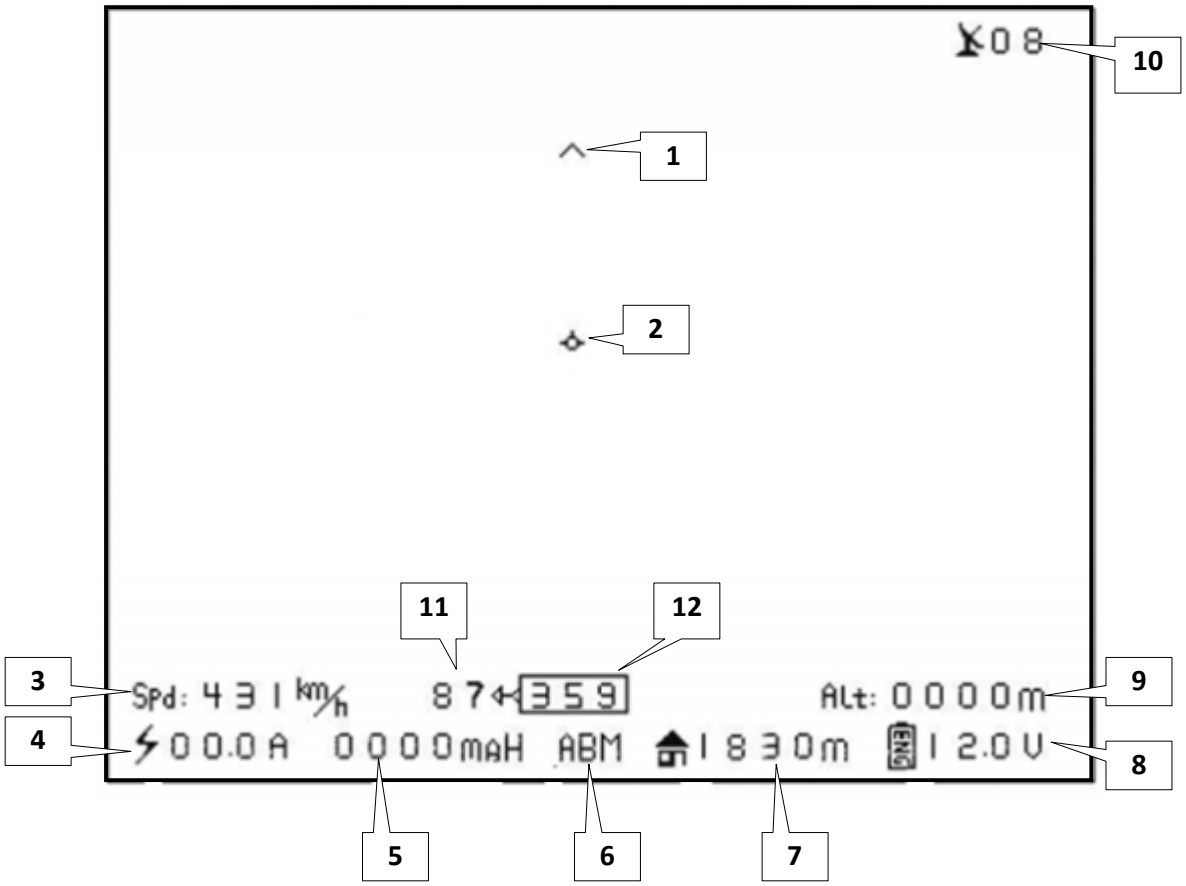
1	Attitude measurement error coefficient	11	Voltage to video transmitter (Unit: V)
2	Aircraft pitch angle (Unit: deg)	12	Relative altitude (Unit : meter)
3	Aircraft roll angle (Unit: deg)	13	Total flight time (Format: “mm.ss”)
4	GPS speed (Unit: km/h)	14	Satellites detected
5	Main battery voltage (Unit: Volt)	15	GPS Latitude & longitude (Format: “dddmm.mmm”)
6	Battery current (Unit: Amps)	16	Course angle of flight (Unit: deg)
7	Power consumed (Unit: mA / h)	17	Angle of turning to Home (Unit: degrees)
8	Flight mode	18	Artificial Horizon Indicator
9	Distance from take-off (Unit : meter)	19	Climb / Decent rate (Unit: m/s)
10	Operating temperature(Unit: Celsius)		

b. **Mode B: partial display with artificial horizon**



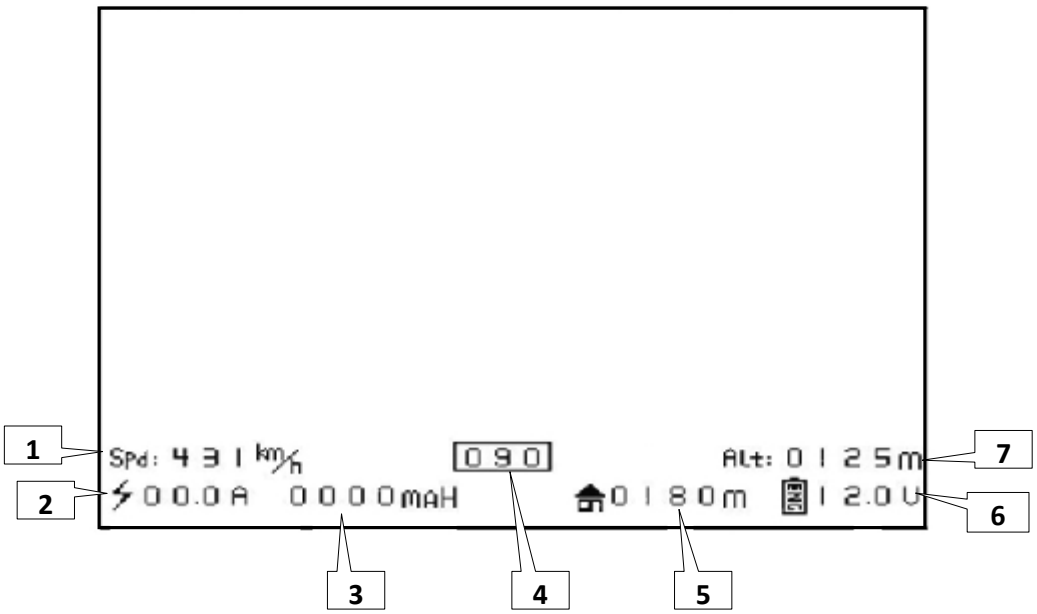
1	Angle of turning to Home (Unit: degrees)	7	Distance from take-off (Unit : meter)
2	Course angle of flight (Unit: deg)	8	Main battery Voltage (Unit: V)
3	GPS speed (Unit: km/h)	9	Relative altitude (Unit : meter) 1. Combination of autopilot barometer altitude sensor and GPS Altitude. 2. When only GPS Receiver is connected to the Hornet, GPS Altitude will be displayed.
4	Battery current (Unit: Amps)	10	Total flight time (Format: “mm.ss”)
5	Power consumed (Unit: mA / h)	11	Satellites detected
6	Flight mode	12	Artificial Horizon Indicator (only shown if connected to an Autopilot)

c. Radar positioning function



1	'Radar' aircraft Position relative to [2]	7	Distance from take-off (Unit : meter)
2	'Radar' Home position	8	Main battery Voltage (Unit: V)
3	GPS speed (Unit: km/h)	9	Relative altitude (Unit : meter) - If only GPS Receiver is connected, GPS Altitude is displayed.
4	Battery current (Unit: Amps)	10	Satellites detected
5	Power consumed (Unit: mA / h)	11	Angle of turning to Home (Unit: degrees)
6	Flight mode	12	Course angle of flight (Unit: deg)

d. **Brief Mode**



1	GPS speed (Unit: km/h)	5	Distance from take-off (Unit : meter)
2	Battery current (Unit: Amps)	6	Main battery Voltage (Unit: V)
3	Power consumed (Unit: mA / h)	7	Relative altitude (Unit : meter) - If only GPS Receiver is connected, GPS Altitude is displayed.
4	Course angle of flight (Unit: deg)		

Data recording Via Micro SD Card

Hornet- OSD can automatically record the information of FY21AP, FY31AP, FY3ZT or GPS Receiver connected to it via an inserted MICRO SD card (to be bought separately - not included in the package).

Micro SD Card Data naming

1. If no data is received by Hornet OSD, the recorded data is noted at "FEIYU***.txt".
2. " *** " is a running number from 000 to 999, for example, "FEIYU001.txt".
3. If autopilot data or more than 4 GPS satellites are detected, the file will automatically renamed after the date and time of flight (month, date, hour and minute). For example; if the date is Nov 14, eight minutes pass eight, the name will be "11140808.txt".

WAYPOINT DISPLAY

When the autopilot is in the Navigation Mode – when FY3ZT or FY31AP is flying via waypoints, the Hornet OSD will display both the letter "NAV" and intermittently the target waypoint every two seconds.

[END OF MANUAL]

Note: This manual may be updated from time to time.