

MyFlyDream
Automatic Antenna Tracker
Manual
V2.0

www.MyFlyDream.com



Notes

Thank you for purchasing the MyFlyDream Automatic Antenna Tracker (hereinafter referred to as MFD AAT).

- Please follow this manual to get familiar with the tracker and operate it correctly. The tracker is a precision mechanical and electronic device. Please read this manual carefully to avoid device damage or body injury.
- The tracker is designed for model entertainment only. Please use it in compliance with applicable local laws. The reliability and accuracy of the tracking system depend on a number of factors. A strong electromagnetic interference, bad GPS status and other reasons may cause a bad tracking result. Please consider the risk and take it yourself. Any loss caused by the tracker system is not our responsibility.
- We reserve the right to continuously improve the product performance, so this document is not necessarily in full compliance with the tracker you purchase. The latest version of this document will be available at our website:

www.MyFlyDream.com

1. System Components



1. MyFlyDream Tracker
2. USB programmer (for firmware update)
3. Heat shrinkable tubes
4. MyFlyDream TeleFlyOSD
5. M3x8mm stainless steel screw and self-locking nut
6. MyFlyDream AATDriver

2. Working Principle

In FPV flight, in order to get a better quality of video signal reception, we wish to use high-gain antenna. But the high-gain antenna is often accompanied by a narrow effective angle. MFD AAT is designed to solve the difficulty to maintain directional antenna in the best angle of reception and transmission during FPV flight.

To form a complete system, you need to mount the TeleFlyOSD module on the plane. The TeleFlyOSD reads data from the GPS on the plane, encodes and modulates the plane coordinates and height information and transmits them back via a wireless audio channel (usually use wireless image transmission audio channel).

The tracker transmits the audio signal received to the AATDriver. The AATDriver demodulates and decodes the signal to obtain the plane position information. After comparing with the original coordinates, it gets the current plane azimuth, distance and height, etc. relative to the tracker. Then the AATDriver transmits the information to the tracker that drives the internal servo to make the directional antenna aimed at the plane position.

3. Specifications

With a built-in high quality electrical slip ring, MFD AAT has the unrestrained, continuous panning capability. There is also a built-in electronic compass which makes it as a Plug-and-Play system without extra initialization.

➤ Tracker:

Weight	905g
Size	165*107*40mm (Length*Wide*Height)
Input voltage	10~13V (12V is suggested)
Current consume(empty load)	100mA
Loading capacity	1KG
Tilt range	0~90 Degrees
Pan range	0~360 Degrees without limit
Tilt speed	100 Degrees/s
Pan speed	200 Degrees/s
Spare signal channels	1~7

➤ TeleFlyOSD:

Weight (Not including the harness)	8g
Size	45 * 25 mm
Input voltage	6~13V (6V is suggested)
Current consume	200mA

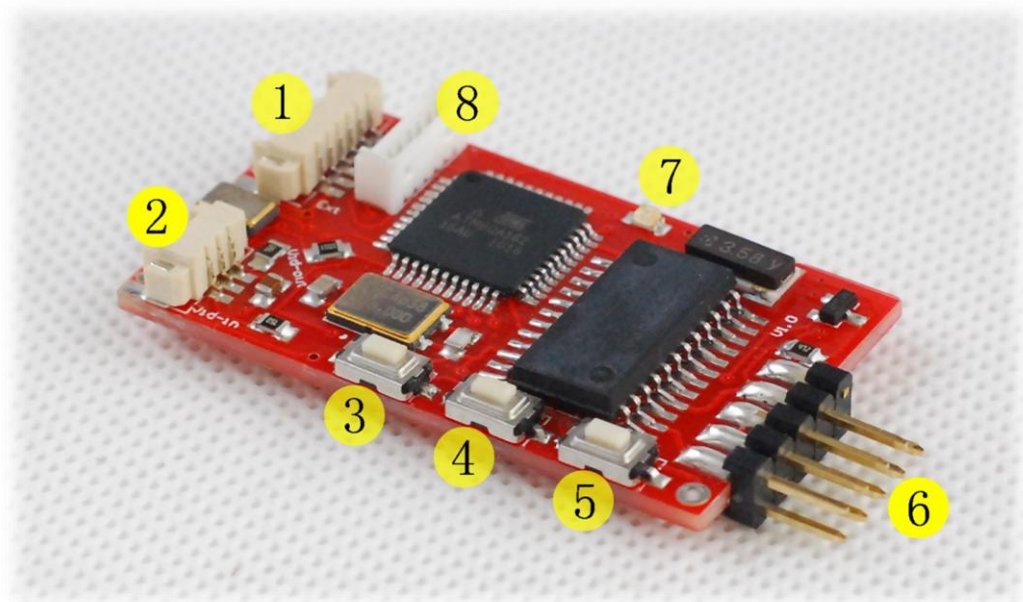
➤ **AATDriver:**

Weight	58g
Size	78*44*23mm (Length*Wide*Height)
Input voltage	10~13V (12V is suggested)
Current consume	100mA
Virtual GPS Communication baud rate	1200bps *Virtual GPS: AATDriver can virtualize itself as a bluetooth GPS module. It outputs the location information of the plane with \$GPGGA and \$GPRMC command.

4. Connection and Commissioning

1) Connecting TeleFlyOSD

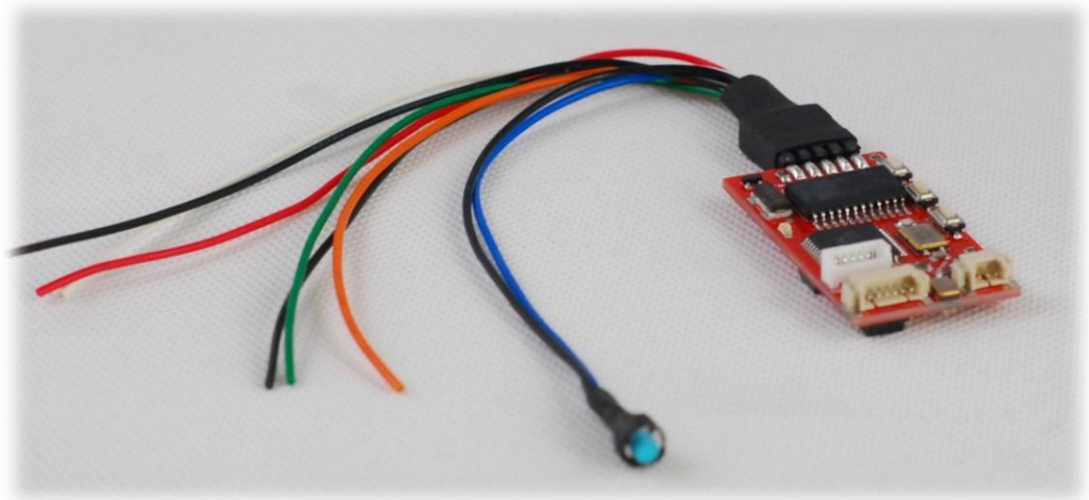
➤ **Introduction to TeleFlyOSD**



部件序号	名称
1	Extension board port
2	OSD video signal port
3	UP button

4	SET button
5	DOWN button
6	Connecting pins
7	LED
8	Firmware upgrade socket

➤ Wires color and function



颜色	名称	功能
Red	Power	Power input
Black(3 wires)	GND	Ground
Blue	SetHome	Set the tracker position
Green	GPS Data	GPS Data
Orange	GPS Power	GPS Power supply(3.3V) *
White	Audio Out	Audio output to transmitter

* Maximum current output: <80ma (13V power supply) , or < 120ma (8V power supply).

Please regard that your GPS current consumption should not exceed the limit.

➤ Connecting TeleFlyOSD

The TeleFlyOSD can either use a separate GPS or share a GPS with other OSD.

Please refer to Connection Diagram A if a separate GPS is used. In this configuration, the TeleFlyOSD powers the GPS.

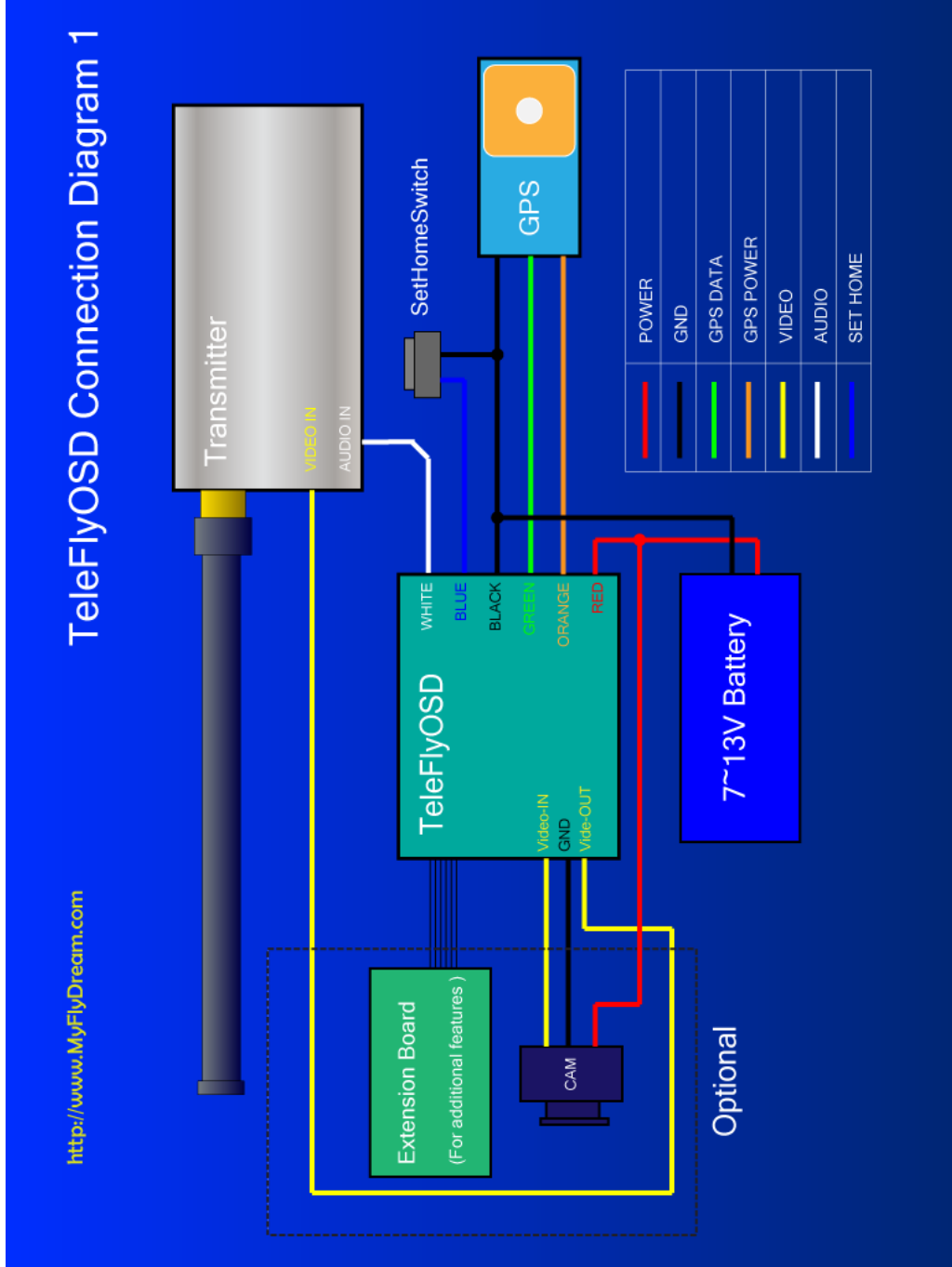
In the diagram, the operating voltage of GPS is assumed as 3.3V. If your GPS needs an operating voltage of 5V, refer to Appendix A.

Please refer to Connection Diagram B if a GPS is shared with other OSD. In this

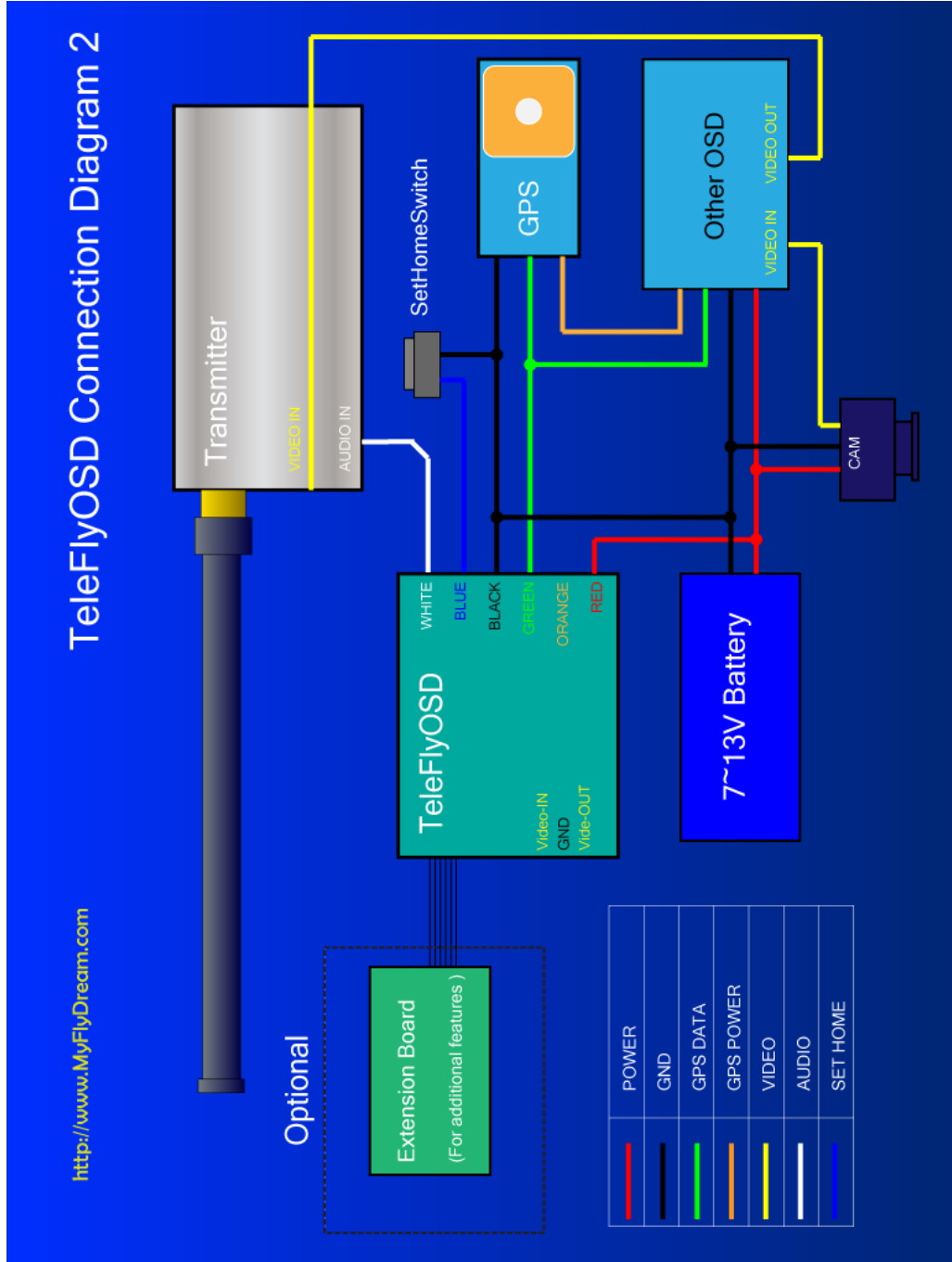
configuration, the GPS and other OSD connect as usual for power supply.

See Chapter 7 “OSD Functions” for specific OSD functions of TeleFlyOSD.

➤ **Connection Diagram A (power the GPS by TeleFlyOSD)**

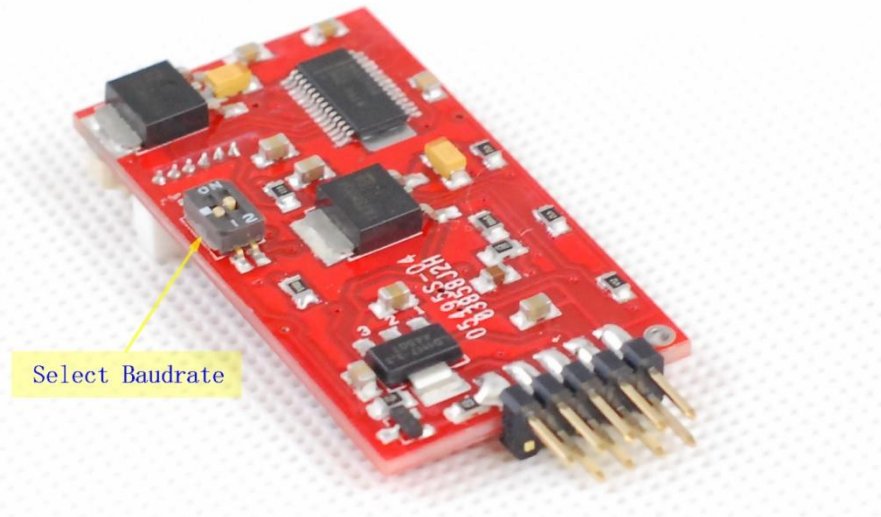


➤ **Connection Diagram B (share GPS with other OSD)**



➤ **Selecting appropriate baudrate for TeleFlyOSD**

Since the output data rate of different GPS may be different, it is necessary to set the baudrate of the TeleFlyOSD communication port directed to the GPS used. There is a two-way DIP switch on the backside of the TeleFlyOSD module used to select baudrates:



The arrow-indicated DIP switch in the figure has an ON mark above. There may be four different baudrates combinations via setting of this switch:

DIP Status(1-2)	Communication Bardrate(bps)
OFF-OFF	115200
OFF-ON	38400 (Default)
ON-OFF	57600
ON-ON	9600

Power on after checking correct connection. The TeleFlyOSD LED will turn on. After a few seconds, if the TeleFlyOSD communicates with the GPS normally, the LED will blink at half the GPS data update frequency. If the LED keeps on, check whether the GPS connection and baudrate setting are correct.

2). Mounting tracker and AATDriver

Please mount the antenna on the antenna handler of the tracker firmly. The image transmission receiver is suggested to be mounted on the antenna handler to avoid electromagnetic interference and feeder fault due to repeated bending force. Specific mounting methods should be designed according to the actual situation. The following picture is for reference only.



Connect the AATDriver to the tracker and mount the tracker on the tripod. Do not ever try to hold the tracker in hand to test it to avoid damage to the device. Three cables lead from the tracker: black 5.5mm power plug, yellow video plug and white audio plug. Connect the three cables to the corresponding jacks on the image transmission receiver. Please note that the 5.5mm power plug is directly connected to the power supply of the AATDriver. For example, if the power supply voltage for the AATDriver is 12V, the power plug output is 12V, too. If the interface specifications or power supply voltage do not match your image transmission receiver, you need some additional settings to connect them.

Finally, connect the monitor to the yellow RCA terminal of the AATDriver to view the video signal.

3).Preliminary system test

- Power on the AATDriver with 12V DC. The red LED and yellow LED on the AATDriver will fast blink for several times and then go out. Blinking for 5 times means the data output of the AATDriver is currently in MFD mode and blinking for 2 times means it is in VGPS mode. The meaning of the two modes will be explained in the following chapter “Advanced Use”.
- The tracker plays a “Beep” sound after power-on. The antenna handler turns to the elevation of 30 degrees, and the red LED (offline indicator) on the tracker blinks. That means the tracker is ready. The power indicator of the image transmission receiver on the tracker should also turn on.
- Press the TEST button on the AATDriver. The red LED on the AATDriver will turn on to indicate it is in TEST mode. If the tracker works normally, you will see the tracker turn as per the following parameters by pressing the TEST button in turn:

TEST sequence #	Azimuth	Tilt
1	0 (North)	0
2	90 (East)	30
3	180 (South)	0
4	270 (West)	60
5	(Quit test mode)	(Quit test mode)

It is recommended to conduct the above system test once before flight to ensure the tracker and driver hardware and software work properly. **But remember to exit test mode before taking off, or the tracker will not start to track.**

- Power on the TeleFlyOSD and image transmission transmitter. The red LED on the TeleFlyOSD should start to blink after turning on for a few seconds. If the image transmission transmitter/receiver channels match with each other and the data link is normal, the red RX LED on the AATDriver will fast blink. That the RX LED blinks once means a valid packet is received.
- Press and hold the SetHome button on the TeleFlyOSD. If the communication is normal, the tracker will play a “Beep...” continuous sound, indicating the origin of coordinates is under setting. After release the button, if the GPS does not lock more than three satellites at the moment, the tracker will play a rapid “Beep...Beep...Beep...” warning sound.
- If the above test steps are passed through normally, it indicates the system connection and configuration are correct and you can conduct outfield flight test.

5. How to use the AAT

- Power on all equipments and use the test button on the AAT Driver to check the tracker. Check to ensure the four pointing directions are basically correct and the red RX LED on the AATDriver fast blinks.
- It takes time for the GPS to search satellites. Wait for a while and check the GPS status according to the blinking frequency of the yellow LED on the AAT Driver. The higher the blinking frequency is, the better the GPS status is. In the best condition, the yellow LED will keep on. Check to ensure a good GPS positioning status before the next step.
- Place the plane near the tracker as far as possible and press the SetHome button on the TeleFlyOSD module for about three seconds. The tracker will play a “Beep...” sound, indicating the origin of coordinates has been set. At the same time, the red LED on the tracker starts to blink, and the antenna should pitch up to 30 degrees angle. That means the tracker stands by for tracking.
- You can manually spin the tracker towards the take-off direction while it is in the standby mode to ensure the best angle of signal reception in the take-off phase, because the tracker won't start tracking unless the plane leaves you 10 meters away.
- Take off your plane now. Once the plane leaves the tracker 10 meters away, the red LED on the tracker turns off and the tracker immediately starts continuous tracking (the track will not stop tracking even if the plane flies back to within 10 meters).

Notes:

- Check before take-off to ensure the AATDriver is not in the test mode (the red RX LED on the AATDriver will keep on in the test mode), and the tracker is not in the offline mode (the red Off-Line LED on the tracker will keep on in the offline mode). In both of these special conditions, the tracker will not track the target.
- If the downlink is broken or the GPS is in a very bad status after SetHome, the tracker will play the “Beep...Beep...” sound and the red LED blinks, warning the tracking capability has lost. In this situation, you can spin the tracker by hand towards the proper direction if necessary (pitch angle will maintain the angle before loss of signal). The system will automatically resume tracking as soon as things go well.

6. Advanced Usage

➤ Setup and operation of the tracker

There are 3 LED indicators and buttons on the right side of the tracker. From left to right, the buttons (LEDs) are:

Off-Line (Red)	North (Yellow)	Cal. (Green)
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Common functions and operations of the tracker:

Function	How to operate	Remark
Enter/Quit offline mode	Press the Off-Line button	Under offline mode the tracker stops tracking. You can manually turn the tracker the direction you need. You can press the "Off-Line" button to enter the off-line mode. The red light will be on to indicate the tracker is in offline mode. Press again the "Off-Line" button to quit the off-line mode.
Hard iron calibration	Press the Cal. button	Press the "Cal." button , the green light will be on in 2 seconds. The tracker starts to rotate for a while automatically to calibrate itself. Please wait until the green light is off, which means the calibration is done. The tracker will stay in a random direction after calibration.
North calibration	Turn the tracker in the new "north" direction and press the North button	When North button is pressed, the yellow light will blink several times, and the current alignment direction will be recorded by the tracker as North. The more the yellow light blinks, the greater the tolerance between North of the latest set and North perceived by the tracker. CAUTION: it is unnecessary to use this function in most cases.
Reset to factory	Press the Cal. Button and	After the above operation the yellow

default	then press the North button immediately within 2 seconds	and green lights of the tracker blink 5 times at the same time, which indicates that the tracker resets to the factory default settings and all the calibration data is cleared. CAUTION: If you don't press North button within 2 seconds after pressing CAL. button, the tracker will start to execute the hard iron calibration.
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Description of the tracker LED indicators:

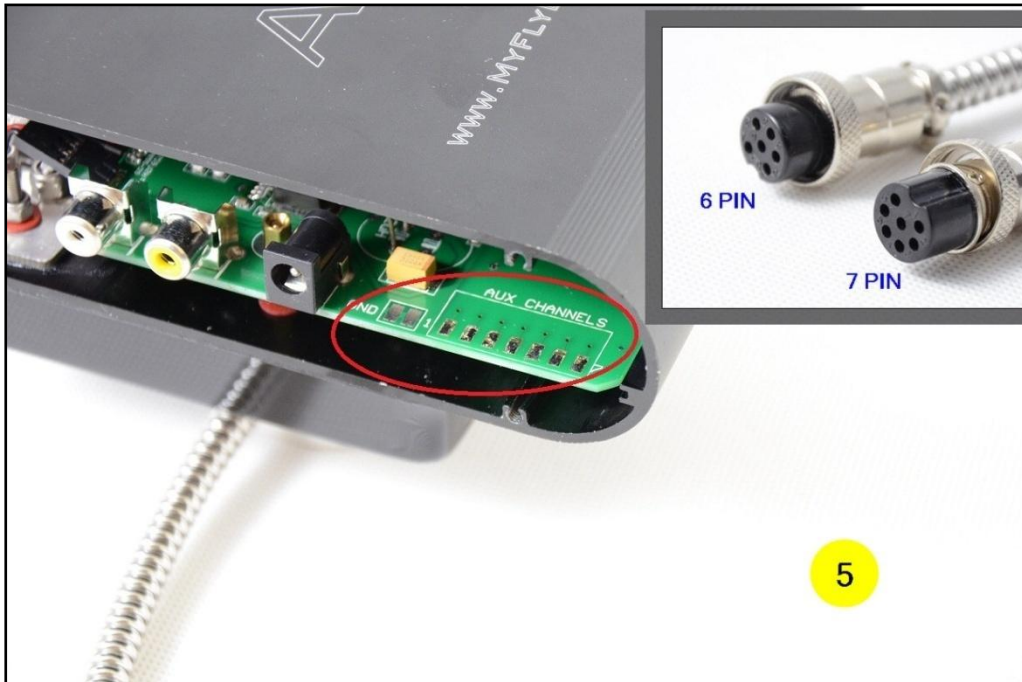
Indicator	Status	Meaning
Off-Line (Red Light)	Off	The tracker is tracking.
	On	The tracker is in off-line mode.
	Blinking	The tracker stands by. If you have set home position, the tracker will start to track once the target moves 10 meters away.
North (Yellow Light)	Blinking	The tracker is executing the North calibration.
CAL. (Green Light)	On	The tracker is executing the hard iron calibration.

➤ How to use the auxiliary channels of the tracker

There is 1 auxiliary channel available in a 6-channels tracker. And there are 7 auxiliary channels available in a 12-channels one. Users can use these auxiliary channels to transmit their own signals. For example, you put a data radio on the tracker, so maybe you need to connect the TX, RX, Power and GND from the data radio to your ground device. Use the auxiliary channels so that you can transmit the data without obstructing the tracker to rotate continuously.

To use these aux channels you must take down the left side panel. These photos show you how to take down the panel step by step:





After take down the left panel you will see there are 7 soldering pad on the PCB. They are numbered from 1 to 7.

A 6 channels tracker has only a 6 pin plug. The Aux Channel 1 maps to PIN#3 of the plug.

A 12 channels tracker has a 6 pin plug and a 7 pin plug. The 6Pin plug is used to connect to AATDriver. PIN#3 of the 6 pin plug is a null pin. The Aux Channel 1 to 7 map to PIN#1 to PIN#7 of the 7pin plug.

CAUTION: The maximum current allowed for each channel is 2A. Don't exceed this limit or the slip ring will be damaged.

➤ Setup and operation of the AATDriver

Common functions and operations of the AATDriver:

Function	How to operate	Remark
Toggle between MFD mode and VGPS mode	Hold down the HOME button to power on	After power on, the yellow LED or the red LED of AATDriver will blink rapidly. The rapid blink of the yellow LED indicates that the current mode is VGPS mode, the blinking red one indicates the MFD mode.

		<p>Power off and then power on again, AATDriver starts work with the new mode.</p> <p>Every time you power on with holding HOME button, AATDriver will toggle between the two modes</p> <p>Every time power on in a normal state, the yellow and the red lights of AATDriver will blink several times. 2 times is currently under VGPS mode, 5 times is currently under MFD mode.</p>
Set the origin coordinate for tracking	Press the Home button	The current coordinate of the aircraft will be recorded as the origin. The tracker needs a origin to track.

Description of the AATDriver LED indicators:

Data mode	Baudrate	Remark
RX (Red Light)	Off	No data received.
	On	It is currently under test mode.
	Blinking	Downlink data is received successfully .
GPS (Yellow Light)	Off	GPS is not fixed.
	On	GPS is in a perfect status. (10 or more satellites are locked)
	Blinking	<p>Indicating GPS status. The faster the blink frequency, the more satellites locked. The relationship between the blink frequency and the number of the locked satellites:</p> <p>0.5HZ: 1 ~ 3 satellites 1HZ: 4 ~ 5 satellites 2HZ: 6 ~ 7 satellites 5HZ: 8 ~ 9 satellites</p>

➤ Connect AATDriver to external devices

The AATDriver has a built-in Bluetooth module. So you can connect your laptop or mobile devices to the AATDriver to view and record the real-time flight data. The Bluetooth password is set to "1234".

The AATDriver has two data output modes: MFD mode and VGPS mode.

Data mode	Baudrate	Remark
MFD	1200bps	The AATDriver outputs data to external device with 5HZ rate in MFD mode.

		MFD protocol contains more information about the plane than VGPS mode. You can use the ground station software provided by MyFlyDream to check the data. Currently it runs on the J2ME platform (need JSR82 support). The android version is also coming soon.
VGPS	1200bps	The AATDriver outputs data in GPS format (only \$GPGGA and \$GPRMC sentence, a subset of the NMEA 0813 protocol). With a variety of navigation software or GPS software you can check the plane's track and coordinates. VGPS mode has better compatibility with most hardware and software.

- View flight information with your iPad:
 1. You must jailbreak your iPad to connect to the AATDriver.
 2. Install the MotionX HD software.
 3. Install the BTStack GPS software and connect the AATDriver after discover it (make sure the AATDriver is in VGPS mode). The connection password is 1234. The BTStack GPS should be able to correctly read coordinates from the AATDriver.
 4. Press the "HOME" key on iPad and then run the MotionX HD to check and record the flight path data of the plane.
 - The Android system has software similar to BTStackGPS to help connect your cellphone to external Bluetooth GPS, e.g., BluetoothGps.
 - Here are some screenshots of the MotionX running on the iPad:



- View flight information with the ground station software FDStation of the J2ME:
FDStation is a J2ME program. Your cellphone must be compatible with CLDC 1.1

and MIDP 2.0, and also support the Bluetooth API (JSR 82) to run it.

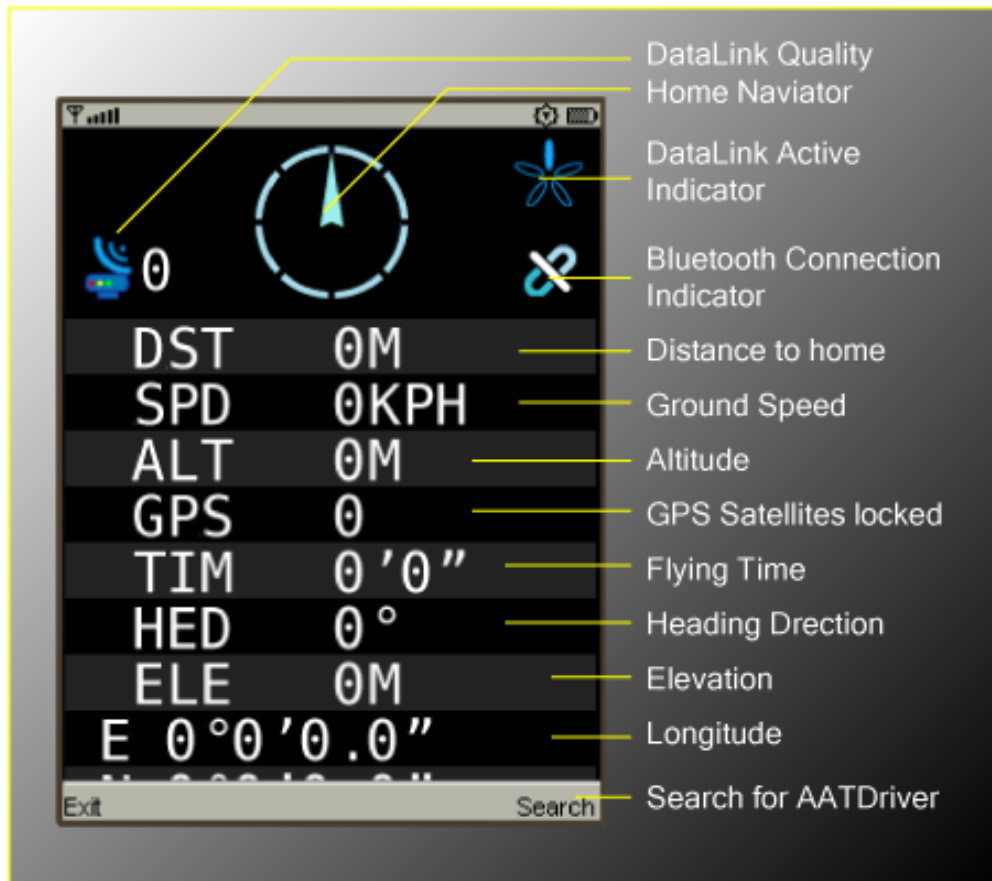
The FDStaion software can be downloaded from:

<http://www.myflydream.com/Help1.aspx>

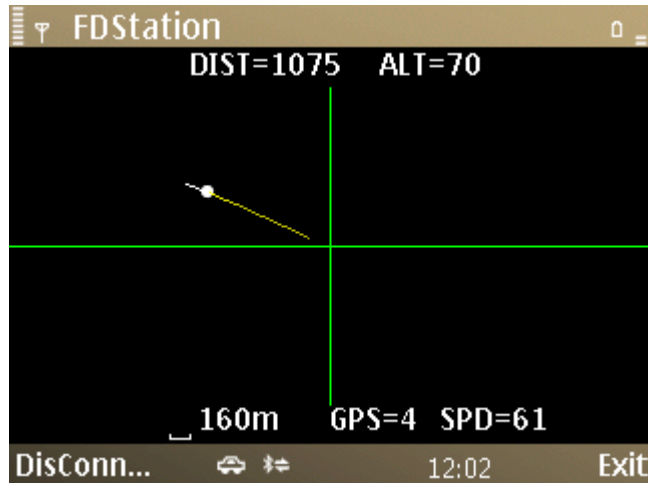
After installing and running the software, search for the AATDriver and use 1234 as password to establish a connection.

Here are some screenshots of the FDStaion software:

DataView :



PathView:



Keys definition of the FDStation software:

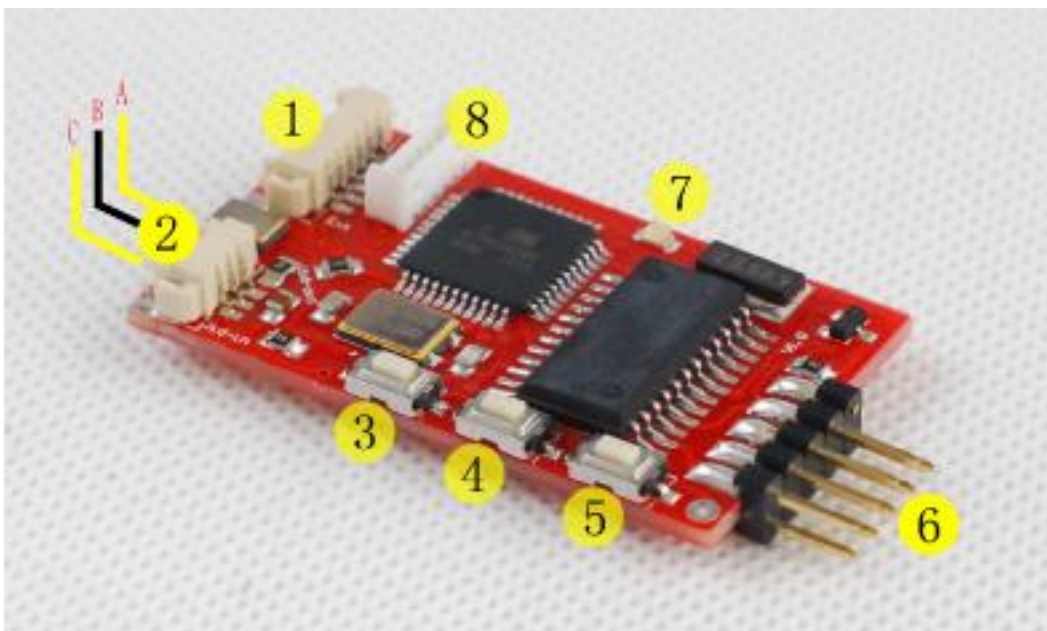
- Left: Toggle between DataView and PathView
- Right: Rotate the screen 90 degrees in DataView
- Up/Down:
 - Scroll the screen in DataView mode
 - Zoom in/Zoom out in PathView mode

7. OSD Functions

The TeleFlyOSD provides OSD functions that can overlay the flight information on the camera videos. See "Connection Diagram A" in Chapter 4 for specific connection.

The three pinouts of the OSD video signal interface (part No.: 2) in the following picture are defined as follows:

A (Video In)	B (Gnd)	C (Video Out)
Video input (Connected to the camera)	Ground	Video output (Connected to the AV Transmitter)

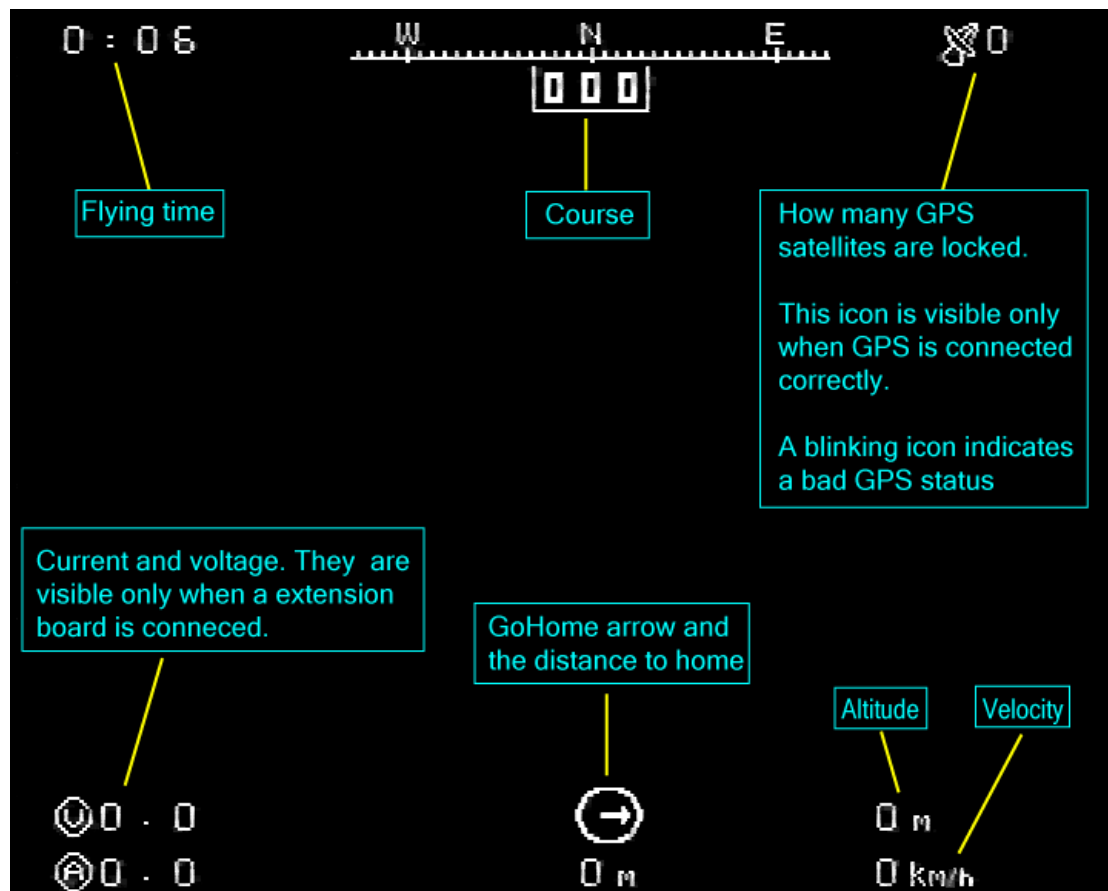


There are invalid Vid-in and Vid-out marks on the TeleFlyOSD PCB of some batches. The above description shall prevail.

Purpose of the three buttons numbered 3, 4 and 5 in the picture:

Part #	Name	用途
3	UP Button	Select the previous item
4	SET Button	Enter a menu list, Or change the current item
5	DOWN Button	Select the next item

If the system is connected properly, you can see the following pictures on the video monitor after the TeleFlyOSD is started.



The reading meaning of various parts in the picture has been marked.

Each time you press the “SetHome” button, the flying time is reset to 0.

Before you press the “SetHome” button, the distance to home is not available and displayed as N.A.

By pressing the “UP” switch, you can enter to view the GPS status data interface.

By pressing the “DOWN” switch, you can enter the interface without OSD data displayed.

By pressing the “SET” switch, you can enter the following interface of system options:

SYSTEM OPTIONS

- 1 .VER OFFSET : 1
- 2 .HOR OFFSET : 3
- 3 .COMPACT MODE
- 4 .RETURN

To change options, use the "UP" and "DOWN" buttons to move the marker to the appropriate option and press the "SET" button.

Options menu:

Item	Remard
VER OFFSET	Press the SET button repeatedly, and VER OFFSE value will vary between -16 to 15, the whole OSD screen picture moves the corresponding pixels in the vertical direction.
HOR OFFSET	Press the SET button repeatedly, and HOR OFFSE value will vary between -16 to 15, the whole OSD screen picture moves the corresponding pixels in the horizontal direction.
COMPACT MODE	Press the SET button to enable or disable the COMPACT MODE. The OSD picture will occupy one less row in COMPACT mode. Enable this option when your monitor is not able to display the whole OSD picture.

7. FAQ

1). Q: When do I need to make the hard iron calibration?

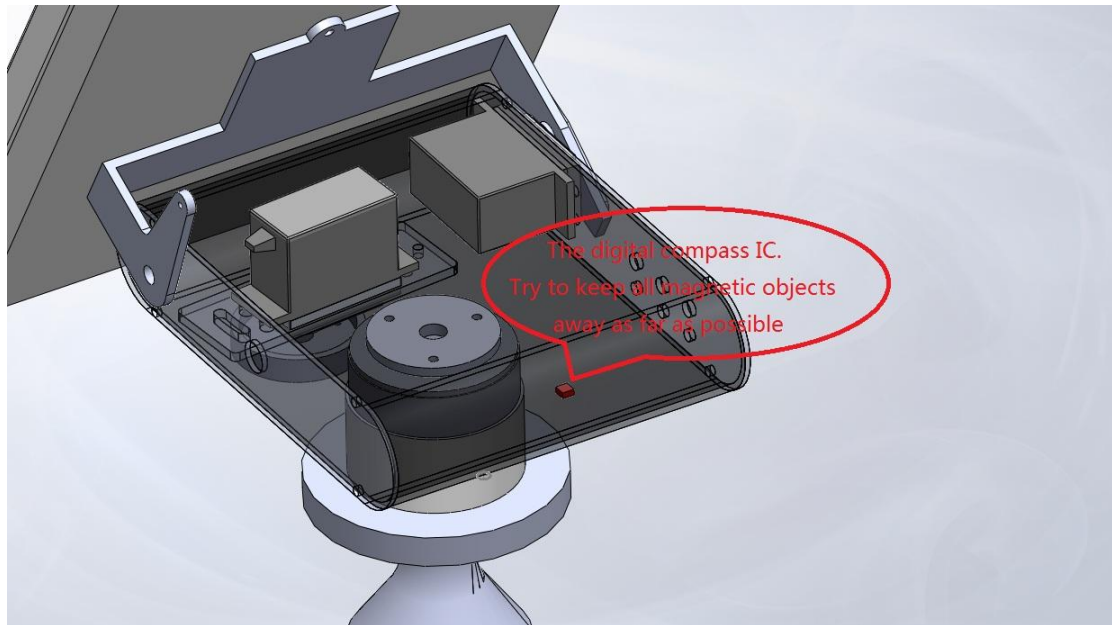
A: When you change the load settings on the tracker, or feel the accuracy of the tracker is not ideal, you may try to make a hard iron calibration. This is because it is simple, fast, and can be cancelled at any time by restoring the factory settings. If you know some principles of the hard iron calibration, it will help you better use this feature.

You may already know that the tracker relies on the internal electronic compass to determine its own direction so as to align the azimuth of the plane. The intensity of the earth magnetic field is very weak and varies dependent on the region, which is generally about 0.6 gauss. And the various electronic devices and ferromagnetic substances in the tracker may generate magnetic fields sufficient to affect the accuracy of the tracker, e.g., the steering gear and built-in motor using permanent magnet. Magnetic fields generated by the load users apply on the tracker, e.g., image transmission receiver and panel antenna, may also affect the accuracy of the tracker.

In the process of hard iron calibration, the tracker spins and analyzes the intensity of the magnetic field around the sensor. Because the steering gear or the electronic circuit generates different magnetic field and geomagnetic field, and they spin with the sensor, we have ways to separate the parameters disturbing the magnetic field in the spinning process to compensate the future sensor data and obtain better tracking accuracy. So whenever you add a device to the tracker, it is necessary to make a hard iron calibration.

You may see from the above that some magnetic interference cannot be corrected even by the hard iron calibration. For example, there is a ferromagnetic substance on the tripod. Since it does not spin with the tracker, the tracker will always regard the magnetic field it

generates as a part of the geomagnetic field in the calculation. So try to prevent the ambient ferromagnetic substances disturbing the tracker to affect its accuracy.



2). Q: When do I need to make the true north calibration?

A: Basically there is no such time. The true north calibration is originally designed to provide a means to correct the error caused by the magnetic declination. If all aspects are normal, it is usually unnecessary to make the true north calibration. General users should not use this feature.

3). Q: How to make the data downlink more reliable?

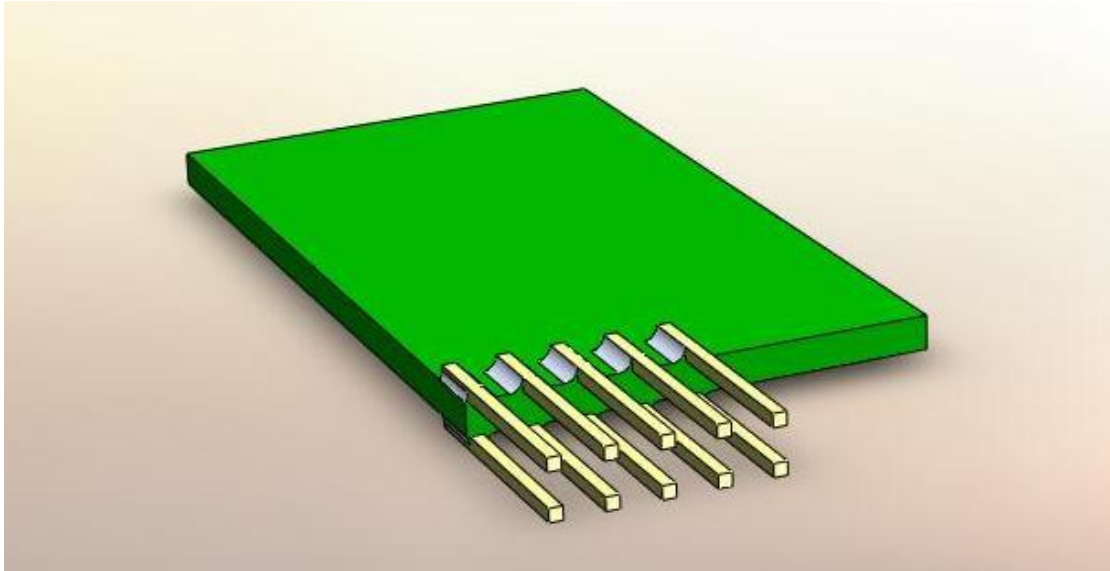
A: MFD AAT uses the audio channels to transmit data. A clean noise-free audio channel with appropriate level can make the data transmission more reliable. It is suggested the peak-to-peak value of audio output level of the image transmission receiver should be preferably within 1~2V. If there is a microphone and amplifier circuit attached to the transmitter, you need to remove them to get the best results.

8. Related Resources

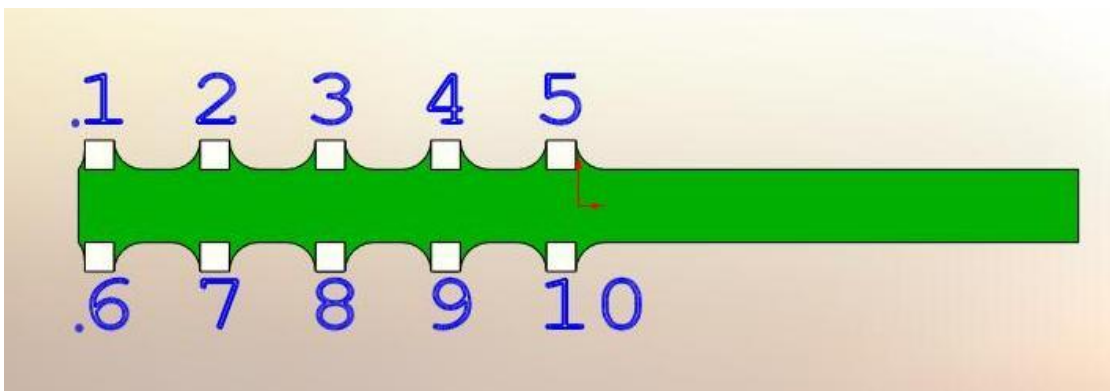
- MyFlyDream website: www.MyFlyDream.com
- The Post discussing the tracker on RCGroups.com:
<http://www.rcgroups.com/forums/showthread.php?t=1159128>
- Tracking demo video of the tracker:
http://v.youku.com/v_show/id_XMjU4OTI0NzQ0.html

Appendix A: Pins and Functions of TeleFlyOSD

There are two rows of pins spacing 2.54mm (0.1inch) at one end of the TeleFlyOSD.



The pins are numbered as follows:



PIN #	Color of the Wire	Name	Remark
1	White	Audio output	connect to the audio input of the AV transmitter
2	Black	GND	Connect to negative pole of the battery
3	Black	GND	Connect to negative pole of the battery
4	N/A	+5V output	Used to supply power to a 5V GPS.
5	N/A	Null	Used for avoid a misconnect.
6	Red	Power supply	Connect to 6~13V DC power
7	Blue	SetHome	Connect to the SetHome Switch
8	Black	GND	Connect to negative pole of the battery

9	Orange	3.3V output	Used to supply power to a 5V GPS.
10	Green	Data Input	Connect to the GPS data output

Appendix B: Connection Diagram of Some Common GPS Modules

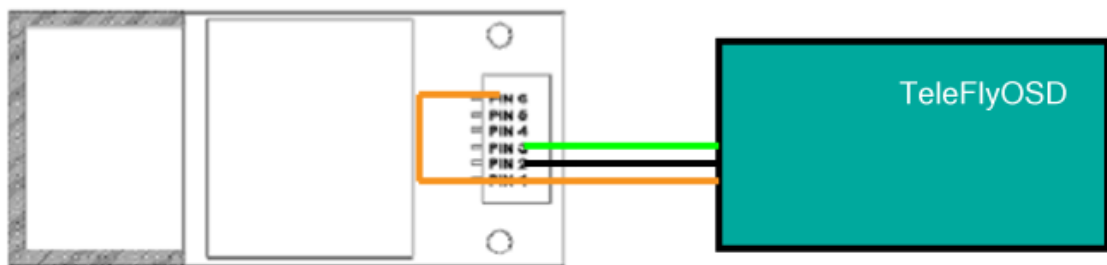
➤ LS20033

LS20033



PIN#	Name	Description
1	VCC	3.3V Power input
2	GND	Ground
3	TX	Data output (TTL level)
4		
5		
6	VBackup	Backup battery supply voltage

● Connection Diagram

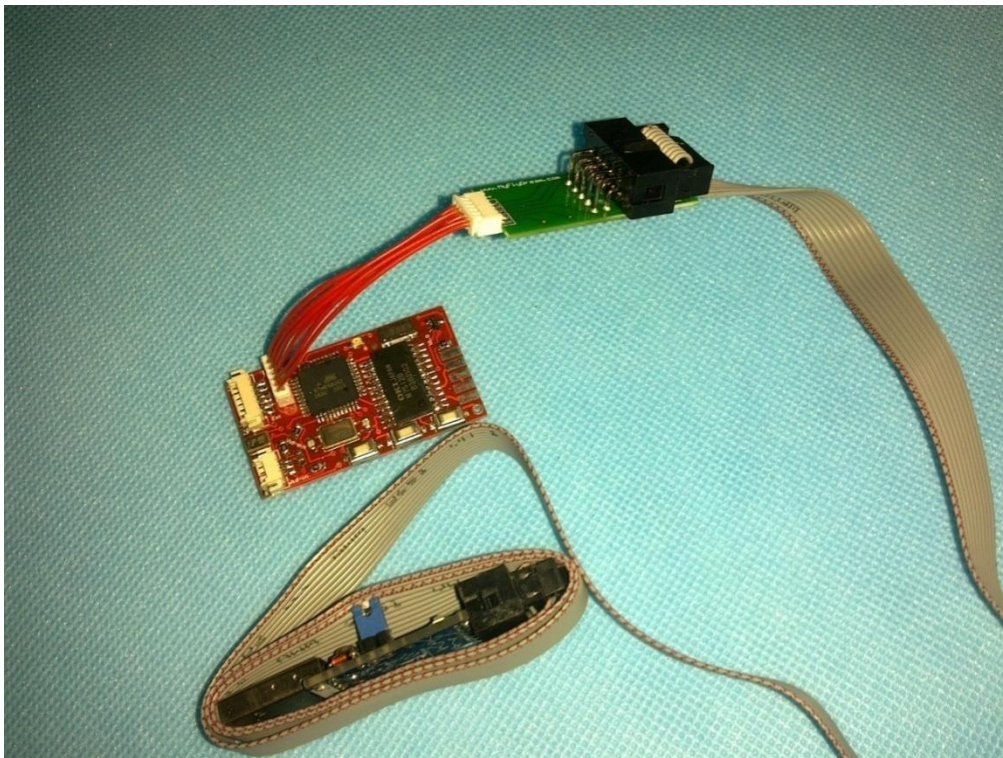



CAUTION: GPS PIN#1 and PIN#6 MUST be connected to +3.3V. This GPS doesn't work without PIN#6 connecting to VCC.

● Current Consume: < 70ma

Appendix C: TeleFlyOSD Firmware Update Steps

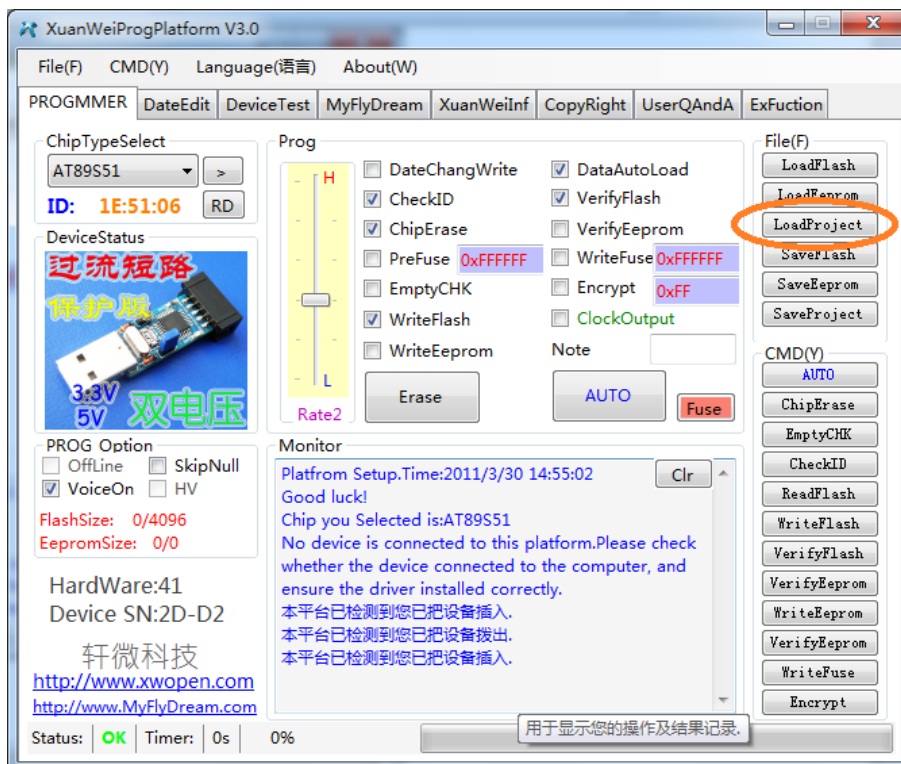
- Download programs and firmware packages required for update from <http://myflydream.com/Help1.aspx>
- Connect the USB programmer to the update socket of the TeleFlyOSD:



- Run this file:  轩微编程器控制平台.exe
- Insert the USB programmer into the computer and wait for the driver to automatically update. Please allow the appropriate permissions of the firewall. After the driver is successfully installed, you can see the program interface change from gray to coloured.



- Click the LoadProject button to open the firmware to be updated, e.g., TeleFlyOSD_v1_1.xwpprj.



- Click the "AUTO" button and wait for about 20 seconds until the update is done.

