

Simplified Method to Modify the Jumper T-Pro OpenTX Transmitter for Mode 1 Stick Configuration

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Abstract— The Jumper T-Pro Transmitter is a low-cost OpenTX transmitter that supports a variety of radio-control protocols. It comes preconfigured for mode 2 stick configuration. The instruction manual provides that the controller can be switched from mode 2 to mode 1. However, the reference only makes cursory mention of the need to swap gimbals without necessary details on how this is done. The procedure is not difficult, yet it is important to understand the necessary steps and potential complications to avoid damaging the unit. Once the hardware modifications have been made, the Jumper T-Pro firmware configuration proceeds according to supplied documentation.

Index Terms— Jumper T-Pro, mode 1, gimbal swap

I. INTRODUCTION

The control of UAVs typically involves a remote control unit with two gimbals for controlling thrust, yaw, pitch, and roll of the aircraft. These controls are mapped to the four axes of the two sticks. There are two common ways to do this.

Mode 2

The most common is called mode 2. Mode 2 maps thrust to the forward-backward motion of the left gimbal and yaw is mapped to the left-right movement. Pitch is controlled with the forward-backward movement of the right gimbal, and roll the left-right movement.

Mode 1

The second most common gimbal mapping is called Mode 1. In mode one, the thrust and pitch are reversed. Pitch and yaw are controlled by the forward-backward and left-right axes of the left gimbal respectively, while thrust and roll are found on the forward-backward and left-right movement of the right gimbal respectively.

Changing Modes

Switching modes requires the remapping of the pitch and thrust controls of the aircraft. To move from mode 2 to 1, thrust must be remapped to the right gimbal and pitch to the left. Yaw and roll remain unchanged.

If the two gimbals operate the same, this can typically be accomplished entirely through configuration settings on the transmitter and aircraft. However, it is also common that pitch, roll, and yaw are all spring centered. This means the stick returns back to the center position when not moved by the operator. Thrust is often not spring centered and must be continually held in the correct position by the operator. If the transmitter is configured without a thrust spring, then when the modes are changed through configuration settings alone, pitch becomes free movement while thrust is now spring centered. To correct this, the gimbals must be changed.

With some settings the vertical gimbal spring on the right gimbal is simply moved to the left gimbal when moving from mode 2 to 1. However, with the Jumper T-Pro, it is advised to swap both gimbals, moving the spring center gimbal from the right to left position.

II. MATERIALS AND METHODS

Equipment

The following equipment is used:

- Jumper T-Pro RC Controller
- Small Phillips Screw Driver
- Tweezers

Figure 1. Jumper T-Pro RC Controller



Setup

The reference manual for the transmitter calls for the left and right gimbals to be swapped.[1]

Step 1 – Remove the Rubber Grips and Batteries

Figure 2 shows the two rubber grips on the back of the controller. It is necessary to remove these grips in order to access some of the screws. There are arrows pointing to a small slot between the grip and the transmitter body in the upper

inside corner of each grip. Gently insert a screwdriver into this slot and pry up the grip.

Figure 2. Rubber Grips



The grip material is soft and easily flexes as it is removed.

Step 2 – Remove 8 Cover Screws and Cover

Figure 3. Cover Screws



On the back of the unit, there are 8 screws. These are shown by the red arrows in Figure 3. Remove all eight of these screws. Once these are removed, the two halves of the case can be separated. The controls and CPU on the front half are connected by wires to the internal transmitter and controls which are located on the back half. Be careful not to tug on any of these wires or pull the connectors out of the sockets.

Step 3 – Remove the Gimbals

Figure 4. Gimbal Screws



The gimbal is mounted with three screws in three of the four corners of the gimbal. The mounting screws are shown by the red arrows in Figure 4. Carefully loosen the screws and then use the tweezers to remove them.

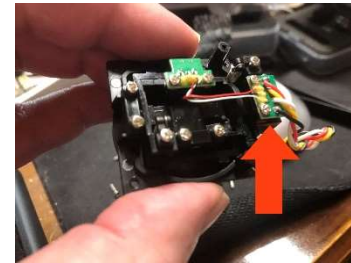
There is one wiring harness connector. This is shown by the green arrow. Gently remove the plug by rocking it gently from left to right until it frees up and comes out. Do not pull on the wires themselves to prevent damaging them.

Step 4 – Move the Left Gimbal to the Right Hole and Vice-Versa.

When swapping the gimbals, note that the wiring harness is attached to one side of the gimbal. This connection is shown by the red arrow in Figure 5. It must always be placed on the inner

side of the transmitter. When you move the left transmitter to the right side, it becomes inverted. What was forward is now backwards. Any trim settings that had been saved must be recalibrated. Before and after the swap, both wiring harness connectors should be on the inside closest to each other.

Figure 5. Gimbal Wire Harness



Step 5 – Replace the Cover and Screws

The two halves of the transmitter can now be reassembled. Fasten the 8 screws removed in step 2. Replace the batteries and the rubber grip battery covers removed in step 1.

III. RESULTS AND DISCUSSION

Verify Gimbal Operation

The mode must also be configured in firmware. This is done with the Radio Setup screen. To access this setup screen, long press the MDL button, also referred to in the documentation as SYS[2].

Figure 6. Changing Mode Setting



The radio setup screen is on page 3. Scroll down until you find the mode option shown in Figure 6 after the red arrow. Change this setting to mode 1. The rudder, elevation, throttle, and aileron indicators show the corresponding stick positions.

Figure 7. Channel Monitor Shows Right Gimbal Linked to Thrust



The operation of the gimbals can now be viewed using the channel monitor screens. Use the back arrow button, referred to as Tele in the documentation, to return to the top-level screen. Channel monitor screens can be used to monitor the gimbal

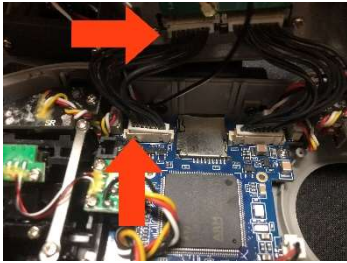
operation. In Figure 7, the right gimbal is linked to the throttle gimbal swapped in the procedure.

Gimbal Calibration

The documentation says that calibration is not necessary as the remote is factory calibrated. However, this is inconsistent with the results found. Maximum, minimum, and center stick positions were observed to be inaccurate. A hardware calibration was necessary after the procedure. The stick hardware calibration setup screen can be accessed by returning to the top-level menu and long-pressing the MDL button to enter the setup screen pages. Hardware calibration is on page 6.

Disassembly and Assembly Care

Figure 8. Care During Handling



Special care must be observed when disassembling and assembling the unit. The wires are quite thin and can be easily damaged. In addition, connectors must remain firmly seated. Figure 8 shows that two connectors appeared to be incompletely seated. This condition likely predates the modifications made in this document; however, it shows how important it is to handle the unit gently while working on it.

Conclusions

The Jumper T-Pro can be reconfigured for mode 1 operation. The ease of the required modifications depends on the level of skill of the person making the changes with the assembly and disassembly of electronic gear. While not technically challenging, some may find it beyond their level of comfort. The documentation is not precise, and it is therefore necessary to move slowly, taking care not to damage delicate wiring or loosen connectors. Once the hardware modifications are made, stick recalibration was a necessary step in the process. But once this was done, and the mode setting were changed, the controller functioned as expected in mode 1.

IV. REFERENCES

- [1] Jumper Technology Limited, "JUMPER LA0256 T-Pro OpenTX Hall Sensor Gimbal Remote Controller User Manual," Manuals+ -- User Manuals Simplified, May 5, 2022. [Online]. Available: <https://manuals.plus/jumper/la0256-t-pro-opentx-hall-sensor-gimbal-remote-controller-manual>
- [2] Jumper Technology Limited, "T-PRO Quick Start Manual," T-Pro | Jumper-rc, December 20, 2021. [Online]. <https://www.jumper-rc.com/products/transmitters/t-pro/>

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