Snelflight Hoverfly

How to Buddy-box the Hoverfly

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We get asked form time to time how to fly the Hoverfly with buddy boxes. This is a natural enough question since the Hoverfly is a trainer, but of course basic Hoverfly operation already makes use of the buddy-box socket so it's not obvious how to go about it. There are a couple of ways:

The simplest method is to make up a two-way connecting lead (a 'Y' lead), so that two transmitters can be connected to the Hoverfly at the same time. A switch needs to be included in the wiring, for selection between the two transmitters. Fig. 1 below shows the idea:

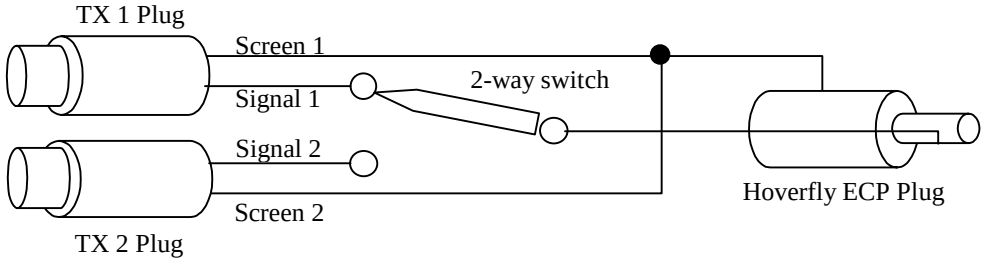

Fig. 1

The switch needs to be physically mounted on the instructor's radio, so that he/she has control over it. Normal practice is to use a 'momentary' (non-latching) switch, so that the instructor only has to release it to retake control.

This method has the great advantage that it is easy to do. The device can be made up by cannibalising two standard Hoverfly leads; the correct TX plug pins will then already be wired. Alternatively, the thing can be made up from scratch, in which case we will be happy to supply information as to the correct TX plug pins to use. A further advantage of this scheme is that the transmitters don't have to be of the same make, provided that the Hoverfly Patch Socket connections are the same for each. That rules out mixing Futaba with JR, but Futaba could be mixed with Hitec, and JR could be mixed with some Sanwa radios. It goes without saying that each radio must be set up appropriately for the Hoverfly.

The drawback to the above is that it doesn't allow the instructor to transfer partial control to the student, a useful feature of some computer radios. It's also a bit clumsy with the separate switch which has to be attached somehow.

An alternative method is possible if the instructor's transmitter has a removable RF pack. Most computer radios do, and these are the only ones which have partial-control buddy box systems anyway. The method is as follows:

Firstly, remove the RF pack from the instructor's radio, which will expose a row of (usually 5) pins. These carry power and the un-modulated PPM control signal into the RF pack, and the all important RF signal back out again so that it can be transmitted from the antenna. It is now necessary to identify the pin carrying the PPM signal, and also the pin carrying ground. These will often be next to each other, and located at one end of the row or the other. However, there is no guarantee of this, and the only way to be

sure is to use an oscilloscope to examine the electrical waveforms present on each pin. In order to do this, it will be necessary to find the ground pin first. It will generally be connected to the negative battery terminal, so it can be found with a multimeter set for low resistance testing. WARNING: A DIGITAL MULTIMETER SHOULD BE USED, BECAUSE THESE TYPES USE A LOW VOLTAGE FOR RESISTANCE TESTING SO THERE IS NO RISK OF CAUSING DAMAGE TO THE RADIO. OLDER ANALOGUE METERS OFTEN USED 9 VOLTS OR MORE FOR RESISTANCE MEASUREMENTS, AND THIS COULD CAUSE HARM.

The ‘scope probe ground clip should be connected to the ground pin once found. The other pins can then be checked one at a time. The PPM signal comprises a series of narrow pulses spaced about 1.5ms apart, and its pin will normally be the only one with anything non-d.c. going on. The PPM signal pin is usually driven by an open-collector output, which means that a pull-down resistor is needed in order to see the signal. I recommend using a resistance value of 1k ohm for this. The resistor should be connected between the pin being ‘scoped, and ground. I haven’t yet come across a radio which needs a pull-up resistor instead of a pull-down, but that’s not to say there aren’t any! One of the pins carries power, so if necessary the resistor can be connected to this instead of to ground. Try this if you can’t find the signal using a pull-down resistor.

A note of caution: Take care when poking around these pins, not to create any shorts (with the ‘scope probe, for instance). The power pin is connected directly to the battery, and will be pretty unforgiving if shorted to ground. Likewise, the open collector PPM signal output may be damaged by a short. Take care!

Having identified the signal and ground pins, you should now make up a lead to connect them to the Hoverfly control box, as in Fig 2:

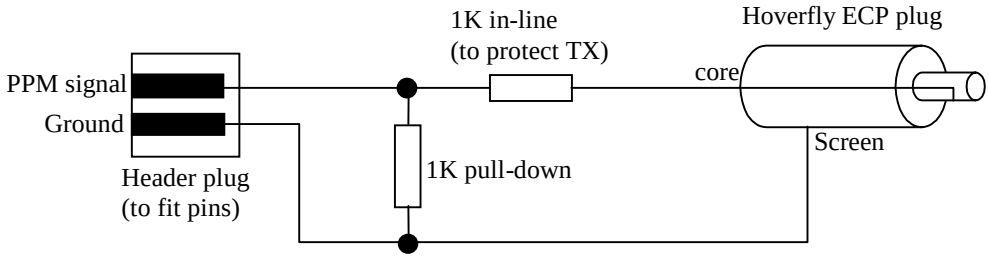

Fig. 2

It will be necessary to buy a header plug to fit onto the pins, which are normally spaced 0.1 inches apart, a very common pitch. Literally thousands of such connectors exist for different numbers of pins. Stores such as Maplin or Radio Shack will probably have something suitable. The resistors should be mounted right at the header plug, and the whole should then be insulated with heat-shrink tubing or similar. It is important to prevent shorts! I leave it to you to adapt the wiring accordingly if a pull-up resistor is needed instead of a pull-down. The resistor will have to link to a third pin, the one carrying power.

The idea of this scheme should now be obvious. This special lead is used to connect the transmitter to the Hoverfly, thereby making use of the signal that would normally get transmitted. This leaves the buddy-box socket free to use as normal, with all the fancy functions intact. Because the transmitter pins are quite fragile, it makes sense to anchor the wire somehow, to prevent it getting tugged. Attaching it to the transmitter handle bar with a cable tie works well.

If an oscilloscope is not available, the above circuit could be used to find the signal pin by trial and error, once the ground pin has been identified by multimeter. The plug should be connected to the Hoverfly control box, which should itself be powered up. Don't plug in the helicopter! Make the ground pin connection at the TX, then try the other pins with the signal line one at a time, until you get a green light on the control box. Connecting to the wrong pins will not harm anything, and it is most unlikely that anything except the right pin will give a green light. Take care when trying it out with the helicopter however, in case of a blast-off. The above cautions about short circuits should be borne in mind, too.