Fixing the 9x PPM in problem

Problem:

A few folks have found out that when connecting two Turnigy/FS-TH 9x radios for training purposes, sometimes the trainer radio cannot receive the ppm signal. Similar problem exits when the radio is used with a simulator.

I have two this type of radios, with two different RF modules: one is FlySky version B, the other is Corona DSSS v2. If I use a radio with the Corona RF module as the trainee, the trainer can receive the ppm signal OK; if I use a radio with the FlySky RF module as the trainee, the trainer cannot receive the ppm signal.

Existing methods to handle this problem:

As a few folks have already figured out, the problem is caused by the attachment of the RF module to the trainee radio. In the training mode, the trainee radio cuts off the power to the RF module, but the ppm signal remains sent. A couple of existing methods to handle this problem include: a. removing the RF module from the radio when used as trainee or the control for a simulator, b. adding a switch to cut off the ppm signal to the RF module manually, and c. adding a relay to cut off the ppm signal to the RF module automatically.

An easy method to handle this problem:

Here I will provide an easy method to handle this problem.

Before talking about the easy method, let's take a look at the deeper reason of the problem. In a modern digital RF module, there is a micro-controller to handle the ppm input as well as other tasks. Many micro-controllers have a kind of high voltage protection to the input pins, which is basically a diode connected between an input pin and the power supply. When the power supply of the RF module is cut off, the ppm signal will be providing power to the micro-controller (or even the whole module) through this diode. As a result, the ppm signal sent to the trainer radio will have a very low level which is lower than the required and cannot be detected.

The above mentioned three existing methods will all effectively cut off the current flow to the RF module and maintain the voltage level of the ppm signal to the trainer. Hence they all work.

The ppm signal is from a pin of a micro-controller, which can provide about 20 mA current. If you put a resistor in the path where you want the switch or relay to be, this will solve the problem. A 1 kohm resistor will work fine, as explained below:

1. It will provide the required voltage level to the trainer even if the ppm signal is short-circuited by the RM module. The pin which produce the ppm signal usually has a output resistance about 200 ohm. When the ppm signal is shorted to ground, the level of the ppm signal sent to the trainer is still very high, 1000 / (1000 + 200) percent by using voltage divider, which is good enough for the trainer.

2. It will provide the required voltage level to the RF module if the RM module is on. The reason is that when the RF module is powered, the input resistance of the ppm input pin will be very high, and 1 kohm resistance will not have noticeable effect.

You may ask if I have tried the easy method already. The answer is yes. I just did both of my two radios, and they are all working fine with whatever RF module.

A picture can be posted at a later time if it is needed.

Cheers,
JH