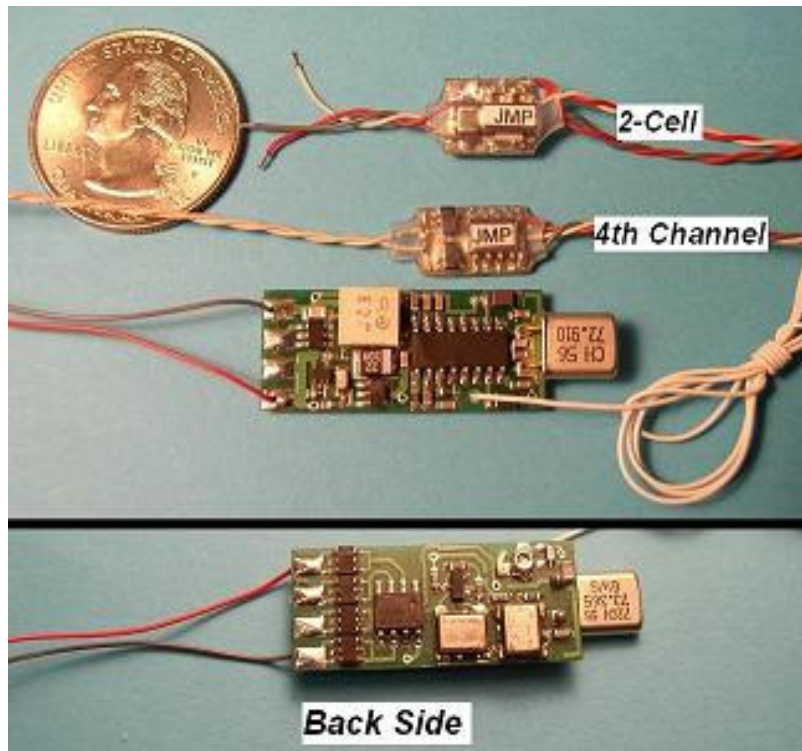


JMP Combo Receiver

A Truly Narrow Band Integrated Micro Receiver

By Gordon Johnson

I recently had the opportunity to evaluate the newest entrant in the market for integrated micro receivers with on-board ESC and actuator drivers. This one is manufactured by the French firm JMP Solutions. JMP is the company famous for the HF9 ESC for use with coreless motors. Their fine engineering once again comes through in this new receiver as it is true narrow band in a very light package. This is a very important feature in often crowded indoor flying sites when it may not be possible to have the only plane flying at any point in time. In addition JMP has also developed two add-on boards for this receiver. One allows a fourth channel to be added for driving a third actuator. The other allows using two LiPoly cells to deliver higher volts to the motor and also the actuators. These are all shown in the picture below. Read on and we'll explore this new family of micro components available now in the US from Bob Selman Designs.



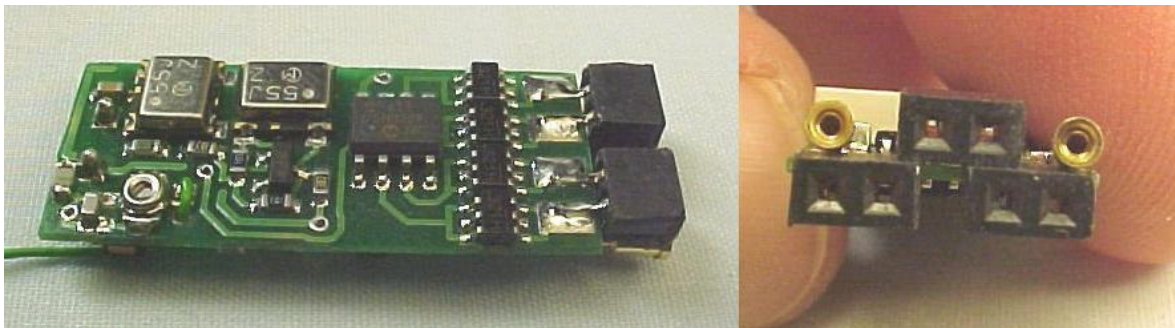
The JMP Combo receiver weighs 2.2 grams with antenna and crystal. Add-on boards allow four channel and two-cell LiPoly operation.

Receiver Overview

The receiver is very small with physical dimensions of 30x12.7x6 mm. For comparison purposes its weight (with crystal but without antenna or wires) is about 2.1g. It does come with an antenna and with that it weighs about 2.2g. It does not come standard with pins to allow quick connections. Instead it has four pads on one end for power and motor leads to be soldered to and four more pads on the back side to solder wires to the actuators to. Included with the receiver are instructions with easy to follow diagrams showing which input and output wires should be soldered to which pads. The crystal, which is not included, is a generic UM1 crystal and is the same one used in the GWS R4P and other receivers. Many people will already have these crystals in their workshop. The wire pins on the crystal are bent at 90-degrees over a 0.8mm thick ruler or sheet of light ply. When, plugged in the crystal hangs off the end of the receiver out of the way. The crystal may also be placed over the receiver IC, and held in place with thin double-sided tape. The receiver's antenna matching circuitry is designed so that a shortening of the antenna in the case of a small model, or lengthening of the antenna for increased range do not require retuning the receiver. The actuator outputs can also be used as bidirectional ESC's to drive two small motors up to 400 mA (i.e. for small blimps, etc.).

Optional Plug-and-play System.

In the US Bob Selman Designs has created an option of purchasing the receiver with a set of connectors already soldered in place. These connectors are the correct size to be compatible with those used on the RFFS-100 and the BSD Plug n Play actuators. With this option the JMP Combo can be easily swapped into a plane already set up for the RFFS-100. And, it can also easily be swapped between planes. At \$14 this is an option I highly recommend. The pins do, however, add weight, bringing the weight with antenna and crystal up to about 2.4 to 2.5grams.



The Bob Selman Designs Plug N Play option adds plugs to the board that make it compatible with the Selman Plug N Play actuators as well as with RFFS-100 wiring and plugs.

Integrated Micro Receivers at a Glance		
	JMP	RFFS-100
Weight without antenna or wires	2.09	1.9
Bandwidth	+/-10KHz	+/-76KHz
Narrow band	Yes	No
Hookup pins	No	Yes
Low volt motor cutoff	3.0V	No
LiPoly 2-cell capability	Add-on	No ¹
4th channel capability	Add-on	No ²
On-board aileron/elevon/V-tail mixing	Yes	No
Price with crystal	\$95	\$97

¹ DU has a 4-channel RX due out soon

² BSD has a 2-cell add-on board for the RFFS-100

The JMP receiver has some differences from the RFFS-100. The table above summarizes most of them. The biggest difference is the bandwidth. JMP lists the Combo receiver at 10KHz while Dynamics Unlimited lists the RFFS-100 at 76KHz. There are other differences between the two receivers in this respect, but the important one to note is that the JMP can operate when another transmitter is operating on an adjacent channel. Dynamics Unlimited generally recommends at least five channels free on each side for the RFFS-100 due to its wide-band nature.

The receiver also features a 3 volt motor cutoff to prevent discharging LiPoly batteries below their 2.7 volt minimum level. This feature can be disabled for running on two NiCd or NiMh cells. This is covered in the instructions and involves cutting a track on the circuit board. Add-on boards for a 4th channel and for 2-cell LiPoly operation are new innovations in the micro receiver. Finally, the receiver has on-board mixing for *V-Tail* or elevons. This means a computer programmable radio is not needed to achieve these capabilities.

Transmitter Compatibility

The JMP Combo works with either positive or negative shift transmitters so is compatible with Futaba/Hitec and JR. The receiver is available in 72mhz for the US market, but also 35/36 mhz and 40/41 mhz for other markets. JMP worked hard to ensure the receiver is available immediately in versions for the different FM frequencies used around the world. In the US it is available from Bob Selman Designs (<http://users.joplin.com/~bselman/>), in the UK from Indoor Flyer (<http://www.indoor.flyer.co.uk/>), in Sweden from Micro Flight Tec (<http://www.mft.nu/>), in France from Bat Modelisme (<http://www.batmodelisme.com>), and in Australia from Robert Allen (rallen@holohost.net). Wherever you are by the time you read this you should be able to buy it from a regional reseller near you on the frequency you fly on. The immediate availability in all these variations is further testament to JMP's engineering prowess.

JMP Actuators

JMP has developed an actuator that can be mounted BIRD style in the control surface. The actuator coils are wound extremely nicely and the coil with two-piece magnet weighs 1.2g. I have a pre-production plastic molding that allows it to be converted to remote actuator use with a push rod. The complete unit with the molding weighs 2.4g, but this might not be its weight in a final production version. In the table below are torque and other measurements for this actuator. For comparison to other actuators see my February 2002 RC Microflight article for torque from other commonly available actuators. Any of the commercially available actuators will work with the JMP Combo so the choice of actuator should be determined by which one most closely matches your plane's needs.

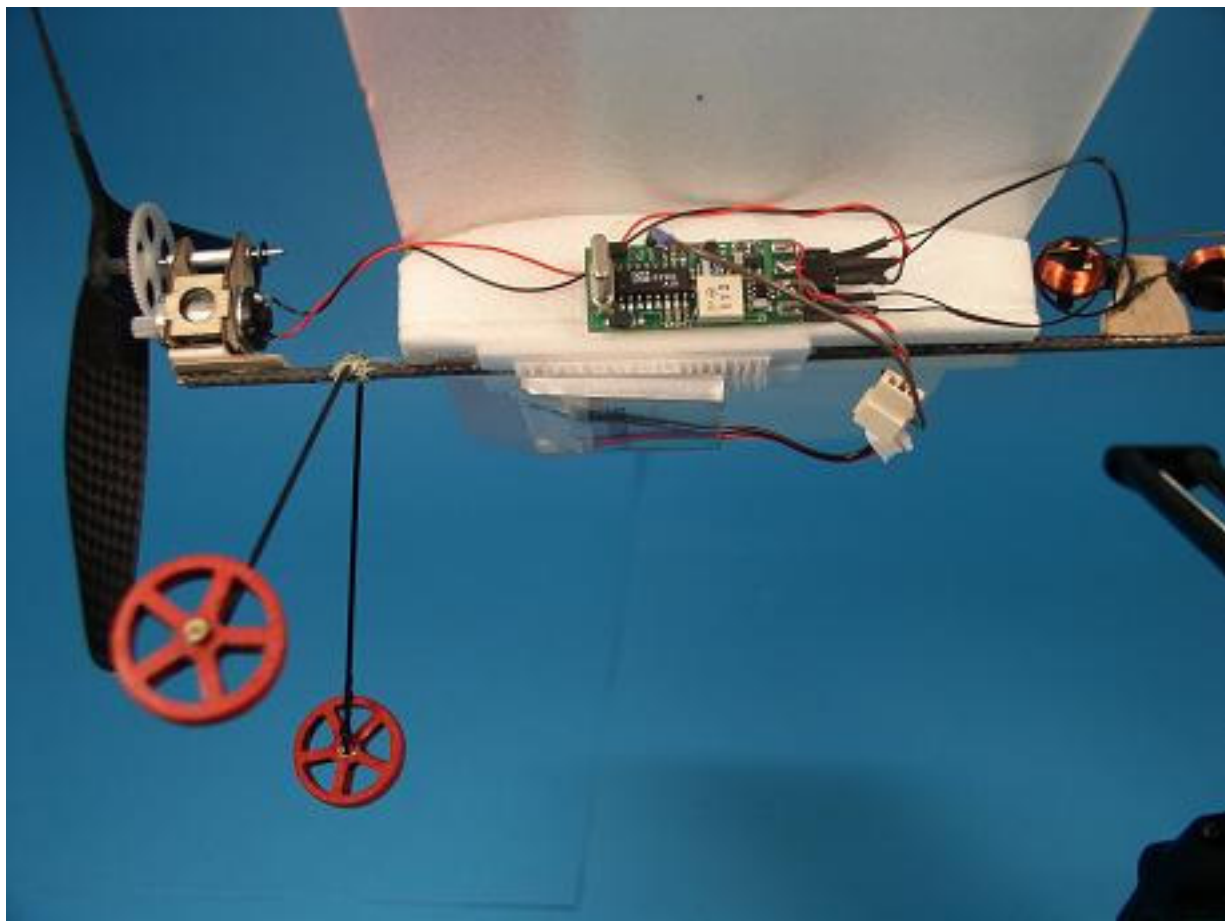
Actuator Performance at 3.5 Volts						
Actuator	Mass (m) <i>g</i>	Resistance <i>ohms</i>	Arm Length <i>mm</i>	Force <i>g</i>	Torque (T) <i>g-cm</i>	Current (I) <i>mA</i>
JMP (prototype housing)	1.42	70	7.7	3.77	2.90	50.0



The JMP Actuator (shown with a prototype housing) weighs 1.4g and generates 2.9 g-cm torque at 3.5 volts.

Installing the Receiver

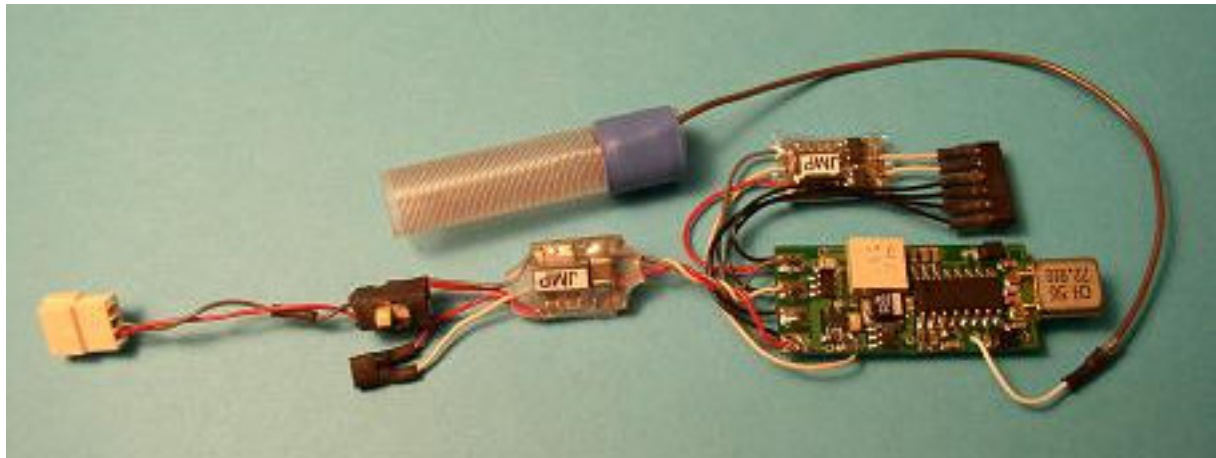
Installation of the basic receiver with no add-on boards is very straightforward. I have a stick plane I call the Quick Mite that uses a Takeoff 2000 formed Depron wing and a CF tube fuselage. Since all the equipment is out in the open it was a snap to install the JMP Combo in place of the RFFS-100 I had been using. I used double-sided foam tape to adhere it to the side of the wing pylon. I plugged existing actuator, motor, and power leads into the optional plug and play plugs and the installation was complete. In my workshop the Quick Mite actuators and throttle controls work perfectly. Even with a transmitter operating on an adjacent channel, I experienced no glitches. I had hoped to fly this plane at the NEAT fair indoor night, but I was not able to get it ready in time. However, four other people who got some of the first JMP receivers did fly their planes indoors as well as outdoors at NEAT with no glitching. In some of these instances I was the “spotter” while someone flew outdoors with lots of other transmitters being operated. I can attest that there was no glitching. These receivers were also used to win the 2003 Inter-Ex Trophy in Holland, flying all day in a crowded sky (see <http://www.inter-ex.com> or <http://jmquetin.free.fr/Intex03e.htm>). At this point it certainly seems the JMP is a resounding success in this regard and glitches are largely a thing of the past with this receiver.



The JMP Combo was a snap to install on my Quick Mite. Existing leads were simply plugged into the Plug N Play connectors and the receiver held on with double sided foam tape.

Wiring up the Receiver with both Add-On Boards

I chose to set up one of my JMP Combo receivers with both of the add-on boards. I have a plane I call a Quick Citabria which I have been flying with an RFFS-100 modified using Matt Keennon's method (July 2003 RCMF) to operate on two LiPoly cells. The propulsion set is a M20-HV geared 6.7:1 with a 5x3 3-bladed carbon fiber prop I had molded. The wing on this plane is held in place at the trailing edge with magnets and is removable to allow alternate wings with ailerons to be tested. So, I was excited to wire the JMP up for this plane and allow the possibility of 4-channel control with ailerons.



I did not solder plugs to the receiver. Instead I soldered wires from the add-on boards to the pads on the receiver and then soldered the leads from those boards to plugs. I also soldered wires from the pads for the standard two actuator channels to a block of six plugs so all actuator leads would be plugged in at the same place. I included a switch for turning power to the system on and off — a convenience I find very nice to have. This is all shown in the picture above. The weight with antenna, wires, plugs, add-on boards, etc is a total of 4.8g. As I write this article I have not had the opportunity to fly with this “full house” actuator system, but I am looking forward to using it.

Conclusion

I am very excited about the JMP combo receiver. With its true narrow band engineering it will be a welcome advancement for micro planes flying in crowded venues where reserving a number of channels free above and below a given channel is not a practical possibility. In fact, micro actuator-based indoor pylon racing might now be possible. Overall this new receiver opens up a whole new range of possibilities from “full-house” planes with elevator, aileron and rudder control to higher thrust 2-cell LiPoly based propulsion systems. I know I'll be experimenting

with new planes to take advantage of these new possibilities. It's a great time for micro planes with developments such as the JMP receiver.