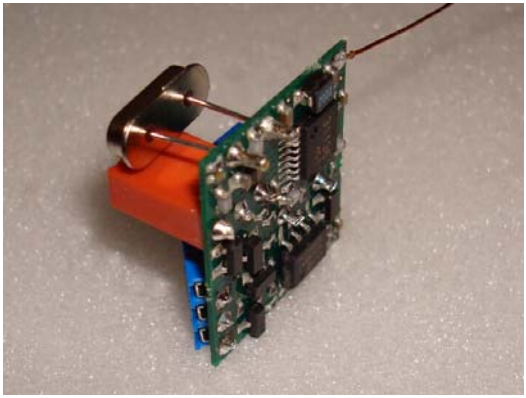
Jump Jet RF Receiver Upgrade

Thank you for purchasing the RF receiver upgrade for your Jump Jet. After installation, this 2g module will allow you to fly your Jump Jet using standard hobby radio transmitters. This allows the aircraft to be flown outdoors, at greater range than is possible with infrared. In optimum conditions the range is about 100 metres, which is much further than it is possible to see the plane!

The receiver is available in 35MHz and 72MHz versions, suitable for operation in different areas. It accepts GWS or Berg micro receiver crystals, available at hobby stores.

Please follow this manual carefully because it contains a lot of useful knowhow about getting the best from your RF module. We had to learn the hard way!



Package Contents

RF Receiver module
Thin wire for optional antenna
Instruction manual

You will need:

Compatible FM transmitter (see Section 2)
Berg or GWS micro receiver crystal (72MHz module only)
Small cross-head screwdriver
Small wire cutters
Fine nosed pliers
Sharp-pointed tool (a large needle is ideal)
Fine-pointed soldering iron & thin solder
Helpful: Blu Tack (Sticky Tack)

1) Installation

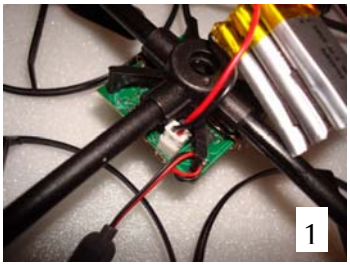
The RF receiver module fits into the Jump Jet in place of the infrared sensor, which is the black or silver oblong device supported by three springy wire legs under the Jump Jet's transparent dome cover. To install the RF module, please follow the procedure below:

1) Switch off the Jump Jet.

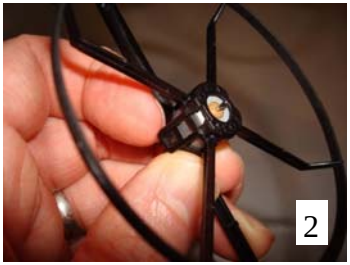
2) Remove the four screws that secure the central enclosure. These are very small, so please put them somewhere safe!

3) Remove the cover, raising the back edge first so that it can slide forwards slightly, in order clear the switch at the front. Take great care doing this, because the switch can be damaged by rough handling. Once the cover is off, remove the grey plastic lever from the switch (it tends to fall off rather easily), and put it in a safe place.

4) Remove the bottom section of the enclosure, and unplug the battery pack from the circuit board (Photo 1).

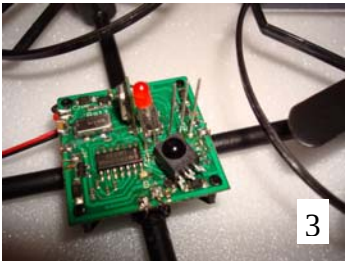


5) The installation will be made easier if the right-hand and rear propellers and guard rings are removed. Grasp each motor firmly and pull off the propeller. The ring is removed by releasing the side clips so that it lifts off (Photo 2).

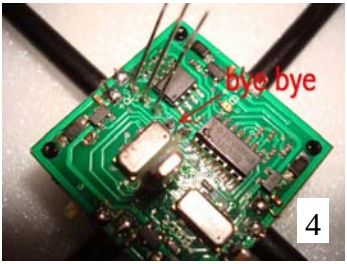


6) Now carefully straighten the wire legs supporting the infrared sensor, so that it stands upright.

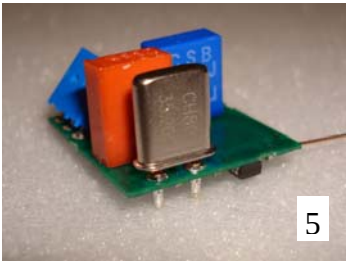
7) Next, it is necessary to snip off the infrared sensor with a pair of wire cutters. Cut close to the device, but below the wire "shoulder", leaving three straight wires standing vertically on the circuit board. If you wish to replace the infrared sensor in future, there should be enough wire length remaining on the sensor to solder it back onto its legs. Straighten the three wires so that they are parallel (Photo 3).



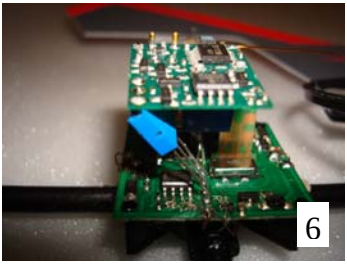
8) If your Jump Jet has a red power LED, this needs to be cut off as close to the board as possible (Photo 4).



9) The plane is now ready to receive the RF module. Begin by fitting a crystal to it if one is not pre-fitted. US customers using 72MHz will need to obtain a crystal from their hobby store – the module accepts micro receiver crystals by Berg or GWS. The crystal fits into the pair of miniature connector sockets, next to the rectangular orange filter. The crystal must not stand taller than the filter and if it does, its leads must be shortened (Photo 5).



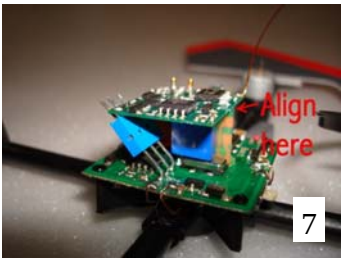
10) To install the RF unit onto the Jump Jet, carefully plug its blue connector onto the three wire IR sensor legs. The blue connector is designed to bend inwards; by bending the three wire legs backwards to an angle of about 45°, the two meet very neatly (Photo 6).

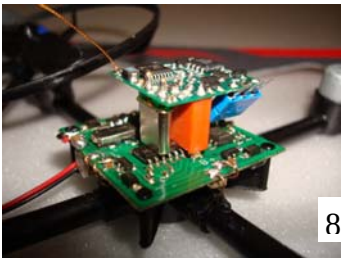


When the blue connector is bent at the correct 45° angle, the wires can pass out through its base and up past the edge of the circuit board. Feed the board on like this as far as possible. When it is in the right position:

- It should sit horizontally.
- The three wires should not be bent sideways – only backwards.
- The orange filter should rest upon the black integrated circuit on the main board.
- The front edge of the RF module should align with the front edge of the vertical gyro sensor board.

Please take great care not to flex the circuit boards whilst manipulating things, because the tiny components can be damaged by this. Do not trim the wire legs for now (Photos 7, 8).





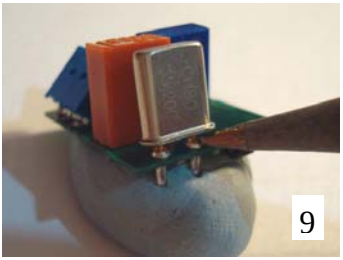
11) At this stage, it is a good idea to test the system to see if it works. In order to do so, an FM transmitter is required – please refer to Section 2 for details about selecting a TX and testing the system.

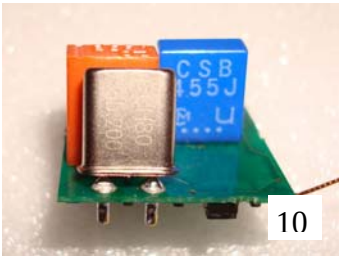
12) Once you are happy that the module works, it is very important to solder it into place. This is because the three wire legs are not made out of the right material to form reliable mechanical contacts; the blue connector is provided as an aid to installation and testing. It will not maintain a reliable electrical connection when subjected to motor vibrations over time, and a radio failure during flight will cause a crash.

Additionally, we strongly recommend soldering the crystal into place as well. This obviously makes frequency changes less convenient, but the micro connectors are not designed for repeated use, and the crystal will be buried inside the plane once re-assembled. If you really don't want to solder the crystal, then it should be attached to the board with a strip of tape to keep it from falling out during a heavy landing.

To solder the parts, please proceed as follows:

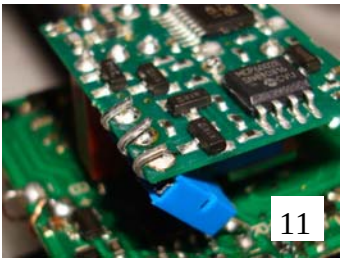
a) Switch off the Jump Jet and unplug the battery pack.
b) Unplug the RF module from the Jump Jet.
c) Turn it over, and carefully solder the two crystal lead wires into their connectors. This is best done by heating the rim of each connector with the soldering iron tip, and then applying thin solder to the wire entry point. It is helpful if the module is fastened to the workbench with a blob of Blu Tack whilst doing this. Allow the first joint to solidify before heating the second one, to prevent the connectors from coming away from the board (Photos 9, 10).



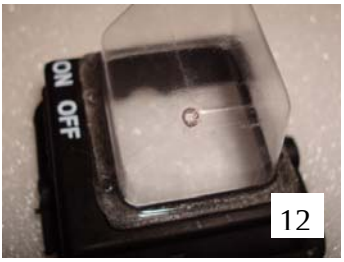


d) Next, re-fit the module onto the Jump Jet. Push the blue connector onto the wire legs as before, and position it correctly (step 10).

e) Now bend each of the wire ends around the edge of the circuit board, so that it rests against the adjacent solder terminal. The wires are flexible enough to do this with a fingernail. Cut off any excess (Photo 11).

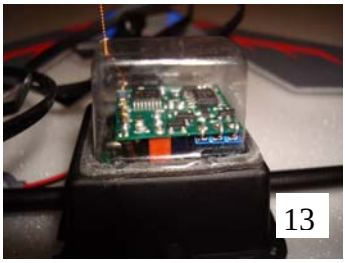


f) Before soldering, it is important to make sure that the plastic cover will fit back over the assembled electronics. But before it can be fitted, a hole must be made in the transparent dome, to let the antenna pass through. The hole should be made with a large needle, from inside to outside. Position it in the front, left-hand top corner of the dome. With care, a fine pointed soldering iron can be used instead (Photo 12).

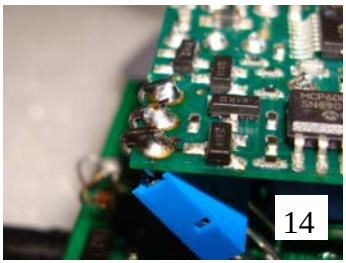


g) If you have not yet done so, remove the grey plastic lever from the power switch.

h) Now feed the antenna wire through the hole in the dome and carefully lower the plastic cover over the circuit boards. The new RF module should slide up inside the dome. The lead wires may need to be adjusted to position the module correctly. Once it looks OK, lower the cover all the way to make sure it fits, taking great care when it reaches the power switch, since the lever can break off. When everything is right, the cover should fit quite easily (Photo 13).



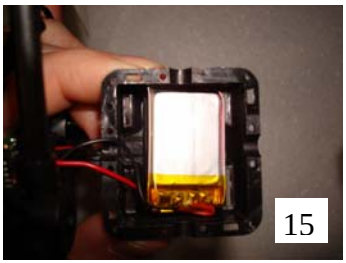
i) Next, take the cover off again, and solder the three wire ends onto the adjacent terminals. Be careful not to touch the nearby electronic components with the iron (Photo 14).



j) You may notice that the orange filter is positioned so as to neatly cover the tiny "signal present" LED on the main circuit board. Although its light can still be seen, visibility can be improved by tilting the RF module so that the board slopes slightly up towards the front. This will swing the filter forwards, revealing the LED.

13) Now you can re-assemble the plastic enclosure as follows:

a) Plug in the battery first, and then place it in the bottom half of the enclosure. Note that the enclosure is not symmetrical; the battery lies lengthways from front to rear, and the side motor arms emerge slightly forward of centre, so the enclosure should be oriented accordingly. The battery should be oriented so that the wires emerge at the rear left-hand corner (Photo 15).



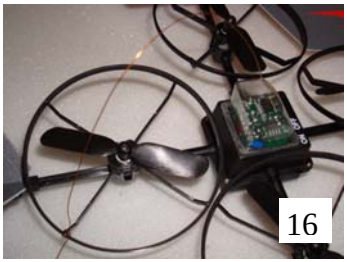
b) Offer up the bottom section to the main body, tucking the wires down beside the battery, out of the way.

c) Replace the top section, as tested previously. Before doing so you may wish to replace the grey switch lever, but we actually recommend **not** doing so. This is because the RF module restricts the free movement of the enclosure that is necessary to manoeuvre it safely over the switch, and it is very easy to snap off the switch lever whilst trying to do so. The bare switch is perfectly operable without the grey lever.

d) After a final check to make sure that the charge lead is located properly and the enclosure is snugly closed, replace the four screws. A magnetic screwdriver is very helpful!
e) Replace the guard rings and propellers.

14) Antennas: For outdoor use, the fitted 8 inch antenna generally works well. It should be straightened and then bent back so that it is angled towards the rear.

For indoor use, we have found that dead spots or "signal holes" tend to occur in various parts of a typical room, even at close range. Nearby metal furnishings, radiators, plumbing etc. make these worse. Increasing the length of the antenna greatly reduces susceptibility, by effectively making the receiving surface larger than the holes. The best way to lengthen the antenna is to first bend the 8" wire back in a semi-circular arc, and wrap the end of it around the rear propeller ring leaving a short length protruding. It is a good idea to "tin" the tip of the antenna before attaching it to the ring, because heat needs to be applied for several seconds. Then solder the supplied length of thin wire onto the end. This method provides strain relief for the antenna, whilst keeping it well out of the way of the propellers. A standard 39" dangling wire seems to work best, but feel free to experiment. Please note that the extra antenna does not increase range outdoors (Photo 16).



A note about tinning the enamelled wires*: Like all soldering jobs, this needs to be done with a clean iron tip, tinned with free-running solder. Add a bit more solder to the iron to form a small ball, and then dip the end of the enamelled wire into this. Provided the iron is hot enough (350 °C is plenty), the enamel will melt away and the wire will "wet". Pre-tin both wires before soldering them together.*

All Done.

2) Transmitters

In order to fly the upgraded Jump Jet, you will need a transmitter. However, because the Jump Jet was not originally designed to work with hobby transmitters, there are some restrictions on the types which can be used. The good news is that the suitable ones tend to be the least expensive. We also offer a **Software Upgrade Service** for the Jump Jet's onboard flight computer in order to allow a much wider range of transmitters to be used, and to improve overall performance under radio control – please see Section 4 below for details.

In order to work with the standard Jump Jet, the transmitter must meet the following requirements:

- Correct frequency (obviously), FM transmission. Outside North America, the RF module is supplied with a 35.200MHz (Channel 80) crystal pre-fitted. The 35MHz unit can also be operated in the 36MHz and 27MHz bands, but please note that many 27MHz transmitters use AM.
- PPM signalling.
- Futaba standard channel sequence: 1=Aileron, 2=Elevator, 3=Throttle, 4=Rudder. In addition to Futaba, the Hitec, GWS and Century brands all use this sequence.
- Servo reverse switches.
- If your Jump Jet came with a separate Power LED standing up on the board (in addition to the tiny "signal present" LED), then it should work with a transmitter which has four or more channels.
- If your Jump Jet did not come with a separate Power LED, then it requires a transmitter with 4 channels, **and no more**. Please refer to "Choosing a 4-Channel Transmitter" below.

Choosing a Four Channel Transmitter

If your Jump Jet requires a 4-channel transmitter, then there are a number of options available. The Futaba channel sequence is very popular among other brands, and most manufacturers offer a budget 4-channel set. Unfortunately, the Futaba Skysport 4 (T4YF) transmitter is **not** suitable, because it actually transmits 5 channels, even though only four are connected to the physical controls! The fifth channel is there unseen, and will prevent the Jump Jet from working properly. However the excellent GWS GWT4A II really is a 4-channel radio, as is the Hitec Focus 4, and the more recent Laser 4. The Century Lightning 4 also works well. Many older sets will work, but it would be wise to try out any unit before purchasing it specially, since manufacturers often change their specifications without warning. In their manual, Futaba make NO MENTION of the fact that the Skysport 4 really has 5 channels!

Setting the Servo Reverse Switches

To fly the Jump Jet it is necessary to set the servo reverse switches to the correct directions of travel. These vary between brands and should be set as follows:

Brand	Channel 1	Channel 2	Channel 3	Channel 4
Futaba	Normal	Normal	Normal	Normal
Hitec	Normal	Reversed	Reversed	Normal
GWS	Reversed	Normal	Normal	Normal
Century	Reversed	Reversed	Normal	Reversed

Switching on and Testing

As with the infrared controller, the plane should be switched on first, before the transmitter. This is because it is important not to move the plane during the first couple of seconds after the transmitter signal is received, so that the gyros can self-calibrate.

If the above details and settings are correct, the Jump Jet's signal LED should light up when the transmitter is switched on. The propellers should then start if the throttle is raised. Please note the following points:

a) If the transmitter has too many channels, then the "signal present" LED will not illuminate.
b) The throttle lever must be lowered to minimum before the motors will start – this is to guard against accidental "blasting off" when the transmitter is first switched on. If the throttle reversing switch is set incorrectly then of course the channel will really be at maximum when the stick is lowered, and the plane will appear "dead". Similarly, if the throttle trim lever is too far forwards, it may prevent the motors from starting.
c) If the reversing switch for any other channel is incorrect then the plane will fly, but watch out!
d) If the channel sequence is not correct, then the throttle will be operated by the wrong channel, whose stick will be centred. The "signal present" LED will light up, but the motors will not start.
e) When the transmitter is first switched on, the Jump Jet automatically trims itself, *taking the current stick positions as neutral* (except for the throttle). This includes the trim positions, which means that any adjustments made to the trims will be "over-ruled" next time the transmitter is switched on. This generally works well and very little trimming is necessary, but you may wish to make a small adjustment, especially to the rudder control. To do so, the trims should be centred prior to switching on the transmitter; the lever can then be moved by the required number of "clicks" before flying.
f) All mixing functions, tailored throttle curves etc. should be disabled when flying the Jump Jet. Exponentials can be used if you wish.

3) Flight

a) With radio control, flying outdoors is a natural. However with its foam body, the Jump Jet will not fly very fast, and it will not tolerate any wind. Outdoor flight is much more satisfactory and fun if the foam body is removed completely and the aircraft flown "naked". It will then respond much more like a helicopter, with very little self-righting tendency although it does retain a little. Please note that we do not recommend removing the propeller guard rings – they do add very useful protection. Some kind of lightweight and highly visible tag indicating the rear of the aircraft should be added as an aid to orientation during flight.

b) The majority of radio transmitters have smaller electrical channel movements than the Jump Jet's infrared handset, causing the controls to feel somewhat sluggish, especially the throttle. This is because the channel throws had to be maximised on the Jump Jet handset in order to make the most of the limited resolution available with infrared.

This problem can be corrected using the settings on a computer radio, but of course 4-channel radios are not generally computer-equipped. Our **Software Upgrade Service** (see Section 4 below) provides a solution to this issue but in the meantime, climb-out performance can be maximised by pushing the throttle trim forwards once the motors have

been initialized. Please take care though, because doing so may prevent the motors from stopping fully at minimum throttle. We found that the Century Lightning 4 has particularly good channel throws, and the GWS GWT4A II is also above average. On the other hand, the Futaba Skysport series has very short channel throws and does not work well with the Jump Jet.

c) When the Jump Jet is flown with the standard infrared handset and with its foam body fitted, it is designed to sink to the floor and land shortly before the on-board batteries cut off completely. This generally prevents it from falling from a great height when the power quits. When flying without the body, the aircraft will be lighter than normal and it therefore might remain airborne right up to the end. The fact that the throttle travel on most radio transmitters is less than on the infrared handset will help here, but please take care.

d) When flying on radio, especially when indoors, please remember that signal dropouts and interference can occur. They tend to be independent of the operating range, and can happen even when the aircraft is close to the transmitter. Extending the receiving antenna (installation step 14) really helps reduce dropouts indoors, but please note these common causes of trouble:

- Dropouts often occur close to large metal objects such as radiators. Don't forget about hidden ones like water tanks, plumbing etc.
- Some electrical devices cause interference, especially ones containing switched-mode power supplies. The Jump Jet AC adapter is quite bad; please unplug it from the wall before flying nearby!
- When flying, do not point the radio antenna straight at the plane, as this is the direction of minimum transmission strength. Pay particular attention to this when flying overhead.
- Always fully extend the transmitter antenna, even indoors.
- Take care when sharing a flying area with others on adjacent frequencies. Please check for interference before flying, as the receiver is not as selective as full-sized units. We suggest a minimum of 30KHz frequency separation from other transmitters. Problems are most likely when the aircraft is nearer to the interfering transmitter than it is to the controlling one.
- Like other "micro" receivers, the RF module does not have any image reject circuitry. This means that in addition to the intended channel, the unit can receive a signal 910KHz lower in frequency. Generally this doesn't matter, because the "image frequency" is not within the hobby band so it is very unlikely to be in use nearby.

4) Software Upgrade Service

As mentioned above, Snelflight can upgrade the software carried within the Jump Jet's onboard flight computer. This will bring several major benefits when flying by radio control:

- Transmitters with more than 4 channels can be used. This allows the Jump Jet to be flown with computer radios.
- Transmitters with the popular JR channel sequence can be used – the sequence is detected automatically when the transmitter is switched on. All the reversing switches should be set to "normal".

- The throttle channel throw is enhanced, boosting climb-out performance. But please note that the Futaba Skysport radios have such short throws that climb-out is poor even after the upgrade.
  Also, please note that after the upgrade, the throttle zero point will be "dynamic" – the Jump Jet will treat as zero the throttle's position when the transmitter is switched on.
- The directional controls are also boosted, making the aircraft more responsive in flight. This permits a greater variety of manoeuvres to be carried out, and allows the plane to be flown in higher winds.
- Please take special note of item c) above.

If you would like to benefit from the software upgrade, please contact us at support@snelflight.co.uk to arrange to return your Jump Jet to us. Please do not return it to us without contacting us first. Once we have received it we will notify you so that you can purchase the upgrade service from our web site.

5) Specifications

Frequencies of operation:	27 – 36MHz (Euro version) 72MHz (North America version)
I.F:	455KHz
Modulation:	FM (positive or negative shift)
Signalling:	PPM
Range:	100m approx
Weight:	2.2g including crystal and antenna
Power requirements:	2.5V, 4mA

Snelflight Ltd
Web: www.snelflight.co.uk
Email: support@snelflight.co.uk