DSX9

9 Channel 2.4 GHz Computer Radio System

MacGregor Industries
Supplemental Instruction Manual

JR
feel the difference!

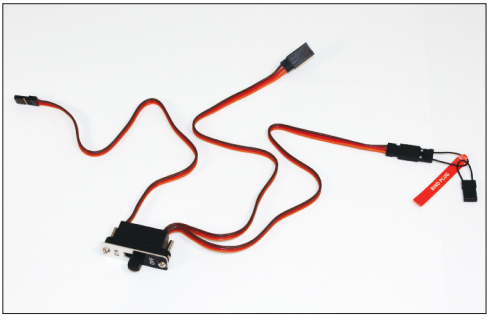
Binding

It is necessary to programme the receiver to the transmitter so that the receiver will only recognise that specific transmitter, ignoring signal from any other sources. If the receiver is not bound to the transmitter, the system will not operate. During binding, the servo's fail-safe positions are stored.

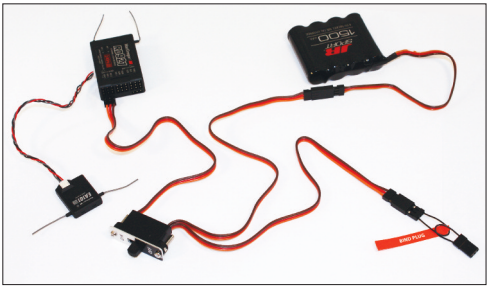
The following sequence describes the binding procedure for the JR RD921, however, all JR DSM aircraft receivers are bound in the same way.

How to Bind

1. With the system hooked up as shown, insert the bind plug in the charge plug receptable. The switch must be a 3-wire type switch to enter the bind mode through the switch. If a 3-wire switch is not available, install the male bind plug into the charge plug receptable and then power the receiver through any other open port to enter bind mode.



2. Turn on the receiver switch. Note that the LED's on all receivers should be flashing, indicating that the receiver is ready to bind.



3. Establish the desired fail-safe stick positions: normally low throttle and flight controls neutral.

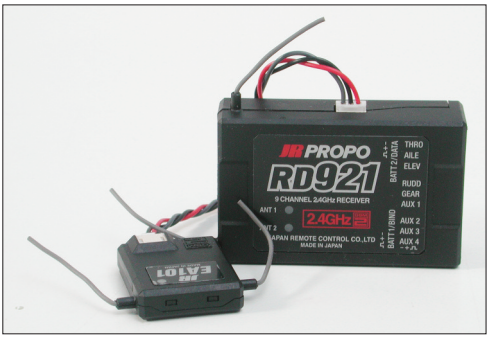
4. Press and hold the bind button on the back of the transmitter while turning on the power switch. The bind button should flash and within a few seconds the system should connect. The LED's on the receivers should go solid, indicating the system has connected.

5. Remove the bind plug from the receiver or switch harness and store it in a convient place.

6. After you've programmed your model, it's most important to rebind the system so the true low throttle and neutral control surface positions are programmed.

NOTE: To bind an aircraft with an electronic speed controller that powers the receiver through the throttle channel (BEC), insert the bind plug into the battery port and proceed to Step 2.

Fail-Safe Functions



The JR RD921 receiver features two types of fail-safe: SmartSafe and Preset Fail-Safe.

SmartSafe

This type of fail-safe is ideal for most types of electric aircraft and is also recommended for most types of petrol- and glow- powered airplanes and helicopters. Here's how SmartSafe works.

Receiver Power Only

When the receiver only is turned on (no transmitter signal is present), all servos except for the throttle are driven to their preset fail-safe positions, normally control surfaces at neutral and the landing gear down. These fail-safe positions are stored in the receiver during binding. At this time the throttle channel has no output, to avoid operating or arming the electronic speed control. In glow-powered models, the throttle servo has no input so it remains in its current position.

After Connection

When the transmitter is turned on and after the receiver connects to the transmitter, normal control of all channels occurs. After the system makes a connection, if loss of signal occurs, SmartSafe drives the throttle servo only to its preset fail-safe position (low throttle) that was set during binding. All other channels hold their last position. When the signal is regained, the system immediately (less than 4ms) regains control.

Preset Fail-Safe

Preset Fail-Safe is ideal for sail planes and is preferred by some modellers for their glow-and petrol-powered aircraft.

Receiver Power Only

When the receiver only is turned on (no transmitter signal is present), all servos except for the throttle are driven to their preset fail-safe positions, normally control surfaces at neutral and the landing gear down. These fail-safe positions are stored in the receiver during binding. At this time the throttle channel has no output, to avoid operating or arming the electronic speed control. In glow-powered models, the throttle servo has no input so it remains in its current position.

After Connection

When the transmitter is turned on and after the receiver connects to the transmitter, normal control of all channels occurs. After the system makes a connection, if loss of signal occurs preset Fail-Safe drives all servos to their preset Fail-Safe positions. For sailplanes, it's recommended that the spoilers/flaps deploy to de-thermalise the aircraft, preventing a flyaway. Some powered modellers prefer to use this Fail-Safe system to programme a slight turn and low throttle to prevent their aircraft from flying away. When the signal is regained, the system immediately (in less than 4 ms) regains control.

Programming SmartSafe

(All DSM Aircraft Receivers)

During the binding process the bind plug is left in throughout the process and is removed only after the receiver connects to the transmitter. After the connection is made, confirmed by operating the servos, the bind plug can be removed. The receiver is now programmed for SmartSafe.

Programming Preset Fail-Safe

(JR RD921 Receivers Only)

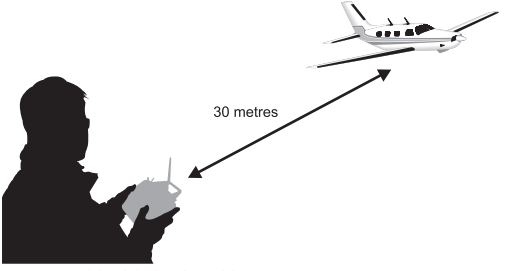
During the binding process, the bind plug is inserted in the bind port or in the charge jack, then the receiver is powered up. The LED's in each receiver should blink, indicating that the receiver is in bind mode, remove the bind plug. The LED's will still be blinking.With the control sticks and switches in the desired Fail-Safe positions, bind the transmitter to the receiver by pressing and holding the bind buttons on the back of the transmitter/module and turning on the transmitter. The system should connect in less than 15 seconds. The receiver is now programmed for preset Fail-Safe.

NOTE: Fail-Safe position are stored via the stick and switch positions on the transmitter during binding.

Standard Range Testing

Before each flying session, and especially with a new model, it's important to perform a range check. The DSX9 incorporates a range testing system which, when the bind button on the transmitter is pressed and held, reduces the output power, allowing a range check.

Range Testing the DSX9



Press and hold the bind button

1. With the model resting on the ground, stand 30 paces (approx. 90 feet) away from the model.

2. Face the model with the transmitter in your normal flying position and depress and hold the bind button on the back of the transmitter. This causes reduced power output from the transmitter.

3. You should have total control of the model with the button depressed at 30 paces (25-30 metres).

4. If control issues exist, contact your Authorised JR Dealer for further assistance.

Receiver Power System Requirements

With all radio installations, it is vital that the onboard power system provides adequate power without interruption to the receiver even when the system is fully loaded (servos at maximum flight loads). This becomes especially critical with giant-scale models that utilise multiple high torque/high current servos. Inadequate power systems that are unable to provide the necessary minimum voltage to the receiver during flight loads have become the number one cause of in-flight failures. Some of the power system components that affect the ability to properly deliver adequate power include: the selected reciever battery pack (number of cells, capacity, cell type, state of charge), switch harness, battery leads, regulator (if used), power bus (if used).

While the RD921 receiver's minimum operational voltage is 3.5-volts, it is highly recommended the system be tested per the guidelines below to a minimum acceptable voltage of 4.8-volts during ground testing. This will provide head room to compensate for battery discharging or if the actual flights loads are greater than the ground test loads.

Recommended Power System Guidelines

1. When setting up large or complex aircraft with multiple high torque servos, it's highly recommended a current and voltmeter in an open channel port in the receiver and with the system on, load the control surfaces (apply pressure with your hand) while monitoring the voltage at the receiver. The voltage should remain above 4.8-volts even when all servos are heavily loaded.

2. With the current meter inline with the receiver battery lead, load the control surfaces (apply pressure with your hand) while monitoring the current. The maximum continuous recommended current for a single heavy-duty servo/battery lead is three amps while short duration current spikes of up to five amps are acceptable. Consequently, if your system draws more than three amps continuous or five amps for short durations, a single battery pack with a single switch harness plugged into the receiver for power will be inadequate. It will be necessary to use multiple packs of the same capacity with multiple switches and multiple leads plugged into the receiver.

3. If using a regulator, it's important that the above tests are done for an extended period of 5 minutes. When current passes through a regulator, heat is generated and this heat causes the regulator to increase resistance, which in turn causes even more heat to build up (thermal runway). While a regulator may provide adequate power for a short duration, its important to test its ability over time as the regulator may not be able to maintain voltage at significant power levels.

4. For really large aircraft or complex models (for example 35% and larger or jets), multiple battery packs with multiple switch harnesses are necessary or, in many cases one of the commercially available power boxes/buses is recommended. No matter what power systems you choose, always carry out test #1 above making sure that the receiver is constantly provided with 4.8 volts or more under all conditions.

5. The latest generation of Nickel Metal Hydride batteries incorporate a new chemistry mandated to be more environmentally friendly. These batteries , when charged with peak detection fast chargers, have tendencies to false peak (not fully charge) repeatedly. This includes all brands of Ni-MH batteries. If using Ni-MH packs, be especially cautious when charging making absolutely sure that the battery is fully charged. It is recommended to use a charger that can display total charge capacity. Note the number of mAh put into a discharged pack to verify it has been charged to full capacity.

Tips on Using 2.4GHz Systems

While your DSM equipped 2.4GHz system is intuitive to operate, functioning nearly identically to 35MHz systems, following are a few common questions from customers:

Q1: Which do I turn on first, the transmitter or the receiver?

A1: If the receiver is turned on first, all servos except for the throttle will be driven to their preset fail-safe positions set during binding. At this time, the throttle channel doesn't put out a pulse position preventing the arming of electronic speed controllers or, in the case of an engine-powered aircraft, the throttle servo remains in its current position. When the transmitter is then turned on, the transmitter scans the 2.4GHz band and acquires two open channels. Then the receiver that was previously bound to the transmitter scans the band and finds the GUID (Globally Unique Identifier Code) stored during binding. The system then connects and operates normally.

If the transmitter is turned on first, the transmitter scans the 2.4GHz band and acquires two open channels. When the receiver is then turned on for a short period (the time it takes to connect), all servos except for the throttle are driven to their preset fail-safe positions while the throttle has no output pulse; the receiver scans the 2.4GHz band looking for the previously stored GUID; and when it locates the specific GUID code and confirms uncorrupted repeatable packet information the system connects and normal operation takes place. Typically this takes 2 to 6 seconds.

Q2: Sometimes the system takes longer to connect and sometimes it doesn't connect at all?

A2: In order for the system to connect (after the receiver is bound) the receiver must receive a large number of continuous (one after the other) uninterrupted perfect packets from the transmitter in order to connect. This process is purposely critical of the environmental, ensuring that it's safe to fly when the system does connect. If the transmitter is too close to the receiver (less than 3/4 metre) or if the transmitter is located near metal objects (metal transmitter case, the bed of a truck, the top of a metal work bench, etc) connection will take longer, and in some cases, connection will not occur as the system is receiving reflected 2.4GHz energy from itself and is interpreting this as unfriendly noise. Moving the system away from metal objects or moving the transmitter away from the receiver and powering the system up again will cause a connection to occur. This only happens during the initial connection. Once connected, the system is locked-in and, should a loss of signal occur (fail-safe), the system connects immediately (4ms) when signal is regained.

Q3: I've heard that the DSM system is less tolerant of low voltage. Is that correct?

A3: All DSM receivers have an operational voltage range of 3.5 to 9 volts. With most systems, this is not a problem as most servos cease to operate at around 3.8 volts. When using multiple high current draw servos with a single or inadequate battery/power source, heavy momentary loads can cause the voltage to dip below this 3.5 volt threshold, causing the entire system (servos and receiver) to brown out. When the voltage drops below the low voltage threshold (3.5 volts), the DSM receiver must reboot (go through the start-up process of scanning the band and finding the transmitter) and this can take several seconds. Please read the receiver power requirement on page G-24 as this explains how to test for and prevent this occurrence.

Q4: Sometimes my receiver loses its bind and won't connect, requiring rebinding. What happens if the bind is lost in flight?

A4: The receiver will never lose it bind unless it's instructed to. It's important to understand that during the binding process the receiver not only learns the GUID (code) of the transmitter but the transmitter learns and stores the type of receiver that it's bound to. If the bind button on the transmitter is pressed at any time and the transmitter is turned on, the transmitter looks for the binding protocol signal from a receiver. If no signal is present, the transmitter no longer has the correct information to connect to a specific receiver and in essence the transmitter has been "unbound" from the receiver. We've had several customers that use transmitter stands or trays that unknowingly depress the bind button and the system is then turned on, losing the necessary information to allow the connection to take place. We've also had customers that didn't fully understand the range test process and pushed the bind button before turning on the transmitter, also causing the system to "lose its bind". If, when turning on, the system fails to connect, one of the following has occurred:

Tips on Using 2.4GHz Systems (Continued)

• The wrong model has been selected in the model memory (Model Match)

• The transmitter is near conductive material (transmitter case, truck bed, etc) and the reflected 2.4GHz energy is preventing the system from connecting (See Q2)

• The bind button was unknowingly (or knowingly) depressed and the transmitter was turned on previously, causing the transmitter to no longer recognise the receiver.

Q5: Can I use a 3-cell Li-Po pack in my transmitter?

A5: No. All current JR transmitters are designed to operate using a 9.6 volt transmitter pack. A fully charged 3-cell Li-Po pack puts out 12.6 volts. This higher voltage can over load the power-regulating transistor causing damage and or failure, possibly in flight. Many of our customers have experienced failures using 3-cell Li-Po packs and their use in JR transmitters is highly advised against. The DSX9 2.4 system will operate for over 8 hours using a 1500mAh Ni-MH battery.

JR DSX9 Frequently Asked Questions

Does the transmitter aerial orientation really matter?
No, the transmitter will function normally with the aerial pointing in any direction.

How do I mount the main & remote receivers?
With the small aerials leaving the receiver it makes it much more difficult to mount the receiver in foam. If you do still want to mount it in foam please make sure that the aerials are not damaged. Most pilots will mount both the main & remote receivers with double sided foam tape or hook & loop tape. Both of these systems work fine and will absorb normal amounts of vibration. To help the tape stick to wooden surfaces, coat the wood with a thin smear of epoxy. Allow this to dry and then apply the tape.

Where do I mount the remote receiver?
As with any receiver system it is important to mount it as far from interference as possible, i.e Ignition systems & servo leads. The orientation of the receiver aerials is also important. Try to mount the remote receiver so that the aerials are pointing in a different orientation, ie. X, Y & Z axis, so if the main receiver aerials are horizontal, mount the remote receiver so its aerials are vertical.

Is there an advantage to adding more remote receivers?
Yes there is, the more you add the less likely it is for a loss of signal. Again try to mount the additional receivers in different orientations to aid reception.

Battery systems:
Please make sure that you use a high quality battery and switch harness. Try to avoid high capacity Ni-Mh cells of a small case diameter (2400mAh +) as there is a lot of internal resistance in the cells, sub C type cells are better. This is true of all radio setups.

Please use high quality extention leads as poor examples will have high resistance and can cause low power situations.

Ni-Mh cells are susceptible to temperature. For those of you flying in the winter or storing models in the shed/ garage please make sure that you check your battery power on a regular basis. Topping up the battery the day of flying is advisable using a peak detect charger.

If using the second power port on the receiver please make sure that you use an independent battery supply and not just 'Y' lead from one power source.

Overcharging batteries:
JR's DSM2 system will use less power to transmit than a normal 35mHz system. Please be aware of this when using the supplied wall charger.

DSC (Direct Servo Control):
JR have confirmed that this function is not available with DSM2 receivers. Owners of JR DSX transmitters should not therefore use this function.

For set-up purposes the set should be used in the conventional manner. Due to the multitude of frequencies available, this will not endanger other models, either in the air or on the ground.

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