



AIRTRONICS RDS8000 FHSS RD8000 - RD6000

R/C Helicopter Guide

The purpose of this guide is to assist new helicopter pilots to setup their radio. Many basics will be covered, as well as explanations of certain choices and how one aspect affects another. Experienced pilots may want to skim through this guide. It first covers the preliminary transmitter programming steps, then swash plate, tail rotor, and throttle / pitch / revolution-mixing curves. Finally, it briefly covers the available compensation mixers, and optional use of the 7th and 8th channels. (Not applicable to RD6000 owners.)

While some helicopter setup theory is covered, the instructions from the manufacturer of your particular helicopter override any suggestions offered here. In the case of doubt, please contact your helicopter manufacturer or Airtronics customer service.

If you are setting up an electric helicopter, ensure that your motor is disconnected from the speed control while making any adjustments. Do not have your engine running while making adjustments if you have a glow or gasoline model.



Preliminary Transmitter Setup

Power on your transmitter. It will not operate however, until it is placed into the Normal (“N”) flight mode, with the throttle stick at the lowest position. If those conditions are not met, you will see an **ID-UP!** or **TH-Hi!** warning message and hear beeping. The two switches at the far upper left and right sides of your transmitter control the flight modes. Both must be positioned toward you to enter the Normal flight mode.

Select a model memory to use for your helicopter. Navigate to **ETC > M-SL**, then press the **Inc+/Yes** button to enter that menu. Now use the **Inc+/Yes** or **Dec-/No** buttons to scroll through your model memories. After selecting the desired model memory, press the **End** key to confirm.

Ensure that your model memory is set to “heli” mode. The upper left corner of your screen will say either “heli” or “aero.” If it lists “aero”, switch to helicopter mode by navigating to **ETC > TYP**, press the **right arrow** key, then the **Inc+/Yes** key to confirm the change. Finally press the **End** key to return to the previous menu.

Name your model memory. Navigate to **ETC > NAM**, then press the **right-arrow** button to enter that menu. Use the four **arrow** keys to change the current letter or scroll to other letters. Press the **End** key when finished.

Due to the involved nature of helicopter programming options, you will need to disable the Basic menu structure to access the complete list of features. Navigate to **ETC > BASIC**, then use the **Inc+/Yes** key to toggle that option to **OFF**.

The transmitter has flight mode switches installed in the traditional locations for airplane use. For helicopter's, you may want to swap the locations. This can be done by carefully removing the back housing, then removing the switches and swapping their positions. You can also send the radio to the service department for that modification.

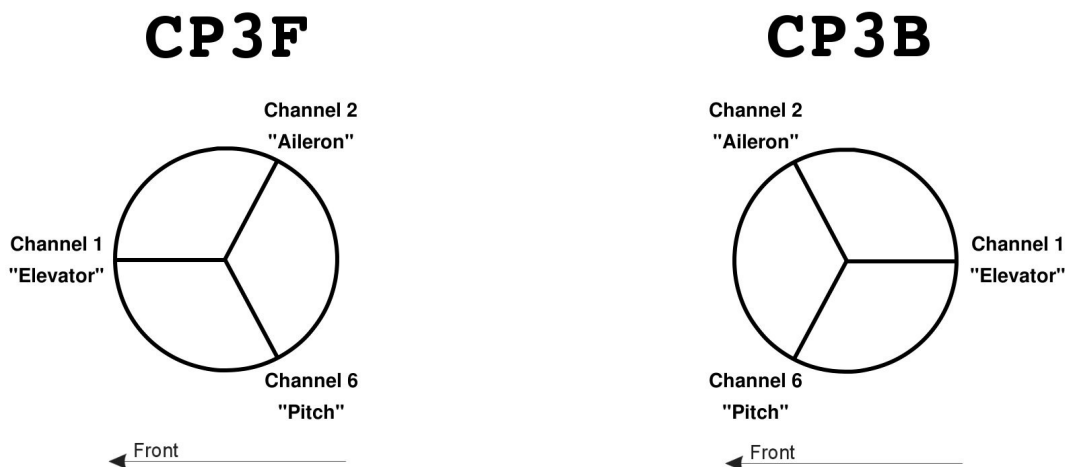
Tip: If you use a flight simulator, it would be advisable to make sure the flight mode switches on your flight sim controller and on your Airtronics transmitter operate identically. This will ensure that any “muscle memory” you develop with the flight simulator will be correct when you fly the real thing.

The direction of your switches can be reversed electronically by navigating to **ETC > SW-R** and use the **Inc+/Yes** key to toggle the option between **NOR** and **REV**.

Swash Plate Settings

A helicopter imparts control inputs to the main rotor head through the swash plate. There are two different methods used to give inputs to the swash plate: CCPM mixing, and mechanical mixing. With a CCPM setup, you have three servos working in unison to tilt, raise or lower the swash plate. Mechanical mixing uses three servos that work independently: one for left/right cyclic, one for fore/aft cyclic, and one for collective pitch.

Select the appropriate swash plate type. Navigate to **ETC > SWH**, and use the **Inc+/Yes** or **Dec-/No** keys to scroll through the available swash plate types. The diagram below indicates the correct CCPM mode to choose if you have a CCPM helicopter.



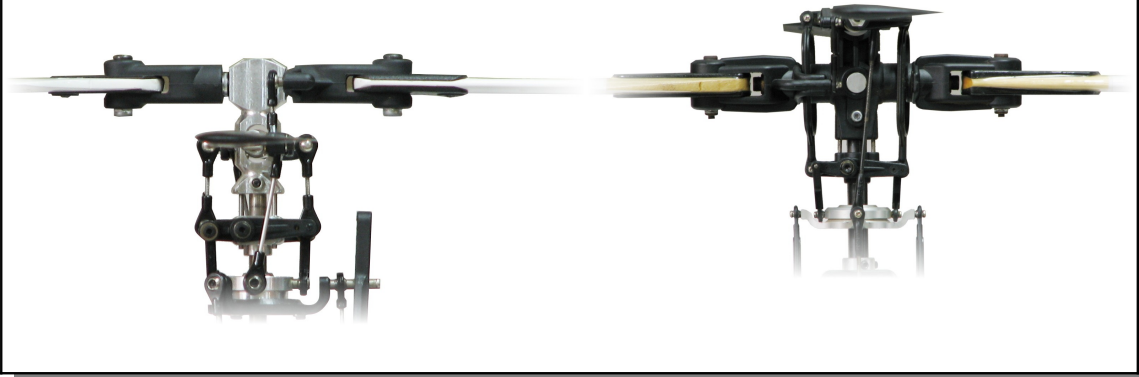
There is one exception for the swash plate type that we are aware of. The Thunder Tiger Mini Titan helicopter has a unique system that results in negative collective pitch being applied when the swash plate is raised. For that reason, if you have the Mini Titan you will need to use the **CP3F** option, and attach your front servo to the Ch1 “Elevator” slot, your rear-left servo to the Ch2 “Aileron” slot, and your rear-right servo to the Ch6 “Pitch” slot.

While the diagram above lists the CCPM servos as “elevator” “aileron” and “pitch” they do not actually perform those functions because they work in unison. Regardless, when programming servo-specific options in your radio, the servos will be identified that way.

If you have not already done so, make sure your rotor head linkages are setup correctly. Consult your helicopter's manual for details. For your convenience, a brief summary of typical rotor-head setup is listed below.

With a collective-pitch helicopter, it is crucial that all of your linkages are setup correctly and safely. A linkage of the incorrect length will result in differential and exponential throw, and if the link is assembled incorrectly it can come apart in flight. Ensure that your rods thread into the plastic links securely, and more than just a few threads are holding it together.

With your throttle/collective stick centered your swash plate servo arms should be at 90 degrees to the linkages, the swash plate should be level, the paddles should be level, the washout / mixer / flybar arms should be level, and your main blades should have zero degrees pitch. Adjust your linkages as needed to achieve this.



When your throttle / collective stick is centered, the swash plate should be very close to level. When you give an input with the cyclic stick, the swash plate will most likely not respond as expected because servo reversing and end points have not been set.

Adjust servo reversing by navigating to **EL > REV**, then use the **Inc+/Yes** or **Dec-/No** keys to toggle between **NOR** and **REV** to change the “elevator” servo direction. Use the left and right **arrow** keys to scroll to the other channels (“aileron” and “pitch.”) Make the adjustments as needed so that your swash plate tilts correctly. When you move the cyclic stick forward, the swash should tilt forward. When you move the cyclic stick to the left, the swash should tilt to the left, etc.

Adjust end-points so that the swash plate is not over-controlled or “binds.” Navigate to **EL > EPA** and make adjustments as needed. Move the cyclic stick forward or backward to adjust the forward or backward “elevator” end-point. Use the **right-arrow** key to scroll to the “aileron” and “pitch” channels and repeat the process.

Note: When using CCPM, end-point adjustments effect the function, not one particular servo.

Throttle and Pitch Curves

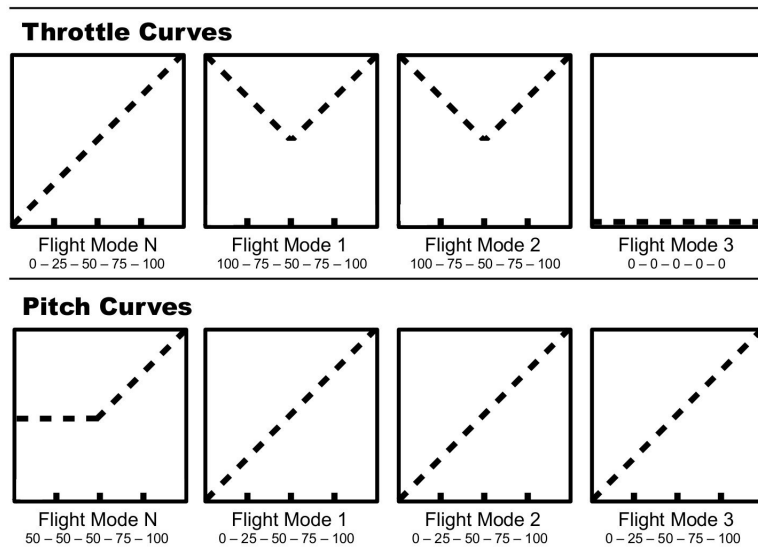
The throttle / collective stick on your transmitter controls two functions at the same time. As the name implies, it controls the amount of throttle applied, as well as the pitch of your main rotor blades. Five-point curves are available and allow you to custom tailor how your helicopter performs in each of the four flight modes. (N, 1, 2 and 3.)

Traditionally, the Normal “N” flight mode is set up to perform somewhat like a fixed-pitch helicopter, with a low stick position you have zero throttle and zero degrees pitch, and with a high stick position you have full throttle, and 9-12 degrees of pitch. Flight modes 1 and 2 are traditionally setup for aerobatic flight, with varying amounts of throttle being applied at all positions, and your pitch varying from negative to positive. Flight mode 3 is generally used for practicing auto rotations or to cut throttle if you anticipate an imminent crash. Throttle is set to zero or idle for all stick positions, and pitch varies from negative to positive.

Consult your helicopter manual regarding suggested starting values for throttle and pitch curves. If no suggestions are listed, you can start with some basic throttle and pitch curves. See the diagram below.

Set the throttle curve for each of your four flight modes. Navigate to **TH > CV-PH**, then **-P3, -P2, -P1, -PL**. The lowest point is PL, and the highest point in PH. The flight mode you are modifying is listed in the lower-left section of your screen, under “F-Mode.” Use the **F-Mode** button to scroll through your four flight modes and set your various curves.

Repeat the same procedure for your pitch curves. Navigate to **P-F > CV-PH**, then **-P3, -P2, -P1, -PL**. The lowest point is PL, and the highest point in PH.



Revolution Mixing

Revolution mixing applies rudder input based upon your throttle / collective stick position. This helps to compensate for changes in torque being applied to the main rotor, which will make the helicopter spin. Today's gyros do a very good job of keeping the tail steady, so there is rarely a need to use this feature. If you have a heading-hold gyro, revolution mixing must be disabled for it to function properly. Even if you plan to use revolution mixing, it is best to disable it during the initial setup of your model. Navigate to **RU > RV.H**, then **RV.M**, and **RV.L**. The lowest point is RV.L, and the highest point is RV.H. The flight mode you are modifying is listed in the lower-left section of your screen, under "F-Mode." Use the **F-Mode** button and up / down **arrow** keys to scroll through your four flight modes and zero all values for each flight mode and all three points.

Tail and Remote Gain Settings

Proper setup of your rudder linkage is essential for proper control and to ensure your gyro is able to perform to the best of abilities. With your rudder stick centered, the rudder servo arm should be at 90 degrees to the linkage, and the pitch lever that the linkage connects to should be at 90 degrees for most helicopters. Consult your helicopter's manual to verify this.



Many gyros have an additional servo lead that plugs into the 5th channel to control the gain and heading-hold/rate modes of the gyro with your transmitter. Each flight mode has two settings, controlled by the two-position "Gyro" switch. If your gyro has the remote gain feature, navigate to **G > GYR**. The flight mode you are modifying is listed in the lower-left section of your screen, under "F-Mode." Use the **F-Mode** button to scroll through your four flight modes and set your various gain settings. Now toggle your "Gyro" switch to the other position and repeat the process.

Rate vs. Heading-Hold Gyros

A "rate" gyro is a simple and low-cost gyro that senses the approximate amount that your tail drifts, and responds with an estimated control input to counteract the drift. It does not lock the position of your tail, and will allow it to weather vane.

A "heading-hold" gyro is more advanced and does a much better job of keeping the tail steady. A simple way to think of how it works is to imagine that it notices a drift, calculates how much it drifted, then applies enough control input (if possible) to return the tail to the commanded heading. Your tail will not weather vane, so you must coordinate your turns with both cyclic and rudder inputs.

Gain Values

Regardless of your gyro type, you must set an appropriate gain value. The gain value tells the gyro how much it needs to amplify the compensation commands. Too low of a gain value will let the tail drift easily, and too high of a gain value will make the gyro overcompensate which results in a tail that “wags.” A good starting point is 50%, then adjust it as necessary after your test flights.

Any change that effects the speed or efficiency of the main or tail rotors can result in a need to change the gain value. Some of the factors include:

- Changes to your throttle or pitch curves
- Changing the length or type of main or tail rotor blades
- Forward flight, backward flight, or flight in a steady breeze (increases efficiency because it brings less-turbulent air to the rotors.)
- Pinion gear, main gear and motor
- Tail drive gears / pulleys

Compensation Mixers, and Channels 7 / 8

Your remote control helicopter's setup is now complete. This section covers optional use of the two available compensation mixers. A C-Mix will mix one channel with another, allowing you to link them. Some of the reasons for the using the C-Mix include:

Reduce CCPM Interactions

CCPM interactions occur when an unintended swash plate movement results from a control input. For example, when applying a full collective-pitch command, your swash plate may also tilt forward slightly which would add an unintended forward cyclic effect. This is the result of imperfect linkage geometry, and the fact that no two servos are completely alike.

You can mix Pitch to Aileron and/or Pitch to Elevator to counteract this effect.

Help Maintain a Constant Head-Speed Without Using a Governor

Any cyclic control input will place a higher load to your main rotor. This increased load will reduce the head speed, and in more demanding maneuvers this change can be significant. By mixing Aileron to Throttle and Elevator to Throttle, you can help compensate the increased load. This should only be done after properly adjusting your throttle and pitch curves to achieve a nearly constant head speed throughout your pitch range.

The RaptorTechnique* website has a great tutorial on how to set this up:

<http://www.raptortechnique.com/throttlemix.htm>

Link a Channel to Your 7th or 8th Channel.

This just links one channel to another. You choose a upper and lower percentage, and that will effect how much the two channels correlate. This will give you indirect proportional control over your 7th and 8th channels if so desired.

*RaptorTechnique.com is not affiliated with Airtronics or Global Hobby Distributors.

For more information on how to use the compensation mixers, consult your Airtronics manual.

The 7th and 8th channels can also be directly controlled by using the AUX1 and AUX2 two-position switches on the front of the transmitter. Some common uses include controlling a governor, on-board glow heater, lights, or retracts.

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