

## Gasser Heli Project Part 4

Throttle Set up

By Gus Garcia

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Programming your heli radio can be without a doubt challenging, especially if you don't quite understand what the values you're entering mean. Therefore from this point on with the gasser project I'll be explaining radio set-up, and just like anything else complicated that's difficult to understand, we'll do it in small steps. So let's get started.

If you fly anything RC then you know that throttle means engine acceleration, and that low stick on the transmitter is low throttle, and full power is achieved by moving the transmitter stick all the way up, so far so good, right? Excellent, so the idea now is to make sure that low transmitter stick is low throttle and transmitter stick all the way up is full power.

**Reverse is the first thing we need to set-up in the radio if the above function is working in the opposite direction. Therefore if your low transmitter stick position is causing full open throttle we need to reverse that.**

But before we do, you need to take into account that currently there are several excellent radio brands in the market, and which one you choose will be a matter of cost and personal taste, and with whatever radio brand

you get, you'll have just about all the basic programming capabilities on the low end price range, to the more sophisticated programming functions on the high end or more expensive radios. What I do recommend is if it's at all possible don't cheap out on your radio, especially when it comes to helicopters. With the versatility of today's radios you only need one for all your airplane, helicopter or sailplane needs, and with a memory capability of up to 50 models stored in your transmitter you really don't need more than that. Once again I recommend that you get the heli version radio from the manufacture instead of an airplane version, because.

- With the airplane version radios the throttle stick has a ratchet to catch and hold the transmitter stick in place, and that's fine for airplanes.
- With the helicopter version radios the throttle stick has a smooth feel to it without the ratchet; and this is due to the fact that the throttle stick is worked constantly not just for throttle, but for collective as well (main blade pitch or angle change).

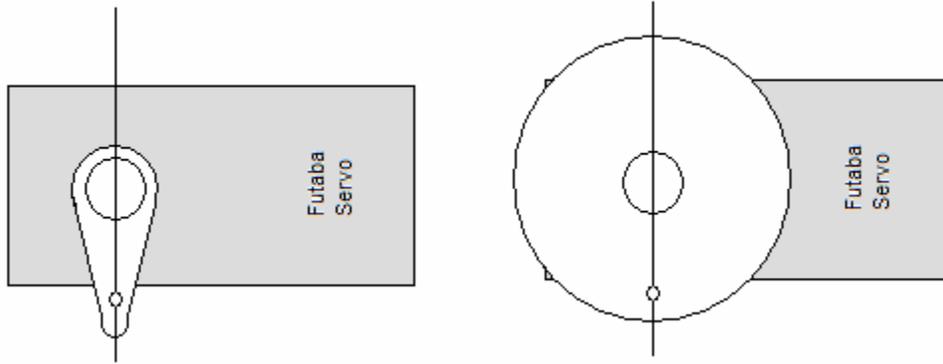
The helicopter radio version will work just fine with the other aircraft types without a problem, but helis don't do too well on airplane version radios (not that it can't be done, but don't make it more difficult on yourself than it has to be). Once you've decided on which brand radio to get, study, study and study the instruction manual over, and over again in order to learn how to navigate through the radio menus. The menus are different from one radio brand to another, and where you find one item on one brand will be completely different on another. Radio type lessons over, let's start programming (by the way, I'm a Futaba guy, and my radio is 10C 2.4 GHz system – it's the best).

#### **Just so happens I did need to:**

- Reverse the throttle direction.
- Check the sub-trim.
- Set the end points.
- Review the throttle curve normal.
  - Deferred throttle cut for latter.

Here we go, the below is how I normally set-up most of my helis with a center stick position for 0° pitch on the main blades, and throttle at 50% opened:

1. Connect the throttle servo to channel # 3 on the receiver (this will vary from one radio brand to another).
2. Power up transmitter.
3. Power up receiver, and let servo find its position in relation to transmitter stick position (no servo wheel or lever arm has been installed at this point).
4. Look for throttle curve normal in the transmitter, and open menu.
5. Set throttle stick at center, having the throttle curve normal menu open will make finding center using the graph illustration easier for absolute center stick position.
6. Place servo wheel or lever arm on servo output shaft at 90° similar to the illustrations below.

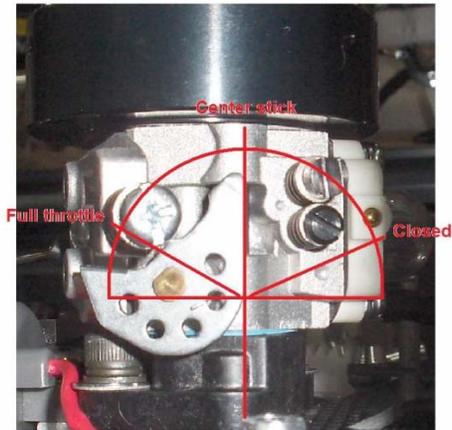


- a. The servo output shaft has gears or teeth, and more often than not the wheel or lever arm will be off center by a few degrees in one direction or the other.
- b. If using a servo wheel, just moving the wheel over one on the servo output shaft until the wheel is lined up at 90° to the servo.
- c. If using a lever arm, you have fewer choices on where the lever will fall on the servo output shaft, and in turn can be off by a few degrees in one direction or another. If this is the case we now need to go into the sub-trim menu to center the servo lever arm.

Sub-trim is primarily used for finding the servo center position at center stick and designed just for this particular problem. However, using too much sub-trim at center will limit overall travel at the end points; it's a tradeoff, so use it wisely. This being the case and me using a servo lever arm, and having my lever off a few degrees, I now needed to make a decision on how to proceed, and below is a list of options to correct the problem:

1. Use sub-trim;
  - a. Navigate the radio menus to get to this function.
  - b. Open sub-trim menu.
  - c. Choose channel # 3 for engine sub-trim (this will vary from one radio brand to another).
  - d. Enter value, either plus or minus to move servo in the right direction until the lever arm is centered.
2. Or – adjust throttle linkage rod;
  - a. Lengthen or shorten throttle linkage rod until throttle is halfway open at transmitter center stick.
3. Or – adjust throttle arm;
  - a. Move throttle arm in one direction or another until throttle is halfway open, and secure in this position.

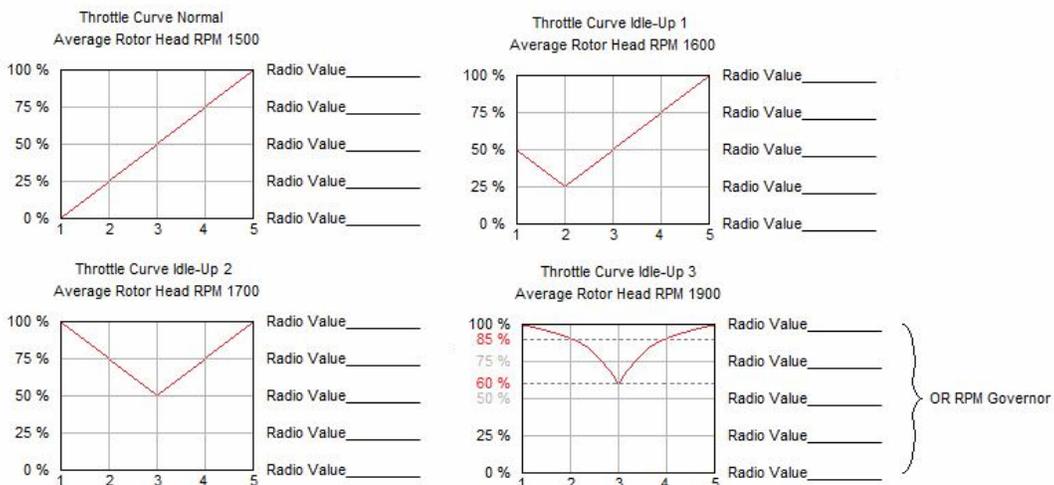
All of the above will solve the problem, and may actually be used with other functions as we progress with radio set-up. But for the throttle set-up I opted for adjusting the linkage rod to solve the problem due to the helicopter's instruction manual recommendations indicating where the throttle lever position should be, and the servo lever arm off center by a few degrees. Therefore the linkage rod from the servo to the throttle lever was adjusted to have the carburetor opened halfway at center stick until I reached the results as shown in the photo below.



The next function that needed to be adjusted was the end point travel limits. This is used to restrict how far the servo will move from low to high (idle to full throttle). This will not interfere with the throttle curves at all, and in order to make the required adjustments we need to:

1. Navigate the radio menus to locate end point.
2. Open menu.
3. Choose channel # 3 (this will vary from one radio brand to another).
4. Enter values;
  - a. Both the low and high need to be adjusted.
  - b. Move the throttle stick slowly to as far as the carburetor will allow it to move (going beyond that may damage the servo).
  - c. Decrease value to limit servo travel in both directions for low stick and full throttle.

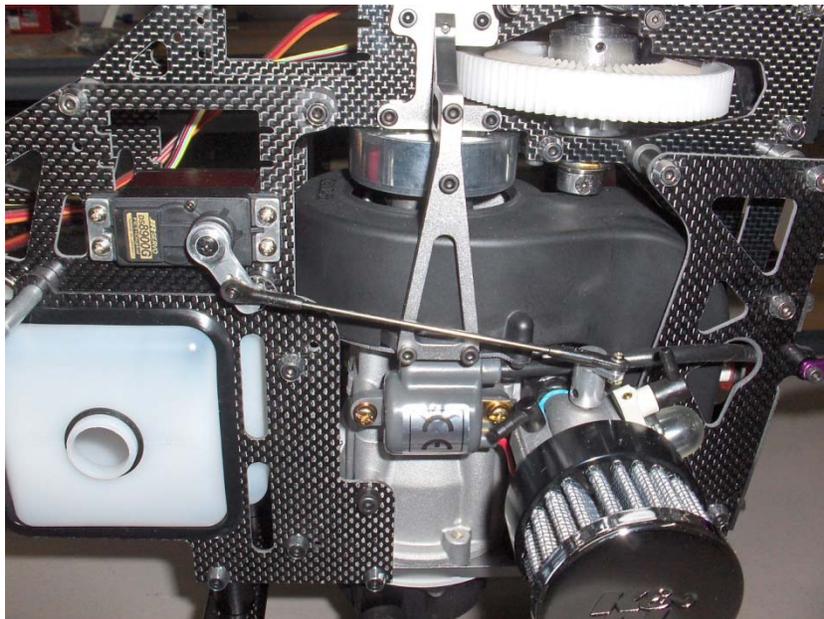
The next step is to set-up the throttle curve normal which is kept in a linear setting for now, and will be adjusted or fine tuned at the field for a more precise throttle curve, actually all of the throttle curves are fine tuned at the field, but I do have a base from which I start, see below graphs for my baseline starting point for all throttle curves.



There you have it, wasn't it easy to set-up the throttle? NO – what do you mean no? Again, like everything else it'll get easier with practice or better said, the more you do it, the easier it'll get. But if you're still unsure, what's the fall back plan? – Ask for help? That's right; you don't have to do it alone.

The above described method of set-up is only one possibility among many, and once you get the idea, you could experiment until you find your preferred technique of set-up for your particular flying style or preference. And once you achieve that, and if you like it, and it works for you, then you can advance to the next step – have fun flying your machine, but how are you going to do that if all you know how to do is set-up the throttle? With this installment on the gasser project we covered throttle linkage, and radio set-up, but there's still more to do. Next time I'll cover gyro installation, linkage, and radio set-up.

So be sure to come back for that, and in the mean time take a look at what a proper throttle linkage looks like on a helicopter.



Not so scary now is it? And that's the idea, don't be afraid – Gus.