HobbyWing Platinum V4 系列电调定速设置

此教程为好盈官方出品教程；
此教程用于指导用户如何使用 Platinum V4 系列电调的定速功能以及转速标定。

电调定速实现：

通过转速标定，建立电机转速-油门值对应曲线，然后将油门值设置为某一固定值，即输出该油门值对应转速，并在电机负载变化时维持该转速不变。

精灵定速与存储定速的区别：

在直升机精灵定速模式下，电调在断电以后不会存储电机转速-油门值对应曲线，所以每次电调通电以后，都要执行一遍转速标定，然后才能正常使用定速功能。
由于每次都要重新标定转速，所以便会出现每次标定的结果都会有所不同（主要是受到电池电压和飞机机械结构顺畅度影响）。同一定速油门值下的主旋翼转速也会有所不同。

在直升机存储定速模式下，电调在转速标定以后会存储电机转速-油门值对应曲线。所以从其他模式调整到该模式后，首次通电使用时需要执行一次转速标定，以后电调断电并重新上电就不需要再去执行转速标定。若从存储定速模式调到其他模式并保存，再调回存储定速模式，电调存储的电机转速-油门值对应曲线就被清除，因此就需要再次执行一遍转速标定。以后保持在存储定速模式下，就会一直执行保存的电机转速-油门值对应曲线，不论更换能力较好还是稍差的同样节数的电池，同一油门值下的转速也是一样的。（更换不同节数的电池就会有可能改变转速。）

所以，精灵定速适合经常调试飞机的用户，若您的机型，电机，齿比，电池节数都确定的情况下，建议您使用存储定速模式，简单省事。

转速标定：

转速标定过程中电调会根据实际输入的电池电压结合电机的实际 KV 值，自建一个电机转速-油门值对应曲线。所以，标定时需要电池为满电，大桨螺距为零度。
一般来说，我们的遥控器默认设置的油门曲线与螺距曲线是如图 1，2 所示的：

油门曲线：

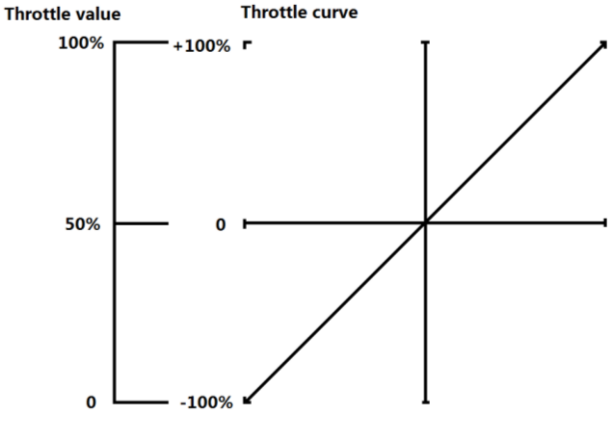


图 1

螺距曲线：

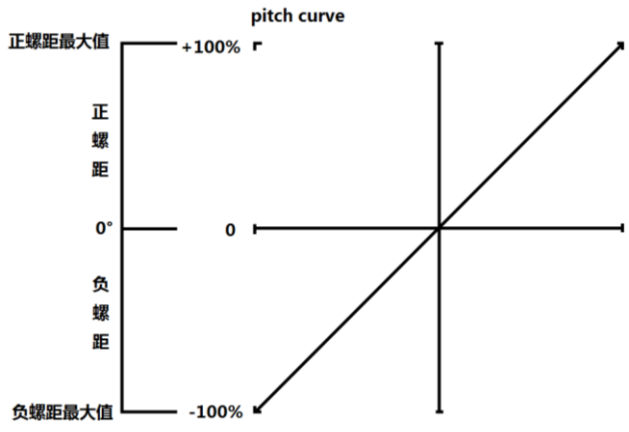


图 2

0%油门时，对应负螺距最大，50%油门对应 0° 螺距，100%油门对应正螺距最大。

转速标定的时候即需要用到 50%油门对应 0°螺距这一设置。

转速标定过程（执行转速标定前请先做油门行程校准，做过油门校准的就不用再做了，一般新电调拿来使用时做完油门行程校准后只要不恢复出厂设置就不需要再次做油门行程校准（更换遥控器与接收机除外））：

1、建议用户使用默认的油门曲线与螺距曲线。(若不想使用默认的设置，请保证电机转起来的时候的油门为 50%，主旋翼螺距为 0 度)
2、遥控器开机，油门在最低位值，等待电调自检完成。
3、设置油门锁的请将油门加锁，随后将油门摇杆推至 50%，然后解锁油门锁，未设置油门锁的可直接将油门推至 50%。
4、电调驱动电机旋转，直升机主旋翼会开始缓慢加速旋转（由于主旋翼螺距为零度，飞机不会升空，但请注意安全），等待缓慢加速完成，主旋翼转速稳定后，将油门锁加锁，或将油门摇杆推至最低。
5、电调不再驱动电机旋转，直升机主旋翼开始减速停转。
6、转速标定完成。

定速功能设置：

存储定速模式下，转速标定完成后，插上 LCD 参数设置盒，按 ITEM 进入电调设置，随后连续按 R/P 键，找到如图 3 所示记录：

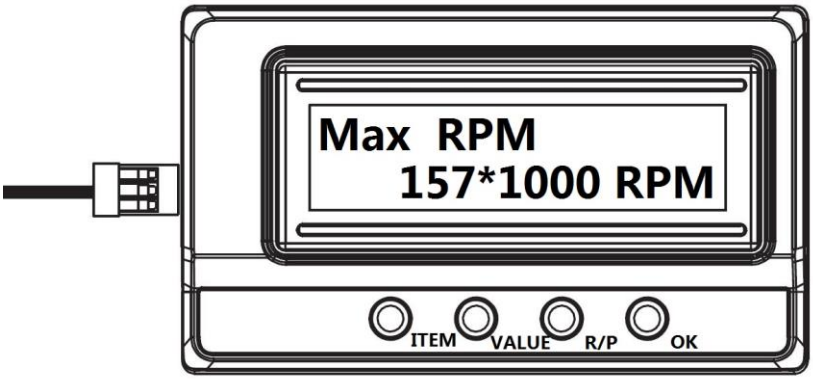


图 3

（图中 157*1000RPM 只是举例，具体以实际看到的为准）
该值为电机在 100%油门下所能达到的最大电器转速。我们以一级减速比的直升机为例，电机为 10 极，电机齿为 13 齿，主齿为 120 齿。那么齿比即为 9.3，根据如下公式可得主旋翼 100%油门下的转速。
主旋翼 100%油门转速=LCD 参数盒上读到的电机最大电器转速 Max RPM÷电机极数的一半÷齿比
这里即为主旋翼 100%油门转速=157*1000÷（10÷2）÷（120÷13） =约 3400 转
如果我飞 3D 时的大桨要 2700 转，需要设定的定速油门为：2700÷3400=约 0.8，即需要设定油门值为 80%。
此时需要将 3D（比如 IDLE1）的油门曲线设置为 80%一条水品线如图 4：

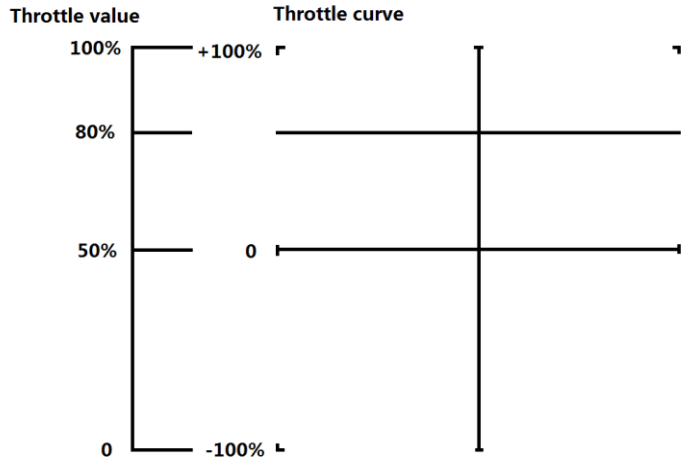


图 4

以后飞行的时候从 Normal 油门曲线起飞以后直接切到 IDLE1 就可以以 80%油门 2700 转的定速进行 3D 飞行了。

一般来说，高级一些的遥控器可以设置并保存 2-3 组油门曲线的 IDLE 设置（油门-螺距关联的，螺距根据实际需求自己调整），并且可以在飞行过程中来回切换这些设置，所以可以设置多个定速油门来满足不同的转速需求（如 IDLE1 设置 70%油门一条水品线，IDLE2 设置 80%油门一条水平线，IDLE3 设置 90%油门一条水平线，这样就有三个不同的定速档，来满足不同的飞行需要）。

精灵定速模式下，由于无法查看 Max RPM，所以用户需要提前将遥控器设置好，并借助外部设备（如魔镜）查看主旋翼的转速，最终确定需要设置的油门值。这里也可以粗略预算一下需要设置的油门值，比如电机 KV 值为 480KV，12S 满电锂电池，电机齿 13，主齿 110，这样可以得到主旋翼的最大转速大致为：480*12*4.2*13÷110=约 2850 转，若要飞 2150 转，2150÷2850=约 0.75 即 75%油门，实际再根据个人感觉或者魔镜看到的数据做调整。

总结：
精灵定速下不能看到标定的具体转速值（Max RPM），所以定速油门只能靠感觉去调（或借助外部看转速的设备如魔镜）；
存储定速可以看到标定的转速（Max RPM），并且不用每次上电都标定转速，所以更加方便一些，建议装好机不怎么换齿比和电池节数的使用该模式，只要齿比准确，得出的定速油门对应的主桨转速也是比较准确的。

最后：

电调的最佳定速油门区间为 70%-90%，设置定速油门请尽量在这个范围内，较低的定速油门会使电调一直在低效率工作，大部分都发热了，较高的定速油门给电调留的补转空间就会很小，负载较高的时候有可能会出现补转不足导致掉转的问题。

附注：

好盈铂金 V3 系列电调的定速设置与 V4 相似，不同点如下：

1） 转速标定时，缓启动完成后需要等待 11 秒再加锁油门锁或将油门摇杆推至最低；
2） 存储定速下标定的油门值需要在 USBLINK 软件上才可以查看。
3） 电调的最佳定速区间为 60%-86%。

HobbyWing Platinum V4 Speed-governing Function

1 Explanation for ESC Speed-governing

Establish the “Motor RPM-Throttle Amount Curve” via the speed standardization, and then set the throttle amount to some fixed value on the transmitter, in that condition, the motor will output the RPM corresponds to the throttle amount and keep rotating at that speed.

• In the “Helicopter (Elf Governor)” mode, the ESC won’t save the “Motor RPM-Throttle” curve after it’s disconnected from the battery, so every time the ESC is connected to the battery, it will standardize the speed, otherwise you cannot use the speed-governing function normally. In this mode, due to the differences like batteries’ different discharge capacity, the standardized RPM is a little different every time. In consequence, at the same throttle amount, the RPM may be a bit different when using different batteries, but this won’t affect the speed-governing effect.

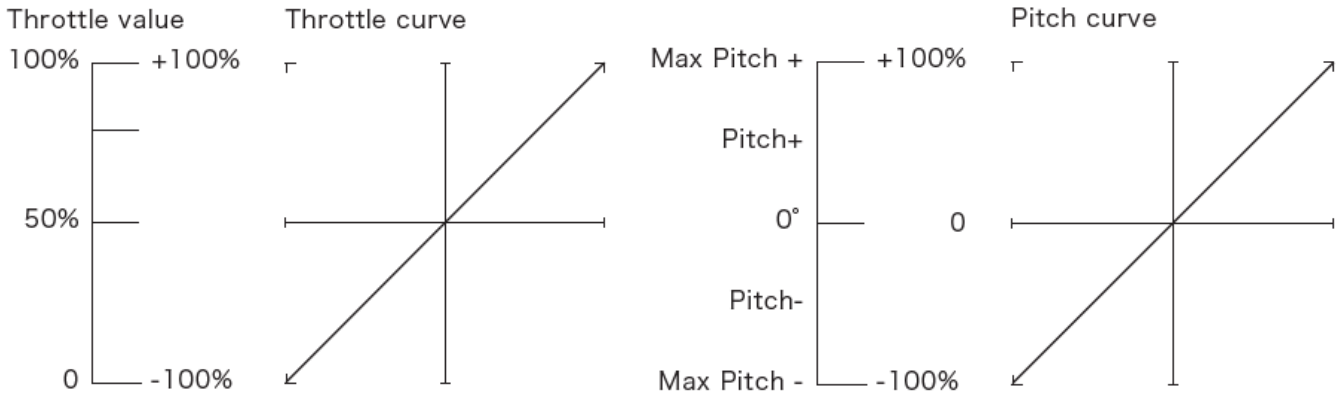
• In the “Helicopter (Store Governor)” mode, the ESC will save the “Motor RPM-Throttle” curve after the speed standardization. So after adjusting to this mode from any other mode, you need to standardize the speed when the ESC is connected to the battery for the first time and you needn’t standardize the speed again after disconnecting the ESC from the battery first and then connecting it to the battery again. If adjusting to any other mode from this mode and saving the “Motor RPM-Throttle” curve, and then adjusting back to this mode, the “Motor RPM-Throttle” curve saved by the ESC will be cleared, and you need to standardize the speed once again. If your ESC remains in this mode in future, then it will always carry out its operation as per the saved “Motor RPM-Throttle” curve. When standardize the speed for the first time, we recommend using a battery in good condition. After the RPM standardization, change another battery with the same number of cells to fly your aircraft. At the same throttle amount, the RPM should be consistent with the RPM of the first flight.

2 RPM Standardization

1) Theory of RPM Standardization

During the RPM standardization, the ESC will establish a “Motor RPM-Throttle” curve by itself based on the actual battery voltage and the actual KV rating of the motor. Therefore , you need to standardize the speed with a fully charged battery, and ensure the main blade pitch is 0° (in order to make the helicopter not take off).

In general, people use the default “Throttle Curve & Pitch Curve” of the transmitter (as shown below) when they standardize the speed.



Attention: Please ensure the main blade pitch is 0° and the throttle amount is above 40% (we recommend using 50%) when standardizing the speed.

2) Procedures of RPM Standardization

• We recommend using the default “Throttle Curve & Pitch Curve”. (If you don’ t want to use the default setting, then please ensure the throttle amount is 50% and the main blade pitch is 0° when the motor rotates.

• Turn on the transmitter, move the throttle stick to the bottom position and then wait for the ESC completing the self detection.

• If you’ve set the “throttle cut” function, please lock the “throttle cut”, and then move the throttle stick to the 50% position and then unlock the “throttle cut”. If there is no “throttle cut”, then you can move the throttle stick to the 50% position directly.

• The ESC drives the motor to rotate, the main blades start to accelerate slowly (because the main blade pitch is 0°, so the helicopter won’t take off, but you still needs to be careful), you need to wait for the acceleration completing and the speed getting stable, and then lock the “throttle cut” or move the throttle stick to the bottom position.

• The ESC will stop driving the motor, the main blades start to slow down and then stop rotating.

• The RPM standardization completes.

Attention: Please calibrate the throttle range before the RPM standardization. There will be no need if you've carried out the ESC/Radio Calibration when the first time you used this ESC or you didn't restore the settings to factory defaults after the calibration (changing the transmitter & receiver is an exception).

3 How to Set the Speed-governing Function

Attention：

• The best throttle amount (set in the Helicopter "Store Governor" mode) of the ESC ranges from 70% to 90%, so please try to set the throttle amount (set in the Helicopter "Store Governor" mode) within this range. A low throttle amount (set in the Helicopter "Store Governor" mode) will make the ESC always function inefficiently; while a high throttle amount (set in the Helicopter "Store Governor" mode) will leave the ESC a very small compensation space, then compensation insufficiency issue may happen and cause (speed decrease) problem when the load is high. In that case, we recommend changing the motor or drive gear ratio (you need to re-standardize the speed after you change the motor or drive gear ratio).

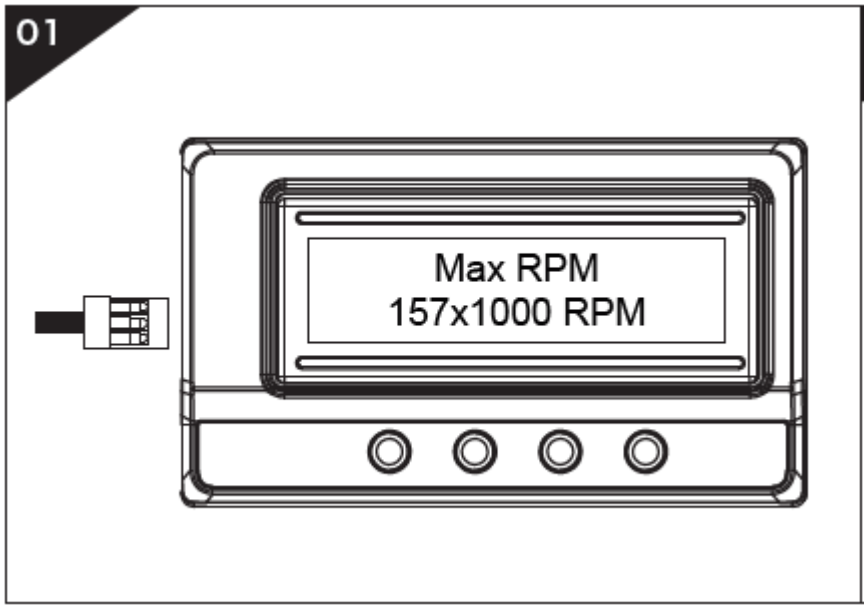
• In the "Helicopter (Store Governor)" mode, if fly your aircraft with a low performance battery after standardizing the speed with a high performance battery may cause damage to the low performance battery.

• In "Helicopter (Store Governor)" mode, different battery packs can bring the same stable RPM only if they have the same cell count. This won't change even when you change the battery pack. However, battery packs with different cell count don't have the same effect. For instance, in "Helicopter (Store Governor)" mode, you can`t use a 4S to calibrate the motor RPM and then use a 6S to drive the motor, hoping it can run at the same RPM.

• You can decide the control feel via adjusting Governor Parameter P/I. In "Helicopter (Store Governor) or Helicopter (Elf Governor)" mode, connect your ESC to a smart phone or PC, then you can check the "throttle VS speed" chart.

1. In "Helicopter (Store Governor)" mode, you can check the standardized speed (Max. RPM) and needn't standardize the speed every time when the ESC is connected to the battery as in the "Helicopter (Elf Governor)" mode, so it's more convenient. We recommend using this mode in the condition that you're using fixed motor, drive gear ratio and battery (with same cell count). In this mode, only if the drive gear ratio is accurate, the main blades ' RPM \ corresponds to the throttle amount (set in the Helicopter "Store Governor" mode) you will get will be accurate as well. About how to "set the speed-governing function" in this mode, let's take an example .

• In "Helicopter (Store Governor)" mode, connect the ESC to the LCD program box or WIFI Express module when the RPM standardization completes, and then find the record (as shown in Figure 1) as per the instruction about the " data checking" process.

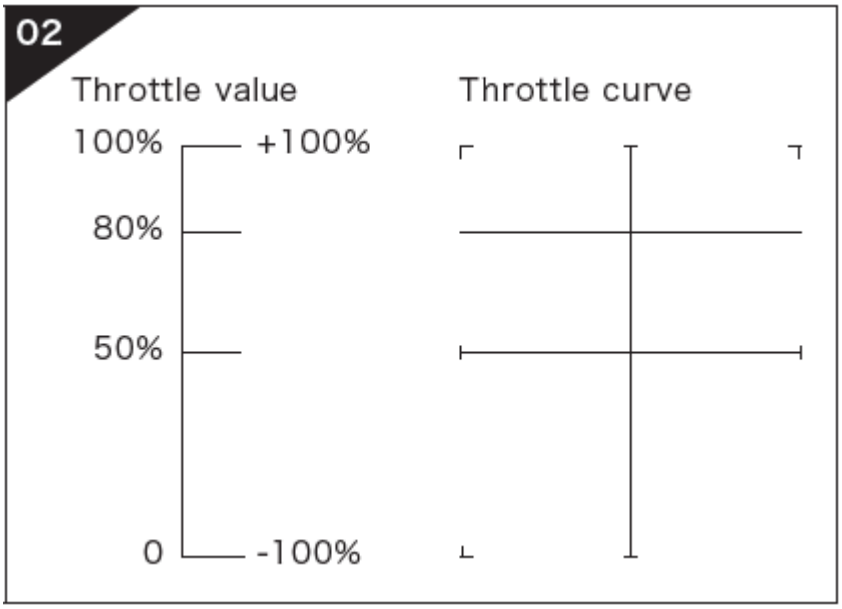


The value shown in the image is just an example, pleas take the value actually displayed on your LCD program box as standard. This value is the max. electrical RPM the motor can reach at the 100% throttle.

• Take a helicopter with single reduction gear unit as an example, with the motor poles is 10, the motor drive gear is 13T and the main drive gear is 120T (that the drive gear ratio is 9.3), then you can get the main blades' RPM at the 100% throttle.

Formula: Main Blades` RPM (at the 100% throttle)=Max. RPM÷ (Motor Poles ÷2)÷Drive Gear Ratio

The Main Blades' RPM (at the 100% throttle) in the example is: 157*1000÷(10÷2)÷(120÷13)_3400 RPM If the Main Blades' RPM needs to remain at 2700RPM during the 3D flight process, then you need to set the throttle amount (set in the Helicopter "Store Governor" mode) to 2700÷3400_ 0.8, that is you need to set the throttle amount to 80%. At this time, you need to set the value of the 3D throttle curve (i.e. IDLE1) to 80% (as shown in Figure 2):



So next time, when you fly your helicopter, let it take off in the "Normal" mode first and then switch to the "IDLE1" mode directly, then your helicopter can starts the 3D flight with 80% throttle amount (that's the standardized speed of 2700 RPM).

Notes: in general, you can set and save 2/3 sets of throttle curve IDLE settings on a high quality transmitter (and you need to adjust the main blade pitch of each set of IDLE setting as per the actual demand), and switch between these settings during the flight and have the different throttle amount (set in the Helicopter "Store Governor" mode) to meet the different RPM demands (i.e. when setting IDLE1 to 70%, IDLE2 to 80%, IDLE3 to 90% in the way as explained earlier, then you will have three different throttle amounts (set in the Helicopter "Store Governor" mode) to meet different flight demands.

2. In the "Helicopter (Elf Governor)" mode, you are not allowed to check the Max. RPM, so you need to set the transmitter in advance and check the main blades' RPM with the help of some external device (like RPM viewer) and then decide the throttle amount you need to set. Here you can calculate the throttle amount roughly. For example, if the KV rating of the motor is 480KV, the battery is a 12S LiPo, the motor drive gear is 13T and the main drive gear is 110T, then the main blades' RPM is: KV Rating × Battery Voltage ÷Drive Gear Ratio (480*12*4.2*13÷110≈2850). So if you want your motor to rotate at the speed of 2150RPM, then the throttle mount is: 2150÷2850≈0.75 (that is 75%), and then you adjust it accordingly as per your preference or the data you read on the RPM viewer.