Flyweight (Application)

Flyweight - Going from stock engine to big bore, change flyweight?

Question) Have your clutch kit on stock 800R x 154". 15.3g for 8150, clicker 4. Dropping in 860BB. Currently have your mountain kit installed. What do you recommend for a set up for this kit at 6000 feet, spring change, pin weight, ramps?

Answer) Your carbureted 860 kit needs correct jetting before the engine speed will have a chance to be correct.
You'll find the full throttle engine won't be near its suggested rated speed until 2 main jet sizes away from target. The tuner first must achieve correct carburetor jetting to get the engine calibrated properly. Then start to tune the primary clutch to match the correct engine calibration.

At this point don't change the clutching other than a clicker choice. Push off the dock with the new engine and get your sea legs with it. Make sure you have the confidence its going to rpm correctly and actually make the power its supposedly to deliver.

Don't be fooled by more power = more flyweight. More pinweight is needed, if the engine runs with increased torque at the original 8200 engine speed or lower.

Example) my test guy FastZap, dyno'd his 800R at 150hp at 8150 rpms. After getting the big bore dialed in and dyno'd it, it went to 169hp at 8300 and had to increase 2 grams but there was an honest 19hp increase.

Another of my test guys went to 8500 twins with his big bore. Clutch settings from (16 grams @ clicker #4) to (15grams @ clicker #5 to get 8500). Sled very strong and higher track speed.

Aaen's Principle) Weight determines rpms. IF you need more engine speed, THEN reduce the flyweight.

IF need less engine speed, THEN increase the flyweight.

1 gram = approximate 200 rpms engine speed change - All testing is done at full throttle.

Bring your tools to change pinweight if needed.

Flyweight - Going from 800etec to 872etec

My personal sled is a 2013 TNT 800E x 120 x 2" paddle w/19:49 gearing (yes a short track w/154 gearing haha)

The flyweight for my stock engine was at 21.5 grams in clicker 3 for 7900~8000 rpms. After installing the TRYGSTAD 872, the first test I did was over revving at 8200 with the 800 settings. To overcome high engine speed, I selected clicker 2 to get 8000 rpms. The sled pulled much harder. At the moment, Im not happy with the backshift in some moments when cutting deep snow.

The lower clicker number revealing 8000 rpms told me that I can add at least 1 gram of flyweight (get back to clicker #3.)

Knowing that 1 clicker number = estimated 200 rpms change. Knowing 0.5 grams = estimated 100 rpms change. I wanted to make the engine grunt at 7900 and just touch 8000.

I added 1.5 grams and reset to clicker #3 and now I get 7900~8000 and there is a big increase of pull on my arms. Wanting to see how much harder I can load the engine, I removed the 167/390 and installed a 135/385, lowering the start force of the primary spring.

The engine pulls even harder now off the bottom end and backshift is superb. The 872 pulls harder and maintains track speed with more attitude than before. The proof of more torque at 7900 with the 872 than the original 800 is the flyweight grams I had to add to prevent an overrev

Flyweight - Can I run a calibration from 2000' to 10000'

Question) is any clutch kit or calibration able to cover 2000 to 10000 feet, or is that too big of a gap?

Answer) First off lets analyze the engine HP per elevations. The percentage noted is information from a Rotax Aircraft engine shop manual.
100% @ 0000' elevation [150hp]
89% @ 3280' elevation [136hp]
78% @ 6560' elevation [121hp]
60% @ 9850' elevation [102hp]

Example engine – mild ported 800HO rated @ 7950 rpms. At 2000 feet there is an estimated 144hp. You have clutch settings that work with an estimated 6hp difference from 144hp that allow the engine to run at its +/- 100 rpms.

Flyweight used to get 7950~8000 rpms @ 2000 feet is 21 grams in clicker #3.

(150hp at 1000 feet – **144hp at 2000 feet** – 138hp 3000 feet) Ideally you should be able to run from 1000 to 3000 feet and not have to change the clicker. The clutch settings should cover the variation in engine power and not go past the factory +/- 100 rpms allowable engine speed variation.

IF you go to 10000 feet [102hp] with that 2000 foot flyweight setting, the grams will be too much for the low power. The ported 800HO has the power of a stock carbureted 500SS engine or a really strong 440.

Flyweight rule of thumb – For every 1000 feet elevation increase, then reduce one gram of flyweight.

Estimated flyweight grams needed for 10000 feet. (10000 – 2000) = 8000 feet difference.

For 8000 foot difference, then reduce 8 grams from 21 = 13 grams.

You could be happy with your performance at home, but not happy with the performance out west at elevations.
At this point, calibration decision is based on a deficiency. To overcome the power deficiency, the tuner has to change at least the flyweight gram amount for the higher elevation.

BRP supplies calibrations for different elevations, so do clutch kit manufacturers. Its not as simple as changing a clicker for a 4000' elevation increase and expect near 100% performance.
Choices - install BRP high elevation components when you go to the mountains and then remove those components and run stock calibration back at home.

OR
Run an all-elevation clutch kit so you can have the aftermarket capacity at home, however require that you only have to change the primary clutch flyweight for the elevations and power differences.

Exhaust - Adding a pipe and/or y-pipe
Question) I have an exhaust that runs higher engine speed. The exhaust is supposed to make another 10 hp now. Should I add flyweight for the additional horsepower?

Answer)Say with stock engine you run 8150 rpms. Add an exhaust system and now the vendor wants you to run 8300. The additional hp is by virtue of engine speed increase and now not necessarily have to add more flyweight.

Remember the principle about finding rpms - IF need higher rpms, THEN reduce flyweight.

IF the engine is making 10 more HP at the original engine speed, THEN you will have to add flyweight grams. The engine is making more torque **at** the original engine speed now and yes you will have to add a percent more grams to maintain original engine speed.

IF the engine is making 10 more HP **at higher** than original engine speed, THEN you will have to reduce flyweight grams. The engine is making less torque now at the original engine speed. The HP peak speed is moved higher. To get the engine to run at the higher speed, you will have to reduce flyweight.

Better to run the sled first, observe rpms, what are they? Then make a clicker adjustment to see if you can find the new engine speed. If you were able to prove the engine ran better at the higher engine speed with the higher clicker number then can reduce flyweight and get back to the original clicker number.

Flyweight - Recommended grams are different than what's in the flyweight kit

Question) I received my kit. From the weight instructions 21.5g is the wanted starting point for my elevation. Referencing the tungsten rods sheet the closest setup is 21.6g (14.5 + 6.3 slug + .08 set screw). Is this 21.6 gram what I should put in or do I need to remove 0.1gram to make it 21.5 grams?

If I do need to remove small gram increments like 0.1g for tuning purposes, what is the recommended way to do so?

For example would I take a file to the tungsten rods or sand down or file down the set screw ends to reduce small amounts of grams.

Answer) Hi. Don’t worry about the 0.1 gram.

½ gram = estimated 100 rpms.

The parts in the flyweight kit are spaced with enough estimated ½ grams for you to achieve the needed engine speed if needed to change engine speed.

Don’t worry about 0.1 gram because one can’t even frame a test to offer repeatable results of engine speed change with 0.1 grams.

You have to start with an estimated flyweight setting. From that point on it's you and the sled and the environment you'll run it in – the tachometer will speak to you if the engine speed is correct or not.

Each sled is an individual when it comes to fuel type, compression, suspension settings, where you stand or sit on the sled, snow type, all local to where you are riding.

Put in an estimated amount and go test full throttle when you have the conditions to do so. Adjust the engine speed with the flyweight grams.

Engine speed

Principles: *Flyweight determines rpms.

Need more rpms = Reduce flyweight mass.
Need less rpms = Add flyweight mass.
1 gram = estimated 200 rpms change at full throttle.

Flyweight - What grams for 0 to 3500 feet and 9 to 11000 feet?

Bruce) 09/800R/154/2.5", I am at 21.6 grams on the weights. And have my clickers set set at 4. For 0 to 3500 ft. Sometimes in Co, 9 to over 11+. 250 lbs Thnx

Joey) Hi Bruce. The suggestion for sea level is 21.5 grams for 8300 rpms. Start off with 21.6 grams at sea level.

Rule of thumb) Think about setting the flyweight grams up for getting perfect engine speed in the middle of the elevation range you ride in.

The median of your range is 1750 feet. (0 to 3500) Go out and run the sled and if you know you are at 1700~1750 feet, do your testing at full throttle there.
Do you see 8300 on the tachometer at 1750 feet yes or no?
IF lower than 8300 rpms at 1750 feet THEN reduce the grams in the appropriate amount to get 8300.
Doing this will get you into the BRP's stated +/- 100 rpms.
Ideally you will see this.

750 feet @ 8400 (+100 rpm)
1750 feet @ 8300 (correct engine speed)
2750 feet @ 8200 (-100 rpm)

Then when going higher elevation causing lower than 8200 rpms can clicker up one number and that will take you for another 1000 feet of elevation increase and not have to touch the clicker to correct engine speed within the BRP stated +/- rpms.

This follows the same patterns for higher elevations. (Sometimes in Co, 9 to over 11+) Look at the setting sheet to see what weight is needed for 9500. 13.6 grams for 9500 feet. Lets say 12000 - 9000 = 3000. The median would be 10500 feet of your riding range.

Rule of thumb) 1 gram = estimated 200 rpms change. 1000 feet elevation difference = estimated 1.0 gram change.

Logic statement) IF 13.6 @ 9500 feet, **THEN** at 10500 feet, apply 12.6 grams.

Doing this will get you into the BRP's stated +/- 100 rpms.
Ideally you will see this.

9500 feet @ 8400 (+100 rpm)
10500 feet @ 8300 (correct engine speed)
11500 feet @ 8200 (-100 rpm)

.....8200ish. haha
Thanks
Joe

Flyweight - pDrive flyweight ramp differences (lazy or crisp)

Charles) What is the best ramp for the summit 850 etec? I have a summit 17 154 2.5 and saw some people telling that the 951 ramp is a lazy one. I ride in the low elevation area. I want your opinion about it. thanks.

Joey) Hi Charles, thanks for asking. On my 154 x 3", I've used the 967, 951 and the trail 968 ramps. I found that they all worked great with the correct pinweight and primary spring to achieve 7900 rpms. Each ramp mentioned has a different weight for itself. I spent about 4 tanks of gas on each ramp and ended with running the high elevation 967 ramps last, and, for the duration of the season. I also had G4 summit owners who tested stock clutching for me. I suppied them with pivot bolt spacers, steel and tungsten for each of the three ramps mentioned.
In the final analysis, I will say each ramp worked great for as I was one of the few tuners out in snowmobileland who had enough pivot weight to tune each ramp to make 7900 rpms. I made tungsten spacer collars to put on the BRP pivot bolts to ensure ability to make enough pinweight to achieve 7900 rpms.
Most people out in snowmobileland owning a summit did not have enough flyweight to get the engine to make correct engine speed. I even supplied skidoo dealers in N.America and Scandinavia with tungsten spacers to help their customers achieve correct pivot weight for sleds regarless of 967 or 951 ramps.

The #1 reason for lack of "pull" is because of the pinweight was not correct for achieving 7900 rpms with this 850 engine and clutching.

The #2 reason people would have had problems with either ramp 967 or 951 on the summit, is because they were tuning the clickers the wrong way. On the pDrive primary clutch....

1] pivot weight determines engine speed (thee end)
2] clicker position only changes the character of the clutch tuning on the bottom end in the greatest amount. Clicker #1 makes the engine feel most revvy. Clicker #5 makes the engine lug the hardest off the bottom end.

Tuners who did not test for me; telling me their story, were running the clickers the same way as the TRA which works opposite of the pDrive primary clutch clicker function.

If you have the 951 ramps they will work just fine with anyone's clutching as long as you have the correct pivot weight to make correct engine speed.

Any other question, please ask
Thanks, Joe

Charles) Thank you very much Joe. This is very helpfull. Last year i bought a kit from goodwin performance for changing the weight of the ramp. I am a heavy guy and don't know if the original spring is enough for me. I want my sled to respond quicker and get rpm fast. Also want to have a good track speed. I don't know which ramp/spring is the best for me. I can change the weight as well.

Joey) The secondary clutch is lazy. The black secondary spring 160/300 is not that strong at converting power to the ground. Say for a heavy guy as you mention, the secondary spring should have more start force like 200/300, a Dalton red or a 218/305 dalton red/yellow.
Then the engine will feel more crisp as the clutches are being "Stalled" by more spring force to allow the engine speed to build quicker instead of lugging its way to 7900

Flyweight - What flyweight do i need to go from low elevation to the mountains & the "fukkits"?

Evan) I'm from Wisconsin looking to do my first trip out west to Wyoming with a trail sled 1.25 track
Joe) To go out west just do what you would do say if you have my kit or anyone else.
Every 1000 feet of elevation increase the engine loses about 5~6hp.
The flyweight grams you use in the sled is a representation of engine torque.
More power at lower elevation, more torque, more flyweight.
As elevation increases, engine has less torque, therefore requires less flyweight.

Example – say you need to run 18 grams at 1000 feet and are going to 9500 feet.
9500 feet – 1000 feet = 8500 feet

Rule of thumb is for every 1000 feet increase can drop estimated 1 gram pinweight.
8500 feet then you would reduce estimated 8.5 grams. Go for 8 grams lower.

Then 18 grams at 1000 feet; 10 grams at 9500 feet. 10 grams at 9500 feet will get you close, might be a little light by 100 rpms.

Overcoming the fukkits
In the mountains, Bring your tools to change the flyweight grams on the first day and do it on the first day right at the end of the ride – strike when the iron is hot and the iron is hottest at the end of the day when everyone is coming down from the high of riding, and laffing and shooting the breeze about the day.

Don't for a second think you will do it the next morning because everyone has a case of the "fuckits". Aww fuckit, we'll do it tomorrow morning....
....and that wont happen because you'll be in line for a long time waiting at denny's to get in for breakfast and then bullshitting with the other guys and all this adds up to "holy shit, its getting late in the morning so "fuckit" gota go riding or I'll be behind.

Yer never under the gun to do clutching at the end of the day – everyone will wait for you, they're tired. But in the morning you are under the gun to do tuning if you did not complete the end of the first day.

Each sled is an individual so that takes in fuel/elevation/snow type/rider style/cylinder head – my suggestion is a push off the dock so to speak and from that point on it can be bang on or a ½ to 1 grams change if needed

Flyweight - Getting used to the pDrive ramp system

Tyler) I understand that the new Pdrive clutch does not use the clicker settings to increase or decrease rpms. It uses pin weight to change rpm. If I am in low elevation, and my sled is consistently hitting 7900 rpm, why would I ever want to add or subtract pin weight? Is it for a harder or lighter acceleration need when on hard pack or off trail? I am slightly confused! Ha-ha

The sled is all stock, and I am about 220 with all my gear on. The highest elevation I ride in is ~1900 ft.

Joey) Pivot pinweight determines engine speed. Need more engine speed, then reduce pivot weight. Need less engine speed, add more pivot weight.
Example: Need 7900 rpms. Testing - IF have 8000 rpms with 33mm pivot weight, THEN need to add more pivot weight.
Rule of thumb - one gram = approximate 150ish rpms change.
Need to add 1 x 2mm steel weight @ 1.1 gram.
Testing should show 7900 rpms (estimated 100 rpms lower now)

pDrive 2mm steel weight 486016040 @ 1.1 gram
pDrive 3mm steel weight 486016041 @ 1.6 gram
pDrive 4mm steel weight 486016042 @ 2.2 gram
pDrive 7mm steel weight 486016043 @ 4.0 gram
38mm pivot bolt 417224222 @ 17.1 gram
33mm pivot bolt 417224221 @ 15.5 gram
26mm pivot bolt 417224221 @ 13.3 gram

Clicker dial
Clicker 5; higher clicker, more load on engine off bottom end - engine lugs harder.
Clicker 1; lower clicker, less load on engine off bottom end – chainsaw revvy feel

Effects of elevation
As the elevation increases, for every 1000 feet, the engine loses estimated 5~6hp. 160hp at sea level, 138hp at 4000 feet. IF at sea level the engine speed is 7900 rpms with 18.2 grams, THEN at 4000 feet, the pivot weight will need to be an estimated 4 grams less @ 14.2 grams.