DUV PXPT-17 (updated)

Dalton Pro ATV Clutch Kit

2017 Polaris RZR XP Turbo model – Stock and oversized tires. Adjustable kit.

Components: 1) Dalton Light Blue/White primary spring (DPPS-LB/W)
1) Dalton Yellow secondary clutch spring (DPSS-Y
1) set of Dalton Quick Adjust flyweights/hardware (QP T- 645)*
Including 3 pkgs coarse set screws and 1/8" T-handle
. 6) Composite flyweight thrust washers (custom wear surface material)

- The Quick adjust hardware includes a selection of ¼" UNC set screws with pre-applied Nyloc material.
  These flyweights are designed differently. The base weight is 64.5g, however, they are bored a different dimension for the use of a special pivot bushing material, and machined differently for the use of thrust washers. They also have different location of mass. The total "grams" of these flyweights are not related to stock or other flyweights.

Tools:
1) Primary clutch puller bolt is recommended. A primary clutch puller makes for easier drive clutch service if you intend to do clutch work in future (maintenance) or remove the drive clutch for easier work and inspection. Polaris puller is part number 2872085. Dalton puller is part# DCP-C.
2) Secondary clutch compression tool.

Description:
Adjustable clutch kit for the 2017+ Polaris RZR XP Turbo models.

One clutch kit that can be set up for different terrain and conditions means accurate clutch tuning for your situation. Improved acceleration, back shifting, and belt performance. The kit is adjustable, making it possible to optimize the clutch calibration for different tire sizes and situations.

This kit includes Dalton's "Quick Adjust" flyweight system that allows you to add or subtract weight from the flyweights, without even removing the flyweights from the drive clutch.
-Set up manual includes "set up instructions" for different applications.

PLEASE READ ALL INSTRUCTIONS CAREFULLY FIRST!

Please take the time to thoroughly read and understand all of these pages before continuing. Belts are expensive, proper installation and knowledge of the system are key to best performance and belt life. (Some of the pages that look boring are most important)

WARNING

Clutch components should only be installed by factory trained mechanics and personnel with a complete knowledge of variable rate belt transmission systems or CVT's.

CVT clutches are assembled under spring pressure and require special tools and procedures. DO NOT attempt to disassemble clutches if not experienced or qualified.

This is a performance kit and is intended for the use of experienced adult riders who are trying to obtain a higher level of performance for racing, etc. Dalton Industries has no control over the use, misuse, or installation of these components and assumes no responsibility for any injury or damage.

INSTALLATION: (dealer installation)

Important: Always remove the KEY from the ignition before working on clutches.

1) Remove left rear wheel to access CVT clutch area. Remove the cover bolts to remove the plastic cover shroud.

2) Take note of direction of belt before removal. Remove belt.

Note the "L" shaped tool from the tool kit. Thread the tool into the threaded hole in the secondary clutch. This will spread the sheaves apart to allow easy removal of the drive belt.

3) Next, remove primary clutch center bolt. Keep the spacers on the bolt and set the primary bolt aside. Thread the primary clutch puller into the drive clutch and remove drive clutch now. **Remove the 6 bolts and clutch cover plate. Be sure to look for alignment marks on cover plate or mark the clutch with a magic marker for orientation during re- installation**. *Be careful when removing cover plate bolts, the primary spring is under pressure.*

Note: there is a plastic spring plate. Note the direction and location of this plastic part under the cover. You will re-install it with the new primary spring later.

4) With the primary clutch cover plate off, and the spring removed, remove the flyweight pivot pin (note direction) and the stock flyweights. ****Take note that with the new adjustable flyweights kit you will be using a thrust washer on each side of the flyweight.**

5)* **Set up the flyweights** as described in this instruction manual for your desired application **See "Set-Up Guide"**
Take note of your set up guide and **set up the flyweights**, then install the flyweights into the drive clutch. Use Blue Loctite on the flyweight pivot bolt nuts. Be sure to read the complete document before continuing.

**** Install thrust washer on each side of the new supplied flyweights. (see next page)**
Always be certain that you keep track of the set screws....it helps to mark the clutch in number from 1-3 to keep track. Be certain to not cause an imbalance. Keep track of screws remaining.
Make sure all screws go in all the way and bottom for secure fastening.

****Install Thrust Washers**- When installing the Dalton Quick Adjust flyweight, it is **important** to install the supplied **thrust washers**. One on each side of each flyweight. These Flyweights were designed to be used with these washers. These special composite washers are a very durable material for wear surfaces.

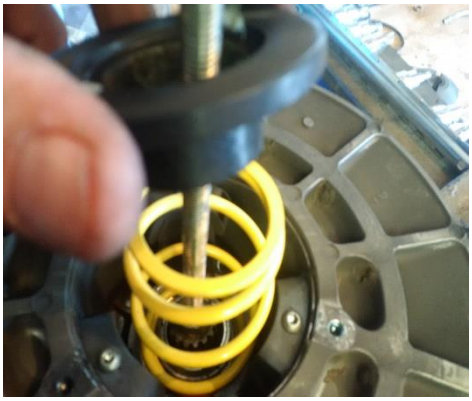
With stock clutches it is very common to see the side of the clutch wearing from the flyweight pivot end gouging into the aluminum, even with only low miles.

**** These thrust washers are a little slow to install but very important!**

Take your time and install the thrust washers properly.
They offer better, more accurate flyweight movement, improve the tolerance/clearance for side to side movement, and improve durability.

6) Install the new primary spring into the clutch and re-install the cover and plastic spring plate onto the drive clutch (primary motor clutch). **Note: alignment marks.** (cover bolts 9 ft/lbs)
7) Re- install the primary and clutch center bolt and torque to manufacturers specs. (96 ft./lbs.)
8) **Remove secondary clutch.**

Remove the center bolt and the snap ring hold the friction washer. (photo 2017, serv. manual for updates)
9) Mark all of the parts of the secondary clutch for reference with a magic marker for orientation reference when you put it back together, this is for proper alignment and balance. Using a secondary clutch compression tool, compress the secondary just slightly to hold light pressure on the three arm retainer plate while you remove the 3 torx screws. **Note**: **The retainer cover is loaded by the spring pressure**! Slowly release the compression and remove the factory helix from the clutch. Note reference marks.



10) Take notice of the spring spacer, spring, and helix, then remove the stock secondary spring, and replace it with the spring provided.

11) Carefully align the parts in reverse order and put it together slowly. Re-align the splines and 3 holes for the 3 screws. Slowly compress the three arm retainer plate and secure the three screws using blue removable Loctite. Torque to spec:

2017-18 (8 ft/lbs)
2019 (12 ft lbs)

12) Install secondary clutch. This type of secondary clutch is a "built on shaft type design" with independent parts that mount on the transmission input shaft. You will notice that you need to take your time and get the inner parts all aligned and the shaft through them all before it will fully seat onto the shaft. Be sure the clutch is fully seated (see service manual).

Re-install the friction washer as it was and the snap ring that holds it, then install the secondary bolt.

Torque Secondary Clutch to: **43 ft./lbs**.(2016-17) , **70 ft lbs** (2018-19). *Always check service manual for torque spec updates.*

Do NOT make guesses at torque or use an impact gun on this bolt. Caution and proper procedures are critical. If not assembled properly, the clutch could come loose and cause serious damage. **Do not assume it is like older versions.**
Use a bit of blue removable thread locker on the secondary bolt (make sure bolt is clean and dry first).

13) Install the belt. Inspect cover shroud and gasket and install cover.

Note: Our testing has shown best results with the factory belt, and calibration for this kit is associated with the factory belt. Use only the factory belt for this application.

OVERVIEW - and general CVT tuning

There are books written on CVT clutch tuning and some in depth principals of controlling the rate of shift of the belt on belt drive systems. The following is a very general guide to help those unfamiliar with understanding some basic principles of the system.

The CVT system on your vehicle is a variable rate system. It is a two pulley system that gives different belt ratio as it shifts. As the belt goes up on the primary motor clutch, it also goes down into the driven (or secondary clutch) giving a higher clutch ratio and more speed. Conversely, as the machine comes under load or slows down its speed, it back shifts to a lower belt ratio so that it will be able to pull away again after slowing or stopping. A system that is properly calibrated for its intended application will UP SHIFT as quick as possible *while still maintaining the proper rpm for the engines power curve. If a system is up shifted TOO quickly it lowers the engine rpm to a level below peak hp....if it up shifts too slowly it will rev higher during the shift phase than that rpm where the engine makes best power.* This same system should also BACK SHIFT properly. Back shifting properly means maintaining that optimum rpm as best possible, as the vehicle comes under load. Clutch components "control the rate of shift of the belt".

.

*****It is very important** to realize that on most ATV/UTV situations, that the "**clutch phase** "(the time that the belt goes from low ratio to high ratio) is only for a distance of approximately 500-600 feet on hard pack at wide open throttle, or around 50 mph. **After** which, the belt is fully shifted, and clutch components have little effect on rpm or speed. Once the belt is to the top, it is to the top... **and the engine starts to build rpm as the belt is out of ratio**. Clutch components cannot control rpm after full shift out is achieved. *Clutch components change the rate of shift of the belt...once the belt is shifted out, clutch kits cannot offer top speed increases.*

When testing for clutch RPM, it is important to check rpm at around <u>300 ft</u> of distance on a wide open throttle run (while the clutches are still not fully shifted).

***** - The <u>STOCK</u> XP Turbo operates best in the zone of 7900-8400 RPM. The conditions, state of tune and mods can dictate different requirements.***

<u>Be certain to properly warm up the vehicle belt and clutches before testing rpm.</u>

Different tuning components can control the rate of up shift and back shift of the belt to maintain a desired rpm range. The goal of a CVT clutch system is to keep the belt in the proper ratio at any given speed and load situation. The factory has set up your system to be a decent "all around" calibration for a stock vehicle. That means it can ride in different terrain, or haul a trailer, or maintain decent emissions, and be a "general" calibration that the factory feels is a suitable compromise in many respects

Many users of these vehicles, for various reasons, like to change the desired effects and purpose of their machine to a more case specific application, whether it be over sized tires for mud, drag racing, sand applications, pulling competition, high altitude operation where less power is available, different engine(rpm) characteristics from engine modification etc. In different situations like this, performance can be optimized by re- calibrating the shift pattern of the CVT.

An example of a need to change the shift pattern would be adding larger tires. When installing larger tires there are a couple of factors that effect the clutching. The larger tires result in taller gearing. With a taller gearing situation, the last thing you would want to do is up shift too fast, as you are already starting off in a higher final drive ratio from the tires. The other factor is rotating mass. Heavier, large diameter rotating mass is a real negative for acceleration. *Although most experienced tuners know that a ATV/UTV with oversized tires will never be as quick as one with stock lightweight tires, clutch tuning can help compensate for some of the losses and help restore performance.*

The Clutch Tuning Components (General tuning info)

Heavier Weights- Generally speaking, when you add heavier weights to a vehicle with the same HP, it will up shift quicker and thus **lower rpm** during the "**clutch phase**"**.**
Depending on the situation, sometimes you can get away with a quicker up shift. It is important to remember that the primary spring is the opposing force to the clutch weights, and that changing the rating of the primary spring can effect the amount of force required from the flyweights.
If you add HP and the machine starts to over rev, you may have to add flyweight mass to upshift faster and control rpm.
Lighter weights- Slower up shift during the **clutching phase**. Slower up shift **results in higher rpm.**
Note: Remember, sometimes different curvature and profile can make total GRAMS irrelevant to each other. ***You can only compare flyweights by grams if the shape and distribution of mass of two flyweights are the same***.
If the engine is not turning enough rpm, and you know that all other things that make the appropriate horsepower are correct and doing their job, you may have to lighten the flyweight mass to allow more rpm during the clutch phase.
The flyweights in this kit have a different weight distribution, as well as machining for different bushings and materials, this makes the grams irrelevant to stock or others.

Springs – In general, stiffer springs slow the up shift. Softer springs up shift faster.

Primary springs are in the front motor clutch. Sometimes primary springs are compared on load charts**. The initial load (first part of the compression)** of a **primary spring** controls **engagement RPM.** Primary motor clutch springs are the principal control of engagement rpm.

Secondary springs are more related to controlling back shift, torque sensing. A spring is another type of tuning component. A spring is always chosen relative to the flyweight and the rest of the system. Sometimes the stock springs are fine, other times re-calibration requires one or both springs in the clutches to be changed to suit the application.

It is NOT that quicker or slower up shift is BETTER....it is totally dependent on the situation. The goal is to achieve the best shift pattern for the application, so that *the engine stays in its best rpm zone.*

Dalton Pro Quick Adjust Cam Arms - Adjustable flyweights.
Dalton's patented quick adjust method means that you can add to and subtract from the flyweight mass from the main body of the flyweight without removing the weights from the drive clutch.

DO NOT turn the **engine backwards** during work on the primary clutch!. There have been claims that the timing can jump.

Grams can be added to or subtracted from the flyweights by simply turning the clutch so that the desired flyweight is in a position that you can use the T-handle, ALWAYS turn the clutch forward in the direction it turns when running only. Add or subtract set screws thus changing the total mass of the flyweight. **Never add screws so that the set screws are protruding past the curve of the flyweight**!

. **SET UP INFO – 2017 RZR XP Turbo**

Primary spring – Light Blue/White (DPPS-LB/W**)** This is the proper primary spring for this kit.

Secondary springs are tested for efficiency for the application. All components work together in a clutch package. For this kit the secondary spring supplied is **Yellow** (DPSS-Y)

This set up guide will provide a guideline for the stock vehicle

Note: When is stock form, the engine seems to make best performance around 7900-8400 rpm, Most often we had best repeated results for trail at approx. 8000-8250, and clutching to rev higher was not as good. In some cases, like exhaust mods, the engine may be ok up a little higher but it is better to not run more rpm than you need to. Many engine crankshaft dynos will prove that more rpm is not always better.
Sand Dune operation is a situation where sometimes it is better to be a little higher (100-200) on rpm because the back shifting is important.
Sometimes modified boost programs for extra HP may specify to run the engine at a higher RPM. The settings suggested here are for a STOCK engine. There are many different race programs and vendors out there that may sell aftermarket boost programs, etc for racers. With those programs expect to test. Sometimes you may find that the new HP level will pull the same clutching up to a desired rpm range on its own with the same clutch kit settings as stock HP level. Different tunes from different aftermarket suppliers make the modified versions all a little different, as well as, of course, the different terrains these vehicles are use in. If too much RPM add weight. Added HP of approx. 20 HP may require a gram or so heavier. Dalton quick adjust weights make it easy to fine tune. Start with the settings below and test rpm* during the "clutch phase" as described in this manual. Make sure that you understand "clutch phase" rpm. (overview page)

Some notes on the flyweight adjustment hardware:
The set screws used for flyweight mass adjustment are ¼" UNC thread and have a pre-applied nyloc compound on them. After repeated use, use a drop of blue removeable Loctite on the threads when finished tuning if doing adjustments for mods.
- **Use the supplied Allen T-handle to install the set screws**. Bottom each one out to the bottom of the threads until it stops. Do not over tighten, especially long ones like the 1" that have a lot of thread pitch can get stuck. You just bottom it out and snug it up. You can use additional screws , just add and bottom against the one that is in there. (do not use combinations that protrude outside the flyweight)
- **Always add the exact same screws to each flyweight** the clutch must remain balanced.
- **Always install the supplied thrust washers as shown** This improves durability of the primary clutch to better than stock.

The set screws are in the following increments (grams):

1/4" = 0.7g
3/8" = 1.3g
1/2" = 1.9g
5/8" = 2.5g
3/4" = 3.1g
1" = 4.3g (do not use combinations that protrude past the curvature of the flyweight)

Flyweight Set Up Guide

Go by TIRE SIZE FIRST, then the provided info. **Always use both springs,** and the flyweight set up for your application as described below. With turbos, terrain differences, and modified versions there can be a fair bit of variation. Dalton "Quick Adjust" flyweights make it easy to fine tune. The following is a basic guideline.

Main instruction for 2 seat version, ***see** note**: (++ for 4 seat versions)***

29-30" Trail/mixed use tires (including stock Bighorns) - **typical mixed use/ AT type tire**
QPT-645 flyweights with one 3/4" long set screw in each flyweight. (*++ 4 seat use 5/8")*

Sandy type terrain with stock tires (desert/ soft terrain riding with occasional dunes)– Install one ½"long (1.9g) set screw in each flyweight.- Test RPM* (*++ 4 seat version. Most often this same set up is fine. Adjust lighter if necessary).*

Sand Dune riding with 29-30" Use one of the 3/8"long set screw in each. (start this way and test your situation)
Note: Sand, HP, different paddles and soft terrain riding can have a lot of variables. Daltons quick adjust makes it easy to fine tune. For sand dune riding be sure to allow for belt cooling time in your riding style. It is sometimes best to go for a little higher rpm around 8300 or so for dunes (sometimes a bit higher if modified turbo boost level etc.). Adjust flyweights as necessary for rpm.

31-32" AT type, Mixed use tires (0-4000') **–** QPT-645 base weight. Add one ½" long (1.9g) screw in each flyweight. Test rpm* Also use this set up for Heavy 30" mud tires if mixed mud/ trail use. (++ 4 seat versions may require the use of the lighter 3/8" long set screw, test with ½" first, adjust if required)

29.5-31" Pure mud tires (Outlaws, etc), (0-4000' elev.) – QPT-645 base weight. Add one ¾" long set screw to each. Test application** This set up is more for Mud use and Rock crawling type application. *(++ use same set up for 4 seat version).*
In many cases, the larger tires require slower rate of shift (lighter weights), however, this is for applications that often use **mostly low range and depending the situation may need actually as bit more weight if low range is primarily used. If you are doing mixed use and often just on trail and using high range use the ½" set screw in each as a starting point.

CVT Clutch Tuning

We have given you the guidelines for many applications. There can however, be some varying terrain, tire weight, and conditions. Individual vehicles themselves vary in output. With turbo units, there can be other things like "boost leak", or etc. Slight problems can lower HP level and effect clutch calibration to get proper rpm. Always try to ensure proper HP as a variable if you have trouble to get rpm.
Special modifications? – There are heavier set screws included for things like extra hp add ons, or smaller tire sizes, etc..but if doing mods, expect to test.

Quick Notes (see "clutch tuning components" for more detail)
MORE WEIGHT upshifts FASTER and LOWERS the RPM during the clutch phase.
In an example, if you are hitting the rev limiter during the clutch phase, you could need to add weight so that the clutches up shift faster and lower the rpm. LESS weight will shift slower and increase RPM. Remember though, that sometimes it is normal to have RPM too high when the belt is cold. Run the machine a while to get belt up to temp for testing RPM.

Using the Quick Adjust set screws

This can be done on the bench for initial set up, and as mentioned earlier in the set up guide, it can be adjusted later while the flyweight is still in the clutch.

> Note: **Make sure that the proper composite thrust washers are installed on each side of the flyweight when installed into the clutch.**
>
> Do not install set screws in a combination that protrudes out of the flyweight.

1) **Carefully** install the set screw into the threaded passage. Be careful to start threads properly. Thread the set screw all the way in until it is snug at bottom of threads. Snug but do not over tighten, especially some of the longer ones like the 1" (with a long thread) as it may get stuck if you over tighten it.
2) Add additional screws as required, always bottoming on the one inside.

Important: be sure to keep track of what you are installing and where it is installed. It helps to mark the clutch with a permanent marker from 1-3 to be sure you install the same amount of set screws in each flyweight.

For later adjustments to the "quick adjust" flyweights, you can add or subtract the set screws without removing the flyweight base weight from the clutch with the use of the supplied Allen key.

Some notes on this model

Belt Burning

This vehicle is fast, and a very popular model for sport use. Power is good, but proper operation, and calibration of the CVT can help certain situations.
Before we ever tested this model, we had already heard of quite a few people seeming to have early belt issues. The factory sends the clutching for what they refer to as general purpose, but there is a wide variety of uses for the vehicle. Case specific clutch tuning can help make the CVT system more efficient for what you do. This is a very flexible kit that allows adjustment. There is a detailed guide to get you started.
Some people have some experience and like to do their own clutch tuning. There is certainly nothing wrong with that, but we sometimes hear that they only consider rpm or drag race results, etc.
Care must always be taken to consider the side effects of changing clutch calibration.
It is important not to neglect things like "back shifting of the belt as the vehicle comes under load".
Proper calibration of the CVT system for your application can reduce belt temperatures and belt problems. This kit is adjustable in and allows you to be better calibrated for different situations.

If you are having belt problems, proper CVT calibration like this kit can help.
There are also other things that could contribute to belt life issues, things like "not using **low range**" when you should.
This vehicle comes from factory with very tall final drive gearing that will allow very high top speeds. The side effect of that is the clutch system can strain in load situations from a take off in high range.

ANY time you are operating at low speeds or in load conditions you should use low range in the gearbox.

Example: The vehicle is being operated in tight woods trails at approximately 10- 14 mph average.

- If you use high range for slowly crawling around at these speeds, the belt stays down on the center hub of the primary a lot of the time. It will hardly up shift the belt to achieve that speed in high range. The belt is wrapped around a small diameter hub on the primary (motor) clutch.
- if you shift the gearbox to low range and travel that same speed, the belt will be shifted up mid way on the primary motor clutch, where it has a much better (larger diameter) grip surface. This also puts the flyweight in a better leverage position and the result is less slippage of the belt (and thus lower clutch and belt temperatures).

Running around at slow speeds or load conditions in high range can easily overheat the belt, and it may not fail immediately, but may later on. You WILL have better belt life if you practice using low when you should

Sand Dunes - Sand dunes can create a different situation. The vehicle is designed to be used in low range in load situations. Sand duners use high range a lot in order to have the momentum to climb…then this puts the vehicle in a load situation as you climb, but the trans is in high. This creates belt heat easily, and experienced duners learn to turn down soon enough and allow belt cooling time to help maximize belt life.

Thank you for choosing Dalton Industries!