DUV P10 G (upodated)

Dalton Pro ATV Clutch Kit

2016 Polaris General 1000 model – 28" and larger tires, Sand dune (any size tires), or higher elevations. Adjustable kit.

*****For stock and all 27" tires order the optional blue stripe secondary spring (DPSS-B/BL-T) also use this optional blue stripe secondary spring if changing this kit to smaller tires later (or using them seasonally). There are notes in the set up guide on the set up using this secondary spring.

Components:

1)	Dalton Orange/Green primary spring	(DPPS-O/G)
1)	Dalton Black/Red secondary clutch spring	(DPSS-B/R-T)
1)	Secondary spring seat/ slip washer	(DPS-SST)
1)	set of Dalton Quick Adjust flyweights/hardware	(QP94-59)*
6)	Composite flyweight thrust washers	(custom wear surface material)
10)	pcs.M5x 12mm long threaded set screw.	(1.2g each)
4)	pcs.M5x 6mm threaded set screw.	(0.6g each)
1)	pkg gold solid steel mass rivets	(3.1g) part # DFR-Y
1)	pkg Black hollow steel mass rivets	(2.8g) part # DFRB-Y
1)	pkg silver hollow steel mass rivets	(1.8g) part # DFRS-Y
1)	pkg aluminum mass rivets	(0.85g) part # DFRA-Y
1)	Dalton Custom Billet Helix (Private label ramp curve)	(Part# P16-R4)

- These flyweights are designed differently, and are bored for use of a special bushing material, thrust washers, etc. They also have different location of mass. The total "grams" of these flyweights are not at all 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 dealers have them or you can order Dalton part# DCP-C
2) Secondary clutch spring compression tool.

Description:
Adjustable clutch kit for the 2016 Polaris General 1000 (28" and larger tires), as well as sand dune or high elevation (above 3500') applications with any tire size.

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. This kit is for the described tire sizes, but can be used with smaller (stock and other 27") tires by adding the optional secondary spring DPSS-B/BL-T (Black/Blue w/tang). The instructions include set ups for that optional spring and tire sizes, etc.
This kit includes Dalton's patented "Quick Adjust" flyweight system that allows you to add or subtract some of the 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!

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 .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.

IMPORTANT!

Take the time to read the associated documents and set up instructions for the components. This kit contains various set up options and recommended settings for different applications.

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. Remove primary clutch center bolt. Keep the spacers on the bolt and set the primary bolt aside.

3) 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.*

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". Install Rivets first,** then set screws as required.
Take note of your set up guide and set up the flyweights, then install the flyweights into the drive clutch. 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. (do not over tighten)

<u>Install Thrust Washers</u>**- 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 <u>designed to be used with these washers</u>. These special composite washers are a very durable material for wear surfaces. They offer better, more accurate flyweight movement, and improve durability.

With stock clutches it is 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 offer smooth function and prevent further wear.

6)Install new primary spring into the clutch and re-install the cover onto the drive clutch (primary motor clutch). **Note: alignment marks.**

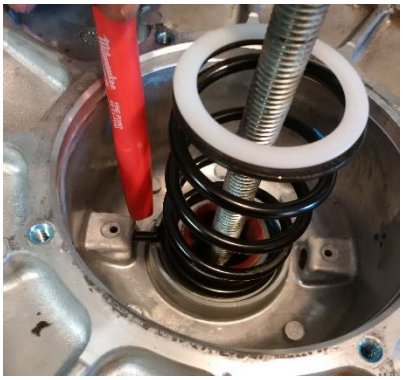
7) Re- install the primary and clutch center bolt and torque to manufacturers specs. (96 ft./lbs.)

8) **Remove secondary clutch.**

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 (Polaris part number PU-50518-A), compress the secondary just slightly to hold light pressure on the helix while you remove the 4 torx screws. **Note**: **The helix cover is loaded by the spring pressure**! Slowly release the compression and remove the factory helix from the clutch. Note reference marks.

10) You will notice that the spring has a tang on one end. This tang is to ensure the spring doesn't pivot on the aluminum end in the clutch which would cause wear. The rollers rotate as they move through the travel on the helix.

11) For the other end of the spring (the end in the roller assembly) we supply a spring seat that also serves as a gliding surface for the rotation. This provides much more consistent clutch action. Install the spring seat into the roller assembly and install the supplied secondary spring. Make sure to locate the tang in the proper position down in the clutch.



Install Helix

12) Align the rollers into the helix as shown and lower the helix into place on the rollers. Use the clutch compression tool to slowly compress the helix down into place.

Important! – Be sure to have the "X" on the helix aligned with the x on the clutch.

13) Install the T25 screws to hold the helix using a drop of blue thread locker. (48 in./lbs.)

14) Install secondary clutch. This type of secondary clutch is a BOSS 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).

Torque to 55 ft./lbs. for older versions like the 2016/17 with Bellville cup washer under center bolt.
Torque to 43 ft./lbs for the newer type or versions updated with the solid black base with the solid flat washer under the bolt.

Do NOT make guesses at torque or use an impact gun on this bolt. This is a BOSS (Built On Secondary Shaft) secondary. Caution and proper procedures are critical.
Use a bit of blue removable thread locker on the secondary bolt. Take note of the Bellville washer and be sure it is still the same direction it came off. If this cup washer is damaged or even used too many time it is important to replace it. Newer versions have the flat sold washer under the bolt, with a solid black piece under it in the clutch.

15) 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. Using other belts may require rpm adjustment.

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".
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******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 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>250-300 ft</u> of distance on a wide open throttle run (while the clutches are still not fully shifted).

*****- The 2016 1000 operates best in the zone of 8200-8600 RPM. This wide power band is good because we have noted that the belt runs at a lower rpm when hot. Ride a bit and warm the belt for testing.***

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, 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 mud 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- 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.
Lighter weights- Slower up shift during the **clutching phase**. Slower up shift **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 curve and distribution of mass of two flyweights are the same***. Curvature and distribution of mass are also tuning methods.

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. Sometimes a stronger compressed load rating spring (second part or load listing of a primary spring on a spring load comparison chart) can allow the use of more flyweight and the combination is effective for a situation, but not all situations are the same.
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.

Helix – Helix ramps are one of the controlling forces of the rate of shift of the secondary.
A **steeper** helix ramp up shifts faster (thus lowering operating rpm during the clutch phase).
A helix with a more **s**hallow ramp up shifts slower and thus allows more rpm. It also back shifts faster.
Remember, never focus on ONE tuning part, different secondary springs, etc. effect the required helix.

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.*
2016 1000 make best HP at 8200-8600 **rpm during the clutch phase.**
(see "clutch phase" in overview).

Dalton Pro Quick Adjust Cam Arms - Adjustable flyweights.
Dalton's patented quick adjust method means that you can add and subtract some of the flyweight mass from the main body of the flyweight without removing the weights from the drive clutch.
There is one rivet hole at the tip of the flyweight that can be used to change the "range" of the flyweight with different optional mass rivets (this rivet must be done with flyweight removed from clutch). Where the weight is located can change the shift pattern.

The threaded passage can hold up to 3 of the supplied threaded set screws that weigh 1.2 grams each. 3.6 grams can be*** *added or subtracted by simply turning the clutch so that the desired weight is up at the top, and using the supplied T-handle Allen key to add or subtract set screws thus changing the total mass of the flyweight***.
Sometimes, for example, switch from one application or terrain to another, you could adjust your clutch to the recommended setting by simply removing the plastic cover shroud, and make weight adjustments (according to instruction sheet), then re-install the plastic cover. No puller or primary clutch disassembly required. Set up and guidelines are on following pages.

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SET UP GUIDE – Polaris General 1000

Primary spring - Orange/ Green (DPPS-O/G**)** This is the proper primary spring for this kit.
Secondary springs are tested for efficiency for the application. Always use the provided **spring seat** on the secondary spring. For this kit the secondary spring supplied is **Black/Red (DPSS-B/R-T**)
Helix - The chosen ramp is part of the package and only related to the use of the flyweights and spring pressures provided with the rest of this kit.
Flyweights and tip rivets – the tip rivets are to adjust the "zone" of the flyweight. Always install/ compress tip rivets first, and then add the set screws (see "installing rivets" on last page).

Go by TIRE SIZE FIRST, then the provided info. **Always use both springs, spring seat, and the helix** provided, and the flyweight set up for your application as described below:

Note **: For all Stock (and 27" tires)- 0-3500' elevation, *This kit is designed and intended for oversized tires (tires that are 28"diameter and larger), and the described applications. Some people alternate with stock tires seasonally, etc. This kit can be used for 27" tires (and some of the smaller/light 28" tires) with the black/blue spring. Order the* ***optional Black /Blue*** *secondary spring* ***(DPSS-B/BL-T) and see "stock tires"*** *at the end of the set up guide on the next page.*
-All of the below settings on this page are for the 28" and larger tires and require the helix and red stripe secondary spring, as well as the primary spring provided.

28" mud tires 0-3500'elevation - QP-94-59 base weight, plus the 2.8g rivet + 3 long set screw in each flyweight.
28" Sand dune- QP94-59 base weight plus the 2.8g rivet + 2 long set screws + one short set screw in each flyweight*.
28" tires 3500-5000' elevation- QP94-59 base weight + 2.8g rivet +2 long set screws*
5000+ elevation - Use the base weight with .85g rivet for first test. Start with 2 long set screws in the threaded passage of each flyweight. Test RPM *(if often at very high try first with no rivet and 2 long)

Sand / High elevation applications – Sand is speculative, some is deep dry sand while other is desert roads and compact beaches, etc. Remember that sometimes shift rpm is a bit different with a hot belt. Different soils and terrain types, as well as the common altitude used can make this very speculative.

29-30" tires - Most AT type and mixed use tires , 0-3500' elev.
For typical hard/mixed **trail** use QP94-59 base weight + black steel (2.8g) rivet + 3 long set screws in each flyweight. If tires measure true 29.5"+ tall installed on rim, use 2 long and 1 short in each. (when using the short set screw be very careful not to cross thread).
For Sandy/desert terrain* use black steel (2.8g) + 2 long screws in each flyweight.
For occasional sand dune with these tires use 2.8g rivet and only 2 screws in each flyweight.
For elevations of 3500-5000' with 29-30" tires start with 1.8g steel rivet and 2 set screws*.
For high elevations (5000+ feet) use the base weight with .85g aluminum rivet and 1 long set screw for first test. Test RPM* (if mostly at very high elevation start with no tip rivet, and test with 2 long).

29.5-32" extreme mud tires/mud applications or extra large 32"AT type
Use QP94-59 base weight with 1.8 rivet, use 2 long set screws, and 1 short set screw in each flyweight* (when using the short set screw be very careful not to cross thread).

*Tire weight, actual size, elevations, terrain type is very speculative. Dalton's Patented "Quick Adjust" makes it easy to test and adjust the flyweights. See "**Clutch Tuning**" on following page.

<u> *Stock Tires -all* 27" (also some 28" that are smaller/lighter)</u> – Stock machine, 0-3500' elev.**
<u>Most applications</u> - QP94-59 base weight, + 2.8g rivet*+ 2 long set screws* in each flyweight. Most general mixed use riding. Use* ***<u>Black/Blue</u>*** *secondary (not the one provided in this kit) Use the helix and primary provided.*
<u>27" tires –</u> <u>Sand dune or high elevations</u> - use **black/ red** secondary spring and see 28" settings above.

<u>CVT Clutch Tuning</u>

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. There are ways to fine tune small adjustments that are quite quick and easy.

In an example, if you are hitting the rev limiter during the "clutch phase", you could need to <u>add weight</u> so that the clutches up shift faster and <u>lower the rpm</u>.
If you get on the rev limiter for any reason, add a set screw (or half screw*), or next heavier rivet in the tip of the weight. Try using **set screws first.** Remember though, that sometimes it is normal to have a slight bit of this when the belt is cold. Using <u>less</u> weight will slow the shift and <u>increase rpm</u>.

More notes on HIGH ALTITUDE - High altitude is less oxygen, and even though modern fuel injection can lean out the fuel and keep the mixture ratio corrected, there is less oxygen, and less fuel which equals less hp. Always try to calibrate for where you do most of your riding.

<u>Special modifications?</u> – There are <u>heavier tip rivets included for things like extra HP</u> add ons, or smaller tire sizes, etc...and more available, but if doing mods, expect to test.

If you have a modified machine that have special features that effect the operating rpm of the engine, particularly long duration camshafts or big bore kits, you must work closely with your engine shop to find the peak rpm requirement of the engine, etc. In these instances there will be a wide variance in requirements of the clutch shift pattern. You should consult the specific engine shop for recommendation as testing clutch components on your own will most likely be required. This is a nice feature of an adjustable clutch kit.

<u>Using the Quick Adjust set screws</u>

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.
1) **Carefully** install the set screw into the threaded passage. Be careful, as the small M5 screws can easily be cross threaded. Wind the set screw all the way in until it is snug at bottom of threads.
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 <u>same amount of set screws.</u>

For ***"installing and removing tip rivets"*** *see last page.*

Some notes on the 1000

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 a 1000 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 both the primary and secondary clutch, 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 final drive gearing that will allow quite high top speeds. The side effect of that is the clutch system can strain in load situations when in high range.

Using low range will make the belt run substantially cooler for slow speeds or load situations like hills or soft terrain.

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. Some do not like it because you have to stop and shift. They will not do it as often as they should, and they have belt problems. That is how it is. It is one of the facts of this type of system.

Installation and removal of Mass Rivet (tip weight)



1) Push the rivet ALL the way into the appropriate hole in the tip of the flyweight.
2) Using a **large** shop vise hold the weight in a manner in the vise that holds the rivet all the way through the hole (The rivet should expand ans pressed).
3) Squeeze/expand the rivet. Be sure to use enough force to fully expand the rivet, some of the larger solid steel ones need a large vise with very strong force to fully expand. **Place all rivets pointing the same direction**
4) **Be certain to compress this rivet to be less than the width of the roller path up inside the spider assembly. (approx .500 "total compressed length), If you are uncertain, install flyweight and cycle it up to see if the rivet clears. You can peen them to a finish length if they are already mostly compressed/expanded. There is no need to over compress shorter than .500" long, as you could break the base weight from over compressing too far.**

For later removal of rivets if desired, use the following procedure:

1) Mark lightly the center of the flush side of the rivet with a center punch.
2) Using a 3/16 "drill bit, drill approximately **half** way into the rivet.
3) Insert a flat ended punch with a straight shaft of 1/8" diameter into the drilled hole and tap the rivet through the hole to remove.

Thank you for choosing Dalton Industries!