

DP 850-12

Dalton Pro ATV Clutch Kit

Model: 2012+ Polaris Sportsman 850 XP , 850 EPS 4X4 Utility ATV
Stock or oversized tires, Altitude adjustable.

Kit #: DP 850 -12

Components:

1 Dalton Orange/Silver primary spring (DPPS-O/S)
1 Dalton Grey/Orange secondary Spring (DPSS-GY/O)
1 set of Dalton Quick Adjust flyweights/hardware (QP93 series,59.5g base, custom curvature=different gr req'd)
10 pcs.M5x 12mm long (1.2g each)
4 pcs.M5x 6mm long (0.6 g each)
1 pkg aluminum rivets (.85gram) (DFRA-Y)
1 pkg hollow steel rivet (Silver short steel, 1.8g) *optional for use only if necessary eg: hitting rev limiter with weight fully loaded.*

Tools: *Primary clutch puller bolt* is recommended . A primary clutch puller makes for easier drive clutch service if you intend to do more clutch work in future(maintenance), or remove the drive clutch for easier work and inspection.. Polaris dealers have them or can order Dalton part # DCP-M. (This model/kit is dealer installation recommended)

Description :

Optimum CVT clutch calibration for the Polaris Sportsman 850 XP 4 x 4
One clutch kit that can be set up for different terrain and tires sizes/elevation means accurate clutch tuning for your situation.
Improved acceleration and performance in bottom and midrange, better clutch reaction to load conditions.

This kit includes Dalton's patented "Quick Adjust" flyweight system that allows you to add or subtract weight from the flyweights without even removing the flyweights from the drive clutch. Instead of using generic flyweights or designs from OEM snowmobiles or regular ATV models ,extensive testing lead to development of a new custom base flyweight specific to this model. The new "Quick Adjust" flyweight in this kit has a different curvature ,and location of mass which allows superior belt grip and RPM control .**Having a different curvature and location of mass on the flyweight means that the total GRAMS you use of flyweight mass are irrelevant to other flyweights** , there is a common misconception in the market as to comparing flyweights by only "grams".

- Ultimate RPM control (can be easily adjusted for modifications)
- Stock tires or oversized
- Altitude adjustable
- New custom SP 850 specific flyweight profile
- Set up manual includes set up instructions for above applications.

PLEASE READ ALL INSTRUCTIONS CAREFULLY FIRST!

This model is a Dealer installation and has reference to the Polaris service manual.

Dealer -Please take the time to thoroughly read and understand these pages before continuing.

An unqualified person installing could cause damage to driveline components and/or injury.

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. There are references to parts diagrams and service manuals. Dalton Pro clutch components are made from high quality materials in a controlled procedure. Do not modify components.

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.This kit should not be installed on any vehicle that will be used by any person of MINOR AGE .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 in this kit before continuing with installation. This kit contains various set up options and recommended settings for different applications.

DP 850-12

INSTALLATION: (dealer)

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

1)Position the vehicle on level surface and place the shifter in PARK position. Elevate rear of vehicle and support in safe manner.

The 850 XP is different to access the belt drive area than previous Sportsman models. On this model, we find it easiest to remove the seat, remove the left rear wheel, left footwell bracket, and then the (4) bolts to remove the lower left hand frame support and remove it from the frame.

2) Remove the (11) cover bolts to remove the plastic cover shroud.
Take note of direction of belt before removal.

3)Loosen the secondary clutch retaining bolt to allow the sheaves to open. (do not yet remove)
Remove belt. INSPECT BELT carefully for hour glass shape or spot wear. Worn belts should be replaced.

4) **Secondary Clutch.** This unit has what is referred to as a **BOSS** (Built On Secondary Shaft) secondary clutch.
Carefully, Remove Secondary clutch. (See notes below before proceeding)

Caution !- Take careful note when removing the secondary center bolt/washers assembly ! All flat washers and thrust washers, should be accounted for . There is one side on the thrust washer that is teflon coated, and it is "direction specific," the PTFE surface goes against the .160" thick flat washer. Remember to confirm assembly order when re-installing. (section #7 in factory Polaris service manual has diagram) Note: secondary clutch center bolt torque is 37 ft/lbs.

Replace the secondary clutch spring with the **Grey/Orange** one provided as per the service manual. Be certain to mark alignment marks before disassembly. Use only **BLUE** threadlocker on the helix screws.



5) You will next be removing primary center bolt. ****Note: left hand thread on primary motor clutch center bolt.** Remove center bolt. Keep the spacers/washers on the bolt and set the primary bolt aside.

6) Thread the primary clutch puller into the drive clutch and remove drive clutch now. Mark the cover for location during re-assembly. **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.*

7) With the belt removed and the primary clutch cover plate off, move the sheave inward and remove stock flyweights.

8)* **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.

Caution: Always assemble clutches as per factory service manual ,be certain all components are re-installed properly and completely. On this model there is a plastic spacer on the center shaft in the primary clutch.(inside the primary spring) that could fall off the shaft. This is a SPEED LIMITING SPACER. It stops the primary motor clutch from shifting all the way and prevents belt failure on extended wide open throttle runs. Make sure the spacer remains in tact in the proper position during re-assembly.

9)** **Install new primary spring** into the primary clutch and re-install the cover plate onto the drive clutch (primary clutch).

10) Re- install the primary clutch center bolt and torque to manufacturers specs.(47 ft lbs)

11) **Install secondary clutch-** Install the driven clutch, thrust washer, and associated flat washers in order came off. (the order shown in the service manual) **The Thrust washer is direction specific** and the teflon side should mate with the .160” thick flat washer.

12) **Install belt** noting rotation direction if same belt is being used again.

Torque Driven clutch retaining bolt to 37 ft-lbs. (50 Nm)

NOTE: While tightening driven center bolt, stop and rotate the clutch counter clockwise a few times to prevent the belt from binding in the clutch.

13) Install cover shroud. It is a good practice to use a new cover seal. Be careful to insure all wires are tucked neatly out of harms way and zip tied, etc as necessary. Carefully inspect cvt air duct, and clamps. Snug the 11 screws. Outer plastic cover shroud screws torque at 45-50 inch -lbs.

14) Re-install lower left hand frame bracket and torque the frame support bolts to 36 ft-lbs.

15) Install Rear wheel assembly and test.

Note: Our testing has shown best results with the factory belt , and calibration for this kit is associated with that factory belt compound. **The factory belt on this model is very high quality.**

see attached **“ Flyweight set- up “ for recommended set up .*

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 principals of the system.

The cvt system on your atv 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 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.

It is very important to realize that on most ATV 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 at wide open throttle,(and even much less than that on some) or around 45 mph. **After** which ...the clutch components are open all the way ,and have little effect ,as the belt is already up on the top of the primary clutch . 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 can not offer top speed increases.***

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 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 what they consider a decent “all around” calibration. Sometimes the factory calibration is better for one situation than another . Many users of ATV’s ,for various reasons , like to change the desired effects and purpose of their machine to a more case specific application, whether it be oversized 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 gear 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 with even slightly 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 to acceptable level.*

General tuning info: following are a few general rules of thumb.

Heavier Weights- Quicker up shift and 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 increases 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 (general)- Stiffer springs slow the up shift. Softer springs up shift faster. The initial load (first part of the compression) of a primary spring controls engagement. Sometimes a stronger compressed load rating spring (second part of spring compression) can allow the use of more flyweight and the combination is effective for a situation ,but not all situations are the same. A spring is another type of tuning component. A spring is always chosen relative to the flyweight and the rest of the system. There are primary (motor clutch) springs, and secondary (driven clutch) springs.

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 at hand, so that the engine stays in its best rpm zone, whether it be a stock or modified engine, or a different terrain tire or situation

Dalton Quick Adjust Cam Arms -and general tuning info

****Primary springs.** The spring in the primary (motor) clutch has many functions. These springs are often compared at two different load heights. The initial load comparison (commonly at 2.5”) is a controlling force for “engagement RPM” . That is the rpm at which the clutch system engages the belt and moves the vehicle. Primary springs are also compared by “compressed load “ (compared at 1.25” compression) which has effect on the flyweights as opposing force, and helps control shift rpm like flyweights do.

In order to change **engagement rpm only** on a given set up, for rider preference, one should use similar “compressed load” on a given spring, but could alter the “initial load” to suit engagement requirements. There is a load chart on the components page of www.daltonindustries.com that compares spring.

Orange/Silver (Dalton part# DPPS-O/S) is the primary spring included in this kit. In this configuration, this spring engages at a slightly higher rpm than the stock spring and weights, There are optional springs that have the required load rate to be compatible with this “set up guide” of the flyweights.

An **optional primay spring** for this kit is the **Orange/Blue (Dalton part# DPPS-O/BL)**. When used in THIS particular clutch/flyweight configuration, this spring is close to or slightly lower than stock engagement rpm. Some prefer the optional orange/blue primary for slow speed rock crawling, etc.

Secondary Springs . Secondary spring is another tuning component. The secondary clutch is load sensing, and should be balanced with the primary clutch calibration. This kit requires the use of Dalton **Grey/Orange (Dalton part# DPSS-GY/O)** secondary spring.

Dalton Pro Quick Adjust Cam Arms - Adjustable flyweights.

Dalton's patented quick adjust method means that you can add and subtract 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), as well as **the patented quick adjust threaded passage** that you can adjust **from outside the clutch** for most common changes and weight adjustments.

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 allen key to add or subtract set screws thus changing the total mass of the flyweight.**

If you were to , for example, switch from one size of tires to another , ..you could most often 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 clutch disassembly required.

Set up and adjustment guidelines are on the following page for different applications.

Always be certain that you keep track of the weights you have adjusted...it helps to mark the clutch in number from 1-3 to keep track. Be certain to not cause an imbalance by double adding to one passage and not all of them the same. Keep track of screws remaining.

Make sure all screws go in all the way and bottom for secure fastening (do not over tighten)*

FLYWEIGHT SET UP GUIDE – 2012+ Polaris 850 XP

Springs. The primary and secondary springs provided in this kit are to be used in all of the flyweight set ups below.

Proper opposing spring pressures are a part of the calibration and without that the flyweight set up would be irrelevant. Primary (motor clutch) springs have some engagement options. The most popular primary spring is provided, but there are options listed on our website and above in the “general tuning info”

This ATV model year has the “BOSS” secondary clutch. The grey/orange secondary spring is similar in size to a primary spring, but it is a secondary spring and should only ever be used in the secondary driven pulley.

2012+ Sportsman 850 XP (QP93-59.5) 0-4000 ft elevation

26" Tires - Stock machine (and with aftermarket typical bolt ons:, filters, slip on pipes, etc. when used with stock camshafts and header pipes.)

- base weight w/**aluminum rivet** installed in tip + use **2 long** set screws, and **1 short** set screw in threaded passage of each flyweight.

** Some of the larger/heavier 26" and 26.5" radial or heavy ply tires require the use of the aluminum rivet + 2 set screws in each flyweight.*

*** for sand/elevation see below*

27-28" Typical Trail/Mud type tires - Stock machine (and with typical bolt ons)

- base weight w/**aluminum rivet** installed in tip + use **1 long** set screw in the threaded passage of each flyweight.

** Some of lighter/smaller than actual 27" (EG: Zilla, early bias ply Mudlite) should use aluminum rivet +2 long set screws in each flyweight*

*** for sand /elevation see below*

28"+ Extreme Mud Tires (Outlaw/Silver back)

-**base weight empty tip**(no rivet) - **1 long** set screw in each flyweight.

also use this set up for 30" trial/mud (mud light, zilla)

****SAND / HIGH ALTITUDE(above 4000')-** the word “SAND” is speculative, Normally riding in deep/dry sand is more inclined to have hills and the riders prefer back shift and throttle response because sand is power robbing. High elevations have less oxygen, and even with Electronic fuel injection, less fuel+ less air= less hp. You do not want to up shift too quickly. Actual sand type and elevation can make this somewhat variable.

26" tires/Sand-high -Use no rivet in the tip and 2 long set screws in each flyweight as a starting point.

27" or larger/Sand-high - use no rivet in the tip and use 1.2 grams (1 long set screw) in each flyweight . For very high elev. Or heavy 28" you may need to run the flyweights totally empty.

+++ **Important notes for all sizes:** *The above is a guideline. There is no way we can test every size and brand/application of tires. In the after market the sizing and weight of tires has large differences from different manufacturers. For example, some 27" radial tires from one brand are much heavier/larger than a 28" from another brand when actually measured.. If in question go to the heavier flyweight set up.*

- ***If you find that you are hitting a rev limiter for any reason (EG: extra HP) add the next heavier set up. That could be one more screw, or change to the heavier optional tip rivet (silver steel 1.8g) but only if necessary.***

Installation and removal of Mass Rivet (tip weight)



- 1) Push and hold the rivet **ALL the way** into the appropriate hole in the tip of the flyweight.(all same direction)
- 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 as it is pressed.
- 3) Squeeze/expand the rivet. **Place all rivets pointing the same direction.**
- 4) Be sure to compress the rivet to less than the width of the roller path up inside the clutch spider.
(.480”-.500” long after compressed.) Do not over compress as you could damage the flyweight.

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.

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.



- 1) **Carefully install the set screw into the threaded passage . Be careful not to cross thread the M5 set screws.**
- 2) Wind the set screw all the way in until it is snug at bottom of threads. Do not over tighten
- 3) 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 hole.