DaltonPro Clutch kit DBO 1000 X

Model: **2016-20** CAN-AM Outlander/ Renegade **1000 XMR** 4X4 ATV
(This kit is designed for the lower gearing/application of the newer XMR versions only)

Kit #: DBO 1000 X Adjustable Kit – **extra large tires (29.5" and larger, XMR versions only)**

Components:
- 1) Dalton Yellow/Red primary clutch spring (DPPS-Y/R)
- 1) Dalton Black/Violet secondary clutch spring (DPSS-B/V)
- 3) Dalton adjustable mass flyweights/ levers (Part# DB 385X)
- 1) pkg Black hollow steel mass rivets (DFRB – Y .2.8g)
- 1) pkg Olive hollow steel mass rivets (DFRO – Y 2.1g)
- 1) pkg Aluminum mass rivets (DFRA-Y .85g)
- 1) includes **Instruction manual** and flyweight set up guide / applications

Description: **Better belt grip and improved performance.**
A clutch tuning package to optimize CVT clutch calibration for extra large tire sizes and mud applications on the 2016 version of the 1000 XMR Outlander and Renegade. A new adjustable flyweight is included. This flyweight is a new profile designed specifically for the XMR version of this vehicle. There are also new primary and secondary springs. This combination provides for better acceleration and improved back shifting. Holds rpm better under load conditions and helps correct the rate of shift for aggressive mud riding. Flyweight set-up guide is included.

Tools: BRP clutch holding tools, torque wrench. (there are critical procedures for proper torqueing of clutches together in the BRP service manual. This is a dealer recommended installation.)

WARNING

Read this before installing

Clutch components should only be installed by factory trained mechanics and service personnel with a complete knowledge of snowmobile / ATV Variable Rate Belt Transmissions. Make sure your clutches have been properly inspected for fatigue, cracks, wear, etc. ATV clutches are assembled under spring pressure. DO NOT attempt to disassemble clutches if you are not qualified, serious personal injury could result.
This is a performance kit and is intended for the use of Experienced Adult Riders, who are trying to obtain a higher level for racing, etc.
Dalton Industries has no control over the use or misuse of these components and assumes no responsibility for any injury or damage

PLEASE READ AND UNDERSTAND THE ENTIRE DOCUMENT BEFORE INSTALLING !

<u>Installation Instructions</u> (Dealer)

<u>IMPORTANT:</u> Always remove the key from the ignition when working around clutches.

This is a dealer recommended installation. There are procedures listed in the Can Am service manuals for drive clutch removal. The following is only a basic guideline, always consult your dealer service manual.

READ AND UNDERSTAND THE ENTIRE DOCUMENT BEFORE STARTING TO INSTALL !

Remove clutch side plastic as necessary to gain access to clutch cover shroud. Remove cover bolts and plastic cover to expose CVT clutch system.

<u>Remove the belt</u>

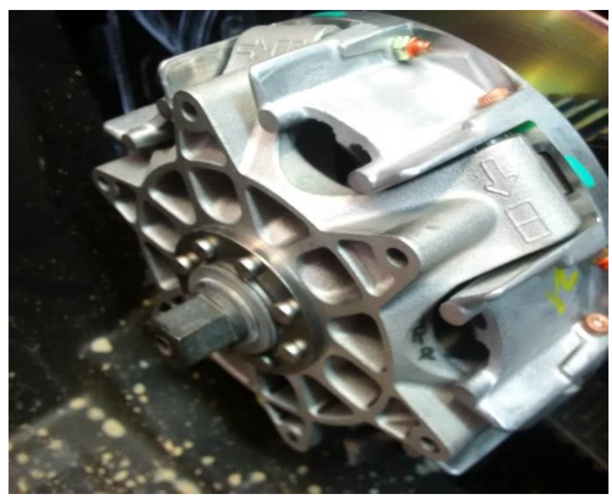
<u>NOTE DIRECTION OF BELT</u> (arrow) when you remove it. *Make sure belt remains clean & free of any oils / grease, a non-residue cleaner like brake cleaner maybe used to clean clutch surfaces, etc.*

To remove the belt, use the Can Am "driven pulley expander" or a M8 x1.25 fully threaded bolt to spread the secondary pulley sheaves. This allows slack in the belt for easier removal. A fully threaded bolt of 75mm length can be used.

1) **Primary (motor) clutch**. While holding the large primary flange nut, loosen the center locking set screw in the flange nut of the primary clutch. Next, loosen the primary flange nut with caution.

2) The outer sheave assembly of the primary may pop loose. Do not completely remove the flange nut until the assembly comes loose. <u>Hold pressure against the primary until the assembly is loose</u> and let it off slowly. Only the outer half of the primary will be removed. The outer half of the primary is on a taper fit. It may need to be tapped lightly with a rubber mallet to jar it loose if it is stuck.

<u>There are clutch holding tools and procedures in your Can Am service manual.</u>



3) Remove center flange nut and the moveable sheave assembly. **<u>NOTE: Keep moveable sheave assembly together as a unit</u>** at this time and place it on the work bench for later work. Note: the primary spring and the spring retainer cup on the shaft. Remove the spring and set it away. Leave the <u>SPRING RETAINER CUP</u> on the shaft.

Secondary Clutch

Remove the secondary clutch by removing the **nuts from the secondary retaining center stud.** Be careful as you release the center bolt, as the spring in the secondary will push outwards when the bolt comes off the threads. Have a helper hold inward on the secondary clutch firmly as you remove the bolt.

1) Slowly release the rear clutch and remove. Take **NOTE** of the **position of the helix cam** as you take it apart. It is **important** that the helix/spring are positioned correctly during re-assembly.
2) As you can see, this spring is a combination of compression and "torsion" style.

This type of spring is very sensitive to change. Using this heavier Black/Violet is only for the applications described. Take note of the tangs on the spring, their locations in the helix and the clutch.
It can help if you make a mark for later reference, as it is very important to be sure the male/female points of the helix are engaged correctly in the clutch.

3) Change to the new secondary spring. Make sure that the <u>helix is all the way</u> onto its splines and that the tangs of the spring are correctly situated on each end.



4) Line up the helix to the corresponding voids in the clutch ramp. You will see that the spring has a slight bit of preload "twist" built into it. The clutch needs to be turned just slightly clockwise to align the helix points properly with the voids in the clutch. You can feel the voids by hand. <u>It is important to make sure they stay aligned as you tighten the clutch back on.</u> Install nuts and Torque secondary correctly*

In order to ensure the helix cam in engaged correctly and in the right position, you should observe to see if there is thread of 0-3.6mm sticking out past the double nut. – otherwise the helix cam may not be engaged correctly. There should be some thread sticking out through.

<u>*Secondary main (inner) nut must be torqued to factory spec of "15 ft/lbs, + 180 degrees rotation</u>", the outer locking nut is 26 ft. lbs. while holding a wrench on the inner nut. See notes in service manual.

<u>Failure to torque this clutch properly can result in the clutch coming off and serious damage</u>

<u>Installing belt</u>. - Examine belt for inspection or replacement (flat spots on edge from burning on take off or holding brake etc) Make sure no oil, grease, etc has contacted belt. Use only non residue cleaners like Brake cleaner to clean components.

<u>Carefully</u> install the belt around the rear clutch and center hub of the front clutch. There is a threaded hole in the secondary clutch that can be used to spread the sheaves of the secondary. Can Am technicians have a special bolt *"driven pulley expander*". This will assist in letting the belt down into the secondary and make re- installing the belt easy. This hole is a M8 x 1.25 . A FULLY threaded bolt of approximately 75mm length can be used.

***** <u>The Factory Can Am belt is the best belt for this vehicle.</u> As much as we would like to recommend a cheaper priced alternative, the factory belt is superior and recommended for this application. In fact the components in this kit and the " set up guide" are calibrated to this belt compound. The drive belt is a CRITICAL component in tuning this vehicle.***

<u>CHANGING PRIMARY COMPONENTS:</u>

A) With the primary assembly still together, use a marker to show orientation of spider for re-assembly

B) With the primary moveable assembly on the workbench (spring side down) carefully lift spider assembly out of the moveable sheave. *ATTENTION: Be careful not to lose the <u>plastic sliding buttons</u> that will be exposed on the sides of each finger of the spider, as you lift it out. Keep the spider flat and horizontal (as not to lose the plastic buttons) and sit it aside gently. If any of these plastic slide buttons are damaged, replace them.*

C) **<u>VERY IMPORTANT:</u>** CAN-AM ATV drive clutch has places for <u>6</u> flyweights. On this Outlander model <u>all 6</u> positions are filled, and as many of you know (CAN AM service techs), there are other Can Am models with only 3 or 4 of the positions filled and some are not used at all. Example: Outlander 500 has only 4 flyweights…. With <u>2</u> of the 6 positions empty (180 degrees opposite each other). Some models only use 3 positions.

In this case, we will be removing and replacing only <u>3</u> of the flyweights and leaving 3 of the stock ones intact. In fig #4 you can see that <u>3 of the stock weights are still in the assembly</u> and has <u>3 Dalton adjustable flyweights.</u>

The 3 stock and 3 adjustable weights are alternating. The 3 stock are 120 degrees apart, as are the 3 new ones. – Every second one is replaced. <u>THIS IS THE ONLY CONFIGURATION THAT 3 WEIGHTS CAN BE REPLACED.</u>

D) After setting up the provided flyweights **<u>properly for your application</u> (* See attached "flyweight set – up" for recommended application),** install the new flyweights into the clutch and secure the pins / nuts the same way as they were removed. Be certain to put metal washers back in place (one each side of flyweight) before putting the pin through the weight.

E) Carefully slide the <u>spider assembly</u> back down onto the <u>moveable sheave assembly</u>, making <u>sure</u> the <u>plastic buttons are still in place properly</u> and the *spider is in the* ***CORRECT POSITION with ROLLERS over each flyweight*** and the marks you made in the correct position.

With the moveable sheave / spider assembly back together, keep it together and re-install as a unit, along with the new <u>primary spring,</u> then install the whole unit and ***torque the primary (*89 ft lbs)**

* **FLYWEIGHT SET-UP** (**DBO 1000 X clutch kit**)

The following set ups are for use with the spring/s and components supplied in this kit, and those components in this configuration. The total "grams" are only relative to components supplied. These mass adjustable flyweights in this kit have a profile, location of mass, and are bored for a different bushing material. The "grams" are not related to stock or other flyweights. The best test results are as follows.

Note: The primary spring supplied in this kit is color coded Yellow/Red. The primary spring is the principal control of the "engagement rpm", although it has other pressure characteristics as the opposing force to the flyweights. The secondary is Black with violet stripe. These springs are both always used with the following rivet/flyweight set ups.

2016 Outlander/Renegade 1000 XMR

29.5-30" tires. 0-4000' elevation – DB385X flyweight with 2.1g hollow (olive) rivet in each, and both springs provided.

31 - 32" Tires (all), 0-4000' elevation - DB385X flyweight with .85g aluminum rivet in each and both springs provided.

Higher elevations- Elevations, and "the elevation you ride the most" can vary. Less flyweight mass is used with the less HP available at higher elevations. For elevations above 4000 ft. start off with the flyweight empty and test.

* be certain that you have read and understand the complete manual.

INSTALLING AND REMOVING MASS RIVETS

1) Push the rivet ALL the way through the hole in the flyweight. (**remember to keep all rivets same direction**)
2) Using a LARGE shop vise, hold the rivet in a manner that keeps the rivet all the way through the hole so that you will be expanding the part that protrudes from the other side.
3) Squeeze/expand the rivet using strong pressure on the vise. Once the rivet expands "tight in the hole" it will flare larger on the end it will not move.

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) Make certain that the flyweight is SUPPORTED all around the rivet before trying to drive out the old rivet. A hole in a steel surface or a large vise that is slightly open (close to the rivet) is good support for the flyweight.
4) Insert a flat ended punch with a <u>smaller diameter straight shaft</u> than the drilled hole (1/8" straight shaft punch) and tap the rivet right through the hole.

Read the following pages before operation!

It is a huge benefit to the vehicle operator to understand the CVT system on this vehicle. Both for the function of the belt, the tuning components and the limitations and proper use of the drive system.

Can Am 1000 - General Overview and CVT (Continuously Variable Transmission)

Clutching, belts, and potential problems.

The new Can am 1000 has excellent HP in stock form. This vehicle has plenty of power, along with very tall final drive gearing making it capable of reaching very high top speeds. Because of this combination, the potential is here to aggressively overheat belts, particularly when operating at LOW SPEEDS in HIGH RANGE. **Any time this vehicle is operated at low speeds it should be in LOW range**.

Some operators, who may be simply uninformed, may state things like.... “It has all kinds of power and I should be able to leave it in high!” Although that may sound logical, it is simply not so. This is not a hydrostatic or oil pressure automatic, nor is it a wet clutch type of CVT. This is, like some other brands, a system that engages the belt each time the vehicle is required to move. With this type of system, it is important to understand the way the system functions, so you can maximize FUN and avoid belt problems.

The important thing to know here is that in LOW range the belt travels farther up the clutch at a given speed. For example, if you are riding at 10 mph in HIGH, the belt may still be very low in the primary clutch (close to the hub). If you switch to LOW range and travel the same mph. the belt rides up at a higher point on the primary clutch, offering MUCH more belt grip and substantially lower belt temperature. When going slow, use low. This is fact, and this simple fact, if not understood, can aggravate the belt wear, and temperature dramatically.

Another mistake that is sometimes done is to hold the brake and rev up the engine past engagement. This will only burn a flat spot on the drive belt and make it not useable. This should not be done on this type of system.

When straying from normal tire sizes and trail operation to other surfaces like mud and sand, it can become increasingly important to have proper clutch calibration to help compensate for the changes. Clutch calibration does one main thing...it changes the rate of shift of the belt. The way to help eliminate unnecessary slippage (and thus heat) is to have the belt in the correct ratio on the pulleys for the loads present. We can manipulate that shift pattern with clutch tuning components.

You cannot make tires that are too big (and mess up the final drive ratio even more) smaller, or the sand dunes flatter or more firm. with less rolling resistance. However, by calibrating clutches we can help to compensate and make these situations easier on the drive belt and improve vehicle performance.

Clutch tuning

Before setting up and installing your clutch kit, take a moment to read a bit of basic clutch tuning theory. CVT tuning can get very involved and there are books written on theory of operation itself. There are various ways to change the way the system reacts from changing or altering the tuning components (spring rate, flyweights, etc). Flyweights alone can be a long discussed topic, as on a flyweight type system, the curvature, distribution of mass, etc. can dramatically change shift characteristics. Many inexperienced tuners often make the mistake of comparing flyweights by “grams” alone. If the curvatures, profile, and location of mass are not the same,...then the “grams” are irrelevant. We have tested and developed various flyweights for this model during testing, and the chosen curvature and mass locations, as well as the adjustability were the result. Following is a basic overview to help you understand if you are unfamiliar with cvt function.

Changing CVT tuning components is done for many different reasons, but the thing that you are doing is ultimately **changing the rate of upshift and back shift of the belt** in the pulley system. The factory sends the machine with a calibration that they feel is a “all around” set up.

Many owners of ATV's and UTV's have a desire to re-calibrate the clutch system more specifically to their needs based on their own usage and situation. Common reasons are racing, oversized tires, altitude, mud running, or towing. For instance, if you are a fan of mud and big tires, it is obvious that the taller final drive ratio from installing

the tires changes things. With larger tires and more rotating weight, the last thing you would want would be to upshift too quickly and kill the rpm too rapidly, so you want that initial upshift to be slower. If you install tires much larger than the acceptable envelope that the manufacturer recommends, <u>you can easily burn belts.</u>
CVT tuning components can't change the actual gear ratio resulting from the bigger tires. But by re-calibrating the cvt drive system, you can often change the shift pattern to help get better results for your application. It will hold its correct rpm better by properly shifting on its own to the proper belt ratio as it comes under load (backshifting)
If you were to install larger tires and your machine was still upshifting quickly (like you can get away with small stock tires) it would lower the rpm lower than the peak hp rpm and performance would suffer. The belt would also not be in the proper ratio for the loads present with the bigger tires resulting in more slippage and heat, causing delamination and failure of the drive belt.

It is also very **important to remember** that CVT tuning parts only control the rpm during the **"clutching phase"** The clutch phase is when the **belt** is going from low ratio to high ratio on the clutch pulleys. ATV's and UTV's are not like snowmobiles, on ATV's / UTV's the "**clutch phase**" is over in a distance of approximately 500 ft on a full throttle run . Once the belt is to the top of the primary clutch, it is to the top, and clutch components no longer control the rpm after that point. After that "fully shifted" point (with stock tires on hard pack) the engine will often start to over-rev but it is because the belt can shift no farther to control the rpm. It is important to remember that clutch components are not the controlling factor for rpm after that belt is fully shifted. For clutch RPM testing it is good to use short distances (300 ft- 400 ft) to determine clutch rpm. **Dalton adjustable flyweights** help make it flexible.

The Components

<u>**Flyweights**</u>- Flyweights are the principal item to control rpm during the clutch phase. ***Heavier*** *weights* upshift *faster* and *lower* the rpm. ***Lighter*** weights upshift ***slower*** and thus *increase* rpm during the clutch phase. It is NOT that lower, or higher rpm is better. Ideally, you want the clutch calibrated to shift the belt at the correct rate to hold the rpm at the <u>rpm that the engine makes best HP*</u>. If an engine makes peak hp at 7300 RPM, then having it calibrated to run at 8000 is probably much worse than if set up to run at 7100, as many crankshaft engine dynos will easily prove. The proper amount of flyweight mass is determined by both the **other cvt tuning components being used,** the **given situation** or intended use of the vehicle and ultimately the **field tested results for best efficiency for the situation** at hand.

* 2016 1000 Outlander XMR operates best at 7100-7500 RPM

<u>**Primary Springs**</u>**-** Primary springs have some overlapping uses. The springs are usually compared by using their pressure load rating at two intervals. The ***first load rating*** is often referred to for ***engagement*** (stall rpm) first load number on a primary spring is the principal component to control engagement rpm.
The fully compressed or ***second load rating*** is used as the principal ***opposing force to the flyweight.*** Stronger fully compressed load ratings are a factor in how much flyweight mass you can run. You can often switch from one primary spring to another and leave flyweight mass the same if the second load rating on the springs are within the same zone and have minimal effect on top rpm. This is useful for those who like to experiment with engagement rpm. Engagement rpm is a personal preference.
It is important to realize that springs have different characteristics when used with other different components. The springs in this clutch kit may engage at very different rpm when used with other flyweights, etc.
The primary spring in this kit:

STOCK primary engages at approx. *1700 rpm
Yellow/Red (included) engages at approx. *1950 rpm

** there is some variance in engagement based on total flyweight mass, belt wear, etc. but the Primary SPRING is the principal control of engagement rpm. The combination in this kit, although slightly higher rpm engagement, is a more smooth, positive engagement of the belt.*
Secondary Springs- Secondary clutch springs are a component that has some overlapping features. Its principal function is torque feedback sensing, that is, that it initiates back shifting of the belt to proper ratio to maintain rpm. The secondary, however does have effect on upshift characteristics as well. <u>CVT's are about efficiency</u>. Proper <u>balance of components for efficiency is the way to good belt life</u>. The key to preventing slippage is having the belt in the correct ratio on the clutches for the given load.

Thank you for choosing Dalton Industries!