DaltonPro Clutch kit _ DBC 1000 -13 *

Model: **2013+** CAN-AM Commander 1000 4X4 UTV.
Kit #: DBC 1000-13 Adjustable Clutch Kit . Stock and Oversized tires
Components: 1)Dalton Yellow/Red primary clutch spring (DPPS-Y/R)
3) DaltonPro adjustable mass flyweights (levers) (Part# DB37-C)
1) pkg Hollow aluminium mass rivets (DFRA – Y .85g)
1) pkg Hollow steel weight mass rivets (DFRH– Y 2.4g)
1) pkg solid mass rivets (DFR-Y 3.1g)
1) includes **Instruction manual and "CVT clutching overview"**

Description: **Better belt grip and improved performance .** This one clutch tuning package can optimize CVT calibration for many tire sizes and applications. This kit includes adjustable mass flyweights for more flexible tuning options. A new case specific flyweight was built for this application, and to work with the springs provided in the kit. This kit provides for better acceleration, and improved backshifting to hold rpm better under load conditions. Adjustments can be made to help compensate for oversized tires, or terrain conditions, as well as power loss from operating at higher elevations. Includes "set-up manual" as well as clutching overview for this model.

WARNING

Read this before installing

Clutch components should only be installed by factory trained mechanics and service personnel with a complete knowledge of CVT (Variable Rate Belt Transmissions), and with the required proper tools and holding fixtures to do so. For example, if your shop does not have the proper equipment to hold a clutch and torque to the proper specification and procedure, there is good probability of damage/part failure and possible injury. Make sure to consult your dealer service manual, and also that clutches have been properly inspected for fatigue, cracks, wear. 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.

Installation Instructions

IMPORTANT: Always remove the key from the ignition when working around clutches.
This is a dealer recommended installation. There are a couple of optional 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 for more detailed description.

1) Remove drivers side seat ,and console panels as necessary to gain access to clutch cover shroud. Remove cover bolts and plastic cover to expose CVT clutch system.
2) Loosen the center bolt on the primary (motor) clutch, do not completely remove the bolt. **There are clutch holding tools and procedures in your Can Am service manual.**
3) Only the OUTER half (moveable) of the primary clutch will be removed. Hold pressure in on the outer half of the primary clutch to be removed while you remove the center bolt. Do not let go, sometimes the part is stuck together, but is under spring pressure. Continue to hold inward, and with a rubber hammer, lightly tap on the side. This will jar the moveable sheave assembly from its taper fit, if it is stuck.
4) Remove center bolt and the moveable sheave assembly. **NOTE: Keep moveable sheave assembly together as a unit** at this time and place it on the workbench for later work. Note: the primary spring and the spring retainer cup on the shaft. Remove the spring and set it away. Leave the SPRING RETAINER CUP on the shaft.
5) The belt can stay on the pulleys if you are certain all is fine, the clutches are clean, and it does not need replaced. However, it is always good to check it.

6) ***Do Not*** *just pull the belt off.* ***BE CAREFUL when removing the belt to not disrupt the primary, and to leave the <u>center hub</u> sprage and <u>spring retainer cup</u> all the way <u>IN</u> on the shaft ! <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.*

Using the Clutch spreader bolt from BRP (A fully threaded M8 X 1.25 bolt can be used) spread the secondary make slack to remove/install the belt.

7) **<u>THIS STEP IS ONLY FOR APPLICATIONS USING OPTIONAL SECONDARY SPRING</u>** (see website for applications). If you are running very large,extreme mud tires or an application that calls for the optional DPSS-B/V secondary clutch spring, you would install it now. **There are detailed instructions in the Black/ Violet spring package** about installing the spring into the secondary clutch on this vehicle. **ANY time the secondary clutch comes apart** on this version with torsional secondary spring (even the stock one) it is CRITICAL that the proper procedure be followed for installing and re-torquing the secondary. The secondary clutch gets torqued to 15 ft/lbs plus 180 degrees of rotation of the bolt. **There is a copy of the instructions on the "downloads" page of daltonindustries.com "installing the optional Dalton Black/Violet DPSS-B/V secondary spring.** It is also stated by Can Am/BRP that the secondary center bolt be replaced after each use, because it is referred to as a "stretch bolt". Do not make assumptions based from other models, this is a very distinct procedure that should be followed.

8) **Install belt. Examine belt for inspection or replacement: (flat spots on edge from burning on take off, or holding brake etc)

- <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 aproximately 75mm length can be used.
- *Make sure belt and clutch surfaces are CLEAN! (non residue cleaner like brake cleaner if necessary for sheaves)*
- *Note direction arrow on the belt.*
- *New belts should be first washed with hot soapy water to remove mould release residue,then rinsed thoroughly .*

***** The Factory Can Am belt** *is the best belt for this vehicle.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.*

CHANGING PRIMARY COMPONENTS:

A) With the primary assembly still together, use a marker to show orientation of spider for re-assembly (Fig# 2&3)

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 plastic sliding buttons 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) **VERY IMPORTANT:** CAN-AM ATV drive clutch has places for 6 flyweights. On this 1000cc Commander model all 6 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 400 has only 4 flyweights…. With 2 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 3 of the flyweights and leaving 3 of the stock ones intact. In fig #4 you can see that 3 of the stock weights are still in the assembly and is ready for installation of the 3 Dalton adjustable flyweights.

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. THIS IS THE ONLY CONFIGURATION THAT 3 WEIGHTS CAN BE REPLACED.
It is well known in the snowmobile racing world, with 4 and 6 weight Drive clutches, that weights are often mixed. BUT, it must be: a) evenly spaced (every second one or 120' apart) or b) Directly opposite each other (180' apart) with the same weights.

D) After setting up the provided flyweights **properly for your application (* 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 washers back in place (one on each side of flyweight) before putting the pin through the weight. Carefully slide the spider assembly back down onto the moveable sheave assembly, making sure the plastic buttons are still in place properly 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 primary spring. Install the new spring into the clutch first with a twisting action, then install the whole unit and ***re-torque as per service manual. (89-95 ft/lbs)**

***This outer moveable sheave /spider assembly attaches to the clutch via a set of matching tapers. Be certain the **tapers are clean and dry** (only use non-residue cleaner like brake cleaner,never lube or oil) . It is **critical that you torque the outer primary assembly properly.** The male and female tapers must be clean and dry so they can lock together properly.
9) Re-install plastic cover shroud, **Note:** Be certain that the cover gasket is properly in place. Inspect clamps,etc.

FLYWEIGHT SET-UP (**DBC 1000-13 clutch kit)**

The following set ups are for use with the springs and components supplied in this kit. The total "grams" are only relative to components supplied and specified in this guide.

26-27" typical trail/mud tires (including stock 27"Bighorn 2.0)

**2.4g hollow steel rivet
Yellow/Red primary
Stock secondary spring.

- when using primarily in sand , or when operating mostly above 4000' elevation.use .85g aluminum rivet.
- if primarily used in Sand AND Higher than 4000 elevation use the flyweight empty.

27 extreme mud tires (Outlaws /Silverbacks) and all 28" tires 0-4000 ft elevation.

** .85g rivet installed
-Yellow/red primary spring, and stock secondary spring

Optional Black/Violet Secondary Spring

(must be ordered separately)- **Extreme Mud Tires** and **Extra Large Sizes**

Using the Optional Secondary Spring (Black/Violet) - First and foremost, do not use the optional secondary spring OR the instructions below unless you require it and have the optional Black /violet secondary spring.....More parts is not always better, applications that require its use are well laid out below, and on our website.
When changing to the optional heavy secondary spring the flyweight in the primary clutch must be adjusted differently.
The flyweight/rivet settings below are related to the use of the Optional Black /Violet spring only.

29.5" and Larger Tires 0-4000' elevation.
- Dalton flyweights (part# DB37C) provided, with 3.1g rivet installed**
- OPTIONAL Dalton Black/ Violet secondary spring (Dalton Part# DPSS-B/V)
- Yellow/red primary spring

31" + Tires 0-4000' elevation
- Dalton flyweights (part# DB37C) provided, with 2.4g rivet installed**
- Yellow/red primary spring.
- DPSS-B/V (Black/violet) secondary spring

28" + tires at High Elevation **For 28" + larger when operation primarily at High elevation (above 4000')**
- Dalton flyweights (part# DB37C) provided, with .85g aluminum rivet installed for first test.*
- Yellow/red primary spring.
- DPSS-B/V (Black/violet) secondary spring

**High elevation and mud tires are speculative,...the elevation ,terrain, and chosen tire can vary widely. Start with .85g aluminum rivet and test - see clutching overview on following pages. (If primary use is above 6000' do first test empty).*

**** For Installation and removal of Mass Rivets see following page**

Modified machines and other options

Clutch tuning has a lot of variables.There is no way to cover every exact situation, as there can be many variables.Things like SAND, and MUD, are not even the same to everybody, that is one of the nice features of our adjustability. Even tire size and weight can vary by brand.

Mods - Typical performance modifications like high flow filters, slip on pipes, etc quite often are not enough difference in engine characteristic to require different CVT calibration from the suggested settings. There are , however, some things that can require major changes such as CAMSHAFTS of long duration, etc.. In those situations,you may need to test. It is best to have all possible manufacturer info for the mods.

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.

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 smaller diameter straight shaft 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 and tuning components, and the limitations and proper use of the drive system.

Commander 1000 - General Overview and CVT (Continuously Variable Transmission)

Clutching, belts, and potential problems.

The Can am 1000 Commander has excellent hp in stock form.This vehicle has plenty of power, along with very tall final drive gearing. This makes it capable of reaching fairly 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,..it is not even a wet clutch type of CVT, it 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 10 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 simple fact, if not understood, can aggrevate 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 un-useable, and 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 best way to help eliminate unnecessary slippage (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 "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. 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 good "all around" set up. The factory set up not only has to be able to tow a trailer, do ok in a drag race, climb and backshift decently, but it also has to consider fuel economy and emissions during its testing. 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, you can easily burn belts. CVT tuning components can't change the actual gear ratio resulting, 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), based on what you set it up to do. If you were to install larger tires, and your machine was still upshifting quickly (like you can get away with 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 hardpac) the engine will often start to overrev, but it is because the belt can shift no farther to control the rpm. **Dalton adjustable flyweights** help make it flexible.

The Components

Flyweights- 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 rpm that the engine makes best HP. If an engine makes peak hp at 7000, then having it calibrated to run at 7600 is probably much worse than if set up to run at 6900, 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.

Primary Springs- 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 good to have options for this.There are OPTIONAL PRIMARY springs, but the most popular for this application is the yellow /red provided in this kit. Some people prefer different "ENGAGEMENT" rpm than others, for various reasons. There are load rating charts available on www.daltonindustries.com under "components"

It is also very important to realize that springs have different characteristics when used with other different components.

The primary spring in this kit:

STOCK Commander spring engages at around *1850 rpm
Yellow/Red *2000-2050 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.*

Secondary Springs- Secondary clutch springs are a component that has some overlapping features . It's principal function is torque feedback sensing, that is that it initiates backshifting of the belt to proper ratio to maintain rpm. The secondary ,however does have effect on upshift characteristics as well. CVT's are about efficiency. Proper balance of components for efficiency is the way to good belt life. The key to preventing slippage is having the belt in the correct ratio at the right time. For the 2013 Commander 1000 we have found the STOCK secondary spring to be the best for most application, and the rest of this package is calibrated to that, except when noted. (see website or "flyweight set up page") for use of optional secondary spring.

Thank you for choosing Dalton Industries !

For other model info and tech support visit our website at www.daltonindustries.com