DaltonPro Clutch kit DB HD10-20

2020 Can-Am Defender HD10/HD10 Max –(not XMR see details*) - Oversized tires

0-3000 feet elevation. There are some suggestions for higher elevations as the flyweights are adjustable, however we have not spent time testing variations of altitude and tires) The kits use is intended as described.

*Re Defender XMR

-XMR version has lower gearing. Has not been tested. Lower gearing can require different calibration for "rate of shift of the belt" and thus possibly different components required) There may be future updates for XMR version.

Description: **Better belt grip and improved performance for oversized tires.** This kit is primarily developed to help recover power losses and belt performance when using oversized tires in the range described above for the model applications as listed.
Larger or heavier tires hurt performance everywhere. Rotating weight and added gearing from larger tires hurt acceleration and top speed. This kit improves bottom end performance and improves belt grip without any further loss of top speed. Throttle response is improved and better back shifting of the belt when the vehicle senses load from soft terrain or hills. A better clutch re-calibration for controlling "rate of shift of the belt" with these tire sizes.

Components: 1) Dalton Mint Green/Silver primary clutch spring (DPPS-MG/S)
1) Custom private label helix (Part# HD10-4)
1) set of 3 custom adjustable flyweights with hardware* (Part# DBAMT**)
1) includes **Instruction manual and "CVT clutching overview"**

* Flyweight hardware includes: 3) ¼ UNF x 3/8" (3.3g) button head screws-silver
3) ¼ UNF x 1/4" (2.6g) button head screws-gold
3) M6 silver plated steel washers
3) ¼ UNF x 1/2" (2.1g) cup point set screw
3) ¼ UNF x 3/8" (1.5g) cup point set screw
3) ¼ UNF x 1/4" (0.8g) cup point set screw
1) 1/8" L-shape Allen key
1) 5/32" L-shape Allen key

***** The flyweight arms in this kit have a different profile and location of mass, thus the total grams are not relative to stock or other lever arms.***

Tools / Products required:

1. **Can Am Clutch holder part# 529 036 380**
2. **Clutch puller Can Am part# 529 035 746 (Dalton part number DCP-L, or DCP-R** (newer heavier maverick version) will work in this application.
3. **#708200720 Driven pulley extractor/adapter (sometimes in vehicle tool kit to spread the secondary and belt removal)**
4. **Pulley spring compressor tool Can Am part # 529 036 012 to compress the secondary to change** helix and spring
5. **Blue Loctite 243**
6. **brake parts cleaner**

Installation Instructions (Dealer Installation)

IMPORTANT: Always remove the key from the ignition when working around clutches.
This is a dealer installation. There are procedures listed in the Can Am service manuals for drive clutch service. There are BRP holding tools and special tools required for these clutches as well. The following is only a basic guideline, always consult your dealer service manual for more detailed description.

READ AND UNDERSTAND THIS ENTIRE DOCUMENT BEFORE INSTALLING!

Figure 1- spread secondary(rear) pulley

1) Remove the drivers' side rear wheel. Remove cover bolts and plastic cover to expose CVT clutch system. Sometimes it is easier to remove cover if the vehicle is jacked up slightly in the center rear to extend suspension.

2) Using the clutch **driven pulley adapter ,** spread the secondary to make slack to remove the belt. **Using the spreader, remove the belt.**

NOTE DIRECTION OF BELT (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.*

3) Remove the secondary pulley (rear clutch) by removing the center bolt.

4) **Change the helix using the Pulley Spring Compressor Tool (part# 529036012)**
First, remove the stock helix using the compressor tool.

Mark the clutch and take note of both halves and the helix (mark)…and position of the roller in the helix for re-assembly. Often, it is best to heat the 3 bolts slightly to release the thread locker before removing.

When you assemble the new helix and spring, the helix and pulleys must be aligned. **It is VERY important to have the "roller" of the clutch in the proper slot of the helix and the torsion spring set correctly.**
When removing, mark the stock helix and take note of where the mark is in relation to the spring holes for later reference on the new one.

Do not remove the 3 bolts of the stock helix without the compressor tool in place to hold the unit together. With the compressor tool in place, remove the 3 helix bolts and slowly release the compressor to allow the pressure to come off the helix and spring assembly. **Pay attention BEFORE** you take it apart. **Make some reference marks.**
-Also take note of the **hole position of the TANG on the end of the spring** where it goes through the helix. Some models have helix with multiple holes.

It is important to note the position of the roller/helix ramp relationship as you release the helix when you take it all apart. Hold the parts and watch carefully as you slowly take it apart.

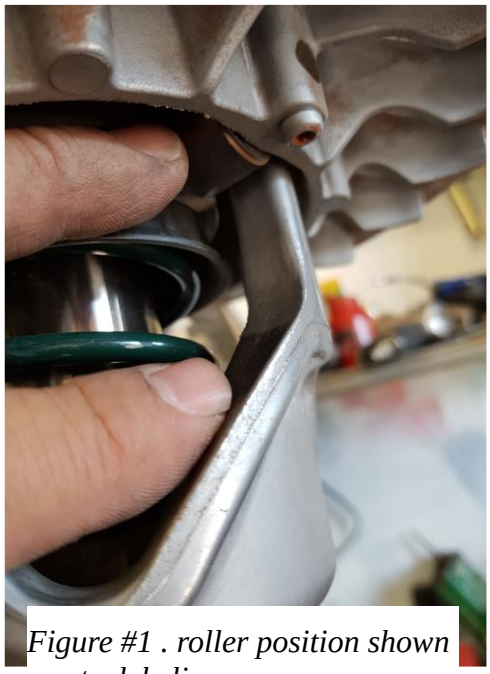


Figure #1 . roller position shown on stock helix

REMEMBER!- <u>pre-load the spring</u> correctly! (important)

The helix will need to be twisted the proper direction to get the roller in the correct position (see fig #1and #4).

Figure 2. stock position#4

The spring tang will be installed in the same **#4 position on the new helix** as the stock was (see **fig#2 and 3**). The billet helix has numbers. The helix and spring must be turned to that same position when you re-install the new billet helix with the secondary spring.

The new helix must be installed using the compressor tool. It is very important to make sure the shaft is **<u>through the helix bushing</u>** before compressing the tool all the way so that you don't damage the bushing. With the compressor tool installed, it is best to partially compress by hand first and **<u>make certain that the shaft is started through the helix bushing</u>** before using the tool to compress all the way. Twist to wind the spring and get roller in proper position as you compress. Make sure shaft through bushing as you go. (see fig#4).

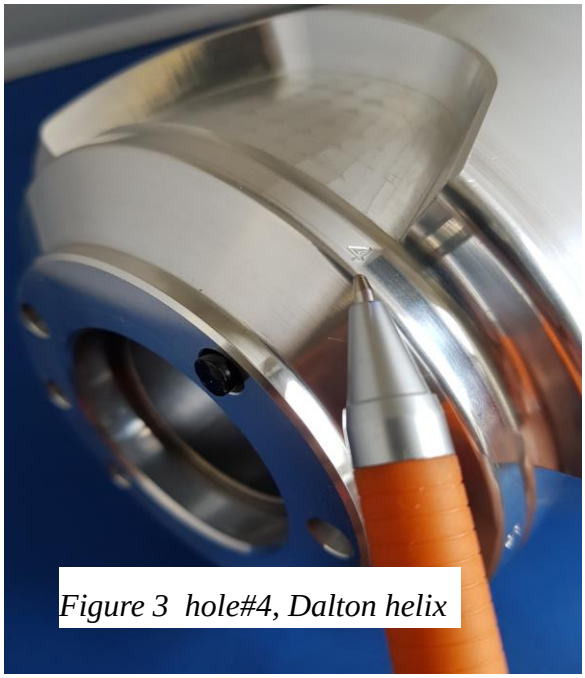


Figure 3 hole#4, Dalton helix

Figure #4 . twist to install

Apply BLUE LOCTITE #243 to the threads of the **helix bolts and torque to specification (45 ft lbs +/-4)** <u>while the compressor tool is still holding the assembly together</u> all the way. Once the helix bolts are installed, the compressor tool can be removed.

You can now install the secondary clutch back onto the machine. Be sure that the secondary clutch assembly is seated <u>all the way</u> in properly on the shaft of the transmission. Sometimes it requires moving it around and putting the trans in gear to get it to drop all the way on to the shaft.

Figure#5. roller position and marks aligned (stock helix before removal shown for reference)

5) The clutch center bolt must always be torqued to the manufacturers torque procedure. The torque must be done while using the proper holding fixture to properly hold the clutch and torque the bolt. Torque secondary clutch center bolt to (**52 ft/lbs +/-4**).

Primary Clutch

Removing the primary clutch from the vehicle.

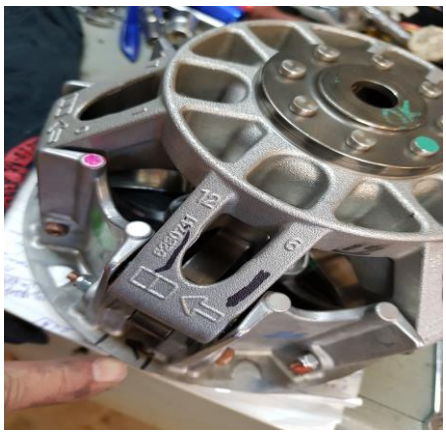
1)Remove the center bolt from the primary clutch. Take note of washers on the bolt. Keep bolt and washers all together and set aside.

Install the primary clutch puller. Screw the clutch puller through the clutch and it will press against the crankshaft to remove the primary clutch assembly. Have someone to help hold the **holding fixture** in place tighten puller to remove the primary clutch.

2) **Make sure the governor and sliding sheave** are marked for index.

Separating the primary. Different Can Am models have procedures in the factory service manuals and it should be consulted individually for each model. For this type, one easy way is to leave the puller threaded into the primary clutch. The threads of the puller must be engaged solidly. Position the clutch with the hex head of the puller and clutch facing upwards. The puller is threaded into the inner half (lower) part of the clutch.

With the help of another person, hold the clutch just a little above a work bench. Hold by the top half. Knocking the hex head of the puller sharply will knock the lower (inner) half through and separate the two halves. The puller must be hit square. Consult the service manual for accurate model details.

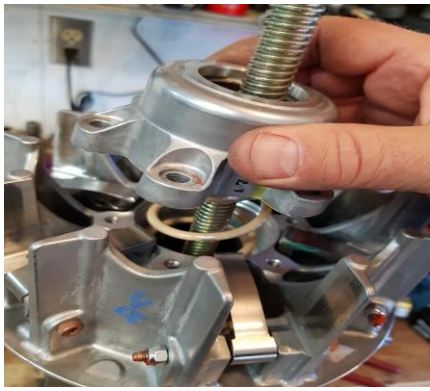


3)Make sure the governor and sliding sheave are marked for index. Carefully lift the governor assembly from the moveable sheave. Be careful not to lose or damage the sliders on the sides of each arm. The slider pucks often fall out and there are special o-rings under them. It is critical that the o-rings get placed back in the groove correctly to re-assemble later. If not it will be too tight when sliding the assembly back together.

temporarily fold the flyweight lever arms to be out of the way for removal of the primary spring.

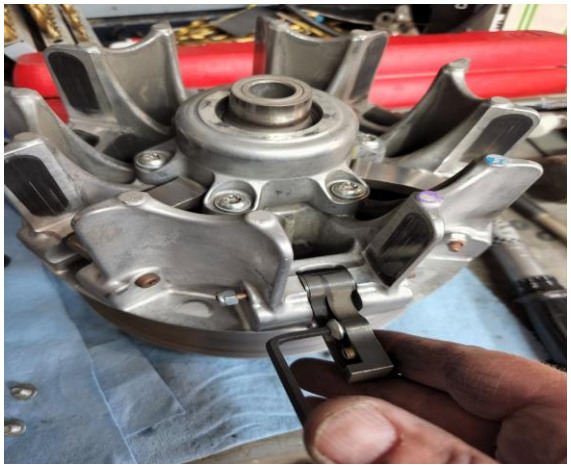
4) Mark the spring retainer cup and the clutch sheave surface with a marker for re-alignment later.

5) **Change primary spring.** Using the threaded compressor tool, close the tool down onto the spring retainer cap to contain the spring while the screws are removed. Do not over tighten the tool onto the retainer.



6) After removing the bolts, use the compressor tool to let pressure off the primary spring retainer cap. Install the new primary spring**.** Using the compression tool, carefully compress the new spring. Be careful when it gets close to seated that the rim edge is in proper position to seat correctly. It should go into place easily.

7) Use blue removeable thread locker on the threads of the bolts for the spring retainer cap. Torque primary spring cap screws to (**89 inch/lbs**) or 10 N.m



8) Set up Flyweights with the screw hardware as described for your application in the "set Up Guide"

- You will be replacing **every second one** with one of the **adjustable flyweights** in this kit. Screw the hardware into the flyweights before you install the flyweight, using <u>blue</u> removable thread locker. For later adjustment if needed, you can do it as shown in the picture.

Install the flyweights using the factory thrust washers from the stock flyweights, it is important that they are there, this is a wear surface that ensures fluid movement of the flyweight.

9) Install Governor /spider assembly back into the sliding sheave. Make sure that you install in the correct position indicated by the marker marks you made previously. It is **important** that the o rings get put in place properly so that the governor assembly will slide down into the slots correctly. If o rings are not in the groove it will damage the o-rings and the clutch will not slide correctly. It is normal to be slightly stiff sliding, but if it is tight the o-rings may not be in place correctly.

10) **Install the primary clutch assembly**. The clutch assembly should be carefully held together as a unit and placed on the crankshaft.

This clutch attaches to the clutch via a set of matching tapers. Be certain the **tapers are clean and dry** (only use quick drying, non-residue cleaner like **brake cleaner**, never lube or oil.

11) Thread in the primary center bolt. Snug it by hand then use the holding fixture on both clutches to hold while doing torque. **<u>Torque primary clutch</u>** to **<u>89 ft/lbs</u> (+/- 6 lbs)**

Before installing belt make sure all sheave surfaces are clean and dry using non residue cleaner (Brake Cleaner) on a clean rag first then wipe.

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

- *Note direction arrow on the belt.*

<u>** The Factory Can Am belt was used for all testing on this vehicle !</u> As much as we would like to recommend a cheaper priced alternative, the factory belt has always performed well for us on Can Am applications. The components in this kit are calibrated to this belt compound. Take note that the use of other aftermarket belts can not only effect durability, but they can operate at different rpms, etc.

12) Re-install plastic cover shroud,

<u>Note:</u> Be certain that the cover gasket is properly in place and use caution not to over tighten the cover bolts. Torque cover shroud screws to **53 inch/lbs or 6 N.m**

Flyweight Set-Up-Guide - Defender HD10, Defender HD10 Max (not XMR)

Note: <u>All flyweight fastening hardware</u> is installed snug with a drop of <u>blue</u> removable thread locker !

<u>28"</u> tires - Use the new billet helix provided, along with the stock secondary spring in the #4 setting (same position as stock setting), and make sure that the secondary spring is preloaded properly. Use the **<u>Mint Green/Silver</u>** spring in the primary clutch.
Flyweights -add the **3/8" long silver "button head"** screw inbound (closest hole to the pivot bolt), and the **½" long "set screw"** in the tip. (MAX model use 3/8" button head and the 3/8" black set screw in the tip)

<u>29-30" tires</u> (most… All terrain and trailable tires) - The 30" tire is a very common size for this vehicle (we go by what size a tire is "labelled as") but there is variance.
Use the new billet helix provided, along with the **stock secondary spring in the #4 hole** (same position as stock) make sure spring is pre-loaded correctly when installed. Use **<u>Mint Green/Silver</u> primary spring**
Flyweights- add the **3/8" long silver "button head"** to the inbound threaded hole (closest to pivot bolt), and the **1/4" long black "set screw"** to the **tip** hole. Note, there is a wide variance in actual size and weight. If you have low rpm after the Clutch phase test (see following pages)…change the 3/8" <u>button head</u> to the gold ¼" button head. Most should be able use the standard silver 3/8".

<u>29.5-30" Extreme Mud Tires</u> (meaning Outlaw 2, Outback Max, etc.) **tires with 1.5 -2" deep lugs for mud only,**
and all
<u>31,32" tires</u> ***
-Use the new billet helix provided, along with the stock secondary spring in the #4 setting and use the provided spring in the primary clutch.
Flyweights- Use the 2.4g gold button head screw in the inbound hole (closest to the pivot bolt), and add the 1/4" long set screw to the tip.

*** <u>All of these tires in this category</u> have a very broad range of <u>actual weight</u>, true <u>size</u>, and actual <u>real application</u> used. The kit has adjustable flyweights. Some fine adjustment may be required for your specific application, our suggestion here is a broad one that will be better than stock clutching for your application. BE SURE that you are using **<u>low range</u>** frequently with these tires.

- The above <u>settings are not for XMR version</u> that has lower gearing

***Note on XMR**: we have not tested the XMR version of this vehicle. It is possible that the kit could still help a XMR version. For instance, the lower gearing of a XMR may require using the settings for the 28" listed above for a larger tire size like 32 …and that thought is only based on the gearing being lower, it has not been tested. Sometimes lower gearing requires a different set up. We may have more data in future on the XMR version, but at this time the kit is only for the described applications.*

-Higher elevations? – We have not tested this vehicle at higher elevations, we have done some others, and it is often the case that as you go up, you lose some HP as there is less Oxygen. As a general rule of thumb, at 4000-5000 feet elevation you need to be a few grams lighter in the flyweights to compensate. The flyweights are adjustable and could be tested if you want to experiment.
The wide variations of actual tire sizes and weight, along with the different elevations make it speculative. You should be able to make it better than stock clutching at elevation if you like to experiment with the adjustable weights, but at this time the kit is marketed as described in the original title.

-<u>Seasonal stock tires/tracks</u> – Stock tires are sometimes used seasonal or part of the year, also track systems. Tracks are geared down within the track, so you set the kit up like you would for stock tire use. *If you use larger tires only seasonal, and go back and forth between stock and oversize tires, ADD the <u>Silver</u> <u>washers</u> under the button head screw for optimal performance when using <u>stock tires/tracks</u> only…standard 2 seat only. For MAX, and LIMITED (full cab) models use only the 3/8" button head and ½"set screw in the tip.*

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.

Note: The primary spring used here and this application guide is related to use with the custom helix and flyweights in this kit.
Do not "assume" things about spring pressures required or used. springs increase pressure at a different rate, and the "engagement RPM" is also sometimes affected. (Engagement is when the vehicle moves).
The engagement rpm of the **Mint Green/Silver is similar to stock when used with these weights, but has increasing pressure as it compresses**. We do not see benefit of a higher engagement rpm for this application.

Defender HD10 - **General Overview and CVT basics**

Clutching, belts, and potential problems.

This vehicle has excellent hp in stock form. This vehicle has plenty of power, along with tall final drive gearing making it capable of reaching fairly high speeds in high range. 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 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 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 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 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 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

If you have the interest, take a moment to read a bit of basic clutch tuning theory. 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 good "all around" set up. For the tire size they provide on the vehicle. 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, the 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 (back shifting). 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 to a point **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 and thus 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. 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 the engine will often start to overrev, but it is because the belt can shift no farther to control the rpm.

******Operating RPM** - CVT tuning is often focused on operation RPM, but remember it is RPM during the **"clutching phase"** that is affected by clutch tuning components. (the first part of the test run). Use High range.

Defender HD10 (stock)– best peak operating rpm is **5850-6250 during the clutching phase.** There can be some variance and some modifications make the vehicle "happy" at higher or lower rpms, but on a STOCK engine this is the best tested rpm zone. **Remember that when on a long road run the "clutch phase" is over in a short distance (400 feet), and that your rpm may be higher after the belt is fully shifted**. On long runs that RPM may not necessarily be clutch. Remember…**higher RPM way down the road is not clutch phase RPM**. It is normal to be higher after 50 mph. Clutch phase RPM refers only to the first approx. 400feet of distance on a WOT test run.

The Components

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 6100, then having it calibrated to run at 6500- 6700 is probably worse than if set up to run at 6100, as many crankshaft engine dynos will easily prove. Some people get wrapped up in thinking "more RPM is always better". Proper peak HP rpm zone is the target. However, do not forget that peak HP RPM test only refers to the Clutch Phase part of the test run! It is normal to rev more after 50 mph when the belt cannot shift any further.

Flyweights- Flyweights are one of the principal controls of engine rpm during the Clutching Phase part of a test run, but all components work together from both clutches. Sometimes stock flyweights are fine.

Primary Springs- Primary springs have pressure characteristics and uses. Primary spring can control "engagement rpm" but also has effects on rate of shift and rpm. The springs are usually compared by using their pressure load rating at two intervals.
The primary spring is the principal ***opposing force to the flyweights in the primary.***

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 on the pulleys when the vehicle senses load. The secondary, however does have effect on upshift characteristics as well. In this case the stock secondary spring is more than sufficient, however a new HELIX with a different ramp curve is used in conjunction with the stock spring to create a different shift characteristic.

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.

Helix- The helix is one of the main components for control of "rate of shift of the belt" in the secondary clutch. A helix can have different ramp angles or curves. The helix is a component that works in conjunction with the rest of the tuning components in both clutches. Sometimes one, or the other need to be different for different vehicles and applications. The helix in this kit is specific to the vehicle and the rest of the kit used.

Thank you for choosing Dalton Industries!