

# INSTRUCTIONS FOR CPC DRIVEN CLUTCH TORSIONAL CONVERSION KIT FOR ARCTIC CAT PRO-CROSS AND PRO-CLIMB MODELS



Thank you for purchasing a CPC Racing clutch kit. We take pride in manufacturing the highest quality and best-engineered parts in the industry! This kit fits all Pro-Climb/ Pro-Climb snowmobiles manufactured 2012 and newer. This kit transforms your clutch into a custom High Performance clutch that provides the following feature and benefits.

## FEATURES

1. Uses torsion spring technology.
2. Adjustable and easy to work on design.
3. Great availability & selection of helix and springs.
4. Easy external roller replacement design.
5. Uses high quality CPC aerospace rollers.

## BENEFITS

1. The use of torsion spring technology improves up shift (acceleration) and back shift.
2. Superior engineering allows for quick change of spring settings
3. Increases belt life due to a decrease in belt heat.
4. Consistent clutch shifting characteristics due to higher lubricity and longer wearing rollers.

## Instructions:



1. Remove driven clutch. Set driven clutch on a workbench with the backside facing up. Using a black marker pen, make a mark on the stationary and movable sheaves so that when you are assembling the clutches that they stay in balance. Next disassemble driven clutch by heating the 4 screws, one at a time with a butane or map gas torch for about 20 to 25 seconds each to loosen the thread-locking compound. Next remove each screw one at a time using a T-40 Torx or 5mm Allen depending on the type of fastener that Arctic Cat used. Repeat the process by heating the next screw and remove it until all screws are removed. If the screw does not want to come out, try heating the screw a little longer. Apply heat only on the head of each screw. Do not heat the aluminum bushing area or you will damage the plastic moveable sheave bushing. Disassembly is easier if you have a driven clutch compression tool or a second person to hold the clutch together until all the screws have been removed. At this point the entire clutch can be disassembled.



2. **Next, remove the white plastic sleeve that is over the black oxide shaft. This sleeve will not be reused.** Next using a clean



- cloth and acetone or brake cleaner, remove all dirt and belt deposits on clutch sheaves. Inspect the moveable sheave bushing for wear and replace it if it is worn.
3. The next step is to remove the 2 roller retaining bolts and rollers from the stationary sheave by bending back the ears on the safety bolt retaining tabs, and then apply a little heat to soften the thread retaining compound then remove the stock bolts and rollers. The safety bolt retaining tabs will be reused but the stock bolts and rollers will not be reused.
4. From the supplied CPC parts you will find an aluminum spring retainer sleeve and 2 stainless steel bolts and 2 new CPC high performance rollers. Before sliding the aluminum sleeve on make sure you have removed the stock black plastic washer out of the cavity where the aluminum sleeve will go. Next, slide the aluminum spring retainer sleeve over the black oxide center shaft and align the holes in the sleeve with the holes in the stationary sheave casting. Then install the

CPC stainless steel bolts into the safety bolt retaining tabs and slide the bolts into the clutch and through the rollers and hand tighten to 16 to 18 foot lbs. of torque. When installed correctly, the stainless steel bolts will retain the aluminum spring retainer. These bolts do not need thread locking compound as they have safety bolt retainers. Then with pliers, re-bend the tab to secure both bolts. The two CPC rollers are made of a special aerospace plastic polymer that resists wear and add durability to this torsional conversion kit.



5. The next step is to slide the new helix over the rollers and through the stationary sheave. Make sure that the machined groove in the 2 legs of the helix matches up with the angled nylon inserts. Then flip the stationary sheave/helix assembly upside down. **Using a drop of blue loctite on each screw**, install the 4 screws into the helix and then torque all screws to 20 to 24 foot lbs. of torque). **Note: Make sure that you align the balance marks made in step #1 to insure the clocking of the movable and stationary sheaves are assembled correctly to keep the clutch in balance.**



6. Install the torsion spring into any one of the 3 holes in the aluminum spring retainer sleeve. The 3 holes are machined at 120 degree locations in order to provide a perfect balance of your clutch.
7. **We recommend the final step of assembling the clutch to be performed with the use of a clutch assembly**



**tool; however you can do it without a tool if you have two strong men working together.**

8. Next, install the cover plate. The cover plate is drilled with 3 series of 6 holes. The purpose for the 3 sets of holes is to provide a perfect balance of the clutch and ease of installing the spring. We recommend that you start with installing the spring tab into the **#2 hole position**. Every #2 hole position is the same preload as all the other #2 holes. The same is true for all other numerical numbers. The higher the numerical number, the more preload or higher spring tension. Increasing to a higher number therefore gives you more spring tension. **For 800cc models that use electronic reverse, you must use a CPC Green/White spring or an Orange/White spring. You can advance the setting for maximum back shift by using the #3 or #4 hole positions but you will compromise reverse performance. Select the desired hole position then preload the spring by twisting the cover plate clockwise 25 to 45 degrees, then align the holes in the top billet cover plate with the treaded holes in the helix and install the six (6) 5mm stainless steel screws to secure the cover plate to the helix. On all 800cc models using electronic reverse models, the clutch will not work properly if you have too much preload (clocking the spring tension to too high of a spring setting).** If you experience problems in reverse where the drive belt is sucked into the lower part of the clutch when using reverse, then remove the 6 screws and loosen the preload on the spring to a lower setting. The CPC Torsional Conversion kit will work without any preload if needed however lowering the spring tension will affect the driven clutch back shift characteristics. Using a 4mm Allen wrench, we recommend that the Allen head socket cap screws are to torqued to 8 to 10 foot lbs. of torque. Lock washers are NOT used on the cover plate. **When using the CPC Torsional Conversion kit, avoid full throttle acceleration while in reverse. Also avoid going uphill when in reverse or using reverse while trying to get un-stuck in deep snow. Avoid backing up the snowmobile on a trailer or asphalt where the ski skags drag causing the belt to be sucked down into the driven sheaves.**

9. The last step is to slide the driven clutch onto the jackshaft and using the correct clutch alignment tool, verify and adjust as needed to obtain the correct offset. The final CPC part to install is the aluminum plug that contains the shims for correct belt deflection. Using a small flat bladed screwdriver, remove the black plastic washer off the stock aluminum driven clutch retainer plug as well as the deflection shims and O-ring. Transfer these parts to the CPC aluminum driven clutch retainer plug and using the stock bolt, tighten the bolt to retain the driven clutch. Now re-check for correct belt deflection. Note: Adding shims will tighten the belt deflection and removing shims will loosen the belt deflection. Every 150 miles it is important to check belt deflection due to belt stretch and wear. Also recheck belt deflection when installing a new drive belt.

### Notes:

Before you start tuning to calibrate either the drive or driven clutch, it is wise to check a few things to make sure you can take advantage of your new CPC clutch kit.

A. Make sure both drive and driven clutches are clean and free of belt dust, grease or dirt.  
B. Make sure that the rollers on the spider of the drive clutch are in good shape and that the cam arms and that the bushing in the movable sheave are not worn.



C. Make sure that you have the correct offset on your clutch alignment. The correct tool to adjust clutch alignment for 2012 models is Arctic Cat part # 0644-428. The correct alignment bar for 2013 models is Arctic Cat part #0644-588.

D. CPC recommends using only genuine Arctic Cat belts. Make sure you start out with a new belt that is free from wear, heat check or stretch. It is impossible to get peak RPM or peak performance with a drive belt that is worn out!

E. After installing the driven clutch, make sure you have the correct belt deflection. Too much belt deflection will cause a bog as you accelerate from a dead stop. Too tight of belt deflection will cause the belt to squeak or the snowmobile to creep at an idle. It will eventually ruin the drive belt if the belt is run in this condition.

F. Make sure your chain case has clean oil. CPC recommends that the oil be changed every 500 miles. Use only Arctic Cat Synthetic chain case oil.

G. Re-evaluate your gearing for the type of riding or racing. Correct gearing will be determined by many factors including how fast of vehicle speed desired, rider weight, snow conditions, altitude, size of engine and type of terrain (flat or hill climbing).

### **Driven Clutch Basics:**

Correct calibration of the driven clutch is essential for maximum efficiency. The most important concept for you to understand is the fact that the driven clutch is dominant over the drive clutch. The driven clutch is torque sensing while the drive clutch on the engine is RPM sensing. To improve efficiency or to change up shift or back shift characteristics, then adjust the driven clutch. If you want to change the RPM's of the engine then adjust the weight of the cam arms in the drive clutch. To change the engagement of the drive clutch, then change to a high or lower tension drive clutch spring. The drive clutch spring has an overlapping effect on the RPM's of the engine. For example, a stronger tension drive spring will raise the engagement to a higher RPM and will overlap and make the shift out RPM's slightly higher as well. A less tension drive spring will have the opposite effect.

The purpose of the driven clutch is to sense a load on a snowmobile and keep the proper tension on the drive belt. Because the driven clutch can sense a load, the clutch must analyze how much torque it is receiving from the engine and compare it to the resistance it receives from the track. At that point it shifts to the highest possible ratio to obtain power and torque. When the load or resistance changes, the driven clutch will override the drive clutch and will shift up or down to maintain a constant RPM and deliver peak power output. Both the drive and driven clutches work as a team and are dependent on each other. A change in one clutch will affect how the other clutch responds. One of the most important clutch tuning components is the driven clutch spring. The driven spring applies side pressure to the drive belt in conjunction with the driven helix. The driven spring is a key component to influence efficiency in the driven clutch. A lack of spring tension will allow the belt to slip in the driven clutch causing an extreme amount of heat. Heat is friction, an enemy to performance. Too much spring tension will cause a loss of efficiency and slow down acceleration. The goal is to have the correct spring tension in conjunction with the correct helix angle for the type of riding conditions (i.e. Load or resistance on the track). Remember that a higher tension spring is required when a larger degree helix is installed. Higher degree helixes produce less side belt pressure because spring pressure is applied perpendicular to the sheaves rather than parallel to the driven clutch sheave.

The technology of this CPC driven clutch conversion kit, is dependent on two spring forces. This kit uses torsion spring forces that are applied by the twisting motion of the spring. Additional torsion force can be applied by changing the location of the spring tab in the holes of the cover plate. The second force is the compression force. This force is applied as the spring is compressed. Additional compression force can be applied by going to a larger diameter wire in the driven clutch spring or by going to a longer free length spring. The theory of changing to less spring pressure allows the belt to shift faster which puts more load on the engine and in return lowers the engine RPM. Just the opposite is true, when changing to more spring tension, the drive belt shifts slower allowing the engine RPM to increase.

The theory behind changing helix angles are simply this: A higher numerical helix degree allows the clutch sheaves to open faster allowing the belt to shift faster to a higher belt gear ratio. Lower degree angle slows the opening of the sheaves and allows the clutches to stay in low gear for a longer duration of time. Higher degree helixes have less side belt force due to the direction of spring pressure. On larger degree helixes, the spring pressure is applied perpendicular to the belt sheaves. On lower degree helixes, the spring pressure is applied more parallel to the belt sheaves. Lower degree helixes also influence better back shifting to a lower belt gear ratio due to more directly applied spring pressure in a parallel direction. This directly transmits to more side belt pressure and quicker back shifts. In reverse, larger degree helixes produce less side belt pressure due to spring force applied to more of a perpendicular direction. Less side belt pressure allows the driven clutch to up shift to a higher belt gear ratio.

Just a quick comment when you are using a compound helix. (An example would be a 42-36 helix). Compound helixes are made to take advantage of special riding conditions or to clutch the snowmobile to the match engine power and torque output characteristics.

**The proper way to tune a clutch is by first choosing the correct spring and helix combination to give you the best overall performance. Then fine-tune your RPM=s by adding or subtracting weight from the cam arms in the drive clutch.**

For additional clutch information and education, you can order a CPC Clutch Tuning Handbook by calling (801) 224-5005 between 9:30am and 6:00 pm MST.

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