INSTRUCTIONS FOR CPC DRIVEN CLUTCH CONVERSION KIT FOR ACT DIAMOND DRIVES VERSION 2

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 ACT Diamond drives manufactured from 2005 to present and transforms them into a custom High Performance driven clutch that provides the following feature and benefits.

FEATURES
1. Uses torsion spring technology.
2. Easy to work on design.
3. Great availably & 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. Rollers can be replaced in seconds without clutch disassembly with an Allen wrench.
4. Increases belt life due to a decrease in belt heat.
5. 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. Next disassemble driven clutch by heating the 9 screws with butane or mapp gas torch for about 20 to 25 seconds each to loosen the thread-locking compound, then remove each screw one at a time using a T-20 torex. 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. 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 should be disassembled. Next, **remove** the plastic sleeve that is over the black oxide shaft. **This sleeve will not be reused**. The next step is to remove the three rollers and pins from the stationary sheave. Only three rollers will need to be removed because the CPC conversion kit will provide 3 high quality rollers and three ¼ inch threaded bolts to hold the spring retainer into the stationary sheave. These three CPC rollers are made of a special aerospace plastic

polymer that resists wear. Due to the fact that the CPC conversion kit uses a torsional spring, additional pressure is applied to these three rollers. The three rollers that will need to be removed will be the left roller as viewed when the stationary sheave black center shaft is pointed up wards. (See photo). Next, you will need to remove every other stock roller and pins by taking a small punch and removing the roll pins by taping them from either side of the stationary sheave. Then take a ¼" drill bit and hand ream the inside of the ¼" hole that the roller pinhole is located in. A twisting motion of the drill bit will remove any burr that was created by the removal of the small retaining roll pins that you just removed. This is important or you will have a difficult time removing the ¼" precision ground pins that retain the stock rollers. These pins can be removed now by taking the small end of an Allen wrench and pushing on the 1/4 inch pin from the inside of the cavity and pushing the pin outwards**. It is important that you remove the correct three rollers and replace them with the long lasting CPC rollers. Failure to remove the wrong rollers will cause the stock "white" nylon rollers to wear out prematurely.**

2. Next, slide the round aluminum torsion spring retainer over the center post on the stationary sheave. Install the 3 CPC rollers in the original roller cavities, then install the 3 stainless steel shoulder bolts to retain the rollers. The shoulder bolts will thread into the aluminum torsion spring retainer. Install all 3 shoulder bolts into the spring retainer before final tightening of the bolts to insure proper alignment before final torque is applied. **Note: You will only use the 3 CPC rollers that are provided in this kit and they will be installed in every other roller cavity. See the photo below for correct roller cavity location. Do not reinstall the plastic sleeve over the black oxide shaft.**
Next using a clean cloth and acetone or brake cleaner, remove all dirt and belt deposits on clutch sheaves.

3. To assemble the driven clutch you will need only the following parts off the original clutch: The 9 screws that held the helix onto the movable sheave, the small flat shim that is used between the helix, the movable sheave and the stationary sheave. If the screws get damaged from the removal process, you can purchase new screws from your Arctic Cat dealer using part# 1623-517**. Note: We recommend you <u>install 9 new screws part # 1623-517 when installing this kit. Failure to do this can result in the old screws shearing off and can cause clutch damage.</u>**

4. The next step is to slide the new helix over the rollers and through the stationary sheave. Then flip the stationary sheave/helix assembly upside down. Then place the aluminum shim on top of the helix so you can align all 9 screw holes in the helix with the holes in the shim. Then slide the movable sheave on top

of the shim and **then use a drop of blue loctite on each screw** and install the 9 screws into the helix and then torque all screws to factory specifications. (Approximately ft lbs of torque**). Note: There is a diamond shape symbol on each sheath that must be lined up to keep the clutch in balance.**

NOTE: MAKE SURE THAT THIS BUSHING RETAINER SHIM IS INSTALLED. IF THIS SHIM IS LEFT OUT OF THE DRIVEN CLUTCH, THE MOVABLE BUSHING WILL WORK ITSELF OUT AND YOU WILL DAMAGE YOUR CLUTCH!

Next step is to install three short Allen socket head cap screws into every other hole in the top of the helix. The purposes of these Allen screws are to secure and give proper alignment to the cover plate. (See photo below for proper positioning of these screws.)

Note: There are 2 different versions of cover plates depending on when your kit was manufactured. If there is a Number 3 below the indexing holes (large hole) on the cover plate then the indexing Allen screws in the helix need to be in lined up with the "D" on the side of the helix as show in the first picture. If there is a number 6 below the indexing holes (large hole) on the cover plate the Allen screws will be just opposite and will not line up with the "D" on the side of the helix as show in the 2nd picture. If these screws are placed in the wrong location, you will not have the proper torsional spring tension and the clutch will not work correctly.

#3 Indexing hole position

#6 Indexing hole position

5. Install the torsion spring into any one of the 3 holes in the spring retainer. The 3 holes are machined at 120 degrees locations in order to provide a perfect balance of your clutch.

6. 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 middle hole(#3 hole) for 2005 through 2008 models that use our CPC Red/White or Silver/White spring then preload

the spring by twisting the cover plate 50 to 75 degrees. **For 2009- 2011 and newer models that use electronic reverse, you must use a CPC Orange/White spring or a CPC Green/White springs. The initial settings for CPC diamond drive conversion kits manufactured after December 25, 2010 must in the # 2 or # 3 cover plate hole. You can advance the setting for maximum back shift by using the #3 or #4 hole positions. Select the correct hole position then preload the spring by twisting the cover plate clockwise 50 to 75 degrees, then slide the cover plate over the head of the 3 Allen bolts that are screwed into the top of the helix. The head of the 3 Allen bolts allow the cover plate to be held into position while you install and tighten the 3 cover plate screws. On electronic reverse models, the clutch will not work properly if you have too much clocking (hole position).** While applying downward force to the cover plate; you can install the 3 long stainless steel Allen socket head cap screws through the cover plate and then into the helix. Tighten all Allen head

socket cap screws to about 6 to 7 ft lbs of torque. **We recommend that you use a clutch assembly tool for assembly and disassembly or you can do it without a tool if you have two extremely strong men working together. Note: Never use an air impact gun to loosen or tighten the screws on the cover plate or you will damage the screws and helix.**

Notes:

The CPC driven clutch assembly is now ready to install 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 is in good shape.

C. Make sure that you have the correct offset on your clutch alignment. The correct tool to adjust clutch alignment for ACT diamond drives is Arctic Cat part # 0644-427.

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 peek 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. CPC offers a belt deflection adjuster that can be installed to change belt deflection without changing the shims on your driven clutch.

F. Make sure your ACT diamond drive gear case has clean oil. CPC recommends that the oil be changed every 500 miles. Use only Arctic Cat Synethic 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.**

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 peek 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 and 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 44-38 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 for $19.95 by calling (801) 224-5005 between 9:30am and 6:00 pm MST.

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