

FREE HORSEPOWER!

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So your Polaris has good horsepower, the chassis works the way you want it to, you have tuned the clutches to perfection and the sled works as well as it can. Or does it? Power is being lost in the clutch system and too often it is assumed that if the clutches move and propel the sled at the desired engine RPM they are working to their maximum potential. There most likely is some "free horsepower" hidden in your clutches and we will explain how to get it. The following performance tips will make your Polaris faster, improve belt life and in some cases even enhance fuel economy. This is not new information; most of it has been practiced by successful snowmobile racers for many years.



To measure belt side clearance, push the belt to one side of the clutch shaft, and slide a feeler gauge between the side of the belt and the sheave of the clutch. Ideal clearance should be .010" to a maximum of .020". This would be with only slight friction on the feeler gauge when testing clearance.

The first issue to address is drive clutch belt side clearance. This is the amount of clearance between the drive belt and the clutch sheaves. The weight arms that actually control the moveable sheave have a "range of efficiency". In this operating range is where the belt will have the necessary side pressure to prevent or reduce slippage and the shift out will be aggressive up to maximum mechanical ratio. If there is excessive belt clearance it can cause poor off the line performance, hesitation, bogging, belt burning as well as reduced acceleration and less top speed. Many times a low speed bog will be blamed on the carburetors simply because it has the same symptoms but in fact it is due to excessive belt clearance. Variance in belt side clearance can even be seen in identical new sleds where one is faster than another.

Belt side clearance on the drive clutch is measured with a new or very good belt in place to ensure proper belt width. Push the belt to one side of the clutch shaft, and slide a feeler gauge between the side of the belt and the sheave of the clutch. Ideal clearance should be .010" to a maximum of .020". This would be with only slight friction on the feeler gage when testing clearance. If there is more than .020" clearance you are losing performance, plain and simple. One or all of the above mentioned symptoms may or may not be present, but you might want to measure it again with a second drive belt, preferably a new one, before making any changes. You don't want to be messing with the clutch if your only problem is a worn (narrow) drive belt. If the side clearance is still more than .020, then proceed.

Adjusting the clearance is usually done by removing the spider and adding or subtracting shims as needed. A variety of thickness shims are available from a Polaris dealer. Polaris performance shops have all the special tools available clutch service and for removing the spider properly. (There are also some clever ways of accomplishing this through an external adjuster, where the moveable sheave is tensioned slightly to decrease the side clearance. Riders who use their machines under heavy load and work their clutching hard can benefit from an external adjuster as it allows you to better maintain the clearance as the belt wears.)

The second issue basically has to do with clutching system cleanliness. When you buy new drive belts, they have a trace of mold release on the surface of the belt from the manufacturing process. This mold release, if not removed, will transfer to the clutch faces and absorb into the pores of the aluminum. This material will increase the possibility of slippage and of course, power reduction to the ground. Other contaminants such as oil, grease and gasoline are also an issue. Build up of rubber on the clutches can also reduce performance; the clutch sheaves must be clean so they can grab the belt. The first caution about cleaning clutches and belts is to never use any solvent based cleaners. This may come as a surprise to many of you, but this would include petroleum, alcohol, cleaning solvent and miscellaneous chemical based products. Things like carb cleaner, brake cleaner, electric contact cleaner, parts washing solvent and so on. For the most part, residue from these products is absorbed into the pores of the aluminum, or simply washes contaminants into the pores to come out later and become permanently attached to the belt; causing slippage.

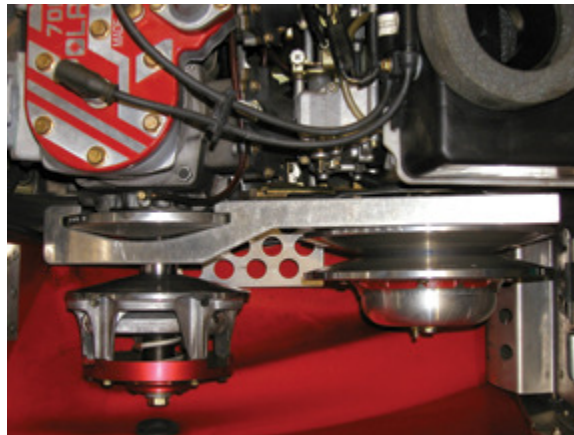


Drive clutch springs should be inspected for deformation and measured for proper free length (sagging). They should be replaced each year or every 2000 miles for consistent performance.

I have heard of hundreds of cleaning methods over the years, but there is only one method that I believe to be really effective. Use a piece of Scotch Brite™ pad or steel wool to scuff off any heavy rubber buildup on the clutch faces. For heavy buildup you can use 180 grit sand paper with caution not to over sand and create low spots. Then wash the clutch faces with hot soapy water (hotter the better) since the heat and soap will tend to draw contamination from the aluminum. Finish by wiping dry or air blow dry. The belt must be cleaned also using a medium to soft (nylon) bristle brush and the hot soapy water to remove contaminants. Dry the belt completely before installing. Be sure not to overlook clutch compartment cleanliness as well. If the compartment is coated with belt dust, oil, fuel, weeds and whatever you can just guess where it will eventually end up.

The next step is to reinstall the clutches and perform all needed adjustments. Clutch offset and center-to-center distance is very important for proper clutch and belt function. If the offset is off it will cause more pressure to one side of the belt than the other. This results in excessive temperature, wear, slippage and performance loss. If belt free play is excessive it will cause the belt to pull up into a higher ratio at engagement causing sluggish performance off the line as well as excessive temperature, wear, slippage and performance loss. Several performance shops can supply you with "go/no-go" tools that will immediately tell you if you the offset and center-to-center are at the proper spec.

One rule that is beneficial for belt free play is to run the belt as tight as possible without creeping at an idle. This insures that the belt will stay in low ratio for a spunky holeshot. Most sleds can benefit from a torque arm (and push arm on some models) to hold the engine and alignment in place. Performance as well as belt life is improved. Performance shops (like SLP) have torque arms for most Polaris models. This is particularly important on engines that have added power, as the OEM engine mounting system may not have been designed to withstand the extra forces.



Polaris dealers and performance shops can supply you with "go/no-go" tools that will immediately tell you if you the offset at the proper spec. This is easily adjusted by adding or subtracting spacers from the jackshaft behind the secondary clutch.

Clutch balance is another issue that is often overlooked. The smoother it runs, the smoother it operates. An out of balance clutch will continually hammer away at main shaft bushings, in turn reducing smooth and efficient movement. This hammering creates accelerated wear on main shaft, roller and weight bushings as well. Balancing can also prevent damage to the crankshaft since this hammering will eventually damage the case and/or bearings. Just a note,

the majority of the time you cannot detect this vibration created from an out of balance clutch until it is too late. If you've invested money into your engine it is wise to protect your investment with precision balancing.

The drive spring quality and condition is something to be aware of to maintain the best performance. Springs are a wear item that can loose tension or response over a period of time during operation. A rule for spring replacement should be once per year or at least every 2000 miles. Removing the springs from the clutches during storage months (so it is not compressed) will also add life to it. Finally, choose good quality springs for best performance. The material that the spring is made of will certainly have an effect on how "snappy" the performance is. Performance suppliers (like SLP) offer a selection of high quality springs that will have better performance and life expectancy than the springs that you can typically buy for your sled. Look for tighter tolerance springs (5% instead of 10%). Ones that are made from chrome silicon wire and shot-peened are going to be the highest quality. It seems like I have given you a long list of work to do. How well do you want to perform? How much of the power do you want to transfer to the ground? Once you have completed this clutch "super tune", keeping them in good condition will come easier. You will enjoy the added performance and the savings for parts and fuel.