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CPC TURBO M8 HANDBOOK USING  
GARRET TURBO FOR  
PROCLIMB / PROCROSS 800  
Stage 2

## ***CPC Turbo M8 Handbook Using Garrett Turbo For Pro Climb and Pro Cross 800's***

Thank you for purchasing a CPC Pro Climb and Pro Cross Turbo Kit. Our kits are built to the highest quality standards. This handbook contains both generic and specific information regarding turbo operation and installation. This handbook also contains valuable information that will help you understand how your turbo works and how to tune your turbo powered Arctic Cat to get the most performance out of this product as well as ways to avoid potential problems and save money.

CPC has been turbo charging snowmobiles since the mid 1990's with a 1993 EXT 550 model as our first project. Two years later we completed a more reliable turbo charged ZR 580 with great success. As the years followed, the Turbo kits continue to be refined.

### **What kind of Turbo does CPC use and why?**

CPC uses a GT Garrett RS series ball bearing turbo. Garrett turbos have passed intensive testing for durability, safety and efficiency. Garrett GT series turbos have a higher efficiency rating which reduces heat and produces more pounds of air per minute than many other turbo manufactures.

### **What kind of maintenance and care is required for the Garrett RS series turbo?**

We recommend that you use Mobile 1 synthetic 5 w 30 oil or other high quality synthetic oils. Use 0 w 30 if temps drop below -20 F. This oil should be changed every 500 miles. After 500 miles of use, the oil will start looking "milky" as moisture and water accumulate in the oil. It is critical to change the oil before too much water is absorbed into the oil which can lead to oil pump failure.

### **How can the Garrett turbo become damaged?**

The most common way a turbo can be damaged is when catastrophic engine failure exists. A hard piston seizure can damage a turbo if metal particles are sent down the exhaust pipe into the turbo. The compressor wheel can be damaged by foreign objects (like rivets or screws) or by ice buildup in the air intake system. Other failures may include improper lubrication or the lack of lubrication from an oil pump failure. This can happen if the snowmobile is run upside down or on its side for long periods of time. If you have an accident where you roll the snowmobile and the snowmobile spends a considerable time upside down or on its side; then you should immediately shut the engine off, up-right the snowmobile, then check oil level. **The correct amount of oil, when filling the oil tank is 16 ounces then check the level of the oil on the dipstick. The oil level should be checked often to avoid running the turbo low on oil. If the oil becomes milky, it is contaminated with water and must be changed.**

### **Why doesn't CPC use an Inter-cooler on your kit?**

Inter-coolers can be beneficial after 12 lbs of boost and if the user is on boost for long periods of time, (usually after 30 to 45 seconds of max boost). We have found that 85% of our customers do not use their turboed powered snowmobile to this extent. Therefore inter-coolers are only effective if and only if their volume capacity is large enough and only if there is adequate air moving through the inter-cooler. This is hard to achieve on a snowmobile application because of space limitations. Also all inter-coolers add restriction. A 1 to 1.5 pound of boost is normally lost when using an inter-cooler.

This means that you need to work the turbo harder by turning up the boost (meaning more heat as you compress the air at a higher boost) to overcome the loss of efficiency. CPC was the first manufacture to use a cold air intake. Cold air is important because colder air is denser; that is, it carries more oxygen than hot air. For every 10 degrees F. you lower your intake temperature, your engine produces 1% more horsepower. An example of this is if one turbo kit breathes hot air from under the hood and another turbo kit manufacture use a cold air intake, and the difference is 70 degrees F, then the company with a cold air kit has a 7% advantage over the other. More oxygen means more horsepower!

### **What kind of fuel is required on a CPC turbo kit?**

CPC requires that you use a minimum of 93 octane fuel at sea level and 91 octane at high elevations for Stage 1 pump gas kits. 110 to 114 octane race fuel may be used on Stage 2 & 3 kits depending on how much boost and what altitude you run. See the Octane Requirement Chart under Fuel Recommendations for specific information. There are many quality brands of fuel. CPC suggests that you find a quality brand and stick with it. Changing brands every time you fuel up can cause inconsistencies with tuning your Attitude control box.

### **What kind of injection oil should I use in my engine on a CPC turbo kit?**

There are many brands of quality oil. The most important concept to focus on is to use 100% synthetic oil. We use genuine Arctic Cat synthetic APV (blue) and have had great success. Again, pick a brand of oil and stay with it. Mixing brands of oil each ride does not make good sense.

### **Will running a turbo wear my engine out prematurely?**

Yes, it is impossible to make more horsepower and not experience added wear to your engine. The most important thing that you can do is make sure you are jetted correctly. Running your engine with a lean air/fuel ratio can promote detonation even if you use 110 octane fuel. If you experience detonation (loose spark plug is the first sign of detonation), the first thing you should do is enrichen your fuel to air ratio by adding more fuel with your Attitude EFI controller.

### **If I install a CPC turbo kit on a new snowmobile, will I need a longer break-in period of time?**

Yes, all new engines require a break-in. Naturally aspirated (stock) require a one tank fuel break-in. CPC recommends two tanks of fuel break-in period of time when turbo charged. This allows for the piston to wear a little to increase the piston to cylinder wall clearance. Most piston seizures result from too much

heat being induced into the piston. Piston's expands when heated. If the pistons get too hot, they will grow larger than the cylinder and piston seizure will result. Long pulls up a steep mountain will result in inducing more heat into the pistons. If you are jetted a little on the lean side, you will be a major candidate for a new piston and cylinder. The two tanks of fuel break-in also allows you plenty of time to dial your jetting in and get use to the awesome power of this kit.

**What type of maintenance will be required with my CPC turbo kit?**

**Spark Plugs.** Spark plugs are always a wear and tear item on turbos. Because of the use of leaded race fuel, lead deposits can shorten their life. If your engine starts to miss or just doesn't seem to run right, then replace the spark plugs. CPC recommends replacing them every 300 to 500 miles if you use leaded race fuel. If you detonate your engine, then replace your spark plugs as we have seen the electrode break off due to detonation shock waves. Spark plug gap should be set at .025 on all turbo applications. A smaller plug gap helps the ignition of a denser fuel and air ratio and higher cranking compression used in turbo powered snowmobiles.

**Reed Valves.** Turbo's are hard on reed valves and wear them out quickly! Reed valves will need to be replaced on a regular basis on all turbo's regardless of how much boost you run. Generally we recommend replacement at 600 miles using stock Arctic Cat reed valves. We have tested other aftermarket reeds and have not experienced anything that will last longer. Running boost over 8 lbs will require reed valve replacement sooner.

**Chain Case.** Another maintenance item is changing oil in your chain case. CPC recommends that the oil be changed every **300 to 400** miles. Frequent oil changes will lengthen the life of your chain and gears. Your Pro Climb or Pro Cross comes with a 13 link wide chain and gears (as delivered from Arctic Cat). **CPC requires that you replace them with 15 link wide components to provide additional strength and reliability.**

**Drive Belts.** Another maintenance area is that of drive belts. You need to expect that your drive belts to wear out sooner since you have more horsepower and torque. Keep an eye on them every ride. If you blow a belt under full boost, you can expect for your crankshaft to be damaged sooner or later! On a turbo powered snowmobile, belt alignment is critical and you will need to check and correctly align the drive belt for correct clutch offset to get maximum belt life.

**Pistons.** Periodically it is a good idea to replace pistons. We are often asked how often, that depends on how many miles you drive and more importantly is how you have tuned your engine. Engines that are run too lean will wear out pistons faster. Riders who climb long hills (long pulls over 30 to 45 seconds) will wear out pistons sooner due to heat saturation and expansion. Riders who know only one speed (wide open) will wear out pistons faster. If you experience detonation (loose spark plugs is a sign of detonation), you can break the ring lands out of your pistons. Simply put, there are too many variables for CPC to put an exact mileage for piston replacement, but one thing that I can tell you is that those individuals who change out pistons sooner will have less long term problems. Most turbo owners on an average change out pistons at about 1200 to 1800 miles of use depending on the above criteria.

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**Water Temp.** Water temp is always a concern especially on hard packed roads and spring riding. Remember that the byproduct of horsepower is heat. With a turbo it is easy to stress your coolant system. Using a water temp gauge is a great idea to keep an eye on the water temp. We recommend that you never exceed **145** degrees F. water temp. On the Arctic Cat 800cc engines, the ECU has been programmed so that if the engine sees too high of water temp, the engine will go into fail safe mode. The same is true with respects of shutting off a hot engine. It is normal for the coolant temperature to rise up after the engine is shut off (due to no water circulation). If the ECU detects this high coolant temp, it will not allow the engine to restart and the ECU will go into a temporary default mode. This can cause concern and may be a hassle if this happens to you. **Because CPC cannot reprogram the ECU and the fact that we cannot change this, we have provided each Turbo kit with a coolant temp bypass switch. There is a yellow electrical connector located right behind the engine. You will need to disconnect this connector and plug male to female in series to our new provided on/off toggle switch. This switch should be mounted in a convenient location. If your engine temperature is at normal running temperature and you shut off the engine and cannot restart it, then you will need to reset or trick the ECU. This can be accomplished by flipping this switch temporarily to the off position, then restarting the engine, then immediately flip the toggle switch to the normal run mode after the engine starts.** Now that you know that this is a characteristic of a turbo charged engine, it should not create any more concern.

**Fuel Recommendations.** The following chart will show recommended fuels and recommended **SAFE** boost levels to be run at specific elevations. If you exceed boost levels or run to low of

ELEVATION	MAX BOOST ON PUMP GAS 91 OCTANE	MAX BOOST ON 110 OCTANE	MAX BOOST ON 112 OCTANE
0 – 5000 FT	5	8	10
5000 – 8000 FT	6.5 - 7	9	12
8000 – 11000 FT	7.5 - 8	10	18

octane fuel, internal engine damage may result! CPC manufactures a special waste gate actuator for customers wanting to run pump gas (91 to 93 octane) for Stage II or Stage III kits.

**Note: All 2012-13 models must have their head modified or replaced before running under 9500 feet altitude!**

**Pro Climb and Pro Cross  
Installation Instructions:**

**#1. Read the entire instructions  
before trying to install this kit!**

Wash your snowmobile to remove all dirt and grease and belt dust in the engine



compartment. Clean and inspect drive and driven clutches if you have a lot of use on the snowmobile. Next siphon all the gas out of the fuel tank. Remember that this turbo charged snowmobile will now be using higher octane fuel unless you are using our pump gas actuator at low boost levels. Leave the fuel tank empty as the fuel pump will need to be replaced later in these instructions. Remove both left and right hand side panels.

#2. Remove the hood by using a T-20 Torex screwdriver and remove the 4 screws which hold the hood on. Then disconnect the headlight harness and the hood can be lifted off the snowmobile. The seat will need to be removed by using a T-27 screwdriver and removing the single bolt out at the rear of the seat. Next using a T-30 screwdriver, remove the 2 screws securing the fuel tank cover and then remove it and set it aside.

#3. Using a spring removal tool; remove the 9 springs which hold the exhaust pipe and the muffler on to the chassis. Then by using a 12mm end wrench or socket, remove the stock "Y" pipe. Next, from the CPC supplied parts, find the small heat wrap and band clamp. Next you need to bend the metal oil injection 90 degree fitting towards the chain case as it comes out of the bottom of the oil reservoir. Metal oil fitting should point towards the bottom chain case bolt. Then using the heat wrap that was supplied in the kit, wrap it around the oil injection line. Using a Torex T30 screwdriver, remove the lower R.H. bolt, then attach the band clamp to the bottom bolt of the chain case (see photo). This will prevent the turbo muffler from melting this oil



hose. **Note: the oil injection hose must be protected and never touch the muffler or the oil injection hose will be damaged and leak oil causing engine failure!**

#4. Using a T 20 Torex screwdriver, remove the 2 screws holding the aluminum cover that protects the ECU(Electronic Control Unit). Save the screws as they will be needed later in the instructions to retain a new CPC heat shield on. Remove the ECU by using an 8 mm wrench and remove the 2 bolts that hold the ECU to the chassis. Keep the 2 bolts as they will be used later to hold the ECU to the new ECU bracket later in these instructions.



5. Using a 10mm and a 13mm end wrench or socket, remove the 2 bolts and nuts that secures the cross support bar to the chassis. Do not remove the servo motor or cables; just lay the bar to the side. Using a flat blade screwdriver, loosen the clamps that secure the large black plastic air duct between the throttle bodies and air plenum as it will not be used in the turbo kit. Using a Philip screwdriver, loosen both the clamps that secure the throttle bodies to the rubber intake manifolds. Then pull the throttle bodies out of the rubber intakes.



#6. Using a T30 Torex and a 10mm wrench, remove the 2 bolts that hold the factory voltage regulator onto the front right hand side of the bulkhead by the lower steering post pivot location. Next, open up the box that contains the Arctic Cat AC to DC power kit. Use the Arctic Cat provided instructions, bolt the AC to DC power kit to the tunnel in front of the left hand front of the fuel tank. Then plug other end into the factory wiring harness where the original voltage regulator was plugged into. Carefully route the AC to DC wiring harness out of the way of the jackshaft or any other areas where it will be damaged and use provided wire ties to secure the harness.

#7. Using a 10mm socket or end wrench, remove the 12 bolts (6 on each reed) that hold the rubber intake manifolds to the engine. This is a perfect time to examine and replace your reeds if they have a lot of use on them. If the engine is new, the reed cages do not need to be removed. Next find the reed gaskets and the billet aluminum reed block injector plates. Place the gaskets between the outer reed cage and the CPC billet aluminum reed block injector plate with the injectors pointing up and the brass inlet pointing toward the recoil starter side (right hand side). Then reinstall the rubber intake manifold with the CPC provided longer 6mm X 50mm flanged head bolts. Tighten them to factory specifications (9-12 Foot/lbs of torque).



#8. Disconnect the stock injector electrical plugs and then disconnect the throttle cable and disconnect both coolant lines that go to the bottom side of the throttle bodies at the throttle body location. These coolant hoses will need to be re-routed towards the turbo charger location to feed coolant to cool the turbo charger. (See instruction #20). On the PTO side of the throttle bodies, you will need to drill a .159 hole (same as a # 21 drill) at the 12:30 O'clock position as viewed when sitting on the snowmobile, then tap the hole using a 10-32 tap(see photo). This hole needs to be drilled on the reed side of the throttle plate. Next, install the 10-32 hose barb that is supplied in a plastic hardware bag in the BOV (Blow Off Valve) box. In the BOV box you will also find a 2 foot long 1/8 inch inside diameter hose. Attach this hose to the barb and run the hose forward. At a later time this hose will be attached to the top of the blow off valve which will also need to be bolted onto



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the charge tube. The next step is to install the charge box. From the supplied parts find the rubber bumper and install it into the bottom front side of the charge box. Note: apply a small amount of grease onto the rubber bumper and twist the rubber bumper with your fingers. It is also helpful to use a small flat blade screw driver to assist in installing the bumper.



Next apply a small amount of grease to both "O" rings in the air charge box. Apply a good amount of pressure to slide the charge box onto the intake side of the throttle bodies. Then using the center aluminum boss on the charge box as a guild, mark the spot where the aluminum boss lines up with the metal support of the throttle bodies and drill a 1/4 inch hole in the steel bracket. Then insert the supplied 6m X 14 Allen head socket cap screw through the bracket into the charge box to hold them securely together. Tighten the screw with a 5mm Allen wrench. As an assembly, install the throttle bodies and charge box into the rubber intake manifolds. **Next using a cut off wheel or die grinder, remove material off the left hand shock bracket and bulkhead nose piece to make 3/8 inch clearance around the stock fuel rail to prevent it from vibrating against the chassis.**

Then retighten Philip screws to hold throttle bodies on to rubber intake mounts. From the supplied parts, find the rubber snubber attached to a thick cupped aluminum washer and insert the rubber end up through the bottom of the existing 1.375 diameter hole in the front of the bulkhead and attach the rubber snubber to the charger box.



#9. The next step is to find the provided CPC fuel pressure regulator. Using some Teflon tape or Teflon sealant, seal the threads of brass 5/16 X 90 & 45 degree fittings, then screw the 45 degree brass fitting into the back center of the regulator and the 90 degree fitting into the side of the regulator. **The center port on the back side is the fuel return back to the fuel tank and the ports on the side of the regulator are the fuel intake port and a port to screw in the fuel pressure gauge.** Then use Teflon tape on the fuel pressure gauge and install it into the front side port. Clock the fittings on the pressure regulator as shown in the photo. Next clock the pressure regulator so it positions the fuel pressure gauge is forward so you can read it. Using a 1/8 Allen wrench, attach the fuel pressure regulator to the aluminum CPC pressure regulator bracket. Using a #T30 Torex screwdriver, remove the 2 top screws that holds the magnesium oil bottle to the chain case and attach the bracket and regulator to the chain case behind the injection oil filler spout.



Attach one end of the EFI fuel hose to the center back side of the of the CPC fuel pressure regulator. Now route the hose in **front** of the



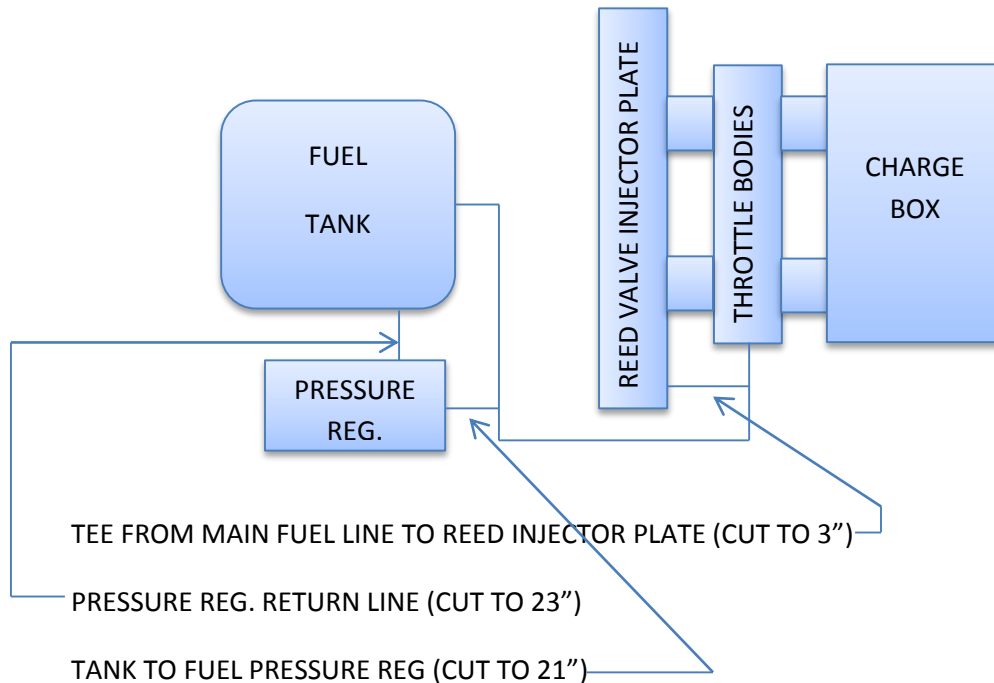
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one inch round horizontal steering support tube that is directly in front of the fuel tank, then up to the tank return bulkhead fitting. As shown in the photo, locate a spot about 2.5 inches from the leading front edge on the top side of the fuel tank as shown in photo. At this location cut the hose. Make sure that the plastic tank cover or anything else will not interfere with the routing of the return hose.



Now you can drill a 1/2 (.500) inch hole into the fuel tank. Note: Using a clean rag in your hand, with your hand down the fuel pump access hole of the fuel tank, you can catch the plastic shavings when drilling into the fuel tank. **Caution: be careful not to push drill bit into your hand and make sure the fuel tank is empty!** From the supplied parts, locate the rubber bulkhead grommet and metal 90 degree bulkhead fitting. Then install the rubber bulkhead grommet into the fuel tank and then push the metal bulkhead fitting into the grommet. Then secure hoses to fittings with the provided hose clamps. Using the provided wire ties, secure **both** hoses to the outside of the vertical aluminum rectangular support tube in front of the fuel tank.



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#10. Next unplug the black plastic 4-way electrical connector coming out of the fuel pump access cover plate located on the front top right hand side of the fuel tank. Next, using your fingers, squeeze the black release tab that is located in the 90 degree white colored plastic fuel connector fitting, while at the same time pulling on this connector to unplug the fuel hose coming out of the top of the fuel pump access cover. Using a #T25 screwdriver, remove the 6 screws holding the fuel pump access cover plate onto the fuel tank. Gently lift and remove the fuel pump assembly out the fuel pump access hole far enough to cut the zip tie.



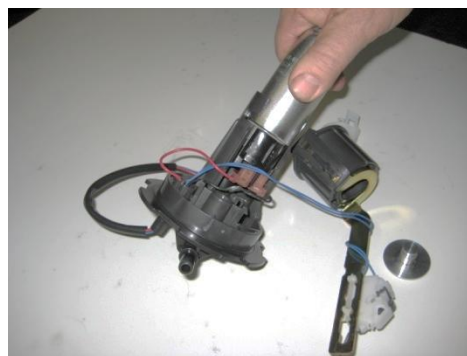
Then pry apart the pinch clamp and remove the fuel pump assembly, leaving the hose end at the fuel tank opening and smart valves to be left in the fuel tank. With the fuel pump assembly on a clean work bench, gently remove the white plastic cover that retains the factory pressure regulator by prying out on the two outer tabs. **Then gently lift the metal factory fuel pressure regulator out of the plastic housing, making sure that you do not lose the small spring that is under the regulator.** (See photo). Remove the spring and set these parts off to the side. The next step is to remove the stock fuel pump. This is accomplished by removing the plastic end cap that retains the stock pump by taking a small flat blade screwdriver and sliding it in a slot and lifting up on the plastic tab, while as the same time twisting



the plastic end cap with your hands about 1/8 of a turn counter clock wise as view from the exit end of the pump. (See photo). Then pull the plastic end cap off and pull the stock pump out of the pump assembly after the electrical terminals are removed. In reverse order, install high volume fuel pump by attaching the electrical wires, then slide the pump into the black rubber hose nipple in the inside of the pump assembly and reinstall the plastic end cap. From the CPC supplied parts, find



the CPC aluminum block off plug and install the rubber Viton "O" ring off the stock fuel pressure regulator onto the aluminum plug. Next install the black wire that has the outer plastic insulation removed, and then place the wire in the slot and place the small spring in the original cavity, then place a drop of oil or a dap of grease on the "O" ring and install the aluminum plug in the location of the original fuel pressure regulator. Install the white plastic retaining cap to retain the



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spring and aluminum plug to the assembly. **NOTE: The purpose of the small spring and black wire with insulation wire removed is to ground out any static electricity for your safety!**

From the CPC supplied parts, install a new Otiker pinch clamp and a new zip tie securing the fuel pump assembly to the hose and smart vales. A pinch clamp tool can be purchased through any quality tool supply store or Snap-on or Mac tool trucks. **Never substitute pinch clamps with traditional hose clamps. Using traditional hose clamps can vibrate loose, damage the electrical wiring and lose fuel pressure which will cause engine failure!** Then reinstall the fuel pump assembly into the fuel tank. Using your hands, make sure the lines leading to the smart valves are straight and not kinked and are returned to their original location in the tank. Then snap the white 90 degree fuel connector back onto the fuel pump access cover.

#11. Next, measure the hose length 6 inches up from the fuel rail fitting at the throttle body location and cut the original factory 5/16 black EFI fuel hose that leads from the fuel tank to the throttle bodies, then install a 5/16 X 5/16 X 5/16 brass "T" fitting and reconnect it to the original fuel line that leads to the throttle bodies. From the CPC supplied EFI hose, cut a piece of fuel hose 7 inches long and

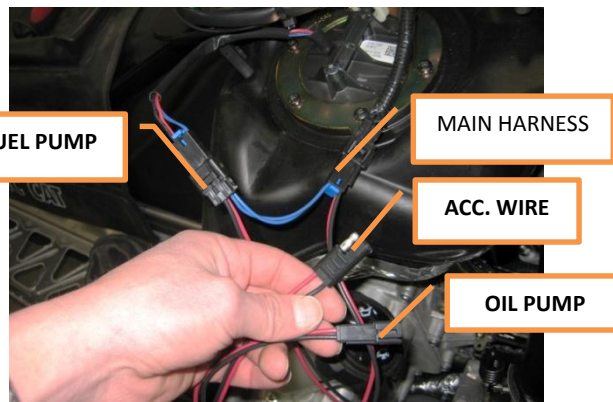


connect this fuel line from the brass "T" fitting to the 5/16 brass 45 degree fitting coming out of the CPC reed- block fuel rail and secure fuel line with provided clamps. Then measure 3 to 4 inches down from the fitting where the fuel line comes out of the 90 degree white plastic connector coming out of the fuel pump access cover and cut the factory EFI fuel hose and install another 5/15 X 5/16 X 5/16 brass "T" fitting. In the center of this brass "T" fitting, run a piece of the CPC provided 5/16 EFI fuel hose to feed fuel to the **side** of the CPC fuel pressure regulator. Run this hose from the "T", then around the back side of the circular horizontal steering support tube, then down across the top of the chain case, then attach it to the 90 degree fitting coming out of the side of the CPC fuel pressure regulator. Wire-tie this hose to prevent it from rubbing the recoil start rope.

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#12. From the CPC supplied parts, find the CPC wiring harness that has 4 electrical connectors and connect them into the following electrical connectors. The first connector connects the one end of the CPC wiring harness to the "2 way male" connector coming from the CPC oil pump. The second connects to the "female 4 wire" end coming out of the fuel tank. The third connector goes to the "4 way Male" main wiring harness (that was originally connected to the fuel pump) and the last connector goes to the "two-way flat" accessory plug outlet located by the chain case by the right hand foot toe-hold. The "two-way flat" connector location provides power from the "lighting coil" and is converted to DC power via the new AC to DC power kit that replaced the factory voltage regulator. This new location will provide enough amps to power the more powerful fuel 6.6 amp CPC high volume fuel pump.



#13. Now hook up the Attitude Industries EFI control box as per instructions provide by Attitude Industries. **For a complete set of tuning instructions, go to [www.tunewithattitude.com](http://www.tunewithattitude.com).** The Attitude box can be mounted on the provided CPC aluminum bracket as shown in the photo. The bracket is mounted by removing the two (2) existing T30 Torex screws and then mounting the bracket on the console in front of the steering post. Wire-tie the Attitude wires and boost hose to the vertical spare to prevent melting. **When wiring**



**up the Attitude EFI control box, you will need to locate a single red wire (or on some boxes a single blue wire) coming out of the wiring loom of the Attitude EFI control box that must be powered to a 12 power source. We suggest that you connect this wire to a 12 volt DC source coming out of the AC to DC power kit down by the bottom right hand side lower steering post location. This is accomplished by crimping on the provided female connector from the supplied parts, and then disconnecting the dummy connector from the DC power kit and then plugging the single wire into the 12 volt source into the male terminal of this two way flat connector at this junction. If this wire is not powered, you will run lean and damage your engine and not be able to fire the additional injectors. Before hooking up the Attitude black male connectors to the factory gray connectors, make sure that the green wire with a red tracer and the yellow wire with a red tracer coming out of the Arctic Cat wiring harness go to the red wire in each of the Attitude black male connectors or the ENGINE WILL NOT START. If the polarity is not correct you must perform the following procedure. Take a pick or very small screwdriver and gently pry the white connector cover off each factory gray connector. Then under the white cover you will need to pull out on the small gray plastic tab at the top of each metal terminal while at the same time pulling on the wires to remove them out the bottom of the gray connector. Then switch positions with wires in order to get the correct wire to line up with the correct color (ie green or yellow wires**

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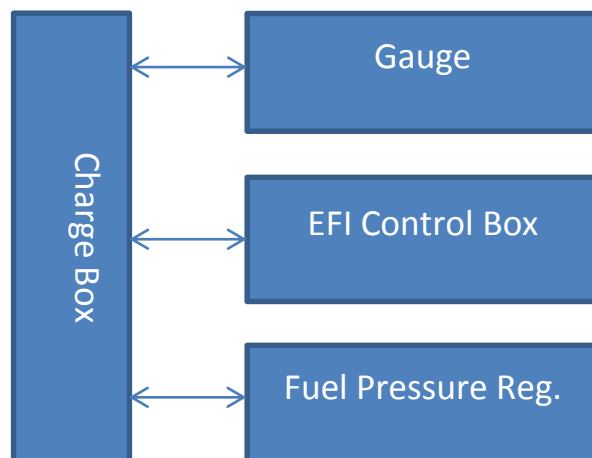
with a red tracer go to the red wire in the black Attitude male connector). Push the wire into the bottom of each connector until it clicks in place, then push the white cap on each connector. We require that you zip tie each black connector to each gray connector after snapping them together to prevent them from vibrating apart.

**NOTE: For Stage II & III , use the following settings, G 1 , Y 2, R 3, GB 3 , RB 5. These are just starting points and you will need to adjust these settings as each user will be starting at a different altitude and different outside temperatures.**

#14. Install the CPC boost gauge bracket. It can be installed either in front or behind steering post using a T30 Torex screwdriver to tighten and loosen the OEM bolts. Then install the gauge into the bracket and plumb 1/8 hose to the charge box. We also have in stock an optional two gauge stainless steel bracket if you want to install more gauges as well as custom brackets for EGT gauges. We also manufacture a complete digital gauge that includes digital boost, fuel pressure, oil pressure, tachometer, 4 thermocouple sensors, AFR (air fuel ratio), playback and record and more. Go to [www.cpcracing.com](http://www.cpcracing.com) and click on CPC Redline gauge.



#15. Next you will find 3 (three) 1/8 inch brass hose barbs screwed into the right hand top of the charge box. Using the CPC supplied 1/8 inch black vacuum hose, plumb the vacuum hoses from the boost gauge to the charge box. Next plumb a hose from the 1/8 inch hose barb coming from the CPC fuel pressure regulator to the charge box hose barb. **The 3<sup>rd</sup> hose barb on the charge box is used for boost pickup from the Attitude Industries EFI control box boost pressure hose.** Wire-tie all boost reference hoses to prevent melting or abrasion that would damage the hoses.

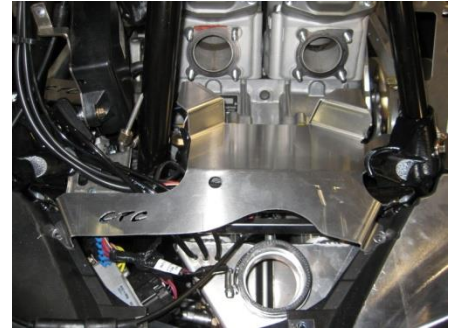


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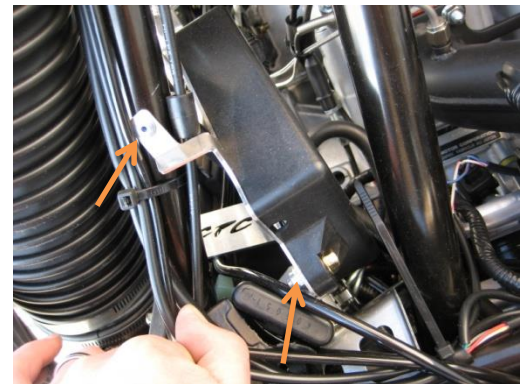
#16. Using a 12mm wrench and socket, remove the 8 bolts holding the "Y" pipe on to the cylinders. If you are using an EGT gauge, this is a perfect time to drill the "Y" pipe and weld on the EGT fittings. The CPC heat shield can now be installed by reinstalling the 2 screws that were removed from the factory heat shield in instruction #4 and by the bolt the holds the rectangle aluminum side support to the bulkhead. Then reinstall "Y" pipe. Next, using your fingers, bend the shield so that it does not touch the injectors or "Y" pipe.



#17. Next you will find from the CPC provided parts a toggle switch that will be installed into the fuel tank cover by drilling a 31/64 (.484) hole in the fuel tank cover console 2 inches directly below the left hand console mounting bolt location and a 1/2 inch to the left as viewed from sitting on the snowmobile. Then route the end harness down to the yellow engine coolant temp sensor connector which is located directly behind the chain case and slightly below the jackshaft and plug the switch harness in series with the male and female yellow connector. Then zip tie the harness so that it will not touch the jackshaft. **Make sure the switch is turned to the ON position when operating your snowmobile.** After mounting you can replace the fuel tank cover console by securing them with the 2 screws and a T-30 screwdriver that you removed in step #2.



#18. You can now mount the stainless steel ECU mounting bracket. This is done by using a 10mm wrench and socket and removing the 2 bolts and nuts where the rectangle aluminum bar meets the left front black painted triangular suspension support (see photo). Line up the bracket and holes and re-install the bolts and nuts to secure the ECU bracket. Then from the CPC supplied parts, install the 3/16 rivet to the top support bracket to line up with the existing hole in the spar tubing. Then using the original bolts that mounted the ECU with the CPC supplied nuts, secure the ECU to the bracket.



#19. Unbox the turbo. Inside the box you will find the oil drain gasket and inlet flange gasket; set them aside. The procedure to mount the turbo to the hanger bracket must be performed in the exact order. 1<sup>st</sup>, from the CPC supplied parts find two male water fittings and install them into opposite sides of the turbo. 2<sup>nd</sup>, remove the steel turbine housing rings that secure the turbine housing to the center section and discard



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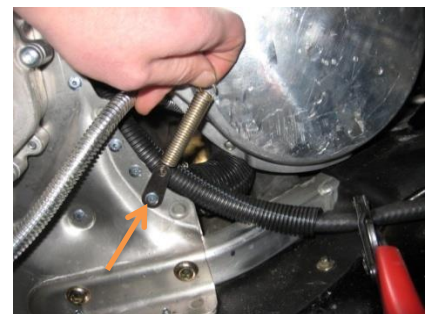
them. Next find the stainless steel turbine housing ring and clock it so that it is located at the top of the turbo. 3<sup>rd</sup>, mount the turbo onto the stainless steel turbo hanger bracket. At this point, leave all the bolts slight loose. 4<sup>th</sup>, mount the CPC oil drain fitting and gasket with two of the supplied Allen head bolts. 5<sup>th</sup>, you can install three rubber grommets into the oil tank then temporarily mount the oil tank to the turbo hanger bracket. The center section of the turbo must be clocked correctly so that the oil drain lines up with the oil drain nipple welded to the oil tank with the 1.5 inch blue hose between both fittings. Next tighten a few of the turbine housing bolts to secure turbo to the hanger bracket. 6<sup>th</sup>, remove the oil tank and tighten all 6 turbine housing bolts. 7<sup>th</sup>, permantly mount the oil tank onto the hanger bracket. 8<sup>th</sup>, mount the waste gate actuator to the hanger bracket. The waste- gate actuator rod must now be adjusted by holding the flapper valve closed and at the same time screw the actuator rod in or out as needed in order for the rod to slip over the pin on the waste-gate flapper valve lever. When the rod is adjusted correctly, it should have ½ turn preload tight to hold the valve closed with a very slight spring tension on it. 9<sup>th</sup>, mount the oil pump onto the hanger bracket and connect the 3.5 inch hose from the bottom of the oil pump to the bottom of the oil tank. Next connect the 17inch hose with the brass fitting to be screwed into the top of the center section of the turbo to the top of the oil pump, then attach all hose ends with hose clamps. The compressor housing bolts should be left loose to clock the aluminum housing later in the instructions.



#20. From the CPC supplied parts, using a 10mm wrench, attach the muffler to the turbo assembly. Make sure you use a small amount of never seize lube on all 5 of the 8mm X 16mm flanged bolts. Never seize will prevent the bolts from seizing and aid disassembly if ever needed. Torque all bolts to approximately 25 ft lbs. Before mounting the hanger bracket/turbo assembly, remove the 3 stock rubber grommets from the stock muffler and install them on the turbo hanger bracket.



#21. Using the adjacent photo as a guide, drill out the bottom rivet on the bulkhead and using the supplied rivet, attach the stainless steel spring tab to the bulkhead. This spring tab along with the long spring that originally held the factory muffler on will be used as a mount, to help secure the hanger bracket/turbo assembly.



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#22. The next step is to attach the coolant hoses to cool the turbo. The procedure is to take the original factory coolant hoses that were disconnected from the throttle bodies in instruction #8 and take the hose that has a 90 degree bend in the rubber end; then from the supplied CPC hardware parts, take a hose clamp and attach the 90 degree female water fitting to the 90 degree rubber hose end. This hose will now be connected to the male water fitting on the center cartridge of the turbo that is closest to the recoil starter. Tighten with a 9/16 or 14mm wrench.



The other straight factory coolant hose, must be extended with a preassembled 5/16 id X 13 inch long hose that has a brass coupler and 90 female water fitting attached to it. Using an Otiker pinch clamp, attach the 13 inch long extender hose to the straight factory hose end. Now route the hose in from the front of the engine, then towards the turbo, then under the turbo and wrap it upwards and attach the female water fitting end with a 9/16 end wrench to the outside male water fitting closest to the right hand side pod (See photo).

#23. Now bolt the "S" shaped exhaust stinger extender to the turbo with the following hardware: (4) 8m X 25m bolts, (4) lock washers and (4) 8m nuts making sure to install a gasket between the turbine exhaust housing and the exhaust flange on the "S" shaped stinger extender. **Do not tighten these bolts at this time.** Wait until the exhaust pipe and springs are installed at a later time in order to get a proper alignment. At this point, it is a good idea to temporarily put a shop rag down the exhaust flange to prevent any foreign material from entering the turbo.

#24. The turbo assembly can now be mounted to the chassis by hanging the stainless steel turbo hanger bracket over the rectangle aluminum tubing just like the original muffler was attached. Then using a long spring hook tool and using the long spring that originally held the muffler on; attach the spring from the spring tab that was installed in instruction #20, to the turbo hanger bracket. The spring must be installed before installing the exhaust pipe. The charge tube can now be installed by sliding the 2.5 inch i.d. X 3 inch long straight black rubber silicon coupler over the charge box nipple and a 2.5 X 2 inch silicon coupler over the turbo compressor end nipple. Clock the compressor housing as needed to line up the housing with the charge tube. Now tighten all bolts securing the compressor housing to the center section of the turbo. Secure all hoses and tubes with CPC provided hose clamps.





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#25. The exhaust pipe can now be installed. Using the 6 CPC provided heavy duty black CPC Turbo Springs, attach 4 of the springs from the exhaust pipe to the "Y" pipe. Use the other 2 springs to attach the exhaust pipe to the "S" stinger extender. Then using one of the stock springs, attach the spring from the chassis to the bottom of the exhaust pipe next to the drive clutch location. At this point with a 13mm end wrench and socket wrench, you can tighten the 4 bolts and nuts holding the "S" shaped stinger extender to the exhaust turbine housing of the turbo. **NOTE: In order to get perfect alignment between the factory exhaust outlet and the "S" pipe, you will need to flex the turbo hanger bracket/turbo assembly and then tighten the bolts and nuts.**

#26. The next step is to use some Teflon tape and wrap the threads of the brass barb that is provided in the Hallman boost controller box, and then tighten this brass barb into the aluminum fitting in the charge tube. The boost controller will get mounted to the CPC fuel pressure regulator aluminum bracket (see photo). The straight hose coming out of the boost controller goes to the brass fitting in the charge tube and the hose coming at a 90 degree angle out of the boost controller goes to the waste gate actuator. Route the vacuum hoses where they will not get melted by the turbo and in an area that is out of the way. If you zip tie them in place, make sure you do not pinch the hoses.

#27. Now route the 45 inch vent hose that is attached to the oil tank towards the recoil starter, then route hose backwards, then route the hose along the edge of the aluminum rectangle steering tube. Then loop the hose around the top end of the rectangle aluminum tube where it meets the black painted forged steering crown and top of fuel tank meet. Let the open end of the hose hang downward in a location that is out of the way and zip tie the hose loosely to the rectangle aluminum tube.

#28. You will need to purchase a quart of Mobile 1 synthetic 5w-30 or 0w-30 motor oil and pour 16 ounces of oil into the oil tank. Next temporarily hook a 12 volt battery to the positive red lead of the oil pump and the negative to the black wire. This can be accomplished by using a paper clip pushed into the black electrical connector to make contact with the small contacts. Let it run for a minute to purge any air bubbles out of the line as well as a test to see if the pump works and if the oil is pumping oil into the top of the turbo and out the bottom of the oil tank. **Now you can permanently plug the oil pump connector into the CPC wiring harness.** Recheck oil after oil lines are purged.



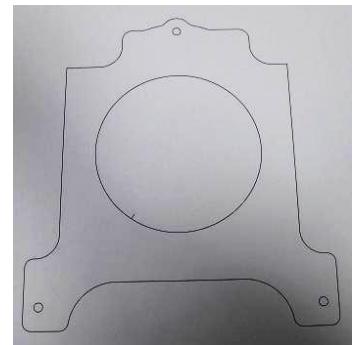
#29. The 4 inch X 3 inch cold air intake rubber elbow can now be attached to the turbo air inlet. Attach one side of the rubber elbow to the turbo and secure by using a provided large hose clamp, loosely position the hose clamp to allow the rubber elbow to be rotated as needed to make a good fit. Next install the other side of the rubber elbow to the 4 inch X 1.5 inch metal coupler. Attach another large hose clamp at this location. Then attach the 4 inch flexible air duct to the metal coupler with another large hose clamp. The flexible air duct must be pushed up through the 4 inch hole in the black plastic cold air plenum after the hood is installed.



Next, take a drill with a 1/2 inch drill bit and drill a hole in the bottom of the 4" X 3" rubber elbow to allow water to drain out. The hole is located in the rubber hose at the lowest point in the hose, close to the inlet of the turbo charger (see photo with arrow). **If this step is not performed, water could puddle and freeze, turning to ice and damage the compressor wheel of the turbo.** The final step is to Velcro the heat shield around the 4 inch flexible cold air tube to prevent it from being melted from the exhaust.

#30. With the hood removed from the snowmobile, the entire stock air duct/plenum can be removed by first using a #T20 Torex screwdriver and remove the 4 screws (2 on the right and 2 on left) that hold the painted colored panel on. Each colored panel is hinged onto the front of the black polyethylene hood structure. Then with the hood upside down, remove the 14 screws that secure the factory air plenum (which will not be re-used) to the polyethylene hood structure. Now remove the headlight cover from the headlight assembly by grabbing the side clips and flexing them to release the hooks that attach to the headlight. Next, using a #T30 Torex, loosen the 2 outer screws and remove the 2 front screws securing the headlight on the polyethylene hood structure and set it aside. Remove the rubber coated band that holds the headlight wiring harness on the front 2 headlight screws as this band is too restrictive and will not allow the headlight wiring harness to be stretched upon reassembly.

#31. Next using the CPC provided paper template, mark the center of the 4 inch hole to be drilled into the polyethylene hood structure in preparation of the external 4 inch additional air intake. This additional 4 inch air intake is to provide additional air in deep snow riding areas. Snow can plug off the smaller factory air inlet vents. Be aware that using the additional 4 inch air intake, you will no longer be able to use the optional factory goggle holder location in front of the handlebars. Using a 4 inch key hole saw, cut a 4 inch hole in the polyethylene hood structure. Using only 1 of the 8 CPC provided 5mm X 16mm SHCS (Allen) screws and 5mm nylock nuts; attach the front mount only of the 4 inch air intake by bolting it to the poly hood structure. **Apply a generous amount of RTV silicone rubber sealant to the underside of poly hood structure gluing the nut to the hood structure. The silicon will prevent any loose hardware from falling into the cold air duct and damaging the turbo if it were ever to come loose.**

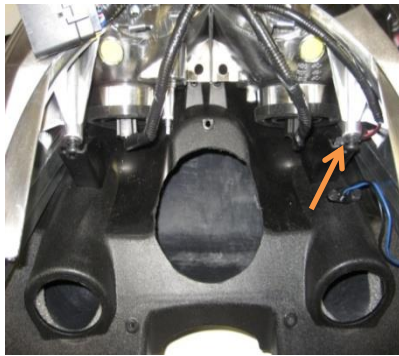


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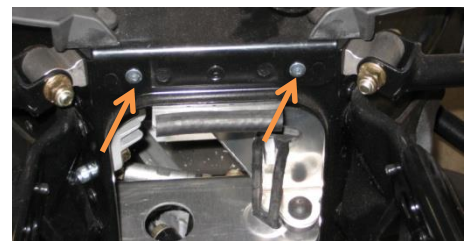
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Then using the remaining 7 screws and nylock nuts, secure the CPC lightweight turbo plenum to the inside of the poly hood structure with an 8mm end wrench and a 4mm Allen wrench. It is optional if you want to put a bead of RTV silicone around the outside perimeter or between the CPC turbo plenum and the poly hood structure. Next install the head light onto the poly hood structure by securing it with the original factory screws. Next stretch the factory headlight harness (**the rubber coated retaining band must be removed**) and slide the large main head light electrical connector on to the metal retaining clip that is pop-riveted to the CPC 4 inch additional air intake(see photo). This metal clip holds the wiring harness in place to make it easier to connect and disconnect the main electrical wiring harness to the head light wiring harness. Then attach the headlight cover on to the headlight and the colored side panels back onto the hood in reverse order.



#32. From the CPC supplied parts, find the aluminum hood retaining bracket and 2 (two) 3/16 pop rivets and attach the hood retaining bracket to the front of the chassis as shown in the photo.



#33. Install the CPC clutch kit with our adjustable cam arms. Follow directions on cam arm instructions to fine tune RPM's to 8050 to 8250.

#34. Take a few minutes at this point to review the instructions and to check to see if all kit installations have been performed correctly. Zip tie any and all hoses. Now cover any electrical wires or hoses with aluminum heat tape that might get melted or damaged. The Attitude Industries EFI box has been delivered with a special program that has been tuned for the CPC turbo kit. Since there is no fuel in the system, it may take 15 or 20 pulls to get the



engine started. After pulling the rope several times, check the fuel pressure as it should pump up to 15 to 20 pounds. As soon as the engine starts, you must hurry and **re-set the fuel pressure to 35 psi at a high idle (2500 to 3000 rpms)**. If higher fuel pressure is used, you will enrich the fuel mixture from an idle to 1/4 throttle. If less fuel pressure is used, it will lean the idle-1/8 throttle. If you experience low end throttle response, and you have tried to adjust the Attitude efi control box with little success; then re-adjust the fuel pressure which is adjusted by using a 9/16 end wrench and loosening the jam nut on the fuel pressure regulator and by using a small 3/16 Allen wrench. Adjusting the screw in will increase fuel pressure and screwing it out will decrease pressure. **Fuel pressure may be adjusted as low as 32 lbs and as high as 40 lbs depending on elevation.**

**Attitude EFI Controller Tuning Tips:** The Green light controls fuel from 1/8 to 3/8 throttle position. It tunes just like a pilot jet on a carburetor and affects the lower rpm fuel settings. The Yellow light controls ¼ to ½ throttle position and it tunes just like a needle on a carburetor and it affects the midrange fuel settings. The red light controls ¾ to full throttle position and tunes like changing the main jet on a carburetor. The green/blue light controls the amount of fuel per pound of boost. This is the major tuning mode and it will add fuel anytime that you are making boost. This adjustment should be made after you have adjusted your fuel pressure as indicated in instruction #34. On all of the above modes, you can add fuel by changing to a high number of lights and remove fuel by lowering the number of lights. The Red/blue light does not add or subtract fuel, but it controls "when" the red (main jet) comes in. Lower in the number of lights make the main jet fuel come in sooner (at a lower RPM) and adjusting this mode to a higher light number delays "when" the red or main jet kicks in at a higher RPM.

**Clutch Adjustment:** On 2012-13 high output (H. O.) models; run engine at 8050 to 8250 RPM's.

**Compression:** If you ride below 9500 feet altitude, we recommend that you change compression ratios by machining or replacing your head! CPC also offers a Turbo billet head.

**Gearing:** 2012-13 Pro Climb models come with a 21/49 gears. We require changing from a 13 link wide gear and chain to a stronger 15 link wide. Gear ratios may need to be changed according to rider weight, altitude, and snow conditions. Gearing is a personal choice.

**EGT Gauges:** We do recommend monitoring temperatures to aid in tuning and for protection against piston seizures. Place EGT probes 2 inches down from where the cylinder and "Y" pipe meet. When using our CPC Redline gauge, make sure the power to feed the gauge is wired into the red positive wire that originally feed the factory fuel pump. Also use the Blue colored "RPM 1" wire to monitor engine RPM's. This wire should be connected to the Purple colored wire that feeds pulse information to the factory speedometer. The best place to hook into this circuit is at the location where the hood harness connector meets the main wiring harness connector in front of the handlebars.

**Disclaimer:** This kit does not meet EPA emission requirements and is designed and intended for closed course competition use only! Updated 8/31/12

